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Early L2 Learners and Phonology

Does Their Early Start Guarantee Nativelike Phonology?

A Bachelor Thesis

Presented to the Department of English Linguistics

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Abstract

It is often thought that the possibility for second language (L2) learners to achieve nativelike phonology is affected by age of onset (AO). That is, early learners will achieve nativelike phonology while late learners will not. This thesis attempted to answer the question whether it is indeed the case that an early start guarantees nativelike phonology. It did so by providing an overview of previous literature and studies which looked at the L2 phonology of L2 learners including heritage speakers. Results of these studies revealed, however, that an early start did not guarantee nativelike phonology, because some early learners had detectable foreign accents despite their early AO. Additional evidence came from studies that focused at the heritage language of heritage speakers which is thought to resemble a L2. These studies revealed that heritage speakers did not have nativelike phonology in heritage language either. Both the L2 and the heritage language thus seemed to not only be influenced by AO, but rather by a combination of AO and other factors such as amount of L2 input and use, identity and language transfer.

Table of Contents

1. Introduction

1.1 Background

An often debated question in the field of second language acquisition (SLA) is whether or not a certain age period exists during which a second language (L2) must be acquired in order to become nativelike in that language. This is referred to as the 'Critical Period Hypothesis' (CPH) (see e.g. Asher & Garçía, 1969; Asher & Price, 1969; Birdsong, 1999; Birdsong & Molis, 2001; Flege, Yeni-Komshian & Liu, 1999; Hakuta, Bialystok & Wiley, 2003; Long, 1990; Johnson & Newport, 1989; Patkowski, 1980; Snow & Hoefnagel-Höhle, 1987;). Although the earliest form of the CPH, proposed by Penfield and Roberts and later popularized by Lenneberg in 1967 (Birdsong, 1999; Saville-Troike, 2012), was related to first language (L1) acquisition, Johnson and Newport (1989) at the time found evidence that it also extends to L2 acquisition. The CPH predicts that only acquiring a L2 within this period will lead to nativelike proficiency. Acquisition outside this period will result in various levels of outcomes but often not in nativelike proficiency, thus showing a discontinuity in outcomes on both sides of the critical period (Hakuta et al., 2003). One explanation for why learning a L2 outside the critical period will not result in nativelike proficiency is because as you grow up, some maturational changes in the brain occur which inhibit it (e.g. Birdsong & Molis, 2001; Harley, 2001; Newport, 1990).

Other scholars have claimed the chances of achieving that not being able to achieve nativelike proficiency when learning begins after a certain age is not only affected by maturational constraints, but also by factors underlying the age factor, such as transfer of the L1 onto the L2 (e.g. Tahta, Wood, & Loewenthal, 1981). By this is meant that L2 acquisition could be constrained by one's L1, which is more likely to happen when one's L1 is more advanced in the case of older learners (see Pallier, 2007 for an overview). This suggests that early learners whose L1 system is not as advanced yet as that of older learners will be less constrained by their L1 which will likely result in better L2 acquisition. This does not imply that L1 transfer is the sole factor affecting L2 acquisition, but supports the idea that there are more variables underlying the age factor which affect L2 acquisition.

One of the studies providing evidence for the CPH is by Johnson and Newport (1989) who compared the English proficiency in grammar achieved by 46 native Korean or Chinese speakers with different ages of arrival in the United States, ranging from 3 till 39 years old, and with different lengths of residence, ranging from 3 till 26 years. They found that the

proficiency of the speakers who arrived in the United States before puberty (age 15) was linearly related to age of arrival, meaning that those who arrived at a younger age scored better than those who arrived at a later age. Additionally, of the speakers who arrived before the age of 7 almost all had nativelike proficiency, but none had nativelike proficiency who arrived after the age of 7. Among those who arrived after puberty (age 17) there was a lot of variation in the results and there did not seem to be a clear age-related decline in proficiency. In other words, the results of Johnson and Newport's (1989) study showed that there seems to be a critical period ranging from birth till the age of 7 which is the critical cut-off point. Although Johnson and Newport chose Korean and Chinese speakers because their language is quite unrelated to English, they did not think that the results of their experiment might have been influenced by this dissimilarity between the languages, because they acknowledge only a limited role of the L1 onto the L2. See for other studies that defend the CPH e.g. Asher & Garçía, 1969, Flege, Yeni-Komshian & Liu, 1999 (only for phonology, not for morphosyntax), Hyltenstam & Abrahamsson, 2000, Johnson & Newport, 1991, Larew, 1961, Patkowski, 1990.

In contrast to the previous scholars who claim that there is a critical period for L2 acquisition, some scholars have claimed that there is no such thing as a certain critical age at all after which L2 acquisition will not lead to nativelike proficiency anymore. Rather, there is a progressive decline in proficiency as age of learning (AO) increases, i.e. the older one gets, the less likely it becomes that one will achieve nativelike proficiency. This implies that there is a more or less gradual age-related decline in proficiency rather than a sudden and quick decline in proficiency after a certain age (e.g. Bialystok & Hakuta, 1999; Birdsong, 1992, 1999; Birdsong & Molis, 2001; Flege et al., 1999; Hakuta et al., 2003; Hyltenstam & Abrahamsson, 2000; Johnson & Newport, 1989, 1991; Newport, 1990).

In response to the studies supporting the CPH and in particular to the conclusion of Johnson and Newport that the L1 only plays a limited role in L2 acquisition, Birdsong and Molis (2001) conducted a study in which they replicated Johnson and Newport's (1981) experiment but then with Spanish L2 learners of English. Interestingly, Birdsong and Molis (2001) found contrasting results. They found that there was a negative correlation between AO and L2 attainment and they even found some evidence of nativelike attainment among late learners, thus rejecting the CPH.

Hakuta et al. (2003) think that the contrasting results between the studies by Birdsong and Molis (2001) and Johnson and Newport (1989) largely result from the fact that Spanish is more related to English than Korean or Chinese, suggesting that one's L1 might play a bigger

role in L2 acquisition than Johnson and Newport acknowledge in their study. Another smaller difference between the two studies which is worth mentioning is that while Johnson and Newport looked at age of arrival, Birdsong and Molis looked at age of first exposure. It may not seem so, but these two have slightly different meanings. Arriving in a new country does not always necessarily mean getting immediately exposed to its majority language and start acquiring it. This is, however, very unlikely, because that would mean that the individual has been completely cut-off from the outside world. If age of arrival did nevertheless not coincide with AO for whatever reason in Johnson and Newport's (1989) study, participants who arrived at the same age as participants in Birdsong and Molis's (2001) study may have actually not started L2 acquisition until several years later. In order to be able to compare the two studies, more should be know about the actual AO of participants in Johnson and Newport's (1989) study before conclusions can be drawn about AO effect on L2 acquisition.

Hakuta et al. (2003) conducted a study to eliminate that the results of the studies by Johnson and Newport (1989) and Birdsong and Molis (2001) were influenced by the similarities and dissimilarities between the L1s and the L2. They chose for both Spanish and Chinese native speakers as participants. The authors found that the degree of success in L2 acquisition gradually declines as AO increases, but not showing the particular discontinuity on both sides of the critical period that characterizes the CPH. Their results thus reject the CPH and supporting the idea that there is a more or less gradual age-related decline in proficiency as AO increases. Hakuta et al. (2003) attributed the different degrees of success not only to age of immigration, but mainly to the amount of formal education which suggests that other factors than AO are important to consider as well. See for more studies that found similar results that the CPH does not exist e.g. Asher & Price, 1969, Birdsong, 1992, Birdsong & Molis, 2001, Hakuta et al., 2003, Neufeld, 1978, Singleton, 2007, and Snow & Hoefnagel-Höhle, 1978.

Other evidence which supports the idea that the CPH might not exist is that scholars supporting the CPH generally have different opinions about the exact end of the critical period, with the onset ranging from as early as birth to the terminus at the age of 12 or 15 (Mackay, Flege & Imai, 2006) to even 20 (Hakuta et al., 2003). If there is not an agreement on the exact terminus of a critical period, there cannot be just one definition of the CPH either. Instead, the results found by scholars who either claim to have found evidence in favour of the CPH or against it largely depend on what the scholar understands as the CPH, one possible factor explaining the different outcomes in studies.

1.2 Research question

Opinions among scholars about whether or not there is an optimal period for L2 acquisition differ greatly. Some scholars claim that there is indeed such a period and that it most likely ends around puberty although there is no general consensus on the exact age that closes it. Other scholars say that there is not a specific period, but rather a sensitive period, meaning that early AOs will result in nativelike L2 proficiency whereas late AOs will most likely not. A third possibility is that the possibility to achieve nativelike L2 proficiency is not just affected by AO, but also by other underlying variables. Most of the studies I discussed in the previous subsection only focused only on one or a few language domains which does not provide a complete view on whether it is possible that one can achieve full nativelike L2 proficiency in all language domains.

The possibility whether one can achieve nativelike L2 proficiency rather seems to be different for different language domains. Phonology, for instance, is speculated by Lenneberg to be main language domain that inhibits late or adult L2 learners from achieving full nativelike L2 proficiency (Saville-Troike, 2012), meaning that is the domain most likely to show the most non-native patterns in late or adult L2 learners. This implies that only early L2 learners should be able to achieve nativelike L2 phonology, suggesting that AO is the most important predictor of nativelike L2 phonology. This is in line with what the CPH predicts, because the CPH also predicts that an early AO, that is, before puberty, will lead to nativelike L2 proficiency, whereas a late AO will not. Other scholars, then, think that the chances to achieve nativelike L2 phonology are not only affected by age-related factors, but also by variables underlying the age factor (e.g. Bongaerts, Planken, & Schils, 1995; Flege et al., 1995, 1997, 1999; Flege & MacKay, 2011; Guion, Flege, & Loftin, 2000; Ioup, Boustagi, El Tigi, & Moselle, 1994). Based on the above observations that age is likely to be the biggest predictor for the degree of success in L2 phonology has led me to the following research question that I would like to investigate further in this thesis: Does an early start guarantee nativelike phonology in a second language?

To answer this question I will give an overview of previous studies on L2 phonology by L2 learners as well as by early bilinguals, namely so-called *heritage speakers*. In section two I will start by providing some definitions on differences between ‘second’ or ‘foreign’ language ‘acquisition’ or ‘learning’ and on differences between L2 learners and bilinguals. I will then extend a bit more on a critical period for phonology in particular and argue that there seems to be an optimal period during which L2 phonology should be acquired in order to

achieve nativelike L2 phonology. At the end of section two I will formulate my hypothesis based on the background information.

Section three will focus on the heritage speakers. I will start this section with a definition of heritage speakers. I will subsequently give an overview of previous studies on heritage speakers to provide more insight into whether an early start guarantees nativelike phonology. I will not only focus on their L2, but also on their heritage language as it is thought that their heritage language resembles a L2 (Montrul, 2012).

Section four will be a general discussion based on the findings of the studies and an overview of factors and explanations that account for the various outcomes. Finally, section five will be a brief conclusion in which I will highlight the major points and provide an answer to the research question.

2. Second Language Phonology

2.1 Overview relevant definitions

In this subsection I will give a brief overview of definitions of terms that are relevant to this paper to make sure that it is clear what is meant when I refer to such terms. As this paper focuses on 'second language (L2) acquisition', it might be useful to start with explaining this term and what distinguishes it from 'second language learning' and 'foreign language learning/acquisition'.

2.1.1 Acquisition versus learning

Strictly speaking, there is a difference between L2 'acquisition' and L2 'learning'. L2 acquisition is a subconscious and natural process, that is, language is acquired through interaction or communication with natives and error correction and explicit teaching of underlying rules and structures do not play a role (Krashen, 1981). The individual does not make any conscious effort to master that language (Ellis, 2015). L2 acquisition should thus be similar to the way children acquire their L1, but if this were true, L2 acquisition would almost always result in nativelike proficiency just like in most cases in L1 acquisition. This does nevertheless not always seem to be the case, so there must be some differences between L1 acquisition and L2 acquisition. L2 learning, on the other hand, is a conscious process and happens in an instructed setting, e.g. a classroom (Saville-Troike, 2012), that is, the learner learns the language through formal instruction. The learner is thus aware of underlying rules and structures and also receives explicit feedback on errors (Krashen, 1981). Despite the differences, L2 acquisition and L2 learning are generally subsumed under the term 'L2 acquisition' (Ellis, 1997). Hence L2 acquisition will be used from now on to refer to the process of either learning or acquiring a second language. I will furthermore use 'L2 learners' to refer to the individuals undergoing the process of L2 acquisition as this is a more commonly used term in second language literature than 'L2 acquirers'.

L2 acquisition seems to refer to the acquisition or learning of a second language, but it can also be used as a cover term for learning a third or fourth language, or even subsequent languages (Ellis, 1997), as in the case of multilinguals who may have been exposed to more than two languages (Rothman, 2009). For the purpose of this thesis I limit myself to speakers

who speak two languages, hence 'second' will only refer to any language acquired subsequently to one's first language.

2.1.2 Second versus foreign language

Lastly, there is a difference between 'second' language or 'foreign' language. 'Second' language is usually used to refer to a language which has been acquired with the purpose of using it often, e.g. in everyday communicative situations (Ellis, 2015). Individuals with various L1s who move to a host country and have to learn the dominant language of that country in order to be able to participate in the wider society or community would be a good example of second language learners. 'Foreign' language is used when the individual does not necessarily need the language in order to be able to participate in the wider society or community, but rather has no or only limited opportunities to use it in everyday communicative situations (Ellis, 2015). Monolingual individuals learning, for instance, French at schools in The Netherlands would be a good example of foreign language learners.

2.1.3 Bilingualism

It is generally believed by the majority of people that a bilingual is someone who speaks two languages (Butler, 2012), but there is not one definition that is agreed upon by all scholars. Bloomfield, for instance, defines bilingualism as "native-like control of two languages" (as cited in Diebold, 1961, p. 99), while Macnamara defines it as possessing "a minimal competence in only one of the four language skills, listening comprehension, speaking, reading and writing, in a language other than his mother tongue" (as cited in Hamers & Blanc, 2000, p. 6). These two definitions are on each end of a continuum and both have certain limitations. Macnamara's definition is too broad and includes too many people. His definition implies that an individual with a very low level of proficiency in a second language would already be classified as bilingual (Hamers & Blanc, 2000). That is, an individual who knows, for instance, how to speak a few words in another language. Bloomfield's definition, on the other hand, is too narrow, because what does it require to be called nativelike in a second language, i.e. what criteria should be met and secondly, if a set of criteria were to be established and agreed upon, people who are very competent in a second language, but not competent enough to be called nativelike, even if this difference is very minimum, are excluded in this definition and are then not considered bilingual at all. There are, of course, many definitions in between these two opposite definitions, hence I will refer to bilinguals as

"individuals or groups of people who obtain communicative competence in more than one language, with various degrees of proficiencies, in oral and/or written forms, in order to interact with speakers of one or more languages in a given society" (as cited in Butler, 2012, p. 112; see Butler, 2012 for an overview of various definitions and their limitations). This definition implies that bilinguals are those who need to use both their languages in order to be able to interact with others and participate in society, distinguishing them from foreign language learners and regular L2 learners who do not need to use their L2 on a daily basis.

Bilingualism can furthermore be divided into 'early' bilinguals and 'late' bilinguals (Grosjaen, 1982; Montrul et al., 2008). Early bilinguals refer to those who acquired or learned their two languages in childhood and late bilinguals refer to those who acquired or learned their L2 in adulthood (Butler, 2012). Moreover, early bilinguals can be divided into two subgroups: sequential bilinguals and simultaneous bilinguals (Rothman, 2009; Montrul, 2008; Butler, 2012). Simultaneous bilinguals children refer to those who have been exposed to both languages at the same time from birth and sequential bilingual children refer to those who have been exposed to their L1 since birth and acquired their L2 after they fully acquired their heritage language (Montrul, 2008) or at least its foundations (Sebastián-Gallés, Echeverría, & Bosch, 2005).

2.2 Critical or sensitive period phonology

This subsection will extend on the CPH in relation to phonology a bit more, because phonology is the domain this thesis focuses on. As Long (1990) observed, the opinions among scholars on the CPH are "sharply divided" (p. 16). Although there is no agreement on the CPH for L2 acquisition in general, some scholars argue that there must be a separate 'critical' period for each language domain (Saville-Troike, 2012; Flege et al., 1999; Long, 1990), as it is hypothesized that some aspects of a language are acquired before others (Krashen, 1981). The speculation by Lenneberg (1967) that phonology is the language domain showing the most non-native patterns in late learners, is because it is one of the most difficult aspects of a language to acquire which is why late or adult learners usually keep a foreign accent (Saville-Troike, 2012). Scovel (1988) even posited that there is only a critical period for phonology, not for any other language aspects (Bongaerts et al., 1995).

A critical period for phonology suggests that only early learners who begin L2 acquisition within that period, thus before a certain age, can achieve nativelike L2 phonology. The possibility to achieve nativelike L2 phonology thus seems heavily influenced by age.

Flege (2003), on the other hand, seems to think that the acquisition of L2 phonology is not only influenced by the age factor but also by other factors or variables. He believes that the amount of input, for instance, is one of those other factors affecting the acquisition of L2 phonology. He claims that as long as adults have enough L2 input they will be able to achieve nativelike phonology, because the capacities that are responsible for whether one can achieve nativelike phonology, both in production and perception, remain intact during one's whole lifespan just like for one's L1. He also claims that the different outcomes in phonological proficiency among adults are not the result of maturational constraints discussed earlier but because of L1 interference (Flege, 2003).

Other scholars say that there is not a critical period for phonology at all which predicts that individuals starting L2 acquisition after a certain age will not achieve nativelike L2 phonology. They claim that it should be called a 'sensitive' period rather than a 'critical' period (Flege et al., 1999). A sensitive period predicts a more gradual decline in phonological proficiency as AO increases instead of a sudden decline after a certain age which characterizes a critical period. A sensitive period does still imply that maturational constraints may be responsible for the decline in phonological proficiency when OA increases (Flege et al., 1999).

As with the CPH, scholars do not agree on the terminus of such a possible period for L2 phonology acquisition. Long (1990) claims that the L2 is generally spoken without a foreign accent if the AO is six years or younger and that learners whose AO is between seven and twelve years are more likely to have a foreign accent, but are still able to achieve a nativelike phonology. He thus thinks that the terminus of a critical period for phonology is twelve years. Scovel, for instance, also claims that twelve years is the terminus (Bongaerts et al., 1995), while Patkowski (1990), for instance, thinks it is somewhere between twelve and fifteen years.

2.3 Overview previous studies on late L2 learners

The CPH and a critical or sensitive period for phonology predict that early learners will achieve nativelike L2 phonology, but they also entail that late learners will not due to the age factor. However, as some scholars believe that there are other factors besides AO that affect L2 phonology acquisition, studies which found cases of late L2 learners who nevertheless achieved nativelike L2 phonology might provide more evidence in these other factors that are at play in L2 phonology acquisition as well.

One of such studies is by Ioup et al. (1994) who studied the case of an adult English woman, Julie, who moved to Egypt at the age of 21 years, married an Egyptian man and who successfully achieved nativelike phonology in Arabic. Her AO was 21years and she acquired Arabic in a naturalistic environment. She had never received formal Arabic instruction before she moved to Egypt. Julie was perceived as having nativelike phonology by 8 out of 13 native judges despite her late start. The ones who rated her as not having nativelike phonology based that on one element of the pronunciation. Julie achieved nativelike L2 phonology despite her late start. Factors that accounted for this success were according to Ioup et al. (1994) her high motivation to speak Arabic, the naturalistic setting in which she acquired it, her extensive L2 input on a daily basis, and her language learning talent.

Another study who found similar results that late learners can achieve nativelike L2 phonology is by Bongaerts et al. (1995). The participants in this study were a group of Dutch L2 learners of English who were divided in a group with high proficiency and a group with a lower proficiency. The authors found L2 learners whose AO was 12 years or older were judged as having a pronunciation that fell within the range of native speakers. Interestingly, some learners from the high proficiency group were sometimes even rated as more nativelike than the natives. However, this seemed to be the result from a flaw in the composition of the native speakers group and the group of judges. As improvement of this previous study, Bongaerts, Summeren, Planken, and Schils (1997) conducted a new study with the same set-up but with a better composition of the native speakers group and the group of judges. In this latter study they found some but not all from the high proficiency group scored as native speakers. The authors mainly attributed this success to the high amount of L2 input that these late learners received. This study supports the findings by Ioup et al. (1994) that some late learners can indeed achieve nativelike pronunciation.

Similar results were obtained in another study by Bongaerts et al., (2000, cited in Bongaerts et al., 1997) in which they argued that the success of late learners in the present study and in their previous studies can also be attributed to personal and professional motivation of the participants. A similar observation that motivation can account for why some adults can achieve nativelike L2 phonology comes from a study by Moyer (1999). In his study Moyer found an exceptional L2 learner of German in the United States who was perceived as nativelike even though his AO was 22 years. He was reported to be highly motivated because he had a strong desire to sound German (Moyer, 1999; see Bongaerts et al., 1997 and 1999 for an overview of additional studies with similar findings regarding late

learners who achieved nativelike pronunciation).

2.4 Hypothesis

This thesis attempts to answer the question whether an early start guarantees nativelike L2 phonology. The literature previously discussed pointed to the possible existence of a critical or sensitive period for phonology which both predict that early learners will indeed achieve nativelike L2 phonology. This prediction led me to my hypothesis that an early start will indeed guarantee nativelike phonology. Although I found evidence in the previous subsection for cases of late L2 learners who did achieve nativelike L2 phonology this should not affect my hypothesis, because I will focus on early learners only and investigate whether they will achieve nativelike phonology.

3. Heritage Speakers

Many studies on L2 phonology acquisition have looked at immigrants or immigrant children who acquired their L2 in a predominantly L2-speaking community (Flege & MacKay, 2011). In this section I will focus on so-called *heritage speakers*, a type of immigrants who started their L2 acquisition at a very early age in childhood (Montrul, 2012). Their early AO makes them of value to this thesis, because an overview of previous studies and their findings on heritage speakers and their phonology could provide evidence for my hypothesis that an early start guarantees nativelike phonology. They may also give a better insight in variables underlying the ability to achieve nativelike phonology.

3.1 Definition

Heritage speakers are immigrants, but not all immigrants are heritage speakers. There is a set of criteria which should be met in order to classify an immigrant as a heritage speaker. Montrul (2012), for instance, defines heritage speakers as "the children of immigrants born in the host country or immigrant children who arrived in the host country some time in childhood" (p. 2), thus explicitly referring to the second generation of immigrants, not to the first generation. Polinsky defines a heritage speaker as "an individual who grew up speaking (or only hearing) A as his/her first language but for whom A was then replaced by another language [language B] as dominant and primary" (Polinsky, 2008, p. 40). Language A refers to the heritage speaker's L1 spoken at home, also called 'home language' (Rothman, 2009) or 'heritage language' and which is furthermore the minority language in the host country (Montrul, 2012). Language B refers to the language of the host country which is spoken by most people in the host country, thus the societally dominant language (Montrul, 2012).To be more specific, heritage speakers have been exposed to their heritage language in childhood, but they did not, however, acquire it completely, because another language (that of the host country) replaced the heritage language and became more dominant (Polinsky & Kagan, 2007). The term heritage speakers thus specifically refers to only young immigrants, not to adult immigrants who moved to the host country after childhood.

Fishman (2001) identifies three different types of heritage languages and heritage speakers. The first one is 'immigrant heritage languages', the home language of immigrants living in a host country. This one is the most similar to Montrul's definition. The second one is 'indigenous heritage languages', languages of people native to a certain country that are

now almost all extinct or at risk of being lost, for example Navajo in the United States. The third one is 'colonial heritage languages', languages that are spoken in a host country as result of groups that once colonized that country and that are still spoken as well, for instance Dutch or German in the United States. What they have in common is that they are all minority languages. Although Fishman (2001) based his three types on the context of the United States, they could be applied elsewhere.

As Polinsky's definition already explained, Montrul further emphasizes that the heritage language used to be a heritage speaker's primary and dominant language, but gradually there is a shift to language B as their primary and dominant language – resulting in the heritage language becoming the secondary and weaker one due to more use of language B (Montrul, 2008, 2012). This is why heritage speakers are usually more fluent in their L2 (Polinsky & Kagan, 2007). In sum, their L1 is the first, but secondary and minority language, whereas their L2 is the second, but primary and dominant language. This important characteristic distinguishes heritage speakers from regular L2 learners whose L1 is the first, primary and dominant language and whose L2 is the second, secondary and minority language (Montrul, 2012). Since heritage speakers have been exposed to two languages in childhood they can be classified as early bilinguals (either simultaneous or sequential) which distinguishes them from late bilinguals and late L2 learners who start learning their L2 after childhood.

Although 'heritage speakers' acquire both their languages through interaction in a naturalistic setting just like (early) 'bilinguals', these two terms cannot be used interchangeably, i.e. each bilingual is not always a heritage speaker. A prerequisite to call early bilinguals heritage speakers is that they must have acquired their heritage language from birth and at home naturalistically, but acquire and get educated in their dominant L2 (Rothman, 2009).

Heritage speakers can furthermore be distinguished from regular L2 learners. Although heritage speakers share some features of L2 learners (Montrul, 2015), there are also differences between them. One of the main differences is the setting in which both acquire or learn the language. Heritage speakers like early bilinguals acquire their L2 in a naturalistic setting, while L2 learners learn their L2 in an instructed setting (Ellis, 1994; Montrul, 2010). In a naturalistic setting, the individual acquires a language in a natural way, for instance through communication in social situations whereby the individual is not explicitly made aware of errors and underlying structures and rules. In an instructed setting, on the other hand, the individual acquires a language through instruction, e.g. in a learning environment like a

classroom, and is made explicitly aware of errors and underlying structures and rules (Saville-Troike, 2012). Long's (1981) proposition that the type of input in a naturalistic setting is very effective for acquisition makes a naturalistic setting seem better for the acquisition of L2 phonology than an instructed setting. A naturalistic setting seems even more effective given the idea that major factors affecting the acquisition of L2 phonology "seem to be those which teachers have the least influence on" (Purcell & Suter, 1980, p.286), thus suggesting that L2 phonology is less likely to be well acquired in an instructed setting, as opposed to a naturalistic setting.

Another distinction between heritage speakers and regular L2 learners is that heritage speakers receive L2 input either from birth or from some time later in early childhood, whereas L2 learners only have access to L2 input at a later age. The above observations suggest that an early natural acquisition thus seems to be better than a later and often instructed one, also because a naturalistic acquisition from birth closely resembles one's L1 acquisition which is also a natural process that leads for most individuals to a perfect nativelike competency in the L1. Based on this, one would assume that these advantages for heritage speakers over L2 learners result in a higher degree in phonology and possibly even full nativelike phonology.

3.2 Relevance of heritage speakers

Montrul (2012) argued that the heritage language of heritage speakers ends up resembling a L2 due to the language shift, meaning that learning the heritage language is to some extent comparable to learning a L2. This makes heritage speakers of particular interest to the purpose of this thesis, because evidence supporting the claim that an early start guarantees nativelike phonology may now be found in their heritage language as well as in their L2 which will hopefully result in even more convincing evidence for the above claim. To find this evidence, I will give an overview of previous studies on heritage speakers' phonology in both their heritage language and L2 in the following subsection. Note that age of arrival in these studies coincides with one's AO.

3.3 Overview previous studies on heritage speaker's phonology

3.3.1 Phonology in L2

Most of the following studies are done on immigrants or heritage speakers and their L2 phonology acquisition in a naturalistic setting. One of the first studies on such immigrants is by Asher and Garçía (1969) who examined the overall pronunciation of English sentences by 71 Cuban immigrants between 7 and 19 years old and who had lived in the United States between 1 and 8 years. Asher and Garçía wanted to investigate what the optimal age is for a Cuban child to enter the United States in order to be able to achieve nativelike L2 phonology. They found that none of the 71 Cuban children were rated as native speakers despite some of them had an early start, but it should be mentioned that none of the children whose AO was 6 six or younger had a definite accent. Moreover, they found that the optimal age at which a Cuban child had the greatest possibility to achieve nativelike phonology in English was with an AO of 6 years or younger, but only when he had lived in the United States for more than five years. To be more specific on the results, of the children whose AO was 6 years or younger 32% had a slight accent and none had a definite accent, of those with the AO between 7 and 12 years 43% had a slight accent and 16% a definite accent, and of those with the AO of 13 years or older 66% had a definite accent and only 27% a slight accent. Lastly, those who lived in the United States for 5 years or more had a higher chance of achieving nativelike phonology than those who lived there for 4 years or less. Asher and Garçía's study seems to provide evidence against the idea that there is a sensitive or critical period for phonology, because none of the early bilinguals had nativelike L2 phonology. The lowest degrees of foreign accent were found among children with an AO of 6 years or younger, because none of them had a definite accent. Furthermore, the degree of foreign accent increased as AO increased. Strictly speaking, this result shows that an early start, that is, before the age of 6 in Asher and Garçía's study, does not guarantee nativelike L2 phonology. It rather suggests that chances to achieve it are higher than for later starters. It is, however, debatable whether the absence of a definite accent among early starters can nevertheless count as evidence supporting the idea that an early start guarantees nativelike L2 phonology.

Other studies on immigrants and their L2 phonology have been done by Flege and his colleagues in a series of studies. In these studies the focus was on sequential bilinguals instead of simultaneous bilinguals to make sure that they only looked at individuals who learned English as a second language and not as one of their first languages which is the case in

simultaneous bilinguals. For example, Flege et al. (1991) examined the voice onset time (VOT) of the word-initial stop consonant /t/ in both English and Spanish in early (AO ≤ 6) and late (AO ≥ 11) Spanish-English bilinguals living in the United States. As it was not clear if the early bilinguals were more dominant in English than in Spanish, one cannot immediately define them as heritage speakers. However, their early AO, and the fact that they were educated in their L2 suggests that they indeed fall in the category heritage speakers. These early and late bilinguals were compared to English and Spanish monolinguals. Flege et al. found that the early bilinguals produced VOTs that did not differ from English monolinguals, whereas the late learners produced VOTs at an intermediate level between that of English monolinguals and Spanish monolinguals. He additionally found that both the early and late learners' production of VOTs in Spanish did not differ from monolinguals. The early bilinguals had an AO of 6 years or younger just like in Asher and Garçía's (1969) study. In contrast to Asher and Garçía, Flege et al. (1991) found that the early learners performed at a nativelike level which seems to be supportive evidence for the idea that an early start guarantees nativelike L2 phonology. However, this study was only based on one small element of phonology which makes the evidence less strong, because it does not give a complete view of L2 phonology. The following study by Flege and colleagues gives a more extended view on L2 phonology, because they examined the overall degree of perceived foreign accent in the production of English sentences.

Participants in this study by Flege et al. (1995) were 240 adult Italian speakers who migrated to Canada between the ages of 2 and 23 years who reported to use their L2 English more often than their L1, although the earlier the AO the more English and the later the AO the more Italian. The authors found that foreign accents were perceived in all age groups, even among the early bilinguals and that the older the AO, the stronger the foreign accent. None of the individuals whose AO was 15 years or older scored even within the range of native speakers, whereas a few whose AO was between 12 and 15 years did. This study is thus evidence for the idea that an early start does not guarantee nativelike L2 phonology, because not all of the early bilinguals were perceived as nativelike. In addition, the degree of foreign accent did not suddenly increase very quickly after the age of 15 as the existence of a critical period would predict. Finally, Flege et al. found that these results can be accounted for 59% by AO, for 15% by three language use factors which were different for each gender, and the rest was accounted for by length of residence and gender. Studies by Flege and colleagues posit that AO always goes hand in hand with other, underlying variables that "may impact L2 learning by immigrants who learn the L2 through immersion in a predominantly L2-speaking

community" (Flege and MacKay, 2011, p. 81). This study by Flege et al. found similar results as Asher and Garçía (1969) that an early start does not guarantee nativelike L2 phonology. The results of the present study are furthermore in line with my hypothesis that an AO of between 12 and 15 years is more likely to result in nativelike L2 phonology than an AO of 15 years or older.

Similar results were obtained by Flege et al. (1999) who also found that a few early bilinguals fell within the range of native speakers. That not all of the early bilinguals performed so well gives evidence that an early does not guarantee nativelike L2 phonology. The participants in this study almost all reported to use their L2 English more than their L1 Korean, so those who arrived in childhood are thus heritage speakers. Similar to the study by Flege et al. (1995), the authors of the present study did not find evidence for a critical period, because they did not find a discontinuity in outcomes after the age of 12 which the authors used as the terminus age in this study. Instead, AO-foreign accent correlations were significant for both the learners whose AO was 12 years or younger as for those whose AO was older than 12 years and accents grew stronger as AO increased. The authors also found that the gradual decline in phonological proficiency could be attributed to maturational constraints for phonology, while the decline in proficiency in morphosyntax could not be attributed to maturational constraints, suggesting that phonology is highly affected by AO. The authors, however, think that the decline in phonological proficiency can rather be attributed to the underlying variable L1 influence onto the L2 due to the fact that one's L1 phonetic system also increases with age which means it might have a greater influence on the L2.

Further evidence that underlying variables of AO are just as important predictors of L2 foreign accent comes from Flege & MacKay's (2011) study. The participants in this study were 54 Italian sequential bilinguals who were divided in three groups according to AO: 7-13 years, 17-19 years, and 23-35 years. The first group used English more than Italian which classifies them as heritage speakers. As in above studies, when AO increased, the stronger the foreign accent, but foreign accents were even perceived among the early learners just like in Flege et al.'s (1995) and Asher and Garçía's (1969) studies. The present study found variables such as amount of L2 input and strength/activation of the L1 system to be big predictors of L2 foreign accent. In an earlier study in 2009 which was very similar to this present 2011 study, Flege found variables such as AO, chronological age, length of residence, frequent use L2, and self-estimated L1 proficiency to be significant correlated to degree of foreign accent. Motivation was not a significant factor (Flege & MacKay, 2011).

Other variables that might predict L2 foreign accent were examined by MacKay et al. (2006) who specifically looked at the variables chronological age and duration of L2 sentences, because earlier research had showed that L2 learners producing sentences that are somewhat longer in duration than that of native speakers is an indicator of a foreign accent in the L2. Furthermore, that the duration of sentences by early learners is closer to that of native speakers than the duration of sentences by late learners indicates that early learners have a lesser degree of L2 foreign accent. The participants in this study, 138 native Italian immigrants, reported speaking Italian more often than English and to be also more proficient in Italian, so they are not heritage speakers. MacKay et al. found similar results as the above studies, namely, the late learners had stronger foreign accents than the early learners. In contrary to Asher and Garçía (1969), the present study showed that a few of the early bilinguals performed within the range of native speakers. The fact that not all the early bilinguals had nativelike L2 phonology suggests like Flege et al. (1999) that an early start does not guarantee nativelike L2 phonology. Furthermore, only if early learners used their L1 infrequently did they have an undetectable foreign accent. Chronological age did not seem to be a significant factor and neither did the duration of L2 sentences in the second experiment. Those who used their L1 Italian more often had stronger accents than those who used Italian seldom. These results show that not only AO, but also variables like 'language use' factors such as percentage of L1 use (at home and in social contexts) and percentage of L2 use influenced the degree of nativelike L2 phonology.

While most of the above studies only looked at one or a few variables, Piske, MacKay and Flege (2001) wanted to look at a wider range of variables, such as AO, length of residence in an L2-speaking environment, amount of continued L1 use, self-estimated L1 ability but also gender. Piske et al. compared two groups of adult early Italian-English bilinguals that were matched for AO, but differed in self-reported amount of L1 use and two groups of adult late Italian-English bilinguals grouped according to the same criteria. As only 11 of the 18 early bilinguals had nativelike L2 phonology, this is again evidence supporting that an early start does not guarantee nativelike L2 phonology. Like all the above studies, the authors furthermore found that late bilinguals had a higher degree of foreign accent than the early bilinguals and similar to MacKay et al.'s (2006) study, participants who used their L1 more often had stronger accents than those who used their L1 seldom. Lastly, there were significant correlations between the degree of L2 foreign accent and AO, length of residence in Canada, amount of L1 use, and self-reported L1 ability. Gender did not play a significant role. Of all these variables, AO was found to be the most determinant factor for the degree of

L2 foreign accent, followed by amount of L1 use, because the participants who used their L1 more frequently had stronger foreign accents.

Whether variation among bilinguals in amount of L1 really influences degree of L2 foreign accent was investigated by Flege, Frieda and Nozawa (1997). Participants in their study were divided in a group which used their L1 often and a group who had a low use of their L1. They were only matched for age of arrival in Canada, but differed in other variables. Again, those who used their L1 Italian relatively often had stronger foreign accents than those who seldom used Italian. In line with aforementioned studies, individuals in both groups who began learning English in childhood had nevertheless detectable foreign accents which is again evidence that an early start does not guarantee nativelike L2 phonology.

Like Piske et al. (2001), Hyltenstam and Abrahamsson (2009) found that the majority of the early bilinguals in their experiment were perceived as having nativelike pronunciation, unlike some other studies in which there are usually only a few early bilinguals with nativelike L2 phonology. Participants were 195 Spanish-Swedish bilinguals, divided in early bilinguals (AO $\leq$ 11) and late bilinguals (AO $\geq$ 12). This division is in line with the thought that a critical period closes at age 12 or 15 (Long, 1990; Patkowski, 1990; Bongaerts et al., 1995). Hyltenstam and Abrahamsson found that a majority of the early bilinguals were perceived as having nativelike L2 phonology and even some whose AO was between the ages of 12 and 17 were perceived as nativelike, but none from the group whose AO was 18 year or older was. However, a second experiment showed that only a few of the group that were perceived as nativelike were still nativelike when scrutinized in detail. Lastly, only 39 of the 195 participants were not judged as having nativelike L2 phonology at all by any of the judges which is relatively few. The results of this study also support that an early start does not guarantee nativelike L2 phonology.

3.3.2 Phonology in heritage language

The following studies have specifically looked at the phonology in the heritage language of heritage speakers. Au et al., 2002 (cited in Montrul, 2015) examined the pronunciation and voice onset time (VOT) for Spanish voiceless stops and for Korean denti-alveolar stops in Korean and Spanish heritage speakers and compared this to late L2 learners of Korean and Spanish and to native speakers of these languages. They found that heritage speakers performed better than the L2 learners, but only for phonology, not for morphosyntax. Heritage speakers did nevertheless not perform at a nativelike level which means that their early start

has not resulted in nativelike phonology. Similar results were found by Oh, Jun, Knightly, and Au, 2003 (Montrul, 2015).

Kim (2012) specifically looked at stop consonants in Spanish and English by Spanish heritage speakers in the United States. The participants reported to be more dominant in their L2 English. Kim was mainly interested whether English stop consonants would influence the Spanish stop consonants, because he argued that phonetic interference between a bilingual's L1 and L2 is inevitable because one language is always more dominant. That the participants in this study were more dominant in their L2 English would suggest that English would interfere in the production and perception of Spanish. He found that heritage speakers did not differ significantly from English native speakers in the production of stop consonants in their L2, whereas in perception they were not nativelike. For their heritage language Spanish, heritage speakers did significantly differ from native Spanish speakers in production, but not in perception. These results thus show that for production they performed almost like natives in their L2, but not at all like natives in their heritage language. The result for the heritage language is similar to the results from the two previous studies. The present study did not make any specific conclusions about whether or not these results derive from language interference but suggested that more research should be carried out on production and perception among heritage speakers to understand language interference better.

A study that focused on such language interference and showed that it accounts for the poor performance in the heritage language is by Godson (2014). He investigated the vowel production by Western Armenian heritage speakers in the United States. He found that some speakers had some difficulty in pronouncing Western Armenian vowels that are the closest to English vowels, especially for those speaker who had been exposed to English in childhood as opposed to those in adulthood. This indicates that there might be some interference from English (L2) into Western Armenian (L1). Furthermore, the vowels of heritage speakers who had been exposed to English for a longer time (since childhood) were stronger influenced by their L2 than for those who got exposed to English later in life. A study by Sadaah (2011) found similar results. She investigated the production of long and short vowels of heritage speakers of Arabic and whose L2 is English and compared this to L2 learners of English. These two studies concluded that language interference is a big factor affecting the phonology in the heritage language and a predictor for a non-native accent.

Chang et al. (2011) looked at the production of Mandarin and English by Mandarin heritage speakers and in particular at language-internal and cross-linguistic phonemic contrasts. They were compared to native speakers of Mandarin and to late L2 learners of

Mandarin. Like Godson's (2014) study, the younger participants had had much exposure to Mandarin, whereas the late L2 learners (AO ≥ 18) had not. Chang et al. found that the heritage speakers performed better than the L2 learners at simultaneously maintaining language-internal and cross-linguistic contrasts.

In a similar vein, a study by Kupisch et al. (2013) examined the degree of foreign accent in 38 adult heritage speakers who were raised as simultaneous bilinguals. They were compared to L2 learners who had not been exposed to their L2 until 11 years and to monolinguals. They found similar results as the aforementioned studies for the heritage language, namely, heritage speakers performed better than L2 learners but did nevertheless not have nativelike phonology.

4. Discussion

4.1 Summary findings

It is generally believed that instead of one critical period for L2 acquisition, there is a separate critical period for each language domain, meaning that learning outside this period will not lead to nativelike proficiency in that domain (Saville-Troike, 2012). For phonology this period is thought to end at twelve or fifteen years or somewhere in between (Long, 1990; Patkowski, 1990; Scovel in Bongaerts et al., 1995). It is thought that starting before the age of 6 guarantees nativelike phonology and that starting between the age of 6 and 15 years is less likely to result in nativelike phonology (Long, 1990). However, it is also believed by some scholars that there is a sensitive rather than a critical period (Flege et al., 1999). Both a critical and a sensitive period predict that early learners will achieve nativelike L2 phonology. In contrast to the critical period, the sensitive period suggests that chances to achieve nativelike L2 phonology more or less gradually reduce as AO increases instead of a sudden decline in phonological proficiency after puberty. Both periods attribute the decline in proficiency to either age-related maturational constraints (but not a strictly defined critical period) or because of non-biological factors such as L1 interference.

According to both periods, early L2 learners including heritage speakers and early bilinguals should have nativelike L2 phonology because of their early start. Heritage speakers should furthermore have nativelike phonology in their heritage language because of an early start as well. Their heritage language was included in this thesis because it closely resembles a L2 (Montrul, 2012). To test these predictions I gave an overview of previous studies who looked early learners' L2 phonology and at heritage speakers' phonology in their heritage language. Some of these studies only looked at one element of phonology which were not extensive enough to draw conclusions from on overall phonological proficiency, but most looked at overall degree of perceived foreign accent in the production of words, sentences, paragraphs, or free speech. Participants in these studies came from various L1 backgrounds and differed in ages of arrival, AO, length of residence, and amount of L1 and L2 input and or use. Apart from Moyer (1999) who looked at American L2 learners of German in the United States and Guion et al. (2000) who looked at Quichua-Spanish bilinguals in a bilingual environment, these studies furthermore specifically focused on immigrants who were either born in or moved to a predominantly L2-speaking host country in which they were required to learn the L2 in order to be able to participate in society. These immigrants were early or late

bilinguals, depending on their AO. The early bilinguals, immigrants who learned both their heritage language and L2 in childhood and whose L2 became their dominant and majority language over time, can additionally be classified as heritage speakers.

The first series of studies I looked at which provided evidence against my hypothesis that an early start guarantees nativelike phonology was by Flege and his colleagues, because they found foreign accents in some early learners. They furthermore did not find any discontinuities after the age of twelve or fifteen years. Rather, they noticed a gradual, almost linear, increase in the degree of foreign accent as age of arrival increased, supporting a sensitive period rather than a critical period. However, some flaws can be detected in some of these studies which undermine the results obtained and perhaps make them less reliable. In one of the studies (Flege et al., 1997), the judges incorrectly identified sentences spoken by native English speakers as having been spoken by an Italian speaker which suggests a flaw in the ability of the judges to detect a foreign accent. A similar flaw can be found in another study by Flege et al. (1995) who did not take into account if and how differences among the judges in their ability to detect foreign accents may have influenced the results of the study. These two observations are of importance, because they suggest that the composition of the group of judges is rather important and can influence the results (Long, 1990). Long (1990), for instance, believes that judges who have encountered more dialects and foreign-accented speech by non-native speakers of their native language are less likely to judge sentences as sounding foreign than those who have not. Furthermore, children are less able to detect foreign accent than adults, according to Scovel (Flege et al., 1995). These observations point to the importance of a carefully selected group of judges to minimize their possible influence on the findings of an experiment.

Although foreign accents were even perceived among early L2 learners, the accents that were found among early learners in the study by Flege et al. (1997) were only very mild and not be readily evident. They were only detectable when closely scrutinized which means that these accents are most likely not be noticeable for natives in everyday life. This finding can thus not be seen as strong evidence against the claim that an early start guarantees nativelike L2 phonology.

Similarly, the findings by Asher and Garçía's (1969) study are also somewhat disputable. Although they found that no Cuban child was perceived as having nativelike L2 phonology despite their early start, none of them whose AO was 6 years or younger only had a definite foreign accent which is more or less evidence supporting that an early start, that is, before the age of six in this study, guarantees nativelike phonology. The Cuban children who

began learning before the age of seven had a greater chance of achieving nativelike L2 phonology than older learners, although still none of them had no foreign accent at all. This is partially in line with Long's (1990) claim that learning a L2 before the age of 7 will result in nativelike phonology. Furthermore, as AO increased, so did the foreign accent. The children whose AO six years or younger and who had lived in the United States for five years or longer had the greatest probability. These results show that the chances to achieve nativelike L2 phonology decrease as AO increases and furthermore that the chance is highly influenced by length of residence.

Another issue with Asher and Garçía's (1969) study is that the results could have been influenced by their L1 Cuban, because in a previous study by Purcell and Suter (1980) it was shown that one's L1 is the best predictor of the degree of L2 foreign accent, suggesting that the results for children from another country may have been different. However, Asher and Garçía's (1969) study and some other studies rejecting the CPH (e.g. Snow & Hoefnagel-Höhle, 1978) cannot be used as strong evidence against the CPH, because they only looked at short-term acquisition. That is, only the early stages of the acquisition process, which shows an advantage for late learners who start in adulthood over early learners who start in childhood. However, children will eventually catch up with adults and show advantages over the longer term (Asher & Garçía, 1969), suggesting that it is important not to draw conclusions too quickly based on short-term studies. Rather, long-term attainment should be examined before one can support or reject a critical period (Ioup et al., 1994).

Stronger and more convincing evidence that an early start results in nativelike phonology came from a study by Tahta et al. (1981). They found no detectable foreign accents in immigrants whose AO was six years or younger, whereas accents were found among older learners and even more so for learners whose AO was twelve years or older. This supports Long's (1990) claim that L2 acquisition that starts before the age of 6 results in nativelike phonology. It also supports a sensitive period, because foreign accents grew stronger as AO increased.

Similarly, Piske et al. (2001) and Hyltenstam and Abrahamsson (2009) also noticed an increase in degree of foreign accents as AO increased and they both also found cases of early bilinguals who were perceived as having nativelike L2 phonology, though not all of them were. Lastly, Flege (1991) only examined the VOT for the consonant /t/ in Spanish and English and found that none of the early bilinguals differed from native speakers at all as opposed to late bilinguals. This was quite a narrow study because it focused on only one element. The study did, however, indicate that pronunciation can be subdivided into smaller

units which can each be tested separately for nativelikeness, because judging someone as not having nativelike phonology does not necessarily mean that all elements of phonology are not nativelike. This was, for instance, the case for Julie in Ioup et al.'s (1994) study. She was not perceived as nativelike by all the judges because of one isolated element that was not nativelike.

Finally, at the end of the section on previous studies, I also looked at the heritage language of heritage speakers in particular. Since heritage speakers have been exposed to their heritage language from an early age, usually birth, the critical and sensitive periods would predict that heritage speakers have nativelike phonology in their heritage language as well, just like most L1 speakers have. Yet, some studies which focused on their heritage language found that most of these immigrants do not have nativelike phonology in their heritage language at all, despite their early start (e.g. Au et al., 2002 and Oh et al., 2003 in Montrul, 2015; Kim, 2012; Kupisch et al, 2013). These studies provided additional evidence that an early start does not guarantee nativelike phonology.

4.2 Factors influencing degree of nativelike phonology in second language

Findings in the previous section have showed great differences in results. This is mostly due to each study tending to focus on one or more different factors that could influence the degree of L2 foreign accent. This wide range of various factors will be discussed in the following paragraphs, because it will perhaps provide more insight into why heritage speakers often do not have nativelike phonology in their L2.

4.2.1 Amount of L2 input and use

Flege (1987, 2002) proposed that the quantity of the L2 input accounts for differences in degree of L2 foreign accent between children and adults. He based his proposition on Cochrane (1977). Cochraine found that children achieved a better phonology than adults, because they tended to speak the L2 with more people outside the home, thus suggesting that the more L2 input one receives and the more L2 one uses, the better the outcomes in L2 phonology. This is supported by Snow and Hoefnagel-Hohle (1978) who found that children had a better L2 phonology than their parents due to more exposure, e.g. on a daily basis at school, while their parents only occasionally spoke the L2, e.g. in social situations. Asher and Price (1967) claim that if the input were the same for children and adults they would get the same outcomes as well. That adults are able to achieve nativelike L2 phonology if they

receive enough L2 input despite starting long after a critical or sensitive is shown by Ioup et al (1994) who attributed Julie's nativelike L2 phonology to the great amount of L2 input she received. If quantity of the L2 input accounts for differences between children and adults, it might also account for differences among children, because it is very unlikely that all children have access to the exact same input. Self-evidently, those learners who receive relatively more input are more likely to have better outcomes than those who receive relatively less input. Similar results on the importance of L2 input and use were obtained by MacKay et al. (2006), Uzal et al. (2015) and Flege and MacKay (2011). Flege concluded that AOA is always correlated to underlying AOA variables such as amount of L2 input and in his earlier 2009 study he also concluded that frequent use of the L2 was significantly correlated to degree of foreign accent (Flege & MacKay, 2011). For other studies with similar findings that are not discussed here see Flege, 1987 and Szyska, 2015.

4.2.2 Amount of L1 input and use

The results of the study by Uzal et al. (2015) did not only show a significant correlation between nativelike L2 phonology and amount of L2 use, but also between nativelike L2 phonology and amount of L1 use. The four of nineteen heritage speakers who were perceived as having nativelike L2 phonology in Uzal et al.'s (2015) study not only spoke their L2 more, but also their L1 less. This suggests that speaking the L2 more and speaking the L1 less will positively attribute to a better degree of nativelike phonology. It is supported by other studies that heritage speakers who use their heritage language more frequently have more detectable foreign accents in their L2 (Flege et al., 1997; Guion et al., 2000; MacKay et al., 2006; Piske et al., 2001; Levis, 2005; Yeni-Komshian et al., 2000). Recall that some judges in the study by Flege et al. (1997) incorrectly identified sentences spoken by native English speakers as having been spoken by an Italian speakers, making that study somewhat less reliable. Using the L1 less and the L2 more often seems to be less problematic for heritage speakers than for L2 learners still living in their country of origin, because after all, the L2 is their dominant language and the majority language of society which they need to use in order to be able to participate in society. They could, for example, use their L1 less frequently with siblings or family members at home and use their L2 with them more often instead. The same thing goes for Julie in Ioup et al.'s (1994) study, for instance. Julie needs her L2 Arabic on a daily basis to be able to participate in the Arabic speaking society, whereas she perhaps uses her L1 only occasionally when communicating with other native English speakers, for example with her

family. For L2 learners still living in their country of origin who need their L1 on a daily basis in society and whose L2 can only be used in limited contexts, using the L1 less and the L2 more is not an option.

4.2.3 Influence L1 on L2

One's L1 can also affect L2 phonology greatly by means of 'L1 transfer' or 'L1 interference' (e.g. Flege, 1981; Saville-Troike, 2012; Butler, 2012; Purcell & Suter, 1980; Setter & Jenkins, 2005; Tahta et al., 1981). L1 transfer is the more neutral term of the two, as it can both refer to positive or negative transfer, whereas L1 interference only refers to negative transfer (Saville-Troike, 2012). A term which defines transfer not only as a result of interaction between one's L1 and L1, but also refers to the process underlying this result is called 'cross linguistic influence' (Ringbom, 1992). However, I do not intend to go in depth about the underlying process of language transfer here, hence, L1 transfer will be used. Odin's definition of transfer, "the influence resulting from the similarities and differences between the target language and any other language that has been previously (and perhaps imperfectly) acquired" (as cited in Butler, 2012, p. 127) implies that transfer seems to be the result of interaction between the L1, or heritage language, and L2.

Tahta et al. (1981) found that L1 transfer only occurs for learners who began learning after the age of six years and that the amount of transfer increased when AO increased. They attributed this transfer to AO, because they think it is the biggest predictor for whether there is accent and intonation transfer and thus a foreign accent. This might also account for the findings obtained by Asher and Garçía (1969) that no Cuban child achieved nativelike L2 phonology, because perhaps participants with other L1 backgrounds that are more similar to English would have produced better results. For an extensive overview of language transfer or cross linguistic influence studies see for example Mora et al., 2015, Ringbom, 1992, and Simon, 2010.

4.2.4 Identity

Young people whose parents are immigrants but who were themselves born in the host country often talk with a non-native pronunciation. Whether they cannot talk with a nativelike accent or use a foreign accent on purpose is not always clear, but it has often to do with the latter, because the way we decide to speak has everything to do with our identity (Setter & Jenkins, 2005). Setter and Jenkins (2005) argue that "our accents are an expression of who we

are or aspire to be, of how we want to be seen by others, of the social communities with which we identify or seek membership" (p. 5). In other words, the degree of nativelike L2 phonology is affected by the degree that language learners identify or want to identify with a certain social community. This implies that immigrants or heritage learners who feel they are part of or wish to be a part of the larger community of the host country and want to be perceived as members of that community will have a better degree of nativelike L2 phonology. This also means that those who want to retain their identification with their own culture and community may keep a foreign accent to retain their own ethnic identity (Flege, 1987; Jones, 1997).

The idea that is there is a relation between the degree of nativelike L2 phonology and ethnic group affiliation is supported by a study by Gatbonton, Trofimovich, and Magid (2005) who conducted a study on the relationship between ethnic group affiliation and L2 pronunciation accuracy. Gatbonton et al. (2005) found that the degree of accent of peer L2 learners indicated their degree of affiliation to their own ethnic group. In other words, the heavier the accent, the higher the degree of affiliation was likely to be.

It seems reasonable to assume that a higher degree of affiliation to one's own ethnic group results in more interaction with members of that group than with members of the larger community of the host country. This extensive amount of interaction with members of one's own ethnic group can affect their L2 phonology as well (Flege et al., 1997). Flege et al. (1997) found that immigrants who interact primarily with speakers of the same native language, thus with members of the same ethnic group, have stronger accents. This suggests that immigrants or heritage speakers who feel more identified with the larger community of the host country than with their own ethnic group will primarily interact with native speakers of this community will result in a better nativelike accent.

4.2.5 Motivation and language attitude

The degree of nativelike L2 phonology is, however, not always a matter of identification or desire to belong to a certain social group. It can also be a result of social pressure, for example in communities in which L2 learning is regarded as an indicator of intelligence L2 learners will try to speak with a nativelike accent the best they can, even late L2 learners (Flege, 1987). In such contexts, learners will generally have a more positive attitude towards learning and a higher motivation to achieve nativelike L2 phonology. Further empirical evidence that attitude is important comes from a study by Moyer (2007) who investigated if there is a

correlation between the attitudes of L2 learners towards the target language and long-term attainment in L2 phonology. She found that the attitudes learners have indeed influence nativelike L2 phonology. The more positive the attitude, the better the outcome. The study by Moyer (1999) found one exceptional adult L2 learner of German who was perceived as having nativelike L2 phonology due to his high motivation to sound German. Tahta et al. (1981) found that the extent to which the L2 is experienced in the home is indirectly related to motivation as well. If there is a shift of identification from the L1 culture to the L2 culture in the home, meaning that the individual wants to have a nativelike L2 phonology, the motivation will be higher to try to achieve it. Levis (2005) and Setter and Jenkins (2015) argue that for some learners, acquiring a nativelike accent in the L2 feels like disloyalty to their own ethnic community and therefore they retain their accent by continuing to use "the sounds, the rhythms and the intonation of our mother tongue while pretending to speak L2" (as cited in Setter & Jenkins, 2005, p. 5). In such contexts, the motivation to achieve nativelike L2 phonology is much less and learners will generally have a more negative attitude towards learning the L2. Attitude and motivation may thus be heavily influenced by identity, because the social and cultural background of L2 learners and the degree of identification with it determines the attitudes towards learning and motivations of L2 learners, or heritage speakers, towards learning the L2 (Ellis, 1994).

4.3 What accounts for poor performance in the phonology of the heritage language

Findings of some studies in section 3.2 showed a surprising result that most heritage speakers often do not have nativelike phonology in their own heritage language. According to a critical or sensitive period for phonology acquisition, these heritage speakers should have nativelike phonology in their heritage language because of their early AO, usually birth – just like monolingual children. Why they nevertheless often do not have nativelike phonology may have to do with Montrul's proposition that the heritage language often ends up resembling a L2 (Montrul, 2012). This proposition suggests that the acquisition of heritage language phonology resembles the acquisition of L2 phonology. In the next subsections I will focus on explanations and one possible factor that account for the finding that most heritage speakers often do not have nativelike phonology in their own heritage language. Note, however, that heritage speakers are bilinguals learning two languages at the same time or shortly after each other, so they are not fully comparable to monolingual children acquiring just one language and after that may learn a second, third, or even fourth language as L2 learners. Heritage

speakers resemble monolingual L1 acquirers to some extent but they also differ greatly from each other (Montrul, 2010). These differences, then, may account for the differences in degrees of phonological proficiency between heritage speakers and monolingual L1 acquirers and will be discussed in the following subsections.

4.3.1 Input differs from input of monolingual children

The language shift that heritage speakers experience has consequences for the acquisition of heritage language, because the input of the heritage language will likely become both quantitatively and qualitatively less than L1 input of monolingual children (Rothman, 2009). A decrease in L1 input for heritage speakers gives them a relatively lesser L1 input in comparison with age-matched monolingual children and this may lead to insufficient L1 input to develop their heritage language optimally, especially because sufficient input is necessary for good acquisition (Montrul, 2008). This is supported by experiments on deaf children who did not learn the L1 in infancy because they were deprived from normal linguistic input (Pallier, 2007). Insufficient L1 input can be enhanced by a lack of motivation by heritage speakers to maintain and develop their heritage language outside what they learned at home (Montrul, 2004, 2010), for instance by enrolling in language classes or simply because they do not have the opportunity to get educated in their heritage language (Montrul, 2010).

4.3.2 Incomplete L1 acquisition

Some heritage speaker may not even have completely acquired their heritage language due to various reasons. This is referred to by the term ‘incomplete L1 acquisition’ (Montrul, 2008; Benmamoun et al., 2007; Montrul & Polinsky, 2010). Although it is very likely that heritage speakers have had L1 input since birth which explains why they generally perform better than L2 learners, Rothman (2009) already argued that this input differs from monolingual children acquiring their L1. The heritage language input is often not sufficient enough, because the language is only used in limited contexts, e.g. at home. When a child has not sufficient access to L1 input as compared to monolingual children who receive enough L1 input, incomplete L1 acquisition may occur (Montrul, 2008, 2010). In the context of heritage speakers, it is referred to by Rothman (2009) as “arrested development of the heritage language” (p. 156). Both terms refer to the L1 or heritage language (or only certain properties) that has never been fully developed during childhood (Montrul, 2008). Incomplete L1 acquisition can, for instance, occur when a bilingual child gets intensively exposed (Montrul, 2008) and

influenced (Rothman, 2009) by the L2 as a result of an early switch to the L2 as dominant language (Polinsky & Kagan 2007). This is most applicable to heritage speakers who were born in the host country or moved to it at a very early age in childhood. Incomplete L1 acquisition thus seems less likely to occur among heritage speakers who moved to the host country at a later age in childhood and experience the language switch at a later age in childhood (Montrul, 2010), because they have already established a quite stable L1 phonetic system (MacKay et al., 2006). MacKay et al. (2006) argued in their study that the fact that the late learners attended school in Italy for a longer period of time than early learners is probably why the late learners in their study reported to be more proficient in their L1 Italian than the early learners, because their L1 phonetic systems may have been more developed than those of the early learners who had more or less an incomplete L1 acquisition. This provides support for the view that "AOA exerts a strong effect on degree of L2 foreign accent because it provides an indirect index of the strength of the L1 phonetic system when L2 learning begins" (p. 179).

4.3.3 L1 attrition

Another possible account for the findings that heritage speakers often do not have nativelike phonology in their heritage language is 'L1 attrition' (Montrul, 2008; Kaufman, 2005; Goral, 2004; Schmid et al., 2004). L1 attrition is defined by Seliger as "the temporary or permanent loss of language ability as reflected in a speaker's performance or in his or her inability to make grammaticality judgements that would be consistent with native speakers (NS) monolinguals of the same age and stage of language development" (as cited in Montrul, 2008, p. 64). In other words, it is a progressive decline in the proficiency of the heritage language that can be the result of decreased L1 input due to intense contact with a dominant language (Kaufman, 2006). That the amount of L2 use may be a major factor affecting heritage language phonology can also be derived from the study by Godson (2014), because he found that the vowel production in the heritage language by heritage speakers who had been exposed to their L2 for more years than other heritage speakers were stronger influenced by their L2. This suggests that L2 exposure/use is an important predictor of the degree of nativelike phonology in the heritage language (as well as in the L2). However, in Godson's (2014) study, L2 interference only seemed to happen in vowels closest to English, thus suggesting that L2 interference is not a major factor affecting heritage language phonology.

L1 attrition can occur in various linguistic domains (e.g. Gurel, 2004; Montrul, 2008). L1 attrition in phonology refers to the temporary or permanent loss of previously available phonological rules which results in the speaker being perceived as less native by other natives (Schmid et al., 2004). This includes, for instance, perception/decoding delays and problems interpreting L1 intonation patterns, but also taking over stress patterns of the L2 and use it in the L1 or using allophones or phonemes of the L2 in the L1 (see Seliger & Vago, 1991; Extra & Verhoeven, 1999). Attrition of L1 phonology thus seems to be largely a result from language transfer or interference from one's L2 onto the L1 due to intense contact with the L2 (Seliger & Vago, 1991). Finding evidence for interference of one's L2 onto L1 was also attempted by Kim (2012), but this study suggested that more research should be carried out on production as well as on perception to understand the phenomenon of language interference better, especially because heritage speakers do not differ from natives in phonological perception (Kim, 2012; Lukyanchenko & Gor in Montrul, 2015), whereas they often do in production (Chang et al., 2011; Kim, 2012; Kupish et al., 2013; Montrul, 2015). Godson (2014), however, found some empirical evidence for the proposition by Seliger and Vago (1991) that L2 interference onto the L1 happens because of intense contact with the L2. He found that the vowel quality in the heritage language by heritage speakers of Western Armenian displayed transfer from their L2, although this was only the case for the vowels in the heritage language that are the closest to the English vowels. Heritage speakers thus had less nativelike phonology in their heritage language when the vowels of the two languages were phonetically very close. This is supportive evidence of language transfer, because it shows that there might indeed be a transfer from the L2 onto the L1. Similar results were found by Sadaah (2011) on Arabic heritage speakers. A similar study on French-English bilinguals which has been carried out by Flege (1987) obtained the same conclusion. He proposed that the merging of phonetic properties of phones that are similar in both languages potentially impacts both languages.

Although L1 attrition is a process that is often observed in sequential (late) bilinguals or in first generation immigrant adults (e.g. Pavlenko in Schmid et al. 2004; Montrul, 2002; Montrul, Foote, & Perpiñán, 2008; Gürel, 2004; Köpke, B. & Schmid, 2004) and less in childhood, when it does occur in childhood it is often much severe (Köpke, 2004). See for L1 attrition in young children e.g. Seliger and Vago, 1991. Yet, the domain phonology is one of the less vulnerable domains prone to attrition (Schmid & Köpke, 2009; Gurel, 2004), so it is not very common to occur in phonology. It might, therefore, be more useful to look at other

factors and or explanations influencing the degree of nativelike phonology.

4.4 Why do heritage speakers perform better than regular L2 learners?

So far I have only looked at explanations for why heritage speakers generally do not have nativelike phonology in their heritage language, but the question still remains what accounts for the surprising results of studies that showed advantages for heritage speakers when it comes to learning their heritage language over L2 learners learning the same language (e.g. Au et al., 2002; Kupish et al., 2012; Oh et al., 2003). It does not directly relate to the research question of this thesis, but it may nevertheless be interesting to give a brief explanation for this finding, because it might provide more insight into opportunities on how to improve one's chance to achieve a higher degree of nativelike L2 phonology when learning a L2.

Since heritage speakers are essentially early bilinguals, they like early bilinguals acquire their L2 as well as their heritage language from a very early age, usually birth. For this matter, the explanations discussed earlier for their advantage over L2 learners in learning a L2 can also be applied to their heritage language. Thus, the naturalistic setting as opposed to the instructed setting of L2 learners and the relatively early age of first exposure as opposed to the later age of first exposure of L2 learners which mostly gives heritage speakers already a higher degree of proficiency in their heritage language than L2 learners of that language have (Montrul, 2015).

4.5 Comparing the factors affecting L2 and heritage language

The factors affecting L2 phonology are not the same as those affecting the phonology of the heritage language. Recall that for the heritage language, L1attrition and incomplete L1 acquisition are explanations rather than factors. As some studies on L2 phonology showed, the degree of L2 foreign accent does not seem to be influenced only by AO. Rather, a combination of AO and other factors such as amount of L1 and L2 input and use, influence of the L1 on the L2, identity, and motivation and language attitude together seems to affect the possibility whether one can achieve nativelike L2 phonology.

Like the acquisition of L2 phonology, the acquisition of the heritage language phonology also seems to be influenced by 'factors' other than AO. These are however, not the same that affect L2 phonology which is likely due to the fact that the heritage language is not identical to a L2. It does share some features with a L2 and therefore it closely resembles a L2 (Montrul, 2012), but they are not exact the same. A heritage language seems to be more

similar to a L1, because the heritage language is the first language heritage speakers acquire birth like monolinguals do. This would predict that heritage speakers end up at the same level as age-matched monolinguals. That they are nevertheless less nativelike than monolinguals suggests that for the heritage language as well, AO is not the biggest predictor for success indeed. The generally poor performance in the heritage language rather seems to be a result of the language shift heritage speakers experience. When their L2 becomes their dominant language this must affect their L1, just like one's L1 can sometimes constrain L2 acquisition. The heritage language seems to be mainly affected by L1 attrition, incomplete L1 acquisition and the difference in L1 as compared to monolinguals.

5. Conclusion

Whether an early start guarantees nativelike L2 phonology was investigated in this thesis by means of an overview of previous studies and literature on early L2 learners such as early bilinguals and heritage speakers as well as on late L2 learners. The hypothesis was that early learners will achieve nativelike L2 phonology due to a critical or sensitive period. Both a critical and a sensitive period predict that only early learners can achieve nativelike L2 phonology and also entail that late learners will not. It is generally thought that this critical or sensitive period ends around puberty. More specifically, the basic assumption in this thesis was that the terminus is around the age of twelve (Scovel in Bongaerts et al., 1995; Long, 1990) or fifteen (Patkowski, 1990).

In section three I looked at studies on early learners such as early bilinguals and heritage speakers and their L2 phonology. Most of these studies found cases of early L2 learners who achieved nativelike phonology although the majority of the early L2 learners usually had not (Flege et al., 1991, 1999; Hyltenstam and Abrahamsson, 2009; MacKay et al., 2006; Piske et al., 2001). Only Asher and Garçía's (1969) study claimed to not have found any early L2 learner with nativelike phonology. Whether this result is strong evidence against the idea that an early start guarantees nativelike L2 phonology is disputable, because none of the early learners in their study with an AO of six years or younger had a definite accent which means that their accent may not even be noticeable by native speakers.

Despite the cases of early L2 learners with nativelike phonology, all the studies found that foreign accents were detected in late learners as well as in early learners. That foreign accents were also perceived among early learners challenges the idea that an early start guarantees nativelike L2 phonology. Furthermore, foreign accents were stronger for late L2 learners than for early L2 learners. These two results suggest that an early start does not guarantee nativelike phonology, but that an early start does increase one's chances to achieve nativelike phonology.

More evidence that an early start does not guarantee nativelike phonology came from studies that looked at the heritage language of heritage speakers. These studies on the heritage language were included in the thesis, because a heritage language closely resembles a L2. A critical or sensitive period would also predict that heritage speakers have nativelike phonology in their heritage language because of their early AO to this language, usually from birth. The studies found that this was, however, not the case. Heritage speakers generally did not perform at a nativelike level (e.g. Au et al., 2000 and Oh et al., 2003 cited in Montrul,

2015) which provides more evidence against the idea that an early start guarantees nativelike phonology.

Findings for the results obtained by the studies that early L2 learners often do not have nativelike L2 phonology and that heritage speakers are additionally usually not nativelike in the phonology of their heritage language as well provide the final answer to the main question, namely, an early start does not guarantee nativelike phonology.

In sum, an early start does not guarantee nativelike phonology, because it is suggested that the possibility to achieve nativelike phonology does not only seem to be accounted for by AO. Rather, a combination of several factors or underlying variables seems to be at play in phonology acquisition and determine whether one will achieve nativelike phonology, for instance amount of L1 and L2 use and input, length of residence and L1 transfer. The often poor performance of heritage speakers in their heritage language compared to monolinguals can be accounted for by incomplete L1 acquisition, L1 attrition and a relatively less amount of L1 input compared to monolinguals.

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