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Cross-linguistic influences in the phonetic and lexical component in English, Basque and Spanish: Contextual and individual factors in language acquisition and attrition

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All errors and omissions are, of course, my own.

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LIST OF ABBREVIATIONS AND ACRONYMS

AO = Age of onset

AOA = Age of arrival

AOL = Age of learning

CCLI = Competence cross-linguistic influence

CLI = Cross-linguistic influence

CLIL = Content and language integrated learning

CP = Critical period

CPA = Strength of concern for pronunciation accuracy

CPA.B = Strength of concern for pronunciation accuracy in Basque

CPA.E = Strength of concern for pronunciation accuracy in English

CPA.S = Strength of concern for pronunciation accuracy in Spanish

CPH = Critical period hypothesis

DA = Degree of language activation

DA.B = Degree of activation of Basque

DA.E = Degree of activation of English

DA.S = Degree of activation of Spanish

DC = Degree of comprehensibility

DC.B = Degree of comprehensibility in Basque

DC.BB = Degree of comprehensibility in Basque as rated by the Spanish/Basque balanced bilingual judges

DC.BD = Degree of comprehensibility in Basque as rated by the Basque-dominant judges

DC.E = Degree of comprehensibility in English

DC.MS = Degree of comprehensibility in Spanish as rated by the monolingual Spanish judges

DC.S = Degree of comprehensibility in Spanish

DC.SB = Degree of comprehensibility in Spanish as rated by the Spanish/Basque balanced bilingual judges

DFA = Degree of foreign accent

DI = Degree of identification

DI.B = Degree of identification with the Basque community

DI.E = Degree of identification with the American community

DI.S = Degree of identification with the Spanish community

DN = Degree of nativeness

DN.B = Degree of nativeness in Basque

DN.BB = Degree of nativeness in Basque as rated by the Spanish/Basque balanced bilingual judges

DN.BD = Degree of nativeness as rated by the Basque-dominant judges

DN.E = Degree of nativeness in English

DN.MS = Degree of nativeness as rated by the monolingual Spanish judges

DN.S = Degree of nativeness in Spanish

DN.SB = Degree of nativeness in Spanish as rated by the Spanish/Basque balanced bilingual judges

EFL = English as a foreign language

ESL = English as a second language

FL = Foreign language

GJT = Grammaticality judgement test

IH = Impediment hypothesis

L1 = First language

L2 = Second language

L3 = Third language

L4 = Fourth language

LOR = Length of residence

LTM = Long-term memory

M = Motivation

M.B = Motivation in Basque

M.E = Motivation in English

M.S = Motivation in Spanish

NL = Native language

NNS = Non-native speaker

NS = Native speaker

PAM = Perceptual assimilation model

PCLI = Performance cross-linguistic influence

PLI = Primary language acquisition

SDH = Separate developmental hypothesis

SLA = Second/secondary language acquisition

SLM = Speech learning model

STM = Short-term memory

TL = Target language

VOT = Voice onset time

WTC = Willingness to communicate

1 Introduction

The topics that motivate this dissertation are three of the biggest linguistic issues concerning the lexicon and the phonological inventory of learners in bilingual/multilingual situations, namely L3 acquisition by native bilingual speakers (see Cenoz *et al*., 2001; Cenoz *et al.*, 2003a; De Angelis & Selinker, 2001; Gibson & Hufeisen, 2003; Hufeisen & Fouser, 2005; Pavlenko, 2009), L1 attrition (Seliger & Vago, 1991a; Ventureyra & Pallier, 2004; Yoshitomi, 1992) and multilingualism (see Gallardo, 2007; Lanza, 1992, 2007; Lasagabaster & Huguet, 2007; Leather, 2003). Another motivation for this study is to investigate whether late second language (L2) learners can achieve native-like pronunciation in the L2 and, if so, which requirements the particular learner has to meet in order to be indistinguishable from native speakers of the L2 in question (e.g. Birdsong, 2007; Bongaerts, 1999; Bongaerts *et al*., 1995; Bongaerts *et al*., 1997; Ioup, 1995; Ioup *et al*., 1994). Finally, we also want to find out which variables have the greatest influence on learners' degree of foreign accent (DFA) in the target language in a natural setting (e.g. Derwing *et al*., 2004; Munro & Derwing, 1999; Munro & Mann, 2005).

There is evidence that the phonological and lexical systems of the different languages interact, hence the phenomenon called *transfer* (see Dechert, 2006; Odlin, 2005), which usually refers to the influence of the lexical and/or phonological system of the native language (NL) on the lexical and/or phonological system of the L2. However, there is evidence that the influences between the phonological and lexical systems of the learners' different languages are not only from the NL(s) on the L2(s)/foreign language (FL(s)), but also from L2(s)/FL(s) on the NL(s). The latter usually results in the alteration of the phonological and lexical systems of the NL(s) in a phenomenon called *phonological* and *lexical attrition*, respectively.

In this sense, phonological attrition in the NL(s) refers to the alterations or loss of phonological features in the NL(s) due to the influence of an L2 or FL; henceforth, we will use the term L2 to refer to both L2 and FL (see section 2.1 for definitions of these concepts)

that is, there are features corresponding to the L2 which are transferred into the NL of the speakers, who are usually unaware of the fact that those L2 features do not actually correspond to their NL. In the case of lexical attrition, it refers to the use of calques or other kinds of lexical items stemming from the L2 and which are usually phonologically and morphologically adapted to the NL norms. These lexical items are used by the L2 learners usually without realizing that they do not exist in the NL.

There are only a few studies on the attrition of the phonological system of the NL because of the influence of an L2 (e.g. De Bot *et al*., 1991; Köpke, 2001, 2002; Major, 1992; Seliger & Vago, 1991a; Yoshitomi, 1992), but, to the best of our knowledge, there is none on the phonological attrition of Basque because of the influence of English. Likewise, there are very few studies on the lexical attrition of the NL because of the influence of an L2 (e.g. Cook, 2003), but none on the attrition of the lexical system of Basque because of the influence of English. These are two of the main research areas in our study, namely the investigation of the influence of the phonological system of an L2 (English) on the phonological systems of the NLs (Spanish and Basque), as well as the investigation of the influence of the lexical system of an L2 on the lexical systems of the NLs (Spanish and Basque).

Another domain which needs to be further investigated is that of multilingualism (Cenoz *et al*., 2003a; 2003b; De Angelis & Selinker, 2001). In this sense, Cenoz *et al.*, (2003b) claimed that even if bilingualism may have a lot in common with multilingualism, research on the acquisition and processing of two languages cannot explain the specific processes resulting from the interaction between the languages that may result from the simultaneous presence of more than two languages in the multilingual speaker's mind (e.g. Cenoz, 2000a, 2000b, 2001, 2003a; De Angelis & Selinker, 2001; Dewaele, 2010; Hammarberg, 2001, 2010; Ringbom, 2001, 2005; Williams & Hammarberg, 1998).

Therefore, the three main topics we are going to focus on in the present study are: L3 acquisition, L1 attrition and multilingualism. We considered that it was necessary to further explore these three phenomena in the area of applied linguistics and, more

importantly, in a natural setting for L3 acquisition; that is, where the L3 (English) is the language of common use. Moreover, this study intends to help to explain the existing interactions between L3 acquisition, L1 attrition and multilingualism.

These research aims led us to conduct the experimental work for this study in both Reno (Nevada) and Boise (Idaho) in the United States, where we would be able to find speakers whose NLs were both Spanish and Basque and who would have learned English (their L3) in a natural setting; that is, they would have been receiving native L3 input in an English-speaking country. We would also be able to find speakers in a multilingual situation; that is, speakers who would have been exposed to three different languages: English, Spanish and Basque from an early age.

We divided the variables analyzed for the present study into three different groups: the first group corresponded to biographical factors, namely age of arrival (AOA), gender (male versus female) and education level (university versus non-university studies). The second group consisted of affective factors, more particularly, degree of identification with the community (DI), motivation (M) and strength of concern for pronunciation accuracy (CPA). Finally, the third group included those factors related to input: length of residence (LOR) and degree of language activation (DA), which was subdivided into two: percentage use and location of residence (Reno versus Boise). There are variables such as AOA, which could have also been included in the group of factors related to input; however, we decided to include it in the first group because, in the first place, participants' AOA determined an important part of their biography and, in the second place, in order to have three equally distributed groups of factors.

In the following sections, we will first present the theoretical background where we include a revision of some concepts related to language acquisition and attrition. The following section will review the existing theoretical background about bilingual systems as well as about multilingual systems followed by a section presenting all the factors in language acquisition and attrition we considered for the present study. Then, we will present the field work conducted for the present study as well as the research questions we

entertained. After that, we will detail the research procedures we followed and the section of results for each of the research questions. Finally, we will discuss the results and extract the corresponding conclusions.

2 Section A. Theoretical background

This study falls within the psycholinguistic studies on the forms and possible mutual influences of the phonological and lexical systems in bilingual/multilingual speakers. In this section, we are going to review the theoretical background that is relevant for the present study; we will start by revising the concepts related to language acquisition and attrition.

2.1 Concepts in language acquisition and attrition

In today's multilingual society it is more and more frequent to find ourselves in situations of languages in contact; hence, the great deal of research that has been devoted to the study of bilingual, as well as multilingual acquisition in recent decades (e.g. Albareda-Castellot, *et al*., 2011; Aronin & Singleton, 2008; Bialystok, 1991, 1994, 2001; Bialystok *et al*., 2003; Dupoux, *et al*., 2010; Genesee, 1989, 2001; Genesee *et al*., 1995; Jared & Kroll, 2001; Kroll & Sunderman, 2003; Sebastián-Gallés, 2010; Sebastián-Gallés & Bosch, 2009; Sebastián-Gallés, *et al*., 2005). Some multilingual speakers may have two NLs, that is, two languages acquired from birth and other L2s or FLs. The concept *second language* (L2) usually refers to those languages acquired after the first language (L1), irrespective of whether the subject has one or more than one NL. The concept FLs refers to those languages which are learned in a country or community where this language is not the language of common use among the population (e.g. Bongaerts *et al*., 1997; García Lecumberri & Gallardo, 2003), whereas the concept *target language* (TL) refers to the language the learner is trying to acquire, irrespective of whether it is a FL or not.

In this section we are going to focus mainly on three concepts: bilingualism, transfer and attrition and the various classifications of those concepts put forward by different researchers.

A frequent division in the literature is that between native and non-native speakers/listeners. In this respect, García Lecumberri *et al*., (2010) suggested that the term L2 applies to languages learned after the L1 is fully established; and those languages (L2s) are in widespread use in the community where the speaker (learner) is located at the time of acquisition, as it is the case for many immigrants. In contrast, they stated that an FL is not widely present in the speaker's environment, even if contact with it through the media or other sources, is frequent. In addition to this, an FL is typically learned through formal instruction and lacks the massive, natural and native input which characterizes L2 acquisition in a natural setting (e.g. Ellis & Laporte, 1997; Larson-Hall, 2008; Muñoz, 2008).

It has also been claimed that it is this difference in the quality and quantity in input what makes the distinction between a formal and a natural setting relevant for studies of L2 acquisition (e.g. Flege & Liu, 2001; Flege *et al*., 1997a; Purcell & Suter, 1980).

As for the term *bilingualism*, one of the earliest definitions of the concept was provided by Bloomfield (1933), who defined it in the following terms:

> "In the cases where this perfect foreign-language learning is not accompanied by loss of the native language, it results in "bilingualism", native-like control of two languages. After early childhood few people have enough muscular and nervous freedom or enough opportunity and leisure to reach perfection in a foreign language: yet bilingualism of this kind is commoner than one might suppose, both in cases like those of our immigrants and as a result of travel, foreign study, or similar association. Of course, one cannot define a degree of perfection at which a good foreign speaker becomes a bilingual, the distinction is relative" (Bloomfield, 1933: 55-56).

This definition of *bilingualism* as provided by Bloomfield (1933) was very strict since it considered *bilingualism* to be "native-like control of two languages", but it was also contradictory because it further stated that "one cannot define a degree of perfection at which a good foreign speaker becomes a bilingual, the distinction is relative". This definition does not really make clear the concept of bilingualism, since it does not encapsulate the main features characterizing the concept such as frequency of use, degree

of command of different linguistic aspects, etc. Thus, we considered that this definition of *bilingualism* needed some revision.

Weinreich (1968: 1) defined the concept of *bilingualism* in the following way: "the practice of alternatively using two languages will be called bilingualism, and the person involved bilingual". We considered this a very vague definition of the concept since Weinreich did not mention anything about the degree of competence required in the languages of the bilingual or about the frequency of use of his/her two languages. Likewise, it is not clear what exactly he refers to when he states that *bilingualism* is "the practice of *alternatively* using two languages (my emphasis)" and, therefore, we should consider this definition inaccurate and lacking rigour.

Another researcher who provided a definition of the term *bilingualism* was Mackey (1970: 555), who defined the concept in the following terms:

> "It seems obvious that if we are to study the phenomenon of bilingualism we are forced to consider it as something entirely relative. We must moreover include the use not only of two languages, but of any number of languages. We shall therefore consider bilingualism as the alternate use of two or more languages by the same individual" (Mackey, 1970: 555).

In his definition of the term, Mackey (1970) included an idea which had already been suggested by Weinreich (1968), namely the concept of the alternate use of two languages; that is, the frequent use of two different languages. However, Mackey (1970) introduced the idea of "two or more languages" in his definition. Likewise, Lamendella (1977) referred to the phenomenon of *secondary language acquisition* (SLA), and also suggested that "SLA may encompass two, three, or more languages learned simultaneously or in succession" (Lamendella, 1977: 181). It is remarkable the fact that as early as 1970 the idea of *bilingualism* as denoting two or more languages had already been suggested, since it shows the growing importance of L2 acquisition and the need of research in this area.

In contrast, Cenoz *et al*., (2003b:1-2) claimed that the word *bilingualism* which includes the Latin prefix "bi" (two), is not appropriate to refer to two or more languages. In this case, they suggested that the term *multilingualism* does encompass not only *bilingualism*, but also additional languages, three, four or more, and is the most appropriate cover term for phenomena involving more than one language. Actually, it is worth taking into account this claim since it has been shown that the L2 can have (and indeed usually has) a different kind of influence from the one the L1 has on the acquisition of an L3 (e.g. Cenoz, 2001; Cenoz, 2003a; Hammarberg, 2001; Ringbom, 2001; Williams & Hammarberg, 1998). We will further explore this issue in section 2.3.

Returning to the concept of *bilingualism*, Weinreich (1953: 9-11) discussed three types of bilingualism depending on the ways in which it was thought that the concepts of the language were encoded in the individual brain: *coordinate*, *compound* and *sub-coordinate* (see also Woutersen *et al*., 1994). He further claimed that these differences seemed to result from the way in which the languages had been learned.

In coordinate bilingualism, the person learns the languages in separate environments, and the words of the two languages are kept separate with each word having its specific meaning; for instance a person whose first language is English, who then learned French in school. It was believed that, because the two languages were associated with two different contexts, two different contextual systems would be developed and maintained for the two languages. In contrast, in compound bilingualism, the person learns the two languages in the same context, so that there is a fused representation of the languages in the brain. For example, a child who acquired both French and German at home would know both German *buch* and French *livre*, but would have one common meaning for them both, that is, the two words would be tied to the same mental representation. In the case of the compound bilingual, the languages are interdependent, whereas for the coordinate bilingual they are independent. Finally, the third type of bilingualism Weinreich (1953) distinguished was the *sub-coordinate* bilingualism, which he considered a sub-type of coordinate bilingualism. In sub-coordinate bilingualism, the

person interprets words of his/her weaker language through the words of the stronger language, that is, the dominant language acts as a filter for the other.

According to Weinreich (1953), the compound bilingual would have one set of meanings and two linguistic systems tied to them, whereas the coordinate bilingual has two sets of meanings and two linguistic systems tied to them. Finally, the sub-coordinate bilingual has a primary set of meanings established through his/her first language, and another linguistic system attached to them.

We could summarize Weinreich's claim by stating that, according to him, a bilingual can develop one or two different linguistic systems depending on the particular circumstances of acquisition of his/her two languages. In fact, this is quite a convincing explanation as in the case of sub-coordinate bilingualism in which the speaker can face some delay in retrieving lexical items or other kinds of lexical retrieval problems in his/her weaker language. This would be due to the fact that his/her dominant language acts as a filter for the weaker one. Still, there is no consensus about how many different kinds of bilingualisms there may be or which and how the mechanisms underlying the different kinds of bilingualisms work (see also Romaine, 1989).

More recently, Montrul (2008:17) defined bilingualism in broad terms as "knowledge and command of two languages, albeit to different degrees". She claimed that two common parameters that distinguish bilingualism are (1) age of acquisition (early in childhood versus late after puberty), and (2) order or sequence of acquisition in childhood (two languages being acquired simultaneously versus one language being acquired successively, after the other). She further claimed that even though second language acquisition is treated as a separate field of study, it is a particular case of bilingualism: early (with children) or late (with post pubescent and adults) L2 acquisition. She also suggested that early bilingualism takes place before puberty and can be *simultaneous* or *sequential*.

On the one hand, *simultaneous bilingualism* occurs in early childhood before the linguistic foundations of the languages are in place. This has also been called *bilingual L1*

acquisition (e.g. Genesee, 2000) because the two languages develop together as first languages (L1s/NLs). On the other hand, Montrul (2008) claimed that *sequential bilingualism* occurs after the individual has acquired basic command of the first language, which for monolingual acquisition is typically considered to be roughly the age of 3-4. In this situation, it is considered that there is an L1 and an L2 sequentially ordered. Sequential bilingualism can take place early, during childhood; or late, in adulthood. Early sequential bilingualism is equivalent to child L2 acquisition in the L2 acquisition field. Early child L2 acquisition spans about two years and takes place between the ages of 4-6, whereas late child L2 acquisition spans the elementary school years, when children are receiving formal instruction in one or in the two languages. Finally, late sequential bilingualism is adult L2 acquisition. In this situation, the L1 has been fully acquired, and with the exception of vocabulary size which can increase or decrease depending on the domains of use throughout the lifespan, the L1 syntax and phonology are assumed to be stable throughout childhood.

Montrul (2008) offered a comprehensive account of the phenomenon of bilingualism. According to her description, as we have just stated, there are two basic parameters, namely age of acquisition and order of acquisition in childhood. These two parameters determine the kind of bilingualism of the speaker. To sum up, in *simultaneous bilingualism* the child learns both languages simultaneously before the linguistic foundations of his/her NL are in place. In *early sequential bilingualism*, the child learns the L2 once the linguistic foundations of his/her NL are in place; and finally, in *late sequential bilingualism*, the L2 is learned once the NL has been fully acquired. These different kinds of bilingualism appear to be fully independent of one another and we could infer that the mechanisms underlying each of them also differ, although this is still to be further investigated.

More recently, Grosjean (2010) stated that, in his writings, he has usually defined *bilinguals* as those individuals who use two or more languages (or dialects) in their everyday life, but he added that bilinguals are very diverse in their knowledge as well as in the use of their languages. Interestingly, he claimed that bilinguals find themselves in their

everyday lives at various points along the language mode continuum; that is, when they are communicating with monolinguals they restrict themselves to just one language and are therefore in a monolingual mode. At other times, they find themselves in a bilingual mode, that is, with other bilinguals who share to some extent their two languages, and with whom they can mix their two languages (e.g. Grosjean, 1997, 1998a, 1998b). He finally added that depending on such factors as their knowledge of the two languages, the person(s) being addressed, the situation, the topic, the function of the interaction, etc., they choose a base language. Then, according to various different momentary needs, they bring in the other language in the form of code-switches or borrowings.

García Lecumberri *et al*., (2010) suggested that there are frequent cases in the literature in which L2 and even FL speakers have been denoted *bilingual*. The term *bilingual* is sometimes used for those situations in which the two languages are acquired at the same time, even if the more exact denomination for this situation would be *simultaneous bilingualism*. They finally suggested that, in practice, most bilinguals have a dominant language (see Flege *et al.*, 2002), which may vary at different stages of their life and even at different moments of their daily life depending on contextual factors such as the topic of conversation or the interlocutors (see Grosjean, 2010).

A further distinction we should make is that between acquisition in a formal setting and acquisition in a natural setting. Acquisition in a formal setting is that in which the L2 learner receives explicit instruction about linguistic aspects of the L2 and the input the learner is exposed to is usually non-native. The studies carried out by the research group *LASLAB* analyzing the acquisition of English by bilingual speakers of Spanish and Basque fall within this category (e.g. Cenoz, 2003b, 2005; Cenoz & García Lecumberri, 1999a, 1999b; Cenoz & Valencia, 1994; Gallardo, 2007; García Lecumberri & Cenoz, 1997; García Lecumberri & Gallardo, 2003; García Mayo, 2003; García Mayo & García Lecumberri, 2003; Ruiz de Zarobe, 2005). However, in a natural setting the learner acquires the L2 in the country or community where this language is the language of common use and, as a result, the input the learner is exposed to is native and, therefore, its quality and quantity exceeds that found in formal settings (see Muñoz, 2008 for a thorough

account of the symmetries and asymmetries of L2 acquisition in naturalistic versus formal settings; see also Larson-Hall, 2008 for findings of modest effects for an early starting age in both grammatical and receptive phonological abilities in a formal instruction setting).

The above-mentioned characteristics of L2 learning in a natural setting make it far more interesting and challenging for research than L2 learning in a formal setting. In this sense, L2 learning research in a natural setting can be especially appealing in the case of immigrants because their linguistic situation (i.e. several languages in contact) can provide us with very interesting insights about the phonological (e.g. Baker, 1992; Baker & Trofimovich, 2005; Flege, 2002; Flege, 2007; Flege *et al*., 2003) as well as lexical interactions between their languages (see Faerch & Kasper, 1987a). Nevertheless, it is important to point out that research in a natural setting entails far more difficulties than research in a formal setting and this is something the researcher has to face at each stage of the field work.

As for the interactions between the languages of a speaker, researchers have traditionally focused on the influence of the NL on the L2 or FL. In fact, the concept *linguistic transfer* has been defined as "a psycholinguistic procedure by means of which L2 learners activate their L1/LN knowledge in developing or using their interlanguage" (i.e. their developing L2 system), (Faerch & Kasper, 1987b: 112) as well as "the incorporation of features of the L1 into the knowledge systems of the L2 the learner is trying to build" (Ellis, 1994:28). Referring particularly to transfer in comprehension and production, Ringbom (1992:87) defined the concept of *transfer* as "the influence of L1-based elements and L1-based procedures in understanding and producing L2 text". Thus, researchers have traditionally held the idea that whenever the NL and the L2 shared properties "positive transfer" would occur (Corder, 1978), whereas "negative transfer", also referred to as "interference" would happen whenever the NL and the L2 differed. In this sense, Faerch and Kasper (1987b) claimed that transfer should be characterized as a *process*; as a consequence, distinctions between "positive", "negative" and "neutral" transfer should be abandoned, since they are clearly product-related.

Concerning the conditions under which transfer occurs, Kellerman (1977) pointed out that transfer depends on cross-linguistic similarity, more particularly, on perceived similarity, which is the perception of the similarity between the L1 and the L2 by the individual learner. In contrast, assumed similarity occurs in production and, in this case, the L1 word or structure is merely assumed to exist also in the target language. In this sense, Ringbom (2006) claimed that it is perceived or assumed similarity what lies behind the concept of transfer, which, generally speaking, means a process whereby the learner makes use of linguistic resources other than their knowledge of the language in which communication takes place (see also Ringbom, 1992 for a full account of L1 transfer in L2 comprehension and L2 production). Faerch & Kasper (1987b) also dealt with the phenomenon of *transfer avoidance* (i.e. conscious lack of transfer) where they gathered the conditions which favour or disfavour transfer which they tagged as *linguistic* (i.e. typological differences), *psycholinguistic* (i.e. perceived language distance or psychotypology) and *socio-psychological* (i.e. taking into account the fact that transfer takes place in communicative interaction) criteria. Nowadays, the notion of "language transfer" has become widely known as "cross-linguistic influence" (CLI), that is, the effect that languages (two or more) may exert on each other regardless of their acquisition order (see also Faerch & Kasper, 1987a; Sharwood-Smith & Kellerman, 1986).

We have just seen that most researchers agree on the basic characteristics of the term *transfer* in their definitions. What is clear is that *transfer* is not only a process that cannot be neglected, but also that it is a process of crucial importance in L2 acquisition studies.

We should also point out that linguistic influence does not only work from the NL onto the L2, but it has been demonstrated that linguistic influences also work from the L2 onto the NL (e.g. De Bot *et al*., 1991; Major, 1992; Köpke, 2001, 2002). This phenomenon is known as "attrition" (e.g. Seliger & Vago, 1991a) or more specifically as *phonetic attrition*, when it deals with phonetic influence from the L2 onto the L1. In his study, Chang (2012) made a distinction between the terms *phonetic attrition* and *phonetic drift*. He claimed that "individuals undergoing attrition experience a decline in their L1

production as communication is accomplished increasingly in an L2, while individuals undergoing phonetic drift experience a change, but not necessarily a deterioration in their L1 production due to the accumulation of L2 experience" (p.18).

In his Speech Learning Model (SLM), Flege (1995) stated that as we have just seen, traditionally, the term *interference* has applied only to the influence of the NL on the production of the L2; however, he claimed that cross-language phonetic interference is bidirectional in nature. We could add that cross-linguistic interference is not only bidirectional when it comes to phonology, but that it may apply to all linguistic domains.

Seliger (1985:4) defined *linguistic attrition* as "erosion in the linguistic performance of a first or primary language". This is a very vague definition of the concept since it does not focus on any specific linguistic aspect, but still, we could claim that it encapsulates in a very concise way the three main ideas behind the concept at issue, namely "erosion", which refers to the concept of attrition itself, "linguistic performance" which refers to the actual ability of the individual to use the language, and ""first or primary language" which makes reference to the NL of the speaker, that is, the one that is undergoing attrition.

Herdina and Jessner (2000) defined *gradual language attrition* as the opposite process to language growth. In fact, this is a very interesting definition of the concept since it assumes that language attrition follows the opposite pattern to that of language growth. In this sense, language growth is assumed to be a natural process in the acquisition of language and, by their definition, these authors assumed that linguistic attrition also qualifies as a natural process, but in this case of decline (as opposed to growth), which can take place under certain circumstances.

Major (2001: 62) stated that he viewed "L1 language loss" as a change in the NL as the result of the influence of another language or languages". He further claimed that there is considerable evidence of language loss among immigrants who after a few years in the L2 environment visit their home country and are thought to sound a little different or even non-native. This is a very straightforward definition of the concept since it directly points to

the process of linguistic attrition which immigrants living in the L2 environment for an extended period of time may undergo. As a result of this linguistic attrition in their NL, Major certainly stated that those immigrants living in the L2 environment may even sound non-native to other native speakers of their own language.

More recently, Altenberg and Vago (2004:105) defined the phenomenon of attrition as "the loss of language of abilities of non-disordered individuals in an L2 environment". This is also a very simple but, at the same time, precise definition of the concept of linguistic attrition which can apply to immigrants in an L2 environment who may have undergone some linguistic attrition in their NL, in the same line of the definition of *language attrition* provided by Major (2001). Another straightforward definition that has been provided for the concept of *language attrition* was the one by Stolberg and Münch (2010) who stated that "attrition refers to increasing problems with the accessibility and the retrieval of formerly available linguistic *knowledge*" (Stolberg & Münch, 2010: 19).

In addition to this, Montrul (2005: 201) suggested that "in many respects L1 loss in a bilingual context is the flip side of the L2 acquisition coin. In the language loss situation, there is the potential effect of another language (an L2) on the L1" (see also Herdina & Jessner, 2000). We could add that this parallelism between L2 acquisition and L1 attrition refers to the fact that both processes are gradual, but, even if they work in different directions, both of them seem to follow the same underlying pattern. Nevertheless, Schmid (2010) suggested that "in language attrition among mature speakers the emerging system is a *derivation* of the full-fledged L1 system, not an *approximation*, as is the case in second language acquisition (SLA)" (Schmid, 2010: 1). All these considerations are certainly to be borne in mind in order to find out the very essence and nature of the phenomenon of language attrition.

In another account, Bee Chin and Wigglesworth (2007) defined *language attrition* as the process whereby an individual's ability to speak and understand a language is reduced. We could state that this is a general description of the process of attrition, albeit an interesting one in the sense that it concentrates on both the faculties of speech and

perception of the language undergoing attrition. In this sense, Bee Chin and Wigglesworth (2007) referred not only to the process of attrition in the NL, but also to the process of L2 attrition (see also Bardovi-Harlig & Stringer, 2010; De Bot & Stoessel, 2000; Nakuma, 1997). They claimed that L2 attrition refers to the loss of an FL or L2 upon return to the L1 environment, or through lack of contact with the L2 due to end of schooling, etc. In this sense, De Bot and Weltens (1991:43-44) made a distinction between *L2 loss* and *FL loss*; they claimed that "second language loss may occur with people who have been staying in a foreign country for some time, have learned and perfected L2 there, but start losing it again after their return to the L1 community"; whereas they suggested that "foreign language loss occurs with people who have learned a foreign language (FL) in an instructional setting, but use the FL to an insufficient degree after the course has finished, and consequently lose it again". In other words, according to their definition of the concepts, *L2 loss* requires having stayed in the L2 country for a period of time, whereas *FL loss* refers to the loss of an L2 that has been learned exclusively in an instructional setting and to an insufficient degree.

As we have just reported above, *linguistic attrition* is a phenomenon which may affect not only the L1, but also the L2 of individual speakers, albeit under different circumstances. We should also point out that both processes might be governed by different mechanisms; however, further research in this area is needed in order to shed light on the issue.

To sum up, we have reviewed the definitions of the term *bilingualism* and different classifications of the phenomenon, as provided by different researchers (e.g. Bloomfield, 1933; Cenoz *et al.*, 2003b; Weinreich, 1953). We have also revisited the concept of *transfer* and its classifications (e.g. Ellis, 1994; Faerch & Kasper, 1987b; Ringbom, 1992, 2006). Finally, we have focused on the concept of *attrition*. In this sense, we could state that all the above-mentioned definitions of *attrition in the L1* are quite precise and straightforward; however, the definitions provided by Major (2001) and Altenberg and Vago (2004) are arguably the ones which can provide a more exact picture of this phenomenon as a process that may affect immigrants immersed in the L2 environment. In that case, we can assume that the interactions between their languages will be in the two opposite directions, namely

from the NL onto the L2 as well as from the L2 onto the NL. This situation of languages in contact may help us gain a better understanding as well as give us a thorough descriptive account of the interactions between the different languages of this kind of population.

2.2 Bilingual systems

In this section we are going to review the existing theory about the phonological and lexical system(s) of bilingual speakers who have been exposed to two different languages from birth, as well as of speakers with one NL learned in childhood and an L2 learned later in life.

2.2.1 NL influence on the L2

The influence of the NL (or L1) on the L2 has been widely investigated by researchers in the last decades; it has been shown that, in the acquisition of an L2, one of the most remarkable and permanent features is the non-native pronunciation due, to a great extent, to the influence of the NL (e.g. Best, 1995; Flege, 1995; Kuhl, 1993; Kuhl & Iverson, 1995). There has been a large number of studies devoted to the phonological training of adults (e.g. Aliaga-García & Mora, 2008; Hazan & Sennema, 2007; Logan *et al*., 1991; Pisoni *et al*., 1994) with differing results, but the attainment of a native accent is rare (e.g. Bongaerts, 1999; Cenoz & García Lecumberri, 1999a, 1999b; Moyer, 1999). In the last decades there has been an increasing interest in the factors and variables that influence the degree of phonological acquisition of L2s (e.g. García Lecumberri & Gallardo, 2003; García Mayo & García Lecumberri, 2003; Leather, 2003; Munro *et al*., 1996). It has been observed that not only the input L2 learners are exposed to and other contextual factors are important, but individual factors such as age of acquisition or age of arrival (AOA), amount and type of motivation, degree of identification with the community, length of residence (LOR), degree of activation of the languages and strength of concern for pronunciation accuracy (CPA) may also play a central role in L2 acquisition. Hammarberg (1990) identified three requirements which have to be met for transfer from L1 to L2 to take place, namely *perceived equivalence* (i.e. the learner perceives an element – structure, category, rule, etc.,- in the target language and one in the native language as sufficiently similar to pass as equivalent), *natural motivation* (i.e. elements that are liable to be transferred) and

developmental relevance (i.e. transfer is a strategy which is applied in the course of an acquisitional process). In the following sections we will first review the most influential models of L2 phonological acquisition as well as several models that have been put forward to account for bilingual lexical production (see Costa, 2005; Costa & Caramazza, 1999; Costa *et al*., 1999, 2003; Costa *et al*., 2006; Costa & Santesteban, 2004, 2006; Dijkstra, 2003; Meuter, 2005, 2009).

In the phonological domain, several studies have shown that the first months of life play a very important role in the establishment of the phonetic categories of the native language (see Best & McRoberts, 2003; Bosch & Sebastián-Gallés, 2003; Genesee 1989, 2001; Genesee *et al.*, 1995; Sebastián-Gallés, 2006; Sebastián-Gallés *et al*., 2005). In this sense, one of the most debated questions in bilingual child acquisition is whether the child begins his/her linguistic development with one or two linguistic systems. That is, whether the child is able to differentiate between the two linguistic systems from the very beginning of his/her linguistic development, or whether the child learns to differentiate between his/her two linguistic systems later in life (e.g. De Houwer, 1990, 1995, 2005; Lindholm & Padilla, 1978; Meisel, 1989, 2001; Volterra & Taeschner, 1980). Next, we will review the mutual influences of the phonological and lexical systems of bilingual individuals who have learned their L2 after puberty (i.e. late learners). We will review those influences in two different directions; on the one hand, the influence of the NL system on the L2 system and, on the other, the influence of the L2 system on the NL system. We will also present some models that have been put forward in order to analyze those two different linguistic phenomena, namely phonological and lexical acquisition of the L2 as well as phonological and lexical attrition in the NL.

As we have just reported above, one of the current debates in the area of psycholinguistics is that of the structure of the phonological and lexical systems of bilinguals. Researchers in the area of phonology (e.g. Bergman, 1976; De Houwer, 1990, 2005; Flege, 1999, etc.) as well as in the area of the lexicon (e.g. De Bot, 1992; De Bot & Schreuder, 1993; De Groot, 1993; Green, 1986, 1993; Pavlenko, 2009; Poulisse, 1993, 1997; Poulisse & Bongaerts, 1994; Ringbom, 1983, 1990, 2006, 2007; Schmid & Köpke,

2009; Schreuder & Weltens, 1993) have addressed this question with different and, at times, contradictory insights.

Next, we will review chronologically the different hypotheses proposed by researchers in the last decades. In the area of phonology, the *independent developmental hypothesis* (e.g. Bergman, 1976) posited that from the very beginning of language development infants who are exposed to two languages from birth develop two independent systems, whereas the *one hybrid system interpretation* (e.g. Volterra & Taeschner, 1978), which we will review later on, suggests an initial processing of the two input languages as one hybrid system. De Houwer (1990) proposed the *separate developmental hypothesis* (SDH) which posited that children who are regularly exposed to two languages from birth according to the "one person, one language" principle develop two distinct morphosyntactic systems (see also De Houwer, 1995). De Houwer (2005) further claimed that there appears to be broad consensus among researchers nowadays that the SDH accurately characterizes the basic process of morphosyntactic development in young bilingual children (see also De Houwer, 2007).

In this sense, Sebastián-Gallés and Bosch (2005) claimed that one of the first prerequisites to become a bilingual is to be able to distinguish the existence of two different sound systems as spoken in the environment (see Sebastián-Gallés & Bosch, 2009 for an account of the developmental shift in the discrimination of vowel contrasts in bilingual infants). It has been demonstrated (e.g. Abercrombie, 1967) that newborns can distinguish between languages that differ fundamentally in their rhythmic or prosodic structure, but not between languages that belong to the same rhythmic category (e.g. Nazzi *et al*., 1998). Sebastián-Gallés and Bosch (2005) further posited that prosodic information could facilitate the discovery of two different language systems and, maybe, this could help infants to start the building of this information in two separate systems before they reach the lexical stage in their language development. In fact, Bosch and Sebastián-Gallés (2001a, 2001b) found in their study with infants exposed to Catalan and Spanish from birth that as early as 4.5 months of age, infants can separate both languages. They stressed the point that simultaneous bilingual exposure was not creating any specific trouble in the process of

language differentiation for these two languages. As a result, they concluded that the possibility of separating those two languages, even if they are rhythmically very similar, is already present in the first half of the first year of life, before any other language-specific behaviour has been observed. They further claimed that the comparison of data from monolingual and bilingual infants gave no indication of a significant delay in early perceptual processes for bilingual infants, even in the most challenging situation, when both familiar languages are rhythmically close (i.e. Catalan and Spanish), (Bosch & Sebastián-Gallés, 2001a, 2001b).

To sum up, according to the above-mentioned studies, it appears that children can differentiate between their two languages at a very early stage of life (see Poulin-Dubois & Goodz, 2001 for evidence of language differentiation from babbling; De Boysson-Bardies *et al*., 1984 and Schwartz & Leonard, 1982 for evidence of target language babbling in monolingual children and for an examination of phonological selection and avoidance in early lexical acquisition, respectively; see also Oller & Eilers, 1982 for similarities of babbling in Spanish- and English-learning babies and Eilers *et al*., 1982 for an account of cross-linguistic perception in infancy); and, apparently, this simultaneous bilingual exposure does not create any specific trouble in the process of language differentiation at least between the two languages in those studies, namely Catalan and Spanish which, additionally, are rhythmically close. In fact, as we have just seen, they suggested that prosodic information could facilitate the discovery of the two different language systems and, therefore, help infants to start the building of this information in two separate systems before reaching the lexical stage in their language development (e.g. Bosch & Sebastián-Gallés, 2001a, 2001b).

In another study, Hoffmann (1991) posited that even if the bilingual's processing of the sound system follows the same pattern as that of the monolingual speaker, the task involved is more complex because two sound systems are involved. She further claimed that, in bilingual processing a larger number of features have to be recognized and produced, and this greater cognitive load may lead to a later onset of speech production or even an initial period of confusion, even if the absence of sound confusion has been

reported more often than its presence. According to the above-mentioned studies, we could infer that it appears that the bilingual child needs some time in order to be able to recognize the existence of two sound systems in his/her environment and in order to be able to differentiate them. Nevertheless, there seems to be ample evidence suggesting that this process is temporary and that the task of separating the two sound systems is not too challenging for the child.

In another study, Flege (1999) proposed the so-called *interaction hypothesis* which posits that bilinguals are unable to fully separate the NL and the L2 phonological systems, which, according to him, necessarily interact with one another (see also Fowler *et al*., 2008 for a study of cross-language phonetic influences in French-English bilinguals, Strange, 2007). He further claimed that the NL and the L2 systems may form constrained subsystems that can be activated and deactivated to varying degrees; this is what, according to this hypothesis, permits different modes of pronunciation in the NL and in the L2. This hypothesis further posits that the phonic elements of the NL subsystem necessarily influence elements in the L2 system and vice versa. Flege (1999) also suggested that the nature, strength, and directionality of the influence may vary as a function of factors such as number and nature of categories established for phonic elements of the NL and of the L2, the amount and circumstances of NL and L2 use, language dominance and so on. Thus, according to Flege (1999), there is constant interaction between both the NL and the L2 systems of bilinguals; however, he highlighted that this interaction can present a dominance of either the NL or the L2 system depending on the collusion of several factors.

In contrast, there have also been suggestions of the idea of a single language system in bilinguals. This idea was supported by examples of language mixing in bilingual acquisition in childhood (e.g. Lindholm & Padilla, 1978; Perecman, 1989; Redlinger & Park, 1980). According to this idea, it was assumed that, in early language development, the child could not differentiate between his/her two linguistic systems. Volterra and Taeschner (1978) proposed a model of early bilingual language development which they divided in three different stages (see also Vihman, 1985 for partial support of this model). They suggested that in the first stage of his/her language development, the child has only

one lexical system; as a result, the use of one language or the other depends on what the child wants to say and not so much on the language spoken to him/her. They claimed that in the second stage of the model, the child has two lexicons, but only one set of syntactic rules for his/her two languages. Finally, in the third stage of the model, the bilingual child tries to keep his/her two languages as separate as possible in order to minimize the risk of interference; in so doing, the child rigidly associates his/her two different languages with different persons, so that language choice becomes an automatic process (see also De Houwer, 1995 for criticism of the *single system hypothesis* and Grosjean, 1998a for methodological and conceptual issues in bilingual research and for criticism of the methodology in both Redlinger & Park, 1980 and Vihman, 1985, which he suggested could have induced language-mixing). Even if this model was actually quite revolutionary and taken into much consideration at the time, the bulk of bilingual studies in the last decades have challenged this hypothesis and many researchers have suggested other models of early phonological acquisition.

Regarding language-mixing, Lanza (1992) found that Siri, her two-year old informant, who was acquiring English (from her English-speaking mother) and Norwegian (from her Norwegian-speaking father) simultaneously in Norway, could differentiate her language use in contextually sensitive ways (see Grosjean, 1998a, 1998b for a thorough explanation of the concept of language mode). Hence, Lanza concluded that her informant could already code-switch at that early age (see also Lanza, 1997, 2000, 2007). The conclusion to be drawn from this study regarding language separation or convergence is that the two-year-old informant had two linguistic systems which she could actually differentiate (see also Müller, 1998). Thus, the findings from this study seemed to lend support to the *separate developmental hypothesis* (e.g. De Houwer, 1990, 2005).

All the hypotheses that have been proposed regarding the development of the linguistic systems of bilinguals appear to be based on empirical data, but they account for this phenomenon in very different and, sometimes, opposite ways. Some of these hypotheses posit that bilinguals differentiate between their two linguistic systems from the very beginning (e.g. Bergman, 1976; De Houwer, 1990; Sebastián-Gallés & Bosch, 2005),

whereas other hypotheses suggest that bilinguals may need some time to be able to separate their two linguistic systems or even, that they are unable to fully separate the NL and the L2 phonological systems (e.g. Flege, 1999; Hoffmann, 1991; Volterra & Taeschner, 1978). In the case of native bilingual acquisition, Hoffmann (1991) suggested that even if bilingual's processing of the sound system follows the same pattern as that of the monolingual speaker, the bilingual child has to struggle in order to efficiently perceive and differentiate between the two sound systems. Nevertheless, she concluded that, even if the child may undergo some period of confusion in the initial stage, s/he eventually manages to clearly differentiate between his/her two sound systems.

In the case of speakers with one NL and one L2, we claim that the *interaction hypothesis* by Flege (1999) seems to provide the most straightforward explanation of the phenomenon. As previously mentioned, he claimed that bilinguals are unable to fully separate the NL and the L2 phonological systems, but that they form some subsystems which can be activated or deactivated to varying degrees; this mechanism should enable them to adjust to the different modes of pronunciation of the NL and of the L2, respectively. According to this hypothesis, the fact that bilinguals are unable to fully separate the NL and the L2 phonological systems could account for the existence of interference of one of the systems on the other under certain circumstances. To conclude, the *interaction hypothesis* by Flege (1999) appears to provide quite a convincing and well-founded account of the structure and mutual influences of the phonological systems of bilingual speakers.

As for the lexical system(s) of bilingual speakers, Paradis (1981) formulated the *subset hypothesis*. According to this hypothesis, the words (or syntactic rules or phonemes) in a particular language constitute a subset of the total inventory of elements and rules. He further claimed that each subset could be activated independently and that some subsets (e.g. from typologically related languages) may show considerable overlap in the form of cognate words (reported in Montrul, 2008). In settings where code switching, that is, the alternate use of two or more languages in the same utterance or conversation has become the norm (see Grosjean, 1982); speakers may develop a subset in which words from

different languages are stored together. De Bot & Schreuder (1993) claimed that a major advantage of the subset hypothesis is that the set of lexical elements from which to choose is reduced dramatically when a particular language/subset has been chosen. Apart from the subset hypothesis, Paradis (1987) mentioned three other different options in order to explain the organization of the two languages in the brain:

1. The *Extended System Hypothesis*; there is no separate storage for each language; elements from a second language are simply stored with what is already there.
2. The *Dual System Hypothesis*, which assumes that there are separate systems for each language, with separate sets of phonemes, rules, and words.
3. The *Tripartite System Hypothesis*, which assumes that language-specific elements are stored separately and joint elements, such as cognates, together (reported in Montrul, 2008).

Green (1993) also offered an account of bilingual representation in the lexicon. He claimed that, on the one hand, it is conceivable that you relate a word in the L2 to its translation in the L1 and that you do so by constructing a link between these two words. On the other hand, in trying to find a translation of a word in the L1 you might think of the concept and try to find a word in the L2 that is linked to that concept. In this sense, he suggested that the representation of a word in the L2 is in part subordinative (i.e. the bilingual speaker reaches the L2 word via the L1 word). Likewise, he suggested that translation from L1 to L2 involves recognizing a word in the L1, retrieving its meaning and finding a suitable word in the L2. Then, if word retrieval and production is a slower process than accessing the meaning of a word, delays in translation times will occur.

In his account, Green (1993) further claimed that abstract words are often represented language-independently (i.e. in a coordinate fashion), whereas concrete words are stored together (i.e. in a compound fashion, see also Kroll, 1993). Thus, he suggested that the bilingual lexicon has mixed representations and that the problem arises when bilingual speakers need to control both compound and coordinate representations. He

described and explained the working of such a mixed representational system on the grounds that whenever the bilingual speaker intends to produce a word in the L2 in a compound representation, the control process must specify which word form is to be chosen, and some property of the word must allow this to be achieved. In contrast, for a coordinate representation, this requirement does not apply; the word can be selected just on the basis of conceptual conditions. Finally, Green (1993) concluded that in cases where the L2 does not provide a lexical concept but the L1 does, as in the coordinate case, and one wants to construct a phrase in the L2 that captures the intended meaning, it is necessary to specify the language of expression at the conceptual level. As a result, he claimed that there are grounds for considering that language specification is needed both at the level of concepts as well as at the level of word forms, if the bilingual speaker is to regulate a mixed-representational system.

De Groot (1993) suggested that an alternative to a mixed structure in which some words are represented one way (e.g. compoundly) and others are represented otherwise (e.g. coordinately) is one in which it is acknowledged explicitly that formal translation "equivalents" (i.e. words that are listed as translations in a dictionary) seldom, if ever, share every single aspect of their meaning. She concluded that a plausible interpretation of the results in a number of studies manipulating word concreteness and/or cognate status of translation equivalents is that *concrete* and *abstract words* are represented differently in the lexical memory of (some types of) bilinguals and that the storage format for *cognates* also differs from that of noncognates (see also Costa *et al.*, 2003). Nevertheless, she left unanswered the question of what the representational status of concrete words that are *not* cognates or abstract words that *are* cognates might be.

De Groot (1993) concluded that it appears that concrete words and cognates (or some intersection of both word types) are relatively often stored in a compound fashion, whereas abstract words and noncognates are more likely to be stored in a coordinate way. She added that also a set of words (e.g. L2 words that are still in an early stage of being acquired) may be represented in a subordinate way (i.e. they are accessed via the L1 equivalent). She shared the view that it may be that concreteness and cognate status by

themselves are not the determinants of the representational form. She also claimed that the degree of meaning similarity between the words within a translation pair may ultimately determine the representational form of the bilingual lexicon. That is, the more similar the meanings of the translations, the more likely they are to be stored in a compound fashion in the bilingual lexicon of some types of bilinguals or, the larger the number of conceptual elements that the translation pair is likely to share. An interesting remark De Groot made was that representational space is not wasted by storing the same meaning twice, once for the word in each language. In fact, for many words in one language a truly equivalent term does not exist in the other language. She claimed that if a pair of nonequivalent translations would be stored in a fully compounded form, say, attaching a new L2 word to the conceptual representation of the corresponding L1 word, the L2 word would be assigned a meaning that is both too broad (the L1-specific part of the original L1-conceptual representation would be unjustly included) and too narrow (the L2-specific part of the meaning would be unjustly excluded). As a result, she concluded that a hypothetical bilingual with a fully compounded lexical structure might never be optimally proficient in both of his/her languages because s/he lacks the specific shades of meaning of either his/her L2 words or of both his/her L1 and L2 words.

In this line, Schreuder and Weltens (1993) claimed that although typological differences play a crucial role in the representation of the bilingual lexicon, a prime feature for language sharing representations is lexical semantic information. They suggested that when a word in language A means the same as in language B, it saves storage space to have only one common representation. They further suggested that a dynamic, developmental perspective is preferred over a static one; that is, they assumed that the lexicon of a bilingual may change over time as information is added, reorganized or even lost (i.e. as level of proficiency in both languages changes).

We could claim that of all the hypotheses Paradis (1981, 1987) proposed, both the *subset hypothesis* and the *tripartite system hypothesis* are the ones which apparently offer the most convincing and straightforward picture of the organization of the two languages in the bilingual brain. As for the extended system hypothesis, our contention is that it is vague

since it does not provide any explanation about how languages are selected for production. Likewise, we claim that the dual system hypothesis is highly impractical because the fact that each of the languages is stored separately does not account for codeswitching phenomena apart from requiring a lot of storage capacity (see Grosjean, 1997 for a thorough account of issues, findings and models in processing mixed language, see also Paradis, 2000). Further empirical research with bilinguals performing highly demanding tasks is needed in order to clarify this question.

To sum up, the present section has summarized a large number of hypotheses regarding the phonological and lexical system(s) of bilingual speakers. On the one hand, concerning the phonological system(s) of bilinguals, one of the most widely accepted hypothesis is that provided by Flege (1999), namely the *interaction hypothesis* which posits that bilingual speakers are unable to fully separate the NL and the L2 phonological systems, which according to him, necessarily interact with one another. On the other hand, regarding the lexical system(s) of bilingual speakers, both the *subset hypothesis* and the *tripartite system hypothesis* by Paradis (1981, 1987) as well as the proposals by Green (1993), De Groot (1993), and Schreuder and Weltens (1993) offer comprehensive accounts of the way the NL lexicon and the L2 lexicon are selected or inhibited depending on the linguistic situation. Nonetheless, further research is needed in order to shed light on all those questions concerning this phenomenon that remain unanswered to this day.

2.2.1.1 Models of L2 phonological acquisition

Next, we will review the three most influential models of L2 phonological acquisition. First, we will present and explain the hypotheses and postulates of *The Speech Learning Model* (SLM) developed by Flege (1992, 1995), then, we will review the model proposed by Best (1994, 1995), namely *The Perceptual Assimilation Model* (PAM) paying special attention to the version of this model addressing specifically to L2, the so-called "PAM-L2". Finally, we will focus on *The Native Language Magnet Model (NLM)* developed by Kuhl (1993). Even if all these models were conceived of in order to account for L2 phonological acquisition, they have also been used to account for acquisition of an L3 and subsequent languages.

The Speech Learning Model (SLM)

This model developed by Flege (1992, 1995) has been considered one of the most important models of L2 phonological acquisition. Flege (1995) claimed that the SLM is primarily concerned with the ultimate attainment of L2 pronunciation. In this sense, he stated that work carried out within this framework focuses on bilinguals who have spoken the L2 for many years (see Flege & Mackay, 2004; Levy & Strange, 2008a, 2008b), as it is the case of immigrants immersed in an L2 environment.

Flege (1995) suggested that L2 learners may fail to discern the phonetic differences between pairs of sounds in the L2, or between L2 and L1 sounds maybe because phonetically distinct sounds are "assimilated" to a single category; because the L1 phonology discards features of L2 sounds that are important phonetically but not phonologically, or because of both reasons. He further claimed that without accurate "perceptual targets", production of L2 sounds will be inaccurate. Flege (1995) proposed some postulates and hypotheses in order to account for the process of L2 phonological acquisition.

We will start by reproducing the postulates Flege (1995: 239) proposed and then, we will also reproduce the hypotheses of the SLM in its latest version:

Postulates

P1 The mechanisms and processes used in learning the L1 sound system, including category formation, remain intact over the life span, and can be applied to L2 learning

P2 Language-specific aspects of speech sounds are specified in long-term memory representations called *phonetic categories.*

P3 Phonetic categories established in childhood for L1 sounds evolve over the life span to reflect the properties of all L1 or L2 phones identified as a realization of each category.

P4 Bilinguals strive to maintain contrast between L1 and L2 phonetic categories, which exist in common phonological space.

Among the postulates Flege (1995) proposed, P1 posits that speech learning mechanisms remain intact across the lifespan. In this sense, Frieda and Nozawa (2007) ran a set of experiments in order to test native Japanese and Korean speakers in their discrimination and assimilation of English vowels; in fact, their results did lend support to P1 above. Concerning P3, it suggests that those phonetic categories established for the L1 can evolve permanently over the life span in order to assimilate the phonetic features of the L2 sounds. In this sense, it is assumed that L2 learners are able to establish new phonetic categories for L2 sounds at any time in their life, irrespective of their age.

Regarding P4, Flege (1995) assumes that L1 and L2 phonetic categories share a common phonological space and, as a result, bilinguals have to struggle in order to maintain the phonetic contrasts between L1 and L2 sounds. This is a very interesting claim which Flege (1999) materialized in his *interaction hypothesis* which posits, as we previously commented on, that bilinguals are unable to fully separate the L1 and the L2 systems and that would be the reason why there may be some interference from one system to the other.

Next, we are going to reproduce the hypotheses Flege (1995: 239) proposed for his model:

Hypotheses

H1 Sounds in an L1 and L2 are related perceptually to one another at a position-sensitive allophonic level, rather than at a more abstract phonemic level.

H2 A new phonetic category can be established for an L2 sound that differs phonetically from the closest L1 sound if bilinguals discern at least some of the phonetic differences between the L1 and the L2 sounds.

H3 The greater the perceived phonetic dissimilarity between an L2 sound and the closest L1 sound, the more likely it is that phonetic differences between the sounds will be discerned and that a new category will be established.

H4 The likelihood of phonetic differences between L1 and L2 sounds, and between L2 sounds that are noncontrastive in the L1, being discerned decreases as AOL (age of learning) increases.

H5 Category formation for an L2 sound may be blocked by the mechanism of equivalence classification. When this happens, a single phonetic category will be used to process perceptually linked L1 and L2 sounds (diaphones). Eventually, the diaphones will resemble one another in production.

H6 The phonetic category established for L2 sounds by a bilingual may differ from a monolingual's if 1) the bilingual's category is "deflected" away from an L1 category to maintain phonetic contrast between categories in a common phonological space; or 2) the bilingual's representation is based on different features, or feature weights, than a monolingual's.

H7 The production of a sound eventually corresponds to the properties represented in the phonetic category representation.

Regarding the hypotheses Flege (1995) proposed for his SLM, in the case of H2 he claimed that a phonetic category can be established for those L2 sounds that slightly differ from the closest L1 sound in case they discern at least some of the phonetic differences

between the L1 and L2 sounds. We can assume that bilinguals will only be able to discern phonetic differences between slightly different L1 and L2 sounds in case they receive massive native input from the L2. For instance, in the case of Spanish learners of L2 English, they will need massive exposure to the L2 in order to be able to establish the phonetic categories of, say, /i:/ and /I/, given that Spanish only has the sound /i/ which slightly differs from both L2 sounds. Additionally, H3 predicts that L2 learners will find it easier to establish L2 phonetic categories the greater the dissimilarity between the L1 and the L2 sounds. In the case of English learners of French, as we claimed above, they may find it relatively easy to establish a new phonetic category for /y/ given that it differs substantially from any other English sound.

Another interesting prediction from this model is the one formulated in H4, namely that the likelihood of phonetic differences between L1 and L2 sounds, and between L2 sounds that are noncontrastive in the L1, being discerned decreases as age of learning (AOL) increases (see Flege & Mackay, 2004). This hypothesis assumes the importance of AOL for learners to be able to accurately perceive and produce new L2 phonetic categories (see Baker *et al*., 2008). In the case of immigrants in an L2 environment AOL is usually referred to as age of arrival (AOA) in the host country. In this sense, H4 of the SLM posits that those learners with later AOAs will find it more difficult to both perceive and produce new L2 phonetic categories. Likewise, Donegan (1995) claimed that very young infants start out being able to perceive all of the usable phonetic distinctions (i.e. the universal set of distinctions used in the world's languages), and end up as adults with seemingly more limited perceptual capabilities (see also Best, 1994). Nowadays, it is widely recognized that adults perceive speech in terms of the phonemic distinctions of their own L1 and that is why it is the phonological system of their L1 the one which determines the easiness or difficulty for acquiring new L2 phonetic categories (e.g. Best, 1995; Flege, 1995).

It is also worth considering here H5 which posits that "category formation for an L2 sound may be blocked by the mechanism of equivalence classification" (see also Fowler *et al*., 2008). This means that the L1 and L2 sound will be perceived as equivalent and, as a

result, the L2 learner will not establish a new phonetic category for that sound and it will be processed indifferently in production.

Finally, H6 assumes that a bilingual's and a monolingual's phonetic categories do not necessarily have to be identical. Flege (1995) suggested two possible reasons why the bilingual's phonetic categories may be somewhat different from those of the monolingual. On the one hand, the bilingual may have made a particular phonetic category of the L1 more dissimilar to that of the closest phonetic category of the L2 in order to maintain the contrast between them; or on the other hand, the bilingual's representation for that phonetic category may be based on different features from that of the monolingual.

One of the main conclusions we can draw from both the postulates and hypotheses proposed by Flege (1995) for his SLM is that the sound system of the L1 is the one that is going to determine the easiness or difficulty of the phonological acquisition of the L2 (see Flege *et al*., 1998; Riney & Flege, 1998; see also Yeni-Komshian *et al*., 2001 for a study on the effects of word class differences on L2 pronunciation accuracy). In fact, some studies have shown that even proficient early bilinguals (who have received early and intensive exposure to an L2) categorize L2 sounds according to their L1 representations (e.g. Navarra *et al.,* 2005). To sum up, depending on the similarity or dissimilarity between the L1 and the L2 sounds, the more difficult or the easier it will be for L2 learners to acquire the L2 sounds.

The Perceptual Assimilation Model (PAM)

The Perceptual Assimilation Model (PAM) developed by Best (1994, 1995) is based, like the SLM by Flege (1995), on the differences between the phonetic categories of the L1 and those of the L2 in order to account for L2 phonological acquisition. In fact, Best (1995) claimed that the fundamental premise of her model is that non-native segments tend to be perceived according to their similarities to, and discrepancies from, the native segments that are in closest proximity to them in native phonological inventory (see Flege & Mackay, 2004; Levy & Strange, 2008a, 2008b; Riney & Flege, 1998). However, Best and Tyler (2007) precised that models of nonnative speech perception such as the Perceptual Assimilation Model (PAM) have focused primarily on *naïve* listeners, whereas models of L2 speech acquisition such as the Speech Learning Model (SLM) have focused on *experienced* listeners. Among their similarities, both the SLM by Flege (1995) and the PAM by Best (1995) establish the L1 system as a referent in order to account for L2 phonological acquisition (see also Sebastián-Gallés, 2005 for a detailed account of cross-language speech perception). However, an interesting point raised by the PAM is that, unlike the SLM, it also accounts for nonspeech L2 sounds (see also Kingston, 2003 for results that challenge predictions of both PAM and SLM models). In the case of immigrants living in an L2 environment, it seems that the SLM better may better adjust to their particular circumstances since, as Flege himself stated, this is a model which aims to account for ultimate attainment in the L2 for individuals who have spoken the L2 for many years (as it is the case for immigrants immersed in the L2 environment). However, the PAM makes a set of predictions about how listeners will categorize, or assimilate non-native sounds, even if she further claimed that her model can be extended to account for early developmental changes, as well as for later perceptual changes that may occur as adults learn new languages (see also Best, 1994).

Best and Tyler (2007) adapted the Perceptual Assimilation Model (PAM) to L2 learning which they named "PAM-L2" and in order to demonstrate how PAM's framework could be extended to predict success at L2 perceptual learning, they elaborated on four

possible cases of L2 minimal contrasts that L2 learners initially perceive as speech segments (Best & Tyler, 2007: 25-28):

1) *Only one L2 phonological category is perceived as equivalent (perceptually assimilated).* At the phonetic level, if only one member of the L2 contrast is perceived as a good exemplar of a given L1 category, then no further perceptual learning is likely to occur for it. All contrasts with other L2 categories would be either two-category assimilations or uncategorized-categorized assimilations, thus the learner would have little difficulty discriminating minimally contrasting words for those distinctions. In this case, we would predict not only that the learner has perceived an L1 and an L2 phonological category as equivalent, but also that the L1 and L2 phonetic categories are perceived as equivalent.
2) *Both L2 phonological categories are perceived as equivalent to the same L1 phonological category, but one is perceived as being more deviant than the other*. In PAM terms, this would constitute a category goodness assimilation contrast. We would expect learners to be able to discriminate these L2 phones well, though not as well as two category assimilation types. The perceiver should also be able to fairly easily recognize the lexical-functional differences between these L2 phones in minimal lexical contrasts. Therefore, we would predict that a new L2 phonetic *and* phonological category is reasonably likely to be formed eventually for the deviant L2 phone that is perceived as a better exemplar would be perceived as phonologically and *phonetically* equivalent to the L1 category. No new category is likely to be formed for the latter.
3) *Both L2 phonological categories are perceived as equivalent to the same L1 phonological category, but as equally good or poor instances of that category.* This situation describes a case of single category L2 contrast assimilation. The learner will initially have trouble discriminating these L2 phones, which would be assimilated both phonetically and phonologically to the single L1 category, and minimally contrasting L2 words would be perceived as homophones. In SLM terms, both L2 phones would be merged with the L1 phonetic category.

4) *No L1-L2 phonological assimilation.* If the naïve listener does not perceive either of the contrasting L2 phones as belonging clearly to any single L1 phonological category, but rather as each having a mixture of more modest similarities to several L1 phonological categories (Uncategorized, in PAM terms), then one or two new L2 phonological categories may be relatively easy to learn perceptually. This suggestion may appear similar to the SLM concept of *new* phone, but it differs in some key respects. In PAM's formulation, it is not only the similarity or dissimilarity of a given L2 phone to the closest individual L1 phonetic category that is crucial to perceptual learning, but its comparative relationships within the interlanguage phonological system.

The above-mentioned four possible cases of L2 minimal contrasts that L2 learners initially perceive as speech segments make up PAM-L2's framework in order to predict success at L2 perceptual learning. In the case of the first minimal contrast: "Only one L2 phonological category is perceived as equivalent (perceptually assimilated to a given L1 phonological category)"; then, needless to say that no perceptual learning is expected to occur for it. However, in the case of the second minimal contrast: "Both L2 phonological categories are perceived as equivalent to the same L1 phonological category, but one is perceived as being more deviant than the other"; then, PAM's framework would expect the L2 learner to assimilate the L2 phone to the better exemplar of the L1 phonetic category, whereas the L2 learner would eventually form a new phonetic category for the more deviant L2 phone. Concerning the third minimal contrast: "Both L2 phonological categories are perceived as equivalent to the same L1 phonological category, but as equally good or poor instances of that category": in this case, the L2 learner will probably need some time before s/he can correctly perceive both L2 phones as dissimilar, and then, the L2 learner will have to form at least one new phonological category. Finally, regarding the fourth minimal contrast: "No L1-L2 phonological acquisition"; in this case, PAM-L2 predicts that, since both phones remain uncategorized (in PAM terms), one or both L2 phonological categories will be relatively easy to learn perceptually.

The Native Language Magnet (NLM) Model

The *Native Language Magnet* (NLM) was proposed by Kuhl (1993) and it made very interesting claims concerning the perception of foreign language sounds. In this sense, the NLM theory holds that phonetic units from a foreign language that are similar to a category in the adult's own native language are particularly difficult to perceive as different from the native language sound, whereas sounds that are not similar are relatively easy to discriminate. In fact, it has been suggested that the native language categories of the listener somehow interfere with the ability to perceive the phonetic distinctions in the new language. The NLM theory posits that the magnet effect contributes to this difficulty, in the sense that native language magnets distort the underlying perceptual space, and this results in the "attraction" of similar sounds. The prediction that stems from the theory is that the difficulty posed by a given foreign language unit will depend on its proximity to a native language magnet; the nearer it is to a magnet, the more it will be assimilated to the native language category, making it indistinguishable from the native language sound. In fact, the phonetic categories of one's native language have been described as forming a "sieve" through which the newly acquired language must pass; as a result, good instances of native language categories act as magnets that filter the new language's phonetic units (e.g. Kuhl & Iverson, 1995, see also Kuhl, 1993).

2.2.1.2 Models of bilingual lexical production

Now, we are going to focus on some of the most important models of L2 lexical production that have been proposed to this day, namely the *Bilingual production model* by De Bot (1992) and those models developed by Green (1986, 1993) called *Inhibitory control model*, De Bot and Schreuder (1993) and Poulisse and Bongaerts (1994), respectively. We have selected these four models of bilingual lexical production because those are the models which have been most widely used by researchers since their formulation, some of which have given ground for posterior models and research.

A Bilingual Production Model

The model De Bot (1992) developed is based on Levelt's (1989) "Speaking" model, which was developed to explicitly describe the unilingual speaker. De Bot (1992) adapted this model in order to describe bilingual processing.

First of all, we are going to outline the most important characteristics of Levelt's unilingual production model in order to be able to understand De Bot's adaptation of this model into his bilingual production model.

Levelt's model aims at describing the normal, spontaneous language production of adults. It was conceived as a "steady-model", and not a learning model. He distinguished between declarative knowledge (conceptual and lexical knowledge) and procedural knowledge, which is relevant to the processing of declarative knowledge. In this model, the following components are distinguished:

- A knowledge component which is more or less separate from the production system and where general knowledge of the world and more specific knowledge about the interactional situation are stored.

- A conceptualizer: this is where the selection and ordering of relevant information takes place and where the intentions the speaker wishes to realize are adapted in such a way that they can be converted into language.
- A formulator: this is where the preverbal message is converted into a speech plan (phonetic plan) by selecting the right words or lexical units and applying grammatical and phonological rules. It has been suggested (e.g. Levelt & Schriefers, 1987) that lexical items consist of two parts, namely the lemma and the morpho-phonological form or lexeme. In the lemma, the lexical entry's meaning and syntax are represented, whereas morphological and phonological properties are represented in the lexeme.
- An articulator which converts the speech plan into actual speech.
- A speech-comprehension system connected with an auditory system which plays a role in two ways in which feedback takes place within the model; the phonetic plan as well as the overt speech, are guided to the speech-comprehension system in order to detect any possible mistakes.

An important characteristic of Levelt's model is that the lexical items needed in the utterance are retrieved first and that the characteristics of these items determine the application of grammatical and phonological rules. Processing is largely automatic; greater attention is paid to conceptualizing and some attention is paid to the feedback mechanisms, but the remainder apparently functions without conscious control. Levelt claimed that production has to be highly automatized in order to account for the enormous speed at which language is produced.

Levelt's model has been considered one of the earliest convincing models accounting for unilingual production; De Bot (1992) considered that it could be adapted so that it could also account for bilingual production.

In this sense, De Bot (1992) claimed that a good model of bilingual language production should be able to cope with universal characteristics of language as well as cognitive processes and situational factors in interaction and their consequences for

language use. He further claimed that the strength of his model lies in the fact that it is not restricted to individual parts of the production process, but all the different parts of the process are integrated in it.

De Bot outlined the requirements a bilingual version of a production model should meet. First of all, he claimed that it should provide an explanation for all the phenomena associated with balanced and non-balanced bilinguals' speech. The most important demands of a bilingual production model, as specified by De Bot (1992: 6-7), are the following:

- The model must account for the fact that the two language systems can be used entirely separately or mixed depending on the situation.
- Cross-linguistic influences have to be accounted for in the functioning of the model.
- The fact that a bilingual uses more than one language should not lead to a significant deceleration of the production system. It is very likely that the production system has sufficient over-capacity to deal with language production problems.
- Assuming that people seldom achieve "total" bilingualism, the model should be able to deal with the fact that the speaker does not master both language systems to the same extent. He suggested that the extent to which the speaker has command of the two systems has consequences for the organization within the model and the way in which the model works.
- The model should be able to cope with a potentially unlimited number of languages, and must be able to represent interactions between these different languages. Typological differences between languages should therefore not cause problems; nevertheless, this does not imply that the structural differences between the bilinguals' languages are irrelevant for the workings of such a model.

One of the central points in De Bot's model is that it assumed that the knowledge component is not language specific, so that a single system suffices. As for language choice, the model suggests that one possibility would be to assume that the knowledge component is involved in this choice; however, the role of the knowledge component is not very clear.

In his model of unilingual production, Levelt (1989) assumes that the conceptualizer is language-specific. Nonetheless, a language production problem that unilinguals are not often faced with, but which is quite normal for non-balanced bilinguals is that a concept has to be expressed in a language which does not have the lexical items needed to express that concept, or for which the relevant item cannot be found (in time). This will lead to problems in the formulator during the grammatical encoding stage. Nevertheless, in De Bot's version of the model it remains unsolved, not only for bilingual, but also for unilingual production.

De Bot (1992:8-9) suggested that for both procedural grammatical morpho-phonological knowledge and for declarative lexical knowledge there must be systems for every language that can be called upon. He proposed two explanations in order to account for this:

1. There is a separate formulator and a separate lexicon for each language, which solves the problem of having to separate the two systems. This will cost some storage capacity, but it turns out to be economical because there is no need for a system that controls the co-ordination and separation of the two languages. However, the remaining problem is that it is unclear how the two languages can be used simultaneously (e.g. during codeswitching).
2. There is one large system which stores all the information, linguistically labeled in some way, about all the different languages. It remains unsolved how the systems are separated in bilinguals without this causing apparent problems.

The above-mentioned explanations seem to account for some of the phenomena during bilingual production, but either they fail to account for other kinds of phenomena or they can cause processing problems during actual speech production.

As already indicated, De Bot (1992) claimed that this model was not aimed at describing or explaining the acquisition process; it is a "steady-state" model. However, he claimed that it should be capable of describing the bilingual system at any moment and at all stages of development. In fact, De Bot's (1992) model attempted to offer a comprehensive account of the different stages of bilingual processing in a way that had not been done before. Nevertheless, several questions such as how the mechanism that enables bilinguals to codeswitch works or how typological differences are represented in the model remain unanswered.

Next, we are going to review the model developed by Green (1986, 1993, 1998), namely the *Inhibitory control model*.

The Inhibitory Control Model

Green (1986, 1993, 1998) developed a particular model named the *Inhibitory control model*, which aimed to provide a comprehensive account of the way in which bilinguals can achieve certain tasks, such as being able to speak in one language rather than the other, or to switch between languages as well as to translate. One of the central aspects of the model proposed by Green was the concept of *control* which refers to how bilingual speakers control the use of their lexico-semantic system (see also Barac & Bialystok, 2011; Bialystok, 2005, 2007, 2009; Bialystok *et al*., 2005; Bialystok *et al*., 2008; Bialystok & Niccols, 1989 for s study of children's control over attention to the phonological and semantic properties of words; Bialystok, 2011; see also Cook, 1997; Costa *et al*., 2009; Hernández *et al*., 2010; see De Bot, 2004 for a study of the multilingual lexicon; De Groot & Christoffels, 2006; Martin-Rhee & Bialystok, 2008; Rodríguez-Fornells *et al*., 2006).

This model assumed that in order to effect control, such as speaking one language rather than the other, there must be an explicit intention to do so, and word meanings as well as word forms need to be tagged in order to indicate the language to which they belong, so that the intention can be realized (see also Green, 2008; Green & Abutalebi, 2008 for an account of the link between bilingual aphasia and language control; see Green & Price, 2001 for an account of the potentials and limitations of functional imaging in the study of recovery patterns in bilingual aphasia and also Hernández *et al*., 2007 for a case study of a Catalan-Spanish bilingual aphasic woman). The tag was considered to be one of the conditions influencing the activation level of an entry in the lexicon. Green (1986, 1993) further claimed that a language system can be in one of several states of activation; it can be *dormant* (if it is not used for a long period of time), *active* (i.e. playing an active role in ongoing processing), or *selected* (i.e. controlling speech output). He also suggested that the fact that more than one language can be active offers a way to explain involuntary intrusions in speech output and interference in experimental tasks (see also Abutalebi *et al*., 2001 for an account of the bilingual brain as revealed by functional neuroimaging; Abutalebi & Green, 2007 for a thorough review of functional neuroimaging studies and Green *et al*., 2006 for evidence of both functional and structural brain changes in the acquisition of an L2 and the implications of these). The inhibitory control model operates at two stages: an early stage, in order to boost the activation of words in the lexicon that are appropriately tagged, and at a late stage to inhibit L1 word forms which are inappropriately tagged (i.e. that are not tagged for the L2).

In the case of codeswitching, Green (1993) claimed that the language to be spoken can be left as a free variable and that there is no need to postulate any special grammar. Nevertheless, he suggested that whenever the individual needs to stick to just one language, there may be a need for more explicit attentional control. A central feature of Green's account is that he assumes that partial separation of languages is indeed possible as a result of the language tag (see Hermans *et al*., 1998 for support of this model; see also Costa *et al*., 2003 for evidence of cross-language interference in highly proficient Spanish (L1)/Catalan (L2) bilinguals during the lexicalization process in L2).

Other researchers such as De Bot and Schreuder (1993) as well as Poulisse and Bongaerts (1994) among others, have also provided accounts of bilingual production. Next, we are going to review the most important features of these accounts of the bilingual production process.

De Bot and Schreuder (1993)

De Bot and Schreuder (1993) also provided an account of the bilingual production process. One of their basic assumptions was that the process of bilingual lexical retrieval is not radically different from that of monolingual retrieval. Nonetheless, they added that it is not clear to what extent differences in proficiency will have a differential impact on the various subprocesses involved in language production. De Bot and Schreuder (1993) adopted the theoretical framework of Levelt (1989) as summarized and adapted by Bierwisch and Schreuder (1992).

De Bot and Schreuder (1993) suggested that languages differ in the way in which they lexicalize the components of a given conceptual structure. They claimed that the relationship between the conceptual primitives, such as *motion, path, figure, ground, manner* and *cause*, and surface elements in a language is not one-to-one. That is, a particular combination of conceptual primitives can be expressed by a single surface element; in contrast, a single conceptual primitive can be expressed by a combination of surface elements. They added that many of these conceptual to surface associations follow a pattern, but that these patterns apparently differ across languages. According to these researchers, this has consequences for a system of lexical access for both L1 and L2 production.

De Bot and Schreuder (1993) claimed that for the mechanics of language separation, two proposals are relevant, namely the *subset hypothesis* from Paradis (1981) and the *inhibitory control model* by Green (1986, 1993), which we already reviewed above. According to Paradis (1981), the words (or syntactic rules or phonemes) in a particular

language constitute a subset of the total inventory of elements and rules. Each subset can be activated independently and some subsets (e.g. from typologically related languages) may show considerable overlap in the form of cognate words. Additionally, in situations where codeswitching has become the norm, speakers may develop a subset in which words from different languages are stored together for the sake of economy (see Hermans *et al*., 1998, for support of this model).

Likewise, we already saw that according to Green (1986, 1993), languages spoken by bilinguals or multilinguals can have three levels of activation:

a. Selected: the selected language controls the speech output:
b. Active: the active language plays a role in ongoing processing, works parallel to the selected language, and does the same things as the selected language but has no access to the outgoing speech channel;
c. Dormant: a dormant language is stored in long-term memory, but does not play a role in ongoing processing.

What De Bot and Schreuder (1993) criticized about Green's model was the fact that it is not clear how codeswitching takes place, and they added that the inhibitory control model suggests deactivation of languages at a rather late stage in the production process. They suggested their own pattern for the lexical retrieval process: they claimed that in the conceptualizer, communicative intentions are translated into a format that is interpretable for the formulator, that is, the preverbal message. In this sense, Bierwisch and Schreuder (1992) claimed that the conceptualizer and the preverbal message are not language-specific, but the preverbal message must contain information about which language is to be used and the value (i.e. strength) of this language cue. De Bot and Schreuder (1993) claimed that languages differ in the way in which the preverbal message is to be formulated for production.

To conclude, De Bot and Schreuder (1993) claimed that speakers of more than one language have different lemmas and lexemes for their languages. They further suggested

that the activation metaphor can explain the degree of separation between languages; however, since this is not an all or none mechanism, words from the non-intended language may slip in. In their description of bilingual production, they assumed that thought, and hence the intended message, are not language-specific. Nonetheless, two problems regarding their explanation remain unsolved; on the one hand, how the system deals with the different lexicalization patterns for different languages and, on the other, how the system deals with the different proficiency levels of the speaker in his/her languages.

Poulisse and Bongaerts (1994)

In their account of the functioning of bilingual production, Poulisse and Bongaerts (1994) claimed, concerning De Bot's (1992) model of bilingual production, that a more economical explanation of the way in which bilingual speakers manage to separate their language systems would be to assume that the information concerning language choice is added to the pre-verbal message in the form of a language component. According to their proposal, this language component plays a role in the activation of individual lexical items. They added that, besides conceptual information activating particular lemmas, there will be an additional language component which spreads activation to the lemmas of that particular language. In fact, the data by Poulisse and Bongaerts (1994) support their proposal for a spreading activation account of lexical access in bilingual speakers. Additionally, their data supported the proposal that inflected word forms are stored in the lexicon both fully and in decomposed form and that there is a checking device which intercepts forms that are not represented in the lexicon. They finally claimed that when a lemma of a particular language has been accessed, phonological encoding will take place in this same language since, with just a few exceptions, their subjects used L1 and L2 phonological encoding to encode L1 and L2 lexical items, respectively (see also Poulisse, 1993 for a theoretical account of lexical communication strategies in bilingual production).

In this sense, Costa *et al.*, (2003) claimed that there are some indications suggesting that the bilinguals' L2 proficiency level may modulate the amount of cross-language

interference even at the lexical level. Concerning Poulisse and Bongaerts' (1994) data, they suggested that cross-language interference at the lexical level decreases dramatically in highly proficient bilinguals. That is why Costa *et al*., (2003) concluded that both the language-specific and the non-specific hypotheses may be correct when describing speech production in bilingual speakers of different proficiency levels.

We have just reviewed some of the most relevant models and proposals for bilingual production that have been suggested since the initial proposal for unilingual production by Levelt (1989). It was De Bot (1992) the first one to adapt Levelt's model for bilingual production and since then, other researchers have adapted this model and/or have made proposals concerning its functioning. Green's *inhibitory control model* offers one of the most straightforward accounts of bilingual production; however, the fact that the unwanted language is deactivated at a rather late stage in the process has sparked criticism from other researchers such as De Bot and Schreuder (1993). All in all, these models and proposals offer comprehensive accounts of bilingual production processing, even if, many questions such as the workings of codeswitching or the stage at which the unwanted language is deactivated remain unanswered (see Poulisse, 1997 for a review of different models of second language production and MacWhinney, 1997 for a full account of the Competition Model in L2 acquisition).

2.2.2 L2 influence on the NL

The L2 influence on the NL (or L1) has become widely known as *linguistic attrition* (e.g. Chang, 2012; De Bot *et al*., 1991; Köpke, 2001, 2002). In this study, we are going to focus on the attrition of the phonological and lexical system of the NL owing to the influence of the L2. That is, we are going to deal with *phonological* and *lexical attrition*. The studies on phonological attrition of the NL usually focus on immigrants who have been immersed in the L2 environment for a long period of time (e.g. De Bot *et al*., 1991; Köpke, 2001, 2002; Seliger & Vago, 1991a). These and other studies (e.g. Ammerlaan, 1996; Hulsen, 2000) have found evidence of phonological attrition in adults manifested in the development of a non-native accent in the NL due to changes in the phonetic values under the influence of the phonetic values of the L2 (e.g. Major, 1992), but not as strong as the phonological attrition in the NL that children immersed in an L2 environment usually undergo (e.g. Pallier *et al*., 2003; Ventureyra & Pallier, 2004; Ventureyra *et al*., 2004). The differences between the type and extent of phonological attrition in the NL in children and adults may be an indicator of the different mechanisms that intervene in the phonological attrition of the NL in children and adults depending on the age at which phonological attrition starts (see Ventureyra *et al*., 2004).

Many authors have provided definitions of the phenomenon of *language attrition*, such as Hansen (2001: 61) who defined this process as "the gradual forgetting of a language by individual *attriters* (original emphasis), persons who are experiencing attrition". She further claimed that the first sign of language attrition "is not the "loss" (original emphasis) of certain items, but rather an increase in the length of time needed for their retrieval" (Hansen, 2001: 63). An even more straightforward definition of the term was provided by Altenberg and Vago (2004: 105) who defined *attrition* as "the loss of language abilities of non disordered individuals in an L2 environment". In fact, this is the case of immigrants living in an L2 environment. Seliger and Vago (1991b) further claimed that one of the common sociolinguistic situations in which language attrition takes place is one in which the role of the NL use and function is dramatically diminished by separation

from the NL community as it is the case of many immigrants in the L2 speaking country or community (see also Gürel, 2004; Schmid & Dusseldorp, 2010). In fact, Chang (2012) recruited 36 American English speakers in Korea with no prior experience with Korean and found that since an early stage of L2 learning phonetic attrition ("phonetic drift" in his terminology) occurred, so he concluded that "experience in another language rapidly alters production of the native language" (p.16).

Van Els (1986), reported in Bee Chin and Wigglesworth (2007) identified four types of attrition, determined by two different dimensions: firstly, *what* is lost, and secondly, the *environment* in which it is lost. This is depicted in table 1 below diagrammatically. The paragraph in bold corresponds to the type of attrition analyzed in the present study.

Table 1. *Possible situations and types of attrition.*

Where it is lost	**What is lost**	
	First language	**Second language**
First-language environment	E.g. loss of the first language as a result of ageing and/or some pathological conditions (e.g. dementia or trauma)	E.g. loss of a foreign or second language upon return to the first-language environment, or through lack of contact with the second language owing to end of schooling, moving, etc.
Second-language environment	**E.g. loss of the first language as a result of migrating to a country in which a different language is spoken; especially likely to apply to children who migrate with parents.**	E.g. language loss late in life after migrating to a country in which a different language is spoken (may also be related to pathological conditions.

(from Bee Chin & Wigglesworth, 2007: 73)

In the dimension of attrition in the first-language environment, we can see that the first language (i.e. the NL) can undergo attrition as a result of ageing or of some pathological conditions such as dementia or trauma. In that case, attrition in the NL has nothing to do with a natural process of decline in the language as a result of separation from the NL-speaking community or lack of use. Likewise, L2 attrition can also take place in the

first-language environment; a foreign/second language can be lost upon return to the NL environment, or due to lack of contact with the L2 due to end of schooling, etc. This is a common situation, for instance, for many speakers who used to study, say, French at school, but once they left school stopped having any contact with the L2 and, as a result, they underwent attrition in their L2 (see also Bardovi-Harlig & Stringer, 2010; De Bot & Weltens, 1995).

In the dimension of attrition in the second-language environment, we can see that the first language can be lost as a result of migration to a country in which a different language is spoken. It is further claimed that this is especially likely to apply to children who emigrate with their parents as well as to international adoptees (e.g. Hyltenstam *et al*., 2009; Pallier *et al*., 2003; Ventureyra & Pallier, 2004; Ventureyra *et al*., 2004) who experience what some authors have called "dominant-language replacement" (e.g. Hyltenstam *et al*., 2009). This is the situation of immigrants living in an L2 environment; they may undergo attrition in their NL due to lack of contact and use of the NL (e.g. Seliger & Vago, 1991a). However, Chang (2012) claimed that his findings of L1 attrition in American learners of Korean were remarkable "precisely because they cannot be attributed to L1 attrition stemming from lack of L1 use, as many previous findings of phonetic drift (i.e. phonetic attrition) could be" (p.16).

Another type of attrition is the one that the L2 can undergo in the L2 environment; in this case, L2 loss takes place late in life after having migrated to a country where a different language is spoken, and it may also be related to pathological conditions such as dementia.

We could claim that the most common types of attrition are, on the one hand, loss of an L2 in a first-language environment and, on the other, loss of a NL in a second-language environment. In those two situations attrition occurs both naturalistically, that is, in environments in which a different language is spoken, and naturally, that is, not due to any pathological condition. In this sense, Bee Chin and Wigglesworth (2007: 73) suggested that "this type of attrition contrasts with attrition which results from the effects of age, trauma or

pathological decline of some sort" (see Au *et al*., 1989 for an account of language in normal aging).

Several researchers have criticized the fact that the overwhelming majority of first language attrition studies have concentrated on "what is lost" to the exclusion of "what is retained" (Schmid & De Bot, 2004). They further claimed that this is a factor that may give a biased picture of an individual's proficiency, since "speakers who are prepared to take more risks by using complex structures will potentially make more "mistakes" than speakers who accept that their control over their L1 is not what it was and consequently use a simplified variety" (Schmid & De Bot, 2004: 227-228). Nevertheless, they added that it is extremely critical to assess what a particular attriter has lost, let alone, what s/he has retained in his/her NL.

In fact, Köpke and Schmid (2004) stated that findings from individual studies seem to indicate that it cannot even be said with any certainty whether a first language in which a certain level of proficiency has been reached can ever undergo significant attrition, let alone how or why it might (see also Schmid & De Bot, 2004). This explanation could be related to the fact that young children, who are supposed not to have reached full proficiency in their NL, are the ones who are usually more severely affected by the effects of attrition (e.g. Montrul, 2008; Pallier *et al*., 2003; Ventureyra & Pallier, 2004; Ventureyra *et al*., 2004). In this sense, Montrul (2008) claimed that even if attrition in the NL can occur in childhood, the term *attrition* as the loss of a given property of the language after that property has been mastered at a native-speaker level and remained stable for some time, usually affects adults. In her view, the concept of attrition in the NL should make reference to adults because they are supposed to have achieved native-like competence in their NL, whereas children may not have reached complete native-like competence in their first language; this is what she referred to as *incomplete acquisition of the NL* (Montrul, 2005).

In their review of the phenomenon of language attrition, Schmid and De Bot (2004) pointed out those factors which, in one way or another have proved relevant in first language attrition research. (see also Köpke, 2004). As for sociolinguistic factors, they

claimed that factors such as age at onset of attrition, education, time elapsed since emigration, gender of the attriter, amount of contact with the attriting language (see De Leeuw *et al*., 2010; Schmid & Dusseldorp, 2010), attitude and motivation, and community factors such as identity and ethnicity are to be borne in mind when it comes to first language attrition research (see also Stolberg & Münch, 2010). Nevertheless, they also pointed out that sometimes the results obtained have been contradictory. They further suggested that we need to be very cautious and take into account psycholinguistic variables because "self-report data from an area that is as emotionally charged as linguistic proficiency might very well be influenced more by how a person wishes to view herself than by an accurate assessment of her linguistic behavior" (Schmid & De Bot, 2004: 221). In his study, Chang (2012) claimed that "while decline in L1 use may contribute to phonetic drift (i.e. phonetic attrition), this is not the main cause. Rather, L2 experience appears to be the primary factor driving changes in L1 production" (pp. 6-7). Therefore, in language attrition research we should consider not only sociolinguistic, but also psycholinguistic variables and other factors which can provide us with a very different picture of the individual attriter.

Ribbert and Kuiken (2010) found in their study with German students living in the Netherlands that L2-induced changes can occur after a relatively short period of time, at least in the case of cognate languages such as German and Dutch that are typologically related. They further suggested that the transfer effects found in their study could be due to the close typological relationship between Dutch and German (see also Köpke, 2004).

In the same vein, Schmid (2010) concluded from her account of L1 attrition as related to bilingualism that "incipient changes in an L1 attrition system appear most likely in lexical areas, in areas of morpho-syntax where there is a great deal of similarity between the two participating languages, among active bilinguals, and among speakers for whom the moment of emigration is situated before puberty" (Schmid, 2010: 6). This conclusion encapsulates two important issues when it comes to first language attrition research; on the one hand, it points out those linguistic areas which are more prone to attrite (Stolberg & Münch, 2010) and, on the other, it also suggests which subjects are more likely to undergo

attrition in their L1 (see Goral, 2004 for similarities and differences of L1 attrition in bilingualism and in healthy aging; see also Au *et al*., 1989).

A further question that has been raised is whether attrition is a phenomenon of performance or competence (e.g. Goral, 2004; Schmid & De Bot, 2004; Seliger & Vago, 1991a; Stolberg & Münch, 2010). In their case study of a German attriter in the USA, Stolberg & Münch (2010) found that the lexicon was most affected by attrition and had also recovered the most. Therefore, they suggested that "if loss can be reverted and thus turns out to be temporary, it must be the accessibility (a performance factor) that has been affected by attrition, not the speaker's language competence" (Stolberg & Münch, 2010: 29). In this sense, Keijzer (2010) stated that "language attrition is not an all or nothing phenomenon and does not affect the ability to use the L1, but optionality occurs which is not present in mature native grammars" (Keijzer, 2010: 16). Therefore, Keijzer also seems to consider that attrition is a performance rather than a competence phenomenon. This is certainly a promising area of research, namely to establish whether attrition is just a phenomenon of performance (i.e. which can be reversed through intensive training and activation) or whether it eventually affects the actual competence of the speaker in his/her own native language (Hyltenstam *et al*., 2009; Köpke, 2004).

2.2.2.1 L1 attrition and its influence on L2 ultimate attainment

An interesting point that has been raised in recent research is the influence of L1 attrition on ultimate attainment in the L2. In this sense, several authors (e.g. Pallier *et al*., 2003; Ventureyra *et al*., 2004) have suggested that the lack of nativeness in attriters observed in some studies was due to the stabilization of the neural network that subserves the maintained L1. They considered that the L1 was supposed to obstruct or even block the full acquisition of the L2; this is what Hyltenstam *et al*., (2009) called the *Impediment Hypothesis* (IH). The IH posits that "there is a considerably high plasticity in the language processing system up until the end of the first decade of life" (Hyltenstam *et al*., 2009: 123). In this sense, they further suggested that this would account for the severe L1 attrition observed in the adoptees of studies such as the one by Pallier *et al*., (2003).

Nevertheless, we should mention that Hyltenstam *et al*., (2009) found no evidence of a causal relationship between L1 attrition and L2 ultimate attainment; that is, they found no evidence that a total loss of L1 is a prerequisite for complete nativeness in the L2. In this vein, Köpke (2004) claimed that it must "be kept in mind that balanced bilingualism does exist and that no relationship whatsoever between L2 level and L1 attrition has been demonstrated to date" (Köpke, 2004: 16).

In their study, Hyltenstam *et al*., (2009) recruited a group of 21 Korean adoptees in Sweden and 11 native Swedes; 3 native Korean controls were also included. The Korean adoptees had arrived in the host country between the ages of 1 and 10, and all of them had been unexposed to Korean for 22 years. We should mention at this point that both the Korean adoptees and the native Swedes were all current or former students of Korean at a Swedish University. They performed two tests of Korean proficiency, namely a grammaticality judgement test and a voice onset time (VOT) perception test. The results showed that the native Swedish group scored significantly better than the adoptee group in the grammaticality judgement test; even two of the native Swedes performed within the range of Korean control whereas none of the adoptees did. The authors ascribed these

(somehow) contradictory results to the somewhat advantageous learning conditions for the native Swedes (i.e. longer stays in Korea, more years of exposure to their L2, etc.).

As for the results in the voice onset time perception test, 7 of the 21 adoptees performed better than the highest performing native Swede on this test, whereas another 7 performed worse (see also Stolberg & Münch, 2010 for partial reversal in L1 attrition). Interestingly, the highest-performing adoptee was the one with the highest age of adoption (10 years and 6 months), while the second best performer had the second-highest age of adoption (9 years). They concluded from this that the seven adoptees who performed highest on the VOT test "could either have acquired their perceptual skills through their own intensive study and/or training, through an extraordinary aptitude for phonetic perception, OR (original emphasis) through retrieved L1 phonetic remnants" (Hyltenstam *et al*., 2009: 128). They further added that given the less advantageous learning conditions for the adoptees it is reasonable to opt for the last option, since "the remnants of the adoptees' L1 seem to consist primarily of basic and detailed features of Korean phonology and phonetics rather than of more complex, higher-order grammatical features" (Hyltenstam *et al*., 2009: 128). Hence, the adoptees' bad results in the grammatical judgement test and good results in the VOT perception test.

Concerning the influence of L1 attrition on L2 ultimate attainment, Hyltenstam *et al*., recruited four adult L2 users of Swedish who had been adopted into Swedish-speaking families as children between the ages of 1 and 9, and who had Spanish as their L1. They were compared to 27 participants who had arrived in Sweden as immigrants with their Spanish-speaking families (i.e. they had continued using their L1) between the ages of 1 and 9. They all performed 10 different tasks in Swedish, namely a VOT production task (instrument 1), a VOT categorical perception task (instrument 2), a babble noise test (instrument 3), a white noise test (instrument 4), an auditory grammaticality judgement test (instrument 5), a written grammaticality judgement test (instrument 6), reaction times for the auditory grammaticality judgement test (instrument 7), a cloze test (instrument 8), a formulaic language test of idioms (instrument 9), and a formulaic language test of proverbs (instrument 10).

The results showed that only one of the four adoptees performed within the native-speaker range across all measures, and this was the participant with the lowest age of adoption. In addition to this, this was also the only adoptee who was perceived as nativelike in Swedish by all 10 native judges. It is worth mentioning that in one case (AOA= 9) none of the judges rated this subject as a native speaker of Swedish. In the case of the 27 immigrant participants, only two participants (AOA = 3 and 7, respectively) performed within the native-speaker range across all 10 instruments. Hyltenstam *et al*., (2009) concluded that since the four adoptees who had experienced dominant-language replacement did not outperform those participants who had maintained their L1, "the adoptees had not gained any advantage in their acquisition of L2 Swedish as a consequence of their severe L1 attrition, although the Impediment Hypothesis predicts that they would" (Hyltenstam *et al*., 2009: 133). Therefore, the authors refuted the Impediment Hypothesis since the results they obtained from this study and the premises of the Impediment Hypothesis could not be reconciled (see also Flege *et al*., 2002). In this sense, Chang (2012), who found evidence of L1 attrition in American speakers in an early stage of Korean learning concluded that " a high level of L2 proficiency is not necessary for L2 input to influence L1 representations" (p. 16).

Finally, the authors concluded that their results on L1 remnants should be interpreted as evidence of severe attrition and inhibition, rather than as a complete loss of the L1. As for L2 ultimate attainment, they claimed that the suggestion that L1 impedes L2 nativeness must be seen as a less convincing explanation than one based fundamentally on maturational factors (see Abrahamsson & Hyltenstam, 2009; Hyltenstam & Abrahamsson, 2003).

The above-mentioned work by Hyltenstam *et al*., certainly broke new ground for both the study of L1 remnants in severe attrition as well as for the influence of L1 attrition on L2 ultimate attainment. Regarding L1 attrition, the findings in this study point to the possibility of boosting the accessibility of L1 phonetic remnants through intensive training and clearly dismiss the complete loss of the L1 even after many years of L1 deprivation. Nevertheless, concerning the influence of L1 attrition on L2 ultimate attainment, this study

points to the rejection of the Impediment Hypothesis (IH), (Hyltenstam *et al.*, 2009), which posits that a total loss of the L1 is necessary in order to attain native-like competence in the L2. The adoptees in this study (i.e. those completely deprived of their L1) did not outperform the immigrant group (i.e. those who had continued exposure to their L1). Nevertheless, a point of criticism at this point could be that the number of adoptees in this group is much more limited (n = 4) than the group of immigrants (n = 27). Therefore, even if strong evidence is provided for the seemingly equivalence between the two groups (i.e. adoptees and immigrants), the question of what the results could have been had both groups had a similar number of participants is left unanswered. Further research is certainly needed in order to gain a better understanding of both the phenomenon of L1 attrition and its influence on L2 ultimate attainment.

2.2.2.2 Models of language attrition

Next, we will present two of the most relevant models of language attrition, namely the regression hypothesis by Jakobson (1941, reported in Montrul, 2008) and Paradis' (2004, 2007) activation threshold hypothesis. These two different models are two of the most influential models used in order to provide a meaningful and exhaustive explanation of the phenomenon of attrition in the NL.

The Regression Hypothesis

This model is the earliest one in language attrition research. The supposed parallelism between language acquisition and language loss has usually been labeled as the *regression hypothesis*. The basic tenet of this hypothesis is that attrition is the mirror image of acquisition (Jakobson, 1941, reported in Montrul, 2008). This principle is also known as *last in, first out* (e.g. De Bot & Weltens, 1991; Keijzer, 2010; Montrul, 2008).

The regression hypothesis has usually been applied to test pathological forms of language loss. However, De Bot & Weltens (1991) claimed that non-pathological forms of language loss are more suitable for testing the regression hypothesis than pathological ones, because one cannot rule out the possibility that pathology influences the organization of language in the brain. That is, the organization resulting from the acquisition process may be altered by brain damage.

Jakobson's evidence for the *regression hypothesis* was based largely on phonological features and processes from Slavic. However, it remains to be seen how this hypothesis would explain the attrition of phonology, say, in a bilingual environment (Montrul, 2008). In this sense, Montrul (2008) proposed that if phonetics/phonology is one of the earliest acquired aspects in infancy, according to the *regression hypothesis* it should be the most resistant aspect to attrition. As a result, phonological attrition in the NL should be rare since it would undergo attrition after all other linguistic aspects (i.e. lexis, grammar,

etc.) of the NL have already been affected (see Keijzer, 2010 for a test of the *regression hypothesis*).

Köpke and Schmid (2004) stated that there are different versions of the *regression hypothesis*, namely one that is based on chronology ("that which is learned last is lost first", i.e. *last in, first out)*, namely the *reverse order hypothesis* and one that is based on reinforcement, namely the *inverse relation hypothesis* ("that which is learned best – i.e. most often used/reinforced -- is preserved the longest"). However, they claimed that this hypothesis has been mainly tested in L2 attrition studies (see e.g. Bardovi-Harlig & Stringer, 2010 for a discussion of different hypotheses in L2 attrition research), but it is to be further tested in NL attrition studies.

De Bot and Weltens (1991) claimed that in order to be able to test the regression hypothesis, one needs acquisition data from the same or highly comparable individuals. In this sense, they stated that it is inadequate to compare, say, loss data from multilingual immigrants with acquisition data from monolingual children in the country of origin. Nonetheless, they suggested that, if acquisition data from the "losing" informants are not available, the language of fully competent native speakers of comparable age and socioeconomic status will serve as a point of reference for measuring language loss.

This hypothesis provides a very interesting insight of language loss. We have seen that there are two versions of the hypothesis, namely the *reverse order hypothesis*, which posits that those aspects that have been acquired the last will be the first ones to be lost; and the *inverse order hypothesis* which posits that what is learned best is preserved the longest. In this sense, the attrition of both phonetics/phonology and lexis is still to be further investigated in order to find out to what extent these two linguistic domains can undergo attrition in the NL(s) of individuals immersed in an L2 environment for a long period of time.

The Activation Threshold Hypothesis

Paradis' (2004, 2007) *activation threshold hypothesis* considers both the order of acquisition and markedness, as well as what was acquired best through frequency and reinforcement (e.g. Köpke & Schmid, 2004; Montrul, 2008) in order to predict attrition in the NL.

The *activation threshold hypothesis* emphasizes the role of inhibition and frequency in bilingual language use. Paradis (2004) stated that the number of impulses necessary to activate an item constitutes its activation threshold. In this sense, he claimed that every time an item is activated, its threshold is lowered and fewer impulses are required to reactivate it. That is, after each activation the threshold is lowered, but it gradually rises again. He further suggested that if an item is not stimulated, it becomes more and more difficult to activate over time (see also Dewaele, 2001; Gürel, 2004; Hyltenstam *et al*., 2009; Stolberg & Munch, 2010). He concluded that "attrition is the result of long-term lack of stimulation. Intensive use/exposure to one of the languages in a bilingual environment leads to a lower activation threshold for that language, even in early, fluent, behaviourally balanced bilinguals" (Paradis, 2004: 28). This model provides us with a very appealing account of the phenomenon of attrition in the NL of individuals immersed in an L2 environment (e.g. De Bot *et al*., 1991; Pallier *et al*., 2003; Ventureyra *et al*., 2004).

In this sense, Köpke and Schmid (2004) claimed that activation and inhibition mechanisms appear to account for the control of multiple languages in the brain as well as for changing dominance patterns. Thus, they posited that within the *activation threshold hypothesis,* attrition is predicted in the form of reduced accessibility as a natural consequence of lack of language use.

Paradis (2004) further claimed that production of an item is more difficult than comprehension of the same item because production requires a lower threshold than comprehension. This is an interesting prediction of the *activation threshold hypothesis* and

it would account for the case of immigrants immersed in an L2 environment for a long time, who have undergone attrition in their NL and claim that they can understand their NL, but find it more difficult to speak (i.e. produce speech) in that language.

According to Montrul (2008), another prediction of the *activation threshold hypothesis* is that the less the NL is used, the more attrition there should be because competition from the L2 would be higher. This model has been mainly used in studies investigating lexical and morpho-syntactic attrition of the NL (e.g. Ammerlaan, 1996; Köpke, 2002).

The two models we have just reviewed, namely the *regression hypothesis* and the *activation threshold hypothesis* can provide us with very interesting insights of linguistic attrition in the NL(s). Further research on the attrition of the phonologies and lexical repertoires in the NL(s) is needed in order to find out to what extent these two linguistic domains can be affected by attrition in the case of individuals immersed in an L2 environment.

2.3 Multilingual systems

Research focusing specifically on multilingualism (i.e. the phenomenon which encompasses the knowledge of more than two languages by an individual speaker) has started relatively recently since researchers have realized that the cover term *bilingualism* (which was the term commonly used to refer not only to L2 but also to L3, L4, etc.) could not account for specific processes that take place in multilingualism (e.g. Cenoz *et al*., 2003a). Cenoz *et al*., (2003b) claimed that even if *bilingualism* is a phenomenon that may have a lot in common with *multilingualism*, research on the acquisition and processing of two languages cannot explain the specific processes resulting from the interaction between the languages that may result from the simultaneous presence of more than two languages in the multilingual person's mind (e.g. Cenoz, 2000a 2001, 2003a; Dewaele, 2010; Hammarberg, 2001, 2010; Ringbom, 2001, 2005; Williams & Hammarberg, 1998). Moreover, multilingualism is a phenomenon which has been described as being particularly complex to explain as well as to describe (see Ruiz de Zarobe & Ruiz de Zarobe, 2015).

It is important to point out that, at the phonetic level, no specific multilingual model has been put forward to this day, so the same models we have already reported, namely the Speech Learning Model (Flege, 1995) and the Perceptual Assimilation Model (Best, 1995) should be used.

Concerning the lexicon, Schönpflug (2003) claimed that the larger the number of linguistic systems at work, the more interactions between the various levels of the system are to be expected. Hence, she suggested that trilingual language processing is more complex than just the doubling of the interactions of a bilingual system (e.g. Cenoz, 2002; Cenoz, 2003a; Jessner, 2003). Jessner (2003) claimed that in third language acquisition there are two more relationships to investigate, namely the influence of L1 on L2, L1 on L3, L2 on L1, L2 on L3 and L3 on L1. We could add that the picture gets further complicated as more languages are included in the multilingual mind (see Singleton, 2003a for a critical synthesis of perspectives on the multilingual lexicon).

Among the factors that have been identified as triggering cross-linguistic influence in L3 acquisition and production are the following: typological similarity (e.g. Cenoz, 2001, 2003a), proficiency (e.g. Poulisse & Bongaerts, 1994; Williams & Hammarberg, 1998), recency of use (e.g. Williams & Hammarberg, 1998) and L2 status (Cenoz, 2001; Hammarberg, 2001; Williams & Hammarberg, 1998) also known as "foreign language effect" (e.g. De Angelis & Selinker, 2001).

Some studies (e.g. Gibson *et al*., 2001) have found that when producing a target language that is similar to another language the learner already knows, this previous knowledge can facilitate the production of interference of errors, hindering access to the correct lexical item. However, in another study Gibson and Hufeisen (2003) found that those multilingual learners who had more than one foreign language were the most skilled ones at making use of their metalinguistic knowledge (i.e. of how languages work and are constructed) and they were also more accurate in their dealings with a task which might require a synthesis of several types of language and meta-language learning strategies. They concluded that metalinguistic awareness combined with specific knowledge of the lexical, syntactic and semantic systems of other languages allows the learner to evaluate, extrapolate and even "guess" (original emphasis) intelligently to process even a new and unknown foreign language.

An aspect in multilingualism, more particularly, in L3 acquisition and production which has started to receive increasing attention on the part of researchers is the role of L2 transfer. We will report the most influential studies chronologically, but we may also go back to previous studies whenever the need arises. In this sense, Hammarberg (2001) claimed that even if the common assumption was that the effect of prior L2 knowledge was negligible, studies that have directly focused on L3 acquisition have provided ample evidence that prior L2s actually play a greater role than previously assumed (see Cenoz *et al*., 2001; Cenoz *et al*, 2003a; Gibson & Hufeisen, 2003; Hufeisen & Fouser, 2005). In this sense, Hammarberg (2010) formulated the definition of L3 as follows: "In dealing with the linguistic situation of a multilingual, the term *third language (L3)* refers to a non-native

language which is currently being used or acquired in a situation where the person already has knowledge of one or more L2s in addition to one or more L1s" (p.97).

In his study with learners of L3 English with either Finnish (i.e. a typologically distant language from English) or Swedish (i.e. a typologically close language to English) as L1, as well as with Swedish and Finnish as L2, respectively, Ringbom (2001) predicted that at an early stage of their L3 learning, learners would frequently make use of L2 words in their L3 production if the L2 and L3 are related and have a number of cognates. In fact, he found that psychotypology (i.e. the perceived typological distance between languages) was an important factor for the occurrence of L2 transfer in L3 production. In this sense, Ringbom (2005) claimed that learners employ a strategy of looking for real or assumed similarities between the target language and any other language they know. Interestingly, he also suggested that cross-linguistic similarity works differently for comprehension than for production, in the sense that in comprehension learners *perceive* (original emphasis) cross-linguistic similarity, which is usually manifested by means of formal similarity to something they already know, whereas in production they merely *assume* (original emphasis) that a similarity exists to a language they do not know (see also Ringbom, 1990). However, Ringbom (2001) suggested that psychotypology is not the only relevant factor determining the relative strength of L2 versus L3 influence. He further claimed that other factors such as degree of activation of the L2 and the stage of L3 learning should be considered. Additionally, he stated that the learner's L2 proficiency is of vital importance, as well as recency (see Williams & Hammarberg, 1998). Finally, he claimed that the extent of L2 input in the learner's environment is also to be considered. According to his account, differences in error frequency are linked with a gradual progress from organization by form to organization by meaning as the learner's L3 proficiency develops.

In her study, Cenoz (2003a) suggested a continuum with two extreme positions, namely interactional strategies and transfer lapses. She claimed that *interactional strategies* are intentional switches into languages other than the target language and that their presence will depend on language mode, so that their frequency is related to the bilingual or monolingual mode adopted by the speaker. She further suggested that following De Bot

(1992), in the case of interactional strategies language choice takes place in the conceptualizer. According to her account, the multilingual speaker makes the decision to use one language other than the target language when s/he is asking for help from his/her interlocutor or making comments about his/her own production.

On the other hand, she also referred to *transfer-lapses* which are non-intentional switches which are preceded by a pause or false start and can be regarded as automatic. She further claimed that these switches are to a greater degree independent of language mode or, at least, of those elements related to language mode that exist in the specific context in which production takes place. She concluded that when transfer lapses occur the other languages the multilingual speaker knows are activated in parallel to the target language and some elements from these languages are accidentally fed into the articulator (see Green, 1986, 1993).

Cenoz (2003a) added that cross-linguistic influence in multilinguals is of special interest because multilinguals could potentially use two or more different languages for interactional and transfer lapses and their language choice could be related to factors such as L2 status (e.g. Cenoz, 2001), typology (e.g. Cenoz, 2001; Hammarberg, 2001; Williams & Hammarberg, 1998), proficiency (e.g. Poulisse & Bongaerts, 1994; Williams & Hammarberg, 1998) and language mode (e.g. Grosjean 1998a, 1998b). In fact, Cenoz (2003a) found that the Spanish (L1) learners of English (L3) in her study with Basque as L2 used both their L1 and L2 as the source languages of transfer or suppliers, but each of these languages played a different role. Basque (L2) was the default supplier for interactional strategies and Spanish (L1) was the language the L3 learners resorted to for transfer lapses. In this case, Cenoz (2003a) suggested that language typology was a stronger cue for the L3 learners than L2 status. Nevertheless, given the young age of the learners (mean = 9.11 years), she offered the alternative explanation that the L2 (Basque), being the school language for these learners, was used for interactional strategies, whereas they used their L1 (Spanish) for transfer lapses in contrast to what has been found in other studies (e.g. Hammarberg, 2001).

In the project led by Williams & Hammarberg (1998), they found that the different languages of a speaker were seen to occupy different roles in the process of L3 acquisition. As Hammarberg (2001) pointed out, this division of roles is not established in a categorical way, but nonetheless constitutes a strong tendency. On the one hand, L1 dominates in various pragmatically functional language shifts that occur during the conversations and support the interactions or the acquisition of words and other expressions, what they have called an *instrumental role*. On the other hand, the L2 has a *supplier role* in the learner's construction of new words in L3 as well as in her attempts to cope with new articulatory patterns in L3. Hammarberg (2001) finally claimed that, gradually, L3 itself takes over more and more of both instrumental and supplier functions, as L3 proficiency increases.

The above-mentioned study by Cenoz (2003a) made strong claims about multilingual production, one of them being that language choice takes place in the conceptualizer in the case of interactional strategies. The Spanish learners of English as L3 with Basque as L2 in her study seemed to provide support for her claim and offered a very interesting insight of the reason why in this study learners used Basque (L2) for interactional strategies, whereas they used Spanish (L1) for transfer lapses. In contrast, in the study by Williams & Hammarberg (1998) and Hammarberg (2001), they found that the L1 had an instrumental role, whereas the L2 had a supplier role. As Hammarberg (2001) concluded, it was the L2 the language which would win out over the L1 in the competition for activation because in their study the L2 scored higher in the conditioning factors (i.e. recency, status, etc.).

We have just seen that multilingual acquisition is a recent area of research in its own right since it is characterized by its own processes. Therefore, multilingual acquisition should be considered as such in order to draw the right conclusions from studies and gain a better understanding of this phenomenon.

2.3.1 Models of multilingual lexical production

In this section we are going to review some models of multilingual processing that have been proposed in recent years. More particularly, we are going to review those models proposed by Müller-Lancé (2003) and Hall and Ecke (2003), which have been two of the most influential models of multilingual production.

2.3.1.1 A Strategy Model of Multilingual Learning

Firstly, we are going to review the model proposed by Müller-Lancé (2003) which he named *strategy model*, and which he divided into three different domains, namely mental lexicon, language comprehension and language production.

We will start by reviewing the structure of the multilingual lexicon as described in this model. One of the first proposals by Müller-Lancé (2003) was that in the mental network the connections between the elements of different foreign languages are not necessarily weaker than those between foreign language elements and L1 elements. In fact, he further claimed that this evidence is compatible with the premises of the *subset hypothesis*, as proposed by Paradis (1981). Müller-Lancé suggested that a kind of *language tagging* should be necessary, not only to mark individual languages, but also to mark the distinction between the L1 and the totality of foreign languages. As a consequence, the L1 is systematically avoided as a transference base in foreign language production.

In this model, the mental connections present different degrees of "strength" depending on the characteristic of the lexical item. In this sense, Müller-Lancé (2003) claimed that the mental connections between cognates (i.e. phonetically and semantically related words of different languages) are extremely strong. He further claimed that in the case of experienced foreign language learners, cognates of different languages seem to be connected even stronger mutually than to the respective L1 element, or to the other elements of the respective foreign language. Thus, interlingual connections can be stronger

than intralingual connections. An especially noteworthy characteristic about this strategy model is that cross-linguistic connections can be built up quickly, but they are also vulnerable to attrition. Therefore, as Müller-Lancé (2003) put it, instability is a characteristic feature of the multilingual lexicon.

Next, we are going to review the process of L3 production or comprehension as suggested by this model. Müller-Lancé (2003: 127-128) suggested the following principles in his model:

- The decisive point for the processing of unknown words is the formal similarity of a word's beginning (first and second syllable) to the beginning of a better-known word (…).
- My association tests have shown that, if a subject has the choice of semantic *and* (original emphasis) phonetic connecting, he usually opts for the semantic possibility. If there is no semantic access to a word form, he will opt for phonetic associations.
- Different languages can be activated in different ways (see also Green, 1986, 1993). If a concrete language is *selected* (original emphasis) as a transference base in the framework of inferencing strategies, it will probably be selected for the next lexical problem as well.
- In the context of selection, language activation and proficiency are more important than learning time or learning order.
- Learning experiences are not only decisive for the organization of mental lexicon (tendency: language acquisition leads to intralingual semantic associations, language learning to translation associations), but also for the choice of inferencing strategies: we can suppose a kind of access filter for comprehension and production whose setting depends on individual language combination and proficiency, learning experiences and temperament (…).
- The setting of the comprehension/production filter is also responsible for the search width when the subject is looking for transference bases: the higher the target language proficiency is developed, the smaller or more precise is the

lexical field in which the transference base is searched. Subjects who have no competences for a target language normally search the whole net (i.e. mental lexicon), provided that they are motivated.

- The result of transference base search is controlled by a monitor (…). The monitor setting depends above all on target language proficiency and temperament.
- Regarding the choice of inferencing strategies, it seems that the world knowledge store can be inhibited by the mental lexicon. This assumption would explain the small number of inferencing based on context, learning episodes (e.g. "Yesterday I still knew this word!") or world knowledge.
- There are differences between L3 production and comprehension regarding the principles of processing and the inferencing strategies: in L3 production for instance context, world knowledge and L1 are often ignored as sources of inferencing. A forced switch of language is first problematic in language production, and language production is also more affected by attrition.

The strategy model of multilingual learning proposed by Müller-Lancé (2003) attempted to offer a comprehensive and straightforward account of two different phenomena; on the one hand, the organization of the multilingual lexicon and, on the other, the way L3 comprehension and production are processed. In fact, it is a fairly comprehensive model in that it accounts for phenomena such as the frequent use of cognates as well as for the instability of the multilingual mental lexicon. It also points to the importance of formal similarity between languages for the occurrence of transfer, and it integrates the terminology used by Green (1986, 1993) in his *Inhibitory Control Model* when he uses the terms of *selected*, *active* and *dormant* as possible states for the different languages of a multilingual speaker. Another point worth mentioning here is the integration of the concept of motivation in this model, which is viewed here as: either the willingness to make the effort to find the right lexical equivalent via an extension of the search width (i.e. the speaker is motivated) or give up (i.e. the speaker is not motivated). All these characteristics render this model worth taking into account when it comes to the

organization of the multilingual lexicon as well as to multilingual production and comprehension.

Nevertheless, one of the main objections to this model could be, as Müller-Lancé (2003) himself recognized, that it does not integrate problems of misunderstanding nor communication strategies (see Cenoz, 2003a). Apart from this issue, Müller-Lancé also acknowledged that the question of which language is selected as transference base was left aside for "reasons of clarity". Nonetheless, we could claim that this is a key issue in a multilingual production model (see Williams & Hammarberg, 1998), namely to identify the language which serves as transference base in multilingual production and comprehension and outline the possible reasons why that particular language and not any other language known to the multilingual speaker is selected.

Even though the model proposed by Müller-Lancé (2003) can be viewed as a serious attempt to account for multilingual processing, further research in this area is certainly needed. Likewise, more proposals should be put forward in order to gain a better understanding of the organization of the multilingual lexicon, as well as of the processes underlying multilingual comprehension and production.

2.3.1.2 The Parasitic Model

This model proposed by Hall and Ecke (2003) is a model of vocabulary acquisition which is characterized by the detection and exploitation of similarity between novel lexical input and prior lexical knowledge. This model is hypothesized to constitute a default cognitive procedure, modulated in practice by other factors external to the lexicon. They claimed that the need for such a model was that the concept of "transfer" or "CLI" (i.e. cross-linguistic influence) are cover-terms for three different but related phenomena, namely (a) the use of non-target lexical representations in the construction of novel target word entries ("acquisition CLI"); (b) the production of non-target language items that are in competition with existing target language entries ("performance CLI); and (c) the production of non-target language items because the corresponding target language items are un- or under-represented ("competence CLI"). Hall and Ecke (2003) claimed that this model presupposes that new words are integrated into the existing lexical network with the least possible redundancy and as rapidly as possible, in order to make them accessible for communication. They further claimed that an important characteristic of the process is that it frequently results in initially non-target representations and access results. Likewise, non-target or incomplete representations will result in competence errors, whereas non-target access routes may result in performance errors. The most frequent type of non-target comprehension errors are slips of the ear (i.e. auditory misperceptions), whereas production failures include tip of the tongue states (e.g. Ecke, 2001) and lexical "errors", more precisely, connections and access routes. It should be mentioned that this model is evidence on a study with Spanish (L1) learners of German (L3) with English as their L2 (Hall & Ecke, 2003).

Next, we are going to review the main characteristics of the Parasitic Model as proposed by Hall & Ecke (2003:78-79).

The parasitic model posits that when a learner encounters a new word form in the L3, s/he is faced with the task of constructing an appropriate triad of form, frame, and their

associated conceptual representation. They hypothesized that the following processes, essentially "parasitic" in nature and effect, are initially invoked by default in the development of such representations and connections:

A.Establishing a form representation

A1. The L3 word form is registered in STM (short-term memory) and the closest matches (if there are any) in L3, L2 or L1 are activated, based on salient form attributes (e.g. Ecke, 2001).

A2. The L3 form is connected to a host representation (normally the most highly activated related L3, L2, or L1 form, where some threshold level of similarity between them is met) and is established in LTM (long-term memory) is distributed fashion (activating the same nodes in the network as the host form).

A3. Difference(s) between L3 form and host representation are detected, new patterns are rehearsed and the representation is revised with respect to the attributes that distinguish it from the host and/or other consolidated neighbours. (This is difficult and not always achieved, leading to fossilization of the interlanguage configuration).

A4. If no matching form representation is activated sufficiently, the L3 form is connected to the frame of the nearest conceptual (translation) equivalent (as in B2 below).

B.Building connections to frame and concept representations

B1. The frame of the form-related host is adopted for deployment of the L3 form. It is retained while contextual cues confirm the inference, and is used as a link to the corresponding conceptual representation.

B2. If subsequent context contradicts information in the frame and conceptual representation inferred from the form-related host, another perceived conceptual (translation) equivalent from L1 or L2 is activated and its frame adopted.

B3. If no translation equivalent can be identified, a provisional frame (based on a variety of distributional and morphological cues) is constructed and connected directly to a conceptual representation.

C.Strengthening and automatisation of representations and access routes

C1. Initially established connections with other L1, L2 or L3 representations are revised , bypassed or severed, to establish a more autonomous triad (with direct L3 form-frame-concept connections) responding to new cues in the input.

C2. Autonomous connections between L3 form, mediating L3 frame and concept are strengthened and the representations themselves refined, with increased frequency of exposure and use.

C3. Access routes between elements of the L3 triad are automatised.

Hall and Ecke (2003) also claimed that the Parasitic Model generates a number of predictions concerning cross-linguistic influence (CLI) in the trilingual lexicon. First of all, they suggested that any kind of representational similarity should play a potential role in the development of L3 lexical competence and the outcomes of L3 lexical performance. The fact that the three languages can serve as sources of lexical influence on each other and on themselves has been referred to as "total parasitism" in the trilingual lexicon (see Ecke & Hall, 2000). They claimed that the Parasitic Model predicts the occurrence of PCLI-based errors (i.e. performance CLI); where a non-target structure is activated and produced at the expense of an existing but more weakly activated target structure, via non-target access routes. They further suggested that the Parasitic Model also predicts CCLI-based errors (i.e. competence CLI); where non-target structures are produced because the target structures are un- or under-represented). Other set of predictions suggested by Hall and Ecke (2003) include the following:

a) Identical nominal gender in L1 and L2 conspiring to override different gender cues in a novel L3 translation equivalent, resulting in the adoption of (elements of) a joint L1/L2 frame;

b) Frequent PCLI (i.e. performance CLI) errors resulting in losses in initial L3 competence due to the strength of activation of competitors.

The Parasitic Model we have just reviewed presents a very interesting set of hypotheses and predictions which can help us gain a better understanding of the way L3 vocabulary is acquired. This model, which is divided into three different stages, namely *establishing a form representation*, *building connections to frame and concept representations* and *strengthening and automatisation of representations and access cues*, relies on previous knowledge of L1 and L2, as well as of knowledge of the L3 itself in the acquisition of new L3 forms. This is what Ecke and Hall (2000) have referred to as "total parasitism". Each of the stages in the acquisition of a new L3 form is described in detail in this model and we can see the importance of the so-called "magnet effect" (i.e. the effect whereby true cognates in different languages are easily recognized and associated by the L3 learner). Another important characteristic of this model is that it accounts for the acquisition of L3 vocabulary from the very initial stages almost until fossilization (i.e. ultimate attainment) has taken over. However, problems can usually arise in characterizing fossilization since it is a process which varies greatly depending on individual and contextual factors (e.g. amount of exposure, frequency of use, degree of motivation towards learning the L3, etc.).

Even if the parasitic model can provide us with quite a comprehensive description of the processes underlying L3 vocabulary acquisition, it should be said that it also presents a number of caveats which must be considered.

First of all, this is a model based on evidence from Spanish (L1) learners of German (L3) with English as L2. That is, this model is based on the performance of native speakers of a particular Romance language (L1) in a particular Germanic language (L3) who have another Germanic language in their linguistic background (L2). This means that this model appears to be highly constrained in the sense that it may be able to account for performance of speakers with the same linguistic background as the group characterizing this model, but

it may fail to account for phenomena featuring in a different language learner group. Another limitation of this model, which the authors of the model themselves acknowledge, is that it is not always apparent whether the selection of a given frame for a new L3 form is influenced by a particular word form from L1, L2 or L3. As a matter of fact, they further added that with the false cognate phenomenon it is very hard to distinguish whether it is either form similarity that is behind the error, or a combination of both form and meaning. In the case of this learner group with two Germanic languages in their linguistic background, namely English as L2 and German as L3, we can presume that the issue of cognates (both true and false cognates) may be particularly complex to analyze. Finally, another limitation of this model which is also acknowledged by the authors themselves is that it is very difficult to determine whether the occurrence of errors is a result of "performance CLI" or of "competence CLI" (i.e. competing or shared representations). All in all, the Parasitic model is a model characterizing the process of L3 vocabulary acquisition in quite a straightforward and detailed way which results in a model worth taking into account in this area of research (see also González Alonso, 2012).

2.4 Factors in language acquisition and attrition

In this section we are going to present those individual and contextual factors in L2 acquisition and language attrition we examined for the present study. The variables we considered are some of the factors which have proved relevant in previous studies of L2 acquisition and language attrition in the NLs (see Baker & Trofimovich, 2006 for a study investigating the role of individual differences in the accurate production of L2 vowels; see Dörnyei & Skehan, 2003 for a review of individual differences in L2 learning; see also Abrahamsson & Hyltenstam, 2009; Hyltenstam & Abrahamsson, 2003). The factors we analyzed for the present study are divided in three main groups. The first group comprehends biographical factors, namely age of arrival (AOA), gender (male versus female) and education level (university studies versus non-university studies). The second group includes affective factors, namely degree of identification (DI), motivation (M) and strength of concern for pronunciation accuracy (CPA). Finally, the third group corresponds to factors related to input, namely length of residence (LOR) and degree of activation (DA), which is subdivided into two: percentage use and location (Reno versus Boise).

2.4.1 Biographical factors

Now we are going to review the theoretical background corresponding to the biographical factors we considered in our study. We looked into three different biographical factors, namely age of arrival (AOA), gender and education level. We will review each of those in two opposite directions, namely their influence on the phonological and lexical acquisition of the L2, and on the phonological and lexical attrition of the native language(s).

2.4.1.1 Age of arrival (AOA)

This variable has usually been considered one of the most influential variables for predicting degree of ultimate attainment in an L2 (e.g. Johnson & Newport, 1989; Munro & Mann, 2005; Piske *et al*., 2001); the common finding being, on the one hand, that the earlier the AOA in the host country, the higher the degree of attainment in the L2. On the other hand, the earlier the AOA in the host country, the higher the degree of attrition in the NL(s) will be. In this section, we are going to analyze the variable AOA from two different perspectives; on the one hand, its influence on the phonological and lexical acquisition of the L2 and on the other, its influence of the phonological and lexical attrition of the NL(s).

A) The influence of AOA in the phonological and lexical acquisition of the L2

The age factor is one of the variables which have been most deeply studied in the last decades since Penfield (1953), a neurosurgeon himself, focused on the phenomenon of language lateralization as triggering the development of speech in children:

> "When a child begins to speak, there develops a functional specialization in one cerebral hemisphere…There are separate areas of the cortex on…the dominant side which come to be devoted to the formulation and the understanding of speech. Meanwhile the slate continues to be blank on the right side" (Penfield, 1953: 203).

A few years later, Penfield and Roberts (1959) further developed their claim in the following terms:

> "The infant possesses a speech mechanism, but it is only a potential mechanism. It is a clean slate, waiting for what that infant is to hear and see,…language will serve as the vehicle for practically all forms of knowledge" (Penfield & Roberts, 1959: 238).

Still, a few years on, Penfield with his own formulations paved the way for the nowadays widely known hypothesis, namely the *Critical Period Hypothesis* (CPH):

> "Before the child begins to speak and to perceive, the uncommitted cortex is a blank slate on which nothing has been written. In the ensuing years much is written, and the writing is normally never erased. After the age of ten or twelve, the general functional connexions have been established and fixed for the speech cortex. After that, the speech centre cannot be transferred to the cortex of the lesser side and set up all over again. This "non-dominant" area that might have been used for speech is now fully occupied with the business of perception" (Penfield, 1965: 762).

The above-mentioned hypothesis became known as the *Tabula Rasa* Hypothesis and it suggested that the full use of the dominant committed part of the cortex leads to an irreversible functional fixation of speech production and speech perception and that it no longer allows other options (see Dechert, 1995 for a critical review of Penfield's theory of L2 acquisition).

However, the CPH as such was formulated for the first time by Lenneberg (1967):

> "There is ample evidence that age two is the beginning of a period of slowed-down structural growth; it is preceded by a period during which growth had gone on at a very rapid pace, and followed by a period of absence of growth" (Lenneberg, 1967: 164).

Several researchers (e.g. Singleton, 1989, among others) have suggested two reasons for the growing interest in the age factor. First of all, the frequent observation that children acquire languages relatively fast and in a native-like manner, whereas adults usually find it more difficult to attain a certain level of proficiency, let alone native-like proficiency (i.e. native-like proficiency in adult learners is extremely rare) in an L2. Secondly, society has demanded further research on this topic in order for teachers and parents to know the optimal age to start learning an L2. Furthermore, adult learners also demand language learning methods which will allow them to learn as quickly and efficiently as possible (e.g. Birdsong, 1992; Birdsong, 1999a, 1999b; Marinova-Todd, 2003b).

In the next section, we will review the Critical Period Hypothesis (CPH) from the very beginning of its formulation, and we will also present studies which have challenged the basic premise of this hypothesis in one way or another. Likewise, we will present the two most relevant positions regarding the age factor in L2 acquisition, namely *the younger, the better* and *the older, the better* positions. *The younger, the better* position suggests that success in L2 learning is inversely related to age of learning, whereas *the older, the better* position posits that older learners are more successful than younger learners (e.g. Singleton & Ryan, 2004).

The Critical Period Hypothesis (CPH)

In the present section we will review different approaches to the Critical Period Hypothesis (CPH); next, we will present some studies favouring "the younger, the better" position; and finally, we will report on several studies supporting "the older, the better position.

Lenneberg (1967) considered the beginning of the CP to be at age 2 and the end at around puberty, this period coinciding with the lateralization process, that is, the specialization of the dominant hemisphere of the brain for language functions. Regarding L2 acquisition, Lenneberg believed that most individuals of average intelligence are able to learn an L2 after the beginning of their second decade, although the incidence of the so-called "language-learning blocks" rapidly increases after puberty (i.e. language learning becomes more and more difficult). He further suggested that automatic acquisition from mere exposure to a given language seems to disappear after this age and FLs have to be taught and learned through conscious effort. Finally, he focused on the acquisition of the phonology of FLs after the offset of the CP. In this sense, he stated that:

> "Foreign accents cannot be overcome easily after puberty. However, a person *can* learn to communicate in a foreign language at the age of forty. This does not trouble our basic hypothesis on age limitations because we may assume that the cerebral organization for language learning as such has taken place during childhood, and since natural languages tend to resemble one another in many fundamental aspects, the matrix for language skills is present" (Lenneberg, 1967: 176).

A decade later, Lamendella (1977) considered reasonable to suggest the concept of a *sensitive period* for the process he referred to as *secondary language acquisition* (SLA). He defined the *sensitive period* as "a span of time when SLA is carried out most efficiently" (Lamendella, 1977:191). In this sense, he further explained that:

> "Accepting the distinction between a sensitive period for SLA and a critical period for PLA (primary language acquisition), one should not, however, fall into the trap of searching for "the" cause for the end of a period of maximal receptivity of the individual to SL input. Without doubt a

> great many extrinsic and intrinsic variables- sociocultural, psychological, cognitive, neurological and environmental- occurring in various combinations and degrees in different individuals are all potential causes for the termination of the sensitive period for SLA" (Lamendella, 1977: 191-193).

Lamendella (1977) made a clear distinction between what he called *primary language acquisition* (PLA) and *secondary language acquisition* (SLA). He considered that the critical period as formulated by Lenneberg (1967) applies to PLA, giving as an example the case of the feral child Genie who, after being kept in physical and linguistic isolation from 20 months of age to approximately 13 years of age and subsequently subjected to extensive tutoring by linguistic specialists, failed to acquire normal language production and comprehension abilities (see also Blumstein & Kurowski, 2006 for a perspective of the foreign accent syndrome). In fact, Lamendella (1977) considered that the term *sensitive period* better captures the idea of a maximal receptivity of the individual to the L2 input (see also Harley & Wang, 1997). Nevertheless, even if the term *critical period* has fallen out of favor for some researchers due to connotations of excessive rigidity, nowadays both terms *sensitive* and *critical* are still used interchangeably (see Harley & Wang, 1997; see also Uylings, 2006 for an explanation of the concept of "critical" or "sensitive" periods).

Since the formulation of the CPH by Lenneberg (1967), many other researchers have supported this hypothesis which posits that the younger the speaker is when L2 learning starts, the better the results in terms of general proficiency will be. However, there are also some studies which have challenged or even refuted this hypothesis because they found native-like performance in adult L2 learners. We will first review chronologically the studies by those researchers who have actually supported this hypothesis.

Scovel (1988) claimed, following the premises of the CPH, that phonology was the only aspect affected by age constraints because of its neuromotor etiology. According to his claim, after a certain age it would be completely impossible to acquire the phonology of any language to a native-like level. Nonetheless, he also suggested that there may be some "superexceptional" L2 learners, 1 out of 1,000 in any population of adult learners who are not bound by the biological constraints of the CP. Nevertheless, for the average L2 learner,

puberty has traditionally been considered as the cut-off point for the CP (e.g. Lenneberg, 1967; Singleton & Ryan, 2004).

In their classic study, Johnson and Newport (1989) put forward two different versions of the CPH, which they called *the exercise hypothesis* and *the maturational state hypothesis*, respectively. They explained the characteristics of each of these hypotheses in the following fashion (Johnson & Newport, 1989: 64):

Version One: The exercise hypothesis. Early in life, humans have a superior capacity for acquiring languages. If the capacity is not exercised during this time, it will disappear or decline with maturation. If the capacity is exercised, however, it will remain intact throughout life.

Version Two: The maturational state hypothesis. Early in life, humans have a superior capacity for acquiring languages. This capacity disappears or declines with maturation.

Johnson and Newport (1989) explained that the *exercise hypothesis* predicts that children will be superior to adults in acquiring a first language and that if learners are not exposed to a first language during childhood, they will be unable to acquire any language fully at a later age. Nevertheless, they further claimed that as long as they have acquired a first language during childhood, the ability to acquire language (i.e. a second or subsequent language) will remain intact and can be utilized at any age. In contrast, the *maturational state hypothesis* claims that there is something special about the maturational state of the child's brain which makes children particularly adept at acquiring any language, first as well as second (see Birdsong & Molis, 2001 for a replication of this study which, however, yielded evidence of both pre-maturational and post-maturational age effects as well as of native language effects and modest evidence of nativelike performance).

It is worth taking into account that these two hypotheses have been considered not to be mutually exclusive (e.g. Harley & Wang, 1997), but there is still lack of evidence

supporting the *exercise hypothesis*. In fact, Johnson and Newport (1989) claimed that their study supported the maturational state hypothesis and not the *exercise hypothesis* (see also Ioup, 2005 for a review of studies supporting the *maturational state hypothesis*). In this sense, they concluded by claiming that "human beings appear to have a special capacity for acquiring language in childhood, regardless of whether the language is their first or second (Johnson & Newport, 1989: 95).

In their thorough account of maturational constraints in L2 acquisition, Hyltenstam and Abrahamsson (2003) reviewed some of the most relevant studies either supporting or challenging the CPH. Even if they concluded that they do not fully support the formulation of any particular hypothesis concerning the CP, they did highlight the importance of maturational constraints in L2 acquisition given the empirical data provided supporting this position.

Hyltenstam and Abrahamsson (2003) claimed that the empirical data against the CPH discussed are not sufficiently rich and consistent to constitute a basis for the falsification of the CPH (see also DeKeyser *et al.,* 2010), primarily because the notion of "nativelike proficiency" is highly elusive. However, they suggested that the most reasonable interpretation of the existing data is that it does support a maturational constraints hypothesis, although "this hypothesis is not necessarily identical to the original or any other prevalent formulation of the CPH" (Hyltenstam & Abrahamsson, 2003: 542). They further suggested that given the fact that there are no published accounts of a single adult starter who has reached nativelike overall proficiency (see, however, Ioup *et al*., 1994 for an account of two highly proficient adult L2 learners in a naturalistic setting whose success the authors ascribed to talent or aptitude for language learning; see Harley & Hart, 1997 for a study on second language aptitude in a formal setting; see also Harley & Hart, 2002; Robinson, 2002; see also Robinson, 2005 for a review of aptitude and L2 acquisition; Sparks & Ganschow, 2001); and given the frequent observation of non-native features even in very early starters, "we would suggest the *possibility* (original emphasis) that absolute nativelike command of an L2 may in fact never be possible for any learner" (Hyltenstam & Abrahamsson, 2003: 575).

More recently, Singleton and Ryan (2004: 32) defined the CP as "the term used in biology to refer to a limited phase in the development of an organism during which a particular activity or competency must be acquired if it is to be incorporated into the behavior of that organism". Thus, they considered the CP concerning L2 learning as the end of the phase when acquisition of a new language will be easier; after the end of the CP, L2 learning will be more difficult and will require more conscious effort on the part of the learner. In their study, DeKeyser and Larson-Hall (2005) stated that they used "the term *critical period hypothesis* (CPH) in their chapter to designate the idea that language acquisition from mere exposure (i.e. implicit learning), the only mechanism available to the young child, is severely limited in older adolescents and adults" (DeKeyser & Larson-Hall, 2005: 89).

We certainly consider Hyltenstam and Abrahamsson's a more than reasonable position which needs to be taken into account in L2 acquisition research. Further research is needed in order to find out whether this position is actually valid or should be abandoned. For now, however, we are far from providing a conclusive explanation which may account for the diverse empirical data found in different studies.

More recently, DeKeyser and Larson-Hall (2005) claimed that even if some late learners can attain very high levels of native-like pronunciation in mostly constrained tasks, there is still to show that late learners can achieve the same high level of phonology as native speakers in spontaneous production (see also DeKeyser, 2000 for support of the CPH in a grammaticality judgement test; DeKeyser *et al.*, 2010).

Nevertheless, there has been a large number of studies which have challenged the validity of the CPH in different ways. Next, we are going to review by order of publication some of the studies which have put into question the validity of this hypothesis and have accounted for their findings in a different light.

Flege (1987b) described differences between adult and child phonological acquisition as stemming from differential processing of new phonetic categories. According

to Flege's model of L2 phonological acquisition, namely the Speech Learning Model (SLM), adult learners may rely on pre-existent phonetic categories from their L1, preventing the development of phonetically accurate L2 sounds (Flege, 1991). Nevertheless, in a previous study, Flege (1987a) showed that adults can produce foreign vowels authentically if these vowels are dissimilar to any native vowel and if they have had enough exposure to the L2. In this study, Flege (1987a) concluded that vowels which are sufficiently dissimilar to any native vowel (e.g. French /y/ for native speakers of English) will not be treated as equivalent to any pre-existent phonetic categories of the L1 by the L2 learner and, as a result, sufficient input and exposure will enable adult L2 learners to establish new phonetic categories for new vowels. This study somehow challenged the basic premise of the CPH which posits that only young L2 learners can master L2 sounds (i.e. produce L2 sounds accurately).

Flege (1987c) further claimed that there is no conclusive evidence for the existence of a CP for human speech learning, and the fact of assuming the existence of a CP may inhibit the search of testable hypotheses concerning the basic child-adult differences in L2 pronunciation (see also Flege, 1999; Mackay, *et al.*, 2006; Mackay & Flege, 2004). However, Patkowski (1990) in his reply to Flege (1987c) claimed that there is sufficient evidence to support the notion of an age-based limitation on eventual proficiency by L2 learners. He further suggested that Flege did not represent the CPH in its entirety accurately and that convincing counterevidence to claim that child L2 learners are superior in terms of ultimate ability has not been provided. As a result, Patkowski (1990) concluded that rejection of the CPH is unjustified.

Another researcher who has also grown skeptical about the validity of the CPH is Birdsong (1992, 1999a, 1999b, 2005). Birdsong (1992) found that 15 out of the 20 native speakers of English who had begun learning L2 French in adulthood fell within the native-speaker range on a demanding grammaticality judgement task (see also White & Genesee, 1996 for similar results with a more controlled selection of subjects). In his study, which was a replication of a previous study by Coppieters (1987), Birdsong (1992) found that, contrary to the findings by Coppieters (1987) experimental performance was not predicted

by the status of a linguistic variable as within or outside the theoretical domain of Universal Grammar (see also Sorace, 2003). However, he also found that, consistent with the findings of Johnson and Newport (1989), age of arrival (AOA) in the host country was positively correlated with deviance scores overall as well as on two of the linguistic variables. Later on, we will see that Birdsong (2007) also found native-like phonological performance in English speakers of L2 French. All these results made Birdsong put into question the validity of the CPH.

In another study, Flege *et al*., (1997b) realized that their L2 participants presented a noticeable foreign accent even in cases when their L2 acquisition had started at ages ranging from 5 to 6 (i.e. early L2 acquisition), and despite the fact that they had been using the language in an L2 environment for 34 years on average. This study also troubled one of the basic premises of the CPH which posits that the L2 will be accent-free if learned in childhood (i.e. before the end of the CP which is supposed to occur around puberty).

In this sense, Harley and Wang (1997) claimed that the critical period concept has proven to be a productive one in prompting the search for evidence of maturational constraints in language acquisition. They further suggested that there is strong evidence from studies of delayed first language acquisition that an onset in early childhood is essential for full development of language. However, they also posited that "an early onset age for second language acquisition confers a statistical, but not absolute, advantage" (Harley & Wang, 1997: 45). This is a very important point to take into account when it comes to age effects in L2 acquisition, since as in the above-mentioned study by Flege *et al*., (1997b), the widespread belief of automatic accent-free speech in early L2 acquisition has been seriously put into question (see also DeKeyser & Larson-Hall, 2005 for a thorough review of studies for and against the premises of the CPH).

In the two studies reported in Bialystok (1997), she found that aspects of a second language that are structurally different from those of the first language are more difficult for L2 learners to master. However, this difficulty emerges irrespective of the age at which learning of the L2 began. Following this line of argumentation, she claimed that children

appear to be more successful language learners, but "the reason for the difference is not because of maturational limits on language learning but because of stylistic differences in learning at different times in life. Moreover, there is nothing inevitable about these differences; they are only tendencies. The child advantage, therefore, has no biological basis, no exclusionary function and reflects no sensitive period" (Bialystok, 1997: 132). Bialystok (1997) is one of those authors who tried to find an explanation for the recurrent finding of an advantage of early learners over older learners, but dismissing a biological basis for such effects.

In the same vein, Flege (1999) suggested that the fact that the CPH has been generally assumed to account for the main differences between those subjects who attain a good pronunciation in an L2 or L3 and those who fail to, has prevented scholars from looking for other convincing explanations for this phenomenon. Flege *et al*., (1999) further claimed that those who suggest that foreign accents arise due to the passing of a CP do not specify whether the age-related changes arise from a loss of ability to auditorily distinguish L2 from NL sounds or to form perceptual representations for L2 sounds in long-term memory, or from a loss of ability to translate those representations into articulatory gestures.

Marinova-Todd *et al*., (2000) showed their strong discontent with what they considered three misconceptions about age and L2 learning. They claimed that the belief that adults cannot master foreign languages is as widespread as erroneous. They considered the misinterpretation of observations of child and adult learners, which might suggest that children are fast and efficient at picking up L2s, to be the first fallacy. They further claimed that the second fallacy is misattribution of conclusions about language proficiency to facts about the brain; and finally, they claimed that the common fallacy of reasoning from frequent failure to the impossibility of success "has dogged L2 research" (p.27). Furthermore, they made what could be considered a highly controversial claim given the existent bulk of evidence suggesting the opposite, namely they claimed that "most adult learners do, in fact, end up with lower-than-nativelike levels of proficiency. But most adult learners fail to engage in the task with sufficient motivation, commitment of time or energy,

and support from the environments in which they find themselves to expect high levels of success" (p. 27). That is, they seemed to dismiss the existence of maturational constraints in L2 acquisition altogether, and pointed out the importance of individual factors as the only determinants in variability in L2 outcomes among adults (see Hyltenstam & Abrahamsson, 2001 for strong criticism of this article; see also Marinova-Todd *et al*., 2001 for their reply to Hyltenstam & Abrahamsson, 2001). In another study, Marinova-Todd (2003a) recruited 30 late learners (AOA higher than 16 years; mean = 11 years) with at least 5 year residence (mean= 11 years) in an English-speaking country). Of the 30 learners, 3 fell within the native-speaker range across all nine tasks. Six others were indistinguishable from natives on seven tasks. Again, this study seemed to contradict the CPH.

Flege *et al*., (2006) found that native Koreans in an L2-speaking country, even those who had arrived as young children and been enrolled in English-medium schools for an average of 4 years spoke English with a detectable foreign accent. They stated that these findings were inconsistent with the hypothesis that adult-child differences in L2 speech production are due in part to the fact that immigrant children receive more native-speaker input from the L2 than immigrant adults do.

More recently, Birdsong (2007) also challenged the CPH for L2 acquisition. He recruited 22 late learners of French with English as their NL, who had resided in the Paris area for 11 years on average. He found that two of the participants performed within the range of 17 native speakers of French on three measures: vowel length, Voice Onset Time (VOT) and global pronunciation, as rated by three native judges. Birdsong himself described his results as impressive rates of native-like pronunciation taken into account the fact that they were all late learners of French. He observed that the most successful learners had had phonetic training and were highly motivated to improve their L2 pronunciation (see also Bialystok & Hakuta, 1999; Bongaerts, 1999; Hakuta *et al*., 2003; Moyer, 1999). Nevertheless, he further stated that other participants were similarly trained and motivated, but did not perform like natives across the pronunciation tasks. At this point, he claimed that high motivation and phonetic training may be necessary, but not sufficient factors for

native-like acquisition and performance. These results made the author of this study put into question, once again, the validity of the CPH.

In their review of four hypotheses regarding age effects on ultimate L2 proficiency, Flege & Mackay (2011) found that all four hypotheses, namely the maturational constraint hypothesis, the cognitive development hypothesis, changes in L1-L2 interactions and input differences between early and late learners, had some predictive power, but none was perfect. As a result, they suggested that age-related effects arise from multiple factors (see also Singleton, 2003b) that co-vary with the age at which L2 learning began, and concluded that "the amount and quality of L2 input received, and the strength of the L1 system may be the most important long-term determinants of ultimate L2 proficiency" (p.65).

Likewise, Muñoz and Singleton (2011) also made a critical review of age-related research on L2 ultimate attainment and concluded from the existing literature that there is no confirmation of an abrupt maturational cut-off point in L2 learning capacity of the kind that would normally be associated with the ending of a critical period as it is usually understood (see Singleton, 1995 for a critical review of the critical period hypothesis in L2 acquisition; see also Scovel 2000 and Singleton, 2001 for reviews of age effects in L2 acquisition research). They added that their view is that "until and unless an "elbow" CAN (original emphasis) be seen as clearly associated with the purported offset of any postulated maturational window of opportunity for language acquisition, age-related factors in L2 acquisition will need to be interpreted in the same light as age-related factors in every other domain of learning" (Muñoz & Singleton, 2011: 26).

To sum up, since the formulation of the Critical Period Hypothesis (CPH) by Lenneberg (1967) many studies have been conducted in order to either confirm or refute the validity of this highly controversial hypothesis. Nevertheless, there is no single study to this day that has provided conclusive evidence for the confirmation or rejection of the existence of an abrupt maturational cut-off point in L2 learning. Therefore, further research must be conducted in order to reach firm conclusions on this long-lasting issue.

A) The influence of AOA in the phonological and lexical acquisition of the L2

"The younger, the better" position affirms that L2 learners whose exposure to the L2 begins in childhood are globally more efficient and successful than older learners (e.g. Singleton & Ryan, 2004).

In this sense, Oyama (1976) conducted a study with 60 Italian immigrants in the United States in order to find the level of proficiency they attained in their L2 (English). The results showed that those immigrants who had arrived in the host country at an early age passed for native speakers of American English, whereas those participants who had arrived in the host country after the age of 12 did not.

Another interesting study in this sense is that of Coppieters (1987). In this study, he investigated whether non-native speakers who passed for native speakers in performance had the same underlying linguistic competence as native speakers of the L2. In so doing, he recruited very advanced L2 (i.e. near-native) learners who had been exposed to the L2 (French) after puberty (i.e. late learners). Coppieters found clear quantitative and qualitative differences between the native speakers and the non-native speakers, with no single individual from the near-native group performing like a native speaker. More particularly, what Coppieters (1987) claimed to have found was that the near-native speakers diverged less from native speakers in formal features than in "functional" or "cognitive" aspects of grammar. Again, this study pointed to the inability of late learners to attain full native-like competence in the L2 due to their development of different underlying grammars for the same language (see, however, Birdsong, 1992 for criticism of this study on both conceptual and methodological grounds).

Flege (1988) conducted a study in which he wanted to test the variable age of arrival (AOA). He found that AOA clearly predicted the degree of attainment in L2 pronunciation, in the sense that the earlier their arrival, the better their pronunciation. However, contrary to expectations, he also found that some individuals from the "early learners" group (i.e. those

who had arrived in the host country before the age of 12) did not pass for native speakers of the L2. From the findings reported in this study, we could conclude that an early arrival seems to be a necessary, but not sufficient condition in order to attain native-like phonological competence in the L2 (e.g. Flege *et al*., 1997b; Harley & Wang, 1997).

In this sense, one of the best-known studies lending support to *the younger*, *the better* position is that by Johnson and Newport (1989). In this study, they recruited 46 Chinese and Korean learners of L2 English and found that, apart from a strong negative correlation (r = -77) between age of onset (AO) of L2 acquisition and scores on an English 276-item, they also found that not a single participant with AO beyond 7 years scored within the native-speaker range. As a result, they concluded that until the age of about 7 years, the L2 can be learned to a level that is grammatically nearly indistinguishable from that of native speakers of the L2. Nonetheless, they suggested that from age 8 to 10 years onwards, it becomes more difficult to fully master the grammar of an L2.

Long (1990) claimed that the bulk of evidence points towards the advantage of an early acquisition for a high degree of language attainment. He further suggested that, even if this is true in general, it seems that it is especially true in the case of phonology. He claimed that the majority of the studies conducted have shown that children who acquired the second language before the age of six appear to have attained native-like competence in that language (see also Long, 2005).

Flege *et al*., (1995) and Flege *et al*., (1999) found that AOA strongly predicted the perceived foreign accent. As a consequence, they concluded that, at least in terms of pronunciation, “earlier is usually better”. In another study, Yeni-Komshian *et al*., (1997) found a linear relationship between the participants’ AOA and the degree of nativeness (DN) they presented in their pronunciation of some sentences in English.

In a study by DeKeyser (2000) which was a partial replication of the methodology used by Johnson and Newport (1989), he tested the validity of the Fundamental Difference Hypothesis (Bley-Vroman, 1988), which implies that only adults with a high level of verbal

analytical ability will reach near-native competence in their L2, but that this ability will not be a significant predictor of success for childhood L2 acquisition. In fact, his study with 57 adult Hungarian-speaking immigrants in the United States confirmed this hypothesis. However, as expected, this ability was not a significant predictor for the early arrivals. This study led DeKeyser to strongly support the existence of a critical period, and not just a sensitive or optimal period for language acquisition, as long as the CPH is understood narrowly enough; that is, applying only to implicit learning of abstract structures (see however, Bialystok, 2002 for criticism of this study on theoretical and methodological grounds).

Piske *et al*., (2001) concluded that even if age may be central to ultimate attainment, no study has yet provided firm evidence for the claim that L2 speech will automatically be accent-free if learned before the age of six (see Flege *et al*., 1997b; Harley & Wang, 1997) and that it will be automatically foreign-accented if learned after puberty (see Bongaerts, 1999; Moyer, 1999). All in all, we could claim that the tendency seems to be that the younger the learner is when L2 acquisition starts, the more possibilities the L2 learner has to attain native-like pronunciation (e.g. Abrahamsson & Hyltenstam, 2009; Birdsong & Molis, 2001; Flege *et al*., 1999; Hyltenstam & Abrahamsson, 2003; Johnson & Newport, 1989).

More recently, Bee Chin and Wigglesworth (2007) also supported the claim that age seems to be an important factor since there is a strong association between age of acquisition and ultimate attainment in the L2, as it has been found in many studies (e.g. Eubank & Gregg, 1999; Hurford & Kirby, 1999; Snow & Höefnagel-Höhle, 1977; Tahta *et al*., 1981a, 1981b; Weber-Fox & Neville, 1999).

Finally, Abrahamsson and Hyltenstam (2009) pointed out that whenever native-like performance has been observed, this has been associated exclusively with young starting speakers (see also Hyltenstam *et al*., 2009 for a study of dominant-language replacement in international adoptees). In fact, their results revealed that only a few of the early learners exhibited native-like competence on all measures of L2 proficiency employed. They

claimed that this was a crucial point since it does not rule out the possibility that even young starting speakers may not have attained native-like competence. Instead, it supported the view, again, that young starting age is a necessary, but maybe not sufficient requirement in order to attain native-like phonological competence in an L2 (e.g. Flege, 1988; Flege *et al*., 1997b; Flege & Mackay, 2004; Harley & Wang, 1997).

We could conclude from the above-mentioned studies that in the area of pronunciation as well as in most other areas of linguistic competence, a young starting age is usually associated with native-like performance in the L2 in natural settings. However, there have also been some studies which have challenged or even refuted the importance of a young starting age in order to attain native-like phonological competence (e.g. Bohn & Flege, 1997; Bialystok, 1997; Snow & Höefnagel-Höhle, 1977, 1979). Further research in this area is needed in order to gain a better understanding about this position which posits the importance of a young starting age in order to attain native-like competence in an L2. In the next section we will review those studies which have lent support to the opposite position, namely *the older, the better* position.

The opposite position to that of *the younger, the better* is *the older, the better* position which we are going to focus on next. This position, which has been supported by some of the studies conducted in this area of research, posits that the older the L2 learner is when L2 acquisition starts (i.e. the greater their cognitive development), the higher his/her ultimate L2 attainment will be.

The primary conclusion Snow and Höefnagel-Höhle (1977) drew from their study was that youth confers no immediate advantage in learning to pronounce foreign sounds. That is, in the short term, older subjects were better than younger ones, and only after a year did the younger learners begin to excel. The main conclusion they drew from this study was that the inability to achieve native-like pronunciation was as true for the younger subjects as for the adults (see also Loewenthal & Bull, 1984 for a study showing an advantage of older children over younger children in the imitation of foreign sounds). They concluded that the fact that the age range 3 to 15 was ultimately found to be optimal for

achieving near-perfect pronunciation in the L2 cannot be explained in terms of any neurologically determined critical period. As a result, they suggested that the CPH for pronunciation must be rejected (see also Snow & Höefnagel-Höhle, 1979 for a study of individual differences in second language ability).

We could conclude from the above-mentioned study conducted in a natural setting that even if older learners appeared to present better results in the L2 than the younger ones in the short term, eventually younger learners excelled. Nevertheless, an interesting point the authors made regarding this study was that the inability to achieve native-like pronunciation holds true not only for adult learners, but also for the younger ones. Therefore, we could claim that this study lends support in its initial stage to the *the older, the better* position; nonetheless, in a more advanced stage of the study, even if this initial advantage fades away, there seems to be no clear evidence that younger learners' ability to pronounce foreign sounds clearly exceeds that of the adults'.

Bialystok (1997) reported two studies that showed an advantage for adults over children in the L2. This controversial result, as well as the fact that no minimal length of residence (LOR) was required, has led researchers to suspect that what really occurred was a rate advantage for adults in the early stages of L2 learning, which has already been attested in many previous studies, especially in those conducted in formal settings (e.g. Fullana & Muñoz, 1999; Cenoz, 2000b; García Lecumberri & Gallardo, 2003; see also Morris & Gerstman, 1986 for a study focusing on syntax and semantics; Ruiz de Zarobe, 2005). Furthermore, the fact that age at which second language acquisition began was not a significant factor in either study led her to conclude that there is insufficient evidence to accept the claim that mastery of an L2 is determined by maturational factors.

In another study, Bohn and Flege (1997) found that like in some of Flege's studies (1987a, 1987b, 1988, 1995), given extensive exposure to the foreign language, adults can learn to perceive and produce a new vowel category in a similar way to that of native speakers of the L2, irrespective of starting age.

The bulk of evidence from the different studies conducted so far seems to favour the *the younger, the better* position in natural settings, even if there have been some studies which have lent support to the opposite position, namely the *the older, the better* position. Nevertheless, more studies are to be conducted in natural settings in order to further investigate the influence of the age factor and find out its role in both processes of phonological and lexical acquisition of the L2.

B) The influence of AOA in the phonological and lexical attrition of the NL

One of the factors which have been more widely investigated as a potential predictor of phonological as well as lexical attrition in the NL is that of the age of arrival (AOA) of the speakers in the L2 environment. In this section, we are going to review studies of linguistic attrition which considered this variable.

Köpke and Schmid (2004) suggested that the younger a child is when the language in his/her environment changes, the faster and deeper s/he will attrite. Nevertheless, they further claimed that none of the studies focusing on attrition allows one to specify a precise age up to which attrition is more likely to occur. Those researchers did highlight the importance of considering both *age at the onset of bilingualism* and *age at the onset of attrition*, since there is converging evidence that a NL system can be affected to quite a dramatic degree if the attrition process starts well before puberty (e.g. Pallier *et al*., 2003; Ventureyra & Pallier, 2004; Ventureyra *et al*., 2004).

In this sense, Pallier *et al*., (2003) studied the case of 8 individuals who had been removed from their native Korea and adopted by French families in the Paris area at ages ranging from 3 to 8. They did not have any subsequent contact with their NL (Korean) and they all became dominant in French (their L2). These subjects claimed to have no knowledge of Korean (their NL) and additionally, the behavioural tests (i.e. sentence identification of Korean versus different languages, word recognition, fragment detection)

revealed no trace of Korean knowledge. Likewise, functional magnetic resonance imaging (fMRI) scans showed no specific activation when listening to Korean and their pattern of activation with French sentences was quite similar to that of the native French controls. This study lent support to the view that a NL can be completely replaced by an L2 when the speakers are removed from the NL environment at an early age and do not receive subsequent input from their NL (see also Hyltenstam *et al*., 2009 for a study of dominant-language replacement in international adoptees). In a follow-up study to that of Pallier *et al*., (2003), Ventureyra *et al*., (2004) focused on the possible remnants of phonology of the NL in the adopted Koreans by assessing the adoptees' capacity to discriminate Korean voiceless consonants which seem to be difficult to perceive by French speakers. The researchers recruited three different groups of participants, namely a group of Korean adoptees by French families in infancy (ranging from 3 to 8 years), a group of native speakers of French and a group of native speakers of Korean. The researchers found that the group of Korean adoptees could not perceive the differences between Korean phonemes any better than the French native speakers who had never been exposed to Korean. Additionally, those adoptees who had been re-exposed to Korean, performed similarly to those who had not. In this study, what the researchers found was a complete phonological attrition of the NL (as well as of other linguistic aspects) since those Koreans who had been adopted by French families in infancy no longer had access to the phonetic categories (nor to any other linguistic aspect) of their NL. This study confirmed the findings by Pallier *et al*., (2003, see also Ventureyra & Pallier, 2004).

More recently, Montrul (2008) made the differentiation between child and adult attrition in the NL. She claimed that the linguistic profile of adult L2 learners assumed to be undergoing attrition in their NL after extensive exposure to (and use of) the L2 is the following: first generation immigrants who migrated to the L2 country in adulthood, and whose command of their native language is strong, although there can be some attrition after more than 10 years of extensive exposure to the dominant language (i.e. the L2). She also stated that, unlike attrition in adults, attrition of the NL in young children occurs in a relatively short period of time and that its effects are much more extensive and evident than what is observed in adults (see also Köpke & Schmid, 2004).

The existing evidence seems to support the claim that the younger the speaker is when s/he migrates to the L2 environment, the faster and deeper s/he will attrite. In cases when the child is removed from his/her NL environment at a very early age, s/he can undergo complete attrition in the NL. As a result, the NL can presumably be completely replaced by the L2 (e.g. Hyltenstam *et* al., 2009; Pallier *et al*., 2003; Ventureyra & Pallier, 2004; Ventureyra *et al*., 2004).

2.4.1.2 Gender (male versus female)

In this section we are going to review some studies which have considered the variable gender (male versus female) in order to account for differences in degree of L2 attainment, especially in a formal setting.

Piske *et al*., (2001) found in their study with 34 male and 38 female Italian participants living in Canada that the ratings they received in English from native speakers of the language did not differ significantly according to gender, nor did the gender factor interact significantly with the age of arrival of these participants in the host country or with amount of L1 use (e.g. Purcell & Suter, 1980; Snow & Hoefnagel-Höhle, 1977). However, Flege *et al.,* (1995) found that early female L2 learners were rated as having a stronger foreign accent than early male L2 learners, whereas female late L2 learners were rated as having milder foreign accents than late male L2 learners.

Nevertheless, gender has in some cases shown up as a significant predictor of L2 proficiency in a formal setting; the recurrent finding being that female learners usually attain higher standards of L2 proficiency than male learners (see Flege *et al*., 1995). In fact, this is also what has been found in previous studies of lexical availability in an L2, namely that female learners present a higher degree of lexical availability than male learners in an L2 (see Agustín Llach & Fernández Fontecha, 2014; López Rivero, 2008; Sámper Hernández, 2002).

There have been very few studies considering gender in a natural setting, so we considered that the present study should help to fill the gap by focusing on the role of this variable on the phonological and lexical acquisition of an L3 in an environment where the L3 (English) is the language of common use.

2.4.1.3 Education level (university versus non-university studies)

Next we are going to do a revision of some studies which have considered this variable in order to account for differences between L2 learners in their degree of phonological and lexical attainment in the L2. We will also review some studies which have analyzed this variable in order to account for differences in degree of phonological as well as of lexical attrition in the NL(s) of immigrants immersed in an L2 environment for an extended period of time.

A) The influence of education level (university versus non-university studies) in the degree of phonological and lexical acquisition of the L2

We will start by reviewing some studies which have examined the variable education level in order to account for differences between participants in their degree of L2 attainment.

Flege *et al.,* (1999) conducted a study with 240 Korean adult immigrants in the United States who performed a 144-item grammaticality judgements test and who were rated in their degree of foreign accent by native speakers of English. They found significant correlations between the scores and AOA, between the scores and LOR and between the scores and years of education in the United States. They also found that when the effects of AOA and LOR were partialled out, the correlation between the scores and years of education remained significant. What is more, the correlation between the scores and AOA became non-significant when the effects of years of education were partialled out as well as the correlations between LOR and the scores when the effects of years of education and AOA were partialled out.

Flege and Liu (2001) found in their study with 62 Chinese adult immigrants in the United States that LOR was only a significant predictor of L2 proficiency in the case of the

participants belonging to the so-called *students* group (i.e. those participants who had been students during most or all of their stay in the United States). That is, those participants from the *students* group with longer LORs were rated significantly higher in all three experiments (i.e. identification of stops in final position of naturally produced English words, a grammaticality judgements test and participants' comprehension of English). Nonetheless, they found that the difference between the participants belonging to the so-called *nonstudents* group (i.e. those participants who had worked full-time during most or all of their stay in the United States) differing in LOR was non-significant.

Concerning degree of lexical availability, education level has also proved a predictor of degree of lexical availability in an L2, being higher for learners with a higher education level (see López Rivero, 2008).

The findings from the above-mentioned studies point to the same direction, namely that education level is a significant predictor of degree of L2 proficiency. Nevertheless, further research considering this variable is needed in order to gain a better understanding of the role of this variable as a predictor of degree of proficiency attained in an L2.

B) The influence of education level (University versus non-university studies) in the degree of phonological and lexical attrition of the NL

In this section we are going to review a study which has considered the variable education level in order to see whether there were significant differences between participants in the degree of linguistic attrition in the NL of participants immersed in an L2 environment.

Schmid and Dusseldorp (2010) conducted a study with 159 native German speakers, namely one group of bilingual speakers (n = 53) in the area of Vancouver, Canada; one group of bilingual speakers in the Netherlands (n = 53) and a reference group (n = 53) in the area of Rhineland, Germany. The language of the environment was English for the Canadian group and Dutch for the group in the Netherlands. All participants were at least 17 years old at the time of migration and they had all lived in the L2 country for more than 15 years. In order to measure L1 (German) proficiency, participants performed the following tasks: a C-test, which is a fill-in test where the participant is presented with a text from which parts of words have been removed and is asked to complete the missing parts; two semantic verbal fluency tasks where participants are asked to name as many items in a specific lexical category as they can within the space of 60 seconds; the two stimuli used were “animals” and “fruit and vegetables”. Participants also performed a grammaticality judgement task, in which they were presented with sentences on a laptop computer in written and audio format simultaneously; the overall test consisted of 48 items, 22 of which were ungrammatical. Finally, participants had to perform a film retelling task in which they were asked to watch and retell a 10-minute excerpt from a silent movie. They found that a higher education level led to a higher score on the C-test. They also found that for the free speech variables namely the lexical diversity measure and the overall frequency of errors, the canonical correlations showed an impact of LOR and education level. Their findings suggested that lexical diversity in the L1 diminishes with a longer LOR in an L2 environment and that the more highly educated speakers outperform those with a lower

education on those two measures. Another finding was that the only variable with a consistent impact was L1 use for professional purposes; the use of German for professional purposes appeared to have a protective effect against language attrition. Another interesting finding from this study was that even those aspects that are in all other aspects indistinguishable from the reference group (i.e. speakers who use the L1 very frequently for professional purposes) may have more errors strongly suggest that these may be simply "performance" phenomena or slips of the tongue, not actual indications of a change in underlying knowledge.

This study suggested the importance of education level as a predictor of degree of attrition in a NL for participants immersed in an L2 environment for an extended period of time, in the sense that a higher education level can prevent language attrition in the NL.

2.4.2 Affective factors

2.4.2.1 Degree of identification with the community (DI)

Another variable which has been considered in L2 studies as well as in language attrition research is that of degree of identification with the community (DI), namely on the one hand, the influence of DI with the L2 community on degree of L2 attainment and, on the other, the influence of DI with the NL community on degree of NL attrition. In this section, we will review some studies which have considered DI with the L2 community and then, we will present the most relevant models of identification that have been proposed in the last decades. Then, we will present some studies which have considered DI with the NL community in order to account for linguistic attrition in the NL.

A) The influence of the degree of identification with the L2 community in the phonological and lexical acquisition of the L2

In this section we are going to focus on the role of the variable degree of identification (DI) with the L2 community in order to account for individual differences in degree of attainment in the L2. First, we are going to review some studies which have shown the importance of DI with the L2 community in L2 learning and then, we will review a study which claimed that DI with the L2 community may not be relevant in the attainment of a higher or lower degree of proficiency in the L2.

Identity has been recognized as a major issue in L2 acquisition and many researchers have considered this variable in their studies (e.g. Giles & Byrne, 1982; Pavlenko, 2002; Pavlenko & Blackledge, 2004). For instance, Giles and Byrne (1982) developed a theory of ethnolinguistic identity which considers that language is a relevant marker of ethnic identity and group membership. They claimed that members of groups where the in-group identification is weak, in-group vitality low, in-group boundaries open

and identification with other groups strong may assimilate and learn the L2 rapidly. In turn, members of groups whose ethnolinguistic vitality is high may experience a fear of assimilation and achieve a low level of L2 proficiency, since they can view the L2 as a "threat" to their own ethnic identity. This is a very interesting insight of the concept of *identity*, since it posits that this concept can significantly affect, positively or negatively (depending on the type and degree of identification), the process of L2 phonological and lexical acquisition.

More recently, Pavlenko (2002) claimed that the two-way relationship between language and identity recognizes that language serves to produce, reproduce, transform and perform identities, and that linguistic, gender, racial, ethnic and class identities exert an influence on the access to linguistic resources and interactional opportunities and, as a result, it also affects the L2 learning process and outcome (i.e. ultimate attainment). In this sense, Pavlenko referred to the L2 learning process as transforming the identity of the L2 learner. In fact, this is what Giles and Byrne (1982) above claimed too, namely that members of groups whose ethnolinguistic vitality is high may experience a fear of assimilation and achieve a low level of L2 proficiency, whereas members of groups with a low ethnolinguistic vitality and low in-group identification may experience assimilation from the L2.

In another study, Pavlenko and Blackledge (2004) claimed that in Québec, in the context of francophone resistance to English domination, language choice shows a complex set of assumptions about the interlocutor's mother tongue, ethnicity, linguistic competence, political position (i.e. federalist versus separatist) as well as open-mindedness and politeness as can be seen in the following excerpt:

> "I stopped in a garage…and struggled to explain…that my windshield wipers were *congelé* and I wanted to make them *fonctionner*. He listened with amusement and then said: "You don't have to speak French to me, madame, I am not a separatist". (Cited in Heller, 1982:108, and reported in Pavlenko, 2004:12).

In the excerpt above, we can find the complexities of language in relation to identity in a context where language is an important part of ethnolinguistic vitality.

However, there have also been studies where degree of identification with the L2 community has not been found to affect (i.e. neither positively nor negatively) the L2 learning process. In this sense, Hoffman (1989) claimed that Iranian immigrants in the US present high levels of competence in English as well as high levels of structural assimilation. However, they also appear to present a low degree of identification with the US society (i.e. with the American community). Hoffman suggested that for many of these Iranian immigrants in the US, English is not a marker of the so-called "American identity", but a language in which they carry out their professional duties. Additionally, these Iranian immigrants also view the English language as a *lingua franca*, which in the pre-revolutionary times of Westernization in Iran was used by those members of the Iranian upper-class with foreigners as well as with each other. This study suggests that, since in many situations English has become the language of communication (i.e. lingua franca), degree of identification with the American community may not affect the L2 learning process. That is, in situations where the English language is not viewed as a marker of a particular identity, individuals with a very low or null identification with the American community may still present very high levels of L2 proficiency.

Next, we will review some of the most relevant models of identification which have been put forward so far, and which intend to explain difference in ultimate language attainment in terms of degree of identification.

Models of identification

Gardner (1985) summarized the most important theories of L2 acquisition and divided them into two groups, namely theories that focus on the linguistic process and theories that focus on the social process. In this section, we are going to present the theories

focusing on the social process because they emphasize the importance of aspects such as degree of identification with the L2 community in the L2 learning process and outcome.

The social psychological model

Lambert's (1963a, 1963b, 1967, 1974, 1981) social psychological model of L2 acquisition is a theory of bilingual development and self identity variation. The central claim in this theory is that the "linguistic component is a basic component of personal identity (…)" (Lambert, 1974: 96). As a result, the development of L2 proficiency has implications for the individual's self identity and, in turn, the individual's self identity also has implications for L2 acquisition.

It is generally assumed (e.g. Pavlenko, 2002; Schumann, 1978a, 1978b) that the more identified the L2 learner feels with the L2 community, the more rapidly and the more efficiently s/he will acquire the L2. As a result, s/he will feel increasingly more identified with the L2 community, and will probably become an active part of the L2 culture and society. However, if the L2 learner does not feel identified with the L2 community, s/he will probably feel uncomfortable about the L2 learning process and will probably avoid becoming an active part of the L2 community.

According to this model, degree of identification with the L2 community can either positively or negatively affect the L2 learning process depending on the extent to which the L2 learner feels identified or not with the L2 community. Likewise, the L2 learning process also affects the concept the L2 learner holds of his/her own identity. We could conclude that the concept of L2 identification has important implications for the L2 learning process, and therefore, this is an important variable to be considered in L2 acquisition research.

The acculturation model

This model, which was developed by Schumann (1978a, 1978b), focuses on identifying the major variables that account for L2 acquisition in a natural setting. That is, it purports to provide an account of L2 acquisition occurring without formal instruction and in the environment where the L2 is spoken. Schumann's central claim was that L2 acquisition is just one aspect of acculturation, and he further suggested that the degree to which a learner acculturates to the L2 group will control the degree to which s/he will acquire the language. In this sense he assumed, like Lambert (1963a, 1963b, 1967, 1974, 1981), he assumed that a primary requirement for L2 acquisition is identification with the L2 community.

Schumann defined *acculturation* as the social and psychological integration of the L2 learner with the L2 group and made the difference between two types of acculturation. Type 1 acculturation refers to the case where the learner is socially integrated with the other community and psychologically open to the L2, whereas type 2 acculturation makes reference to the situation where the individual views the other community as a reference group whose values and lifestyle s/he desires to adopt, be it consciously or unconsciously. Schumann claimed that, even if in both types of acculturation there is social interaction involved, it is only in type 2 acculturation that the individual strives as much as possible in order to become like a member of the L2 community in more ways than just linguistically (see also Moyer, 1999).

Schumann (1978a, 1978b) presented the taxonomy of factors that, according to his model, may wield an influence on the L2 acquisition process such as social, affective, personality, cognitive, biological, aptitude, personal, input and instructional factors. He claimed that the only factors that have shown a relationship to L2 learning are: tolerance of ambiguity, self-esteem, field-independence and monitoring. Regarding the concept of *field-independence*, Gass and Selinker (2001) claimed that the field-independent person tends to

be highly analytic, ignoring potentially confusing information, and self-reliant; whereas the field-dependent person tends to pay great attention to context.

Schumann (1978a) further claimed that there is an "individual" component which influences L2 acquisition under affective variables. This "individual" component includes language shock, culture shock, motivation and ego permeability. He suggested that in this context *language shock* refers to the fear and apprehensiveness an L2 learner may undergo when trying to operate in a second or weaker language (for the individual L2 learner); whereas he posited that *cultural shock* is the anxiety resulting from disorientation encountered upon getting in contact with a new culture. In this sense, Schumann (1976, 1978a, 1978b) also put forward the concept of *social distance* which he defined as cultural, technical and political status, and claimed that *social distance* between the L2 learning group and the NL group is a relevant factor in L2 learning. He further suggested that in case there are big differences between the NL group and the L2 learning group, this will negatively affect the L2 learning process.

Finally, Schumann adopted the concept of *ego permeability* from Guiora (1972), which refers to the extent to which an individual's "language ego" has flexible or rigid boundaries. Schumann defined this concept as "the ability to empathize". In this sense, Guiora *et al*., (1980) conducted an experiment in which they administered benzodiazepine (valium) to a group of Thai learners of L2 English. Interestingly, the group turned out to show a significant improvement in their ability to produce authentic English sounds, since this drug appears to decrease one's inhibition and, as a result, the ego becomes more permeable (i.e. more flexible).

In another study, Schumann *et al*., (1978) conducted an experiment in which 20 subjects were hypnotized and subsequently tested in their ability to pronounce Thai words. The subjects' responses, which were evaluated by a native Thai linguist, showed that deeply hypnotized subjects performed significantly better than less deeply hypnotized subjects. This finding suggested that hypnosis also decreased the participants' inhibition and enabled their ego to become more permeable. Schumann (1978a) concluded that if

language shock and *cultural shock* are not overcome, and if the L2 learner does not present sufficient and appropriate motivation and *ego permeability*, then s/he will not be able to fully acquire the L2.

This model of acculturation has been widely accepted because it encompasses different components such as *language shock*, *culture shock*, *ego permeability* and *social distance* which have proved relevant in the L2 learning process and outcome (e.g. Bongaerts, 1999; Moyer, 1999), in the sense that the higher the degree of acculturation of the L2 learner, the greater the chances of a high degree of L2 attainment. Further research considering this model is needed in order to gain a better understanding of its underlying principles and processes as well as its relation to the L2 learning process and outcome.

The social context model

Clément (1980) presented a model of L2 acquisition which Gardner (1985) has referred to as *the social context model* because it places a considerable emphasis on the cultural setting and the relative vitality of the communities involved in the L2 learning process. This model assumed that L2 acquisition involves not only the learning of language skills, but also the adoption of patterns of behaviour of the L2 community. The central concept in this model is *motivation*, which is viewed as consisting of two possible processes; on the one hand, those cultural settings where one of the two language communities has a low level of ethnolinguistic vitality (i.e. low status), few speakers of the language and minimal instructional support are termed *unicultural settings*. In these settings, the major motivational force is hypothesized to be the "primary motivational process". This primary motivational process is the result of two opposing forces, namely integrativeness and fear of assimilation. Clément (1980) finally claimed that where the difference is positive, the primary process reflects integrativeness and a high level of motivation, whereas where the difference is negative, the primary process reflects fear of assimilation, and motivation to learn the language will be relatively low.

On the other hand, Clément (1980) defined *multicultural contexts* as those contexts in which ethnolinguistic vitality of both languages is high. That is, both languages have comparable status, both are well represented in the community and they both have a certain level of institutional support. He claimed that in those settings, "a secondary motivational process" is implicated. This process reflects self-confidence with the L2 and it is supposed to result from the interaction of the number and nature of contacts with the other language community.

This model posits the importance of the ethnolinguistic vitality of the NL as determinant in the L2 learning process. If the ethnolinguistic vitality of the NL is relatively low (as in unicultural settings), the L2 learning process will be determined by individual aspects such as integrativeness and fear of assimilation, whereas if the ethnolinguistic vitality of the NL is high (as in multicultural settings), the L2 learner is likely to succeed in the L2 learning process because s/he will not experience fear of assimilation from the L2.

The intergroup model

Giles and Byrne (1982) proposed a model of L2 acquisition which focuses on the acquisition of an L2 by members of a linguistic minority group. The central concept in this model is the *self-concept* and the major motivational force is that of maintaining or developing a positive self-image. Gardner (1985) claimed that this model might be viewed as one focusing on describing the process underlying the motivation to learn an L2, mainly concentrated on Gardner's concept of the *integrative motive*; that is, a real motivation on the part of the L2 learner to become an integrated member of the L2 community.

In this model, the *self-concept* is claimed to be the major motivational force in the sense that if the L2 learner develops a positive self-concept regarding L2 learning, s/he is likely to attain a high level of L2 proficiency; whereas if the learner holds a negative self-concept regarding the L2, s/he will find it more difficult to succeed in the L2 learning process.

The four models we just presented in this section, namely *the social psychological model*, *the acculturation model*, *the social context model* and *the intergroup model* all have in common that their central component is the concept of identification with the L2 community. In this sense, we consider that the model which has provided a more comprehensive account of the different components that interplay in the L2 learning process and outcome in the case of immigrants immersed in the L2 environment as well as for L2 learners in a foreign language setting is *the acculturation model* (Schumann, 1978a, 1978b). This model includes a wide range of components such as *language shock, cultural shock*, *motivation* and *ego permeability* among others, which can provide an exhaustive account of the reasons why the L2 learner is likely to succeed in the L2 learning process and which will be the outcome of that process.

B) The influence of the degree of identification with the NL community in the phonological and lexical attrition of the NL

The influence of the degree of identification (DI) with the NL community in order to look into attrition in the NL has appeared to be far more crucial than the variable LOR. In this sense, Köpke and Schmid (2004) claimed that, even if attitude towards the NL community is an important factor in attrition research, it has also proved one of the most slippery and difficult measures to analyze.

Seliger and Vago (1991b) claimed that subordination of the NL to the L2 in the affective domains of language such as prestige, social status, attitude and degrees of acculturation can promote attrition in the NL. In this sense, they claimed that subordination of the NL to the L2 may determine the extent of linguistic attrition in the NL. For instance, they reported that French speakers in Québec may refuse to speak in English (their L2), the dominant language, because they feel that English may threaten the ethnolinguistic vitality of their own language and culture. That is, apparently they do not want their "French identity" to be replaced by an "English identity" and that appears to be the reason why they may refuse to speak in the dominant language.

In another study, Schmid (2002) showed that exceptional settings (such as persecution) might generate emotional factors which may influence attrition in the NL much more dramatically than any other extralinguistic circumstance. Nonetheless, the evidence provided so far has not made it clear to what extent adopted children may suffer from similar trauma which may trigger a rapid and severe attrition in the NL (e.g. Hyltenstam *et al*., 2009; Pallier *et al*, 2003; Ventureyra & Pallier, 2004; Ventureyra *et al*., 2004).

More recently, Köpke and Schmid (2004) claimed that since language has a great symbolic value in a particular group's identity, it can be assumed that strong ethnolinguistic vitality would prevent attrition in the NL. They also suggested that, nevertheless, their two

studies investigating the role of these factors are inconclusive. They concluded that from a psycholinguistic point of view, it has been hypothesized that insights into the internal reasons for attrition in the NL might help us understand the mechanisms underlying this phenomenon. In this sense, De Bot (2002) claimed that even if these aspects have received little attention so far, the available evidence suggests that the phenomenon of attrition in the NL may be psycholinguistic in nature.

It seems that the concept of identification in studies of attrition in the NL is still to be further investigated in order to be able to draw firm conclusions. However, the existing evidence points to the importance of a high degree of identification with the NL community in order to prevent attrition in this language (e.g. Köpke & Schmid, 2004; Seliger & Vago, 1991a) in the case of speakers immersed in an L2 environment and, in some cases, even deprived of input from their L1, for an extended period of time.

2.4.2.2 Motivation (M)

In recent decades, the factor *motivation* has stood out as one of the most important predictors of degree of L2 attainment. Many studies (e.g. Bongaerts, 1999; Moyer, 1999) have shown the importance of presenting a high degree of motivation towards learning the L2 for a high degree of attainment in this language (see Dörnyei & Skehan, 2003; see also Segalowitz, 1997 for a review of individual differences in L2 acquisition). However, this factor has not been that deeply investigated in studies of linguistic attrition in the NL. In this section, we are going to review some L2 studies which have considered *motivation* as one of their factors. Then, we will describe different types of motivation that have been put forward and finally, we will deal with the role of motivation in studies of attrition in the NL.

A) The influence of L2 motivation in the acquisition of the L2

Many studies (e.g. Ellis, 1994; Gardner, 1980; Gardner & Lambert, 1972; Moyer, 1999, Muñoz, 1999; Strange, 1992) have shown ample individual differences in the ability of perceiving non-native phonetic contrasts and in the progress experienced through phonetic training (e.g. Aliaga-García & Mora, 2008; Hazan & Sennema, 2007; Logan *et al*., 1991; Pisoni *et al.*, 1994). However, it has proved very difficult to assess to what extent these differences may be due only to individual factors and to what extent to other factors. Among all of these individual factors L2 motivation stands out as one of the most influential.

Gardner (1985: 10) defined the concept of *motivation* in the following terms:

> "Motivation in the present context refers to the combination of effort plus desire to achieve the goal of learning the language, plus favourable attitudes toward learning the language. That is motivation to learn a second language is seen as referring to the extent to which an individual strives to learn the language because of a desire to do so and the satisfaction experienced in this activity. Effort alone does not signify motivation. The motivated individual expends effort toward the goal, but the individual expending effort is not necessarily motivated (…). The individual may

want to learn the language and may enjoy the activity, but, if this is not linked with a striving to do so, then it is not truly motivation" (Gardner, 1985:10).

As we have just seen in the paragraph above, Gardner (1985) considered that motivation involves four aspects: a goal, effortful behavior, a desire to attain the goal and favourable attitudes towards the activity involved.

However, the direction of the correlation between motivation and linguistic achievement is, so far, uncertain. We still do not know whether high motivation results in high linguistic competence in the L2 or whether it is high linguistic competence in the L2 that results in high motivation towards the L2 (e.g. Bongaerts, 1999; Moyer, 1999; Strong, 1984). In a study with Spanish-speaking kindergarteners in an American classroom, Strong (1984) found that there was no positive association between integrative motivation (i.e. interest in the language and in the L2 group) and acquired English proficiency; whereas in his comparison of beginners with advanced English speakers, he found that they showed a significantly larger amount of integrative orientation to the L2 group. He concluded that these findings lent support to the notion that integrative attitudes follow L2 acquisition skills rather than promoting them.

Nevertheless, other studies have shown that highly motivated individuals can achieve native-like abilities in the L2 (e.g. Bongaerts, 1999; Bongaerts *et al*., 1995; Bongaerts *et al.,* 1997; Moyer, 1999), even if the number of learners who attained native-like pronunciation in those studies was very limited. These findings suggest that a high level of motivation can, in some cases, overcome biological constraints (e.g. the critical period) and, as a result, enable highly motivated learners to achieve native-like phonological proficiency in the L2.

Likewise, Purcell and Suter (1980) found that strength of concern for pronunciation accuracy was one of the four predictors, along with first language (favoured languages, Persian and Arabic in this study, versus unfavoured languages, Japanese and Thai), aptitude for oral mimicry, residency (i.e. LOR), that were useful in accounting for the variability of subjects' pronunciation accuracy scores. In this case, we could identify the factor *strength*

of concern for pronunciation accuracy as motivation towards attaining native-like pronunciation in the L2.

Bongaerts *et al.*, (1995) and Bongaerts *et al.*, (1997) found overlap between native and highly motivated non-native speakers for pronunciation in the L2, in a group of participants who had been identified as "experts" and some of whom had received intensive training in the perception and production of the L2 sounds. The conclusion we can draw from this study is that the attainment of native-like pronunciation is, in fact, possible but arguably only for those (few) L2 learners with exceptional abilities (e.g. those who can overcome the biological constraints associated with the critical period, etc.), who are usually referred to as "exceptional" L2 learners.

In another study, Moyer (1999) found that one of the most influential types of motivation in order to achieve a native-like pronunciation in the L2 was instrumental; that is, motivation of a professional type. Nevertheless, only 1 out of 24 English learners of L2 German in her study presented an excellent performance in the different tasks. This person reported that his motivation to learn German was beyond his professional area, that he was really fascinated by the German language as well as by German people. Thus, an L2 learner who wants to integrate in the L2 community is more likely to attain a native or near native pronunciation in the L2 than an L2 learner who is not interested in becoming part of the L2 community. In this sense, a positive attitude towards L2 learning and the L2 community appears to be a prerequisite for a high level of L2 attainment.

More recently, Yashima *et al*., (2004) reviewed some studies based on the so-called *willingness to communicate* (WTC) in an L2 model. This model developed by MacIntyre *et al*., (1998) represents the complexity of communicating using an L2 (see also MacIntyre & Legatto, 2011). It does not place communicative competence as a goal of learning an L2 in itself, but rather places it as a means to achieve a communicative goal (see also Yashima, 2009 for a recent study). Yashima *et al*., (2004) used 2 studies conducted with Japanese adolescent learners of L2 English. The first study had 160 participants, whereas the second one involved 60 students. The students in both investigations participated in a study-abroad

program in the United States. They found in both studies that WTC in an L2 predicted frequency and amount of communication (i.e. degree of activation of the L2). Additionally, they also found that the students' perception of their own competence in the L2 appeared to be strongly related to how willing they were to communicate in this language. We could conclude that the findings in this study suggest that a high motivation towards learning the L2 may be both a cause and result of a high degree of attainment in the L2.

Likewise, Birdsong (2006) claimed that in the area of pronunciation those learners who are taken for natives by native judges are usually those who present high levels of L2 practice, motivation to sound native-like (e.g. Moyer, 1999; Purcell & Suter, 1980) and L2 phonetic training (e.g. Aliaga-García & Mora, 2008; Hazan & Sennema, 2007; Logan *et al*., 1991; Pisoni *et al*., 1994). However, he also suggested that some factors tramp others in the sense that, for instance, it is useless to invoke neurobiological capacities (or deficiencies) in an individual who has no interest in passing for a native. In fact, it is still to be investigated the effect of a negative motivation towards learning the L2 in the phonological acquisition of an L2.

We have just seen that L2 motivation appears to play an important role in determining the learner's degree of phonological attainment in the L2. In this sense, it has generally been found that those participants who present high levels of L2 motivation or, more specifically, for sounding native-like in the L2 (e.g. Birdsong, 2006; Moyer, 1999; Purcell & Suter, 1980) are more likely to present high levels of phonological attainment in the L2. Additionally, in the next section we are going to see that, even if L2 motivation in itself seems to be a crucial predictor of degree of attainment in the L2, there are different types of motivation which may account for degree of phonological attainment in the L2 in different ways.

Types of motivation

In this section we are going to review two of the main dichotomies in the context of L2 motivation, namely the integrative-instrumental motivation and the intrinsic-extrinsic motivation. We could state that in the case of the first dichotomy (i.e. integrative-instrumental), it is based on the aim of learning, whereas in the case of the second dichotomy (i.e. intrinsic-extrinsic), it is based on the source of the motivation itself.

Integrative-instrumental motivation

Gardner (1985) highlighted the importance of the distinction between integrative and instrumental motivation, which has been widely used among researchers in L2 motivation studies (e.g. Gardner, 1980; Moyer, 1999).

Integrative motivation: some learners may choose to learn a particular L2 because they are interested in the language and the culture the L2 group represents. The concept of *integrative motivation*, also known as *integrative orientation*, was defined by Gardner and Lambert (1972: 132) as "reflecting a sincere and personal interest in the people and culture represented by the other group". They further posited that the basic premise underlying the *integrative* concept, namely that the L2 learner must be willing to identify himself/herself with members of the L2 group and take on some aspects on their behaviour, has sparked a heated debate. Ellis (1997) claimed that it is this kind of motivation that underlies the fact that many English-speaking Canadians want to learn French. Gardner (1985, 2001) defined *integrativeness* as a latent construct made up of the following variables: interest in foreign languages, integrative orientation and attitudes towards the learning situation.

Instrumental motivation: Learners may make efforts for some functional reasons such as to pass an examination, to get a better job, or to get a place at University. It has been suggested that in some learning contexts an instrumental motivation appears to be a major

force which determines L2 learning success. Gardner (1985) defined instrumental motivation as the utilitarian gains associated with the mastery of the L2 (i.e. better jobs and/or higher salary).

Intrinsic-extrinsic motivation

This dichotomy of *intrinsic-extrinsic* motivation is based on the source of the motivation itself. Both dichotomies of motivation, namely the *integrative-instrumental motivation* and the *intrinsic-extrinsic motivation* are not independent from one another, but they are interrelated. That is, we can find integrative and instrumental intrinsic motivation as well as integrative and instrumental extrinsic motivation.

Intrinsic motivation: this kind of motivation is based on the satisfaction the L2 learner experiences from the L2 learning process; that is, the L2 learner finds the learning tasks s/he is asked to perform intrinsically motivating (e.g. Ellis, 1997).

Extrinsic motivation: this kind of motivation is related to the concept of *instrumental motivation*, since the L2 learner is encouraged to learn the L2 because this will help him/her to get a better job, to pass an examination or to get a place at University. Thus, in this case motivation comes from the outside in contrast to the concept of *intrinsic motivation*.

To sum up, the role of motivation, in general, as well as the role of the different types of motivation is to be further investigated in order to get conclusive results about its effect on the process and outcome of L2 learning. The general assumption is that the higher theL2 motivation, the higher the chances of L2 success (e.g. Bongaerts, 1999; Moyer, 1999). However, it is still to be investigated whether *motivation* is the result or the cause of learning (e.g. Strong, 1984), as well as what the consequences of presenting a negative L2 motivation would be; those two questions remain unanswered to this day.

In the next section we are going to present some models of L2 motivation that have been proposed by different researchers. These models are to take into account in L2 acquisition research since they purport to provide an explanation of the reasons why some learners attain a higher level of L2 competence than others.

Models of L2 motivation

Several models of L2 motivation have been put forward in order to account for individual differences in L2 attainment. The most important (and widely accepted) of all these models are, on the one hand, *the socio-educational model* (Gardner, 1985) and, on the other, *the motivational self-system* (Dörnyei, 2005), which we are going to review in this section. Models of L2 motivation are usually related to models of identification with the L2 community, like the ones we reviewed above.

The socio-educational model

This model has undergone a number of revisions since it was first presented, in order to describe more clearly what appear to be the major processes involved in L2 learning. According to Gardner (1985), all versions of the model stress the idea that languages are unlike any other subject taught in the classroom in that they involve the acquisition of skills or behaviour patterns which are characteristic of an L2 community. As a result, Gardner (1985) claimed that the relative degree of success in L2 learning will be influenced to some extent by the individual's attitudes towards the L2 community or to other communities, as well as by the beliefs in the community that are relevant to the L2 learning process.

This model focuses on four types of variables: the social milieu, individual differences, language acquisition context and outcomes. It views the L2 learning process as involving a particular interplay of these four variables. Given that this model focuses on the

importance of L2 learning taking place in a particular context, Gardner further claimed that the beliefs in the L2 community concerning the importance and meaningfulness of learning the L2, the nature of skill development expected and the role of individual differences in the learning process will influence L2 acquisition.

This model emphasizes the importance of all individual differences in the affective domain regarding the L2 learning process. According to this model, L2 learning is not only a process of language learning in itself, but it involves the four variables we have just reported above, namely the social milieu, individual differences, language learning acquisition contexts and outcomes. All these components determine the L2 learning process in the sense that those learners presenting the favourable requisites towards learning the L2 and towards the L2 community will get a higher level of L2 attainment.

Motivational L2 self system

Dörnyei (2005) developed a new conceptualization of L2 motivation, the so-called *motivational L2 self system* which is made up of the following three elements:

1) Ideal L2 Self
2) Ought-to L2 Self
3) L2 Learning experience

Dörnyei posited that the central concept of his *motivational L2 self system* is the *ideal L2 self*, which refers to the representation of all those attributes that somebody would ideally like to possess (i.e. a representation of his/her personal hopes, aspirations or wishes). He used the term *Ought-to L2 self* in order to refer to all those attributes that one believes s/he ought to possess (i.e. a representation of somebody's obligations or responsibilities). A basic prediction in this model is that if proficiency is the target, language is part of one's ideal *Ought-to L2 self*. As a result, this will serve as a powerful

motivator to learn the L2 because of the learner's psychological desire to reduce the discrepancy between his/her current self and his/her possible future selves.

Dörnyei's theory of the *motivational L2 self system* seems to rightly posit that one's image as a competent L2 speaker is a significant driving force in the L2 learning process. Next, we will review several studies which have followed the premises of this model as developed by Dörnyei (2005).

In Csizér and Dörnyei (2005b), which is a follow-up study of both Dörnyei and Csizér (2002) and Csizér and Dörnyei (2005a), the participants were 4,765 pupils (2,377 males; 2,305 females; 83 with missing gender data) in 1993 and 3,828 pupils (1,847 males; 2,305 females; 74 with missing gender data) in 1999. All the pupils were 13-14 years old and attended the final (8^{th}) grade in the primary school system. In this study, they found two important L2 criterion measures, namely the learners' *intended effort* (i.e. the amount of effort the student was willing to expend in order to learn the L2), and *choice of the L2s to study*. They divided the pupils into four different groups depending on several factors. The first group was that of *the least motivated learners*, who were not interested in FLs or language learning in general. The opposite group was that of *the most motivated learners*, who presented a general high disposition across all the motivational dimensions. Csizér and Dörnyei (2005b) suggested that the latter group, namely the high motivated students had managed to develop a salient *ideal L2 self*, which was also associated with an interest in FLs and language learning in general. The two other groups in the middle presented the following characteristics: group 2 showed more positive attitudes towards the L2 culture and community, whereas group 3 students were superior on instrumental aspects. They further suggested that the reasons why the L2 learners in these groups had not developed a strong *ideal L2 self* was (a) in the case of group 2, a lack of professional future relevance of the L2 and (b) in the case of group 3, because their motivation was determined by the *ought-to L2 self*, which is a less internalized counterpart of the *ideal L2 self* in Dörnyei's system. This is a very interesting study which suggests the importance of both the instrumental and the integrative motivations in creating the *ideal L2 self*, which will urge

the L2 learner to strive as much as possible in the L2 learning process and, as a result, will probably provide him a positive outcome.

More recently, Kormos and Csizér (2008) investigated the L2 learning process of 623 Hungarian students, namely secondary school students, university students and adult learners. They found that the main factors affecting students' L2 motivation were language learning attitudes and the *ideal L2 self*. In the case of the secondary school students, it was interest in English-language cultural products that affected their L2 motivation, whereas *international posture* (i.e. "interest in foreign or international affairs, willingness to go overseas to study or work, readiness to interact with intercultural partners (…) a non-ethnocentric attitude towards different cultures" Yashima, 2002: 57) as a significantly predictive variable was only present in the university students as well as in the adult L2 learning group.

In another study, Dörnyei and Ushioda (2009a, 2009b) claimed that the more elaborate *the possible self* in terms of imaginative, visual and other content elements, the more motivational power it is expected to have. In this sense, Oyserman and Markus (1990) suggested that *a desired possible self* will have maximal effectiveness when it is balanced by a counteracting *feared possible self*. They stated that an immigrant in the US may desire to learn the L2 and integrate in the society by fear of failure in succeeding in the L2 learning and, as a consequence, become an outcast.

The two models we have just presented in this section, namely *the socio-educational model* by Gardner (1985) and *the motivational L2 self system* by Dörnyei (2005) posit the importance of motivation towards learning the L2 and towards integrating in the L2 community in order to attain a high degree of competence in the L2. Gardner (1985) suggested the importance of four different variables, namely the social milieu, individual differences, language acquisition contexts and outcomes in the L2 learning process; whereas Dörnyei (2005) suggested the importance of developing an *ideal L2 self* as well as an *ought-to L2 self*. In this sense, he claimed that if L2 proficiency is the target, the L2 is part of the *ideal L2 ought-to self* , which will boost the learner to strive as much as

possible to become proficient in the L2. Both models of L2 motivation may provide us with very interesting insights of the L2 learning process and outcome; nonetheless, we could suggest that Dörnyei's *motivational L2 self-system* is the one which appears to provide a more exhaustive and comprehensive account of the L2 learning experience and outcome of immigrants immersed in an L2 environment for an extended period of time. It is a very innovative model which appears to point directly to the original source of motivation by invoking the components the model itself is made up of, such as *the ideal L2 self*, *the ought-to L2 self* (and by extension *the feared possible L2 self*) and *the L2 learning experience*. Although this model appears to be very straightforward, further research in this area is certainly needed in order to gain a better understanding of the processes and implications underlying L2 motivation and its influence on the L2 learning process and outcome.

B) The influence of motivation in the NL in the phonological and lexical attrition of the NL

The factor of *motivation* has been widely and deeply investigated in the context of L2 learning, in the sense of how degree of L2 motivation may affect the L2 learning process and outcome (e.g. Bongaerts, 1999; Ellis, 1994; Moyer, 1999). However, degree of motivation towards maintaining a NL has not yet been widely considered in language attrition research. Rather, in the case of attrition in the NL, it has been *degree of identification with the NL community* (even if it is closely related to *motivation towards the NL*) the factor that has been much more often considered (e.g. Köpke & Schmid, 2004; Seliger & Vago, 1991a), along with *amount of contact with the NL* (i.e. degree of activation of the NL) and LOR (e.g. De Bot *et al*., 1991).

Motivation has been typically treated as an "affective" variable (e.g. Dörnyei, 2009); thus, we could suggest that there have been cases in which complete or almost complete attrition in the NL has occurred arguably due to lack of "affection" towards the NL. Or, we could even suggest that it may have been due to *negative motivation* towards the NL (e.g. Schmid, 2002; Ventureyra *et al*., 2004), even if this variable still needs to be investigated in depth.

In this sense, Schmid (2002) found that exceptional circumstances (such as persecution) might generate emotional factors (e.g. lack of "affection" or negative motivation towards the NL and what it represents for the individual speaker) which would influence attrition in the NL much more dramatically than any other extralinguistic circumstance. In this case, we could suggest that motivation towards the NL would be dramatically reduced (or even become negative motivation) and the individual would probably pick up an L2 in a short period of time which would make him/her feel comfortable and integrate in the L2 community. At the same time, the L2 learner would try to block his/her knowledge of the NL until this language is certainly completely or almost

completely forgotten (at least consciously). In this case, we can see that both identification and motivation towards a particular language are closely interrelated.

We could also suggest that in the study by Ventureyra *et al*., (2004), the Korean adoptees, who had been adopted by French families between the ages of 3 and 8, and had undergone complete attrition in their NL may have also been affected by some kind of trauma. This trauma might arguably have dramatically reduced their motivation to maintain their NL, or even their motivation could have become negative. Thus, these children, for whom L2 communication was arguably essential for many reasons (e.g. school needs, peer pressure, etc., Köpke, 2004), might have felt the need to learn (and excel at) the new language they were exposed to (French) as soon as possible and therefore, integrate in the L2 community where they could feel comfortable. Additionally, they could have felt the need to forget everything that could remind them of their past, their NL included. As a result, these children experienced rapid attrition in their NL and behaved like any other native speaker of French (i.e. their NL was arguably replaced by their L2, see Hyltenstam *et al*., 2009) not only in linguistic terms, but probably also in their degree of identification with the French community as well as in their degree of motivation towards the French language.

2.4.2.3 Strength of concern for pronunciation accuracy (CPA) in the L2

In this section we are going to present some studies which have considered this variable in order to account for degree of phonological attainment in the L2 in a natural setting as well as in a foreign language setting.

Purcell and Suter (1980) found in their study of 61 non-native speakers of English that those who were more concerned with pronunciation accuracy were the ones who presented milder foreign accents in English. In fact, they attempted a profile of the non-native speakers who were more likely to pronounce more accurately in English: they were native speakers of the "favoured" languages (in their study Arabic and Persian versus Japanese and Thai), they were good oral mimics, they had lived in an English-speaking country for a considerable number of years, and for most or all of the time they had lived with a native speaker of English. Finally, they were concerned about their accuracy of pronunciation in English.

More recently, Moyer (1999) found that only 1 out of the 24 English learners of L2 German in her study performed to a native-like level across all tasks, despite the fact that he started learning German at the age of 22 (i.e. late learner) and that he had no prior experience in foreign language learning. This participant reported that his earliest motivation to learn German was a personal fascination with the language and with Germans. Additionally, this participant was largely self-taught and reported spending much time just listening to exchange student friends from Germany in order to "absorb the sounds" (p. 98) before going abroad to Germany where he spent two years. He reported a strong desire to acculturate and to sound German, a desire that only a few of the other subjects had. All these favourable circumstances were arguably the reason why he managed to excel in his attainment of native-like phonological proficiency in the L2.

In contrast to the two studies reported above where strength of concern for pronunciation accuracy in the L2 showed up as a significant predictor of degree of phonological attainment in the L2, Elliott (1995) found in his study with 43 English

learners of L2 Spanish in a foreign language setting that strength of concern for pronunciation accuracy was not a predictor of degree of degree of phonological attainment in the L2. Nevertheless, he found that the type of instruction provided, namely the multimodal instruction did result in significant improvement of L2 pronunciation for the subjects in the experimental group. He described the multimodal instruction consisting of (a) teaching concrete rules about point, place and manner of articulation; (b) designing class presentations on pronunciation that appeal to individual differences in learning styles and preferences; (c) employing both deductive and inductive modes of teaching pronunciation; (d) providing students with ample drill and practice exercises; and (e) giving immediate feedback in order to prevent phonological fossilization (p. 538).

Given that the findings from the above-mentioned studies cannot be reconciled at this stage, further research considering strength of concern for pronunciation accuracy in the L2 is needed in natural settings as well as in formal settings in order to gain a better understanding of the role of this variable as a predictor of degree of phonological attainment in the L2.

2.4.3 Input

2.4.3.1 Length of residence (LOR)

The variable length of residence (LOR) has usually been defined as the number of years a particular individual has been living in the L2-speaking country (see Flege & Liu, 2001; Flege *et al.*, 2006; Piske *et al.*, 2001). As a result, individuals who migrate to an L2 country are supposed to receive a substantial amount of native L2 input in their new environment, whereas the input they receive from their NL is supposed to be dramatically reduced. In this section, we are going to analyze the variable LOR from two different perspectives; on the one hand, the influence it wields on the phonological and lexical acquisition of an L2 and, on the other, the influence it exerts on the phonological and lexical attrition of the NL.

A) The influence of LOR in the phonological and lexical acquisition of the L2

In this section, we are going to review different considerations that have been proposed by researchers regarding the variable LOR and, then, we will present some studies which considered this variable in studies of phonological and lexical acquisition of the L2. It must be pointed out that this variable has usually been considered along with the variable AOA because of their interdependence.

Stevens (2006) pointed to the fact that linguists have generally considered LOR as a measure of the time available for immigrants to learn the L2. In this sense, Johnson and Newport (1989) considered just 5 years as sufficient time for the achievement of ultimate attainment in the L2, whereas Birdsong (2005) mentioned a more realistic span of 10 years as necessary for ultimate attainment in the L2. At this point, it is important to point out that Birdsong (2006) stated that the term *ultimate attainment* has occasionally and erroneously

been used as a synonym for *native-like proficiency*. He made it clear that the term *ultimate attainment* refers to the final product of L2 acquisition, be it native-like (i.e. pass for a native speaker of the L2) or any other outcome.

First, we are going to review those studies which found that LOR was a relevant variable for predicting L2 proficiency; and then, we will present some studies which found that this variable was immaterial for predicting level of proficiency attained in the L2.

Purcell and Suter (1980) found in their study of 61 nonnative speakers of English that only four variables were useful in accounting for the variability of the subjects' pronunciation scores in the L2, namely first language (in this study, the favoured languages were Arabic or Persian as opposed to Japanese or Thai), aptitude for oral mimicry, residency (i.e. LOR), and strength of concern for pronunciation accuracy. In the case of LOR, they highlighted the importance of having lived in the English-speaking country for a considerable number of years in order to get good results in L2 pronunciation.

In another study, Best and Strange (1992) wanted to test the proposal that the degree of difficulty adults encounter in discriminating non-native segmental contrasts varies considerably across contrasts and languages. The participants in their study were 9 native Japanese learners of L2 English, who had had intensive English conversational instruction with native American English speakers (8-10 hours a week) and had been living in the US for 18 to 48 months at the time of testing (the experienced group); and 5 native Japanese learners of L2 English who had had little or no English conversational instruction (0-3 hours a week) and had lived in the US for less than 7 months. They found that those with intensive English conversation experience and longer LOR showed identification and discrimination patterns more similar (though not identical) to the American speaker group than did those who had little experience and shorter LORs. Thus, this study lent support to the hypothesis that those subjects with a longer LOR (i.e. with a longer exposure to the L2) in the L2 country will get better results in the L2 than those with shorter LORs (i.e. with a shorter exposure to the L2).

In another study, Flege *et al*., (1997a) assessed the effect of English-language experience on non-native speakers' production and perception of English vowels. Twenty speakers for each group of German, Spanish, Mandarin and Korean backgrounds were recruited. The participants were assigned to experienced or inexperienced groups depending on their LOR in the US (mean 7.3 versus 0.7 years, respectively). The experienced non-native subjects produced and perceived English vowels more accurately than did the inexperienced non-native subjects as assessed by native English-speaking listeners. This study, again, confirmed the relevance of LOR for predicting degree of phonological attainment in the L2, in the sense that the longer the LOR of the participants in the L2 country, the higher their degree of phonological attainment in the L2.

More recently, Flege and Liu (2001) conducted a study where the participants were adult Chinese L1 students and non-students who differed in their LOR in the United States. They found that there was a positive correlation between LOR and level of L2 competence. That is, those Chinese students with longer LORs presented a higher degree of L2 competence than those with shorter LORs. However, the difference among the non-students who differed in their LORs was not significant. These results suggest not only that L2 competence will improve over time if and only if the L2 speaker receives a substantial amount of L2 input, but it also points to the importance of the quality of L2 input (e.g. students versus non-students).

Next, we are going to review some studies which found that LOR was irrelevant for predicting degree of phonological attainment in the L2.

For instance, Oyama (1976) tested 60 Italian male learners of ESL (English as a Second Language) to compare the effects of AOA in the US and length of exposure (i.e. LOR) on degree of phonological attainment in the L2. Using a read-aloud task as well as narration, AOA was found to have had a very strong effect on the speakers' pronunciation in the L2, whereas number of years of residence (i.e. LOR) was irrelevant.

Likewise, Johnson and Newport (1989) investigated both AOA and LOR. They found that the correlation between LOR and the test scores was low (r = .16) and the correlation between LOR and AOA was also low (r = -.09). As a result, they concluded that LOR was immaterial, as in the study by Oyama (1976) above.

Stevens (1999) used the 1990 census data, but restricted her sample to those subjects who were between 18 and 40 years old at the time of the census. However, she did not exclude those subjects with limited LOR. In this study too, AOA appeared to be a much stronger predictor of L2 proficiency than LOR, at least in the case of participants with a LOR longer than 5 years. Five years was precisely the amount of time estimated by Johnson and Newport (1989) to attain ultimate attainment in the L2, in contrast to the (presumably) more realistic 10-year span suggested by Birdsong (2005). Apparently, the claim that 5 years of LOR were necessary in order to attain ultimate attainment in the L2 seemed to be confirmed in this study since LOR failed to be a significant predictor of L2 proficiency for participants with LORs longer than 5. Further research is certainly needed in order to clarify the role of LOR in the degree of phonological attainment in the L2.

In another study, Piske *et al*., (2001) examined the influence of Italian-English bilinguals' age of learning, LOR in an English-speaking country (Canada), gender, amount of continued NL (Italian) use and self-estimated NL ability on degree of foreign accent in the L2. They found that LOR in an L2-speaking country did not have a significant independent effect on overall pronunciation in the L2. They suggested that after learners have spent a certain amount of time in a predominantly L2-speaking environment, increases in LOR will cease to have a further ameliorative effect on L2 pronunciation. Once again, in this study LOR was found to be immaterial after participants had been living in the L2 environment for a substantial amount of time. This finding suggests that L2 learners had probably reached their ultimate attainment in the L2 after a certain number of years immersed in the L2 environment and that could be the reason why LOR did not materialize as a relevant predictor of L2 proficiency.

More recently, Flege *et al*., (2006) found in their study of Korean children and adult learners of L2 English that the effects of LOR (3 versus 5 years) were non-significant for both the native Korean children and for the native Korean adults. This finding was unexpected since these individuals had probably not reached their ultimate attainment in the L2; what is more, LOR was expected to be inversely related to degree of nativeness (DN) in the L2. Nonetheless, it was observed that children presented milder foreign accents than adults; they accounted for this finding by suggesting that immigrant children typically receive a greater amount of L2 input than adults.

The relevance of LOR in the attainment of a more or less native-like grammar and pronunciation in the L2 is still to be further investigated. Generally, LOR has not been analyzed controlling for actual amount of exposure or quality of input (e.g. Flege, 2009; Flege & Mackay, 2010; Muñoz & Singleton, 2011). For instance, Flege and Liu (2001) found that L2 proficiency does increase with LOR, but only if the L2 learner participates in social settings such as schools, etc., where they can receive a substantial amount of L2 input from native speakers of the language. Thus, we should make the difference between LOR and amount of exposure, which is the critical thing. In some immigrant communities, the amount of exposure to the L2 is so limited that LOR becomes irrelevant. This could be the reason why LOR has not shown up as a more predictive factor in L2 studies (see e.g. Johnson & Newport, 1989; Oyama, 1976; Flege *et al*., 2006, among others).

Apart from this, it has proved difficult to analyze AOA and LOR independently (e.g. Flege, 2010), since AOA has generally been taken as the starting point of LOR and they have both been considered to be inseparable from one another. In fact, AOA and LOR usually appear to be closely related, but another variable which should be considered along with these two in order to properly account for individual differences in the degree of attainment in L2 proficiency of learners is, as mentioned above, amount of exposure. Flege (2010) also pointed out the importance of this variable in order to be able to draw firm conclusions about the influence of these factors in the attainment of a higher or lower level of proficiency in the L2.

In this sense, García Lecumberri *et al*., (2010) claimed that the amount of native L2 input obtained varies with the age of the L2 learners, their occupation and social contacts. According to these researchers, late learners do not generally receive as much native input as natives and early bilinguals, who in turn, interact abundantly through school and other activities, whereas adult immigrants are usually more likely to maintain contact with other NL speakers. They suggested that quantity can be viewed from minimal aural exposure to total immersion in the L2 environment, with 100% of the learners' speech interaction being carried out in the L2. Hence, it has been claimed that an L2 acquisition context is a necessary, but not sufficient condition for the latter (i.e. 100% degree of activation in the L2).

At this point, we cannot draw firm conclusions about the role of LOR in the degree of proficiency attained in the L2. Thus, further research considering LOR in natural settings is needed in order to gain a better understanding of this variable and its influence on degree of L2 proficiency.

B) The influence of LOR in the phonological and lexical attrition of the NL

The variable LOR has not only been considered when conducting research investigating degree of attainment in the L2, but it has also been taken into account in studies focusing on phonological and lexical attrition in the NL (e.g. De Bot *et al*., 1991). In this sense, LOR refers to the number of years an individual has been living in the L2-speaking environment. As a result, s/he is supposed to have been significantly deprived of input from his/her NL(s) which may have affected his/her proficiency in the latter.

De Bot *et al*., (1991) found in their study of Dutch immigrants in France that, in measuring attrition in the NL of these immigrants, there was a significant effect of both "time elapsed since emigration" (i.e. LOR) and "amount of contact with the NL" (i.e. degree of activation of the NL). They claimed that the relationship between those two variables is a complex one, since there is only a linear relationship between LOR and attrition in the NL when there are few contacts with the NL. As a result, De Bot *et al*., (1991) suggested that in attrition research, LOR and "amount of contact with the NL" should not be used as two independent measures.

In the study by Pallier *et al*., (2003) we could suggest that it was an early AOA (between the ages of 3 and 8), along with an extended LOR in the host country (France) as well as no subsequent input from their NL which made the 8 Korean adoptees in this study claim that they had no knowledge of their NL (i.e. complete attrition). In fact, the behavioural tests demonstrated that these individuals kept no trace of residual knowledge of their NL (Korean). Hence, their NL appeared to have been completely replaced by their L2 (French) and they behaved like the native French controls in the study (see also Ventureyra & Pallier, 2004; Ventureyra *et al*., 2004).

Even if the effect of LOR on the linguistic attrition in the NL is still to be further investigated, the existing evidence points to the importance of considering LOR as a

significant variable in attrition research. Those individuals who have been immersed in the L2 environment for a rather extended period of time appear to be more likely to present signs of attrition in their NL than individuals who have been immersed in the L2 environment for a less extended period of time.

2.4.3.2 Degree of language activation (DA)

Degree of activation is another factor that has been considered in L2 studies as well as in attrition research. It has been generally assumed that the more frequently the L2 is used, the higher the degree of L2 proficiency will be. In turn, the less frequent the use of the NL, the more rapid and severe the degree of attrition in this language will be. We will review several studies that have considered this factor in order to account for L2 learning and outcome as well as in language attrition research.

A) The influence of the degree of activation (DA) of the L2 in the phonological and lexical acquisition of the L2

Degree of activation of the L2 (i.e. frequency of use) is a factor that has been consistently invoked in L2 acquisition studies. A classic example of this view is the study by Flege *et al*., (1999) which found that those native speakers of Korean who used English (their L2) often had a better pronunciation in the L2 than those who used English relatively seldom.

We should take into account the fact that factors which account for L2 learning usually work together, and this is especially so in the case of this factor. We cannot isolate this factor, also referred to as "frequency of use", from the remainder (e.g. Birdsong, 2006; Yashima *et al*., 2004). In this sense, Yashima *et al*., (2004) found that *willingness to communicate* (WTC) in an L2 predicted frequency and amount of communication in this language by Japanese learners of L2 English in a study-abroad program (see also MacIntyre *et al.,* 1998; MacIntyre & Legatto, 2011). In this sense, Birdsong (2006) claimed that those L2 learners who pass for native speakers of the L2 tend to be those learners who present high levels of L2 practice (e.g. Flege *et al*., 1999), motivation to sound native-like (e.g. Bongaerts, 1999; Moyer, 1999; Purcell & Suter, 1980), and L2 phonetic training (e.g. Aliaga-García & Mora, 2008; Hazan & Sennema, 2007; Logan *et al*., 1991).

Flege (2010) suggested that in order to give an exhaustive account of the degree of activation of the L2, measurements (not estimations!) of amount of L2 input are needed. This would certainly provide us with a more precise picture of the L2 learner and it would enable us to account for individual differences in degree of L2 attainment in connection with this variable.

To sum up, degree of L2 activation is a variable which we should consider in studies of L2 learning; nevertheless, we cannot neglect the fact that this factor may interplay with many other factors, and even some factors may offset the effect of others. Thus, future research should consider all those variables which may exert some kind of influence in L2 learning in order to draw the right conclusions.

B.1) The influence of the degree of activation (DA) of the NL in the phonological and lexical acquisition of the L2

In this section we are going to review some studies which have analyzed the influence of degree of NL activation in the degree of phonological acquisition of the L2.

Flege *et al*., (1997b) found that the native Italian immigrants in their study who continued to speak their NL relatively often had significantly stronger foreign accents in English than did the subjects who seldom spoke Italian. This finding suggests the importance of the DA of the NL as a predictor of phonological proficiency in the L2, in the sense that the higher the degree of activation of the NL is, the lower the degree of phonological attainment in the L2 will be.

Flege (1999) proposed the so-called *interaction hypothesis* according to which bilinguals are unable to fully separate the NL and the L2 phonological systems, which necessarily interact with one another. In this sense, he claimed that the *interaction hypothesis* leads to a prediction that is not generated by the critical period or any other hypothesis, namely that the loss of the NL, or its attenuation through disuse (e.g. Romaine,

1989), may reduce the degree of perceived foreign accent in an L2 (see also Hyltenstam *et al*., 2009 for a study rejecting the so-called *Impediment Hypothesis (IH))*. This is a very interesting prediction which leads us to expect that, in the case of immigrants immersed in an L2 environment for an extended period of time, those who report an infrequent degree of activation of their NL will be arguably perceived as presenting a higher degree of nativeness in the L2.

In a similar vein, Guion *et al*., (2000) found that there was a positive correlation between the amount of use of the NL (for bilingual speakers of Quichua and Spanish) and the degree of foreign accent (DFA) in the L2 of these speakers. Thus, the more they used their NL (Quichua), the higher their DFA in the L2 (Spanish) was. On the contrary, the less they used their NL, the lower their DFA in the L2.

In another study, Piske *et al*., (2001) also found that the frequency of use of the NL strongly predicted DFA in the L2, both for early and late bilinguals. That is, those participants who reported a frequent use of the NL presented a higher DFA in the L2, whereas those participants who reported an infrequent use of the NL presented a lower DFA in the L2.

More recently, Flege and Mackay (2004) conducted some experiments of vowel perception with Italian immigrants in Canada. They divided their groups into early arrivals (from 2 to 13 years) and late arrivals (from 15 to 26 years) and subdivided these groups into low L1-use and high L1-use. They found that the early learners obtained higher discrimination scores than the late learners, and also that low L1-use participants (early and late arrivals) obtained higher scores than high L1-use participants. Furthermore, the early learners who used Italian often (early high), but not the early learners who used Italian seldom (early low), were found to differ from the native speakers of English in the control group in perceiving English vowels. Therefore, they concluded that "learning an L2 in childhood does not guarantee a nativelike perception of L2 vowels, nor does the establishment of a sound system for the L1 preclude a functionally nativelike perception of L2 vowels" (Flege & Mackay, 2004: 1). The fact that the early-low group did not differ

from the native English group in their perception of English vowels whereas the early-high group did certainly suggests that the degree of activation of L1 wields an important influence on the perception of L2 vowels even at a very early age of L2 acquisition. Additionally, it points to an early AOA as a necessary, though not sufficient, requirement to achieve native-like perception and production of native-like L2 phonology (see Flege, 1988; Flege *et al*., 1997b; Harley & Wang, 1997).

The main conclusion we can draw from all these studies is that the existing evidence suggests that a frequent use (i.e. high activation) of the NL seems to negatively affect the phonological acquisition of the L2; whereas as we reported above, a frequent L2 use appears to favour L2 phonological acquisition.

B.2) The influence of the degree of activation (DA) of the NL in the phonological and lexical attrition of the NL

It has been found that *degree of activation (DA) of the NL* is a relevant factor in attrition research. De Bot *et al*., (1991) suggested the difference between *many contacts* and *few contacts* when dealing with the frequency of use (i.e. degree of activation) of the NL. In their study with Dutch immigrants in France they found that, as we already mentioned above, this factor has to be analyzed along with other factors such as LOR. De Bot *et al*., (1991) found that in measuring attrition in the NL of their Dutch immigrants in France, there was a significant effect of both "amount of contact with the NL" and LOR. They claimed that the relation between "amount of contact with the NL" and LOR is a complex one, in the sense that there is only a linear relation between LOR and attrition in the NL when there are few contacts with the NL (i.e. when the degree of activation of the NL is low). They concluded that in attrition research both "amount of contact with the NL" and LOR should not be taken as independent measures in order to draw the right conclusions.

We could also mention the study by Pallier *et al*., (2003) reported above, when dealing with the influence of the age factor in the phonological attrition of the NL in a natural setting. In this study, 8 individuals were removed from their native Korea at ages ranging from 3 to 8 and adopted by French families. The adoptees had no subsequent contact with Korean (their NL) and claimed to have no knowledge of their NL. In fact, Pallier *et al*., (2003) demonstrated through some behavioural tests that these individuals had no residual knowledge of Korean (see also Ventureyra & Pallier, 2004 and Ventureyra *et al*., 2004; see Hyltenstam *et al*., 2009 for a study suggesting the existence of L1 remnants in international adoptees). We could suggest that in the case of these 8 Korean adoptees in France, it was the combination of three factors that triggered a complete attrition of their NL, namely an early AOA in the host country (they were all in early childhood when removed from their native country and adopted by French families), a long residency in the host country and a complete replacement of input from their NL (Korean) to L2 input (French). These individuals did not receive subsequent NL input upon arrival in the host

country and, as a result, we could assume that their NL was completely deactivated. This is an extreme example of complete lack of activation of the NL (see also Green, 1986, 1993, 1998; Grosjean, 1997, 1998a, 1998b) and, as a result, complete attrition in the NL.

In another study, Bylund *et al.*, (2009) explored the role of aptitude as a predictor of L1 proficiency in speakers who were removed from their L1 environment prior to puberty (i.e. pre-pubescent speakers). 25 L1 Spanish-L2 Swedish bilinguals living in Sweden (LOR ranged from 12 to 34 years, mean =24.6) participated in the study and 15 native speakers of Spanish living in Chile were recruited as controls. L1 proficiency was measured by means of a grammaticality judgement test (GJT) and they measured aptitude through the *Swansea Language Aptitude Test* (Meara *et al.*, 2003). They found a positive correlation between GJT performance and language aptitude scores. What is more, those bilinguals with above-average aptitude were more likely to score within the native-range on the GJT than those bilinguals with below-average aptitude. Nevertheless, a very interesting finding from this study was that among the participants with below-average aptitude, GJT scores were related to daily L1 use. Therefore, they suggested that language aptitude has a compensatory effect in language attrition; it helps the attriter to retain a high level of L1 proficiency despite dramatic reduction of L1 use.

More recently, De Leeuw *et al*., (2010) conducted a study with 34 L1 German speakers in Anglophone Canada, 23 L1 German speakers living in the Netherlands and 5 German monolingual controls in Germany. 19 German listeners evaluated global foreign accent of the participants in German. As expected, they found that the German listeners were more likely to perceive a global foreign accent in the speech of those bilinguals in Anglophone Canada and the Dutch Netherlands than in the speech of the control group. Additionally, 9 immigrants to Canada and 5 immigrants to the Netherlands were clearly perceived as non-native speakers of German. In this study, two types of contact were differentiated: (i) *C-M* represented communicative settings in which little code-mixing between the L1 and the L2 was expected to occur, and (ii) *C+M* represented communicative settings in which code-mixing was expected to be more likely to occur. They found that the variable *C-M* was a significant predictor of foreign accent in native

speech, whereas the variable *C+M* was not. They suggested that contact with the L1 through communicative settings in which code-mixing is somehow inhibited helps to maintain the stability of native language pronunciation in consecutive bilinguals immersed in an L2 environment. Finally, further analysis revealed that quality and quantity of contact (e.g. De Bot *et al*., 1991; Ventureyra *et al*., 2004) with the native language (German) had a more significant effect as a predictor of global foreign accent in native speech than age of arrival or length of residence.

All of the above-mentioned studies point to the importance of a high degree of activation of the native language of immigrants immersed in an L2 environment for an extended period of time in order to prevent language attrition. However, further research is needed in order to gain a better understanding of the role of this variable as a predictor of degree of attrition in the native language.

3 Section B. Field work

3.1 Introduction

We have just presented the theoretical background of our study, so next, we will describe the field work we conducted in Reno (Nevada) and Boise (Idaho) in the United States. We decided to conduct our field work in these two American cities because they have been traditional settlements for Basque immigrants in the United States. In the case of Reno, there is the so-called "Center for Basque Studies" at the University of Nevada where students can study the Basque language and culture. Boise is home to the Basque Museum and Cultural Center and also hosts a large Basque festival known as *Jaialdi* every five years; the last *Jaialdi* took place from 28th July to 2nd August 2015.

First of all, we aimed to look into the influence of biographical factors, affective factors and input in L3 acquisition, L1 attrition and multilingualism, respectively. That is, we intended to find out which variables may have the greatest influence on these three phenomena and which ones may have a minimal influence, or even be irrelevant and should be disregarded. Concerning biographical factors, we analyzed age of arrival (AOA), gender (male versus female) and education level (university studies versus non-university studies); regarding affective factors, we included degree of identification (DI), motivation (M) and strength of concern for pronunciation accuracy in the L2 (CPA). Finally, as for input factors, we considered length of residence (LOR) and degree of language activation (DA), which we subdivided into two, namely percentage use of the language and location of residence (Reno versus Boise). All those variables were analyzed in relation to L3 acquisition and L1 attrition; in the case of multilingualism, age of arrival (AOA) and length of residence (LOR) were not applicable, since all the multilingual participants had been born and had always lived in the United States.

3.2 Research questions (RQs)

Considering the theoretical background and the aims of our work, the present study intended to address the following research questions:

RQ1: *Which is the influence of biographical factors, affective factors and input in L3 acquisition?*

Our contention is that, even if L2 learning and L3 acquisition may share many characteristics, L3 acquisition has some particularities and should be treated as a linguistic phenomenon in its own right (e.g. Cenoz, 2003a; Jessner, 2003). In this sense, Jessner (2003) claimed that in third language acquisition there are two more relationships to investigate in comparison to L2 acquisition, namely the influence of L1 on L2, L1 on L3, L2 on L1, L2 on L3 and L3 on L1. The present study should help us assess the role of various factors on L3 acquisition and, as a result, gain a better understanding of the L3 acquisition

RQ2: *Which is the influence of biographical factors, affective factors and input in L1 attrition?*

L1 attrition is a linguistic phenomenon which has taken prominence in the last decades (De Bot *et al*., 1991; De Bot & Stoessel, 2000; De Bot & Weltens, 1991; Ventureyra *et al.*, 2004; Ventureyra & Pallier, 2004), but which is still in its infancy, since there are many questions which remain unanswered. Most research conducted so far has focused on the L1 attrition experienced by (young) international adoptees upon arrival in the host country and after contact with their native language has been abruptly interrupted (Ventureyra *et* al., 2004; Ventureyra & Pallier, 2004). We thought that this phenomenon should be investigated in a different group of subjects in order to find out which of the three groups of factors we analyzed for the present study would have the greatest influence and which ones may be disregarded. Apart from this, the present study also intended to look

into the process of L1 attrition by bilingual speakers of Spanish and Basque, since, to the best of our knowledge, language attrition in Basque by the influence of English has not been explored to this day. The present study should shed light on this under-researched area.

RQ3: *Which is the influence of biographical factors, affective factors and input in multilingualism?*

The reason why we formulated this research question is the need to understand multilingualism better, and therefore, the factors that impinge upon it should be explored. Researchers have realized that *multilingualism* should be differentiated from the cover term *bilingualism* because the former phenomenon also has its own specific characteristics and, as a result, should be treated studied in its own right (e.g. Cenoz, 2000a, 2001, 2003a; Dewaele, 2010; Hammarberg, 2001, 2010; Ringbom, 2001, 2005; Williams & Hammarberg, 1998). In fact, Schönpflug (2003) stated that the larger the number of linguistic systems at work, the more interactions between the various levels of the system are to be expected. In a similar vein, Cenoz (2003a) pointed out that cross-linguistic influence in multilinguals is of special interest because multilinguals could potentially use two or more different languages for interaction and language choice could be related to factors such as L2 status (e.g. Cenoz, 2001), typology (e.g. Cenoz, 2001; Hammarberg, 2001; Williams & Hammarberg, 1998), proficiency (e.g. Poulisse & Bongaerts, 1994; Williams & Hammarberg, 1998) and language mode (e.g. Grosjean, 1998a, 1998b). Ruiz de Zarobe & Ruiz de Zarobe (2015) mentioned that one of the main characteristics of multilingualism is the notion of complexity in three different dimensions. First, in terms of the definition itself and its relationship to bilingualism, as the boundaries between both notions are not always clear; second, as a social phenomenon in itself, since multilingual societies arise in a number of ways, such as cohabitation of different linguistic groups in a community, immigration or emigration, etc; finally, when it is viewed as a multidimensional phenomenon, since multilingualism touches upon different dimensions in societies, namely language education, language use, language teaching and learning, etc. The present study attempts to shed light on the influence various factors on

multilingualism, that is, the simultaneous acquisition of several languages, in this case, English, Spanish and Basque in an environment where English is the dominant language.

In sum, we considered that this study would help us gain a better understanding of the role of biographical factors, affective factors and factors related to input in three linguistic phenomena which have become more and more popular in the last decades, namely L3 acquisition, L1 attrition and multilingualism.

3.3 Research procedures

In this section we will first present the methodology we followed for data collection, then we will provide an overview of our sample; finally, we will explore the relation of each of the variables analyzed for the present study to our sample.

3.3.1 Data collection

The data for this study was collected in the cities of Reno (Nevada) and Boise (Idaho) in the United States during a period of roughly three months (1 October 2011- 23 December 2011). The experimenter had been keeping regular contact with the University of Nevada in Reno, where the *Center for Basque Studies* is based, for several months before travelling to the United States as well as with several relevant representatives of the Basque community in Boise (Idaho). Given that the experimenter had already conducted field work in Reno for a preliminary study, she had already met most of the Basque immigrants settled in this area. Prior to her trip to the United States, the experimenter had contacted all participants from her previous study as well as new (potential) participants.

As for the data collection procedure in Boise (Idaho), the experimenter had contacted two members of the Basque community in Boise, namely a Professor at Boise State University and the director of the Basque Museum, who helped the experimenter to find participants for her study. The experimenter had provided these two members of the Basque community in Boise basic information about the study and about the requisites participants had to meet in order to qualify for it. They managed to contact a great deal of would-be participants and asked them whether they would be willing to participate in the study. After that, they provided the experimenter the names and contact details of those participants who were actually willing to participate in her study and, therefore, she was able to prepare her field work in Boise prior to her trip to this city. In fact, this was a very efficient way to proceed and, as a result, a great deal of data was collected in Boise (Idaho).

The data was collected either individually or in small groups of no more than three people (only for questionnaire filling). First, they filled in a questionnaire about their linguistic and biographical background (see appendices 1 and 2). Then, they were recorded (individually) first in English, then in Spanish and, finally, in Basque. They were asked general questions about the culture and lifestyle, first, of the United States (see appendix 3); then, of Spain (see appendix 4); and finally, of the Basque Country (see appendix 5). Finally, participants performed a lexical availability task in the three languages (some participants only performed the task in one or two of the languages). All participants were given a small gift upon completion of the task.

Data was collected from a total of 53 participants; however, our two final samples were made up of 16 L3 participants, that is, native Spanish/Basque bilinguals who had learned their L3 English in a natural setting, and 11 multilingual participants, that is, US born participants of Spanish/Basque heritage who had been exposed to three languages, namely Spanish, Basque and English from an early age. The remainder of the informants was excluded because either their linguistic or biographical background was somehow different from that of the participants who made up our two final samples.

3.3.2 The sample: overview

All the participants in our study were either Basque migrants to the United States or American born citizens of direct Basque descent, living in the city of Reno (Nevada) or Boise (Idaho). These two cities were chosen to conduct the study because they have traditionally been considered two settlements for Basque immigrants in the United States. Many Basques migrated to this country, and especially to the Western area of the United States, where these two cities are located, mainly during the decades of the 60s and 70s of the 20th century. The reason why most of these Basque immigrants settled in these areas is because they could work as shepherds. During these decades, Spain was plunged into a deep economic and social crisis after the civil war (1936-1939), and the economic and social circumstances did not improve much under Franco's dictatorship (1939-1975). As a result, many people, in this particular case from the Basque Country, migrated to the United States in search of a better future.

All the L3 participants in this study were native speakers of both Spanish and Basque, and had learned the L3 upon arrival in the host country. As for the multilingual participants, most of them had learnt Spanish and Basque from their parents, but living in an English-speaking country they had been exposed to English from a very early age. Even so, they reported that they had kept using Spanish and/or Basque on a regular basis.

3.3.3 Biographical variables

In this section we are going to detail the biographical data corresponding to both our Spanish/Basque bilinguals as well as to our multilingual participants. The biographical variables we considered in our study are age of arrival (AOA), gender and education level. However, we will only relate AOA to our L3 participants, since our multilingual participants were actually born and had always lived in the United States, the country where we conducted the field work for the present study.

3.3.3.1 Age of arrival (AOA)

The first of the biographical variables we analyzed for the present study was age of arrival (AOA). AOA has traditionally been used to index the beginning of relevant exposure to the L2 (see Muñoz, 2008). We could have included this variable either in the group of biographical variables or amongst input variables; we decided to include it in the biographical group because this variable determined one of the most important aspects of our participants' biography in many aspects other than linguistic, but it is also closely related to input.

We divided our participants into two different groups according to their AOA in the English-speaking country. The 11 participants who were born in the United States made up the sample of multilingual participants. The 16 participants not born in the United States made up the sample of L3 participants (see appendices 32 and 33). Amongst them, 1 participant arrived in the host country at the age of 7, whereas 15 of them arrived in the US from the age of 8 onwards.

As for the theoretical background concerning this variable, we considered that the loss of ability to master an L2/L3 is progressive (e.g. Bialystok & Hakuta, 1999; Birdsong, 1992, 1999a; Birdsong & Molis, 2001; Bongaerts, 1999; Johnson & Newport, 1989). Some researchers have suggested age 6 as the offset of the critical period for the acquisition of

phonology following Long (2005: 206), who claimed that "a native-like accent (for segmental and supra-segmental phonology) is impossible unless first exposure occurs before age six for many individuals, and by about age 12 for the remainder". Interestingly, this definition leaves open the existence of the so-called "exceptional learners" who can achieve a native-like pronunciation in the L2 after the critical period for the acquisition of L2 phonology has come to an end for most individuals (see Bongaerts *et al.*, 1995, 1997; Moyer, 1999), and it does not detail the characteristics of L2 acquisition for those individuals whose first exposure begins between the ages of 6 and 12.

In this sense, several cut-off points for the acquisition of phonology have been put forward (e.g. Diller, 1981; Molfese, 1977; Scovel, 1988; Seliger, 1978) since the formulation of the Critical Period Hypothesis (Lenneberg, 1967). Molfese (1977) proposed age 1 as the cut-off point for the acquisition of native-like phonetics/phonology, whereas Diller (1981) extended it from age 6 to 8. Seliger (1978) claimed that puberty was the cut-off point for L2 phonological acquisition, as well as Scovel (1988) who suggested age 12.

We considered that Molfese's (1977) claim of age 1 as the cut-off point for phonological acquisition was too restricted, whereas both Seliger's (1978) and Scovel's (1988) proposals of puberty and age 12 as the cut-off points, respectively, were somehow vague. Finally, Diller's claim of age 6 to 8 as the offset of the critical period seems to be pretty clear, but still lacks rigour as well as a precise explanation of why this particular age frame may make up a window of opportunity, and it completely rules out the existence of speakers who can acquire native-like L2 phonology beyond this age. We adhere to the view that the loss of capacity to master an L2 is progressive, as it has been claimed by many researchers in the last decades (e.g. Bialystok & Hakuta, 1999; Birdsong, 1992, 1999a; Birdsong & Molis, 2001; Bongaerts, 1999; Flege, 1999; Flege & Mackay, 2010, 2011; Johnson & Newport, 1989).

In our sample, we had 11 participants who were actually born in the United States (i.e. the multilingual participants). This means that, even if most of them did not report English as one of their NLs (most of them reported Basque and/or Spanish as their home

language(s)), they were exposed to it from a very early age and we expected all of them to have attained native-like phonological proficiency in this language. We also had 1 participant who arrived in the host country at the age of 7 (i.e. early arrival). In his case, we could say that given that he was exposed to English from quite an early age, he was also expected to have attained native-like phonology in this language. We will separate the whole sample into L3 participants (sample 1) and multilingual participants (sample 2) when the need arises.

3.3.3.2 Gender (male versus female)

There were 9 male and 7 female learners in our sample of L3 participants. As for our multilingual participants, there were 3 male and 8 female speakers. In this case, our sample of multilingual participants was more unbalanced in terms of gender (see appendices 32 and 33).

3.3.3.3 Education level (university versus non-university studies)

In this section we are going to present the data corresponding to education level of the L3 as well as of the multilingual participants in our sample. In the “university studies” group were included those participants with a university diploma, whereas those participants who did not have a university diploma were placed in the “non-university studies” cohort.

Only 2 participants in our L3 sample had a university diploma (1 of those 2 participants was the early arrival), whereas 14 of them did not hold a university qualification. We can see that, in terms of education level, our sample of L3 participants was clearly unbalanced. Concerning the multilingual group, 8 of the participants in our sample had a university diploma, whereas 3 of them did not have one. In this case, our sample was also unbalanced in terms of education level (see appendices 32 and 33).

3.3.4 Affective variables

3.3.4.1 Degree of identification with the community (DI)

Another of the variables we considered for the present study study was degree of identification (DI) with, on the one hand, the American community (DI.E) and, on the other, with the Spanish community (DI.S) and with the Basque community (DI.B). In order to collect the data, all the participants (i.e. the L3 and the multilingual participants) filled in a questionnaire where they were asked to express their own opinion about some statements regarding the different communities they belonged to. The range of possible answers in a scale of 5 for each statement was the following: “strongly agree”, “agree”, “neither agree nor disagree”, “disagree” and “strongly disagree” (see appendix 1). The maximum score was for “strongly agree” for which the participant would be given 5 points, whereas the lowest score was for “strongly disagree” for which the participant would be given 1 point. Considering that this section was made up of seven different statements, the minimum score in this section would be of 7 points (i.e. in case the participant answered “strongly disagree” to all the statements), whereas the maximum score would be 35 points (in case the participant answered “strongly agree” to all the statements).

We will see in the section of results (section 3.4) the influence of degree of identification with the three communities on L3 acquisition, L1 attrition and multilingualism.

3.3.4.2 Motivation (M)

L2 motivation is one of the variables which have been more deeply studied in the last decades but have, in some cases, yielded contradictory results (e.g. Dörnyei & Ushioda, 2009a; Gardner, 1985, 2001; Moyer, 1999; Schumann, 1978b).

We examined the influence of this variable on L3 acquisition, L1 attrition and multilingualism. In the questionnaire that the participants had to fill in there was a module related to motivation (see appendices 1 and 2). In this section, they had to express their opinion about how important or unimportant they thought their different languages were in order to conduct ordinary activities of their daily life such as making friends, watching TV, getting a job, etc. This section was made up of 12 statements for each of the languages under study, and participants could choose between three different options, namely "important" (3 points), "a bit important" (2 points) and "unimportant" (1 point). As a result, the minimum score in this section could be 12 points (i.e. in case the participant chose "unimportant" for all the 12 statements), whereas the maximum score would be 36 points (in case the participant answered "important" in all 12 statements). In the section of results for English, only L3 participants will be considered, since multilingual participants were all expected to present native-like proficiency in English irrespective of their motivation in English.

Most L3 and multilingual participants presented a high motivation in English, whereas they differed substantially from one another in their motivation in both Spanish and Basque (see appendices 32 and 33).

3.3.4.3 Strength of concern for pronunciation accuracy (CPA)

This is another variable we considered in our study in order to see whether it had any predictive power on L3 acquisition and multilingualism. This is a variable which has usually been considered in L2/L3 studies; in fact, we disregarded its (potential) influence on L1 attrition because participants could have found those questions concerning strength of concern for pronunciation accuracy in their native languages as tricky or misleading. We also ruled out the possibility of considering strength of concern for pronunciation accuracy in English for our multilingual participants, since they were all expected to fall within the native-speaker range irrespective of that data. Purcell and Suter (1980) found that strength of concern for pronunciation accuracy was a significant predictor of phonological attainment in the L2, in the sense that those learners who presented a stronger concern for pronunciation accuracy in the L2 were the ones who attained a higher degree of phonological proficiency.

Our L3 participants differed considerably (range: 5-15) in their strength of concern for pronunciation accuracy in the L3 (see appendix 32), as well as our multilingual participants in their strength of concern for pronunciation accuracy in both Spanish and Basque (see appendix 33). We will see in the section of results (section 3.4) whether this variable played a significant role for our two groups of participants.

3.3.5 Input

3.3.5.1 Length of residence (LOR)

The first variable related to input we considered was that of length of residence (LOR). This is a variable that is closely related to that of AOA (e.g. Johnson & Newport, 1989; Oyama, 1976; Stevens, 1999), since AOA in the host country, usually marks the beginning of LOR and, as a result, of relevant exposure to the target language (see Muñoz, 2008). However, we divided AOA and LOR in two different sections because AOA is more related to the participants' biography (i.e. biographical variables), whereas LOR is a measure of the time during which participants have been receiving input of the language spoken in the country where they have living during that time.

Some studies have considered that the minimum LOR necessary to observe ultimate attainment in L2 learners is 5 years (e.g. Johnson & Newport, 1989), whereas some other studies (e.g. Birdsong, 2005) have considered a more realistic span of 10 years as necessary for ultimate attainment in the L2. All the L3 participants in our sample had LORs longer than 10 years, so we expected all of them to have reached their ultimate attainment in English. We wanted to find out whether LOR had any influence (either promoting or preventing), on the one hand, on L3 acquisition and, on the other, on L1 attrition (e.g. De Bot, 1991; Pallier *et al*., 2003).

Our 16 L3 participants differed widely in their LOR (participants' range of LOR: 23-63 years); multilingual participants were not considered since LOR was not expected to have any influence on them given the fact that they were born and had always lived in the United States. We will see in the section of results (section 3.4) whether this variable actually had an influence on participants' L3 acquisition as well as on L1 attrition.

3.3.5.2 Degree of language activation (DA)

This variable has also been used in L2 studies (Flege *et al*., 1997b; Flege *et al*., 2002; Guion *et al*., 2000; Piske *et al*., 2001) in order to account for individual differences among L2 learners. In the present study we wanted to find out its influence on L3 acquisition as well as on L1 attrition and multilingualism. We measured the degree of activation of the languages of our participants in two different ways; first, via a questionnaire our participants filled in (see appendices 1 and 2), which included a section where they had to specify their percentage use of their different languages in their daily life: at home, at work, etc. Secondly, we measured their degree of language activation by taking into account their geographical location since our participants lived in two different locations, namely Reno and Boise. Although both Boise and Reno have been traditional settlements for Basque immigrants in the United States, nowadays Boise presents a bigger and more active Spanish/Basque community than Reno. Therefore, we wanted to see whether location (degree of immersion in a Spanish/Basque community, in this case) could have any influence on the three phenomena under study, namely L3 acquisition, L1 attrition and multilingualism. Six of the 16 L3 participants in our sample were established in Reno, whereas 10 of them were established in Boise (see appendix 32). 4 out of the 11 multilingual participants were established in Reno, whereas 7 of them were established in Boise (see appendix 33).

We will not include the degree of activation in English of the multilingual participants in the section of results (section 3.4), since, as we already reported, in their case we expected native-like performance in English irrespective of any other variable.

3.3.6 Analysis methodology

In this section we will describe the methodology we followed in order to analyze the data collected for the present study.

The degree of "deviation" from the phonological system of the target language (TL) is usually measured through **degree of nativeness** (DN) or **degree of foreign accent** (DFA) judgements carried out by native (and usually monolingual) speakers of the TL. These judgements can provide us with quite an accurate account of the degree of phonological attainment of the language learners. DN ratings are usually requested along with **degree of comprehensibility** (DC) ratings. DC ratings from native speakers of the TL give us information about the extent to which native speakers of the TL find it easy or difficult to understand learners' speech in that language. In the case of Spanish and Basque, we decided to include judgements from Spanish/Basque balanced bilinguals as well as from Spanish monolingual and Basque-dominant speakers in order to see whether there was any difference between the judgements provided by these two different groups of judges.

We will start by describing the methods we followed in order to gather the native judgements in English, then the native judgements in Spanish and, finally, those in Basque.

3.3.6.1 Native judgements in English

In this section, we will present the methods we followed in order to collect the native judgements in English from native speakers of American English.

Native judges of American English

Six speakers of American English were recruited as native judges in order to rate the English pronunciation of the participants in our two samples, namely the L3 and the multilingual participants. These judges were all native speakers of American English living in the area of Reno (Nevada). Amongst the classifications of American accents, Francis (1958) distinguishes three major accent areas, namely General American, Southern and Eastern; Reno and Boise fall in this case in the same accent area, that is, General American. Nevertheless, Thomas (1958) in a more detailed classification, considers ten accent areas. In Thomas's (1958) classification, Reno would fall within the Southwest area, whereas Boise would fall within the Northwest area, even though Boise is borderline with the Southwest area (from Wells, 1982). Given that our participants were from Reno and Boise, but native judges were recruited only in Reno, we made sure that they were also familiar with the accent in Boise.

All our native judges were basically monolingual speakers of American English. That is, some of them had some knowledge of a foreign language, but in all cases their degree of proficiency in those languages was below conversational. As for their education level, they were all undergraduate students of different degrees at the University of Nevada in Reno.

All native judges were told that they were going to listen to several recordings, some of which belonged to native speakers of American English, whereas others belonged to non-native speakers of American English. The task was conducted individually in a

small quiet room at the Center for Basque Studies at the University of Nevada in Reno. The whole task lasted 1 hour approximately and all judges performed the task in one session.

None of the native judges reported hearing impairment and they were all paid $10 upon completion of the task.

Materials

Native judges listened to excerpts from our participants' recordings. In these excerpts, participants answered general questions about culture and lifestyle in the United States; native judges were asked to fill in a questionnaire for each of the recordings (see appendix 9).

Native judges were asked to listen to the different excerpts and answer the questions about **degree of nativeness** (DN) and **degree of comprehensibility** (DC) as well as about the overall pronunciation of each of the participants in English (see appendices 12, 13, 22 and 23). **Degree of nativeness** is a linguistic measure of competence which tells us information about the phonological competence of the speaker in a particular language, whereas **degree of comprehensibility** is a functional measure of competence which provides us with information about the actual efficiency of the speaker to communicate in a particular language. The 7-point scales provided to the native judges for their DN and DC ratings were the following:

Degree of nativeness (linguistic measure of competence). 0= very strong foreign accent; 1= strong foreign accent; 2= a more than moderate amount of foreign accent; 3= moderate amount of foreign accent; 4= a less than moderate amount of foreign accent; 5= slight foreign accent (i.e. near native); 6= no foreign accent (i.e. native).

Degree of comprehensibility (functional measure of competence). 0= completely incomprehensible; 1= very difficult to understand; 2= difficult to understand; 3=

moderately understandable; 4= quite understandable; 5= almost perfectly understandable; 6= perfectly understandable.

Distractor-control group

In order to test the reliability of our native judges and to intersperse in our sample recordings as distractors, we introduced a distractor-control group (henceforth "control group"). This group consisted of 5 native speakers (NSs) of American English (3 from Reno and 2 from Boise) and 2 non-native speakers (NNSs) of English with quite a strong foreign accent in that language (see appendix 34 for judgements in English assigned to the control group).

Procedure

All native judges were asked to fill in a questionnaire before performing the task. In this questionnaire they were asked about their biographical and linguistic background (see appendix 6).

After filling in the questionnaire, the judges were given written instructions about the task to perform and answer sheets. The experimenter asked them whether they had understood the instructions and then, the native judge turned to the following page where the instructions to rate the first recording were detailed (see appendix 9). The native judge read the instructions for the first recording and was told that the instructions were the same for all the recordings. They were also warned that once they had assigned a particular DN or DC rating to a particular speaker they could not change it.

In order to conduct the task, the experimenter made use of a personal laptop where all the recordings were stored. The native judge performing the task listened to the different recordings (1 minute per recording) via headphones and the order in which the recordings

were presented was randomized for each judge, except for the first recording which was, in all cases, from a participant who was excluded from subsequent analysis because she did not present the same linguistic and biographical background as the remainder of the sample. This was done as a trial in order to make sure that all native judges correctly understood the task to perform. The results of the native judgements in English are presented in appendices 12, 13 (for L3 participants), 22 and 23 (for multilingual participants).

3.3.6.2 Native judgements in Spanish and Basque

Native judgements in Spanish

We recruited monolingual Spanish judges as well as Spanish/Basque balanced bilingual judges. None of the native judges in both groups reported hearing impairment and they were all paid 10 euros upon completion of the task (20 euros in the case of the Spanish/Basque balanced bilingual judges, who performed the task in both Spanish and Basque in two different days).

Monolingual Spanish and Spanish/Basque balanced bilingual judges

We recruited 11 native monolingual speakers of Spanish and 11 Spanish/Basque balanced bilingual judges who listened to each of the recordings in Spanish of our two groups of participants, namely the L3 as well as multilingual participants. They rated **degree of nativeness** (DN) as well as **degree of comprehensibility** (DC) in Spanish. We decided to include a group of Spanish/Basque balanced bilingual judges to rate our participants' DN and DC in Spanish, apart from the monolingual judges, given that the Basque autonomous community is a bilingual community where both Spanish and Basque cohabitate.

Native judgements in Basque

We recruited Basque-dominant speakers (i.e. native speakers of Basque who reported to be more competent in Basque as well as using Basque more frequently than Spanish) and, Spanish/Basque balanced bilingual judges. Again, none of the native judges in both groups reported hearing impairment and they were all paid 10 euros upon completion of the task (20 euros in the case of the Spanish/Basque balanced bilingual judges, who performed the task in both Spanish and Basque in two different days).

Basque-dominant and Spanish/Basque balanced bilingual judges

11 native (dominant) speakers of Basque and 11 Spanish/Basque balanced bilingual judges were recruited. They rated the **degree of nativeness** (DN) and **degree of comprehensibility** (DC) in Basque of the L3 as well as of the multilingual participants in our sample. Currently, there are no adult monolingual speakers of Basque, given that the Spanish language is the dominant language in the Basque autonomous community; even those speakers who report Basque as their only native language and using Basque constantly, also report being highly proficient in Spanish due to massive exposure to this language in the environment, via the mass media, etc.

Materials

In order to conduct the task, our native judges listened to an excerpt of 1 minute of each of our participants' recordings, where they answered some general questions about Basque culture and lifestyle. Before performing the task, they all filled in a biographical and linguistic questionnaire in Spanish and Basque, respectively (see appendices 7 and 8). After that, they were provided with the instructions and answer sheets in order to perform the task in Spanish and Basque, respectively (see appendices 10 and 11). The 7-point scales we used for degree of nativeness and degree of comprehensibility were the same as the ones we used for Spanish.

Distractor-control group

In this task we also introduced a control group made up of 2 balanced Spanish/Basque bilingual speakers, 3 non-native speakers (NNSs) of Basque with varying degrees of foreign accent, as well as 9 NNSs of Spanish with varying degrees of foreign accent in this language. The two balanced bilinguals were expected to be rated as native speakers (NSs) of Spanish and Basque, whereas the 3 NNSs of Basque were expected to be rated as presenting different degrees of nativeness in Basque as well as the 9 NNSs of Spanish.

Procedure

The procedure the native judges of Basque followed was exactly the same followed by the native judges of Spanish. As before, the first recording in Spanish and the two first recordings in Basque they all listened to were those of participants who were excluded from subsequent analysis because they did not present the same linguistic and biographical background as the remainder of the sample. This was done as a trial in order to make sure

that all native judges correctly understood the task to perform. The results of the native judgements in Spanish and Basque can be found in appendices from 14 to 21 (for L3 participants) and from 24 to 31 (for multilingual participants).

T-tests

First, we performed a Kolmogorov-Smirnov test where we found normality in our data related to the L3 participants, which means that the different variables were normally distributed.

In order to confirm the validity of the judgements provided by the different groups of judges in Spanish and Basque (i.e. the Spanish monolingual and the Spanish/Basque balanced bilingual judges for Spanish and the Basque-dominant and the Spanish/Basque balanced bilingual judges for Basque), we performed two different T-tests; one for the judgements given to the L3 participants, and another one for the judgements given to the multilingual participants.

We found significant differences between degree of nativeness in Spanish as rated by the monolingual Spanish judges and degree of nativeness in Spanish as rated by the Spanish/Basque balanced bilingual judges; we also found significant differences between degree of comprehensibility in Spanish as rated by the monolingual Spanish judges and degree of comprehensibility in Spanish as rated by the Spanish/Basque balanced bilingual judges. In both cases, degree of nativeness and degree of comprehensibility were higher as rated by the Spanish/Basque balanced bilingual judges.

We did not find significant differences between degree of nativeness in Basque as rated by the Basque-dominant judges and degree of nativeness in Basque as rated by the Spanish/Basque balanced bilingual judges. Nevertheless, we did find significant differences between degree of comprehensibility in Basque as rated by the Basque-dominant judges and degree of comprehensibility in Basque as rated by the Spanish/Basque balanced

bilingual judges; degree of comprehensibility in Basque as rated by the Basque-dominant judges was significantly higher than degree of comprehensibility in Basque as rated by the Spanish/Basque balanced bilingual judges for the L3 participants in our sample.

In the first case, the fact that degree of nativeness in Spanish was significantly higher when rated by the Spanish/Basque balanced bilingual judges than by the monolingual Spanish judges follows the pattern we expected, given that bilingual speakers may be more used to listening to speakers who may present phonetic influences from other languages than monolingual speakers. In this sense, bilingual judges appeared to be more tolerant in their judgements, and therefore, they assigned higher ratings regarding participants' degree of nativeness than their monolingual counterparts. Likewise, Spanish/Basque bilingual judges assigned higher ratings for degree of comprehensibility in Spanish than their monolingual counterparts.

Finally, the fact that degree of comprehensibility in Basque as rated by the Basque-dominant judges was significantly higher than by the Spanish/Basque balanced bilingual judges, even though seemingly contradictory at first sight, it could have a very simple explanation. All but 1 of our Basque-dominant judges were specializing in Basque at the University of the Basque Country, whereas none of our Spanish/Basque balanced bilingual judges was specializing in Basque. As a result, the Basque-dominant judges, apart from being more familiarized with the language, could have also been able to identify the different Basque dialects of our L3 participants and, therefore, they could have found it easier to understand them than their bilingual counterparts. On the other hand, some of the Spanish/Basque balanced bilingual judges could have failed to recognize some of the Basque dialects or they could have been less familiarized with the language and, as a result, they could have had more problems in order to understand them.

Regarding the multilingual participants, we also found normality in our data, that is, the variables were also normally distributed. As for the T-test, we found significant differences between degree of comprehensibility in Spanish as rated by the monolingual Spanish judges versus the balanced bilingual judges. Degree of comprehensibility in

Spanish was significantly higher when rated by the Spanish/Basque balanced bilingual judges. We found no significant differences in the degree of nativeness in Spanish provided by the two groups of judges. Regarding Basque, the degree of comprehensibility in Basque for the Basque-dominant judges was significantly higher than for the Spanish/Basque balanced bilingual judges. Again, we found no significant differences in the degree of nativeness in Basque provided by the two types of judges to our multilingual participants.

In the first case, the fact that Spanish/Basque balanced bilingual judges considered the degree of comprehensibility in Spanish of our speakers higher than the other judges could be ascribed, as before, to the fact that Spanish/Basque bilingual judges could have been, as expected, less strict in their judgements compared to their monolingual counterparts.

In the second case, the fact that degree of comprehensibility in Basque for the Basque-dominant judges was significantly higher than for the Spanish/Basque balanced bilingual judges could, again, seem contradictory at first sight; therefore, we propose the same argument we provided before. That is, the Basque-dominant judges could have been able to identify the different Basque dialects or they could have been less familiarized with the language and, as a result, they could have found it easier to understand them than their bilingual counterparts.

3.3.6.3 Lexical availability task

In this section we are going to review the origins of this task and then, we will also review some studies which have focused specifically on this task and how researchers have analyzed their data (see Jiménez Catalán, 2014 for a very interesting compilation of studies on lexical availability in English and Spanish as a second language).

"Lexical availability addresses the words that speakers store in their mental lexicon and whose activation depends on a given prompt or center of interest" (Fernández Fontecha & Jiménez Catalán, 2015). Studies of lexical availability were born in France during the elaboration of *Le Français Élémentaire* published in 1954 (from López Morales, 2014). As López Morales (2014) pointed out, initially, the primary purpose of these studies was to teach the French language to the people that made up the federation of territories known as Union Française. Nevertheless, later, with most of those countries already converted into independent nations, the original project was refocused on ensuring that citizens of the former colonies continued to keep bonds with Gallic language and culture. In some of those countries French was maintained as the official language, whereas in others it was the most influential foreign language.

This kind of task was first used as a research method for lexical production by Michéa (1953), Gougenheim *et al*., (1956, 1964) in French and López Morales (1973) for Spanish. Other researchers such as Mackey (1971) also conducted a big project in order to see vocabulary differences in France and America and concluded that some words reveal culture and civilization differences. Other researchers such as Azurmendi Ayerbe (1983) were inspired by Mackey; Azurmendi Ayerbe (1983) analyzed the lexical availability of Spanish/Basque bilingual speakers from the area of San Sebastian.

Another important project that has been conducted concerning lexical availability is the so-called "PanHispanic project" ("Proyecto Panhispánico"). This project has been conducted in countries such as Puerto Rico (e.g. López Morales, 1979), The Dominican

Republic (e.g. Alba, 1995), Uruguay, Mexico (e.g. Justo Hernández, 1986), Chile (e.g. Echevarria *et al*., 1987), Costa Rica (e.g. Murillo Rojas, 1993) and Spain (e.g. Benítez Pérez, 1992; Sámper Padilla & Hernández Cabrera, 1997; see also Samper Hernández, 2002, 2014).

Concerning what the concept of *vocabulario disponible* (available vocabulary) is, López Morales (1984) stated that it is the set of lexical items of a specific semantic content. According to Marconi (2000) being able to use a particular word implies that the person in question presents two fundamental skills; on the one hand, the inferential competence, which corresponds to the knowledge of the network of connections established between one word and the rest of the voices and the linguistic expressions of the same system. It implies skills such as semantic inference, paraphrasis, definition and the finding of synonyms. On the other hand, the referential competence, which corresponds to those capacities needed in order to project those words into the real world, mainly in two different ways: naming (recognize an object and find the word) and applying (understand a given word and pick the object).

An interesting point that Hernández Muñoz (2006) made was that the fact a particular speaker knows that a specific word, say, *dog* belongs to the semantic category *animals* does not mean that the speaker has any other knowledge about that word or that s/he knows how to use it. In this sense, López Rivero (2008) concluded that what we know is that those "forms" (formas) do exist in the speaker's mind and that they hold some kind of semantic load related to their inclusion in a group of elements that share some characteristics.

More recently, Jiménez Catalán and Ojeda Alba (2009) found in their study of lexical availability with 86 L2 learners of English as a foreign language (EFL) in their 6th grade of primary school (11-12 years old) divided in two groups (42 (group A) and 44 (group B)) that those participants who were receiving CLIL (Content and Language Integrated Learning) instruction did not show a greater degree of lexical availability in English than participants who only had English as a subject at school. These findings

cannot be reconciled with those in previous studies (see Ruiz de Zarobe & Jiménez Catalán, 2009) with monolingual as well as bilingual communities in Spain where significant evidence of a positive effect of CLIL has been provided.

In a recent study, Ferreira Campos and Echeverría Weasson (2014) looked into the lexical availability of basic ("body parts" and "food and drink") and advanced ("terrorism and crime" and "health and medicine") semantic categories in English as L1 and English as L2 (50 participants in each group). They found that native speakers outperformed L2 speakers within all semantic categories. In addition to this, they also found that both native and non-native speakers produced more words for basic than for advanced semantic categories. The authors suggested that their findings revealed that L2 speakers follow the same pattern of vocabulary growth and organisation as native speakers. However, they concluded that their research was only a first attempt to directly compare monolingual native speakers and advanced L2 speakers in a lexical availability task, and to provide relevant cognitive explanations about the processes underlying word production (see also Sámper Hernández, 2014 for a study where "level of proficiency" was found to be a predictor of lexical availability of learners of Spanish as a foreign language in an immersion context). Therefore, they called for further research including bigger samples as well as tighter control over sociocultural and economic variables which they suggested might have had an effect on the results.

In another study, Jiménez Catalán *et al*., (2014) made use of a lexical availability task in order to explore the relationship between age (13 young and 13 adult English as a Foreign Language (EFL) learners) and learners' lexical production on two specific semantic domains, namely "town" and "countryside". They found an advantage in the number of responses in favour of adult learners, but this advantage did not reach significance (see also Hernández Muñoz *et al*., 2014 for a study on cognitive factors of lexical availability in a second language). Apart from this, they also found that the field "town" proved to be much more productive than "countryside" for both groups. Finally, they added that they could not conclude that adult EFL learners have a higher lexical availability than younger learners, but that the small size of their samples could explain, in

part, the lack of significant differences (see also Gallardo del Puerto & Martínez Adrián, 2014 for a study of the influence of previous foreign language contact in a lexical availability task with senior learners of L2 English and Agustín Llach & Fernández Fontecha, 2014 for a study on the effect of gender on learners' lexical availability).

We could add that what the lexical availability task can tell us about the subject who performs the task is that the words s/he reproduces are the words that are available to him/her (i.e. the words s/he can recall) at that specific point in time. This means that if the same speaker performs the task at a different time, s/he might recall some of the same words, but some other words might be different from the ones recalled the previous time (see Jiménez Catalán & Fitzpatrick, 2014 for a study on frequency profiles of EFL learners' lexical availability).

We considered that it was important to include this task in the present study because, in the first place, our research could be more complete when lexical production went hand in hand with oral production. That would give us a more comprehensible account of the issues considered. Moreover, this task has usually been conducted in Francophone and Hispanic environments, and very scarcely in English environments, except for the few studies mentioned above (e.g. Jiménez Catalán, 2014)

All the participants in our study (the L3 as well as the multilingual participants) performed a task of lexical availability; first, in Spanish, then in Basque and finally, in English. The task consisted of 5 different prompts for each of the languages namely, "parts of the body", "pieces of clothing", "the city and the countryside", "jobs and professions" and "food and drink". We included these prompts because they were related to basic semantic categories that could be quite familiar to our participants in order to activate the words stored in their mental lexicon. They were asked to fill in the space for each of the items with as many related words as they could think of and they were given 2 minutes to perform the task for each of the items; 10 minutes in total for each of the languages. At the moment of counting the words recalled and reproduced by each of the participants, we excluded some words for the following reasons: words that were repeated (i.e. they were

only counted once), unintelligible words, etc. Nevertheless, we did not exclude words for orthographical reasons, as long as they were legible and understandable. In this sense, Jiménez Catalán *et al.*, (2014: 41) outlined the following criteria in order to edit word responses in lexical availability tasks, which were also considered in our research:

> (i) Correcting spelling mistakes, (ii) counting repeated words only once per prompt, (iii) discarding unintelligible words and Spanish words, (iv) inserting a hyphen in lexical units containing more than one word (e.g., orange-squash), (v) deleting proper names that have the same spelling in English and Spanish as for instance, Paris, Portugal, but keeping those that are written in a different way in these languages (e.g., New York, London). (Jiménez Catalán *et al*., 2014: 41). (See also Sámper Hernández & Jiménez Catalán, 2014).

Finally, we aimed at emphasizing the importance of using both a lexical and an oral production task in order to offer a more complete and straightforward picture of our L3 as well as of our multilingual speakers' minds.

3.4 Results

In this section we will present the results organized by research questions preceded by a description of the global results per group and language. Additionally, since our analysis is based to a large extent on native judgements, we will start by presenting the results of the native judgements obtained for the control group for each of the languages. As was mentioned above, the control group had three different functions: first, to act as distractors for the judges; second, to estimate the reliability of the judges by introducing speakers who would demand the use of extreme values along the scale and, third, to obtain reference values for later comparison with those obtained for our participants. Five out of the 13 speakers included in the control group could speak the three languages under study, but with varying degrees of phonological proficiency in their non-native language(s). The remainder of the speakers in the control group could speak either none or only one of the other languages, irrespective of their own native language. We considered native range between 5.50 and 6 in the degree of nativeness (DN) and degree of comprehensibility (DC) in the three languages under study because all controls were rated between those ranges in both their DN and DC in English, Spanish and Basque. There was only one control who received a slightly lower rating in her DN in Basque; we will explain that result when we deal with the results of the native controls in Basque.

Regarding the results in English, the 2 non-native speakers (NNSs) of English were indeed recognized as NNSs of the language, whereas the 5 native speakers (NSs) of English were correctly identified as NSs of the language. So, the different types of control speakers were clearly identified by judges (see appendix 34).

As for the results in Spanish, both controls 1 and 2 were correctly recognized as NSs of the language by both the monolingual Spanish and the Spanish/Basque balanced bilingual judges. Likewise, the remainder of the control group was correctly identified as NNSs of Spanish by both groups of judges (see appendix 35).

Concerning the results in Basque, control 2 was rated within the native-speaker range in Basque by both the Basque-dominant and the Spanish/Basque balanced bilingual judges, whereas control 1 was rated within the native-speaker range by the Spanish/Basque balanced bilingual judges, but she received a slightly lower rating (5.27) in her degree of nativeness by the Basque-dominant judges. Both controls 1 and 2 were from Navarre, but had been living in the Basque Country for roughly 20 years (control 1 was 39 years old, whereas control 2 was 48 years old at the time of the interview). Both of them reported Basque and Spanish as their native languages; even so, the Basque-dominant judges could have detected a slightly lower than native phonetic competence in Basque in the case of control 1. This speaker might have been phonetically more competent in Spanish than in Basque, even though she considered herself a Spanish/Basque balanced bilingual speaker. This could be the reason why she did not reach 5.50 in her DN in Basque as rated by the Basque-dominant judges. Controls 3 and 5 were, also as expected, recognized as NNSs of Basque. However, contrary to expectations, control 4 received a high rating in his DN in Basque: 5.18 by the Basque-dominant judges and 5.27 by the bilingual judges, even if he was not a native speaker of the language. This means that this speaker's performance was perceived as near-native by both groups of judges, even though his overall rating in degree of nativeness was slightly lower than that of the controls who were actually NSs of the language (see appendix 36); as a result, this speaker could have qualified as an exceptional language learner (Bongaerts, 1999; Ioup *et al*., 1994; Moyer, 1999). In fact, this speaker was a third generation Basque immigrant whose family was originally from Larrabetzu (Biscay). He was born in Boise, a location which is characterized by the presence of a big Spanish/Basque community, and had only left Boise in his early twenties to live for a year and a half in Oñati (Gipuzkoa) and for 6 years in Moscow (Idaho). He stated only English as his native language and also reported University studies. He had received Basque lessons for two years, apart from a frequent use of the language at the time of testing (55 years of age). As we mentioned above, this speaker could have actually qualified as an exceptional language learner since, even though he presented many favourable characteristics for attaining a high proficiency in Basque, being perceived near-native in a heritage language by two different groups of native judges is out of reach for most second, let alone third

generation immigrants (e.g. Bongaerts *et al.*, 1995, 1997; Moyer, 1999; Yashima, 2002; Yashima *et al.*, 2004).

In the next sections, we will first present the overall results of degree of nativeness and degree of comprehensibility given to our two groups of participants in the three languages in question and then, our results and their statistical analysis. Given the number of factors analyzed as well as the various speaker and judge groups, we will group results by research questions so that they may be more easily interpreted. Each of the research questions is subdivided into three groups following the types of factors analyzed, namely biographical factors, affective factors and input. Some of the variables included in those three groups were categorical variables, namely gender (male versus female), education level (university versus non-university studies) and location (Reno versus Boise). In the case of those three variables, we compared all the variables under study in relation to that categorical variable; that is why our study also yielded results such as that there were, for instance, significant differences between men and women in their degree of activation of English and Basque, significant differences between participants from Reno and those from Boise in their degree of identification with the American community, etc.

3.4.1 Overall results of degree of nativeness (DN) and degree of comprehensibility (DC) for the two samples

We are going to describe the global results we obtained for degree of nativeness (DN) and degree of comprehensibility (DC) in English, Spanish and Basque for our L3 participants as well as for our multilingual participants. The group of American English native judges rated DN and DC in English of our two samples; the monolingual Spanish judges rated DN and DC of both groups of participants; the Basque-dominant judges rated DN and DC in Basque of our L3 and multilingual participants, and finally, the Spanish/Basque balanced bilingual judges rated DN and DC in both Spanish and Basque for our two groups of participants. The scales the judges were given in order to rate our participants' performance ranged from 0= very strong foreign accent and 6= no foreign accent (i.e. native) for degree of nativeness, and from 0 = completely incomprehensible to 6 = perfectly understandable for degree of comprehensibility.

3.4.1.1 L3 participants

In this section we will describe our global results concerning degree of nativeness (DN) and degree of comprehensibility (DC) in English, Spanish and Basque for the L3 participants in our sample. Our L3 participants were bilingual Spanish/Basque speakers who migrated from the Basque Country to the United States and learned their L3 (English) in a natural acquisition setting.

English

Only 1 out of the 16 L3 participants in our sample was identified as a native speaker of English by the American English judges; this participant was the only early arrival in the United States (AOA = 7). We can assume that his early arrival in an English-speaking

country, in addition to early schooling in an English-medium school and massive exposure to the L3 enabled him to attain native-like phonological proficiency in English.

Concerning the remainder of the sample, L3 participants received rather low ratings concerning their DN in English. The lowest DN rating was 0.83, whereas the highest rating was 4 (median = 2). However, they received higher ratings in their DC (between 2.20 and 4.83; median = 3.83) than in their DN in English. This means that, apart from being clearly recognized as non-native speakers of English, the American judges found it rather difficult to understand our participants in English (see appendices 12 and 13). The DN and DC ratings given to our L3 participants show a considerable range of degrees of proficiency in the L3; we will see in the section of results which variables were actual predictors of the degree of proficiency in English of our L3 participants.

Spanish

The L3 participants received, in general, intermediate ratings concerning both their DN and DC in Spanish. In fact, none of the 15 participants was recognized as a native speaker of the language by the monolingual Spanish judges, whereas only 2 were rated as native (between 5.50 and 6) in their DN by the Spanish/Basque balanced bilingual judges. Interestingly, the early arrival in the host country was the one who received the lowest ratings both in his DN and DC in Spanish; DN = 2.73 and DC = 3.73 by the monolingual Spanish judges, and DN = 3.09 and DC = 4.09 by the Spanish/Basque balanced bilingual judges. Excluding those participants who fell within the native-speaker range and the early arrival, the lowest DN rating was also 2.73, whereas the highest DN rating was 4.91 by the monolingual Spanish judges, whereas the lowest DN rating was 3.45 and the highest was 5.36 by the Spanish/Basque balanced bilingual judges. As for their DC in Spanish, 5 participants were rated between 5.50 and 6 by the monolingual Spanish judges, and 7 by the bilingual judges (see appendices 14 to 17). All these results suggest that our L3 participants did show attrition in Spanish.

Basque

Eight L3 participants were rated within the native-speaker range in their DN (between 5.50 and 6) in Basque by the Basque-dominant judges and 9 by the Spanish/Basque balanced bilingual judges. The early arrival (AOA = 7), who was rated within the native-speaker range in English was also rated within the native-speaker range in his DN in Basque, but not included in that calculation. Those identified as native speakers of Basque also received, in general, high ratings in their DC in Basque; in fact, most participants received rather high ratings in their DC in Basque by both groups of judges. All these results suggest that judges identified half of the L3 participants as native speakers of Basque (see appendices 18 to 21), but they also suggest attrition in the degree of nativeness of the other half of those participants.

3.4.1.2 Multilingual participants

Next, we will describe the global results of DN and DC for our multilingual participants in the three languages in question.

English

All multilingual participants were identified as native speakers of English. Both their DN and DC ratings were between 5.50 and 6, and suggest that native judges considered them as native speakers of the language presenting the same linguistic behaviour as any other native speaker of American English who would have been exposed only to English from birth (see appendices 22 and 23).

Spanish

All our multilingual participants received very low ratings in their DN in Spanish; the lowest DN rating was 0.55 whereas the highest was 2.64 by the monolingual Spanish judges. According to the Spanish/Basque balanced bilingual judges, the lowest DN rating was 0.73, whereas the highest was 3.09. Therefore, all of them were clearly recognized as non-native speakers of the language. They received only slightly higher ratings in their DC (between 2 and 6) than in their DN in Spanish, which suggests that the native judges did have some difficulties in order to understand our multilingual participants in Spanish (see appendices 24 to 27). All these results show that even having both parents who use the heritage language with their children does not guarantee a high level of proficiency, let alone native-like acquisition when the language in question is a minority language in the acquisition setting. We will return to this issue in the Discussion section.

Basque

Our multilingual participants also received, in general, rather low ratings in their DN in Basque, even though they were slightly higher than their DN in Spanish. Only 1 of the multilingual participants was rated within the native-speaker range in his DN in Basque (between 5.50 and 6) according to the Basque-dominant judges, but none by the Spanish/Basque balanced bilingual judges. The lowest DN rating was 2 and the highest 5, according to the Basque-dominant judges (excluding the participant who passed for native). According to the Spanish/Basque balanced bilingual judges, the lowest DN rating was 1.73 and the highest was 5. In this case, again, our multilingual participants received slightly higher ratings in their DC (between 3 and 6 approximately) than in their DN in Basque (see appendices 28 to 31). Once more, our results in Basque suggest that the acquisition of a heritage language is a complex process in which native-like attainment is not guaranteed even when both parents use it with their children from birth.

In the next sections we will analyze the results according to research questions in order to ascertain which factors intervened in the acquisition level of the three languages by the speakers in this study.

3.4.2 Research question 1: What is the influence of biographical factors, affective factors and input in L3 acquisition?

This first research question addressed the L3 participants. The participant who arrived in the host country at the age of 7 was only included in the statistical analysis for age of arrival, because he stood out from the rest of the participants with respect to this variable, which was obviously the main predictor of his native-like performance in English. He was the only one arriving before the end of what most authors would agree to be the outer limit of the critical period (puberty), and he was also the only participant who fell within the native-speaker range in English; therefore, for the rest of the variables he was treated as an outlier and excluded from the statistical analyses since he would have skewed the results.

3.4.2.1 Biographical factors

Age of arrival

All L3 participants were born in the Basque Country and migrated to the US at different ages (range of participants' AOA = 7-38; mean = 23.62). Therefore, we considered that age of arrival could be a very important variable to take into account in order to explain the different degrees of L3 attainment of this group of participants. In fact, we found a significant negative correlation between AOA and degree of nativeness in English (r = -,672) as well as between AOA and degree of comprehensibility in English (r = -,575) for our group of participants. This means that, as expected, AOA did emerge as a predictor of phonological attainment in the L3 for our group of L3 participants; in fact, as we already reported above, only 1 participant (AOA = 7) fell within the native-speaker range. Therefore, our results support the effect of a sensitive period (e.g. Lamendella, 1977; Harley & Wang, 1997), which has been claimed to be progressive in the sense of "the

younger, the better" (see also Bialystok & Hakuta, 1999; Birdsong, 1992, 1999a, 1999b; Birdsong & Molis, 2001; Johnson & Newport, 1989; Munro & Mann, 2005; Muñoz & Singleton, 2011). However, AOA did not turn out to be a significant predictor of degree of lexical availability in English. Participants' performance in the lexical task in English was, in general, very poor; in fact, 6 participants refused to perform the task because they did not feel confident enough to write in English. As a result, the potential effect of AOA did not materialize. However, we decided to perform the statistical analysis with participants' chronological age, and in this case we did find a significant negative correlation between participants' chronological age and degree of lexical availability in English (r = -,859). This means that younger participants presented a higher degree of lexical availability in English (range of participants' chronological age = 47-87; mean = 69), probably because they might have presented greater lexical retrieval abilities than older participants, or because their social network in English was larger than that of the older participants. We will further explain these results in the Discussion section.

Gender and education level

We found no significant differences between men and women either in their degree of phonological attainment in the L3, or in their degree of lexical availability in English. We only found significant differences between men and women in their degree of activation of English; values for that variable were significantly higher for men. The levels of phonological proficiency in English for both men and women were concentrated, in general, at rather low levels, so no significant differences were found. The analysis of education level for this group was not viable since only 1 out of the 15 participants reported having university qualifications, whereas the remainder of the sample reported non-university studies. This variable will be discussed again with respect to the multilingual participants.

3.4.2.2 Affective factors

Degree of identification, motivation and strength of concern for pronunciation accuracy

Degree of identification with the American community (DI.E), motivation in English and strength of concern for pronunciation accuracy in English were not found to be predictors of either degree of nativeness or degree of lexical availability in English. We only found that participants from Reno presented a significantly higher degree of identification with the American community than participants from Boise. The majority of participants reported a rather high degree of identification with the American community as well as a high motivation in English, whereas they differed considerably in their strength of concern for pronunciation accuracy in English. Nevertheless, most participants were grouped in the range between 1 and 3 in their degree of nativeness, and the wider range between 2 and 5 in their degree of comprehensibility in English. They also presented, in general, a very low degree of lexical availability in the L3; these narrow ranges might have obscured the potential effect of the affective variables we examined.

3.4.2.3 Input

Length of residence and degree of language activation

There was no significant correlation between length of residence (LOR) and degree of nativeness or degree of comprehensibility in English for our L3 participants. However, we did find a significant negative correlation between length of residence and degree of lexical availability in English (r = -, 806). This result, seemingly contradictory at first sight,

could have a simple explanation; in this case, LOR might have been confounded with participants' chronological age. In fact, we already reported that a significant negative correlation between participants' chronological age and degree of lexical availability in English was found (r = -,859). That is, as we already mentioned above, younger participants might have presented greater lexical retrieval abilities than older participants (range of participants' chronological age = 47-87; mean = 69), or this result could be due to younger participants having a larger social network in English than older participants.

As far as degree of language activation is concerned, we found no significant correlation between degree of activation (percentage use) of English (DA.E) and degree of nativeness in English. Nevertheless, there was a significant correlation between degree of activation of English and degree of comprehensibility in English (r = ,566) for our L3 participants. Those participants who reported a higher percentage use of the target language were better understood by the American English judges. We found no significant correlation between degree of activation of English and degree of lexical availability in that language for our sample; this could be due to the fact that, even though participants varied considerably in their degree of activation of English, most of them presented a very low degree of lexical availability in that language. Finally, there were no significant differences according to location in degree of nativeness or degree of comprehensibility in English, neither in degree of lexical availability in the L3. As we already mentioned above, we did find significant differences according to location in degree of identification with the American community; values for that variable were significantly higher for participants from Reno. This finding could be due to participants from Reno being more immersed in the American community than participants from Boise, where the Spanish/Basque community is bigger and more active.

To sum up our results for research question 1, age of arrival proved to be a significant predictor of both degree of nativeness and degree of comprehensibility in English, whereas both length of residence and participants' chronological age were predictors of degree of lexical availability in English. Degree of activation of English also

turned out to be a relevant factor for degree of comprehensibility in English, and we found that men had a significantly higher percentage use of English. Finally, our results showed that participants from Reno presented a significantly higher degree of identification with the American community than participants from Boise. In the discussion we will explain why the remainder of the variables we examined might not have proved to be as statistically significant.

3.4.3 Research question 2: What is the influence of biographical factors, affective factors and input in L1 attrition?

In this section, we will present our results concerning L1 attrition; more particularly, we will see whether the different groups of variables under study exerted any kind of influence on the phenomenon of L1 attrition. This research question was also addressed to the sample made up of L3 participants who migrated from the Basque Country to the United States several decades ago and, therefore, could have undergone attrition in their own native languages, namely Spanish and Basque.

3.4.3.1 Biographical factors

Age of arrival

As we already reported above, all L3 participants were born in the Basque Country and migrated to the US at different ages. In this case, age of arrival was a very important variable to examine because some studies (e.g. Ventureyra & Pallier, 2004; Ventureyra *et al*., 2004) have found that this variable was a relevant predictor of degree of attrition in a native language. However, our results in Spanish showed that there was no significant correlation between AOA and degree of nativeness or degree of comprehensibility in Spanish. For Basque, we did find a significant correlation between AOA and degree of nativeness in Basque as rated by the Spanish/Basque balanced bilingual judges (r = ,518). Finally, we found no significant correlation between AOA and degree of lexical availability in Spanish or Basque. In this case, we found that degree of lexical availability was predicted by participants' chronological age in both Spanish (r = -,633) and Basque (r = -,773). These results suggest that the younger participants might have presented greater lexical retrieval abilities than older participants; or they took part more actively in the activities organized by the Spanish/Basque community; in fact, their social network was

larger not only in English, but also in Spanish and Basque. The finding that their degree of lexical availability was higher in Spanish than in Basque may seem contradictory and it will be interpreted in the Discussion section.

Gender and education level

We found no significant differences between men and women in their degree of phonological proficiency in Spanish or Basque; nor did we find significant differences between them in their degree of lexical availability in any of those two languages. However, we did find significant differences between men and women in their degree of activation (i.e. percentage use) of Basque; values for this variable were significantly higher for women. Concerning education level, again, this analysis was not possible since only 1 out of the 15 participants in the statistical analysis reported having university qualifications.

3.4.3.2 Affective factors

Degree of identification and motivation

As far as Spanish is concerned, there was no significant correlation between degree of identification with the Spanish community (DI.S) and degree of nativeness or degree of comprehensibility in Spanish. For Basque, we found a significant negative correlation between degree of identification with the Basque community and degree of comprehensibility in Basque as rated by both groups of judges (DC.BD: r = - ,651; DC.BB: r = - ,676). Finally, there was no significant correlation between degree of identification and degree of lexical availability in Spanish or Basque for our sample. The fact that there was a significant negative correlation between degree of identification with the Basque community and degree of comprehensibility in Basque suggests that those participants who reported a higher degree of identification with the Basque community were the ones who were rated as being more difficult to understand. Seven participants were rated as having a native degree of comprehensibility in Basque (between 5.50 and 6) by the Basque-dominant judges, whereas only 1 by the bilingual judges. Those 7 speakers who were rated as having a native degree of comprehensibility in Basque by the Basque dominant judges were 66, 69, 60, 80, 79, 63 and 47 years old at the time of testing (range = 47-87; mean = 69); that is, most of them were among the youngest participants. According to the bilingual judges, who were stricter in their DC judgements, the only 2 participants who were rated between 5.50 and 6 in her DC were, on the one hand, the youngest participant in the whole sample (47), whereas on the other, a speaker who was among the older participants (79). These results suggest that the older participants could have been, in general, more difficult to understand (even though no significant correlation between degree of comprehensibility in Basque and participants' chronological age was found), arguably because the quality of their voice might have been negatively affected by increasing age or because in some cases they used old-fashioned expressions.

The variable motivation did not show statistical correlations with degree of nativeness, degree of comprehensibility or degree of lexical availability in Spanish or Basque. Participants differed considerably in their motivation in Spanish and Basque, but they did not differ as much in their level of proficiency in Spanish and Basque, neither in their degree of lexical availability in any of those two languages. As a result, motivation did not turn out to be statistically significant.

3.4.3.3 Input

Length of residence and degree of language activation

There was no significant correlation between length of residence (LOR) and degree of nativeness or degree of comprehensibility in Spanish or Basque. In the study by De Bot *et al*., (1991), they recruited their Dutch immigrants in France according to three criteria, namely emigration after age seventeen (they claimed that at this age the acquisition of the first language has been completed both through formal and informal input), LOR in France of at least 10 years, and variation in the amount of contact with the Dutch language since emigration. They found that there was only a linear relation between LOR and attrition when there were few contacts with the native language; that is, when the input from the native language was scarce. Our participants reported, in general, a rather high percentage use of both native languages, especially in the case of Basque; that could be the reason why LOR did not emerge as statistically significant for degree of phonological attrition. Additionally, as we already mentioned, ratings of DN and DC in both Spanish and Basque were, in general, grouped together along their respective scales, so the influence of variables such as LOR was difficult to examine. However, as in the case of English, we found a negative correlation between LOR and degree of lexical availability in Basque (r = -,696). These results suggest a higher degree of lexical attrition for participants with longer LORs (range = 23-59; mean = 44.27). That is, those participants with longer periods of residence in the US had undergone, as expected, a higher degree of lexical attrition in

Basque than those participants with shorter LORs. We also found that this result was related to participants' chronological age (range of participants' chronological age = 47-87; mean = 69); in fact, there was a significant negative correlation between participants' chronological age and degree of lexical availability in both Basque (r = -,773) and Spanish (r = -,633). We already mentioned above that this could have been because younger participants might have presented greater lexical retrieval abilities, or because they took part more actively in the social activities organized by the Spanish/Basque community; in fact, we found that their social network in both Spanish and Basque was larger in the case of the younger participants. As far as degree of language activation (percentage use) is concerned, it turned out not to be correlated to degree of nativeness, degree of comprehensibility, and degree of lexical availability in either Spanish or Basque. This could be because the results our study yielded in these three measures were, in general, grouped together. However, there was a significant correlation between participants' chronological age and degree of activation of Basque (r = ,557). This means that the older participants, most of whom were already retired at the time of testing and probably had a less frequent interaction with the L3 community, were the ones who reported a higher degree of activation of Basque. This could have also prevented them from undergoing severe attrition in that language.

Concerning location of residence, we found no significant differences between participants from Reno and participants from Boise neither in their degree of phonological attrition in Spanish, nor in their degree of lexical availability in Spanish or Basque. We did find significant differences between participants from Reno and participants from Boise in their degree of comprehensibility in Basque as rated by the Basque-dominant judges; values for that variable were higher for participants from Boise. The fact that DC in Basque was higher for participants from Boise suggests that a greater degree of immersion in the native language community may have a positive influence on the participants' functionality in the native language, even though not necessarily on their degree of nativeness.

In sum, as far as research question 2 is concerned, we found that age of arrival was a significant predictor of degree of nativeness in Basque. We also found that participants'

chronological age was a predictor of degree of lexical availability in both Spanish and Basque. Likewise, our results showed that women had a significantly higher degree of activation of Basque, but they also showed that older participants reported a significantly higher degree of activation of Basque than younger participants. Degree of identification with the Basque community also turned out to be a relevant factor for degree of comprehensibility in Basque. Finally, length of residence proved to be a predictor of degree of lexical availability in Basque, whereas location of residence showed up as statistically significant for degree of comprehensibility in Basque. In the Discussion section we will explain why several variables were not significant for phonological proficiency in Basque, and why none of the variables examined turned out to be relevant in Spanish.

3.4.4 Research question 3: What is the influence of biographical factors, affective factors and input in multilingualism?

Finally, in this section we will present our results with regards to multilingualism. This research question refers to our sample of multilingual speakers; that is, those participants who were born in the United States, but apart from English, could also speak Spanish and Basque because of their Spanish/Basque heritage.

3.4.4.1 Biographical factors

Our multilingual participants were born in the host country, where the field work was conducted, so age of arrival was actually not a variable to be considered. As expected, we found that all of them were rated within the native-speaker range in their degree of nativeness in English (i.e. between 5.50 and 6 in the 7 point scale) and they were also rated between 5.50 and 6 in their degree of comprehensibility in English (see appendices 22 and 23), but not in Spanish or Basque (see appendices 24 to 31). As expected too, all participants in this sample presented a higher degree of lexical availability in English than in Spanish or Basque.

It should be pointed out that only 1 participant was rated within the native-speaker range (i.e. between 5.50 and 6) in his degree of nativeness in Basque as rated by the Basque-dominant judges, whereas none was rated as native by the bilingual judges. Likewise, only another 1 participant was rated between 5.50 and 6 in his degree of comprehensibility in Basque by the Basque dominant judges, whereas none of them reached this level according to the bilingual judges. It is remarkable that only one participant of all those multilingual speakers, who were exposed to Basque at home from birth, was perceived as a native speaker of the language. As for their DC in Basque, most participants received higher ratings in their degree of comprehensibility than in their degree of nativeness in Basque. Apart from this, multilingual participants received, in general,

higher ratings in their DN and DC in Basque than in Spanish. We will explain these differences in the level of phonological proficiency in Spanish and Basque of the multilingual participants in the Discussion section.

Gender and education level

We found no significant differences between men and women in their degree of nativeness or degree of comprehensibility in Spanish, nor in their degree of lexical availability in Basque. However, we did find significant differences between men and women in their degree of comprehensibility in Basque as rated by the Spanish/Basque balanced bilingual judges (DC.BB) and also in their degree of lexical availability in both English and Spanish (e.g. Saville-Troike, 2012); they were higher for women in all cases. Our multilingual participants differed more widely in their degree of proficiency in Basque than in Spanish; as a result, the effect of variables such as gender was more difficult to discern in Spanish.

Regarding education level, we found no significant differences between participants with university studies and those without university studies neither in their degree of phonological attainment in Spanish or Basque, nor in their degree of lexical availability in any of those two languages. In this case, only 3 out of the 11 participants in our sample reported non-university studies; as a result, the small size of our sample probably undermined the (potential) effect of education level, since some previous studies have shown that the role of education could be important (e.g. Flege & Liu, 2001).

3.4.4.2 Affective factors

Degree of identification, motivation and strength of concern for pronunciation accuracy

There was no significant correlation between degree of identification and degree of nativeness or degree of lexical availability in Spanish or Basque. Nevertheless, we did find a significant correlation between degree of identification with the Basque community and degree of comprehensibility in Basque as rated by the Basque-dominant judges (DC.BD, r = ,678), as well as by the Spanish/Basque balanced bilingual judges (DC.BB, r = ,805). These findings suggest that those participants who presented a higher degree of identification with the Basque community were probably the ones who also made a (subconsciously) bigger effort to communicate in Basque more accurately, either with a clearer accent and/or in their overall language, therefore, they turned out to be more easily understood by the native judges (e.g. Derwing *et al.*, 2004; Munro & Derwing, 1999).

Motivation and strength of concern for pronunciation accuracy did not appear to be predictors of degree of nativeness, degree of comprehensibility and degree of lexical availability in Spanish and Basque. This leads us to believe that the higher degree of comprehensibility in Basque for those who had a higher degree of identification with the Basque community was probably more a question of them making an overall effort to communicate more clearly rather than specifically in their pronunciation. Participants' motivation and strength of concern for pronunciation accuracy were, in general, similar in both languages as well as their degree of proficiency in Spanish; as a result, the influence of these two affective variables in Spanish was not relevant. Participants' level of proficiency in Basque varied more than in Spanish, but apparently not enough for variables such as motivation and strength of concern for pronunciation accuracy to emerge as statistically significant.

3.4.4.3 Input

In this section, we will present the results concerning degree of language activation, both through language percentage use and location. LOR was not considered in this case because multilingual participants were born and had always lived in the United States, where English is the dominant language, not Spanish or Basque.

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Degree of language activation

Both percentage of language use and location proved non significant as predictors of degree of nativeness, degree of comprehensibility and degree of lexical availability in Spanish and Basque. A higher percentage use of the language and a greater immersion in the heritage language community (i.e. Boise) did not have a positive impact on our participants' proficiency in either of the two heritage languages. We only found significant differences between participants from Reno and participants from Boise in their motivation in Basque (M.B), in their degree of identification with the Basque community (DI.B), as well as in their strength of concern for pronunciation accuracy in Basque (CPA.B), being higher for participants from Boise in all cases. In this case, a greater immersion in the Basque community (i.e. Boise) resulted in a higher affection for the language, as evidenced by these results.

To sum up, as far as research question 3 is concerned, gender turned out to be a predictor of degree of comprehensibility in Basque as well as of degree of lexical availability in English and Spanish. Degree of identification with the Basque community also proved significant as a predictor of degree of comprehensibility in Basque. Interestingly, location of residence influenced several affective variables for Basque but this influence did not transcend to the linguistic measures of competence. In the discussion we will explain why the remainder of the variables we examined turned out not to be relevant predictors of degree of nativeness, degree of comprehensibility and degree of lexical availability in Spanish and Basque.

3.4.5 Lexical availability task

First, we will present the data of the lexical availability task corresponding to the L3 participants and, then, the data corresponding to the multilingual participants. The lexical availability task was divided into five different prompts for each of the languages, namely "parts of the body", "pieces of clothing", "the city and the countryside", "jobs and professions" and "food and drink"; prompts that, as we mentioned above, correspond to basic semantic categories (e.g. Ferreira Campos & Echeverría Weasson, 2014). Participants were given 2 minutes to complete each of the items (30 minutes in total to perform the task in the three languages).

Our L3 participants produced 898 words in Spanish, 495 in Basque and 478 in English. Their lexical availability was much higher in Spanish than in Basque or English. Four participants refused to perform the task in Basque and 6 in English, because they reported that they could not write in either one or both of those languages. The data corresponding to participant 6 is not included because he was the only early arrival in our sample and the only one who fell within the native-speaker range in English (see appendix 37).

Our multilingual participants produced 640 words in Spanish, 516 in Basque and 1289 in English. These results show that, as expected, their lexical availability in English clearly exceeded that in Spanish or Basque, even though 1 participant refused to perform the task in Spanish and 3 participants refused to perform the task in Basque because they did not feel confident enough or because they could not write in the language in question. In the case of the multilingual participants, as expected, English was the language in which they presented the highest degree of lexical availability, followed by Spanish and finally, Basque (see appendix 38).

We will now present the statistical analysis we performed concerning the lexical availability task; first, we will present the data corresponding to the L3 participants, and

then, the one corresponding to the multilingual participants. As we already mentioned, we did not include participant 6 of the L3 participants in the statistical analyses.

L3 participants

We can see in the table below that only nine participants performed the lexical availability task in English. We found that the item which received the highest number of responses were both "the city and the countryside" and "food and drink" whereas the one with the fewest responses was "pieces of clothing". Regarding the items "the city and the countryside" and "food and drink", the total number of responses was 109, whereas the mean number of responses for each participant was 12.11.

Table 2. *Results in English for the L3 participants.*

	BODY.E	**CLOTHING.E**	**CITY.E**	**JOBS.E**	**FOOD.E**
N	9	9	9	9	9
Sum	96	79	109	85	109
Mean	10.67	8.78	12.11	9.44	12.11

For Spanish, eleven participants performed the task, as shown in the table below. We found that the item which received the greatest number of responses was "parts of the body", whereas the one which received the fewest responses was "jobs and professions". Regarding the item "parts of the body" a total of 140 responses were given and the mean number of responses for each participant was 12.73.

Table 3. *Results in Spanish for the L3 participants.*

	BODY.S	CLOTHING.S	CITY.S	JOBS.S	FOOD.S
N	11	11	11	11	11
Sum	140	113	126	93	127
Mean	12.73	10.27	11.45	8.45	11.55

Finally, eleven participants performed the task in Basque. We found that, as we can see in the table below, the item which received the highest number of responses was, again, "parts of the body" and the one with the fewest responses was, again, "jobs and professions". Regarding the item "parts of the body", we found that the total number of responses was 115, whereas the mean number of responses per participant was 10.45.

Table 4. *Results in Basque for the L3 participants.*

	BODY.B	CLOTHING.B	CITY.B	JOBS.B	FOOD.B
N	11	11	11	11	11
Sum	115	91	108	74	107
Mean	10.45	8.27	9.82	6.73	9.73

Multilingual participants

Eleven participants performed the lexical availability task in English. We found that the item which received the greatest number of responses was "parts of the body", whereas the one with the fewest responses was "jobs and professions". The total number of responses for the item "parts of the body" was 312, whereas the mean number of responses was 28.36.

Table 5. *Results in English for the multilingual participants.*

	BODY.E	CLOTHING.E	CITY.E	JOBS.E	FOOD.E
N	11	11	11	11	11
Sum	312	219	258	213	287
Mean	28.36	19.91	23.45	19.36	26.09

Ten multilingual participants performed the lexical availability task in Spanish. We found that, as shown in the table below, the item which received the greatest number of responses was “food and drink”, whereas the one which received the fewest responses was “pieces of clothing”. Regarding the item “food and drink”, the total number of responses was 179, whereas the mean number of responses per participant was 17.90.

Table 6. *Results in Spanish for the multilingual participants.*

	BODY.S	CLOTHING.S	CITY.S	JOBS.S	FOOD.S
N	10	10	10	10	10
Sum	133	86	140	102	179
Mean	13.30	8.60	14.00	10.20	17.90

Table 7*. Results in Basque for the multilingual participants.*

	BODY.B	CLOTHING.B	CITY.B	JOBS.B	FOOD.B
N	8	8	8	8	8
Suma	119	84	116	75	122
Media	14.88	10.50	14.50	9.37	15.25

Finally, in the results for Basque, the table above shows that the item which received the greatest number of responses was, again, “food and drink”, whereas the one with the fewest responses was “jobs and professions”. The item “food and drink” received a total number of responses of 122, whereas the mean number of responses per participant was 15.25.

3.5 Discussion

In this section we will address the results we obtained in our field study in the light of the theories reviewed in section 2A and previous studies. Our results concerning the effect of the various factors analyzed on the level of phonological and lexical achievement in an L3 for bilingual speakers show that, as expected, we found that age of arrival was a predictor of degree of phonological attainment in the L3 for our group of participants. A large number of researchers have claimed in recent decades that the offset of the critical period (e.g. Lenneberg, 1967) should be considered progressive rather than abrupt in the sense of "the younger, the better" (see Bialystok & Hakuta, 1999; Birdsong, 1992, 1999a, 1999b; Birdsong & Molis, 2001; Johnson & Newport, 1989; Munro & Mann, 2005; Muñoz & Singleton, 2011). In fact, our results do support this hypothesis of a sensitive period rather than an abrupt offset in the ability to acquire a language. Consequently, the present study shows that the earlier the arrival in the L3 speaking country, the greater the chances to attain native-like phonology in the L3. Nonetheless, only the participant in our sample who arrived in the host country at the age of 7 (i.e. the early arrival) fell within the native-speaker range in English, whereas the remainder of the sample followed a decreasing pattern of nativeness and none of them was perceived as near native in the target language. Age of arrival was not a predictor of degree of lexical availability in English for the L3 participants in our sample, probably because their performance in the lexical availability task in English was, in general, very poor. In fact, 6 participants refused to perform the task in English because either they did not feel confident enough or because they reported that they could not write correctly in English. Nevertheless, we did find a significant negative correlation between participants' chronological age and degree of lexical availability in English (r = -,859), which suggests that younger participants might have had greater lexical retrieval abilities than older participants (range = 47-87; mean = 69), or because their social network in English was larger than that of the older participants. In fact, speakers' social network tends to shrink after retirement; that is why younger participants reported a greater number of contacts in English than older participants.

Concerning gender, we found no significant differences between men and women in their degree of phonological attainment in the L3 (see Flege *et al.*, 1995; Piske *et al*., 2001), nor in their degree of lexical availability in English. However, we did find significant differences between men and women in their degree of activation of the L3 (English); men used English significantly more frequently than women. It could be due to men being, in most cases, the breadwinners of the family; that is, those who worked outside of the house, whereas women were the ones who stayed at home with their children. As a result, women were the ones who passed on their native language(s) to their children and used the L3 less frequently. In this sense, Ellis (1994) also reported that "Sex (or gender) is, of course, likely to interact with other variables in determining L2 proficiency. It will not always be the case, therefore, that females outperform males. Asian men in Britain generally attain higher levels of proficiency in L2 English than do Asian women for the simple reason that their jobs bring them into contact with the majority English-speaking group, while women are often "enclosed" in the home" (p. 204). However, the fact that gender did not turn out be a predictor of either degree of nativeness, degree of comprehensibility in English or degree of lexical availability in English could be ascribed to the fact that differences in ratings for those two measures as well as results in the lexical availability task among men and women were minimal, so the (potential) effect of gender was offset or undermined.

We could not perform the statistical analysis for education level because only one of the L3 participants had university studies. Nevertheless, given that most of the L3 participants did not attain a high level of proficiency in the target language (excluding the early arrival, who attained native-like proficiency), we suggest their low degree of lexical availability in English was related to the fact that most of them did not have a high educational level, although we cannot provide empirical evidence for this claim since no statistical comparisons could be carried out. However, some studies (e.g. Flege & Liu, 2001) have pointed out the importance of education (students versus non-students) as a predictor of attainment in the target language.

The results obtained for degree of identification with the American community (DI.E) showed that it did not predict either degree of phonological attainment or degree of

lexical availability in English for our group of participants. There have been some studies (e.g. Bongaerts *et al.*, 1995, 1997; Moyer, 1999) where degree of identification with the L2 community has proved significant for attaining a high degree of phonological proficiency (in some cases native-like proficiency) in the L2. In her study, Moyer (1999) found that 1 of her 24 English (L1) learners of German as an L2 passed for a native speaker of German. This person, who had started learning German at the age of 22 (i.e. late learner) reported a fascination for the German language and for German people. He also reported that he was largely self-taught and presented a strong desire to acculturate and sound German. In this case, we could claim that this participant might have qualified as an "exceptional" L2 learner because, even though he presented many favourable characteristics for attaining a high degree of phonological proficiency in the L2, very few learners presenting the same characteristics can actually attain native-like proficiency in the target language. Following this line of argument, we claim that in order to be able to attain a high level of phonological proficiency in an L2/L3 as a late learner, even more native-like phonological attainment, and therefore qualify as an "exceptional" L2 learner, one of the characteristics the speaker usually presents is a high degree of identification with the target language community. However, this is probably neither the only characteristic, nor an indispensable requisite the "exceptional" learner has to meet.; in fact, very few late learners can actually be considered "exceptional" language learners, even though they present all the favourable characteristics to attain a high level of proficiency in the target language. Apart from this, we found that participants from Reno reported a significantly higher degree of identification with the American community than participants from Boise; this could be due to the fact that the Spanish/Basque community in Boise is bigger and more active than the one in Reno. As a result, participants from Boise were arguably less integrated in the American community than participants from Reno, as suggested by these results.

Our results also show that, again, motivation in English (M.E) could not predict degree of phonological or lexical attainment in the L3, since we found no significant correlation between motivation in English and degree of nativeness, degree of comprehensibility or degree of lexical availability in English. It should be highlighted that even though all of our participants reported a rather high motivation in English, this did not

result in a high degree of phonological or lexical proficiency in the L3; in fact, most of them were rated as having rather low degrees of nativeness and comprehensibility in English. Additionally, their performance in the lexical availability task was, as we already mentioned above, very poor. The fact that their DN and DC ratings were, in general, concentrated in one area of the scale and that their lexical availability task was very poor probably offset the effect of an affective variable such as motivation which has proved to be important in cases where some late L2 learners stood out from the rest for their high L2 attainment (e.g. Bongaerts, 1999; Ioup *et* al., 1994; Moyer, 1999).

Likewise, there was no significant correlation between either strength of concern for pronunciation accuracy in English (CPA.E) and degree of nativeness, degree of comprehensibility or degree of lexical availability in English. Some studies (e.g. Bongaerts, 1999; Moyer, 1999; Purcell & Suter, 1980) found that strength of concern for pronunciation accuracy or desire to sound native-like in the L2 were strong predictors of degree of phonological attainment in the L2. Nevertheless, in some of those studies, those learners who attained a high degree of phonological attainment (in some cases native-like attainment) were recognized as "exceptional" language learners; that is, speakers who are (apparently) not bound by maturational constraints (e.g. Hyltenstam & Abrahamsson, 2003). We presume that it is arguably, not just the influence of one factor, but the collusion of several factors which make "exceptional" language learners excel at an L2/L3. There are other studies (see Elliott, 1995, for a study in a formal setting) in which strength of concern for pronunciation accuracy was not found to be a significant predictor of degree of phonological proficiency in the L2. In our study, no late learner stood out from the remainder of the sample for his/her outstanding performance in the L3; in fact, as we already mentioned above, their overall performances were rather poor. As a result, the range of participants' DN and DC ratings as well as the results for the lexical availability task were apparently too narrow to allow us to see significant trends.

In a similar vein, and contrary to expectations, length of residence did not emerge as a significant predictor of degree of phonological attainment in English for the L3 participants in our sample (e.g. Flege *et al*., 1997a; Flege & Liu, 2001; Purcell & Suter,

1980). However, there was a significant negative correlation between degree of lexical availability in English and LOR (r = - ,806) for our group of participants. This means that those participants with shorter LORs were the ones who presented higher degrees of lexical availability in English. This unexpected finding could, nonetheless, have a very simple explanation: LOR could have been confounded with participants' chronological age. In fact, we found a significant negative correlation between chronological age and degree of lexical availability in English than older participants (r = -,859). As a result, the younger participants (i.e. those with shorter LORs) might have also presented greater lexical retrieval abilities and their social network in English was larger than that of the older participants (participants' chronological age range: 47-87; mean = 69), who were already retired at the time of testing. This could be the real reason why participants with shorter LORs presented a higher degree of lexical availability in English than those with longer LORs. Future research should be conducted partialling out length of residence from other variables in order to avoid any kind of interference which may obscure the results. In this sense, Flege and Liu (2001) found in their study that those participants in the student group (those participants who had been students during most or all of their stay in the United States) with longer LORs obtained better results in the three tasks, namely identification of stops in final position, a grammaticality judgement task (GJT) and a listening comprehension test than those participants in the student group with shorter LORs. Nevertheless, LOR for both groups was too restricted since it ranged from 0.5 to 3.8 years for the short-LOR group and from 3.9 to 15.5 years for the long-LOR group. Our contention is that those participants with LORs longer than 10 years (see Birdsong, 2005) would have arguably benefitted from a greater amount of exposure to the L2 and could have already reached their ultimate attainment in the L2 in contrast to participants with shorter LORs. We should highlight the finding that LOR differences for the nonstudent group (i.e. those participants who had worked full-time during most or all of their stay in the United States) were non-significant. This finding points to the importance of a widely neglected variable such as quality and quantity of input (see Flege, 2009; Flege & Mackay, 2011; Muñoz & Singleton, 2011) as well as literacy as potential significant predictors of degree of phonological attainment in an L2/L3. In this sense, we could conclude that after ultimate attainment in the L2/L3 has been reached (after a 5-year span according to Johnson

& Newport, 1989; or after a more reasonable 10-year span according to Birdsong, 2005), as it is arguably the case for all the participants in our sample, differences in LOR appear to be non-significant, like in our study.

Interestingly, for degree of activation of the L3 (English), we found a significant correlation between degree of activation of English and degree of comprehensibility in English (r = ,566) for our informants, which means that those participants with a higher degree of activation of the L3 were better understood by the native American judges. Nevertheless, we found no significant correlation between degree of activation of English and degree of lexical availability in English for our sample. These results show that a higher degree of activation of the L3 may have an influence on degree of comprehensibility in the L3, but not necessarily on the degree of nativeness in the target language. In fact, degree of nativeness and degree of comprehensibility do not have to go hand in hand, since degree of nativeness is more related to pronunciation accuracy, whereas degree of comprehensibility may be taken by judges as a global measure which includes non-phonological aspects which influence how effectively speakers manage to make themselves understood, that is to say, to communicate (e.g. Derwing *et al.*, 2004; Munro & Derwing, 1999). In fact, Munro and Derwing (1999) repeatedly found that degree of accentedness is only partially related to comprehensibility; that is, they claimed that, although speech that is rated unaccented or lightly accented will almost always be rated easy to understand and speech that is judged to be difficult to understand will received strong accentedness ratings, nevertheless heavily accented speech is often considered easy to understand. As we already mentioned above, men reported a significantly higher degree of activation of English than women, which could be due to men being the breadwinners of the family, whereas women stayed at home with children and, as a result, were arguably less integrated in the American society than men. In order to measure degree of language activation, we adapted the questionnaire from Flege and Mackay (2004) which included a section devoted to percentage use of the language. Participants filled in that section by choosing which percentage they used each of the languages under study. However, it is very difficult for bilingual, let alone for multilingual speakers, to measure realistically their percentage use of a language. In this sense, Flege (2010) suggested that the only way to get real measures of

degree of language activation would be by providing speakers with a 24-hour recorder which could register every single word they uttered. In fact, this could be a very efficient way to measure degree of language activation, but very difficult to carry out.

Finally, there were no significant differences between participants from Reno and participants from Boise neither in their degree of phonological proficiency in English, nor in their degree of lexical availability in that language. Therefore, the fact that the Spanish/Basque community in Boise was bigger (i.e. that participants from Boise were arguably exposed to a greater quality and quantity of Spanish/Basque input than the ones in Reno) appeared not to be either beneficial or detrimental for L3 acquisition. We found significant differences between participants from Reno and those from Boise in their degree of identification with the American community; participants from Reno presented a higher degree of identification with the host community than participants from Boise. This could be due to the fact that participants from Reno may have been more immersed in the American community, whereas participants from Boise might have been more immersed in the existing Spanish/Basque community in Boise than in the American one; hence this result with regards with degree of identification.

Our results suggest that the L3 participants showed attrition in their native languages. In fact, none of the participants was rated within the native-speaker range in Spanish by the monolingual Spanish judges, and only two by the bilingual judges. In Basque, 8 participants were rated native-like by the Basque-dominant judges and 9 by the bilingual judges. However, our results regarding L1 attrition showed that, contrary to expectations, age of arrival was neither a predictor of degree of phonological attrition in Spanish, nor of degree of lexical availability in Spanish for the L3 participants in our sample. All this means that, contrary to our expectations and to what other researchers have claimed, AOA was not related to degree of phonological attrition in Spanish for the L3 participants (e.g. Köpke & Schmid, 2004; Pallier *et al*., 2003; Ventureyra & Pallier, 2004; Ventureyra *et al*., 2004). Nevertheless, we did find a significant negative correlation between participants' chronological age and degree of lexical availability in Spanish (r = -,633), which suggests, as we already claimed above in the case of English, that younger

speakers might have had greater lexical retrieval abilities than older participants and they probably took part more actively in the activities organized by the Spanish/Basque community, etc. In the case of the 8 Korean adoptees in France in the study by Ventureyra & Pallier (2004), it was the combination of three different factors what promoted a complete attrition of their NL (Korean), namely an early AOA in the host country (they were all in early childhood when removed from their native country and adopted by French families), a long period of residence in the host country and a complete replacement of input from their NL (i.e. complete deprivation of Korean) for their L2 (French). On the other hand, the L3 participants in our sample had not been completely deprived of input from their NL (Spanish), even if native input from this language would have probably been dramatically reduced upon arrival in the host country. The L3 participants in our sample probably managed to receive input from their NL (Spanish) from different sources; they may have established contacts with other Spanish-speaking immigrants in the host country, or they could have also made friends with members of the large Hispanic population settled in the US. Apart from this, we must bear in mind that there is a large network of mass media in Spanish in the US, so Spanish has always been accessible for these L3 speakers from different sources. Our contention is that, had our participants also been more deprived of input from their NL (Spanish), the earlier their arrival in the host country, their chances of having undergone a more severe phonological attrition in Spanish than they actually did would have been much greater.

For Basque, we only found a significant correlation between AOA and degree of nativeness as rated by the Spanish/Basque balanced bilingual judges ($r = ,518$). This finding suggests that, as expected, participants who arrived earlier in the host country presented a lower degree of nativeness (i.e. a higher degree of phonological attrition) in Basque as rated by the Spanish/Basque balanced bilingual judges than participants who arrived later. We suggest that the reason why participants who arrived earlier in the host country (even though they were already in their late teens or early twenties and their native phonetic systems were well-established) were rated as having a lower degree of nativeness in Basque (albeit by only one of the groups of judges), could be ascribed to the fact that Basque input was dramatically reduced for them upon arrival in the host country. We claim that, in

addition to a dramatic reduction of Basque input, a long residence in the host country where Basque is a minority language could be the real reasons of this result. Finally, we found no significant correlation between AOA and degree of lexical availability in Basque for our group of participants. However, again, we did find a significant negative correlation between participants' chronological age and degree of lexical availability in Basque (r = -,773) which means that the older participants presented a lower degree of lexical availability in Basque than younger participants. In this case, as we already mentioned above in the case of English and Spanish, younger participants might have presented greater lexical retrieval abilities than older participants; or they probably took part more actively in the activities organized by the Spanish/Basque community, etc. Additionally, as we already mentioned above, the social network of the younger participants was larger in the three languages under study than that of the older participants, because people's social networks tend to shrink considerably after retirement. The fact that their degree of lexical availability in Spanish was, in general greater than it was in Basque could be ascribed to the existence of a large network of Hispanic mass media in the United States, whereas Basque, being more of a minority language, like many other languages in the US is completely absent from the American mass media. As a result, this massive presence of Spanish in the mass media could have rendered their Spanish vocabulary richer than it was in Basque, even though this may not necessarily have a positive impact on their degree of phonological proficiency in that language, like in our study.

The hypothesis that earlier arrivals would present a higher degree of attrition in their NL(s) is based, as we already mentioned above, on previous studies of language attrition (see Ventureyra & Pallier, 2004; Ventureyra *et al.*, 2004) which have been conducted mainly with international adoptees. However, in contrast to the Korean adoptees by French families in the studies by Pallier *et al.*, (2003) and Ventureyra *et al.*, (2004), who arrived in the host country between the ages of 3 and 8, our participants did continue using their native languages, mostly with other Spanish/Basque immigrants, upon arrival in the host country, even though arguably to a much lesser extent. Therefore, in this case, degree of activation of Basque (most participants reported a high percentage use of Basque) could have (partially) offset the effect of an early arrival (i.e. in their late teens or early twenties)

and a long period of residence in an English-dominant environment, although we did find a significant correlation between AOA and degree of nativeness in Basque as rated by the bilingual judges. As we already mentioned above, 8 participants were rated as native (between 5.50 and 6) in their DN in Basque by the Basque-dominant judges, whereas 9 were rated as native by the bilingual judges. This means that more than half of our participants were still perceived as native-like, whereas the remainder of the sample did undergo attrition. The fact that those participants who arrived earlier in the host country also presented a lower degree of nativeness in Basque as rated by the bilingual judges could be due to the combination of several factors, namely an earlier AOA, a long residence in the host country and, as a result, a longer period of use of the L3 (English) to the detriment of their native language, in this case, Basque.

It is worth noting the case of participant 6 (AOA = 7), who migrated to the host country along with his family, and his parents kept using Spanish and Basque with him even though, eventually, this speaker might have become English-dominant (see Hyltenstam *et al.*, 2009). This participant was actually rated within the native-speaker range in both English and Basque (only his DC ratings in Basque were slightly lower than 5.50). In the case of English, it is clear that his early AOA in the host country was the only predictor of his native-like performance; whereas in the case of Basque, his perceived native-like performance is more remarkable given his early arrival in the host country, in addition to a dramatic reduction of Basque input upon arrival in the US. As a result, we could account for the outstanding performance of this participant in Basque by suggesting that he might have presented a greater ability than average to sustain an optimal representation of more than one linguistic system (e.g. Hojen & Flege, 2006). In their study with pre-pubescent attriters, Bylund *et al.*, (2009) suggested that language aptitude may have a compensatory function in language attrition, helping the attriter to retain a high level of L1 proficiency despite reduced L1 contact; therefore, we suggest that this speaker might have also presented a higher language aptitude than average given his outstanding performance in Basque, which is clearly a minority language in the US and is completely absent in the American mass media. Interestingly, this speaker received the lowest ratings in his DN and DC in Spanish among the L3 participants; DN = 2.73 and DC = 3.73 by the

monolingual Spanish judges, and DN = 3.09 and DC = 4.09 by the bilingual judges. Therefore it seems to be the case that his attainment in Basque was achieved at the cost of his Spanish proficiency, given that he was the speaker with the worst balance between competence in the two native languages. This participant attended an English-medium school, but still, he was considered to be a native speaker of both English and Basque. Therefore, we suggest that the factors which led to his native-like attainment in English and outstanding proficiency in Basque negatively affected his degree of proficiency in Spanish, which was perceived to be clearly non-native in terms of both degree of nativeness and degree of comprehensibility in that language. Additionally, his performance in the lexical availability task in Spanish was the poorest among the L3 participants; in fact, he reported 0% use of Spanish at the time of testing and also reported no motivation in that language; in fact, he did not fill in the section in the questionnaire related to motivation. In his case, we could claim that either he had undergone severe attrition in Spanish or that he had never acquired Spanish fully (e.g. Montrul, 2008).

Gender turned out to be irrelevant for degree of phonological attrition as well as for degree of lexical availability in the native languages. However, we did find significant differences between men and women in their percentage use of Basque; women used Basque significantly more frequently than men, whereas men used English significantly more frequently than women. This finding could be ascribed, as we already reported above, to the fact that men were, in most cases, the breadwinners of the family, whereas women were in charge of the children. As a result, women were the ones who passed their native languages onto their children. In this sense, Ellis (1994) stated that "It will not always be the case, therefore, that females outperform males. Asian men in Britain generally attain higher levels of proficiency in L2 English than do Asian women for the simple reason that their jobs bring them into contact with the majority English-speaking group, while women are often "enclosed" in the home" (p. 204). Likewise, the L3 participants in our sample migrated to the United States mostly during the decades of the 60s and 70s of the twentieth century when women worked, in most cases, only in the home, so these results do make sense in this particular context.

For education level, the statistical analysis was not possible, since only 1 out of the 15 participants in our sample reported university studies, whereas the remainder of the sample reported that they did not have university qualifications. In this case, we should add that most of our L3 participants had had reduced access to education in their home country, let alone in the host country, where most of them migrated in their late teens or early twenties in order to work as shepherds. Therefore, their knowledge of both Spanish and Basque had not been much reinforced through literacy. Apparently, only some speakers might have managed to keep a high level of proficiency in both Spanish and Basque through constant contact with their families, with other Spanish/Basque speaking immigrants in the host country, or in the case of Spanish, by getting input from the Hispanic mass media in the US.

Degree of identification with the Spanish community was neither a predictor of degree of nativeness or degree of comprehensibility, nor of degree of lexical availability in Spanish for the L3 participants. In Basque, contrary to expectations, we found a significant negative correlation between degree of identification with the Basque community (DI.B) and degree of comprehensibility as rated by the Basque-dominant judges (DC.BD, r = -,651), as well as by the bilingual judges (DC.BB, r = -,676). These results were completely unexpected since they show that those participants who presented higher degrees of identification with the Basque community were the ones who presented higher degrees of phonological attrition, albeit only in terms of degree of comprehensibility. We already reported that roughly half of the participants fell within the native-speaker range in their degree of nativeness in Basque and they were also rated quite favourably in their degree of comprehensibility in Basque. Our findings suggest that this variable could have been confounded with participants' chronological age since most participants who were rated as native in their DC in Basque (between 5.50 and 6) by the Basque-dominant judges were among those in the younger group, namely 66, 69, 60, 80, 79, 63 and 47 years old (range = 47-87; mean = 69). The only 2 speakers who were rated as native in their DC by the bilingual judges were, on the one hand, the youngest participant in the sample (chronological age = 47), whereas the other one was among the older participants (chronological age = 79). However, participants' chronological age did not emerge as

statistically significant for degree of comprehensibility in Basque. Following this line of argument, older participants' voices could have been negatively affected by increasing age or they might have used old-fashioned expressions; those could be the reasons why some of the older participants were perceived as being more difficult to be understood. At this point, we should also recall that most participants reported a high degree of identification with the Basque community (DI.B). Our contention is that that had differences in degree of identification with the Basque community been higher among our participants, we might have also found bigger differences in degree of phonological attrition in Basque among them.

We also found that motivation in Spanish (M.S) was not a predictor of either degree of nativeness, degree of comprehensibility or degree of lexical availability in Spanish. It is important to point out that, even if our participants differed widely in their degree of activation of Spanish (range of our participants' percentage use of Spanish: 0% - 43.33%), the presence of a large Hispanic community in the US and the existence of a large network of mass media in this language could have enabled them to get input from this language, albeit possibly sometimes just in a passive fashion. Nevertheless, both their degree of nativeness and degree of comprehensibility ratings in Spanish were rather concentrated in one range of the scale, so that result could have offset the effect of this variable.

Regarding motivation in Basque (M.B), this variable did not turn out to be significant for degree of phonological attrition or degree of lexical availability in Basque. Participants differed quite widely in their motivation in Basque (range: 6 – 36); however, as we already reported, roughly half of them were rated within the native-speaker range in their degree of nativeness in Basque, and were also rated quite favourably in their degree of comprehensibility in Basque. Interestingly, even though 1 of our participants reported a very low percentage use of Basque (5.56%), he was also rated within the native-speaker range in his degree of nativeness in Basque by both groups of judges, and he was rated only slightly lower than 5.50 in his degree of comprehensibility in Basque. These results suggest that even a low degree of activation of this language (i.e. a minority language in the US) could have been enough to allow participants to prevent phonological attrition in Basque.

Nevertheless, in this case, it is also important to point out that this participant's age of arrival was among the highest (AOA = 28; participants' range of AOA = 7-38), so his phonological system of Basque was well-established prior to arrival in the US, and possibly more resistant to attrition than in the case of the earlier arrivals. We could claim that, in contrast to the international adoptees in the studies by Ventureyra *et al*., (2004) and Ventureyra & Pallier (2004), most of our participants were adults at the time of migration to the host country and they were not completely deprived of their native language input upon arrival in the US. These could have been the most important reasons why our participants did manage not to undergo the severe language attrition attested in those studies.

We also found that length of residence was neither a predictor of degree of phonological attrition, nor of degree of lexical availability in Spanish. In a similar vein, length of residence was not a predictor of degree of phonological attrition in Basque. Nevertheless, length of residence was indeed a strong predictor of degree of lexical availability in Basque (r = - ,696). That is, those participants with a shorter length of residence (range of LOR = 23-59; mean = 44.27) presented a higher degree of lexical availability in this language. That is, those participants with a shorter period of residence in the US had undergone a lower degree of lexical attrition in Basque. This result also suggests that this variable could be related to participants' chronological age. In fact, we found a significant negative correlation between participants' chronological age and degree of lexical availability in Basque (r = -,773) as well as in Spanish (r = -,633). Therefore, we could claim that the reason why those participants with a shorter LOR presented a higher degree of lexical availability in Basque could be due to two causes: on the one hand, they had been exposed to the dominant language for a shorter period of time, so their native language Basque was less lexically attrited, and on the other, those participants with shorter LORs were in fact younger (participants' chronological age = 47-87; mean = 69), so they might have presented greater lexical retrieval abilities than older participants; or younger participants probably took part more actively in the activities organized by the Spanish/Basque community and, as we already mentioned above, their social network was larger in the three languages under study than that of the older participants. However, the

reason why LOR could not predict either degree of nativeness or degree of comprehensibility could be ascribed to the fact that both DN and DC ratings in Spanish were, in general, concentrated so this variable could not emerge as relevant. In the case of degree of lexical availability in Spanish, our participants differed more than in their DN and DC ratings, but apparently not enough for LOR to be statistically predictive. In the study by De Bot *et al*., (1991), they recruited their Dutch immigrants in France according to three criteria, namely emigration after age seventeen (they claimed that at this age the acquisition of the first language has been completed both through formal and informal input), LOR in France of at least 10 years, and variation in the amount of contact with the Dutch language since emigration. They found that there was only a linear relation between LOR and attrition when there were few contacts with the native language (i.e. when the input from the native language was scarce). We claim that the (negative) effects of a long residence on the degree of attrition could be offset in case the immigrants immersed in an L2/L3 environment keep getting input on a regular basis from their native language. In the case of Spanish in our study, our participants did manage to keep getting input from this language regularly due to the existing large Hispanic community and mass media in the US. In addition to this, their self-reported percentage use of this language was quite high (see appendix 32 for data corresponding to degree of activation of Spanish of our L3 participants), so all these could be the reasons why our participants' performance did not differ much among them and, as a result, LOR could not predict any of the measures in Spanish under study.

In the case of Basque, half of our participants were rated within the native-speaker range in Basque irrespective of their length of residence in the host country. This finding is particularly surprising since, in contrast to the situation of the relatively large Hispanic community in the United States, Basque is a minority language in the US and access to the Basque language is much more restricted. Nevertheless, our participants probably also managed to keep getting input from this language since, no matter how long they had been living in the host country, their degree of phonological attrition in Basque was not predicted by this variable. In fact, most participants kept using the language regularly, as evidenced by their self-reported percentage use of Basque (range of participants' percentage use of

Basque: 5.56% - 66.67%). Most of them reported a high percentage use of Basque, even though in most cases their degree of activation of English (the dominant language) was higher. This continued use of Basque prevented them from undergoing severe phonological attrition in the latter, contrary to what has been found in other studies where participants had been completed deprived of native input and, as a result, had undergone severe attrition in their native language (e.g. Hyltenstam *et al*., 2009; Ventureyra & Pallier, 2004; Ventureyra *et al.*, 2004).

Degree of language activation was not a predictor of degree of phonological attrition or degree of lexical availability in the native languages even though this variable has usually been found to be a strong predictor of degree of phonological proficiency in the native language(s) of speakers in an L2 migrant setting (see De Leeuw *et al*., 2010). As for the results in Spanish, their degree of activation of Spanish was lower then in Basque and their degree of attrition in Spanish was also higher than in Basque. Nonetheless, degree of activation of Spanish did not turn out to be statistically significant probably because the ranges of DN and DC ratings were too narrow for this variable to show up. Concerning our results in Basque, most participants reported a rather high degree of activation of Basque (even though, in general, it was lower than their degree of activation of English); but some of them did report a low degree of activation of the language (5.56%). Nevertheless, half of them were rated within the native-speaker range in their degree of nativeness and also received rather high ratings in their degree of comprehensibility in Basque. It could be that, given that most participants arrived in the host country in adulthood, the phonological system of their native language Basque (and also Spanish) might have been well established and been highly resistant to phonological attrition (in contrast to the international adoptees in the above-mentioned studies by Ventureyra *et al*., 2004 and Ventureyra & Pallier, 2004). As a result, even those participants with a low percentage use presented a rather high degree of phonological proficiency in Basque. We also found that there was a significant correlation between participants' chronological age and degree of activation of Basque (r = ,557). This means that older participants reported a higher degree of activation of Basque. This finding could be due to the fact that most of the older participants were already retired at the time of testing; as a result, their interaction with the

L3 community could have been reduced. This higher degree of activation of Basque could have also prevented them from undergoing severe attrition in that language.

Regarding location of residence, there were no significant differences between participants from Reno and those from Boise neither in their degree of phonological attrition nor in their degree of lexical availability in Spanish. In the case of Basque, we only found significant differences between participants from Reno and participants from Boise in their degree of comprehensibility in Basque as rated by the Basque-dominant judges (DC.BD); values being higher for participants from Boise. We also found that degree of activation of Basque was significantly higher for participants from Boise. We expected that participants from Boise would present a lower degree of phonological attrition in Spanish and Basque as well as a higher degree of lexical availability in those two languages, given the fact that the Spanish/Basque community in Boise is bigger and more active than the one in Reno. We already mentioned the fact that Spanish input is relatively accessible in the US due to the existence of a large Hispanic community as well as a network of mass media in this language. In contrast, access to Basque (Basque being more of a minority language in the US) could have been much more restricted for these participants, but they still managed to keep getting input from this language by interaction with Spanish/Basque friends or with other Spanish/Basque relatives also settled in the US. Another possible explanation for the lack of significant differences between participants from different locations could be the following: the fact that none of the groups presented a high degree of phonological attrition in none of the languages suggests that their native phonological systems were, as we already reported above, well established before migration to the US and, as a result, they were highly resistant to attrition (in contrast to the international adoptees in the studies by Ventureyra *et al*., 2004 and Ventureyra & Pallier, 2004). Likewise, participants from both locations presented a similar degree of lexical availability in both languages. Therefore, our study has shown that a greater degree of immersion in the native language community (as it was in the case of the Boise participants) may not have any significantly positive influence on the degree of phonological proficiency or in the degree of lexical availability in the native languages in the case of participants immersed in an L3 environment for an extended period of time.

Our results with regards to the effect to of the variables examined related to the phonological and lexical component in multilingualism showed that, as expected, all multilingual participants were recognized as native speakers of English. Additionally, their degree of lexical availability in English was, in all cases, greater than it was in either Spanish or Basque. Even though most participants reported Spanish and/or Basque as their first learned languages, the fact that they were massively exposed to English from a very early age (mainly due to schooling) and that the quality, variety and quantity of input they received in this language clearly exceeded the one they received in both Spanish and Basque, enabled them to attain native-like proficiency in this language. In fact, they probably attained native-like production proficiency in English to the same degree as any other native English speaker who might have been exposed only to English from birth (see Hyltenstam *et al*., 2009; Muñoz & Singleton, 2011), although some studies have found differences in perceptual performance in adverse conditions between monolinguals and bilinguals from infancy (Mayo *et al.,* 1997) presumably due to the smaller amount of accrued experience in any one language for a bilingual as opposed to a monolingual. In sum, our study shows that quality and quantity of input may be very important factors which must be considered in any L2/L3 phonological and lexical study (e.g. Flege, 2009; Muñoz, 2008) because they can actually make a big difference.

We also found that none of the multilingual participants in our sample passed for a native speaker of Spanish. This goes against the widespread belief that the "one parent-one language" strategy leads to bilingualism. In fact, De Houwer (2007), whose main research question was "why do some children exposed to two languages from early on fail to speak those two languages?" found that the "one parent-one language" strategy did not provide a necessary nor sufficient input condition in families in which at least one parent spoke a language other than the majority language. She concluded that raising children to speak a single language has a 100% success rate except in some cases of impairment; whereas raising children to speak two languages only has a 75% success rate. Her findings showed that successfully raising children to speak two languages very much depends on the parental language input patterns. That is, she stated that language choice patterns can be planned ahead of time and modified to suit families' needs in the sense that parents who

might have decided to each use both languages might well be advised to restrict the use of the majority language so that only one of them uses it (see also De Houwer 1990, 1995, 2005). In our case, it is interesting to analyze why the speakers in our sample did not achieve native-like competence in Spanish, apart from the fact that the strategy "one parent-one language" clearly cannot provide sufficient input in order to attain native-like levels of proficiency. Most of the multilingual participants had learned Spanish from their parents from birth; however, they had not, in general, received formal instruction in this language (i.e. their knowledge of the language was not reinforced by formal education or literacy). This lack of formal instruction in Spanish could be one of the main reasons why the multilingual participants were rated as having very low degrees of nativeness in this language, even though the presence of Spanish is rather widespread due to, as we already mentioned above, the presence of a large network of Hispanic mass media in the US. This could have enabled them to keep contact with the language, even though this did not result in a high phonological attainment in that language. As a result, they were identified as non-native speakers of the language by both groups of judges. In the case of Basque, only 1 participant was rated within the native-speaker range in his DN and another one in his DC by the Basque-dominant judges, whereas none of the participants was rated between 5.50 and 6 in their DN or DC in Basque by the bilingual judges. In addition to this, the only multilingual participant who was rated within the native-speaker range in Basque by the Basque-dominant judges (participant 3) did not present a high degree of identification with the Basque community or a high motivation in this language. This participant might have presented a special ability to avoid phonetic interference from the dominant language (see Flege, 1997, 2002; Flege *et al*., 2003), or he might have presented a greater ability than average to sustain an optimal representation of more than one linguistic system (e.g. Hojen & Flege, 2006). Or, we could suggest that he could have simply qualified as an "exceptional" language learner given that he was the only one who could excel in Basque in spite of the restricted quality and quantity of input he would have been exposed to (see appendices 28 and 30 to see the individual DN ratings given by each native judge to this participant). Therefore, if the "one parent-one language" strategy does not provide sufficient input in the case of bilingualism, our results suggest that in the case of multilingualism, where there are two minority languages, it is evident that there is no

sufficient input in these languages in order to reach native-like levels, and whenever native-like levels are attained (as in the case of the early arrival, who was rated as native in both English and Basque), it is at the cost of one of the heritage languages.

The multilingual participants received, in general, between low and intermediate ratings in both their degree of nativeness and degree of comprehensibility in Spanish. These results suggest they had all become English-dominant and probably presented a similar linguistic behaviour to any other native speaker of American English who would have only been exposed to English from birth (Hyltenstam *et al*., 2009). As was mentioned above, early bilinguals may appear to be the same as monolinguals unless tested in special conditions which may expose their different linguistic makeup. In fact, they had all attended English-medium schools (not Basque-medium schools, due to impossibility) and at the time of the interview they also reported, as expected, a much higher degree of activation of English than of Basque. All this could have probably contributed to their dominant-language replacement (see Hyltenstam *et al*., 2009) during their early school years, even though they would have retained Basque (i.e. another linguistic system) to a greater or lesser extent depending on their individual and contextual differences.

Concerning degree of lexical availability, all participants presented a higher degree of lexical availability in English than in Spanish or Basque. This finding was not surprising since all our multilingual participants had been born and had always lived in the United States, a country where English is the dominant language. As a result, they had always been exposed to massive English input, whereas the input they had received in both Spanish and Basque had been of smaller quantity and less diverse.

In some L2 studies in a foreign language setting, gender has been found to be a factor in linguistic competence, with women usually surpassing men when it comes to degree of L2 attainment (e.g. Flege *et al*., 1995; Piske *et al*., 2001). Nevertheless, we found no significant differences between men and women in their degree of phonological attainment in Spanish or Basque, although we did find significant differences between them in their degree of lexical availability in both Spanish and English, as well as in their degree

of comprehensibility in Basque as rated by the bilingual judges (DC.BB), being higher for women in all cases. We suggest that the reason why there were no significant differences between men and women in their degree of phonological attainment in Spanish or Basque could be that both groups were quite similar in their degree of language activation as well as in their degree of identification with the Spanish/Basque community, etc. The fact that degree of lexical availability in both Spanish and English was significantly higher for women than for men could have a simple explanation: on the one hand, there were 11 multilingual participants in our sample, 3 of whom were men and 8 were women. 1 out of 3 men had non-university studies, whereas the remainder did report university qualifications. On the other hand, concerning the women in our sample, only 2 (one of whom was only 16 at the time of testing) out of 8 had non-university studies, whereas the rest did hold a university diploma. Therefore, a higher education level could have enhanced women's lexical availability in both English and Spanish or, it could simply be that the women in our sample had a greater ability for lexical production (see section 2.2.1.2 for models of bilingual lexical production).

There were no significant differences between participants with university studies and those with non-university qualifications in their degree of nativeness, degree of comprehensibility, or degree of lexical availability in Spanish or Basque. We suggest that the reason why education level turned out to be non-significant could be that, in the case of degree of nativeness and degree of comprehensibility our participants' ratings did not differ enough for the potential effect of this variable to surface. In the case of degree of lexical availability in Spanish, other variables such as gender proved to be more significant, even though, as we just claimed, education level might have enhanced the effect of this variable, albeit not statistically significant. In the case of Basque, the fact that 3 out of the 11 multilingual participants refused to perform the lexical availability task could have limited the range of performances in a way that the (potential) effect of education level could have been offset. In fact, previous studies such as the one by Flege and Liu (2001) showed that education level may have a very important role in L2/L3 attainment.

Degree of identification with the Spanish community was not a predictor of either degree of phonological attainment, or degree of lexical availability in Spanish for our group of multilingual participants. Concerning the results in Basque, we did find a significant correlation between degree of identification with the Basque community (DI.B) and degree of comprehensibility in Basque as rated by the Basque-dominant judges (r = ,678), as well as a strong significant correlation between degree of identification with the Basque community and degree of comprehensibility in Basque as rated by the Spanish/Basque balanced bilingual judges (r = ,805). These results suggest that, as expected, those participants who presented a higher degree of identification with the Basque community were also rated as being more easily understood. The lack of correlation between degree of identification and degree of nativeness in both Spanish and Basque could be ascribed to narrow ranges of DN ratings in both languages. In the case of lexical availability in Spanish gender, as we have just mentioned, was the most important variable, whereas in the case of lexical availability in Basque the small size of the sample (3 out of 11 participants refused to perform the task) could have suppressed the possible effect of this variable. Nevertheless, the existence of a correlation between degree of identification with the Basque community (DI.B) and degree of comprehensibility in Basque as rated by both groups of judges could be ascribed to those participants with a high degree of identification (subconsciously) making a greater effort to be understood in this language; or, it could be due to, as we already mentioned, the fact that degree of nativeness is a measure which is related to pronunciation accuracy, whereas degree of comprehensibility may be taken by the native judges as a more global measure, which includes non-phonological aspects which influence on how speakers make themselves understood (e.g. Derwing *et al.,* 2004; Munro & Derwing, 1999). It is remarkable that our two groups of judges gave, in general, higher DC than DN ratings to the multilingual participants. We suggest that both groups of judges were probably used to listening to speakers in Basque who presented phonological influences from Spanish (i.e. Spanish speakers who would have learned Basque through formal instruction) or, to a lesser extent, from French (i.e. people from the French Basque Country), but they were probably not used to listening to speakers speaking in Basque who presented phonological influences from English. This could be the reason why they might

have assigned higher (and more linear) degree of comprehensibility (DC) than degree of nativeness (DN) ratings in Basque to our group of multilingual participants.

Motivation was neither a predictor of degree of phonological proficiency, nor of degree of lexical availability in Spanish or Basque for our group of multilingual participants. In this sense, some studies (e.g. Bongaerts, 1999; Moyer, 1999) have shown that motivation was a key for predicting degree of phonological attainment in an L2. Nevertheless, the participants who excelled at pronouncing the L2 (in some cases native-like phonological attainment) in those studies usually qualified as "exceptional" language learners. Therefore, it could be that a high motivation in the target language may only be a predictor of phonological attainment in the L2/L3, especially of native-like phonological attainment, whenever exceptional language learners are involved (e.g. Bongaerts, 1999; Ioup *et al*., 1994). In the case of heritage languages, like in our study, the role of motivation could be more complex given that participants are not L2 learners, but speakers who learned their heritage languages from birth, but the limited quantity of input they have received, in contrast to the massive input they have been exposed to in the dominant language, might have had a great negative impact on their degree of phonological proficiency and degree of lexical availability in the heritage languages, as reflected at the time of testing. There was only one speaker among our participants, who was rated within the native-speaker range in his degree of nativeness in Basque (between 5.50 and 6) by the Basque-dominant judges. Surprisingly, this participant did not present a high motivation in Basque and, furthermore, he reported a very low percentage use (4.44%) of this language. Nevertheless, this participant, who reported Basque as one of his first learned languages, might have attained high proficiency in this language because of his early acquisition (e.g. Hyltenstam *et al*., 2009), because he might have had a high language aptitude (e.g. Bylund *et al*,. 2009), because he might have a greater ability than average to sustain an optimal representation of more than one linguistic system (e.g. Hojen & Flege, 2006), or simply because he might have qualified as an "exceptional" language learner.

We found that strength of concern for pronunciation accuracy was neither a predictor of degree of phonological proficiency, nor of degree of lexical availability in Spanish or Basque. Even though some studies (Moyer, 1999; Purcell & Suter, 1980) found that this variable was relevant for predicting degree of phonological attainment in the L2, there have also been other studies where strength of concern for pronunciation accuracy in the L2 proved irrelevant (e.g. Elliott, 1995). In the case of Basque, those participants who presented a high degree of phonological proficiency in Basque did not apparently make an extra effort to pronounce accurately in this language, since they did not score high in this variable, probably due to their early and natural acquisition of this language. In fact, the only participant (informant 3) who did fall within the native-speaker range in his degree of nativeness in Basque reported only 6 (range: 5 to 15) in his strength of concern for pronunciation accuracy in Basque. On the other hand, the fact that our participants' ratings in their strength of concern for pronunciation accuracy in both Spanish and Basque did not differ much in addition to the fact that participants' ratings in both their DN and DC, as well as their performances in the lexical availability task in both languages differ very little may have obscured the potential effect of this variable.

As for the input variables we considered, contrary to expectations, degree of language activation (percentage use) was not a predictor of degree of phonological attainment or of degree of lexical availability in Spanish or Basque for our group of multilingual participants. As a result, our study has shown that degree of language activation may have a low impact on both degree of phonological attainment and degree of lexical availability in cases where quality and quantity of input is not at its highest (e.g. Flege, 2009; Muñoz, 2008; Muñoz & Singleton, 2011). As for location of residence, we found no significant differences between participants from Reno and participants from Boise in either their degree of phonological attainment or degree of lexical availability in Spanish or Basque. Nevertheless, we did find significant differences in motivation in Basque as well as a significantly higher degree of identification with the Basque community and a greater strength of concern for pronunciation accuracy in Basque; those values were significantly higher for participants from Boise (i.e. the location with a bigger and more active Spanish/Basque community) in all cases. Therefore, our study has

demonstrated that a greater degree of immersion in a certain linguistic community can actually enhance affective variables related to the target language and to the target language community (see Yashima *et al*., 2004), even though that greater degree of immersion may not promote degree of phonological proficiency or degree of lexical availability in the heritage languages, like in our study.

To sum up, as for the first research question which examined the effect of various factors on L3 acquisition at the phonological and lexical level, we found that age of arrival was a predictor of degree of phonological acquisition in the L3, in the sense that an earlier age of arrival in the host country resulted in a higher degree of phonological proficiency in the L3. Concerning the input variables, we found a significant negative correlation between length of residence and degree of lexical availability in English. However, in this case, we already claimed that this variable might have been confounded with "participants' chronological age"; in fact, there was a significant negative correlation between participants' chronological age and degree of lexical availability in English. This means that the younger participants might have presented greater lexical retrieval abilities in English; or, it could be due to the fact that younger participants' social network in English was larger than that of the older participants. Degree of activation of English (percentage use of the language) proved to be a predictor of degree of comprehensibility in English for our group of L3 participants. Finally, participants from Reno reported a significantly higher degree of identification with the American community than participants from Boise. Our results with regards to the effect of the variables analyzed at the phonological and lexical level on L1 attrition showed that none of the variables examined could predict degree of phonological attrition in Spanish, but in the case of Basque, degree of nativeness was predicted by age of arrival, in the sense that the higher the age of arrival, the higher their degree of nativeness in that language. In the case of the affective variables, we found a significant negative correlation between degree of identification with the Basque community and degree of comprehensibility in Basque. We claimed that in this case, this variable might had been partially offset or even confounded with other variables such as participants' chronological age, since most of those participants who were rated as native in their degree of comprehensibility in Basque were among the younger participants, even

though no significant correlation between degree of identification with the Basque community and participants' chronological age was found. Input variables, more particularly, length of residence proved a significant predictor of degree of lexical availability in Basque (as well as in Spanish); that is, participants with shorter periods of residence in the US were the ones who presented a higher lexical production in that language. In this case, we already suggested that younger participants might have presented greater lexical retrieval abilities; or, it could be due to the fact that younger participants took part more actively in the activities organized by the Spanish/Basque community, as well as to the fact that the social network of the younger participants was larger that that of the older participants. Finally, in the case of our third research question, which explored the impact of the variables examined on multilingualism, we found that, in the case of English, all multilingual participants were rated within the native-speaker range and their degree of lexical availability in English was, in all cases, greater than it was in both Spanish and Basque. We ascribed these two findings to multilingual participants having been exposed to massive English input from a very early age, whereas the quantity of input they received in both Spanish and Basque was not as extensive. In this sense, we already mentioned above that De Houwer (2007) found that the "one parent-one language" strategy did not provide a necessary nor sufficient input condition. Her findings showed that successfully raising children to speak two languages very much depends on the parental language input patterns; for instance, parents who might have decided to each use both languages should restrict the use of the majority language so that only one of them uses it. She concluded that raising children to speak two languages only has a 75% success rate (see also De Houwer, 1990, 1995, 2005). As a result, as we already mentioned above, if the "one parent-one language" strategy does not provide sufficient input in the case of bilingualism; our results suggest that in the case of multilingualism, where there are two minority languages in addition to the dominant language, this strategy clearly cannot provide sufficient input in order to attain native-like levels. In the case of Basque, we found that the affective variable "degree of identification with the Basque community" was relevant as a predictor of degree of comprehensibility. In this case, we claimed that participants with a higher degree of identification with the Basque community might have made a (subconsciously) greater effort in order to be understood in Basque than participants with a lower degree of

identification with the Basque community; or, native judges probably took degree of comprehensibility as a more global measure which includes non-phonological aspects which influence on how speakers make themselves understood (e.g. Derwing *et al*., 2004; Munro & Derwing, 1999).

3.6 Conclusions

This section summarizes the main findings of our field work and presents the conclusions from the present study whose aim was twofold: on the one hand, to explore the process of L3 acquisition (English) in a natural setting as well as the possibility of L1 attrition (Spanish and Basque) in bilingual speakers. On the other hand, we intended to investigate the process of early multilingual acquisition of three languages in which there were two minority languages (Spanish and Basque) and a dominant language (English).

We considered the need of looking into the processes of L3 acquisition in a natural setting as well as L1 attrition and multilingualism given that much of the research conducted analyzing specifically L3 acquisition and multilingualism so far has been in a formal setting and, therefore, the L3 has been a foreign language (e.g. Cenoz, 2003b, 2005; Cenoz & García Lecumberri, 1999a, 1999b; Cenoz & Valencia, 1994; Gallardo, 2007; García Lecumberri & Cenoz, 1997; García Lecumberri & Gallardo, 2003; García Mayo, 2003; García Mayo & García Lecumberri, 2003; Ruiz de Zarobe, 2005). In the case of L1 attrition, there was no study, to the best of our knowledge, which had investigated attrition in Basque due to the influence of English. We explored the influence of three different kinds of factors, namely biographical factors, affective factors and input factors on the three phenomena under study: L3 acquisition, L1 attrition and multilingual acquisition. Concerning biographical factors, we took into account age of arrival, gender and education level; regarding affective factors, we considered degree of identification with the community, motivation and strength of concern for pronunciation accuracy. Finally, for input we included length of residence and degree of language activation; the latter was subdivided into two different variables, namely percentage use of the language and location of residence.

Our study showed that age of arrival was a relevant predictor of both degree of nativeness and degree of comprehensibility in English for the L3 participants in the sense of "the younger, the better"; that is, our results support the so-called "sensitive period" in

contrast to an abrupt offset in the ability to learn an L2/L3 (see Bialystok & Hakuta, 1999; Birdsong, 1992, 1999a, 1999b; Birdsong & Molis, 2001; Johnson & Newport, 1989; Munro & Mann, 2005; Muñoz & Singleton, 2011). Participants' chronological age also proved to be a predictor of degree of lexical availability in English; younger participants produced more words in English than older participants, which we ascribed to either younger participants having greater lexical retrieval abilities, or to younger participants having a larger social network in English than older participants, who were already retired at the time of the interview. Our study also found that men reported a significantly higher degree of activation of English than women. We accounted for this finding by arguing that men, being the breadwinners of the family, probably had a more frequent contact with members of the L3 community than women. As for the affective variables, we can conclude that they did not emerge as predictive factors of phonological attainment in the L3 possibly because the L3 participants' degree of nativeness and degree of comprehensibility ratings were concentrated in one range of the scale, which offset the effect of the affective variables we examined. As for the input factors, length of residence (as well as participants' chronological age) proved to be a significant predictor of degree of lexical availability in English; that is, those participants with shorter periods of residence in the US presented a higher degree of lexical availability in the L3. Participants with shorter periods of residence in the host country, that is, younger participants, as we just mentioned above, might have presented greater lexical retrieval abilities, or their greater degree of lexical availability in English could be due to their larger social network in English in comparison to that of the older participants. Additionally, degree of language activation (in percentage use of the language) also showed up as a significant predictor of degree of comprehensibility in English for the L3 participants; as a result, we can conclude that those participants who reported a higher degree of activation of the L3 were also considered easier to understand (e.g. Derwing *et al.,* 2004; Munro & Derwing, 1999).

Our study has also shown that age of arrival was a significant predictor of degree of nativeness in Basque; that is, it proved to be a key factor in attrition in Basque (e.g. Ventureyra & Pallier, 2004; Ventureyra *et al.*, 2004). Degree of identification with the Basque community also turned out to be a significant predictor of degree of

comprehensibility in Basque but in the sense that a higher degree of identification with the Basque community resulted in a lower degree of comprehensibility in that language. We ascribed this result to participants with higher degrees of comprehensibility being among the younger participants in our sample at the time of testing, because in this case, older participants' voice might have been negatively affected by increasing age or because, in some cases, they used old-fashioned expressions. As for the input variables, length of residence was a strong predictor of degree of lexical availability in Basque, as well as participants' chronological age (negative correlations were found in both cases); the latter emerged as a significant predictor of degree of lexical availability in both Spanish and Basque. We ascribed this result to the fact that younger participants might have presented greater lexical retrieval abilities, or that they probably took part more actively in the activities organized by the Spanish/Basque community, apart from the fact that the social network of the younger participants was also larger than that of the older participants in both Spanish and Basque. Our study found that women reported a significantly higher degree of activation of Basque than men, probably because they were the ones who stayed at home with their children and, as a result, had a less frequent contact with the L3 speakers. Finally, participants' chronological age turned out to be a relevant factor for degree of activation of Basque, in the sense that older participants, most of whom were already retired at the time of testing and probably had a less frequent contact with the L3 speakers, reported a significantly higher degree of activation of Basque than younger participants who, on the contrary, were still actively at work at the time of the interview.

Concerning multilingualism, our study showed that gender was a relevant factor, since women were rated as having not only significantly higher degrees of comprehensibility in Basque, but they also presented higher degrees of lexical availability in both English and Spanish. We accounted for this finding by suggesting that education level could have enhanced women's degree of lexical availability in those two languages, since only 2 women (one of whom was only 16 at the time of testing) reported non-university studies, whereas the remainder of the women in our sample all had university qualifications; or, it could be that they simply had a greater ability for lexical production than men. As for the affective variables, we found that degree of identification with the

Basque community was a relevant predictor of degree of comprehensibility in Basque, which we ascribed to participants with a higher degree of identification with the Basque community making a (subconsciously) bigger effort to communicate in Basque, either with a clearer accent and/or in their overall language. Finally, regarding the input variables, we found that participants from the location with the bigger and more active Spanish/Basque community (i.e. Boise) had significantly higher degrees of identification with the Basque community, as well as significantly higher motivation in Basque and higher strength of concern for pronunciation accuracy in that language. However, we can conclude that, even though a greater degree of immersion in the target language community can enhance affective variables related to that language as well as to that community, this result does not necessarily transcend to the linguistic measures of competence in our study.

The findings from the present study may entail a number of pedagogical implications. First of all, an important conclusion from the present study is that if the "one parent-one language" strategy does not provide a necessary nor sufficient input condition in order to attain native-like levels in bilingualism according to some previous studies (e.g. De Houwer, 2007; see also De Houwer 1990, 1995, 2005), we found that native-like attainment is even less likely in the case of two minority languages, probably because it is even more difficult to maintain three separate linguistic systems and, crucially, because the total amount of obtained input is shared between three languages, which, as expected, is more detrimental to the minority languages. Secondly, learners in a foreign language setting usually find it much more difficult to excel in an L2/L3 than learners in a natural setting given the limitations of a foreign language setting in both quality and quantity of input (e.g. Cenoz, 2003b, 2005; Cenoz & García Lecumberri, 1999a, 1999b; Cenoz & Valencia, 1994; Gallardo, 2007; García Lecumberri & Cenoz, 1997; García Lecumberri & Gallardo, 2003; García Mayo, 2003; García Mayo & García Lecumberri, 2003; Ruiz de Zarobe, 2005). In this sense, L2/L3 teachers should find ways to provide the highest quality, variety and quantity of input in order for language learners to be able to identify and follow a suitable role model. Previous research has shown that L2/L3 learners in a foreign language setting may benefit very positively from explicit phonetic training from native L2/L3 teachers who they could identify as the yardstick (see Cenoz & García Lecumberri, 1999b; Gómez

Lacabex, 2009). Some studies have shown that an early start is a key to excel in an L2/L3, but only when L2/L3 input is massive. Moreover, very few learners with a late start have been found to excel in an L2/L3, and the latter have usually been identified as "exceptional language learners" (e.g. Bongaerts, 1999; Ioup *et al*., 1994; Moyer, 1999); that is, learners who are apparently not bound by maturational constraints (e.g. Hyltenstam & Abrahamsson, 2003). Therefore, our contention is that the foreign language curriculum should provide an early start for L2/L3 learning, but at the same time it should also provide learners with as much L2/L3 input (massive input if possible) and as many opportunities for interaction as possible so that they could attain the highest degree of proficiency in the target language (e.g. Yashima *et al*., 2004). Finally, an important implication to take into account is that degree of phonological attainment as well as degree of lexical availability in an L2/L3 is not the result of a single variable, but the result of the collusion of several factors, and this is a point which should not be disregarded.

Despite the above-mentioned contributions and potential implications, the present study also has its caveats which should be amended in future research in the field of both L2/L3 acquisition in a natural setting as well as language attrition. First of all, the most evident limitation of the present study is the size of each of the samples, namely our samples of L3 and multilingual participants. Recruiting participants who could qualify for our study was definitely not an easy task; hence the small size of the two samples. Nonetheless, had each of the samples in our study been bigger, our results would have had a greater statistical power.

Secondly, future research should try to make use of more accurate instruments in order to analyze the variables, notably degree of language activation which is one of the most difficult and tricky variables to analyze (e.g. Flege, 2009; Flege, 2010; Flege & Mackay, 2011). Furthermore, another aspect that could and should be reinforced is the number of variables to be analyzed; other individual and contextual factors such as language aptitude (Bylund *et al*., 2009), metalinguistic awareness, ability to sustain an optimal representation of more than one linguistic system (Hojen & Flege, 2006), ability to avoid phonetic interference from the dominant language (see Flege, 1997, 2002; Flege *et*

al., 2003), etc., could be analyzed in future research of language acquisition and attrition in order to offer a clearer and more straightforward picture of these two phenomena.

Further research could shed more light on which variables can predict degree of phonological proficiency and degree of lexical availability in an L2/L3 as well as in a heritage language, not only in a natural setting but also in a foreign language setting. Future research could also help us to gain a better understanding of which variables are more explanatory of degree of phonological attrition as well as of degree of lexical availability in the native language(s) of speakers immersed in an L2/L3 environment for an extended period of time, and which variables should be disregarded or definitely abandoned.

4 References

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5 Appendices

Appendix 1. Questionnaire delivered to the L3 participants.

QUESTIONNAIRE

(Adapted from Lasagabaster & Huguet, 2007; Flege & Mackay, 2004)

We would like you to help us by answering the following questions. This is not a test so there are no "right" or "wrong" answers. We are interested in your personal opinion. Please give your answers sincerely as only this will guarantee the success of the investigation. The information provided in this questionnaire will be treated anonymously and as confidential information and none of the personal data provided by the participants will ever be made public. Thank you very much for your help.

1. **First name and last names:**

In the following please put an "X" in the right place:

2. **Gender: Male___ Female___**
3. **City and province of birth:**
4. **Date of birth and age (in years and in months):**
5. **Mother Tongue (circle the corresponding language(s)):**

- English
- Basque
- Spanish
- English and Basque
- English and Spanish
- Basque and Spanish
- English, Spanish and Basque

- Others. Please explain:

6. **Languages (spoken and heard) at home in childhood: (circle the choice which best applies to you)**

   a) My mother would speak to me in: -Basque -Spanish -both

   If your mother used both languages with you, which was the percentage of use for each of them? Basque____ % Spanish____ %

   b) My father would speak to me in: -Basque -Spanish -both

   If your father used both languages with you, which was the percentage of use for each of them? Basque____ % Spanish____ %

   c) My brothers/sisters would speak to me in: -Basque -Spanish -both

   If your brothers/sisters used both languages with you, which was the percentage of use for each of them? Basque____ % Spanish____ %

If you answered that you spoke/heard both languages (Spanish and Basque) from your parents and brothers/sisters to the same extent <u>go to question 8</u>, if not continue with the following question.

7. **If your home language was Basque, answer the following <u>i), ii) and iii) questions</u>. If your home language was Spanish, <u>go to question 7b).</u>**

i) At what age did you learn Spanish?

ii) Where did you learn Spanish? (at school, at work, outside the Basque Country, etc)

iii) Once you learned Spanish, do you think that you could speak in Spanish as well as you did in Basque?

7b) If your home language was Spanish answer the following <u>iv), v) and vi) questions</u>.

iv) If you learned Basque, at what age did you learn Basque?

v) Where did you learn Basque? (at school, at work, outside the Basque Country, etc.)

vi) Once you learned Basque, do you think that you could speak in Basque as well as you did in Spanish?

8. Information about education

a) Number of years of formal education in the Basque Country_____

b) Did you receive instruction in Basque (i.e. the school language was Basque)? If yes, for how long?

c) Did you receive Basque lessons?

d) Did you receive instruction in Spanish (i.e. the school language was Spanish)? If yes, for how long?

e) Did you receive Spanish lessons?

f) Did you receive instruction in English before migrating to the United States?

g) Did you receive extra English lessons once in the United States in order to improve your English proficiency? If yes, when? For how long?

h)

9. Languages used during adolescence

a) While you were in your teens, which language would you use with your family? (circle the choice that best applies to you)

- Basque - Spanish -Both

If you used both languages with your family, which was the percentage of use for each of them?

Basque____ % Spanish ____%

b) While you were in your teens, which language would you use with your friends? (circle the choice that best applies to you)

- Basque - Spanish - Both

If you used both languages with your friends, which was the percentage of use for each of them?

Basque____ % Spanish ____ %

c) While you were in your teens, which language would you use at school/work? (circle the choice that best applies to you)

- Basque - Spanish - Both

If you used both languages at school/work, which was the percentage of use for each of them?

- Basque____ % Spanish ____ %

10. Age of arrival and length of residence in the US.

a) How old were you when you first arrived in the United States?

b) How long (years) have you lived in the United States?

11. Number of years of formal education in the United States _____

12. .Please, answer as honestly and accurately as you can to the following questions (cross out the choice that best applies to you):

a) How concerned do you think you are for pronouncing accurately in English?

Not at all concerned	A little concerned	Quite concerned	Very concerned	Extremely concerned

b) How important it is for you to sound native in English?

Not at all important	A bit important	Quite important	Very important	Extremely important

c) How much effort do you expend for sounding native in English?

No effort at all	A bit of effort	Quite a lot of effort	A lot of effort	A great deal of effort

12. Geographical and linguistic background in the US.

a) US state and town where you currently live:

b) The community where I live is mainly a/n: (put an "X" in the right place)

English-speaking community _____

Basque and English-speaking community _____

Basque and Spanish-speaking community _____

Basque, Spanish and English-speaking community _____

Other. Please specify:

13. Years and places where you have lived elsewhere (in the United States and also abroad)

14. Specialization (degree obtained or courses done):

15. Current occupation:

a) Manager, director, or owner of a business/company with more than 25 workers.

b) Bachelor's degree (lawyer, architect, chemist, engineer, doctor, Lecturer, economist, etc.

c) Degree or HND (*Higher national Diploma) (school teacher, technical engineer, social worker, etc.), or middle management without a bachelor's degree (commercial head. production head, administrative head, etc.).

d) Owner of a business or company with less than 25 staff, health worker, clerical, salesperson, etc.

e) Specialized worker (mechanic, chauffeur, policeman, plumber, waiter, mason, electrician, etc.), farmer or cattle breeder.

f) Labourer, seasonal worker, watchman, etc.

g) Housework (housewife).

h) Others (please specify).....

16. Parental occupation (tick the corresponding box):

	Father	Mother
a) Manager, director, or owner of a business/company with more than 25 workers.		
b) Bachelor's degree (lawyer, architect, chemist, engineer, doctor, lecturer, economist, etc.		
c) Degree or HND (*Higher national Diploma) (school teacher, technical engineer, social worker, etc.), or middle management without a bachelor's degree (commercial head. production head, administrative head, etc.).		
d) Owner of a business or company with less than 25 staff, health worker, clerical, salesperson, etc.		
e) Specialized worker (mechanic, chauffeur, policeman, plumber, waiter, mason, electrician, etc.), farmer or cattle breeder.		
f) Labourer, seasonal worker, watchman, etc.		
g) Housework (housewife).		
h) Others (Please specify).....		

17. In the following section we would like you to answer some questions by simply giving marks from 0 to 4.

0= None, 1= A little, 2= Good, 3= Very good, 4= Native

For example, if your Chinese is "very good", your Japanese "good" and you can speak no Arabic ("None"), you should write this:

	Chinese	Japanese	Arabic
General Proficiency	4	3	0

Please put one (and only one) whole number in each box and don't leave out any of them in the first three columns (Basque, Spanish and English). If you know any other language, please put numbers in the "Other" columns after specifying the language concerned.

In your opinion, what is your proficiency in.....?

	Basque	Spanish	English	Other (Specify:)	Other (Specify:)
General Proficiency					
Reading					
Writing					
Speaking					
Listening/ Comprehension					

18. Language use:

a) Please estimate to the nearest 10% how much you speak English, Spanish and Basque in these places or situations. Try to base your estimate on your use of these languages over the past 5 years. Remember that the total sum of the percentages for each item must be 100% (cross out the corresponding box for each language).

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
While at home	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
Visiting family members	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
At work (including volunteer work)	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
At church or church functions	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
Visiting friends	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
On the telephone	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
While on vacation	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
While shopping	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
At parties and social gatherings	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque

a) How appropriate do you think it is to mix languages when you speak.....
(tick the corresponding box)

Languages	Not at all appropriate	A bit appropriate	Quite appropriate	Very appropriate	Extremely appropriate
In English?					
In Spanish?					
In Basque?					

b) Do you tend to mix two or three languages? If so, which ones? In which context? How frequently do you mix languages (in percentages, e.g. 60% of the time)?

19. How important or unimportant do you think that the Basque, Spanish and English languages are for people to do the following in your town?

FOR PEOPLE TO:

	BASQUE	**SPANISH**	**ENGLISH**
Make friends	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Read	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Write	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Watch TV	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Get a job	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Be prestigious	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Bring up children	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Go shopping	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Make phone calls	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Be accepted in the community	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Talk to colleagues at work	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Talk to friends	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____

Here are some statements about the **Basque** language. Please say whether you agree or disagree with these statements. There are no right or wrong answers. Please be as honest as possible. Answer with **ONE** of the following:

SA= **S**trongly **A**gree	(circle **SA**)
A= **A**gree	(circle **A**)
NAND = **N**either **A**gree **N**or **D**isagree	(circle **NAND**)
D= **D**isagree	(circle **D**)
SD= **S**trongly **D**isagree	(circle **SD**)

1. I like hearing Basque spoken…… SA A NAND D SD

2. I like speaking Basque …….. SA A NAND D SD

3. Basque is an easy language to learn …….. SA A NAND D SD

4. There are no more useful languages to learn than Basque……. SA A NAND D SD

5. The Basque language is part of my cultural knowledge……. SA A NAND D SD

6. Basque is a language worth learning……. SA A NAND D SD

7. If I have children, I would like them to be Basque Speakers regardless of other languages they may know…… SA A NAND D SD

Here are some statements about the **Spanish** language. Please say whether you agree or disagree with these statements. There are no right or wrong answers. Please be as honest as possible. Answer with **ONE** of the following:

SA= **S**trongly **A**gree	(circle **SA**)
A= **A**gree	(circle **A**)
NAND = **N**either **A**gree **N**or **D**isagree	(circle **NAND**)
D= **D**isagree	(circle **D**)
SD= **S**trongly **D**isagree	(circle **SD**)

1. I like hearing Spanish spoken…… SA A NAND D SD

2. I like speaking Spanish …….. SA A NAND D SD

3. Spanish is an easy to learn language…… SA A NAND D SD

4. There are not more useful languages to learn than

Spanish……. SA A NAND D SD

5. The Spanish language is part of my cultural Knowledge…… SA A NAND D SD

6. Spanish is a language worth learning…… SA A NAND D SD

7. If I have children, I would like them to be Spanish Speakers regardless of other languages they may know …… SA A NAND D SD

Here are some statements about the **English** language. Please say whether you agree or disagree with these statements. There are no right or wrong answers. Please be as honest as possible. Answer **ONE** of the following:

SA= **S**trongly **A**gree (circle **SA**)
A= **A**gree (circle **A**)
NAND = **N**either **A**gree **N**or **D**isagree (circle **NAND**)
D= **D**isagree (circle **D**)
SD= **S**trongly **D**isagree (circle **SD**)

1. I like hearing English spoken…….. SA A NAND D SD

2. I like speaking English …… SA A NAND D SD

3. English is an easy to learn language …… SA A NAND D SD

4. There are not more useful languages to learn than English…….. SA A NAND D SD

5. The English language is part of my cultural Knowledge…….SA A NAND D SD

6. English is a language worth learning…… SA A NAND D SD

7. If I have children, I would like them to be English Speakers regardless of other languages they may Know……... SA A NAND D SD

Here are some statements about the **Basque, Spanish and English** languages. Please say whether you agree or disagree with these statements. There are no right or wrong answers. Please be as honest as possible. Answer with **ONE** of the following:

SA= **S**trongly **A**gree (circle **SA**)
A= **A**gree (circle **A**)
NAND = **N**either **A**gree **N**or **D**isagree (circle **NAND**)
D= **D**isagree (circle **D**)
SD= **S**trongly **D**isagree (circle **SD**)

1. It is important to be able to speak Spanish
Basque and English……. SA A NAND D SD

2. Knowing Basque, Spanish and English makes
people cleverer……..SA A NAND D SD

3. Children get confused when learning Spanish,
Basque and English……...SA A NAND D SD

4. Speaking three languages is not difficult…….SA A NAND D SD

5. Knowing Basque, Spanish and English gives
people problems……SA A NAND D SD

6. People know more if they speak Spanish, Basque and
English……SA A NAND D SD

7. People who speak Basque, Spanish and English can have
more friends than those who speak one language……SA A NAND D SD

8. Young children learn to speak Basque, Spanish and
English at the same time with ease……SA A NAND D SD

9. If I have children, I would like them to speak Basque,
Spanish and English…….SA A NAND D SD

PLEASE DO CHECK WHETHER YOU HAVE CIRCLED EVERY SINGLE STATEMENT

(This questionnaire has been adapted from Flege & Mackay, 2004; Baker, 1992 and Lasagabaster & Huguet, 2007)

Appendix 2. Questionnaire delivered to the multilingual participants.

QUESTIONNAIRE

(Adapted from Lasagabaster & Huguet, 2007; Flege & Mackay, 2004)

We would like you to help us by answering the following questions. This is not a test so there are no "right" or "wrong" answers. We are interested in your personal opinion. Please give your answers sincerely as only this will guarantee the success of the investigation. The information provided in this questionnaire will be treated anonymously and as confidential information and none of the personal data provided by the participants will ever be made public. Thank you very much for your help.

1. **First name and last names:**

2. In the following please put an "X" in the right place:
   Gender: Male___ Female___
3. **City and province of birth:**
4. **Date of birth and age (in years and in months):**
5. **Mother Tongue (circle the corresponding language(s)):**

   - English
   - Basque
   - Spanish

   - English and Basque
   - English and Spanish
   - Basque and Spanish
   - English, Spanish and Basque

- Others. Please explain:

6. **Languages (spoken and heard) at home in childhood (circle the choice that best applies to you).**

i) My mother would speak to me in**:** -Basque -Spanish -English
If your mother used more than one language with you, which was the percentage of use for each of the languages?

Basque _____% Spanish _____% English _____%

ii) My father would speak to me in**:** -Basque -Spanish -English
If your father used more than one language with you, which was the percentage of use for each of the languages?

Basque _____% Spanish _____% English _____%

iii) My brothers/sisters would speak to me in**:** -Basque -Spanish -English
If your brothers/sisters used more than one language with you, which was the percentage of use for each of the languages?

Basque _____% Spanish _____% English _____%

iv) If you answered that your parents and siblings did not speak any English to you? When and where did you learn English?

v) Did you stop using Spanish and/or Basque once you learned English? Why?

vi) Can you speak fluent Spanish and/or Basque at present? Which of those languages can you speak more fluently?

7. **Education:**
   - **a)** Number of years of formal education in the United States _____
   - **b)** Did you receive Basque lessons? If yes, when and for how long?
   - **c)** Did you receive Spanish lessons? If yes, when and for how long?

8. Please, answer as honestly and accurately as you can to the following questions (cross out the choice that best applies to you):

a) How concerned do you think you are for pronouncing accurately in the following languages?

SPANISH	Not at all concerned	A little concerned	Quite concerned	Very concerned	Extremely concerned
BASQUE	Not at all concerned	A little concerned	Quite concerned	Very concerned	Extremely concerned

b) How important it is for you to sound native in the following languages?

SPANISH	Not at all important	A bit important	Quite important	Very important	Extremely important
BASQUE	Not at all important	A bit important	Quite important	Very important	Extremely important

c) How much effort do you expend for sounding native in the following languages?

SPANISH	No effort at all	A bit of effort	Quite a lot of effort	A lot of effort	A great deal of effort
BASQUE	No effort at all	A bit of effort	Quite a lot of effort	A lot of effort	A great deal of effort

9, Linguistic and biographical background in the US.

a) US state and town where you currently live:

b) The community where I live is mainly a/n: (put an "X" in the right place)

English-speaking community _____

Basque and English-speaking community _____

Basque and Spanish-speaking community _____

Basque, Spanish and English-speaking community _____

Other. Please specify:

10. **Years and places where you have lived elsewhere (in the United States and also abroad)**
11. **Specialization (degree obtained or courses done):**
12. **Current occupation:**

i) Manager, director, or owner of a business/company with more than 25 workers.

j) Bachelor's degree (lawyer, architect, chemist, engineer, doctor, Lecturer, economist, etc.

k) Degree or HND (*Higher national Diploma) (school teacher, technical engineer, social worker, etc.), or middle management without a bachelor's degree (commercial head. production head, administrative head, etc.).

l) Owner of a business or company with less than 25 staff, health worker, clerical, salesperson, etc.

m) Specialized worker (mechanic, chauffeur, policeman, plumber, waiter, mason, electrician, etc.), farmer or cattle breeder.

n) Labourer, seasonal worker, watchman, etc.

o) Housework (housewife).

p) Others (please specify).....

13. Parental occupation (tick the corresponding box):

	Father	Mother
i) Manager, director, or owner of a business/company with more than 25 workers.		
j) Bachelor's degree (lawyer, architect, chemist, engineer, doctor, lecturer, economist, etc.		
k) Degree or HND (*Higher national Diploma) (school teacher, technical engineer, social worker, etc.), or middle management without a bachelor's degree (commercial head. production head, administrative head, etc.).		
l)		
m) Owner of a business or company with less than 25 staff, health worker, clerical, salesperson, etc.		
n) Specialized worker (mechanic, chauffeur, policeman, plumber, waiter, mason, electrician, etc.), farmer or cattle breeder.		
o) Labourer, seasonal worker, watchman, etc.		
p) Housework (housewife).		
q) Others (Please specify).....		

14. In the following section we would like you to answer some questions by simply giving marks from 0 to 4.

0= None, 1= A little, 2= Good, 3= Very good, 4= Native

For example, if your Chinese is "very good", your Japanese "good" and you can speak no Arabic ("None"), you should write this:

	Chinese	Japanese	Arabic
General Proficiency	4	3	0

Please put one (and only one) whole number in each box and don't leave out any of them in the first three columns (Basque, Spanish and English). If you know any other language, please put numbers in the "Other" columns after specifying the language concerned.

In your opinion, what is your proficiency in.....?

	Basque	Spanish	English	Other (Specify:)	Other (Specify:)
General Proficiency					
Reading					
Writing					
Speaking					
Listening/ Comprehension					

15. Language use.

a) Please estimate to the nearest 10% how much you speak English, Spanish and Basque in these places or situations. Try to base your estimate on your use of these languages over the past 5 years. Remember that the total sum of the percentages for each item must be 100% (cross out the corresponding box for each language).

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
While at home	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
Visiting family members	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
At work (including volunteer work)	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
At church or church functions	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
Visiting friends	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
On the telephone	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
While on vacation	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
While shopping	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque
At parties and social gatherings	English	English	English	English	English	English	English	English	English	English	English
	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish	Spanish
	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque	Basque

c) How appropriate do you think it is to mix languages when you speak.....

(tick the corresponding box)

Languages	Not at all appropriate	A bit appropriate	Quite appropriate	Very appropriate	Extremely appropriate
In English?					
In Spanish?					
In Basque?					

d) Do you tend to mix two or three languages? If so, which ones? In which context? How frequently do you mix languages (in percentages, e.g. 60% of the time)?

16. How important or unimportant do you think that the Basque, Spanish and English languages are for people to do the following in your town?

FOR PEOPLE TO:

	BASQUE	**SPANISH**	**ENGLISH**
Make friends	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Read	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Write	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Watch TV	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Get a job	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Be prestigious	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Bring up children	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Go shopping	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Make phone calls	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Be accepted in the community	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Talk to colleagues at work	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____
Talk to friends	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____	Important ____ A bit important____ Unimportant____

Here are some statements about the **Basque** language. Please say whether you agree or disagree with these statements. There are no right or wrong answers. Please be as honest as possible. Answer with **ONE** of the following:

SA= **S**trongly **A**gree	(circle **SA**)
A= **A**gree	(circle **A**)
NAND = **N**either **A**gree **N**or **D**isagree	(circle **NAND**)
D= **D**isagree	(circle **D**)
SD= **S**trongly **D**isagree	(circle **SD**)

1. I like hearing Basque spoken…… SA A NAND D SD

2. I like speaking Basque …….. SA A NAND D SD

3. Basque is an easy language to learn …….. SA A NAND D SD

4. There are no more useful languages to learn than Basque……. SA A NAND D SD

5. The Basque language is part of my cultural knowledge……. SA A NAND D SD

6. Basque is a language worth learning……. SA A NAND D SD

7. If I have children, I would like them to be Basque Speakers regardless of other languages they may know…… SA A NAND D SD

Here are some statements about the **Spanish** language. Please say whether you agree or disagree with these statements. There are no right or wrong answers. Please be as honest as possible. Answer with **ONE** of the following:

SA= **S**trongly **A**gree	(circle **SA**)
A= **A**gree	(circle **A**)
NAND = **N**either **A**gree **N**or **D**isagree	(circle **NAND**)
D= **D**isagree	(circle **D**)
SD= **S**trongly **D**isagree	(circle **SD**)

1. I like hearing Spanish spoken…… SA A NAND D SD

2. I like speaking Spanish …….. SA A NAND D SD

3. Spanish is an easy to learn language…… SA A NAND D SD

4. There are not more useful languages to learn than Spanish……. SA A NAND D SD

5. The Spanish language is part of my cultural Knowledge…… SA A NAND D SD

6. Spanish is a language worth learning…… SA A NAND D SD

7. If I have children, I would like them to be Spanish Speakers regardless of other languages they may know …… SA A NAND D SD

Here are some statements about the **English** language. Please say whether you agree or disagree with these statements. There are no right or wrong answers. Please be as honest as possible. Answer **ONE** of the following:

SA= **S**trongly **A**gree (circle **SA**)
A= **A**gree (circle **A**)
NAND = **N**either **A**gree **N**or **D**isagree (circle **NAND**)
D= **D**isagree (circle **D**)
SD= **S**trongly **D**isagree (circle **SD**)

1. I like hearing English spoken…….. SA A NAND D SD

2. I like speaking English …… SA A NAND D SD

3. English is an easy to learn language …… SA A NAND D SD

4. There are not more useful languages to learn than English…….. SA A NAND D SD

5. The English language is part of my cultural Knowledge…….SA A NAND D SD

6. English is a language worth learning…… SA A NAND D SD

7. If I have children, I would like them to be English Speakers regardless of other languages they may Know……... SA A NAND D SD

Here are some statements about the **Basque, Spanish and English** languages. Please say whether you agree or disagree with these statements. There are no right or wrong answers. Please be as honest as possible. Answer with **ONE** of the following:

SA= **S**trongly **A**gree (circle **SA**)
A= **A**gree (circle **A**)
NAND = **N**either **A**gree **N**or **D**isagree (circle **NAND**)
D= **D**isagree (circle **D**)
SD= **S**trongly **D**isagree (circle **SD**)

17. It is important to be able to speak Spanish
Basque and English……. SA A NAND D SD

18. Knowing Basque, Spanish and English makes
people cleverer……..SA A NAND D SD

19. Children get confused when learning Spanish,
Basque and English……...SA A NAND D SD

20. Speaking three languages is not difficult…….SA A NAND D SD

21. Knowing Basque, Spanish and English gives
people problems……SA A NAND D SD

22. People know more if they speak Spanish, Basque and
English……SA A NAND D SD

23. People who speak Basque, Spanish and English can have
more friends than those who speak one language……SA A NAND D SD

24. Young children learn to speak Basque, Spanish and
English at the same time with ease……SA A NAND D SD

25. If I have children, I would like them to speak Basque,
Spanish and English…….SA A NAND D SD

PLEASE DO CHECK WHETHER YOU HAVE CIRCLED EVERY SINGLE STATEMENT

(This questionnaire has been adapted from Flege & Mackay, 2004; Baker, 1992 and Lasagabaster & Huguet, 2007)

Appendix 3. Prompts in English for both participants and distractors.

1- What could you tell me about these cities? What do they mean for you? Have you ever been to any of them?

2- As for sports in the United States, which is in your opinion the most popular sport in the United States and which is your favorite one?

3- Which is your favorite food here, in the United States? And does the cuisine have a great importance in this country?

4- What do American festivities such as “Thanksgiving” and “Halloween” mean for you and do you celebrate them?

5- Which is the commonest way of getting together with friends here in the US, in a bar, at home, etc.?

6- How important do you think friendship is for Americans? And to family?

Appendix 4. Prompts in Spanish for both participants and distractors.

1- ¿Qué opinas de ciudades como Madrid, Barcelona o Sevilla? ¿Has estado en alguna de ellas?

2- En cuanto a los deportes en España (no en Euskadi), ¿Cuál crees que es el deporte más popular en España? ¿Cuál es el que a ti más te gusta?

3- ¿Cuál es la comida española que más te gusta? ¿Crees que la cocina tiene una gran importancia en España?

4- ¿Qué significan para ti festividades como las navidades, el día de reyes, etc.?

5- ¿Cuál crees que es la forma más común de reunirse con los amigos en España, en un bar, en casa, etc.?

6- ¿Cuánta importancia crees que los españoles dan a la amistad? ¿Y a la familia?

Appendix 5. Prompts in Basque for both participants and distractors.

1- Zer esan diezadakezu hiri hauei buruz?

2- Zein da zure ustez kirolarik ezagunena, eskupelota, sokatira, etabar? Zein da zuri gustatzen zaizun gehien?

3- Zein da euskal herriko gustatzen zaizun gehien janaria? Zure ustez gastronomía (sukaldaritza) oso inportantea da Euskal Herrian?

4- Zer esan diezadakezu euskal jaiei buruz, Aste Nagusia, San Fermin, etabar?

5- Zure ustez zelan biltzen dira lagunak Euskal Herrian, etxean, kalean, etabar.?

6- Zure ustez laguntasuna oso inportantea da Euskal Herrian? Eta familia?

Appendix 6. Questionnaire delivered to the native judges of English.

1- <u>Biographical information</u>

1- First name and last name.
2- Age (in years and in months)
3- Birthplace
4- City of residence
5- Specialisation. Degree studied or courses done.
6- Current occupation.
7- How many and which American accents can you recognize? (e.g. Southern, Eastern, etc.)
8- How many English (non-American) accents can you recognize? (e.g. British English, Australian English, etc.)
9- Can you speak any other language apart from English? If yes, to which level?

2- <u>Knowledge of languages</u>

Spanish (circle the right option):

Speak Nothing – Beginner – Intermediate – Advanced – Native
Read Nothing – Beginner – Intermediate – Advanced – Native
Write Nothing – Beginner – Intermediate – Advanced – Native

Basque (circle the right option):

Speak Nothing – Beginner – Intermediate – Advanced – Native
Read Nothing – Beginner – Intermediate – Advanced – Native
Write Nothing – Beginner – Intermediate – Advanced – Native

English (circle the right option):

Speak Nothing – Beginner – Intermediate – Advanced – Native
Read Nothing – Beginner – Intermediate – Advanced – Native
Write Nothing – Beginner – Intermediate – Advanced – Native

Other foreign languages (circle the right option) and specify:

Speak Nothing – Beginner – Intermediate – Advanced – Native

Read Nothing – Beginner – Intermediate – Advanced – Native

Write Nothing – Beginner – Intermediate – Advanced – Native

10- How often do you interact with foreign speakers of English in English? (circle the correct option)

- Never -hardly ever - once or twice a week
- Three to five times a week - Daily

3- Degree of oral contact with the following languages:

Spanish (circle the right option):

1 = none 2= hardly ever 3= from time to time 4= quite often

5= constantly

Basque (circle the right option):

1 = none 2= hardly ever 3= from time to time 4= quite often

5= constantly

English (circle the right option):

1 = none 2= hardly ever 3= from time to time 4= quite often

5= constantly

Other languages (circle the right option):

1 = none 2= hardly ever 3= from time to time 4= quite often

5= constantly

4- <u>Stays abroad</u>

Have you ever lived in a foreign country for any length of time? If yes, where and for how long? How long ago?

5- Hearing information

1- Do you have any hearing impairment?
2- Do you work in a very noisy place? (e.g. disco, factory with loud noise, etc.)
3- Do you usually wear headphones with loud music? Or do you usually listen to loud music while in your car?

Appendix 7. Questionnaire delivered to the native judges of Spanish.

1- <u>Información biográfica</u>

1- Nombre y apellidos.
2- Edad (en años y en meses).
3- Lugar de nacimiento.
4- Lugar de residencia.
5- Especialización (carrera estudiada o cursos hechos).
6- Ocupación actual.
7- ¿Con qué frecuencia mantienes contacto con hablantes extranjeros (i.e. hablantes no nativos de castellano) en castellano? (redondea la opción correcta)

- Nunca - Casi nunca - Una o dos veces a la semana
- De tres a cinco veces a la semana - A diario

8- ¿Cuántos acentos españoles (y cuáles) reconoces? (e.g. del norte, catalán, gallego, del sur, de Madrid y alrededores, canario, etc.)

9- ¿Cuántos acentos (y cuáles) castellanos (no españoles) reconoces? (e.g. mejicano, argentino, colombiano, ecuatoriano, venezolano, etc)

10- ¿Hablas alguna otra lengua aparte de castellano? Si es que sí, ¿a qué nivel?

2- <u>Conocimiento de idiomas</u>

Castellano (redondea la opción correcta):
Habla Nada – Principiante – Intermedio – Avanzado – Nativo
Lee Nada – Principiante – Intermedio – Avanzado – Nativo
Escribe Nada – Principiante – Intermedio – Avanzado – Nativo

Euskera (redondea la opción correcta):
Habla Nada – Principiante – Intermedio – Avanzado – Nativo
Lee Nada – Principiante – Intermedio – Avanzado – Nativo
Escribe Nada – Principiante – Intermedio – Avanzado – Nativo

Inglés (redondea la opción correcta):
Habla Nada – Principiante – Intermedio – Avanzado – Nativo
Lee Nada – Principiante – Intermedio – Avanzado – Nativo
Escribe Nada – Principiante – Intermedio – Avanzado – Nativo

Otras lenguas extranjeras (redondea la opción correcta):

Habla Nada – Principiante – Intermedio – Avanzado – Nativo
Lee Nada – Principiante – Intermedio – Avanzado – Nativo
Escribe Nada – Principiante – Intermedio – Avanzado – Nativo

3- <u>Grado de contacto hablado con las siguientes lenguas:</u>

Castellano 1= nada 2= casi nunca 3= de vez en cuando
4= bastante a menudo 5= Constantemente

Euskera 1= nada 2= casi nunca 3= de vez en cuando
4= bastante a menudo 5= Constantemente

Inglés 1= nada 2= casi nunca 3= de vez en cuando
4= bastante a menudo 5= Constantemente

Otras lenguas 1= nada 2= casi nunca 3= de vez en cuando
4= bastante a menudo 5= Constantemente

4- <u>Estancias en el extranjero</u>

¿Has estado viviendo en algún país extranjero durante más de 6 meses? Si es que sí, ¿en qué país y durante cuánto tiempo? ¿Hace cuánto tiempo?

5- <u>Información auditiva</u>

1- ¿Tienes algún problema auditivo?

2- Trabajas en un lugar con gran volumen de ruido? (e.g. discoteca, fábrica con mucho ruido, etc.)

3- ¿Sueles llevar habitualmente auriculares (walkman) con la música muy alta? ¿O sueles llevar la música muy alta en el coche?

Appendix 8. Questionnaire delivered to the native judges of Basque.

1- <u>Argibide pertsonala</u>

1- Izen-abizenak
2- Adina (urteak eta hilabeteak)
3- Jaiotze herria
4- Bizilekua
5- Espezializazioa (karrera edo egindako ikasketak/ikastaroak)
6- Gaur egungo lanbidea.

7- Sarritan berba egiten duzu euskarazko hizlari natiboak ez direnekin? (aukeratu zure kasuan dagokiona)
   - Inoiz ez - ia inoiz ez - behin edo birritan astero
   - Hiru edo lau aldiz astero - egunero

8- Zenbat eta zein euskalki ezagutzen dituzu?

9- Beste hizkuntzarik hitz egin al dezakezu euskeraz aparte? Zein mailatan?

2- <u>Hizkuntzen ezagumena</u>

Gaztelania (azpimarritu aukera zuzena):
Hitz egin Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa
Irakurri Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa
Idatzi Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa

Euskera (azpimarratu aukera zuzena).
Hitz egin Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa
Irakurri Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa
Idatzi Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa

Ingelesa (azpimarratu aukera zuzena):
Hitz egin Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa
Irakurri Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa
Idatzi Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa

Beste hizkuntzak (azpimarratu aukera zuzena):
Hitz egin Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa
Irakurri Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa
Idatzi Ezer ez – hasiberria – erdi-mailakoa – aurreratua – natiboa

3- <u>Mintza kontaktua hizkuntza hauekin:</u>

Gaztelania 1= Inoiz ez 2= Ia inoiz ez 3= Noizean behin
4= Sarritan 5= Etengabe

Euskera 1= Inoiz ez 2= Ia inoiz ez 3= Noizean behin
4= Sarritan 5= Etengabe
Ingelesa 1= Inoiz ez 2= Ia inoiz ez 3= Noizean behin
4= Sarritan 5= Etengabe

Beste hizkuntzak 1= Inoiz ez 2= Ia inoiz ez 3= Noizean behin
4= Sarritan 5= Etengabe

4- <u>Egonaldiak atzerrian</u>

Inoiz bizi al zara azterrian sei hilabetez baino luzeago? Non eta zenbat hilabetez/urtez? Orain dela zenbat hilabete/urte?

5- <u>Entzumen argibidea</u>

1- Entzuteko arazorik al duzu?

2- Zure lantokian zarata handia al dago?

3- Normalean entzungailuak eramaten dituzu musika altuarekin? Zure autoan zaudenean musika altua jartzen al duzu?

Appendix 9. Instructions and questionnaire to rate degree of nativeness and degree of comprehensibility of our participants in English.

First name _____ Last name _____

Instructions

You are going to be asked to evaluate the degree of foreign accent in English in a number of recordings you are going to listen to.

Some of the recordings will be of native speakers of American English, whereas others will be of non-native speakers of American English.
The recordings you are going to listen to may have some background noise. Please ignore the noise as much as you can in making your judgements and concentrate on the individual pronunciation.

Please rate each individual pronunciation on a 6-point scale, where 0 means "very strong foreign accent", 3 means "a moderate amount of foreign accent" and 6 means "no foreign accent" (native pronunciation in American English). Try to use all points on the scale. You are also asked to rate the degree of comprehensibility (DC) of these speakers in English. Please rate their DC from 0 to 6, where 0 means "completely incomprehensible", 3 means "moderately understandable" and 6 means "perfectly understandable". You are provided with one answer sheet for each of the recordings; please let the researcher know when you have finished with the answers for each of the recordings so that we can pass to the following one.

Your concentration is needed to make meaningful, accurate judgements. If your concentration is wandering, or if you need a break, simply do NOT answer to an item. You can take a break and, afterwards, you will go on with your judgements. You may take a break whenever you feel the need for it.

Do you have any questions?

1st recording

1- How strong is the foreign accent of this participant? (circle the right choice for you):
   - 0= very strong foreign accent
   - 1= strong foreign accent
   - 2= a more than moderate amount of foreign accent
   - 3= moderate amount of foreign accent
   - 4= a less than moderate foreign accent
   - 5= slight foreign accent (i.e. near native)
   - 6= no foreign accent (i.e. native accent)

2- How hard to understand do you find this speaker's accent? (circle the right choice for you):
   - 0= completely incomprehensible
   - 1= very difficult to understand
   - 2= difficult to understand
   - 3= moderately understandable
   - 4= quite understandable
   - 5= almost perfectly understandable
   - 6= perfectly understandable

3- Is there any sound (vowel or consonant) which strikes you as being pronounced in a weird or uncommon fashion?

4- If you think this speaker **IS NOT** a native speaker of English, the pronunciation of which sound (vowel or consonant) lets you recognize him/her as a **NON-NATIVE** speaker of English?

5- Please highlight any aspect of this participant's pronunciation or any other aspect which may have caught your attention.

6- To what extent do you think you have been able to make your judgements based on pronunciation only? (circle the right choice for you):

   - Only based on pronunciation.
   - Mainly based on pronunciation.
   - Equally on pronunciation and other aspects to the same extent.
   - Based mostly on aspects of speech than on pronunciation.
   - Based totally on aspects of speech rather than on pronunciation.

Appendix 10. Instructions and questionnaire to rate degree of nativeness and degree of comprehensibility of our participants in Spanish.

Nombre y apellidos _____

Instrucciones

La tarea que vas a llevar a cabo consiste en evaluar el grado de acento extranjero en castellano en una serie de grabaciones.

Algunas veces corresponden a hablantes nativos de castellano y otras a hablantes no nativos de la lengua.

Las grabaciones que vas a escuchar pueden tener algo de ruido de fondo. Por favor, ignora el ruido tanto como te sea posible en el momento de hacer tus valoraciones y concéntrate en la pronunciación de cada sujeto.

Por favor, evalúa el grado de acento extranjero (GAE) de cada sujeto en una escala del 0 al 6, donde 0 significa "acento extranjero muy fuerte", 3significa "acento extranjero moderado" y 6 significa "no hay acento extranjero" (i.e. acento nativo). También debes evaluar el grado de dificultad en la comprensión (GDC) de estos hablantes en castellano. Por favor, evalúa su GDC del 0 al 6, donde 0 significa "completamente incomprensible" (i.e. no se le entiende nada), 3 significa "moderadamente comprensible" y 6 significa "perfectamente comprensible" (i.e. se le entiende perfectamente).

Es necesario que estés concentrado/a de forma que puedas hacer valoraciones precisas y significativas. Si no estás plenamente concentrado/a, o si necesitas un descanso por cualquier motivo, simplemente no respondes a las preguntas. Puedes tomarte un descanso y, después, continúas con las valoraciones. Puedes tomarte un descanso siempre que lo necesites.

¿Tienes alguna pregunta?

1ª grabación

1- Grado de acento extranjero (redondea la opción correcta según tu criterio):
   - 0= acento extranjero muy fuerte
   - 1= acento extranjero fuerte
   - 2= acento extranjero bastante fuerte
   - 3= acento extranjero moderado
   - 4=acento extranjero poco perceptible
   - 5= acento extranjero muy poco perceptible
   - 6= no hay acento extranjero (i.e. acento nativo)

2- Grado de dificultad en la comprensión (redondea la opción correcta según tu criterio):
   - 0= completamente incomprensible
   - 1= difícil de comprender
   - 2= bastante difícil de comprender
   - 3= moderadamente comprensible
   - 4= bastante comprensible
   - 5= comprensible
   - 6= perfectamente comprensible

3- ¿En tu opinión hay algún sonido (vocal o consonante) que este sujeto pronuncie de forma extraña o poco común?

4- ¿La pronunciación de qué sonido (vocal o consonante) te hace pensar que este sujeto **NO ES** hablante nativo de castellano?

5- Aquí puedes escribir cualquier comentario que te gustaría hacer sobre la pronunciación de este sujeto.

6- Aquí puedes destacar cualquier aspecto sobre la pronunciación de este sujeto o cualquier otro aspecto que haya llamado tu atención.

7- ¿Hasta qué punto crees que te has centrado solo en la pronunciación?
   - Sólo me he centrado en la pronunciación.
   - Me he centrado principalmente en la pronunciación.
   - Me he centrado en la pronunciación y en otros aspectos en la misma medida.
   - Me he centrado más en otros aspectos que en la pronunciación.

Appendix 11. Instructions and questionnaire to rate degree of nativeness and degree of comprehensibility of our participants in Basque.

Izen-abizenak_____

Argibideak

Euskarazko ez-natibo ahoskera baloratu behar duzu grabaketa batzuetan. Grabaketa batzuk hizlari natiborenak izango dira; beste grabaketa batzuk hizlari ez-natiborenak.

Entzungo dituzun grabaketek zarata apur bat euki ditzakete. Mesedez, ezentzun zarata ahal duzun neurrian balorazioak egiterakoan eta arreta eskaini lagun bakoitzaren ahoskerari.

Mesedez, baloratu agun bakoitzaren ahoskera 0-etik 6-ra eskalan, non 0 “ahoskera atzerritarra oso gogorra” esan nahi du, 3 “ahoskera atzerritarra moderatua” esan nahi du eta 6 “ahoskera natiboa” esan nahi du. Saiatu 7 puntuak erabiltzen eskalan. Ulerkotasuna ere neurritu behar duzu. Mesedez, baloratu ulerkotasuna 0-etik 6-ra, non 0 “guztiz ulertezina” esan nahi du, 3 “ulerkotasuna moderatua” esan nahi du eta 6 “guztiz ulergarria” esan nahi du.

Zure konzentrazioa beharrezkoa da balorazio zehatzak egiteko. Konzentratua baldin ez bazaude edo atsedenaldi bat hartu behar baldin baduzu, ez erantzun galderak. Atsedenaldi bat har dezakezu eta gero, zure balorazioak ematen jarraituko duzu. Nahi duzun momentuan har dezakezu atsedenaldi bat.

Galderarik al duzu?

1º grabaketa

1- Atzerriko azenturen gradua (azpimarratu aukera aproposa zure iritziz):

- 0= ahoskera atzerritarra oso gogorra
- 1= ahoskera atzerritarra gogorra
- 2= ahoskera atzerritarra nahiko gogorra
- 3= ahoskera atzerritarra moderatua
- 4= ahoskera apur bat atzerritarra
- 5= ahoskera ia-ia natiboa
- 6= ahoskera natiboa

2- Ulerkotasunaren gradua (azpimarratu aukera aproposa zure iritziz):

- 0= guztiz ulertezina
- 1= ulertezina
- 2= nahiko ulertezina
- 3= ulerkotasuna moderatua
- 4= nahiko ulergarria
- 5= ulergarria
- 6= guztiz ulergarria

3- Zure ustez, lagun honek soinurik (bokal edo kontsonante) modu arraroan ahoskatzen al du?

4- Zein soinuren ahoskerak pentsarazi dizu lagun honek **EZ DELA** euskarazko hizlari natiboa?

5- Hemen lagun honen ahoskerari buruzko komentarioak idatz ditzakezu.

6- Hemen lagun honen ahoskerari edo beste aspekturi buruz komentarioak azpimarra ditzakezu.

7- Zure ustez, zein neurritan zentratu zara ahoskeran bakarrik (azpimarratu aukera aproposa zure kasuan)?

- Ahoskeran bakarrik zentratu naiz.
- Nagusiki, ahoskeran zentratu naiz.
- Ahoskeran eta beste aspektutan zentratu naiz.
- Beste aspektutan ahoskeran baino gehiago zentratu naiz.

Appendix 12

DN in English as rated by the English judges for the L3 participants

	J1	J2	J3	J4	J5	J6	AVERAGE	SD
1	2	3	1	3	4	2	2.50	1.04
2	3	5	4	4	6	2	4.00	1.41
3	0	0	1	2	3	1	1.17	1.16
4	1	1	1	2	3	2	1.67	0.81
5	1	0	2	1	1	1	1.00	0.63
6	6	6	6	6	6	6	6.00	0
7	2	1	1	3	4	1	2.00	1.26
8	2	3	2	3	5	2	2.83	1.16
9	1	1	0	1	3	0	1.00	1.09
10	0	0	0	3	2	1	1.00	1.21
11	1	2	1	2	5	2	2.17	1.47
12	1	0	0	1	2	1	0.83	0.75
13	1	1	1	4	3	2	2.00	1.26
14	5	4	3	4	4	3	3.83	0.75
15	1	1	1	2	3	0	1.33	1.03
16	5	2	3	3	3	3	3.17	0.98

Range for DN 0= very strong foreign accent; 6= no foreign accent (i.e. native)

Appendix 13

DC in English as rated by the English judges for the L3 participants

	J1	J2	J3	J4	J5	J6	AVERAGE	SD
1	4	4	5	4	6	3	4.33	1.03
2	4	4	6	5	5	3	4.50	1.04
3	1	2	6	4	5	2	3.33	1.96
4	2	2	5	4	6	2	3.50	1.76
5	4	2	5	3	5	2	3.50	1.37
6	6	6	6	6	6	6	6.00	0
7	5	3	6	4	6	2	4.33	1.63
8	4	4	6	5	6	4	4.83	0.98
9	2	1	3		4	1	2.20	1.30
10	1	1	5	4	4	2	2.83	1.72
11	3	5	6	4	6	4	4.67	1.21
12	1	1	5	3	4	2	2.67	1.63
13	2	3	6	5	4	3	3.83	1.47
14	6	6	6	6	6	4	5.67	0.81
15	2	2	2	3	6	1	2.67	1.75
16	4	4	6	4	6	3	4.50	1.22

Range for DC 0= completely incomprehensible; 6= perfectly understandable

Appendix 14

DN in Spanish as rated by the monolingual Spanish judges for the L3 participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	6	5	5	2	5	5	6	3	2	6	3	4.36	1.56
2	4	4	3	5	6	4	5	3	3	5	2	4.00	1.18
3	6	6	4	5	6	5	6	5	3	5	6	5.18	0.98
4	3	6	5	4	6	6	4	4	4	5	6	4.82	1.07
5	5	6	5	2	6	3	6	3	4	6	5	4.64	1.43
6	0	3	4	2	3	2	4	2	1	4	5	2.73	1.48
7	6	6	4	6	6	5	6	3	3	6	6	5.18	1.25
8	4	6	3	5	5	6	5	4	2	5	6	4.64	1.28
9	0	5	4	1	4	4	5	3	2	5	4	3.36	1.68
10	6	5	3	3	5	6	6	5	3	6	6	4.91	1.30
11	6	6	6	0	5	6	6	1	2	5	5	4.36	2.24
12	6	6	2	6	6	6	6	3	1	5	2	4.45	2.01
13	3	4	3	0	4	3	2	3	1	4	3	2.73	1.27
14	6	6	5	3	5	6	5	5	5	5	6	5.18	0.87
15	6	6	4	3	6	5	5	4	6	5	5	5.00	1
16	6	5	3	6	6	4	6	3	3	6	5	4.82	1.32

Range for DN 0= very strong foreign accent; 6= no foreign accent (i.e. native)

Appendix 15

DC in Spanish as rated by the monolingual Spanish judges for the L3 participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	1	2	5	6	6	4	4	3	4	6	3	4.00	1.67
2	3	5	5	6	6	4	5	3	3	4	5	4.45	1.12
3	6	6	6	6	6	5	6	5	4	6	6	5.64	0.67
4	4	6	5	5	6	5	3	4	5	5	6	4.91	0.94
5	6	6	5	6	6	3	6	4	3	6	6	5.18	1.25
6	3	5	5	6	4	2	3	3	1	4	5	3.73	1.48
7	6	6	5	6	6	5	5	4	4	6	6	5.36	0.80
8	5	6	4	6	6	6	6	6	4	6	6	5.55	0.82
9	5	5	4	6	6	4	3	5	4	5	6	4.82	0.98
10	5	6	5	6	6	6	6	6	5	6	6	5.73	0.46
11	6	6	6	6	6	6	6	3	4	6	6	5.55	1.03
12	1	4	3	6	6	5	6	3	2	5	6	4.27	1.79
13	5	5	5	6	6	3	5	4	4	5	6	4.91	0.94
14	5	6	6	6	6	6	6	6	5	6	6	5.82	0.40
15	5	6	5	6	6	5	4	5	6	6	6	5.45	0.68
16	5	5	3	6	6	5	5	4	4	5	6	4.91	0.94

Range for DC 0= completely incomprehensible; 6= perfectly understandable

Appendix 16

DN in Spanish as rated by the Spanish/Basque balanced bilingual judges for the L3 participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	4	5	4	6	4	5	4	2	5	5	6	4.55	1.12
2	5	5	5	6	2	3	3	1	5	5	5	4.09	1.57
3	6	5	6	6	5	6	4	5	5	6	5	5.36	0.67
4	5	5	4	6	4	6	4	2	6	5	5	4.73	1.19
5	6	5	5	6	4	6	3	2	6	5	5	4.82	1.32
6	4	3	2	4	5	3	1	2	4	3	3	3.09	1.13
7	6	6	6	6	6	6	5	5	5	5	5	5.55	0.52
8	5	5	4	5	5	5	5	3	6	5	5	4.82	0.75
9	5	5	2	5	3	4	1	3	4	5	5	3.82	1.40
10	5	5	3	5	5	6	3	4	6	5	5	4.73	1.00
11	5	6	3	6	5	6	3	3	5	4	6	4.73	1.27
12	6	5	6	6	2	5	5	2	6	5	6	4.91	1.51
13	5	3	1	4	4	3	3	2	5	4	4	3.45	1.21
14	5	6	6	6	6	5	6	5	6	6	6	5.73	0.46
15	6	6	4	4	4	6	3	2	4	5	5	4.45	1.29
16	6	5	5	6	3	5	6	3	6	6	6	5.18	1.16

Range for DN 0= very strong foreign accent; 6= no foreign accent (i.e. native)

Appendix 17

DC in Spanish as rated by the Spanish/Basque balanced bilingual judges for the L3 participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	5	6	6	5	5	6	6	3	5	6	6	5.36	0.92
2	5	6	5	6	5	6	5	3	5	5	5	5.09	0.83
3	6	6	6	6	6	6	5	5	5	6	6	5.73	0.46
4	6	6	6	6	6	6	6	4	6	5	6	5.73	0.64
5	6	6	5	6	6	6	6	3	5	6	5	5.45	0.93
6	4	5	5	4	4	5	5	3	4	4	2	4.09	0.94
7	6	6	6	6	6	6	6	3	5	5	5	5.45	0.93
8	6	6	6	6	6	5	6	5	6	6	6	5.82	0.40
9	6	6	5	6	6	6	6	4	4	5	5	5.36	0.80
10	6	6	6	6	6	6	5	6	6	6	6	5.91	0.30
11	5	6	6	6	6	6	5	5	6	6	6	5.73	0.46
12	6	6	6	6	5	5	6	3	5	5	5	5.27	0.90
13	6	6	6	5	6	5	5	3	6	5	6	5.36	0.92
14	6	6	6	6	6	6	6	5	6	6	6	5.91	0.30
15	5	6	6	5	6	6	4	4	4	6	5	5.18	0.87
16	6	6	6	6	6	6	6	3	6	6	5	5.64	0.92

Range for DC 0= completely incomprehensible; 6= perfectly understandable

Appendix 18

DN in Basque as rated by the Basque-dominant judges for the L3 participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	4	6	6	5	6	3	6	6	5	6	5	5.27	1.00
2	5	6	6	5	5	6	6	6	5	6	5	5.55	0.52
3	6	6	6	6	6	6	6	6	5	6	6	5.91	0.30
4	3	6	3	4	4	6	5	4	5	6	5	4.64	1.12
5	6	6	6	6	6	6	6	6	5	6	6	5.91	0.30
6	6	6	6	5	6	6	6	6	6	6	5	5.82	0.40
7	5	6	6	6	6	6	6	5	6	5	6	5.73	0.46
8	6	6	6	6	6	4	5	5	6	4	4	5.27	0.90
9	6	6	6	6	6	6	6	5	6	6	6	5.91	0.30
10	6	6	6	6	6	6	6	6	5	6	5	5.82	0.40
11	5	6	6	5	4	6	5	6	6	4	5	5.27	0.78
12	6	6	6	6	6	6	6	6	6	6	6	6.00	0
13	5	6	6	5	3	5	2	5	5	4	4	4.55	1.21
14	6	6	2	5	5	6	6	5	6	5	6	5.27	1,19
15	6	6	6	6	6	6	6	6	5	6	6	5.91	0.30
16	5	6	6	4	4	6	4	5	4	4	2	4.55	1.21

Range for DN 0= very strong foreign accent; 6= no foreign accent (i.e. native)

Appendix 19

DC in Basque as rated by the Basque-dominant judges for the L3 participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	6	5	4	3	3	6	6	2	5	6	5	4.64	1.43
2	6	6	5	5	3	6	6	4	4	6	5	5.09	1.04
3	6	6	4	5	6	6	6	6	4	5	6	5.45	0.82
4	6	5	3	5		6	6	4	5	6	4	5.00	1.80
5	6	6	5	5	6	5	6	6	6	6	6	5.73	0.46
6	6	4	5	4	6	6	6	4	6	6	6	5.36	0.92
7	6	6	6	5	5	5	6	4	6	6	6	5.55	0.68
8	6	5	5		6	6	6	5	6	5	5	5.50	1.73
9	6	5	6	5	5	6	6	4	6	6	6	5.55	0.68
10	6	5	4	5	6	6	6	4	5	6	4	5.18	0.87
11	6	5	6	6	4	5	6	5	6	5	5	5.36	0.67
12	6	6	6	6	5	6	6	5	6	6	6	5.82	0.40
13	6	6	6	5	4	6	6	5	6	6	5	5.55	0.68
14	6	6	6	6	5	6	6	5	6	6	6	5.82	0.40
15	6	5	6	6	3	6	6	4	5	5	5	5.18	0.98
16	6	5	6	4	4	6	5	4	4	3	3	4.55	1.12

Range for DC 0= completely incomprehensible; 6= perfectly understandable

Appendix 20

DN in Basque as rated by the Spanish/Basque balanced bilingual judges for the L3 participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	6	6	6	6	6	5	5	4	4	2	6	5.09	1.30
2	5	6	6	6	5	5	6	5	5	5	3	5.18	0.87
3	6	6	6	6	5	6	6	5	6	5	5	5.64	0.50
4	3	6	6	6	2	4	5	4	5	5	5	4.64	1.28
5	6	6	6	6	6	6	6	6	6	6	6	6.00	0
6	6	5	6	6	5	5	6	5	6	6	6	5.64	0.50
7	6	6	6	6	6	4	6	5	6	6	6	5.73	0.64
8	6	6	6	6	5	6	6	4	5	6	5	5.55	0.68
9	6	6	6	6	6	6	6	5	5	6	6	5.82	0.40
10	6	5	6	6	5	6	6	5	5	6	5	5.55	0.52
11	4	6	6	6	4	4	6	5	5	5	2	4.82	1.25
12	6	6	6	6	6	6	6	6	6	6	6	6.00	0
13	3	5	6	6	4	4	6	4	5	5	5	4.82	0.98
14	6	6	6	6	4	6	5	5	6	5	5	5.45	0.68
15	6	6	6	6	6	6	6	6	6	6	6	6.00	0
16	1	6	6	6	4	3	6	4	5	6	6	4.82	1.66

Range for DN 0= very strong foreign accent; 6= no foreign accent (i.e. native)

Appendix 21

DC in Basque as rated by the Spanish/Basque balanced bilingual judges for the L3 participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	5	4	5	3	2	5	5	4	4	3	4	4.00	1
2	5	6	6	5	6	3	5	5	5	5	4	5.00	0.89
3	5	6	5	3	5	6	6	5	6	6	6	5.36	0.92
4	3	6	6	3	6	5	5	4	5	5	5	4.82	1.07
5	6	6	6	3	6	6	6	3	6	6	6	5.45	1.21
6	4	6	5	2	5	4	5	5	6	5	6	4.82	1.16
7	5	6	6	3	6	5	5	5	6	6	5	5.27	0.90
8	4	6	6	4	3	6	6	6	5	5	5	5.09	1.04
9	5	6	6	3	6	6	5	4	6	6	6	5.36	1.02
10	6	6	4	3	4	4	6	3	6	5	6	4.82	1.25
11	5	6	6	6	6	4	6	5	5	5	5	5.36	0.67
12	5	6	6	4	5	6	6	5	6	6	6	5.55	0.68
13	4	6	6	5	5	5	6	5	6	5	5	5.27	0.64
14	6	6	6	6	6	6	6	5	6	6	6	5.91	0.30
15	6	6	5	4	5	5	5	4	6	5	6	5.18	0.75
16	2	5	5	2	5	3	5	4	4	3	5	3.91	1.22

Range for DC 0= completely incomprehensible; 6= perfectly understandable

Appendix 22

DN in English as rated by the English judges for the multilingual participants

	J1	J2	J3	J4	J5	J6	AVERAGE	SD
1	6	6	5	6	6	6	5.83	0.40
2	6	6	6	6	6	6	6.00	0
3	6	6	6	6	6	6	6.00	0
4	6	6	6	6	6	6	6.00	0
5	6	6	5	6	6	6	5.83	0.40
6	6	5	6	6	6	5	5.67	0.51
7	6	6	5	6	6	6	5.83	0.40
8	6	6	6	6	6	5	5.83	0.40
9	6	6	5	6	6	6	5.83	0.40
10	6	5	5	5	6	6	5.50	0.54
11	6	6	5	6	6	6	5.83	0.40

Range for DN 0= very strong foreign accent; 6= no foreign accent (i.e. native)

Appendix 23

DC in English as rated by the English judges for the multilingual participants

	J1	J2	J3	J4	J5	J6	AVERAGE	SD
1	6	6	6	6	6	6	6.00	0
2	6	6	6	6	6	6	6.00	0
3	6	6	6	6	6	6	6.00	0
4	6	6	6	6	6	6	6.00	0
5	6	6	6	6	6	6	6.00	0
6	6	6	6	6	6	5	5.83	0.40
7	6	6	6	6	6	6	6.00	0
8	6	6	6	6	6	6	6.00	0
9	6	6	6	6	6	6	6.00	0
10	6	6	6	6	6	6	6.00	0
11	6	6	6	6	6	6	6.00	0

Range for DC 0= completely incomprehensible; 6= perfectly understandable

Appendix 24

DN in Spanish as rated by the monolingual Spanish judges for the multilingual participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	0	2	3	0	4	2	6	2	2	4	4	2.64	1.80
2	0	1	1	0	0	1	1	0	0	2	0	0.55	0.68
3	0	4	3	0	3	2	3	0	2	3	1	1.91	1.44
4	0	4	2	0	3	2	2	3	1	4	4	2.27	1.48
5	0	3	1	0	2	2	4	0	1	3	2	1.64	1.36
6	0	3	0	0	1	1	3	0	0	1	0	0.82	1.16
7	0	3	2	0	2	2	4	0	0	2	0	1.36	1.43
8	0	3	3	0	3	2	5	0	0	2	0	1.64	1.74
9	0	3	2	0	3	2	5	2	2	3	5	2.45	1.63
10	0	3	1	0	3	2	4	1	1	3	5	2.09	1.64
11	0	3	4	0	1	3	4	0	0	3	0	1.64	1.74

Range for DN 0= very strong foreign accent; 6= no foreign accent (i.e. native)

Appendix 25

DC in Spanish as rated by the monolingual Spanish judges for the multilingual participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	3	4	4	5		3	5	4	4	6	6	4.40	1.07
2	2	2	1	4	3	3	2	2	1	4	3	2.45	1.03
3	3	4	3	3	4	3	4	1	4	4	4	3.36	0.92
4	3	4	4	5	6	3	5	3	4	5	6	4.36	1.12
5	3	5	1	5	6	4	2	3	3	4	3	3.55	1.43
6	0	2	1	3	4	2	2	1	0	2	2	1.73	1.37
7	1	2	3	5	4	2	3	1	1	2	5	2.64	1.50
8	4	3	3	5	6	3	5	2	1	3	5	3.64	1.50
9	1	5	4	6	5	3	6	5	3	5	6	4.45	1.57
10	2	5	3	6	5	2	3	3	1	3	6	3.55	1.69
11	1	5	5	3	3	2	2	1	1	3	5	2.82	1.60

Range for DC 0= completely incomprehensible; 6= perfectly understandable

Appendix 26

DN in Spanish as rated by the Spanish/Basque balanced bilingual judges for the multilingual participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	4	2	3	5	2	2	3	2	4	2	5	3.09	1.22
2	1	0	0	2	0	0	0	1	2	1	1	0.73	0.78
3	2	0	1	3	2	2	1	1	3	3	3	1.91	1.04
4	3	1	1	5	3	2	2	2	3	2	1	2.27	1.19
5	3	2	0	3	0	3	2	2	3	3	2	2.09	1.13
6	0	0	0	3	0	1	1	0	3	0	2	0.91	1.22
7	2	0	1	3	1	2	2	1	2	3	4	1.91	1.13
8	2	0	1	3	0	2	2	2	3	2	1	1.64	1.02
9	3	4	2	4	1	2	3	3	4	3	5	3.09	1.13
10	2	1	1	3	1	2	1	2	4	2	2	1.91	0.94
11	0	0	0	2	0	3	0	1	3	0	0	0.82	1.25

Range for DN 0= very strong foreign accent; 6= no foreign accent (i.e. native)

Appendix 27

DC in Spanish as rated by the balanced bilingual judges for the multilingual participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	5	6	5	5	6	4	5	4	5	6	6	5.18	0.75
2	2	3	3	4	3	3	4	3	2	3	5	3.18	0.87
3	4	2	6	5	4	5	4	3	4	5	5	4.27	1.10
4	5	5	6	6	6	4	5	4	4	5	5	5.00	0.77
5	4	5	5	5	6	3	5	4	3	5	4	4.45	0.93
6	3	2	4	4	4	1	4	2	3	3	1	2.82	1.16
7	2	3	2	4	4	3	4	2	3	4	2	3.00	0.89
8	3	4	4	4	4	5	5	4	3	4	3	3.91	0.70
9	4	6	6	6	5	6	5	4	5	6	6	5.36	0.80
10	3	5	5	4	5	2	4	3	5	4	3	3.91	1.04
11	2	3	4	3	3	5	4	2	3	2	1	2.91	1.13

Range for DC 0= completely incomprehensible; 6= perfectly understandable

Appendix 28

DN in Basque as rated by the Basque-dominant judges for the multilingual participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	4	5	3	3	4	3	3	2	4	4	4	3.55	0.82
2	2	2	6	3	1	1	0	1	3	0	3	2.00	1.73
3	6	6	6	4	6	6	6	5	5	6	6	5.64	0.67
4	2	3	4	4	2	3	4	4	4	3	2	3.18	0.87
5	5	6	6	6	6	4	4	4	5	4	5	5.00	0.89
6	1	4	1	4	1	2	0	3	3	1	2	2.00	1.34
7	2	4	6	4	1	3	1	0	4	4	3	2.91	1.75
8	3	5	3	4	2	6	2	2	5	2	3	3.36	1.43
9	3	5	5	5	4	6	5	4	5	5	5	4.73	0.78
10	3	4	1	4	3	5	3	0	5	4	4	3.27	1.55
11	3	4	2	5	2	2	2	4	4	2	3	3.00	1.09

Range for DN 0= very strong foreign accent; 6= no foreign accent (i.e. native)

Appendix 29

DC in Basque as rated by the Basque-dominant judges by the multilingual participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	6	6	6	5	5	6	6	4	6	4	5	5.36	0.80
2	6	5	5	6	3	2	5	3	4	2	5	4.18	1.47
3	6	6	5	4	5	5	4	4	5	6	5	5.00	0.77
4	6	6	4	5	5	5	6	4	4	4	5	4.91	0.83
5	6	5	5	6	5	6	6	4	6	5	6	5.45	0.68
6	6	6	2	5	4	4	4	4	4	4	4	4.27	1.10
7	6	5	6	4	2	5	5	4	3	5	3	4.36	1.28
8	6	6	4	4	5	6	6	5	4	4	4	4.91	0.94
9	6	6	4	6	6	5	6	5	5	6	6	5.55	0.68
10	6	6	6	6	4	6	6	4	5	4	5	5.27	0.90
11	6	5	5	4	4	3	5	4	5	2	3	4.18	1.16

Range for DC 0= completely incomprehensible; 6= perfectly understandable

Appendix 30

DN in Basque as rated by the Spanish/Basque balanced bilingual judges for the multilingual participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	4	4	4	5	0	3	4	3	4	5	6	3.82	1.53
2	1	2	1	2	0	1	3	2	3	2	2	1.73	0.90
3	6	4	5	6	2	3	4	3	6	3	6	4.36	1.50
4	4	4	4	3	4	2	5	4	5	4	3	3.82	0.87
5	5	5	4	6	5	4	6	5	5	6	4	5.00	0.77
6	2	2	2	6	1	2	3	2	4	2	1	2.45	1.43
7	3	4	2	6	0	3	5	3	4	3	4	3.36	1.56
8	2	5	3	6	3	3	3	2	4	4	3	3.45	1.21
9	5	5	5	6	4	3	6	5	5	5	3	4.73	1.00
10	3	4	4	5	3	3	3	3	5	4	3	3.64	0.80
11	2	5	6	6	2	4	5	4	4	4	3	4.09	1.37

Range for DN 0= very strong foreign accent; 6= no foreign accent (i.e. native)

Appendix 31

DC in Basque as rated by the Spanish/Basque balanced bilingual judges for the multilingual participants

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	AVERAGE	SD
1	4	5	6	6	6	4	6	5	5	6	6	5.36	0.80
2	3	4	5	3	6	3	4	4	4	4	5	4.09	0.94
3	4	3	5	3	3	1	5	2	6	4	6	3.82	1.60
4	4	6	5	4	6	4	5	5	6	5	5	5.00	0.77
5	5	6	5	2	6	5	5	3	6	5	6	4.91	1.30
6	3	4	5	3	3	4	5	4	5	3	2	3.73	1.00
7	3	5	5	3	6	2	5	5	5	5	3	4.27	1.27
8	4	6	5	4	6	4	5	4	5	5	4	4.73	0.78
9	5	6	6	5	5	4	6	4	6	5	6	5.27	0.78
10	5	5	5	6	5	5	5	4	5	5	5	5.00	0.44
11	3	6	5	1	5	4	4	4	5	3	5	4.09	1.37

Range for DC 0= completely incomprehensible; 6= perfectly understandable

Appendix 32. Table of all data provided by the L3 participants.

	BIOGRAPHICAL VARIABLES			AFFECTIVE VARIABLES							INPUT VARIABLES				
SUBJECTS	AOA	GENDER	EDUCATION LEVEL	DI			M			CPA (ENGLISH)	LOR	DA (percentage use)			LOCATION
				E	S	B	E	S	B			E	S	B	
1	26	MALE	NON-UNIVERSITY	32	28	31	36	29	22	5	44	50	30	20	RENO
2	20	MALE	NON-UNIVERSITY	31	28	26	36	29	26	15	47	72.5	3.75	23.75	RENO
3	28	MALE	NON-UNIVERSITY	23	26	28	36	27	15	5	36	51.11	43.33	5.56	RENO
4	24	FEMALE	NON-UNIVERSITY	28	25	33	36	33	22	14	35	52.22	24.44	23.33	RENO
5	27	MALE	NON-UNIVERSITY	31	25	28	35	31	25	6	39	51.11	26.67	22.22	RENO
6	7	MALE	UNIVERSITY	29	21	25	34	Ø	22	12	43	90	0	10	BOISE
7	33	FEMALE	NON-UNIVERSITY	26	30	28	36	28	20	12	35	26.67	10	63.33	BOISE
8	24	MALE	NON-UNIVERSITY	22	31	29	33	27	31	6	36	55.56	15.56	28.89	BOISE
9	38	FEMALE	NON-UNIVERSITY	22	31	28	34	32	26	3	42	32.22	1.11	66.67	BOISE
10	21	FEMALE	NON-UNIVERSITY	27	30	32	36	30	27	4	58	45.56	13.33	41.11	BOISE
11	18	MALE	NON-UNIVERSITY	27	24	27	34	12	18	3	51	85.56	0	14.44	BOISE
12	23	MALE	NON-UNIVERSITY	25	25	27	36	23	24	4	56	52.22	5.56	42.22	BOISE
13	22	FEMALE	NON-UNIVERSITY	29	33	29	33	25	25	4	40	38.89	20	41.11	BOISE
14	24	FEMALE	UNIVERSITY	29	27	28	36	20	17	9	23	63.33	4.44	32.22	BOISE
15	24	FEMALE	NON-UNIVERSITY	30	33	30	28	29	27	12	63	20	16.25	63.75	BOISE
16	19	MALE	NON-UNIVERSITY	30	31	32	36	29	28	4	59	52.22	4.44	43.33	RENO

Education level (university studies, non-university studies); degree of identification (DI): minimum=7, maximum= 35; motivation (M): minimum=6, maximum=36; strength of concern for pronunciation accuracy (CPA): minimum= 7, m aximum=35; Location (Reno, Boise).

Appendix 33. Table of all data provided by the multilingual participants.

	BIOGRAPHICAL VARIABLES		AFFECTIVE VARIABLES								INPUT VARIABLES			
SUBJECTS	GENDER	EDUCATION LEVEL	DI			M			CPA		DA (percentage use)			LOCATION
			E	S	B	E	S	B	S	B	E	S	B	
1	FEMALE	UNIVERSITY	26	23	29	36	24	12	5	5	54.44	23.33	22.22	RENO
2	FEMALE	UNIVERSITY	25	32	25	35	16	12	7	7	100	0	0	RENO
3	MALE	UNIVERSITY	30	27	25	36	19	13	6	6	91.11	4.44	4.44	RENO
4	FEMALE	UNIVERSITY	25	31	29	35	28	26	7	7	67.78	6.67	25.56	BOISE
5	FEMALE	UNIVERSITY	29	23	28	36	24	22	12	12	77.78	1.11	21.11	BOISE
6	MALE	UNIVERSITY	31	26	27	36	24	29	12	15	75.56	0	24.44	BOISE
7	FEMALE	UNIVERSITY	34	29	29	34	18	15	5	6	81.11	0	18.89	BOISE
8	FEMALE	UNIVERSITY	32	21	30	36	14	26	6	13	66.67	1.11	32.22	BOISE
9	FEMALE	NON-UNIVERSITY	34	35	31	36	21	13	9	7	88.89	0	11.11	BOISE
10	FEMALE	NON-UNIVERSITY	30	27	31	36	17	16	8	8	84.44	2.22	13.33	BOISE
11	MALE	NON-UNIVERSITY	32	30	25	36	33	21	8	6	95.56	0	4.44	RENO

Education level (university studies, non-university studies); degree of identification (DI): minimum=7, maximum= 35; motivation (M): minimum=6, maximum=36; strength of concern for pronunciation accuracy (CPA): minimum= 7, m aximum=35; Location (Reno, Boise).

Appendix 34

Table of degree of nativeness (DN) and degree of comprehensibility (DC) in English assigned to the distractor-control group.

ENGLISH	DN	DC
1.T.A. (NNS)	2.33	4.50
2.J.E. (NNS)	1.17	3.50
3.M.W. (NS)	5.83	6.00
4.K. A. (NS)	5.83	5.83
5.L. A. (NS)	6.00	6.00
6.R. O. (NS)	5.83	5.83
7.M. D. (NS)	6.00	6.00

NS = native speaker; NNS= Non-native speaker. DN values ranged from 0 =very strong foreign accent and 6 = no foreign accent (i.e. native); DC values ranged from 0 =completely incomprehensible and 6 = perfectly understandable.

Appendix 35

Table of degree of nativeness (DN) and degree of comprehensibility (DC) in Spanish assigned to the distractor-control group by the monolingual Spanish judges (DN.MS/DC.MS) and by the Spanish/Basque balanced bilingual judges (DN.SB/DC.SB).

SPANISH	DN.MS	DN.SB	DC.MS	DC.SB
1.T.A. (NS)	6.00	5.91	6.00	6.00
2. J.E. (NS)	5.91	6.00	6.00	6.00
3. L.A. (NNS)	1.09	1.73	3.55	4.55
4. A.C. (NNS)	0.82	1.18	3.00	3.55
5. D.M. (NNS)	2.00	1.82	4.64	4.82
6. M.W. (NNS)	1.18	1.36	3.27	4.00
7. E.V. (NNS)	2.45	2.82	4.18	4.55
8. J.L. (NNS)	1.27	1.45	2.09	3.18
9. C.B. (NNS)	4.64	4.18	5.45	5.82
10. P.L. (NNS)	4.45	3.36	4.73	5.18
11. J.C. (NNS)	2.18	2.18	4.30	4.73

NS = native speaker; NNS= Non-native speaker. DN values ranged from 0 =very strong foreign accent and 6 = no foreign accent (i.e. native); DC values ranged from 0 =completely incomprehensible and 6 = perfectly understandable.

Appendix 36

Table of degree of nativeness (DN) and degree of comprehensibility (DC) in Basque assigned to the distractor-control group by the Basque-dominant judges (DN.BD/DC.BD) and by the Spanish/Basque balanced bilingual judges (DN.BB/DC.BB).

BASQUE	DN.BD	DN.BB	DC.BD	DC.BB
1. T.A. (NS)	5.27	5.64	5.91	6.00
2. J.E. (NS)	5.55	5.55	5.91	5.82
3. A.C. (NNS)	1.36	1.00	2.82	2.45
4. C.B. (NNS)	5.18	5.27	5.64	5.73
5. P.L. (NNS)	4.36	4.27	5.55	5.27

NS = native speaker; NNS= Non-native speaker. DN values ranged from 0 =very strong foreign accent and 6 = no foreign accent (i.e. native); DC values ranged from 0 =completely incomprehensible and 6 = perfectly understandable.

Appendix 37

	SPANISH						BASQUE						ENGLISH					
	A	**B**	**C**	**D**	**E**	**T**	**A**	**B**	**C**	**D**	**E**	**T**	**A**	**B**	**C**	**D**	**E**	**T**
1	11	8	7	9	9	**44**	8	6	7	1	8	**30**	8	7	6	7	7	**35**
2	8	6	7	6	6	**33**	8	5	5	3	3	**24**	4	4	5	5	4	**22**
3	11	13	13	12	12	**61**												
4	16	12	16	6	12	**62**												
5	12	11	12	5	5	**45**												
6																		
7	10	9	5	8	11	**43**	9	6	8	7	9	**39**	10	9	11	8	10	**48**
8	19	13	16	16	20	**84**	14	11	14	10	14	**63**	14	15	20	14	19	**82**
9	8	8	9	2	10	**37**	6	2	6	2	7	**23**						
10	19	12	15	13	14	**73**	12	6	7	6	11	**42**	6	5	9	5	8	**33**
11	14	8	12	10	14	**58**	8	2	7	6	5	**28**	15	10	12	6	15	**58**
12	12	13	14	6	14	**59**	9	8	9	4	11	**41**	10	7	11	8	13	**49**
13	12	13	8	10	11	**54**	9	8	9	7	7	**40**						
14	27	29	32	27	37	**152**	27	29	32	28	28	**144**	28	21	30	29	30	**138**
15	9	11	9	7	12	**48**	5	8	4	0	4	**21**	1	1	5	3	3	**13**
16	10	8	10	7	10	**45**												
T	**198**	**174**	**185**	**144**	**197**	**898**	**115**	**91**	**108**	**74**	**107**	**495**	**96**	**79**	**109**	**85**	**109**	**478**

a) Parts of the body; b) Pieces of clothing; c) The city and the countryside; d) Jobs and professions; e) Food and drink; T = total

Appendix 38

	SPANISH						BASQUE						ENGLISH					
	A	**B**	**C**	**D**	**E**	**T**	**A**	**B**	**C**	**D**	**E**	**T**	**A**	**B**	**C**	**D**	**E**	**T**
1	12	15	20	19	23	**89**	22	11	19	18	23	**93**	30	21	26	24	28	**129**
2	20	9	17	9	24	**79**	10	8	13	7	8	**46**	31	16	19	18	25	**109**
3	10	3	3	6	12	**34**	9	9	8	6	8	**40**	26	10	13	15	17	**81**
4	24	17	21	16	28	**106**	18	14	21	10	19	**82**	27	25	32	24	30	**138**
5	18	8	19	12	24	**81**	18	11	9	7	14	**59**	34	27	25	24	28	**138**
6	6	4	7	3	7	**27**							28	16	20	15	18	**97**
7							9	7	11	7	13	**47**	28	25	26	20	35	**134**
8	14	7	12	12	15	**60**	19	11	15	10	16	**71**	28	21	26	22	28	**125**
9	8	5	16	9	19	**57**							20	18	22	16	27	**103**
10	16	15	18	12	22	**83**	14	13	20	10	21	**78**	37	25	36	22	35	**155**
11	5	3	7	4	5	**24**							23	15	13	13	16	**80**
T	**133**	**86**	**140**	**102**	**179**	**640**	**119**	**84**	**116**	**75**	**122**	**516**	**312**	**219**	**258**	**213**	**287**	**1289**

a) Parts of the body; b) Pieces of clothing; c) The city and the countryside; d) Jobs and professions; e) Food and drink; T = total.

Influencias inter-lingüísticas en el componente fonético y léxico en inglés, euskera y castellano: factores contextuales e individuales en la adquisición y atrofia lingüística

Nuestro estudio investiga tres áreas de conocimiento lingüístico que han centrado la atención de numerosos investigadores en las últimas décadas: la adquisición de una tercera lengua (L3), (e.g. Cenoz *et al*., 2001; Cenoz *et al.*, 2003a; De Angelis & Selinker, 2001; Gibson & Hufeisen, 2003; Hufeisen & Fouser, 2005; Pavlenko, 2009), atrofia lingüística de la primera lengua (L1), (Seliger & Vago, 1991a; Ventureyra & Pallier, 2004; Yoshitomi, 1992) y multilingüismo (ver Gallardo, 2007; Lanza, 1992, 2007; Lasagabaster & Huguet, 2007; Leather, 2003; Ruiz de Zarobe & Ruiz de Zarobe, 2015). Nuestro estudio ha explorado estas tres áreas de conocimiento lingüístico desde el punto de vista fonético y léxico.

Para llevar a cabo nuestro trabajo de campo nos trasladamos a las ciudades de Reno (Nevada) y Boise (Idaho), que se caracterizan por ser asentamientos tradicionales de inmigrantes vascos en Estados Unidos. Por una parte, captamos a un grupo de 16 inmigrantes vascos cuyas lenguas nativas eran castellano y euskera y que habían aprendido inglés (su L3) en un contexto natural de adquisición; en este caso, también analizamos si sus lenguas nativas (euskera y castellano) habían sufrido atrofia lingüística. Por otro lado, reunimos a un grupo de 11 hablantes multilingües nacidos y residentes en Estados Unidos. Este grupo de sujetos multilingües aprendieron euskera y castellano en casa, pero debido a que vivían en un ambiente donde el inglés es la lengua dominante, fueron expuestos a inglés desde una edad temprana. Todos los participantes fueron grabados en las tres lenguas bajo estudio y realizaron una prueba de disponibilidad léxica en inglés, castellano y euskera. También incluimos 3 grupos de control, uno para cada lengua.

En este estudio analizamos tres grupos diferentes de factores: factores biográficos, factores afectivos e input. En el primer grupo incluimos la edad de llegada al país de acogida, género (masculino o femenino) y nivel educativo (estudios universitarios frente a

estudios no universitarios). En el grupo de factores afectivos incluimos el grado de identificación con la comunidad lingüística, motivación y el grado de preocupación por una buena pronunciación en la lengua meta. Finalmente, el grupo de input estaba compuesto por periodo de residencia en el país de acogida y el grado de activación de la lengua; este último factor estaba dividido en porcentaje de uso de la lengua y localización de residencia (Reno frente a Boise, ya que Boise se caracteriza por albergar una comunidad vasca más amplia y activa que la existente en Reno).

Los resultados de las diferentes variables analizadas con respecto a la adquisición de la L3 en primer lugar, la edad de llegada en el país de acogida predecía negativamente tanto el grado de nativismo como el grado de comprensibilidad en inglés. El participante que llegó a Estados Unidos a los 7 años pasó por nativo y el el grado de competencia en inglés decrecía progresivamente con el aumento de la edad de llegada en el país. Por tanto, nuestros resultados apoyan la postura denominada "cuanto más joven, mejor" en cuanto a la adquisición de una L2/L3 (e.g. Bialystok & Hakuta, 1999; Birdsong, 1992, 1999a, 1999b; Birdsong & Molis, 2001; Johnson & Newport, 1989; Munro & Mann, 2005; Muñoz & Singleton, 2011). Por otro lado, las diferencias por género no produjeron ningún resultado significativo. Sin embargo, el hecho de que los hombres declararan un uso significativamente mayor del inglés que las mujeres sugiere que los hombres eran los que trabajaban fuera de casa y estaban más integrados en la comunidad americana, mientras que las mujeres serían las que se quedaban en casa al cuidado de los hijos (e.g. Ellis, 1994). Como ya hemos mencionado anteriormente, el análisis estadístico de nivel educativo no fue viable, ya que solamente 1 de los 15 participantes en nuestra muestra declaró que tenía estudios universitarios, mientras que el resto de los participantes declaró no tener un título universitario. El hecho de que la gran mayoría de nuestros participantes no alcanzaran un alto nivel de competencia en inglés pudo ser debido precisamente a su bajo nivel educativo, especialmente su grado de disponibilidad léxica en inglés, dado que estudios como el de Flege y Liu (2001) demostraron la importancia de este factor (estudiantes frente a no estudiantes) para alcanzar un alto nivel de competencia en la lengua meta. En cuanto a los factores afectivos, ninguno de ellos predijo ni grado de nativismo, ni grado de comprensibilidad, ni grado de disponibilidad léxica en inglés. En este caso, el hecho de que

nuestros participantes obtuvieran resultados similares (en general bajos) en estas tres medidas pudo haber anulado el efecto de cualquiera de los factores afectivos examinados en este estudio. Sin embargo, periodo de residencia en el país de acogida predecía negativamente el grado de disponibilidad léxica en inglés. En este caso, periodo de residencia podría haber sido confundida con la edad cronológica de los participantes, ya que también encontramos una correlación negativa entre la edad cronológica y el grado de disponibilidad léxica en inglés; esto podría haber sido debido a que los participantes más jóvenes podrían haber tenido mayores habilidades de producción léxica o porque su red social en inglés era más amplia que la de los participantes de mayor edad, que ya estaban jubilados en el momento de la entrevista, ya que su grado de interacción con miembros de la comunidad de la L3 habría disminuido considerablemente después de la jubilación. Asimismo, el grado de activación en inglés y localización de residencia no produjeron ningún resultado con respecto al grado de nativismo en inglés de nuestros participantes. En este caso, nuestros participantes variaban considerablemente tanto en su periodo de residencia en el país de acogida como en su porcentaje de uso del inglés. Sin embargo, tanto su nivel de nativismo como su grado de disponibilidad léxica en inglés fueron bastante bajos; de hecho, 6 de nuestros 15 participantes se negaron a realizar la prueba de disponibilidad léxica en inglés porque declararon no saber escribir correctamente en esta lengua. Estos bajos resultados generales serían el motivo por el que estos dos factores no produjeron ningún resultado significativo. El hecho de que los participantes de mayor edad declararan un mayor del euskera podría deberse a que estos participantes ya estaban jubilados y se relacionaban más con otros hablantes de su misma lengua nativa, mientras que los participantes más jóvenes seguían en activo y, por tanto, tenían una mayor interacción con hablantes de la L3.

En cuanto a los resultados en relación a la atrofia lingüística de las L1, nuestros participantes obtuvieron unos resultados más variados en castellano que en euskera; sin embargo, ninguna de las variables analizadas produjo resultados significativos en castellano, probablemente porque los resultados no fueron lo suficientemente variados como para que alguna de las variables resultara significativa. En cuanto a los resultados en euskera, ya hemos comentado anteriormente que la edad de llegada en el país de acogida

predecía el grado de nativismo en euskera por los jueces bilingües. Sin embargo, género no produjo ningún resultado estadísticamente significativo con respecto a el grado de nativismo, el grado de comprensibilidad y el grado de disponibilidad léxica; sólo encontramos que las mujeres declararon un grado de activación de euskera significativamente mayor que el de los hombres. En este caso, ya hemos explicado anteriormente que este resultado podría deberse al hecho de que los hombres eran los que salían a trabajar fuera de casa y estaban más integrados en la comunidad americana, mientras que las mujeres eran las que se quedaban en casa al cuidado de los hijos (e.g. Ellis, 1994). Asimismo, los factores afectivos examinados en el presente estudio tampoco produjeron ningún resultado significativo con respecto al grado de nativismo en euskera. En este caso, la falta de variedad en los resultados impidió que ninguna de las variables afectivas resultara significativa. Por otro lado, el grado de identificación con la comunidad vasca sólo predijo negativamente el grado de comprensibilidad; este resultado podría haber sido influenciado por la edad cronológica de los participantes, ya que aquellos que recibieron una puntuación entre 5,50 y 6 en su grado de comprensibilidad en euskera por los jueces dominantes estaban, en general, en el rango de edad menor a la media (rango = 47-87; media = 69), mientras que una de las dos hablantes que obtuvieron la puntuación entre 5,50 y 6 en su grado de comprensibilidad por los jueces bilingües era la más joven de la muestra (47 años; mientras que la otra tenía 79 años), aunque no encontramos ninguna relación estadística entre la edad cronológica de los participantes y el grado de comprensibilidad en euskera. Periodo de residencia en el país de acogida sólo resultó estadísticamente significativo (negativamente) como predictor del grado de disponibilidad léxica en euskera, pero no del grado de nativismo o del grado de comprensibilidad en esta lengua. Este resultado podría haber sido influenciado, de nuevo, por la edad cronológica de los participantes; es decir, aquellos participantes con un periodo menor de residencia en el país de acogida, los más jóvenes, fueron aquellos que produjeron más palabras en euskera y en castellano (rango = 47-87; media = 69); de hecho, encontramos una correlación estadísticamente significativa (negativa) entre la edad cronológica y el grado de disponibilidad léxica tanto en euskera como en castellano. Esto podría deberse a unas mayores habilidades de producción léxica por parte de los participantes más jóvenes, porque tomaban parte más activamente en las actividades organizadas por la comunidad

vasca, o porque su red social tanto en euskera como en castellano (y en inglés) era más amplia que la de los participantes de mayor edad; de hecho, las redes sociales de las personas tienden a disminuir considerablemente después de la jubilación. En este sentido, De Bot *et al*., (1991) reunieron a un grupo de inmigrantes holandeses en Francia de acuerdo con tres criterios: emigración después de los 17 años (ellos sugerían que después de esta edad la adquisición de la primera lengua se ha completado tanto a través de input formal como informal), periodo de residencia en Francia de al menos 10 años, y variación en la cantidad de contactos con la lengua holandesa desde la emigración. Los resultados fueron que sólo encontraron una relación lineal entre periodo de residencia y atrofia lingüística cuando había pocos contactos con la lengua nativa (i.e. cuando el input recibido en la lengua nativa era escaso). Por último, el grado de activación de la lengua y localización de residencia tampoco produjeron ningún resultado estadísticamente significativo con respecto a el grado de nativismo, el grado de comprensibilidad o el grado de disponibilidad léxica en euskera. En este caso, a pesar de que los resultados estaban bastante agrupados en las tres medidas analizadas, el hecho de que ninguno de los factores analizados como input fuera estadísticamente significativo confirma los resultados de De Bot *et al*., (1991) descritos anteriormente de que el periodo de residencia en el país de acogida sólo resulta ser un factor estadísticamente significativo cuando los contactos con la lengua son escasos, algo que en el caso del euskera no sucedía, ya que la mayoría de nuestros participantes declararon un uso bastante frecuente del euskera teniendo en cuenta que se trata de una lengua minoritaria en Estados Unidos.

En cuanto a los resultados con respecto al multilingüismo, ninguna de las variables analizadas en este estudio predijo el grado de nativismo ni el grado de comprensibilidad en castellano. En el caso del grado de nativismo, esto se pudo deber al hecho de que nuestros participantes multilingües recibieron una variedad de puntuaciones en castellano bastante limitada. Aunque la variedad de puntuaciones en el grado de comprensibilidad fue un poco más amplia, al parecer no lo fue lo suficiente como para que alguna de las variables produjera resultados significativos. Sin embargo, en cuanto a los resultados en euskera, tampoco hubo ninguna variable que predijera el grado de nativismo, a pesar de que la variedad de puntuaciones era más amplia que en castellano. En este caso, probablemente lo

que ocurrió fue que los participantes que conformaban nuestra muestra divergían poco en cuanto a las variables analizadas, es decir, motivación, el grado de identificación, etc., y esto pudo anular el efecto de cualquier variable sobre el grado de nativismo de nuestros participantes en euskera. El hecho de que factores como nivel educativo no tuvieran ninguna repercusión podría deberse de nuevo a que nuestros participantes divergían poco en su grado de nativismo y de comprensibilidad en ambas lenguas. En el caso del grado de disponibilidad léxica en castellano, las diferencias por género produjeron resultados significativos a favor de las mujeres, probablemente potenciada por el nivel educativo, ya que sólo 2 (1 de las cuales sólo tenía 16 años en el momento de la entrevista) de las 8 mujeres en la muestra declararon no tener estudios universitarios; mientras que en euskera, el hecho de que 3 de los 11 participantes no realizaran la prueba en euskera limitó el rango de resultados en esta prueba, de manera que esta variable no resultó estadísticamente significativa. Los resultados en euskera apoyan los del estudio de Flege & Liu (2001) que subrayaban la importancia del nivel educativo para conseguir un alto nivel de competencia en la lengua meta. También es importante señalar que los factores de input (i.e. porcentaje de uso de la lengua y localización de residencia) tampoco tuvieron ningún impacto en el grado de nativismo en euskera de nuestros participantes. El hecho de que los participantes de Boise declararan un grado significativamente mayor de identificación con la comunidad vasca, así como mayor motivación y mayor grado de preocupación por una buena pronunciación en euskera sugiere que una mayor inmersión en la comunidad lingüística de la lengua meta influye positivamente en las variables afectivas (e.g. Yashima, 2002; Yashima *et al.,* 2004), aunque esto no se traduzca necesariamente en un mayor grado de nativismo en la lengua meta, como en nuestro estudio. Como ya hemos comentado anteriormente, nuestros resultados demuestran que si la estrategia "un padre/madre-una lengua" solamente produce un porcentaje de éxito del 75% en el caso del bilingüismo (e.g. De Houwer, 2007), en el caso del multilingüismo, en el que tenemos 2 lenguas minoritarias y una lengua dominante, el input recibido en cada una de las lenguas minoritarias resulta claramente insuficiente para conseguir niveles nativos de adquisición (ver De Houwer, 1990, 1995, 2005), tal y como lo demuestran los resultados obtenidos en nuestro estudio en el que los resultados generales de los sujetos multilingües tanto en euskera como en castellano estaban lejos de alcanzar niveles nativos.

El presente estudio nos ha permitido extraer una serie de conclusiones con respecto a los tres fenómenos analizados, a saber adquisición de una L3, atrofia lingüística en las L1 y multilingüismo, que detallamos a continuación. En lo que ser refiere a la adquisición de L3 en un contexto natural de adquisición, podemos concluir que a menor edad de llegada al país de la L3, mayores las probabilidades de alcanzar un alto nivel de competencia fonética en esa lengua (e.g. Bialystok & Hakuta, 1999; Birdsong, 1992, 1999a, 1999b; Birdsong & Molis, 2001; Johnson & Newport, 1989; Munro & Mann, 2005; Muñoz & Singleton, 2011), incluso competencia nativa si la llegada se produce antes de los 8 años de edad (e.g. Long, 1990, 2005). Estas posibilidades van decreciendo progresivamente a medida que la edad de llegada al país de la lengua meta aumenta.

En cuanto a la atrofia lingüística de las L1, el presente estudio ha demostrado que éste es un proceso que no puede ser explicado por la influencia de un solo factor, sino que es el producto de la colusión de una serie de factores. Asimismo, nuestros resultados apoyan los del estudio De Bot *et al.*, (1991) que demostraron que factores como periodo de residencia en el país de acogida sólo tiene una relación lineal con la atrofia lingüística cuando los contactos con la lengua nativa son escasos.

Con respecto al fenómeno de multilingüismo, nuestro estudio ha corroborado que uno de los rasgos más característicos de este fenómeno es su complejidad tanto en su definición como en su consideración como fenómeno social (e.g. Ruiz de Zarobe & Ruiz de Zarobe, 2015). La conclusión más firme que podemos extraer en este sentido es que la estrategia “un padre/una madre-una lengua” no proporciona input suficiente en el caso de dos lenguas minoritarias y una lengua dominante como para que los hablantes alcancen niveles nativos de adquisición (e.g. De Houwer, 2007; ver De Houwer, 1990, 1995, 2005). Nuestros resultados también nos permiten concluir que una mayor inmersión en la comunidad de la lengua de herencia tiene un efecto positivo en los factores afectivos hacia esa lengua y esa comunidad, aunque estos factores no trasciendan a las medidas lingüísticas.

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