FINAL RESEARCH PROJECT

THE CRITICAL PERIOD

HYPOTHESIS

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ABSTRACT

The Critical Period Hypothesis (CPH), originally proposed by Lenneberg (1967), states that there is a maturational period of time during which language acquisition can take place. The CPH is often cited to account for difference in success between early and late language learners. Based on Lenneberg’s hypothesis, other researchers have generated additional hypothesis, all of which consider a maturational period of time during which language acquisition take place. This Final Research Project investigates the critical period hypothesis for second language pronunciation from an English-as-a-foreign-language perspective. It aims to investigate whether it is possible for late learners of English to achieve a native-like pronunciation regardless of maturational constraints.

This project also investigates whether the variable ‘exposure to the target language’ influences significantly or not the ability for late L2 learners to obtain native-like pronunciation. In order to find out about this, two groups of non-native speakers, differing in the amount of exposure they receive to the target language in their secondary education, were included in this study, alongside a native speaker control group.

Three speech samples were collected for each speaker: a word list, a paragraph, and an answer to an open-ended question. After these speech samples were collected from each subject, 6 linguistically naïve native speakers of English evaluated the sound samples based on native likeness. After these scores were obtained, means were calculated to determine their performance and to determine intergroup comparison.

Results indicate that there were no late L2 learners of English who had obtained a native-like pronunciation. This could provide evidence in favor of a critical period for second language pronunciation. Results also indicate that there was a significant difference in mean scores between the non-native speaker groups, with an advantage for students in bilingual Spanish-English programs over those in monolingual Spanish programs, suggesting a significance for the variable ‘exposure to the target language’ in determining second language pronunciation in late learners. Thus, exposure to the target language influences the acquisition of second language pronunciation, possibly, alongside a developmental critical period.
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I would like to thank Mrs. Andrea Insaurralde, for her supervision and support throughout this Final Research Project.

I would also like to extend my gratefulness to all subjects who took part in this study, to the English instructors and students at Clearance: Escuela de Inglés Aeronáutico Civil y Militar, and to the six Native American volunteers who helped to the completeness of this work. Without their willingness to cooperate and their efforts to provide me with their feedback in an efficient and timely manner, I would not have been able to write this project.
INTRODUCTION

This Final Research Project aims to investigate the Critical Period Hypothesis (CPH) for second language pronunciation from an English-as-a-foreign-language perspective by researching the possibility that late learners of English are able to achieve a native-like pronunciation in the target language. Laypersons often have the perception that adults or late learners of second languages sound like non-native speakers when producing a second language. This perception also suggests that early learners or children seem to be able to attain a native-like pronunciation of a second language. Even though late learners may have a cognitive advantage over early learners, in that they may have developed increased abstract thinking skills that could help them process second language input, this cognitive advantage does not seem to provide an advantage for native-like pronunciation. The question, then, is the following: Why do early learners often seem to be able to attain a native-like second language pronunciation with more success than late learners?

Research from a variety of disciplines suggests that one reason for the difference in success between early and late second language learners relative to native-like pronunciation can be found in a biologically based critical period for second language acquisition.

Hypotheses about such a critical period vary considerably, ranging from considering one absolute time span to determine successful language acquisition as a whole (Lenneberg, 1967), to multiple possible time spans that determine the ease with which specific skills can be acquired, such as for pronunciation, morphology, and syntax, but all of them are based on the assumption that there is a maturational period (or time span) during which language acquisition can easily take place. The premise for all of these hypotheses is that, if language acquisition commences after a certain time period has passed, the learners will not be able to achieve a native-like proficiency in the target language.

The goal of this study is to investigate layperson perceptions of non-native speakers (NNS) speech and whether it is possible to find late learners who have obtained a native-like pronunciation. The importance of this question is that, if it is possible for late learners of a second language to acquire the pronunciation of such language to a level that is similar to that of native speakers, it at least questions the strength of the CPH if not the existence of this hypothesis itself.
Although several studies have been conducted to investigate whether it is possible to find late learners who have acquired a native-like pronunciation of a second language, they have not revealed whether exposure to a target language actually influences second language acquisition. The present study used an opportunity sample so as to investigate the ability of a small average group of late English language learners to achieve a native-like pronunciation of the target language. In contrast to the subjects of the present study, most subjects in previous studies had lived abroad for a number of years or were linguistically trained English professors. In those studies, it was easily demonstrated that it is indeed possible to find exceptional individuals who can achieve a native-like English pronunciation level. However, this work aims to establish whether exposure to a target language actually influences second language acquisition for everyone, or just for a selected few.

In addition, most research on the topic of late non-native second language learners is conducted in target language settings in which learners are exposed to a target language in different ways and contexts. Consequently, it becomes difficult, if not impossible, to truly measure the extent to which they are exposed to the target language.

In this regard, this project aims to fill this gap by using groups of subjects who differ greatly in the amount of target language exposure they have received and whether they received monolingual or bilingual education. In addition, subjects are not L1 speakers of Spanish who are advanced L2 speakers of English. However, due to the spread of English as an international language of communication, media, and technology, it is questionable whether it is possible to find a context in which these two types of English language input can be measured independently from one another.

In order to test the influence of a critical period on the acquisition of second language pronunciation in late learners, 10 Spanish speakers and 5 native American speakers of English participated voluntarily in three tasks. The 10 non-native speakers of English had all received at least 6 years of English language formal instruction during their education at different schools and none of them commenced their English language acquisition before the age of 12. All speakers, both native and non-native, had obtained a total of 12 years of formal education.

A tester group consisting of 6 native speakers of English measured the obtained sound samples. Untrained native speaker testers were used in order to obtain judgements about the pronunciation of native and non-native speakers of English, and the judgements of the testers
were considered typical of the perceptions of laypersons. These 6 tester were not chosen randomly; all of them are employees of a multinational company based currently in Chile. The candidates were only selected if they were citizens of the United States and if they only spoke Spanish as a L2. Testers were asked to evaluate the samples based on the “native likeness” of the sample of speech on a five-point scale, in order to distinguish the pronunciation of native speakers from that of non-native speakers. This was intended to demonstrate the influence of a critical period on second language pronunciation. In other words, if significant differences in the pronunciation of both groups cannot be found in the mixed sound samples, and both groups receive similar scores, it is likely that there is no maturational restriction in the successful attainment of second language pronunciation in late learners.

In addition to examining the strength of a critical period for the acquisition of second language pronunciation in late learners, this thesis also aims to find out whether the variable of “exposure to the target language” is of significance in determining second language pronunciation in late learners. In this study, exposure to a target language is defined in terms of two types of instruction for Spanish L1 speakers in the instructional domain. The first type of instruction is monolingual education. In this type of program, students receive an average of two hours of English language instruction per week. The second type of instruction is bilingual education, in which students receive an average of 14 hours of English language per week. In order to investigate the effect of the variable exposure to the target language on the acquisition of second language pronunciation in late learners, then, two groups of non-native speakers differing in the amount of exposure to the target language they have received, are included in this study alongside a native speaker control group.

Although it may seem natural to assume that more exposure to the target language over an extended period of time would result in improved pronunciation, from an innatist perspective, this may not necessarily be the case. According to cognitive theories of second language acquisition that adhere to the idea of a critical period, differing amounts of exposure to a target language may not function as the most significant factor in determining the possible end result for second language acquisition (Schachter, 1988). The level of attainment of native-like pronunciation skills in the target language is considered to be governed by biological factors and, as such, is considered a manifestation of innateness rather than one of exposure or practice (Lenneberg, 1967). Consequently, if we consider only biological factors, the two non-native subject groups in
this study would be expected to perform similarly to one another since as non-native speakers with the same L1, both groups would have the same access to whatever innate capacity governs L2 acquisition.

The following research questions motivate this study:

1. Are Spanish speakers, who are late learners of English, able to achieve a native-like pronunciation of English?
2. Does exposure to the target language make a difference in the level of attainment of pronunciation in Spanish speakers who are late learners of English?

Hypotheses for research question one:

- There will be no difference in the level of attainment of a native-like pronunciation of English between students in bilingual programs and those in monolingual programs.
- Students in bilingual education programs will have obtained a more native-like pronunciation in English than students in monolingual education programs.

Hypotheses for research question two:

- There will be Spanish speakers who acquired English as a foreign language after the proposed critical period has passed who will have achieved a native-like pronunciation of English.
- There will be no Spanish speakers in this study who acquired English as a foreign language after the proposed critical period has passed who will have achieved a native-like pronunciation of English.

A review of the literature that was used to formulate this research questions can be found down below. Moreover, the methods that were used to investigate the research questions mentioned above are also carefully detailed.
Then, the proposed research questions and hypotheses are evaluated in order to consider the strength of a possible critical period for the development of second language pronunciation and its implication on research in the field of second language acquisition.
BACKGROUND

Review of the Literature

AN INTRODUCTION TO THE CRITICAL PERIOD HYPOTHESIS (CPH)

There is a popular belief which claims that children as L2 learners are superior to adults (Scovel 2000); that is the younger the learner, the faster the learning process, and the better the outcomes. Nevertheless, a closer examination of the ways in which age combines with other variables reveals a more complex picture, with both good and not so good age-related differences associated with early and late L2 learners (Johnstone 2002).

The “Critical Period Hypothesis” (CPH), proposed by Eric Lenneberg (1967), claims that there is indeed an optimal period for language acquisition, ending at puberty. However, in its original formulation, evidence for its existence was based on the relearning of impaired L1 skills, rather than the learning of a second language under normal circumstances.

According to the CPH, the capacity to acquire language decreases at puberty, due to loss of brain plasticity, which implies a sensible decrease in the ability to learn language.

A key concept in Lenneberg’s theory is that of brain lateralization, connected with the cerebral hemispheres. Each hemisphere, and more precisely each brain area, tends to specialize in certain functions and processes. Then, the processing of language is carried out mainly in the left hemisphere. According to Lenneberg’s explanation in “Language in the Context of Growth and Maturation”, the cerebral areas suitable for language learning lose their learning potential considerably when reaching puberty. Since from puberty those brain areas are no longer qualified for the acquisition of a second language, then other brain areas must be readapted for that purpose.

For Lenneberg, the lack of plasticity associated with hemispheric lateralization is responsible for the differences between children and adults in the acquisition of a foreign language. The author claims that the acquisition of a second language after a certain age, differs from the acquisition of the first language in that, once the brain has overcome a certain evolutionary stage, it becomes difficult for the learner to have access to the language acquisition device (LAD) and the Universal Grammar (UG).
K. Kim et al. (1997) demonstrate, at least partially, the veracity in Lenneberg’s theory: in subjects who learn two languages in their childhood, the result was that both share practically the same space in Brocca’s area (frontal lobe), whereas those who learn a second language after childhood, this L2 occupies a different space than the first language, with a minimum-sized overlapping area. On the other hand, in Wernike’s area, located in the temporal lobe, in both kinds of subjects there is a sole area shared by both languages.

However, other research studies indicate that age effects depend largely on the actual opportunities for learning which are available within overall contexts of L2 acquisition and particular learning situation, notably the extent to which the initial exposure is substantial and sustained.

The fact that adults who learn a second language will hardly reach a native-like level and that only in exceptional cases will they reach a native-like pronunciation level, should not be due exclusively to physiological factors. There are plenty other factors of different nature in connection with age, such as motivation, will to integrate into the foreign language community, available time for practice, the type of native interlocutors willing to cooperate with the learning process, interference of L1, etc.

In general, linguists, teachers and students agree that adults are less apt to learn a second language, and the reason appears to be a decrease in the ability involved in the linguistic acquisition associated to maturation, as suggested by the CPH (Lenneberg 1967).

In general, children have less fear to failure and ridicule, and less negative attitude towards the foreign speaking community. Additionally, the same popular belief which claims that adults cannot perfectly acquire a foreign language could condition them in such a way that it actually becomes impossible for them to do so.

In order to prove experimentally if there is actually a biological predisposition before puberty for the exact imitation of pronunciation, James J. Asher and Ramiro García (1969) tried to determine the factors related to the achievement of an L2 native-like pronunciation. They made high school American students evaluate the pronunciation of two groups of subjects: one Experimental Group
made up of 71 Cuban immigrants aged 7 to 19 (26 boys and 45 girls), most of them with 5 years of residency in the United States, and a Control Group composed of 30 American children (13 boys and 17 girls).

The results of the investigator’s experiment threw the following data:

• Regardless of the age of arrival at the United States and their time of residency, none of the 71 Cuban children reached an English native pronunciation.

• However, many of them acquired a pronunciation very close to the native one. This was mainly seen in children who had arrived at the United States between 1 and 6 years old and had lived there between 5 and 8 years.

• The younger the child, the higher the probability of achieving a good pronunciation. This was even more notorious when their residence in the English speaking country was longer.

• More girls than boys achieved a pronunciation closer to the native. This difference between boys and girls tended to decrease as the time residing in the United States increased.

What is curious about all this is that, even though it is in the younger child that the probability of acquiring a more accurate pronunciation is higher, some older children, a small group, could also achieve an excellent pronunciation. This may suggest that biology does not determine this phenomenon completely.

**PRONUNCIATION MISTAKES IN ADULTS**

The general explanation for the pronunciation mistakes made by adults is that some articulatory organs which have been producing a phonological system for years, become somehow “atrophied” to produce a different one. Elaine E. Tarone (1989), does not limit this atrophy – which she calls “phonological fossilization” – to physiological habits, and suggests that maybe the flexibility of the brain declines with age and affects second language pronunciation, more than its syntax and semantics.

Adults need to process all linguistic data through strategies associated to the left hemisphere, where language functions are localized. “The trust in the analytical procedures can make adults
more skilled than children in the acquisition of certain aspects of language in the short term, but it will impede, in every language learning stage, the acquisition of linguistic components which seem to require a holistic analysis for its comprehension, and in the end it will lead to a foreign accent.”

Krashen (Krashen, Scarcella and Long, 1979) dismisses the neurological explanation of the “critical period” arguing that brain lateralization related to the functions of language remains firmly established by the age of five, and consequently, it is not possible that the end of the critical period is marked by puberty.

Through a laboratory study, Katherine Snow and Marian Hoefnagel-Höhle (1978), tested a hypothesis which suggests that the years before puberty constitute a critical period for linguistic acquisition:

“In a study about the acquisition of second languages in a natural environment, it was discovered that older people had an initial advantage in second language learning. Youngsters stood out in the pronunciation of some sounds, even though there was not yet a general difference regarding age. These results are impossible to reconcile with the predictions of the CPH.”

“The CPH claims that the acquisition of the first language must occur before brain lateralization is complete, which is expected to occur in puberty approximately. One of the predictions of this hypothesis is that the acquisition of second languages will be relatively fast, successful, and similar to the acquisition of the first language only if it occurs before puberty. [...] It was also found out that adolescents between 12 and 15 years, as well as adults, made faster progress during the first months of learning a second language in a natural environment (foreign speaking country). At the end of the first year, those between 8 and 10, and those between 12 and 15 had reached a better domain of the language. Those between 3 and 5 obtained the worst results. This data does not support the CPH for linguistic acquisition.”

It was suggested to substitute the term “critical” for the term “sensible” because the former excludes the possibility that youngsters and adults can learn a second language without foreign accent; the latter, however, does not include this possibility but neither denies that there might be biological advantages of starting at an early age.

Given that there is enough proof to demonstrate that at least some adults can reach a foreign language pronunciation similar to that of a native speaker, it seems reasonable to focus on the learning capacity from a more positive approach.
Three decades ago, Peter Strevens (1974) claimed that, compared to children, adults show a series of advantages and disadvantages which characterize their attitude and performance the learning of foreign pronunciation. Some of these disadvantages are:

- **REDUCED LINGUISTIC CAPACITY.** Children have great auditory and articulatory abilities during the acquisition of their phonological system of their mother tongue. Adults, on the other hand, does not seem to be fully ready to assimilate a linguistic system completely new because the structures of their mother tongue are so solid that it hinders the learning of others.

- **MORE SHYNESS.** Adults feel embarrassed at making mistakes in public, which make them avoid producing different sounds or facial gestures in front of other people.

- **MORE CONFIDENCE IN WRITING.** Adults appeal to the written form of language as an expeditious recourse to guarantee efficiency in the process of learning. This limits the assimilation of foreign pronunciation.

The advantages which compensate for such disadvantages derive all from the fact that adults have leant how to learn: they may follow detailed instructions, infer, deduce, generalize, etc. They have also a better concentration ability than children. Adults tend to intellectualize the acquisition of a foreign language, and their conceptual apparatus, information processing techniques and memory recourses are definitely superior that those of children.

According to Strevens, “the more sophisticated the student, the more sophisticated the instruction.”

**DIFFERENT APPROACHES TOWARDS THE CPH**

After Lenneberg, other authors modified his original proposal adopting more accurate approaches. Oyama (1979) proposed the existence of a sensitive period, after which the acquisition of language becomes more difficult, but not impossible. Moreau and Richelle (1981) make reference to a privileged period (période privilégiée) which might extend up to ten years. Mägiste (1984) alludes to an Optimum Age Hypothesis, denying the existence of a critical age.

Even if it is true that Lenneberg suggests the existence of a critical period between age two and puberty, based on cerebral immaturity for language acquisition before age two and the loss of brain plasticity (linked to functions lateralization) after puberty, his hypothesis is not as inflexible
as some authors claim. The same Lenneberg recognizes that most individuals are able to learn a
second language (SL) after puberty, but with more difficulty than children.

Lenneberg’s hypothesis is based on criteria such as chemical composition of the cerebral cortex or
the white substance in neurodensity or in the frequency of cerebral waves. Even if it is true that
Lenneberg quotes some studies done on other animals (cats, chimps, etc.), but it is not true that
he applies those theories on people.

Seright (1985) suggests that auditory comprehension of adults decreases with age. McLaughlin
(1977) questions not only the existence of a sensitive period, but also the existence of differences
between children and adults when it comes to learning a second language. Menyuk (1981) assures
that no period is more critical than other. Munsell et al. (1988) suggest that brain plasticity may
continue as long as our learning processes receive stimuli. Scovel (1969-1978) subscribes the CPH,
but only in connection to the learning of pronunciation. Studies like Salinger’s (1982) claims the
existence of different critical periods for phonetics, syntax and semantics, respectively. Jacobs and
Schumann (1992) believe that brain plasticity maintains through all life and that, actually, there
are multiple critical periods for language learning.

Thirty years after Lenneberg formulated his theory of the CPH, it is still debatable nowadays
because even now the arguments against it are not solid enough. New opposed, alternative and
complementary theories arise every year. Amongst the latter, we can include Donald Loritz’s. He
claims that when individuals acquire their L1, they develop phonetic coding and decoding
processes for the phonological system of their L1. Loritz proposes that, once these phonetic
schemes are fixed, the cerebellum is reluctant to modify them in order to adapt them to the
phonological system of their L2.

THE CONCEPT OF LATERALIZATION

It was Eric Lenneberg (1967) who established a connection between the concepts of critical period
and cerebral lateralization. Traditionally, the brain’s left hemisphere was considered a linguistic
area, and the right hemisphere a non-linguistic one.

The perspective which considers that human language is processed through one hemisphere only
turns a little simplistic. Even though we can consider broadly that certain functions are located in
one or other hemisphere, we should not forget the interactions between cortical areas and between cortical and subcortical areas.

For example, accentuation is recognized and produced mainly in the left hemisphere, which works in an analytical and linear way. On the other hand, intonation (as well as space relations, movement, color, music, and emotions) is processed in the right hemisphere, which works synthetically and in parallel.

Although considerable research has been dedicated to the finding of evidence both for and against the existence of a critical period, no clear-cut answer has been formulated. At present, there are over 100 empirical studies on the topic of maturation constraints on language acquisition, but no consensus has been reached on the existence, scope, and timing of maturational constraints on the human language learning capacity, as well as on implications for practice. Further evidence is needed to conclusively eliminate a number of hypotheses, so as to enable the evidence-based formation of a single theory on language acquisition.
METHODOLOGY

Subjects

In order to investigate the two research questions mentioned in the first pages of the present work, two groups of subjects were included in this study. The first group of subjects consisted of a total of 15 subjects who provided three separate speech samples and, for this reason, they will be referred to as “speakers”. The second group consisted of 6 subjects who functioned as testers of speech samples and will be referred to as “testers”.

The speaker group consisted of 5 American native speakers of English and 10 speakers of Spanish who are L2 speakers of English. Each subject recorded three different speaking tasks. The non-native English speaking subjects in this study had not received formal instruction in English until after the CPH for phonology is supposed to have passed, around age 12, and all subjects were at least 18 years of age. In order to minimize the effects of individual variables in the outcomes of this study, non-native speakers filled out a questionnaire containing questions on their language background, and only those non-native speakers of English who had spent their entire lives in Chile and were raised monolingually in Spanish were included in this study. The native speakers included in the study lived their entire lives in the United States, a country in which English is the main language of communication, and they were raised monolingually in English, but were working in Chile by the time the study was made.

The non-native-English-speaking group was further divided into two groups of 5 speakers depending on the type of secondary education they had experienced. The first group consisted of 5 students who received monolingual Spanish secondary instruction with an average of 2 hours of EFL (English as a Foreign Language) instruction per week for a total of 6 years, and the second group consisted of 5 students who had received bilingual English-Spanish secondary education with an average of 2 hours of EFL and 18 hours of CLIL (Content and Language Integrated Learning) instruction per week for a total of 6 years.

Both groups, thus, have similar history of EFL instruction with a focus on language structure and the four skills (listening, speaking, reading and writing), but bilingual subjects also received content-based instruction through English language. The tester group included in this study, on the other hand, consisted of 6 linguistically naïve native speakers of English who have lived their entire lives (or most of them) in the United States, a country in which English is the main language.
of communication. Subjects included in the tester group were all college-level professionals with no formal knowledge of linguistics and all of them have studied Spanish as a foreign language.

The subject who were included in this study can be summarized as presented in Table 1.

Table 1. Distribution of Subjects Per Group

<table>
<thead>
<tr>
<th>Type</th>
<th>Speakers</th>
<th>Testers</th>
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<tr>
<td>Native Speaker of English</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Non-Native Speaker Monolingual Spanish</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Non-Native Speaker Bilingual English-Spanish</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>6</td>
</tr>
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Data Collection

As mentioned above, “speaker” subjects were presented with three separate stimuli to which they were asked to respond, thus resulting in a total of 15 x 3 = 45 tokens of speech. The tasks were presented to speakers in an order of increased speaker control and samples of the following types of speech were collected for each subject:

1. A word list
2. A paragraph
3. Spontaneous speech

Subjects were initially asked to read a word list out loud. The word-list consisted of ten items and included several instances of phonemes that are considered to be difficult for Spanish speakers of English to produce. An advantage of using a word list to elicit data is that the content of responses will be similar among speakers, so that comparisons can be easily made. In addition, analysis of this type of speech considers the pronunciation of sounds alone; stress and intonation are not included. At the same time, this could also be a disadvantage, as speaker control is very low and comparisons between speakers can only be made based on the pronunciation of sounds, excluding the influence of suprasegmentals on second language pronunciation.

In order to consider the influence of suprasegmentals, subjects were then asked to read a paragraph from a famous novel out loud. This task involved the pronunciation of vocabulary as well as such matters as intonation and stress. This type of task, however, still did not provide a high degree of speaker control because speakers were presented with a written version of what they were supposed to produce.

Finally, then, in order to allow for a higher degree of speaker control, subjects were asked to respond to an open-ended question aimed at eliciting spontaneous speech. As such, speakers had a high degree of control over the content of their response, which allows for matters such as word choice and register to be considered. Due to its high amount of speaker control, however, this task also involves more domains of language than just pronunciation, as speakers can control their use of word order and word choice as well. As such, making comparisons between speakers does not just involve detecting differences in their pronunciation, but it includes differences in other linguistic domains which may influence language proficiency as well.
As subjects were thought to be likely to respond somewhat differently in the final task, it was decided to record a fixed amount of each response in order to manage data collection. Although Scovel (1981) demonstrates that native speaker testers can provide reliable judgements on the native-like pronunciation of their language within as little as eight seconds, for the purpose of this project, in order to form a reliable opinion on their accents, a 30-second passage was recorded for each speaker.

After this speech samples were obtained, testers were asked to assign each sample a score on a 5-point scale based on what they, as Native American English speakers, considered to be the level of native likeness of each sample.

Based on this scale, the following scores were assigned:

1. Very strong foreign accent; definitely non-native
2. Strong foreign accent
3. Noticeable foreign accent
4. Slight foreign accent
5. No foreign accent at all; definitely native speaker

Testers were told that there was a combination of native and non-native speakers who were asked to complete the assignment, though they were not told about the exact numbers of each type of speaker. Testers did not receive any tester-training, because the purpose of this study was to investigate native speaker laypersons’ perceptions on the speech of non-native speaker. However, each tester was presented with an anticipatory set of three example stimuli, in order to enable them to anticipate the range of possible levels of pronunciation they were about to hear. Testers were not given any information as to whether the example stimuli were recorded by native or non-native speakers as this was thought to influence the evaluation of the stimuli with which they were presented.
METHODS OF ANALYSIS

The 6 testers who took part in this study were presented with a sequence of 45 stimuli, which included 15 samples of task one, 15 samples of task two, and 15 samples of task three. As such, each tester evaluated the performance of each speaker, and each stimuli from each speaker was evaluated by each tester.

In order to analyze the data obtained, an average of each group was then calculated so as to mark the range in speaker pronunciation as measured by the testers in this study. Based on the advantages and disadvantages of the three task types that were mentioned above, each task was analyzed separately in order to investigate its influence on second language proficiency.

If the mean score of each non-native speaker group for each task resulted in a score near the mean of the native speaker group, a non-native subject was considered to have a native-like pronunciation of English. This measure was chosen to determine the native likeness of each subject because it captures the idea that non-native speakers can be considered to pronounce a language with a native-like ability if this speaker pronounces the language within the range of native speakers of the language as judged by an impartial, different set of native speakers. If a non-native speaker is, thus, rated by a native speaker with a result rather similar to other native speaker’s, this non-native speaker should be considered to have the capacity to speak the target language with a native-like fluency. As this project aims to investigate whether it is possible for non-native speakers to obtain a native-like proficiency in the target language as judged by native speakers of that language, the earning of an average seems to provide a suitable –though not quite representative- way to analyze the speech of the subjects in this study. In using this measure, the total number of non-native speakers with a native-like language proficiency could be calculated so as to determine whether it is possible for the Spanish speakers in this study to obtain a native-like pronunciation of the English language as judged by native speakers of said language.

In addition, a mean comparison was made between the monolingual group and the bilingual group in order to find out whether students in bilingual programs performed significantly better in speaking English than students in monolingual programs as based on native-speaker judgements for each type.
RESULTS

In order to facilitate inter-group comparison, mean scores were calculated for individual subjects and subject groups per task. As can be seen in table 2, none of the non-native speaker’s scores was similar to the mean of the native speaker group.

Table 2: Mean Scores Per Speaker on Task 1

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS1</td>
<td>4.86</td>
</tr>
<tr>
<td>NS2</td>
<td>5.00</td>
</tr>
<tr>
<td>NS3</td>
<td>3.71</td>
</tr>
<tr>
<td>NS4</td>
<td>5.00</td>
</tr>
<tr>
<td>NS5</td>
<td>4.71</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>4.65</strong></td>
</tr>
<tr>
<td>NNSM1</td>
<td>1.86</td>
</tr>
<tr>
<td>NNSM2</td>
<td>2.71</td>
</tr>
<tr>
<td>NNSM3</td>
<td>2.29</td>
</tr>
<tr>
<td>NNSM4</td>
<td>2.57</td>
</tr>
<tr>
<td>NNSM5</td>
<td>2.43</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>2.37</strong></td>
</tr>
<tr>
<td>NNSB1</td>
<td>2.57</td>
</tr>
<tr>
<td>NNSB2</td>
<td>3.43</td>
</tr>
<tr>
<td>NNSB3</td>
<td>2.29</td>
</tr>
<tr>
<td>NNSB4</td>
<td>2.86</td>
</tr>
<tr>
<td>NNSB5</td>
<td>2.86</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>2.8</strong></td>
</tr>
</tbody>
</table>

In order to answer the second research question, an average was calculated in order to test the significance of the difference in means between the monolingual non-native group and the bilingual non-native group. Using the mean scores of Table 2, the observed difference in means is not greatly significant.
Secondly, mean scores were calculated for all speaker groups based on their performance on the second task. As can be seen in table 3, none of the non-native speakers’ scores reached a score similar to that of a native speaker group for the second task. There were, thus, no non-native speakers who were considered to have a native-like pronunciation of English.

Table 3: Mean Scores Per Speaker on Task 2

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS1</td>
<td>4.86</td>
</tr>
<tr>
<td>NS2</td>
<td>4.86</td>
</tr>
<tr>
<td>NS3</td>
<td>4.29</td>
</tr>
<tr>
<td>NS4</td>
<td>5.00</td>
</tr>
<tr>
<td>NS5</td>
<td>4.86</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>4.77</strong></td>
</tr>
<tr>
<td>NNSM1</td>
<td>1.86</td>
</tr>
<tr>
<td>NNSM2</td>
<td>2.15</td>
</tr>
<tr>
<td>NNSM3</td>
<td>2.43</td>
</tr>
<tr>
<td>NNSM4</td>
<td>2.43</td>
</tr>
<tr>
<td>NNSM5</td>
<td>1.57</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>2.09</strong></td>
</tr>
<tr>
<td>NNSB1</td>
<td>2.43</td>
</tr>
<tr>
<td>NNSB2</td>
<td>3.24</td>
</tr>
<tr>
<td>NNSB3</td>
<td>2.57</td>
</tr>
<tr>
<td>NNSB4</td>
<td>2.57</td>
</tr>
<tr>
<td>NNSB5</td>
<td>3.71</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>2.89</strong></td>
</tr>
</tbody>
</table>

In addition, an average was calculated in order to test the significance of the difference in means between the monolingual non-native group and the bilingual non-native group. Using the mean scores that can be found in table 3, the difference in results between the monolingual and bilingual speaker groups for this task type are not significant either.
After this, mean scores were calculated for all speakers and speaker groups based on their performance on the third task, as can be seen in Table 4. Similar to the first and second task, none of the non-native speakers reached a score similar to the mean of the native speaker group for the third task. There were, thus, no non-native speakers who were considered to have a native-like pronunciation of English.

Table 4: Mean Scores Per Speaker on Task 3

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS1</td>
<td>4.86</td>
</tr>
<tr>
<td>NS2</td>
<td>5.00</td>
</tr>
<tr>
<td>NS3</td>
<td>4.29</td>
</tr>
<tr>
<td>NS4</td>
<td>5.00</td>
</tr>
<tr>
<td>NS5</td>
<td>4.57</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>4.74</strong></td>
</tr>
<tr>
<td>NNSM1</td>
<td>2.14</td>
</tr>
<tr>
<td>NNSM2</td>
<td>2.00</td>
</tr>
<tr>
<td>NNSM3</td>
<td>3.14</td>
</tr>
<tr>
<td>NNSM4</td>
<td>2.71</td>
</tr>
<tr>
<td>NNSM5</td>
<td>2.57</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>2.51</strong></td>
</tr>
<tr>
<td>NNSB1</td>
<td>3.29</td>
</tr>
<tr>
<td>NNSB2</td>
<td>3.14</td>
</tr>
<tr>
<td>NNSB3</td>
<td>3.14</td>
</tr>
<tr>
<td>NNSB4</td>
<td>2.57</td>
</tr>
<tr>
<td>NNSB5</td>
<td>3.71</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>3.17</strong></td>
</tr>
</tbody>
</table>

In addition, an average was calculated in order to test the significance of the difference in means between the monolingual non-native group and the bilingual non-native group. Using the mean
scores that can be found in Table 4, the difference in means between these two groups is relatively noticeable.

Finally, then, overall mean scores were calculated for each speaker and for each speaker group. As can be seen in Table 5, native speakers were overall scored higher than any of the non-native speakers and the students in bilingual programs scored higher than students in monolingual programs in terms of overall scores.

Table 5: Mean Scores Per Speaker Overall

<table>
<thead>
<tr>
<th>Speaker</th>
<th>Mean Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS1</td>
<td>4.86</td>
</tr>
<tr>
<td>NS2</td>
<td>4.95</td>
</tr>
<tr>
<td>NS3</td>
<td>4.10</td>
</tr>
<tr>
<td>NS4</td>
<td>5.00</td>
</tr>
<tr>
<td>NS5</td>
<td>4.71</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>4.72</strong></td>
</tr>
<tr>
<td>NNSM1</td>
<td>1.95</td>
</tr>
<tr>
<td>NNSM2</td>
<td>2.29</td>
</tr>
<tr>
<td>NNSM3</td>
<td>2.62</td>
</tr>
<tr>
<td>NNSM4</td>
<td>2.57</td>
</tr>
<tr>
<td>NNSM5</td>
<td>2.19</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>2.32</strong></td>
</tr>
<tr>
<td>NNSB1</td>
<td>2.76</td>
</tr>
<tr>
<td>NNSB2</td>
<td>3.24</td>
</tr>
<tr>
<td>NNSB3</td>
<td>2.66</td>
</tr>
<tr>
<td>NNSB4</td>
<td>2.66</td>
</tr>
<tr>
<td>NNSB5</td>
<td>3.43</td>
</tr>
<tr>
<td><strong>Group Mean</strong></td>
<td><strong>2.95</strong></td>
</tr>
</tbody>
</table>
In order to answer the second research question, another average was calculated to test the significance of the difference in means between the monolingual non-native group and the bilingual non-native group. Using the mean scores that can be found in table 5, the difference in means in this opportunity is rather significant.
DISCUSSION

Based on the results presented, there were no non-native speakers of English whose scores reached the mean of the native speaker group for any of the three task types. In other words, there were no non-native speakers who were considered to have a native-like proficiency of English as judged by native speakers. The non-native speaker who obtained the highest rating on any of the separate tasks is NNSB5, with a score of 3.71. In order to qualify as a native speaker, however, a subject would have to have obtained a higher mean score on all three task. As such, though NNSB5 was rated, on average, as having in between a noticeable foreign accent and a slight foreign accent, his/her pronunciation was not considered to be of similar quality to that of native speaker.

Although Lenneberg (1967) had no access to such data when he proposed the CPH, it seems that, in fact, his perceptions were also accurate for L2 native-like pronunciation according to the data obtained in this study.

Although the lack of non-native speakers who have achieved a native-like pronunciation of English seems to provide support for a critical period for second language pronunciation from an EFL perspective, we must also realize that the results are not evidence for ultimate attainment, nor are they statements about the final native-like pronunciation that these subjects might acquire or the effects of what additional exposure to the target language in different degrees of intensity might produce. As such, these results merely indicate that, at this point, after 6 years of English language instruction, the subjects in this study have not been able to obtain a native-like pronunciation based on native speaker laypersons' perceptions. The English pronunciation of the subjects in this study may continue to evolve over time toward target language norms; therefore, this study does not directly provide support for a critical period for second language pronunciation by itself.

The non-native speakers who received bilingual education overall were rated closer to target language norms than the non-native speakers who received monolingual education. As such, subjects in the bilingual group were considered to have a more native-like pronunciation of English than subjects in the monolingual group. Is the reason for the bilingual group's advantage motivated by the amount of exposure to the target language through time? Is it motivated by the type of exposure to the target language? Or is it a combination of both factors? This is a topic for further research in this area.
Although there were some instances in which speakers in monolingual programs received higher scores than particular speakers in bilingual programs or individual tasks, an average was earned to each task type in order to investigate if the difference in mean scores between the non-native speaker groups was significant. As it turns out, the difference in mean scores between the two non-native speaker groups was indeed significant for all three tasks. Moreover, significance was found for the overall mean scores between the monolingual and bilingual non-native speaker groups.

The finding that students in bilingual programs in Chile have a more native-like pronunciation of English than students in monolingual programs supports the idea that the “amount of input” learners receive plays an important role in obtaining a native-like proficiency. It may also indicate that the type of input plays an important role as well. The results of this study suggest that second language acquisition is influenced by both the intensity and type of input. This notion supports the idea that second language acquisition is not solely an innate process, but that there has to be, at least, an interaction between processes inside the learners and those external to them.

Interestingly, both non-native speaker groups received higher mean scores for the third task, which involved a higher degree of speaker control. As such, it is visible the influence of other language skills on second language pronunciation. A reason for this could be that, with an increased speaker control, speakers are able to compensate for the non-native features of their speech by avoiding them. As speakers were required to produce particular sounds in the first task, and particular sounds and suprasegmentals in the second task, they were required to demonstrate their proficiency in these two areas. In the third task, however, speakers were able to use only those sounds and suprasegmentals that they wished to use, and, as such, they have left out particular sounds which they probably felt uncomfortable with. Whether speakers indeed omit language skills that they struggle with when given more control on their output was beyond the scope of this project.

A last point that needs to be mentioned here is that all three groups had low scores, which means that the distribution of scores within each group was relatively homogenous, subjects in each group were, as well, scored very similar by all testers. The testers, thus, were able to distinguish between three different types of speaking proficiency. The individual scores that speakers received suggest that native-speaker testers were able to clearly distinguish between native speakers and non-native speakers with little variation among individual testers, even without
tester training. Although the difference in mean scores between the two non-native-speaker groups is smaller than when the non-native-speaker-groups are compared to those of native speakers, the data do suggest that testers were able to distinguish among the three different groups, and rated them differently. This difference emerged from the data, not from tester training. The almost identical standard deviation scores for each of these three groups suggests that native speaker testers were able to clearly identify the subjects in each group regarding their level of pronunciation, and that they were able to make judgements about the pronunciation of these speakers that could likely be generalized to other native speakers.
CONCLUSION

In order to add to the existing body of research available on the CPH, this final research project investigated the possibility for such a hypothesis to explain differences in second language pronunciation from an English-as-a-foreign-language perspective. This study focused on a reduced sample of students from both monolingual and bilingual programs in Chile.

In addition, the aim of this project was to investigate the influence of the amount of target language exposure on the acquisition of English pronunciation skills.

In order to structure this work, the following research questions were posed at the beginning of this work:

1. Are Spanish speakers, who are late learners of English, able to achieve a native-like pronunciation of English?
2. Does exposure to the target language make a difference in the level of attainment of pronunciation in Spanish speakers who are late learners of English?

Based on the results presented above, these questions can be answered as follows:

1. Spanish speakers who are late learners of English are not necessarily able to achieve a native-like pronunciation of English, as it was demonstrated in comparison scores between samples of their speaking and those of native speakers of English.
2. Exposure to the target language makes a difference in the level of attainment of pronunciation in Spanish speakers who are late learners of English. In other words, there is a difference in English language pronunciation between students in monolingual education and those in bilingual education programs in Chile, as it was demonstrated in comparison scores between samples of their speech.

Research question one, thus, warrants acceptance of the first hypothesis posed at the beginning of this work, which states that there were no non-native speakers of English who were considered to have obtained a native-like pronunciation of English by native speaker testers. This result seems to provide support for a critical period for second language pronunciation from an EFL perspective, but the results are not even close to represent ultimate attainment, or the final proficiency a
person can acquire. Of course, deeper and more longitudinal research is needed to establish the effects of a critical period for second language pronunciation on ultimate attainment.

The second research question posed requires the acceptance of the second hypothesis presented on the first pages of this work, which states that subjects who received bilingual education in Chile had obtained a more native-like pronunciation of English than subjects in monolingual programs, as judged by native speakers of English. This finding supports the idea that the amount of input plays a large role in obtaining a native-like pronunciation of English. It also suggests that bilingual programs are a successful way of increasing proficiency as they provide more varied and intense input. This result implies that a maximized level of exposure to a target language is beneficial to the development of students’ second language pronunciation skills and is, therefore, an important factor to consider in designing second language curricula.

To conclude, although further research is needed to ascertain the effects of a critical period for second language pronunciation on ultimate attainment, the amount to which learners are exposed to a target language influences significantly their native-like pronunciation of that language. Finally, this project investigated the effects of exposure to the target language as a factor in the development of late learners’ second language pronunciation, considering the CPH from an English-as-a-Foreign-Language perspective.

“It requires less effort to conquer your enemy than it does to learn to communicate with him. The rewards of conquest can be substantial, especially when compared to the cost of learning the language of an enemy.” Our remarkable facility to learn a first language at an early age – and our equally strong difficulty to learn another one later on – are easily predictable consequences of our prehistoric heritage. Language acquisition is one maturational process linked to interactions with physical and social environments. As Eric Lenneberg would say, “if you don’t acquire it early, you might as well not acquire it at all.”

But, above all, there is no doubt: for sharp pronunciation to populate our classrooms we have to start by removing our skepticism about students’ potentials and about our own ability to make them develop those potentials satisfactorily.
APPENDIX A

Questionnaire

Answer the following questions about yourself and the circumstances under which you have learnt English. This information is anonymous and will only be used to provide the researcher with information that can influence the reliability of the results of the research study.

1. Gender:
2. Age:
3. Age at which you started learning English:
4. Do any of your parents speak English as a first language?
5. How many years have you received formal instruction in English?
6. Did you received monolingual or bilingual instruction at secondary school?
7. How many hours of English instruction per week did you receive?
8. Have you ever lived in an English-speaking country?
9. Is there any other way in which you have been exposed to the English language (media, travel, etc.)?
10. Why do you study English?
   a. Because I have to
   b. Because I like the language
   c. Because my parents want me to
   d. Other:

11. On a scale from 1-5 (1 being the lowest and 5 being the highest), how would you rate your English pronunciation?
APPENDIX B

SPEECH MATERIAL

Word List

You are about to go on a 10-day-trip with your friends. Please read out loud the following list of items you need to pack.

1. A pair of purple snickers
2. A black leather jacket
3. A woolen sweater
4. A pair of black shoes
5. Four pairs of cotton socks
6. An orange scarf
7. Two pairs of blue jeans
8. A black shirt
9. Three towels
10. Two bathing suits

English sounds that are difficult to pronounce for Spanish speakers:

/ɜ:/, /s/ in initial position, /ð/, /ʊ̈/, /ʃ/, /ə/ after a plosive consonant, /s/, /tʃ/, /θ/, and /w/. 
Short Paragraph

Read the following paragraph out loud:

Behind Winston’s back the voice from the telescreen was still babbling away about pig-iron and the overfulfilment of the Ninth Three-Year Plan. The telescreen received and transmitted simultaneously. Any sound that Winston made, above the level of a very low whisper, would be picked up by it, moreover, so long as he remained within the field of vision which the metal plaque commanded, he could be seen as well as heard. There was of course no way of knowing whether you were being watched at any given moment. How often, or on what system, the Thought Police plugged in on any individual wire was guesswork. It was even conceivable that they watched everybody all the time. But at any rate they could plug in your wire whenever they wanted to. You had to live — did live, from habit that became instinct — in the assumption that every sound you made was overheard, and, except in darkness, every movement scrutinized.

(Excerpt from George Orwell's 1984)

Spontaneous Speech

Speak about your plans for next year.
BIBLIOGRAPHY


