UNIVERSIDADE FEDERAL DE SANTA CATARINA

PÓS-GRADUAÇÃO EM LETRAS/INGLÊS E LITERATURA CORRESPONDENTE

THE PRODUCTION OF WORD-INITIAL /ɹ/ BY BRAZILIAN LEARNERS OF ENGLISH AND THE ISSUES OF COMPREHENSIBILITY AND INTELLIGIBILITY

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ABSTRACT

THE PRODUCTION OF WORD-INITIAL /ɹ/ BY BRAZILIAN LEARNERS OF ENGLISH AND THE ISSUES OF COMPREHENSIBILITY AND INTELLIGIBILITY

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Brazilian Portuguese (BP) rhotics have many variations, and Brazilians sometimes transfer the rhotics from BP to English when learning this language, mainly in the early stages of acquisition (Osborne, 2008). This process results in non-target productions of the rhotics, and in order to help Brazilians to succeed when communicating with other non-native (NNS) and native speakers of English (NSE), it is important to investigate which non-target productions really hinder intelligibility and comprehensibility. The concepts of intelligibility and comprehensibility are different dimensions of language use that complement each other (Munro, Derwing, & Morton, 2006). While intelligibility refers to what the listeners actually understood, comprehensibility assesses the level of difficulty faced by the listeners to understand speech samples (Munro, Derwing, & Morton, 2006). Both dimensions can be affected by variables such as the listener's familiarity with the speaker's first language and/or accent, and the listener's level of proficiency, among other factors. The objective of this study was to investigate how Brazilians' non-target productions of /ɹ/ affect intelligibility and comprehensibility when they are heard by other Brazilians and NSE. In

order to achieve this objective, reading samples were recorded by BP speakers of English as a second language and a NSE. Some of the recordings containing target and non-target productions of 4 words beginning with /ɻ/ were then presented to 2 groups of Brazilians and 1 group of NSE. Overall, results suggest that the replacement of /ɻ/ with /h/ hindered intelligibility and comprehensibility. Due to research limitations, however, more studies need to be conducted so as to confirm the results reported in this thesis.

Keywords: rhotics; intelligibility; comprehensibility; Brazilian Portuguese;

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RESUMO

THE PRODUCTION OF WORD-INITIAL /ɹ/ BY BRAZILIAN LEARNERS OF ENGLISH AND THE ISSUES OF COMPREHENSIBILITY AND INTELLIGIBILITY

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Os róticos do Português Brasileiro (BP) possuem várias variações, o que às vezes induz os brasileiros a transferir a pronúncia dos róticos do PB para o inglês, principalmente nos estágios iniciais de aprendizado (Osborne, 2008). Tal processo geralmente resulta em produções não-padrão dos róticos e, de forma a ajudar os brasileiros a serem bem sucedidos na comunicação com outros falantes não nativos, bem como falantes nativos do inglês, é de suma importância investigar quais produções não-padrão realmente dificultam a inteligibilidade e a compreensibilidade. Os conceitos de inteligibilidade e compreensibilidade são dimensões diferentes do uso da língua que se complementam (Munro, Derwing, & Morton, 2006). Enquanto a inteligibilidade se refere ao que o ouvinte foi capaz de entender, a compreensibilidade avalia o nível de dificuldade que os mesmos tiveram em entender as amostras de fala (Munro, Derwing, & Morton, 2006). Ambas as dimensões podem ser afetadas por variáveis, tais como o nível de proficiência do ouvinte e a sua familiaridade com a primeira língua do falante e/ou sotaque, entre outros fatores. O objetivo deste estudo foi investigar como as produções não-padrão dos brasileiros afetam a inteligibilidade e a compreensibilidade quando ouvidos por outros

brasileiros e por falantes nativos de inglês. Para atingir este objetivo, amostras obtidas a partir da leitura de frases foram gravadas por brasileiros falantes de inglês e por um falante nativo de inglês. Algumas das gravações que continham produções padrão e não-padrão de quatro palavras com /ɹ/ em posição inicial foram apresentadas a 2 grupos de brasileiros e 1 grupo de falantes nativos de inglês. Os resultados sugerem que a substituição do /ɹ/ por /h/ dificultou a inteligibilidade e a compreensibilidade. No entanto, devido às limitações da pesquisa, mais estudos precisam ser conduzidos para confirmar os resultados relatados nesta dissertação.

Palavras-chave: róticos; inteligibilidade; compreensibilidade; português brasileiro

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LIST OF ABBREVIATIONS

BP – Brazilian Portuguese

BPSE – Brazilian Portuguese Speaker(s) of English

EIL – English as an International Language

ESL – English as a Second Language

Extra – Extracurricular Course/Group

L1 – First Language/Mother Tongue

L2 – Second Language/Foreign Language

NS – Native Speaker(s)

NSE – Native Speaker(s) of English

NSE-F – Native Speaker(s) of English Familiar with BP accent

NSE-U- Native Speaker(s) of English Unfamiliar with BP accent

NNS – Non-native Speaker(s)

NNSE – Nonnative Speaker(s) of English

NTP – Non-target Pronunciation

PPGI – Programa de Pós-Graduação em Inglês/Group

SLA – Second Language Acquisition

TP – Target Pronunciation

UFSC – Universidade Federal de Santa Catarina

CHAPTER 1
INTRODUCTION

1.1. Context of investigation

Brazil is a large country with a wide range of dialects. One of the features that distinguish the dialects is the production of the rhotics (r sounds). For instance, people from Rio Grande do Sul may say ***r**ata* 'mouse' as [ˈɾatə][1], but people who are born in Florianópolis tend to pronounce this word as [ˈχatə] (Brenner, 2005). The position of the rhotic in the word also influences the way it is pronounced, for example, <r> in onset position, as in *ca**r**o* 'expensive', is pronounced as a tap [ɾ], while the same grapheme can be pronounced as a retroflex [ɻ] in some Brazilian Portuguese (BP) dialects. Conversely, in English, there are not as many variations of the rhotics in word and syllable initial positions as there are in BP (Deus, 2009). While American English has a retroflex rhotic, in the Northwest of England the standard rhotic pronunciation is the uvular fricative (Ladefoged & Maddieson, 1996) /χ/. Thus a word such as 'red' can be pronounced as [ɻɛd] or [χɛd] (see section 2.1.2 for further details about the rhotics in English dialects).

With the intent of mapping the variations of the rhotics, some studies on this sound in the world languages have been conducted (Ladefoged & Maddieson, 1996; Ladefoged, 2001; Lindau, 1985). Regarding the BP rhotics, many studies have been carried out to verify and describe the different pronunciations of rhotics and their deletion in BP (Bertani, 1998; Brenner, 2005; Brescancini & Monaretto, 2008; Callou, Moraes, & Leite, 1998; Deus, 2009; Fraga, 2006; Monaretto, 2009; Monguilhott, 2007; Pedrosa & Cardoso, 2010; Reinecke, 2006; Silva-Brustolin, 2009; Toledo, 2009). Related to these studies is the transfer of rhotics from BP to English, an issue that has not been

[1] In this study, transcriptions were made according to Cristófaro-Silva's (2010) recommendations.

extensively investigated yet, even though it is a very common process for BP speakers who attempt to learn English as a Second Language (ESL) (Deus, 2009; Lieff & Nunes, 1993; Osborne, 2008, 2010).

In addition to the scarce literature reporting the transfer of rhotics production from BP to English, there is also a gap in research regarding the effect (if there is one) of such transfer from BP to English on comprehensibility and intelligibility, which are two of the concepts referring to the listener's ability to understand different levels of a speaker's speech. For the purposes of this study, comprehensibility will be understood as "the ease or difficulty with which a listener understands L2 [2] accented speech" (Derwing et al., 2007, p. 360), meaning that the listener evaluates the extent to which an utterance or a word is easy or difficult to understand. Intelligibility, on the other hand, aims to verify if the speech was appropriately comprehended by the listener, and therefore will be defined as "the extent to which a speaker's utterance is actually understood" (Munro et al., 2006, p. 112)

The notions of comprehensibility and intelligibility have been discussed by scholars in the area for some time now. Since English has now the status of a *lingua franca* and is a means of communication used by people from different L1 backgrounds (Jenkins, 2004), some scholars advocate that there is no need for bilingual[3] speakers to sound like native speakers (NS) anymore; rather, bilingual speakers should aim at being intelligible and comprehended by others (McKay, 2003). Consequently, the issues of intelligibility and comprehensibility are now

[2] In this study, L2 will be understood as "any language that is learned subsequent to the mother tongue" (Ellis, 1997, p. 3), and will be used interchangeably with the term "foreign language".

[3] The term bilingual will be defined following Valdés' reasoning (2001), for whom bilingualism does not consist only in achieving native-likeness, and that there are different levels of L2 knowledge, meaning that L2 learning is a continuum.

being discussed and investigated in the light of English as an International Language (EIL[4]) (Sharifian, 2009).

1.2. Objective and Research Questions

Taking into account what has been previously stated regarding the pronunciation of the rhotics in BP and English, the transfer from one language to another and the issues of intelligibility and comprehensibility in the context of EIL, the main objective of this research is to investigate how each type of non-target pronunciation of English word-initial /ɹ/ by Brazilian Portuguese speakers of English (BPSE) affects comprehensibility and intelligibility when these speakers are heard by native speakers of English (NSE) and other BPSE.

In order to achieve this objective, the first step was to check what the possible productions of English word-initial /ɹ/ by Brazilians were, and if they matched the ones predicted in the literature. The second step was to examine which group of listeners had more difficulty in comprehending the Brazilian accented /ɹ/, taking into account that three variables that can influence the results are a) listeners' familiarity with the speaker's accent, b) listeners' and speakers' mother tongue (L1) background, and c) listeners' level of proficiency. In accordance with the objectives of this study, the questions and hypothesis that guided this research were:

RQ1) How does the non-target pronunciation of English word-initial /ɹ/ by BPSE affect intelligibility according to BPSE and NSE listeners?

H1. The transfer of the fricatives [h] or [χ] as allophones for the word-initial position /ɹ/ will cause unintelligibility for the listeners in general (Lieff & Nunes, 1993).

[4] "EIL emphasizes that English, with its many varieties, is a language of international, and therefore intercultural, communication" (Sharifian, 2009)

H2. BPSE listeners (PPGI and Extra) will provide more accurate transcriptions of the BPSE utterances in comparison to the NSE listeners, since BPSE participants share an L1 background and therefore will be more attuned to the Brazilian accent in English.

H3. Less proficient listeners (Extra) will perform better than more proficient L2/NSE listeners in the intelligibility tasks[5], since they will not be able to notice the difference between [ˈɹæbɪts] and [ˈhæbɪts] (Bent & Bradlow, 2003; Hayes-Harb, Smith, Bent, & Bradlow, 2008; van Wijngaarden, Steeneken, & Houtgast, 2002).

RQ2) How does the non-target pronunciations of English word-initial /ɹ/ by BPSE affect comprehensibility according to BPSE and NSE listeners?

H4. Lower proficiency BPSE (Extra) will assign higher comprehensibility rates in comparison to the other groups of listeners, because they will not be able to notice the difference between the target and non-target productions.

H5. Brazilian listeners in general will assign higher comprehensibility rates to BPSE non-target pronunciation of /ɹ/ in comparison to NSE (Bent & Bradlow, 2003; Harding, 2011; Imai, Flege, & Walley, 2003; Major, Fitzmaurice, Bunta, & Balasubramanian, 2002; Munro & Derwing, 2006).

[5] In this study, task will be defined according to Bygate, Skehan, and Swain (2001) "a focused, well-defined activity, relatable to pedagogic decision making, which requires learners to use language, with an emphasis on meaning, to attain an objective, and which elicits data which may be the basis for research".

RQ3) How are the dimensions of comprehensibility and intelligibility associated for the different groups of listeners?

H6. Listeners will transcribe the word according to what they heard and intelligibility will be compromised, while they will assign higher rates for comprehensibility, because they will believe they transcribed what the speaker actually intended to say. In this sense, lower proficiency listeners will perform better in intelligibility and comprehensibility tasks than other Brazilians, who will perform better than the NSE.

RQ4) Which group of NSE listeners have more difficulty in understanding the Brazilian accented /ɹ/ in English words regarding the dimensions of comprehensibility and intelligibility?

H7. Familiar NSE listeners will be more accurate when transcribing the tested words (intelligibility measure) and will assign higher rates to BPSE productions (comprehensibility measure) (Cruz, 2008; Derwing & Munro, 1997; Gass & Varonis, 1984; Munro & Derwing, 2006).

1.3. Significance of the Study

As previously stated, most studies on the production of the rhotics are concerned with the description of these sounds (both in BP and English) and the transfer of rhotics from Portuguese to English, which usually leads to the production of non-target pronunciation (e.g., Deus, 2009; Osborne, 2010). However, so far no study has been carried out with the intent of investigating the extent to which the non-target pronunciations of English /ɹ/ in word-initial position affect (or not) speakers' comprehensibility and intelligibility. Actually, there are not many studies concerning NNS intelligibility of English segments at all, since most experiments still seek evidence of NNS accentedness in English segments (e.g., Deus, 2009; Osborne, 2010).

Nevertheless, Munro & Derwing (2006) are part of a group of scholars who have been advocating a change in Second Language Acquisition (SLA) research and teaching, and suggest that there is a need for more studies in the area of intelligibility and comprehensibility, since "pronunciation instructors seeking to assist their L2 learners to become effective communicators should concentrate on aspects of L2 phonology that affect intelligibility and comprehensibility, rather than accentedness alone" (Munro & Derwing, 2006, p. 521).

In addition, most studies in the area of pronunciation have been testing the comprehensibility and intelligibility of NNS through NSE judgments. Yet, if we consider that nowadays there are more NNS communicating in ESL than NSE (McKay, 2003), it seems that restricting the analysis to NSE evaluation offers a limited view of the facts. Nelson (2011, p.3), for instance, remarks that "users want to know whether their English will serve them with other users who are not of their immediate neighborhood, circle, region, or nation". Likewise, McKay (2003) and other scholars have proposed that NNS should emulate other NNS who have overcome the obstacles in learning a second language (L2) and are therefore considered to be successful in communicating, instead of trying to achieve the so called native-like competence.

Munro and Derwing (2011) also emphasize that most of the research produced so far is not in accordance with the underlying assumption that intelligibility is more important than accent when it comes to effective communication (which is usually the ultimate objective of learning an L2) and, therefore, it seems that the research agenda is not in accordance with pedagogical interests either. Thus, this study is also innovative and important in the sense that it aims to verify the extent to which the pronunciation of a certain phoneme consonant segment is comprehensible and intelligible to other speakers, not only NSE, but NNS as well.

Following this rationale, the answers to the research questions may enlighten teachers in relation to the teaching of English rhotics, meaning that the results might indicate whether non-target pronunciations of the word-initial /ɹ/ really hinder listeners'

comprehensibility and intelligibility of what L2 learners say, and, in case they do, what type of deviation is most difficult for each group of listeners to understand (NSE and BPSE). This way, teachers will probably be more confident regarding the importance (or not) of demanding a more comprehensible and intelligible pronunciation from their students, and about whether or not it is important to have a native-like pronunciation for the English /ɹ/.

1.4. Organization of the Study

The present study is organized as follows: Chapter 2 provides an overview of the relevant literature concerning the description of rhotics in BP and in English, as well as the description of the transfer process of rhotics from BP to English; in addition, this chapter deals with the issues of comprehensibility and intelligibility, which are discussed in the light of English as a Lingua Franca. Then, Chapter 3 presents a detailed description of the method and instruments used in data collection and analysis, as well as the participants' profiles. In Chapter 4 the results are reported and discussed in terms of the review of literature previously presented. Finally, Chapter 5 highlights the main findings of the present research, its limitations and suggestions for further studies, besides the main insights that emerged from the results.

CHAPTER 2
REVIEW OF LITERATURE

This chapter begins with the most relevant literature concerning the variations in the pronunciation of the <r> in Portuguese and in English, as well as the process of transfer from Portuguese to English by BPSE. This is followed by the discussion of terms related to intelligibility. Finally, some of the variables involved in the rating of comprehensibility and intelligibility are presented.

2.1. Context of investigation

Generally speaking, rhotics have been considered hard to describe in most languages due to their variations across and within languages. Ladefoged and Maddieson (1996) highlight that while most languages have only one type of rhotic, there are others that have two or more (e.g., Portuguese, Spanish). According to some authors (Ladefoged, 2001; Lindau, 1985), the ways in which the <r> sounds are pronounced vary not only across and within languages, but also according to each speaker's idiolect. Other sources of variation can also be the position of the r-sound in the word (Cristófaro-Silva, 2005) and the speaker's age (Silva & Albano, 1999). However, even though there is not a consensus concerning all the descriptions of <r> among researchers, variations of rhotics are usually classified as "voiced or voiceless vocoids, approximants, fricatives, trills, taps and flaps produced at various places of articulation" (Eklund et al., 2005).

In the case of BP, the number of different realizations of the <r> sounds is large. It is important to remark that, besides not finding agreement among scholars concerning the description of the rhotics both in BP and in English, there are also differences in the selection of symbols that represent each segment. However, it is not the intention of this study to focus on this discussion, since the main objective here is to give a brief description of the rhotics in both languages in word-initial position only.

Nevertheless, before moving on to the description of rhotics in word-initial position, it is crucial to explain why this context was chosen at the expense of other word-positions. First of all, it would not be possible to examine the pronunciations of /ɹ/ by BPSE and their intelligibility for all word-positions in this study. Therefore, I chose to examine the production of this phoneme in word-initial position only, based on Bent, Bradlow, and Smith's statement (2007) that errors in word-initial position are more likely to hinder intelligibility if compared to other word positions. If we relate this statement to the present study, we could argue that NNS who produce non-target pronunciations of the English /ɹ in word-initial position are more likely to be misunderstood than NNS who have difficulty with this sound in medial or final word position.

This claim is based on the activation-competition model of lexical access, according to which "[…] word-initial segments play a special role in activating lexical items since segmental information is encoded sequentially and the encoding of initial segments activates possible completions" (Bent et al., 2007, p. 336). This statement seems to be supported by the results found by Bent et al. (2007) in a study on intelligibility conducted with speakers of Mandarin-accented English, in which the authors found that non-target productions of vowels and consonants in word-initial position caused more problems for listeners than non-target pronunciations of segments in other positions. In, fact, when investigating if BPSE tended to transfer the pronunciation of rhotics from BP to English, Deus (2009) verified that these speakers were more likely to transfer the BP rhotics to English in word medial and initial position (this study will be explained in more detail in section 2.2).

Clearly more empirical research is needed to support or refute this argument, and albeit the present study does not aim to make a comparison of the effects of non-target productions in different word positions, it appears more logical to start the investigation focusing on word-initial position, since non-target productions of consonants in this environment are apparently more detrimental to intelligibility and comprehensibility.

2.1.1. The pronunciation of rhotics in Brazilian Portuguese

As mentioned above, scholars have not reached an agreement concerning the description of rhotics in BP. This is a result of two factors: a) traditionally, research has focused on standard BP, which usually consists of the varieties spoken in Rio de Janeiro and São Paulo; b) more recent research has investigated other varieties of BP, but has also been limited to certain regions and has tended to dismiss less evident productions of the researched sound, as is the case of Brescancini and Monaretto's research (2008) about the dialects found in the south of Brazil, and Cristófaro-Silva's study (2010) on the typical dialects from Minas Gerais. Even though initial studies in each region are necessary so as to have a complete and detailed description of all dialects, there is little empirical research overviewing all the rhotic variants found in Brazil, both standard and dialectal ones, as remarked by Reinecke (2006).

In spite of this gap, there seems to be an agreement regarding the origin of two of the standard rhotic productions in BP, the trill and the tap, which are believed to have emerged from Latin, even though these sounds changed over time, resulting in the current variants. Camara Jr. (1953; 2008), for example, explains how the tap (which he calls the weak /r/), and the trill (multiple /r/) developed from the Latin rhotics:

> [...] our weak /r/ corresponds to a weakening of the simple Latin /r/ in intervocalic position. Conversely, the multiple /r/ elongates the Latin /r/, which is maintained – as the other consonants – in initial or medial non-intervocalic position (this was also the case with the geminate consonant); therefore, this sound occurs for the same reason in *rei, genro, erra* (Camara Jr., 1953; 2008, p. 78) [6]

[6] My translation. The original excerpt is: "[...] o nosso /r/ brando corresponde, justamente, a um enfraquecimento do /r/ simples latino em consequência da posição intervocálica. O /r/ múltiplo prolonga, ao contrário, o /r/ latino, mantido – como as demais consoantes – em posição inicial ou medial não intervocálica,

Therefore, it can be inferred that Camara Jr. (1953; 2008) claims that in standard BP only the trill occurs in word-initial position. Thus, for this author, the tap occurs only in medial intervocalic-position, in words like *cara* 'face', *para* 'to', *arara* 'macaw'.

Likewise, Cagliari (2007) lists the following rhotic variants that can be found in BP in word-initial position:

a) the voiceless velar fricative [x], as in *rato* 'mouse' [ˈxatɔ], which is the typical *carioca* pronunciation;

b) the voiceless uvular fricative [χ], as in *roda* 'wheel' [ˈχɔdə], which is also mentioned by Camara Jr. (2008);

c) the voiced glottal fricative [ɦ], as in *roda* 'wheel' [ˈɦɔdə], or the voiceless glottal fricative [ɦ̥], as in [ˈɦ̥ɔdə], which are common pronunciations of the *mineiro* dialect;

d) the retroflex (which can be classified as approximant in other phonological models) [ɻ], as in *roda* 'wheel' [ˈɻɔdə]. Cagliari (2007) claims that this is a typical pronunciation of the *caipira* dialect, which can be found in Minas Gerais and in São Paulo.

From the list of possible variants above, we can perceive that similarly to Câmara Jr. (1953; 2008), Cagliari (2007) does not mention the occurrence of the tap in syllable onset position either, which is reaffirmed in this statement:

> In Portuguese, the tap usually occurs between a plosive or labiodental fricative and a vowel, between two vowels, and for certain speakers, it can also occur in the

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como era a do caso especial da consoante geminada; temo-lo, pois, sempre pelo mesmo motivo, em *rei, Israel, genro, erra"* (Camara-Jr., 1953; 2008, p. 78).

> syllable coda before a consonant. In Portuguese, the tap does not occur in the beginning of words (Cagliari, 2007, p. 41)[7].

Cristófaro-Silva (2010) classifies the BP rhotics into four groups according to manner of articulation: fricatives, taps, trills, and retroflex. In word-initial position, however, this author claims that only five realizations are possible: the voiceless alveolar trill, the voiceless velar fricative, the voiceless glottal fricative, the voiced velar fricative, and the voiced glottal fricative. According to this author, the trill occurs in some BP dialects and idiolects, as in the *paulista* dialect, for example. The voiceless alveolar trill is represented by the symbol [r̆] (e.g., ***r****ata* 'mouse' [ˈr̆atə]). The voiceless velar fricative, represented by the symbol [χ], is typical of the *carioca* and *florianopolitano* (in word-initial position) dialects (Monaretto, Quednau, & Hora, 1996) (e.g., ***r****ata* 'mouse' [ˈχatə]). The voiceless glottal fricative, represented by the symbol [h], is a typical pronunciation of the dialect found in Belo Horizonte (e.g., ***r****ata* 'mouse' [ˈhatə]).

Cristófaro-Silva (2010) argues that the tap has only one realization in BP, the voiced alveolar tap [ɾ], as in *car****a*** 'face' [ˈkaɾə]), and that it does not occur in word-initial position. However, other authors such as Monaretto, Quednau, and Hora (1996), and Monaretto (2009) disagree. These authors argue that bilingual speakers who live in communities of European colonization replace the trill with the tap in all positions of the word (Monaretto et al., 1996; Monaretto, 2009).

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[7] My translation. The original excerpt is: "O tepe em português ocorre comumente entre uma oclusiva ou fricativa labiodental e uma vogal, entre duas vogais, e, na pronúncia de certos falantes, também em posição final de sílaba diante de uma consoante. Em português não ocorre o tepe em início de palavra" (Cagliari, 2007, p. 41).

Likewise, Cristófaro-Silva (2010) explains that the retroflex rhotic [ɻ] does not occur in word-initial position in BP. According to her, it is considered to be a voiced alveolar in BP, and it occurs in the coda, as in the word *mar* 'sea' [ˈmaɻ], being a typical production of the *caipira* dialect of Minas Gerais. Other authors show evidence that this variation can be found in other regions as well, such as in parts of Paraná (Botassini, 2009; Toledo, 2009), Rio Grande do Sul (Callou, Moraes, & Leite, 1996), Santa Catarina (Monguilhott, 1998). In fact, Noll (2008) claims that the retroflex is part of dialects from Rio Grande do Sul all the way to Rondônia. It should be also mentioned that Cagliari (2007) and Monaretto (2009) claim that the retroflex can occur in word-initial position, even though it is rare, as in *roda* 'wheel' [ˈɻodə].

Even though traditional classifications should always be taken into consideration when analyzing segments of the language, it is also crucial to pay attention to evidence from language in use, as in studies that investigate the frequency of the rhotic variants (e.g., Bertani, 1998; Botassini, 2009; Brenner, 2005; Brescancini & Monaretto, 2008; Callou, Moraes, & Leite, 1996; Callou, Moraes, & Leite, 1998; Costa, 2009; Dias, 2003; Fraga, 2006; Mollica & Fernandez, 2003; Monaretto, 2009; Monaretto, Quednau & Hora, 1996; Monguilhott, 1998, Monguilhott, 2007; Noll, 2008; Pedrosa & Cardoso, 2010; Reinecke, 2006; Silva-Brustolin, 2009; Toledo, 2009). Three of these studies - Brescancini and Monaretto (2008), Monaretto (2009), and Monaretto et al. (1996) suggest that the tap is also found in word-initial position, which deviates from the usual classification adopted by more traditional scholars. Most data showing occurences of the tap in word-initial position are from the VARSUL project[8], and indicate that in certain Brazilian communities of European colonization there are bilingual speakers who replace the trill with the tap in all word positions. The table below summarizes the occurences of each BP rhotic variant in

[8] VARSUL (Variação Linguística Urbana no Sul do Brasil) is a data base of spoken BP, and consists of interviews recorded by people from the South of Brazil.

word-initial position according to the different authors mentioned above.

Table 1
Possible Variations of Rhotics in Word-Initial Position According to Most Cited Authors

Rhotic allophones in word-initial position	**Câmara Jr. (1953; 2008)**	**Cristófaro-Silva (2010)**	**Cagliari (2007)**	**Brescancini & Monaretto (2008); Monaretto (2009); Monaretto, Quednau, & Hora (1996)**
Trill [r̆] [ˈrapidʊ]	Yes	Yes	No	Yes
Voiced Velar Fricative [ɣ] [ˈɣapidʊ]	No	Yes	Yes	Yes
Voiceless Velar Fricative [χ] [ˈχapidʊ]	Yes	Yes	Yes	No
Uvular Fricative [ʁ] [ˈʁapidʊ]	Yes	No	Yes	Yes
Voiceless Glottal Fricative [h] [ˈhapidʊ]	No	Yes	Yes	Yes
Voiced Glotal Fricative [ɦ] [ˈɦapidʊ]	No	No	Yes	No
Retroflex [ɻ] [ˈɻapidʊ]	No	No	Yes	Yes
Tap [ɾ] [ˈɾapidʊ]	No	No	No	Yes

No: this author does not mention the occurrence of this variant in word-initial position.
Yes: this author mentions the occurrence of this variant in word-initial position.

Given the claims made about BP word-initial rhotics, the trill, the velar and glottal fricatives, the tap, and the retroflex rhotics will be investigated in this study as possible transfer variants from BP to English, even though the retroflex is not expected to affect intelligibility and comprehensibility, because of its similarity with the retroflex in English. It is also important to highlight that all the phonetic transcriptions in BP used in this study will follow the one suggested by Cristófaro-Silva (2010), in order to avoid misunderstandings due to the different symbols used by each author.

2.1.2. The pronunciation of rhotics in English

In Standard American English, rhotics in word-initial position are usually pronounced as a retroflex [ɹ] similar to the BP "caipira" <r> discussed above, or as an approximant. According to the description provided by Uldall (1958), in some varieties of English the <r> grapheme can be pronounced as an approximant, which is alveolar or post-alveolar for "some speakers […], but a more complex articulation occurs in the so-called 'bunched r'. This sound is produced with constrictions in the lower pharynx and at the center of the palate, but with no raising of the tongue tip or blade" (Uldall, 1958, as cited in Ladefoged & Maddieson, 1996, p. 234). The articulatory position can be visualized in Figure 1 below.

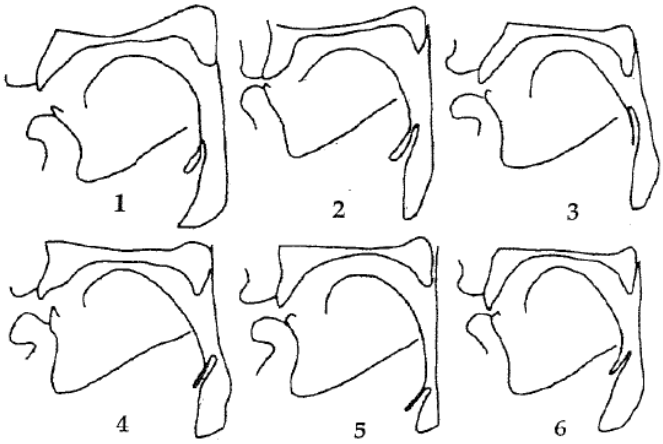

Figure 1 – "Articulatory position for syllabic 'bunched r' from six speakers of American English" (Ladefoged & Maddieson, 1996, p. 235)

Delattre and Freeman (1968, as cited in Ladefoged & Maddieson, 1996, p. 234) claim that other American English speakers "use a more or less retroflex articulation for [ɹ], which is also combined with a constriction in the lower pharynx, as well as lip rounding". There is also variation regarding the British English rhotic, which is described by Yavas (2011) as having no retroflexion, rather "[…] the tip of the tongue approaches the alveolar area in a way similar to that of alveolar stops, but does not make any contact with the roof of the mouth. This is commonly described as a post-alveolar approximant" (Yavas, 2011, p. 70). Moreover, Ladefoged and Maddieson (1996) briefly describe other variants of /ɹ/ in other English dialects:

> Alveolar fricative ɻ̊ is the standard rhotic in some urban South African English dialects. Uvular rhotics (usually fricative ʁ but occasionally the trill ʀ) are a marker of the Northumberland dialect spoken in the North West of England and of the English of Sierra Leone. In Scottish cities, such as Edinburgh and Glasgow the norm is an alveolar tap ɾ. Despite stage caricatures of Scottish speakers, it is only in the Scottish Lowlands (e.g., in Galashiels) that an alveolar trilled r is the most common form (Ladefoged & Maddieson, 1996, p. 235-236).

Because of the orthographic "r", some BPSE tend to transfer the Portuguese rhotic pronunciations (fricative) to English, which leads them to produce non-target pronunciations in English. As explained before, there are two fricative allophones for the rhotics in English dialects as well, although these allophones are not the standard pronunciation of the rhotics. It is important to highlight that in this study, the main objective is to investigate whether these non-target pronunciations really have an effect on comprehensibility and intelligibility, concepts that will be dealt with later.

2.2. The process of transfer from BP to English

The role of transfer in second language acquisition is now accepted as one of the phenomena that take place in acquiring an L2. Nevertheless, there is still disagreement concerning its definition, due to the different trends of thought regarding the way and the extent to which transfer occurs (Koda, 2007). In this study, transfer will be understood as "automatic activation of well-established L1 competencies (mapping patterns) triggered by L2 input" (Koda, 2007, p. 17), which implies that the prior language structures are so rehearsed that they are recalled automatically when learning the L2, and this process is likely to take place throughout L2 acquisition, even though transfer might cease as the learner becomes more proficient.

Even though studies describing rhotics in PB and in English abound in the literature, studies regarding the process of transfer of these sounds from Portuguese to English are still scarce, Deus (2009) and Osborne (2010) being the only ones to report results in this area, to my knowledge.

Deus (2009) tested 30 Brazilian English language university students in order to check if they transferred the BP production of <r> in word-initial position to English and whether there was more transfer of this pronunciation in cognate words. Deus (2009) found that students tended to transfer more when words contained <r> in initial or in medial position, although there was not as much transfer as he expected to find. The author explains that this may be due to the easy level of the task applied to collect data (word-reading task).

Likewise, Osborne (2010) tested three BPSE who were living in New York at the time of the data collection. The author investigated if these participants transferred the BP pronunciation of <r> to English in different positions of the word in free speech. Differently from Deus (2009), Osborne (2010) found that the transfer occurred no matter the position of <r> in the word. For instance, in word-initial position, 3 out of 4 occurrences were produced as a fricative [h], that is to say, in a non-target manner. Osborne (2010) suggests that this process is related to the difficulty participants had in perceiving the differences between the realizations of this sound in the two languages.

In sum, there are not many studies on the transfer of rhotics from Portuguese to English by BPSE (Deus, 2009; Osborne, 2010), and the ones found yielded different findings, which is probably a result of the different methods employed in the data collection. Hence, it is important to conduct more studies to investigate to what extent the transfer of this sound is recurrent for BPSE and should be a concern for teachers of ESL.

2.3. Defining terms: comprehensibility and intelligibility

Non-native utterances can be evaluated in several dimensions and the classifications and definitions of these dimensions vary among studies. Evaluating intelligibility is, therefore, a difficult task, due to several factors. Munro and Derwing (2011), for example, relate the lack of a universal definition to the implications for teaching and learning: "What has been missing until very recently is, first, a conceptualization of intelligibility that assists teachers in setting priorities and second, empirical evidence that identifies effective practices" (p. 317).

A clear instance of the "lack of universal definition" just mentioned is Cruz's review (2007) of ten different dimensions related to the term intelligibility from 1950 to 2003: intelligibility, effectiveness, comprehension, comprehensibility, interpretability, understandability, communication, accessibility, acceptability, and communicativity. However, the most common dimensions found in the literature related to the phonological aspects of speech, which are the focus of investigation in this study, are intelligibility and comprehensibility. Different authors have provided different definitions for these terms, some of them using one term or another as a cover word for both and for other dimensions as well. The more common definitions in the literature are the ones provided by Smith and Rafiqzad (1979), Smith and Nelson (1987), Munro and Derwing (1995)[9].

Smith & Rafiqzad (1979) work with two concepts, intelligibility and comprehension. For them, intelligibility is related to the "capacity for understanding a word or words when spoken/read in the context of a sentence being spoken/read at natural speed" (p. 371), whilst comprehension "involves a great deal more than intelligibility" (p. 371). Because their definition does not specify to what other aspects

[9] Munro and Tracey first presented the definitions for intelligibility and comprehensibility in 1995, which were improved and adapted as other studies were published with the collaboration of other authors, for instance Derwing et al. (2007) and Munro et al. (2006).

of speech they are referring, this explanation would not fit the purposes of this study

Smith & Nelson (1985), on the other hand, present definitions for three concepts: intelligibility, comprehensibility and interpretability. These authors claim that intelligibility consists in "word/utterance recognition" (p. 334), while comprehensibility refers to its meaning, and interpretability would be, as the name itself suggests, a deeper understanding of the word/utterance. Although this definition has been used by some authors (Cruz, 2004, 2008; 2010; Jenkins, 2000; Matsuura, Chiba, & Matsuda, 2010; Matsuura, 2007) the data gathered in this study for comprehensibility does not match the definition given to this concept by Smith and Nelson.

The definition of the terms comprehensibility and intelligibility that seem to be most appropriate for this study are the ones given by Derwing, Munro and Thomson (2007) and by Munro, Derwing and Morton (2006), for their specificity and clarity. According to Derwing, Munro and Thomson (2007), comprehensibility refers to "the ease or difficulty with which a listener understands L2 accented speech" (p. 360). Therefore, when checking for comprehensibility, the main objective is to verify how easy or difficult a NNS' speech is for a listener to understand (along a scale). Derwing and Munro (2008) complement this definition by stating that "[t]his dimension is a judgment of difficulty and not a measure of how much actually gets understood" (p. 478), and thus, comprehensibility is usually related to how long it takes or how much effort is necessary for the listener to understand the speaker's speech (Derwing & Munro, 2008).

Intelligibility, on the other hand, aims to verify if what was said by the speaker (usually a NNS) was accurately understood by the listener (through orthographic transcription), as expressed in Munro and Derwing's definition (1995, p. 291): "intelligibility refers to the extent to which an utterance is actually understood". As perfectly put by Derwing and Munro (2008, p. 480), "[…] comprehensibility is about the listener's effort, and intelligibility is the end result: how much the listener actually understands". Thus, it is possible to infer that even though these two concepts are intertwined, they are distinct dimensions and the difference relies mainly on methodological issues, which will be discussed in more detail in the next chapter.

A review of recent publications reveals that these authors' definitions have been employed in several studies in the area (Becker, 2011; Delft, 2009; Gooskens, van Heuven, van Bezooijen, & Pacilly, 2010; Kennedy & Trofimovich, 2008; Major et al., 2002). Thus, adopting their definitions is also an attempt to reach a consensus regarding the concepts and methodologies concerning intelligibility and comprehensibility.

2.3.1. Variables involved in comprehensibility and intelligibility rating

Comprehensibility and intelligibility are usually evaluated by listeners, in the sense that they tell what they have heard (Munro et al., 2006) and then rate the level of difficulty in understanding nonnative speech, usually by choosing a number on a scale (Derwing et al., 2007). According to these authors, these procedures tend to produce reliable results, as verified in the studies carried out by some researchers in the area (Bent & Bradlow, 2003; Derwing & Munro, 1997; Kennedy & Trofimovich, 2008; Munro & Derwing, 1995).

Such a measure of intelligibility and comprehensibility might be affected by certain speaker and listener factors, which should be taken into account in order to increase the reliability of the study. Regarding the speaker, some related factors are rate of speech, number of non-target productions, and voice quality, whilst some listener factors are familiarity, L1 background, level of education, multilingualism, and metalinguistic knowledge. Still other factors concern both the speaker and the listener, like age, gender, and L2 proficiency. Because of space constraints, only some of the variables relating to the listener will be investigated in this study and discussed in more detail in the paragraphs that follow.

Gass and Varonis (1984), for example, call our attention to variables such as familiarity with the topic, with nonnative speech, with a specific accent, and with a particular speaker, all of which are believed to increase comprehensibility. These authors played recordings by 2 Japanese and 2 Arabic speakers reading sentences in English to 142

NSE. Even though these authors found that familiarity with the topic seemed to facilitate listeners' comprehensibility the most, results indicated that familiarity with an accent also played an important role in listening to NNS speech.

Derwing and Munro (1997) carried out an experiment with Cantonese, Japanese, Polish, and Spanish intermediate ESL students, whose speech was evaluated by NSE. These scholars asked the speakers to narrate a story based on a series of cartoons. Parts of the recordings were then heard by the NSE. Among other things, the authors asked the NSE listeners to identify the speakers' L1, as a way of checking whether the listeners were in fact familiar with the accents they were listening to, which most of them did successfully. Similar to the results found by Gass and Varonis (1984), familiarity with an accent seemed to have a positive effect on comprehensibility. Other studies that have come to the same conclusions are Cruz (2008) and Munro et al., 2006).

The second listener variable is what Bent and Bradlow (2003) label *the interlanguage speech intelligibility benefit*, which suggests that listeners who share an L1 background with the speakers will have an advantage over other listeners. These authors tested the *interlanguage speech intelligibility benefit* with three groups of speakers (Chinese, Korean, and English) and four groups of listeners (monolingual English, Nonnative-Chinese, Nonnative-Korean, and Nonnative-mixed). They found that (a) native listeners judged the native speaker's speech to be more intelligible than the nonnative speakers'; (b) nonnative listeners judged the highly proficient NNS speech (from the same L1 background) to be as intelligible as the NS; and (c) highly proficient NNS were considered as (or more) intelligible than NS.

Bent and Bradlow (2003) point out that the interlanguage speech intelligibility benefit may be explained in terms of phonologic knowledge shared by the NNS of the same L1 background, which is more extensive than the knowledge shared by a NNS with a different L1 and a NS of the target language. Thus, NNS of the same L1 background are able to understand each other's speech in situations that could be misinterpreted by a NS or by a NNS of another L1 background.

Smith and Rafiqzad (1979), in a study related to Bent and Bradlow's interlanguage speech intelligibility benefit, tested the following proposition: "[…] it is often maintained that the educated native speaker is more likely to be intelligible to others than the educated nonnative speaker" (p. 371). This proposition is therefore in accordance with the mainstream reasoning that in order to be a successful communicator in an L2 it is crucial to speak as accurately as a NS of that language. Their findings, nontheless, reveal that for the nonnative participants the speakers from the same L1 background were as intelligible as the NSE, which justifies their conclusion: "since native speaker phonology doesn't appear to be more intelligible than non-native phonology, there seems to be no reason to insist that the performance target in the English classroom be a native speaker" (Smith & Rafiqzad, 1979, p. 380). Other studies that corroborate the findings just reported are Harding (2011), Imai et al. (2003), Major et al. (2002), and Munro et al. (2006).

Some scholars view the two factors discussed above, namely familiarity with an accent and L1 background advantage as the same varible (e.g., Cruz & Pereira, 2006). In this study, however, the two factors will be analyzed separetely so as to obtain more fine grained results.

The third listener variable is listeners' L2 proficiency. Some studies have suggested that low proficiency L2 listeners have an advantage over high proficiency listeners from the same L1 background, as well as NS of the L2 (Bent & Bradlow, 2003; Hayes-Harb et al., 2008; van Wijngaarden et al., 2002). For example, Hayes-Harb et al. (2008) conducted a study in which Mandarin native speakers performed an English production task that was later evaluated by Mandarin and NSE listeners for intelligibility. Among other results, these authors noticed that low proficiency listeners performed better than other listeners (NNS and NS) when listening to a low proficiency Mandarin speaker.

The results presented in this section leads to the proposition that NNS will be more intelligible, in this order, to 1) BPSE with low proficiency in the L2; d) BPSE in general regardless of their knowledge

of the L2; 3) NSE who are familiar with the BP accent English, and 4) NSE who are not familiar with the BP accent in English. This proposition can be more easily understood by looking at Figure 2.

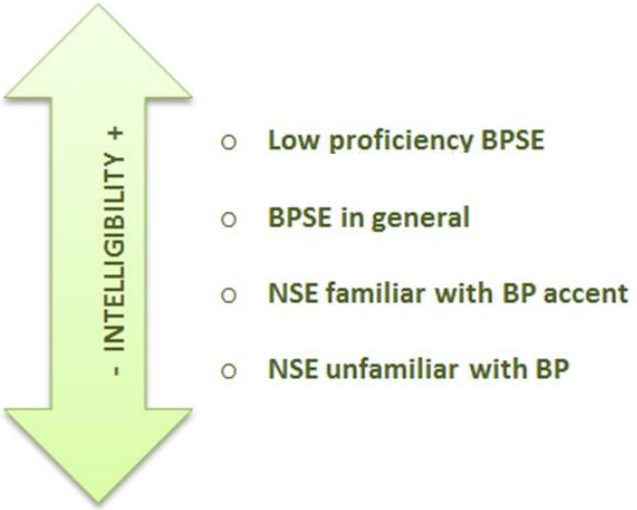

Figure 2 – Level of intelligibility of NNS speech by different groups of listeners

Even though it seems that by examining listener factors (e.g., L1 background, familiarity with the speaker, and listener's level of proficiency) the focus of the study is on the listener', in fact, this is a way of examining the speaker-listener relationship (Bent & Bradlow, 2003). Thus, the variation in intelligibility and comprehensibility will rely not only on the speakers, but on the relationship between the two parts involved in the process of producing and understanding speech. With this in mind, the present study aims to investigate these issues through the collection of data from different groups of listeners, which will be better described in the method chapter.

2.3.2. Methodological concerns involved in comprehensibility and intelligibility rating

Another difficulty faced in the area of comprehensibility and intelligibility studies is caused by the multiplicity of methods used to collect data. Even when authors adopt the same definition, the methods applied in their studies are different, making it almost impossible to compare results and obtain more general conclusions. The main differences concerns the type of sample and the method used to collect data on intelligibility and comprehensibility.

As for the type of sample used to collect data, it is worthwhile to mention that researchers have analyzed intelligibility and comprehensibility both through samples of spontaneous speech and the reading of words in isolation, sentences or texts.

At the word-level we find studies with samples containing minimal pairs. For instance, Reis and Kluge (2008) tested the intelligibility of 1 BPSE and 1 NSE when heard by a group of 10 BPSE and a group of 10 Dutch native speakers. The speakers read 6 monosyllabic minimal pair words in isolation (e.g., cam/can). Then, listeners had to choose between two given alternatives for each word. The authors found that intelligibility was higher for the Dutch listeners, although the BPSE listeners had the same L1 as one of the speakers.

Cruz (2005) also conducted a study with minimal pairs, but these were generated in interviews with a NS and therefore placed in sentences that provided a context and therefore prevented the listener from getting confused because of the minimal pair words. According to this author, although minimal pairs are believed to cause misunderstandings, this is not the case with words in context. Thus this issue should be investigated by more scholars so as to deconstruct this myth.

Other studies have investigated intelligibility data gathered through samples of reading aloud without minimal pairs (e.g., Bent & Bradlow, 2003; Derwing & Munro, 1997; Gass & Varonis, 1984; Tajima, Port, & Dalby, 1997). However, some scholars advocate that

speech elicited from speakers performing reading tasks does not constitute a good sample to analyze intelligibility and comprehensibility. For example, Algethami, Ingram, and Nguyen (2010) argue that when reading, L2 speakers have the chance to monitor themselves, which helps them to avoid deviation from the standard production. On the other hand, Kenworthy (1987) advises that reading aloud usually increases speakers' anxiety, which in turn leads them to make mistakes they would not make otherwise. In addition, the author highlights that reading aloud is not something people do in their daily lives. It could also be argued that the sample would not resemble real life, and that reading tasks might also have an impact on listeners, who may remember the sentences or missing words by heart after listening to the same sample many times (Kenworthy, 1987).

Even though reading-aloud tasks have several limitations, they have the advantage of providing control over the sounds being studied and the context in which these sounds occur, which allows the researcher to make comparisons with other speakers and listeners' data, as pointed out by Algethami, Ingram, and Nguyen (2010). In addition, in extemporaneous speech some speakers might avoid producing certain sounds they have difficulty with, and thus leave the researcher without the speech samples s/he needs in order to investigate certain pronunciation features.

Derwing, Munro and Morton have been using speech samples derived from extemporaneous speech to collect data on intelligibility and comprehensibility (Derwing & Munro, 1997; Munro et al., 2006; Munro & Derwing, 1995). In their studies they have asked speakers from different L1s to narrate a story based on a series of cartoons. The researchers select some excerpts, and listeners are asked to orthographically transcribe what they have heard and then assign a value using a 9-point Likert scale, where 1 means extremely easy to understand, and 9 means impossible to understand.

Cruz has also been investigating intelligibility through the assessment of speakers' free speech. Her method differs in the sense that speakers are interviewed by a NSE instead of being asked to narrate a story, along with other methodological steps. For instance, in a study

conducted in 2003, listeners were also required to answer questions about the speech deviations that hindered their understanding of the speakers' utterances while looking at the orthographic transcriptions provided by the researcher. In this research, the results revealed that word stress affected intelligibility the most.

In another study in which interviews were used as a way of collecting speech samples, Cruz and Pereira (2006) asked listeners to transcribe speakers' utterances and indicate the words they had found a) hard to understand, b) very hard to understand, and c) impossible to understand, and then come up with possible explanations for the mentioned difficulties. One of the purposes of the study was to investigate the influence of familiarity with the BP accent, which constituted an advantage for BPSE listeners, who seemed to understand the BPSE utterances better than the NSE. Another procedure used by Cruz (2008) to improve the data collected from the listeners' orthographic transcriptions and the assessment of level of intelligibility through a 6-point scale, was to ask the listeners to tell the speakers' nationality. This procedure was used to check listeners' familiarity with accent, which was again, found to have a positive impact on intelligibility.

In order to find a balance between control over the free speech samples and at the same time avoid monitoring strategies by speakers, Algethami, Ingram and Nguyen (2010) have proposed another procedure. In their study, speakers were required to paraphrase some sentences. According to them, it was intended to "[…] place a moderate cognitive load on the L2 speakers so that they would be preoccupied with formulating the sentences rather than with monitoring their pronunciation. It also offered a way to control the lexical items to be included in the listening task" (Algethami, Ingram, & Nguyen, 2010, p. 31).

The ideal sample, according to Kenworthy (1987), demands well-developed research skills. It would be best to test the speakers' intelligibility in real interaction with listeners, but it is not necessary to state all the difficulties of this procedure. In addition,

Derwing & Munro (2008) remind us that "while there are many ways of assessing intelligibility, no one way is fully adequate" (p. 479).

In a study carried out under time constraints (the case of the present study), it is necessary to have more control over the samples obtained from the speakers, and therefore I chose a reading aloud procedure with a set of sentences containing words that form minimal pairs as a way of testing Cruz's claims (2005) regarding the use of minimal pairs in intelligibility data collection, which may confuse listeners. Subsequently, listeners transcribed the word that was missing from a sentence they heard and assigned a value from 0 to 9, in which 0 meant very difficult to understand and 9 referred to very easy to understand. This interpretation of the scale seems more intuitive than Munro and Derwing's scale (1995), for example, since 0 is more intuitively attributed to difficulty.

2.5. Summary of the chapter

It was seen in this chapter that the grapheme <r> has different pronounciations in BP, and some of them may be transferred to English when Brazilian speakers attempt to learn this language.

In addition, this chapter discussed the complexity of defining and measuring intelligibility, and the fact that many definitions and different methods have been used in data collection. It was pointed out that this makes it hard to compare results and make recommendations for teachers regarding the importance of teaching or not certain segments, taking into consideration that students should be able to communicate effectivily, rather than following native-like models. Moreover, several speaker and listener factors were discussed as having an effect on intelligibility and comprehensibility results, which must be accounted for when collecting data.

CHAPTER 3
METHOD

The primary objective of this chapter is to provide a general overview of the method used in the data collection, including the main characteristics of the participants who provided the data to be analyzed in this study, as well as the instruments used for data collection, and the respective procedures for data analysis.

3.1. The participants

The participants had different roles in the data collection and, therefore, are divided into speakers and listeners. Each group will be described below.

3.1.1. The speakers

Since the focus of the study is to check the level of comprehensibility and intelligibility of English words containing non-target pronunciations of word-initial /ɹ/ as produced by Brazilians, 40 Brazilian speakers of ESL and 2 native speakers of English (one American and one British English speaker) participated in the data collection. The Brazilian speakers were: a) 17 students from the *Letras Inglês* undergraduate program at the *Universidade Federal de Santa Catarina* (UFSC – mostly 2nd semester); b) 11 students from the *Secretariado Executivo* undergraduate program at UFSC (3rd semester); c) 9 students from the distance learning *Letras Inglês* undergraduate program at UFSC (EaD, from various semesters); d) 2 students from the *Letras Inglês* Master's program at UFSC; and e) 1 student from the *Letras Inglês/Português* undergraduate program at *UNIFRA* (Santa Maria/RS).

BP speakers' ages ranged from 16 to 47 (M= 26,7). The majority of the speakers had lived most of their lives in Santa Catarina[10] (27 speakers - 69,23%), whereas 7 had lived in Rio Grande do Sul[11] (17,94%), 3 in Paraná[12] (7,69%), 1 in São Paulo (SP) and 1 in Assu (Rio Grande do Norte). Concerning gender, 53,84% of the participants were women (21 speakers), and 46,16% were men (18 speakers). The speakers' profiles can be seen in more detail in Appendix A (p. 111). The American English native speaker was from Utah and had been living in Brazil for more than a year.

3.1.2. The listeners

As mentioned in Chapter 2 (section 2.3.2), listener judgments are the basis of research in intelligibility and comprehensibility and the reliability of this procedure is claimed by Derwing and Munro (2008, p. 478): "[…] what listeners perceive is ultimately what matters most. […] This is a very reliable approach to assessing accentedness and comprehensibility". In addition, Munro et al. (2006) highlight the importance of testing intelligibility with listeners with whom the speakers are more likely to interact with. Thus, in order to assure the study's validity and gather valuable data to investigate the issues of familiarity, L1 background and level of proficiency, various groups of listeners participated in this study.

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[10] Cities of Santa Catarina where the participants had spent most of their lives, in order of frequency: Florianópolis (12), São José (4), Brusque (2), Concórdia (2), Águas de Chapecó (1), Araranguá (1), Campos Novos (1), Joinville (1), Palhoça (1), Petrolândia (1), Tijucas (1).

[11] Cities of Rio Grande do Sul where the participants had spent most of their lives, in order of frequency: Porto Alegre (2), São Leopoldo (2), Alegrete (1), Frederico Westphalen (1), Pelotas (1).

12 Cities of Paraná where the participants had spent most of their lives, in order of frequency: Cascavel (1), Chopinzinho (1), Curitiba (1).

Three groups of listeners took part in this study, formed as follows: a) one group of 28 native speakers of English, which will be referred to as *NSE*; b) one group of 24 advanced Brazilian speakers of English (Master's and Doctoral students and former students from the Graduate Program in *Letras Inglês* at UFSC, which will be referred to as *PPGI*), and c) one group of 21 Brazilian learners of ESL (students from the advanced level of the Extracurricular English Courses at UFSC, which will be referred to as *Extra* from now on). Differently from the PPGI group, which was formed mainly of English teachers and linguists, the Extra participants were students from different courses at UFSC and therefore can be considered less proficient L2 speakers, as well as less experienced concerning their metalinguistic knowledge in English. A group with these characteristics is important for this study to test the impact of listener level of proficiency regarding intelligibility and comprehensibility, as discussed in section 2.3.1. All listeners reported having no hearing problems and each group will be described in detail below.

The PPGI group consisted of 20 women and 4 men, whose ages ranged from 24 to 49 (M=32.92). The majority of participants from this group were born in Rio Grande do Sul[13] (7) and Santa Catarina[14] (6), while the others were from São Paulo[15] (4), Paraná[16] (3), Rio de

[13] Cities of Rio Grande do Sul where the participants were born: Dois Irmãos, Pelotas, Porto Alegre, Rio Grande, Santa Bárbara, São Luiz Gonzaga, and Torres.

[14] Cities of Santa Catarina where the participants were born, in order of frequency: Florianópolis (2), Chapecó, Criciúma, Garopaba, and Gaspar.

[15] Cities of São Paulo where the participants were born, in order of frequency: São Paulo (3), and Santos (1).

[16] Cities of Paraná where the participants were born, in order of frequency: Maringá (2), and Londrina (1).

Janeiro[17] (2), Minas Gerais[18] (1) and Piauí[19] (1). Most of them speak another language besides BP and English (79.6%). A more complete profile can be seen in Appendix B (p.116).

The Extra group consisted of 15 men and 6 women, whose ages ranged from 18 to 50 (M=25.09). The majority of them were born in Santa Catarina[20] (13 listeners – 61.9%), whereas 2 were born in Rio Grande do Sul[21] (9.52%), 2 in São Paulo city (9.52%), 1 in the capital of Pará, 1 in the capital of Paraíba, 1 in the capital of Paraná, and 1 in Rio de Janeiro city. The majority of them speak another language in addition to BP and English (61.9%). A table with more information regarding their profiles is provided in Appendix C (p. 118).

NSE listeners' ages ranged from 18 to 62 (M = 36.28). The majority of them were born in the United States of America[22] (17

[17] Cities of Rio de Janeiro where the participants were born: Petrópolis (1), and Rio de Janeiro (1).

[18] City of Minas Gerais where the participant was born: Cruzília.

[19] City of Piauí where the participant was born: Teresina.

[20] Cities of Santa Catarina where the participants were born, in order of frequency: Florianópolis (5), Blumenau, Catanduvas, Concórdia, Criciúma, Joinville, São José, São Miguel do Oeste.

[21] Cities of Rio Grande do Sul where the participants were born: Porto Alegre e Uruguaiana.

[22] Cities of the United States of America where the participants were born, in order of frequency: Chicago – Illinois (2), Frederick - Maryland, Provo - Utah, Glens Falls – New York, Pawtucket - Rhode Island, Aurora – Illinois, Santa Ana – California, La Jolla – California, Bronx – New York, Springfield – Massachusetts, Johnson City – Tennessee, Fairfield – California, St. Louis – Missouri, Prescott – Arizona, Denver – Colorado, Yonkers – New York.

listeners – 60.71%), 7 in England[23] (25%), 3 in Australia[24] (10.71%), and 1 in New Zealand[25] (3.57%). Unfortunately, it was not possible to control for gender, so that 35.71% of the participants in this group were women (10 listeners), and 64.29% were men (18 listeners). According to their answers, 82.14% of them reported speaking at least one other language besides English, and 39.28% of them reported speaking BP.

Because of methodological reasons that will be discussed in more detail in section 3.4, the NSE group was split into two in the analysis of the results of Research Question 4 in order to investigate the influence of NSE familiarity with the BP accent on comprehensibility and intelligibility. The categorization of listeners into *familiar listeners* and *unfamiliar listeners* was based on their answers to the questionnaire. First, the question alternatives were assigned a value, and then listeners' answers were operationalized so as to obtain each listener's total value. Listeners whose scores ranged from 0 to 6.99 fell into the unfamiliar category, while listeners' scores ranging from 7 to 10 were categorized as familiar listeners. The operationalization of these questions and the listeners' classifications appear in Appendix E (p. 123) and F, respectively (p. 126).

Upon the classification of listeners, each group was formed by 14 listeners. The group of familiar listeners was formed by Listeners 3, 4, 5, 9, 16, 18, 23, 28, 42, 43, 47 50, 60 and 69, being 11 men and 3 women. The group's age ranged from 18 to 62 (M=37.5). The group of unfamiliar listeners was formed by Listeners 6, 13, 21, 32, 38, 39, 49, 52, 53, 58, 59, 61, 71, and 72, being 7 men and 7 women. The group'

[23] Cities of England where the participants were born: London – London (2), West Midlands – Birmingham, Pretty Good – London, Middlesex – London, Haslemere – Surrey.

[24] Cities of Australia where the participants were born: Sydney - New South Wales, Hobart – Tasmania, Perth - Western Australia.

[25] City of New Zealand where the participant was born: Christchurch – Canterbury.

age ranged from 19 to 61 (M=38.14). The NSE profiles can be seen in more detail in Appendix D (p. 121).

3.2. Instruments

The website "Comprehending L2 Speech" (www.comprehendingl2speech.com) was designed for collecting data from speakers and listeners (Appendix G, p. 128). On-line data collection on intelligibility and comprehensibility was also adopted by Algethami et al. (2011), but in their study the authors e-mailed the listeners, who then emailed back their responses. In this study the website was necessary mainly as a means of collecting data from listeners who should not have much contact with the BP accent. Different questionnaires and tests were designed and applied to the different groups of participants, and each one will be described as follows.

3.2.1. Instruments for speakers

An online instrument was designed for the speakers, which was written and answered in BP (Appendix H, p. 129). The instrument consisted of four parts:

(a) *Consent form:* The consent form identified the researcher and the context of the research, confirmed the confidentiality of participants' identity, briefly explained the procedures of the data collection (steps, duration, and other information) and asked for participants' permission to use the data provided by them (Appendix H, p. 129).

(b) *Questionnaire about participants' bio-data:* In this questionnaire, the speakers were asked to fill in their name, date and place of birth, place where they had lived most of their life (so as to enable the identification of their BP dialect and possible transfer in the pronunciation of the rhotics), current residence, level of education,

knowledge of foreign languages (including English), and level of proficiency in each one (Appendix H p. 130-131).

(c) *English sentence-reading test:* This test consisted of 20 sentences in English, and 20 sentences in BP. The sentences in English were designed so that they could sound ambiguous, depending on the pronunciation; that is, 10 of the English sentences contained words starting with rhotics that could have another meaning in case the participant pronounced the rhotics as fricatives ('rabbits', 'rug', 'ride', 'rated', 'rats', 'roof', 'ropes', 'rank', 'racks', 'rights'). In these sentences, the preceding environment was controlled: it was always a vowel (e.g., *She abandoned tw**o r**abbits*). In addition, 10 distracter sentences were added to the test so that the participants would not be able to identify the sound being investigated, as this could lead them to monitor themselves and improve their pronunciation, or could make them nervous and worsen their pronunciation. The sentences can be seen in Appendix H (p. 132) (the odd sentences contain rhotics in word-initial position, while the even sentences are the distractor ones).

(d) *BP sentence-reading test*: The sentences in Portuguese were designed with the intent to verify the allophone the participants used to pronounce the <r> grapheme in BP. As in the English sentences, there were distractor sentences in the BP test too, so that the participants would not focus on the rhotics, which could lead them not to read the sentences naturally. Fifteen of the 20 BP sentences (sentences 1, 2, 3, 5, 6, 7, 8, 10, 11, 12, 14, 15, 17, 18, and 19 from Appendix H, p. 133) contained words with rhotics in different word positions (VrV, VrrV, r_, _r, VrC), so that it would be easier for the researcher to identify the speaker's rhotic allophone.

In both BP and English sentences, the researcher was careful to create short simple sentences, since too much content and information could hinder the listeners evaluation of the speakers' intelligibility and comprehensibility later on. Likewise, simple sentences were important to help the speakers to read without stumbling very often with unusual words.

3.2.2. Instrument for BP listeners (PPGI and Extra groups)

The instrument to collect data from the Brazilian listeners consisted of a consent form and a questionnaire to elicit the participants' bio-data (similar to the ones used with the speakers), plus a listening task to collect data about comprehensibility and intelligibility, and a complementary question about comprehensibility and intelligibility of BPSE. The listening task consisted of instructions, training, and data collection. The instrument can be seen in Appendix I (p. 134).

The instructions provided the participants with the steps they would have to follow when performing the comprehensibility and intelligibility tasks (see the procedures for data collection in section 3.3.2). The recordings used in the instructions were retrieved from the BBC website (2011). The training gave the participants the chance to practice the steps of data collection by listening to and evaluating three excerpts, which were retrieved from "The Speech Accent Archive" website[26] (Weinberg, 2011). The excerpts used in the training section focused on words different from the ones used in the test, but the task was similar in the sense that speakers' recordings of the sentences containing the rhotic words were played to the listeners. The listeners saw a screen with a written version of the recorded sentences, each one with a word replaced by a box, where they were asked to transcribe the missing words, according to what they had heard. Then the listeners were asked to rate the comprehensibility of the missing word on a scale ranging from 0 (very difficult to understand) to 9 (very easy to understand).

An example of the form containing the intelligibility and comprehensibility tasks is displayed below in Figure 3. The decision to use a large scale like this was based on Munro and Derwing's

[26] The Speech Accent Archive "uniformly presents a large set of speech samples from a variety of language backgrounds. Native and non-native speakers of English read the same paragraph and are carefully transcribed. The archive is used by people who wish to compare and analyze the accents of different English speakers (Weinberg, 2011).

recommendation (1995) that having a Likert scale with more items allows the researcher to have a better understanding of the data when comparing the results against the data of other dimensions.

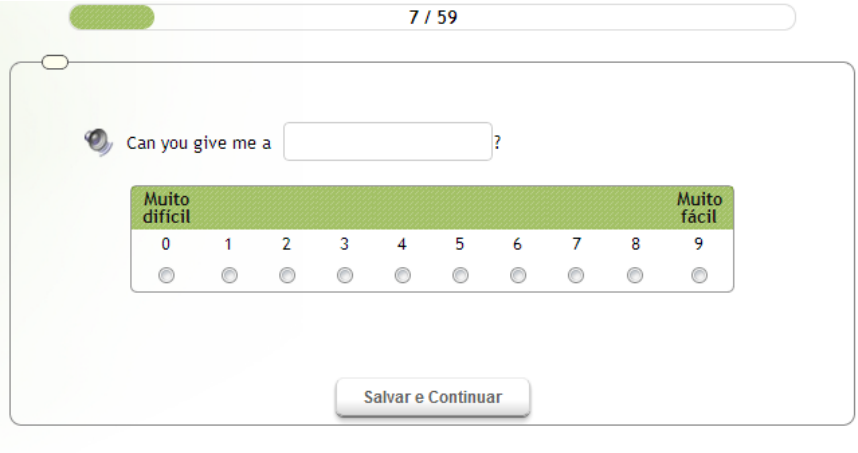

Figure 3 – Example of intelligibility and comprehensibility task

Although each speaker recorded 10 sentences with rhotic words, only four of them were presented to the listeners, and more information about the criteria used for selection is provided in section 3.3.1.

Even though most recordings were made by BPSE (there was only one NSE), this is not mentioned in the instrument. This decision was made keeping in mind that some people may react differently to certain accents and results might change due to prejudice, for example. As stated by Rubin (1992, as cited in Derwing & Munro, 2008), some people may understand less of what an L2 speaker says just because of knowing that s/he is not a native speaker. When the listeners and speakers share the same L1 background, listeners may behave differently: they may feel more irritated and annoyed (Fayer & Krasinski, 1987), but the opposite effect is also possible, in situations in which the listener recognizes his/her countryman and assigns higher comprehensibility rates because the listener expects “to understand it

[the speech] better than the other speech samples" (Munro et al., 2006, p. 127).

Likewise, another listener factor that may interfere with the results concerning intelligibility and comprehensibility is the knowledge of other languages (multilingualism), which is why the listeners were asked about the languages they speak and their level of proficiency in these languages. Even though this is not the main focus of this study, this factor will be investigated in further research.

The last part of the data collection with BPSE aimed to map the main BPSE pronunciation problems that might lead to unintelligibility and lack of comprehensibility from the perspective of the BPSE themselves. This question was intended to investigate if BPSE really think that the way Brazilians pronounce the English /ɹ/ can cause intelligibility and comprehensibility problems, without focusing only on this sound, which could influence their answers. Thus, in this task participants were asked to rank the level of difficulty that some listeners might have when listening to BPSE that have a hard time pronouncing certain segments (e.g., pronunciation of vowels), including the pronunciation of /ɹ/. Finally, participants were also allowed to give more examples of other difficulties that they thought that Brazilians face when learning English (Appendix I, p. 131).

3.2.3. Instrument for NSE listeners

The instrument that was used to collect data from NSE is very similar to the one just presented in section 3.2.2, but it is in English and contains questions about NSE familiarity with BP, so that they could be grouped according to their level of familiarity with BP later on (Appendix J, p. 134) in order to verify the effect of this variable in the present study.

3.3. Procedures

This section will provide a detailed description of the procedures followed during speakers and listeners' data collection, as well as the procedures regarding the pilot tests that preceded the actual collection.

3.3.1. Speakers' data collection

Speakers' data were collected from September to December 2011, through the website designed for this research. Even though the instrument was online, the researcher scheduled individual appointments with most of the participants so as to have more control over how the task was performed and to guarantee good quality recordings. The participants did not know that the focus of the research was on rhotics, and neither were they allowed to read the sentences before being recorded; instead, they were told to read the sentences as naturally as possible, and in the case of the BP sentences, they were even asked to keep their accent. When participants stuttered, hesitated or missed a word, the researcher asked them to pause and read the whole sentence again, so that later on listeners would not benefit from repetitions of words, for example.

These meetings with the speakers were not possible, however, with students from the Letras-English distance learning program, who then answered the online questionnaire and recorded themselves at home, and sent the recordings through the website. Albeit the quality of most of the recordings was not as good as the ones recorded by the researcher herself, they were still useful for the research. Another feature noticed in this group of participants was that most students from the distance course had a good performance in the sentence-reading test concerning pronunciation and intonation, and it is possible that they had rehearsed the sentences before recording themselves, despite the instructions.

Before data collection, 5 speakers participated in the pilot, and some adjustments were made to the tasks and the procedures (e.g., volume and microphone were adjusted, more instructions were added to the test). Since these were minor adjustments, the data from these speakers were still considered useful for this research and were analyzed along with the other speakers' data.

After collecting data with 40 BPSE and 1 NSE, the BPSE recordings were auditorily analyzed. The analysis revealed that from the 400 tokens containing /ɹ/ in word-initial position, only 25 contained non-target productions of this sound (only 6.25%). All the non-target pronunciations of word-initial position /ɹ/ were pronounced as a fricative [h] or [χ]. From the 40 BPSE, only 14 of them produced non-target pronunciations of rhotics in word-initial position (35%). Most of these participants produced non-target pronunciations when reading the words 'rug' and 'rated', while the word "right" was always pronounced according to standard American English.

As stated in the first hypothesis, it was expected to find speakers who transferred the BP fricative allophones to pronounce the English <r> rather than speakers who transferred the other allophones of this sound (for example, the trill and the tap). This expectation was based on the fact that all the participants were expected to speak standard BP (which was evident in their recordings of the sentences in BP), even though they came from different regions of the country.

The low number of non-target pronunciations found in this study has two concurrent explanations. It is possible that BPSE do transfer the sounds of rhotics from BP to English in their daily lives, but monitored themselves while performing the reading test, a strategy mentioned by Algethami et al. (2011). Deus (2009) came to this conclusion after analyzing his data and noticing that there was not as much transfer as he expected to find.

A second possible explanation refers to speakers' level of proficiency. Maybe BPSE produce non-target pronunciations of this sound in English only at the first stages of their interlanguage

(beginners), being able to monitor and correct themselves very soon in the process of L2 acquisition. In this case, the BP speakers being tested were not beginners. This insight is related to the fact that the liquids in general are very frequent in English, more specifically in word-initial position (Yavas, 2011), and possibly the frequent contact with the English /ɹ/ in a prominent position might have helped the speakers to become aware of how different this sound is in the L2, thus improving the learners' production.

Although the reading task might have influenced the speakers, the second justification seems more reasonable when comparing the results of the study with the frequency of the words in English as they appear in the frequency list of oral speech of the Corpus of Contemporary American English - COCA[27] (Davies, 2012). It is common ground that the more frequent a word is in a language, the faster it will be acquired and produced accurately (Kamil, Pearson, Moje, & Afflebach, 2011). In fact, from the words tested in this study, the most frequent one in oral speech according to the corpora is the word 'rights', which was also the word that had no occurrence of non-target production among the BPSE. Its non-target counterpart 'heights', on the other hand, is far less frequent in the corpora list. Conversely, the second least frequent word in the corpora is 'rug', which was the word with highest occurrence of non-target pronunciations by the BPSE, while its non-target pair 'hug' is more frequent in the corpora, which might explain the speakers' productions. The number of non-target pronunciations per tested word and their frequency in oral speech according to COCA can be seen in Table 2.

[27] "The Corpus of Contemporary American English (COCA) is the largest freely-available corpus of English, and the only large and balanced corpus of American English. The corpus was created by Mark Davies of Brigham Young University, and it is used by tens of thousands of users every month (linguists, teachers, translators, and other researchers) (Davies, 2012).

Table 2

BPSE Non-Target Pronunciations of Word-Initial /ɹ/ Per Tested Word Compared to Their Frequency in Oral Speech

Tested words[28]	Frequency of NTP	NTP (%)	Frequency in oral speech (COCA)	Frequency of the NT counterpart (COCA)
Rug	9	2	472	773
Ropes	4	10	853	8611
Rated	3	7.5	779	6012
Rabbits	2	5	507	1445
Ride	2	5	3408	5504
Rats	2	5	1193	2371
Roof	1	2.5	1875	45
Rank	1	2.5	1204	3
Racks	1	2.5	253	89
Rights	0	0	44329	0
Total	25	6.25		

3.3.2. Listeners' data collection

After an aural analysis, the speakers with more non-target pronunciations of the rhotics were identified, and their recordings containing rhotic words produced either accurately or not, plus distractor sentences were edited and normalized at -6db with an interval of approximately 3 (three) seconds between each other by using Sound

[28] The sentences in which the words were included can be seen in APPENDIX H.

Forge Pro 10.0. These recordings and the NSE recordings were then randomized and posted on the website. This resulted in a test with 134 tokens, repeated twice (all listeners heard the sentences in the same order).

The recordings were played at random, so as to avoid order effects. It should also be noted that participants were asked to transcribe only the missing word rather than the entire sentence. This was an attempt to evaluate only the intelligibility and comprehensibility of the rhotic sounds pronounced by BPSE, without attention to other non-target pronunciations that might also hinder listeners' comprehension.

First, 4 students from the last semester of the *Letras Inglês* undergraduate program at UFSC and a student from the same course that had already graduated one year before were asked to access the website and complete the test at home. One of these participants did not complete the entire test. Then, 1 Master's student from PPGI and 2 ex-PPGI students who had finished their doctoral studies not long ago completed the whole test, along with a professor from the same program. Another Master's student that was invited to participate in the pilot did not finish the test. These informants also responded the test at home, by accessing the website.

These participants reported taking more than an hour to complete the whole test, and this was probably the reason why two of them gave up in the middle of it. The 3 post-graduate students also gave informal feedback after completing the test, and the three of them mentioned these points: (1) the test was too long and the repetition of sentences contributed to their feeling of 'exhaustion'; (2) after hearing the same sentence several times, listeners used their inference skills to fill in the missing word, regardless of how the listener pronounced it; (3) some words were really hard to understand and they had to rely on other resources to transcribe them (they tried to remember the words as previously pronounced by more intelligible speakers, or tried to pay attention to the sentence to infer which word would better fit in that context).

Taking this information into consideration, it was decided to reformulate the test so as to diminish the effect of listeners' fatigue, and decreasing the number of repetitions would consequently prevent listeners from memorizing the missing words. Thus, I selected the recordings of the sentences containing the words that were more frequently produced with non-target pronunciations:

a) Can you give me a **rug?**
b) Do you still have any **ropes?**
c) She **rated** his performance so bad!
d) She abandoned two **rabbits.**

In order to decrease the number of tokens, it was also necessary to reduce the number of distractor sentences, and the following ones were kept:

a) I could hear the **buzz.**
b) We couldn't find any **trace**
c) What's the problem with your **knees**?
d) This is such a **tangle**
e) What does the word **temple** mean?

As can be noticed, the first three distractor sentences are related to the voicing/devoicing of /s/ and /z/, while the last two involve the pronunciation of the syllabic /l̩/, which BPSE tend to produce as /əʊ/. These issues will not be examined in this study though.

Having chosen the sentences to be used in the test, it was necessary to choose the recordings to be evaluated by the listeners. Taking into account that only a few participants produced non-target productions of rhotics, it was not possible to establish a pattern in the number of target and non-target productions of the chosen words. The intelligibility and comprehensibility test ended up with the following distribution of recordings of the sentences containing rhotic words: 3 BPSE non-target pronunciations of the word 'rug'; 2 BPSE and 1 NSE target pronunciation of the word 'rug'; 2 BPSE non-target pronunciations of the word 'rated'; 2 BPSE and 1 NSE target pronunciation of the word 'rated'; 2 BPSE non-target pronunciations of

the word ‘rabbits’; 2 BPSE and 1 NSE target pronunciation of the word ‘rabbits’; 2 BPSE non-target pronunciations of the word ‘ropes’; 2 BPSE and 1 NSE target pronunciation of the word ‘ropes’, plus 28 recordings of distractor sentences. This generated a test with 49 tokens plus 10 tokens that were repeated in order to test listeners’ reliability.

Data with listeners were collected during the months of July and August of 2012. The majority of listeners from the Extra groups filled out the questionnaire and took the on-line intelligibility and comprehensibility assessment test in a laboratory located at UFSC, while the PPGI and NSE participants were invited to take part in the research by e-mail and then filled out the questionnaire and took the test at home, using their own private computers. The procedure took about 30 minutes for the PPGI and Extra group, whereas the NSE listeners took 30 to 40 minutes, because the questionnaire designed for them had more questions regarding familiarity with BP.

3.4. Data Analysis

The answers to the research questions were obtained mostly through a quantitative analysis of the data which were tabulated in SPSS 16.0 in order to run the statistical tests. Research Question 1 was: *How does the non-target pronunciations of English word-initial /ɹ/ by BPSE affect intelligibility according to BPSE and NSE listeners?* Hypothesis 1 predicted that the non-target productions would result in unintelligibility, and Hypothesis 2 predicted that intelligibility would be higher for lower proficiency listeners in comparison to other Brazilians, and Hypothesis 3 predicted that intelligibility would be higher for Brazilians in comparison to NSE listeners.

In order to answer this research question, intra and inter-rater reliability (see section 4.1) with BPSE non-target and NSE target productions were calculated in percentages as a means to test whether the listeners consistently evaluated the speakers’ utterances. The recordings that were repeated were also analyzed with this purpose.

The next step was to classify and code listeners' transcriptions into 3 groups: a) non-target production transcribed as non-target (e.g., [hoʊps] transcribed as 'hopes'); b) non-target production transcribed as the target pair (e.g., [hoʊps] transcribed as 'ropes'); c) non-target production transcribed as another word (e.g., [hoʊps] transcribed as 'whole'). Then, contingency tables were created with different speakers' non-target productions of the same word to check how intelligible these productions were. These contingency tables also provided the Chi-square values[29], which were then analyzed according to Dancey and Reidy's recommendations (2004).

Listeners' evaluations of the level of unintelligibility caused by the non-target pronunciation of "r"[30] were taken into account by calculating the median values assigned by the listeners per group. Along with this quantitative analysis, a qualitative examination was carried out by checking if listeners mentioned the production of the rhotics when answering the last part of the last question (mentioned in footnote 30): "Besides the mispronunciation of these sounds, are there any other mispronunciations you think that hinder your understanding of Brazilians' speech? Please demonstrate using at least one word that exemplifies the difficulty".

The second Research Question was: *How does the non-target pronunciation of English word-initial /ɹ/ by BPSE affect*

[29] Chi-squares are used to "[…] calculate the difference between the scores you observed and the scores you would expect in that situation and then see whether the magnitude of the difference is large or small on the chi-square distribution" (Larson-Hall, 2010, p. 208).

[30] Alternative "c" from the question: "Below you can see some sounds and sound pairs which are often mispronounced by people who are learning English. Based on your familiarity with Brazilian Portuguese and/or on the recordings you listened to, mark the degree to which you think these mispronunciations would hinder your understanding of Brazilians' speech on the scale below." (Appendix I).

comprehensibility according to BPSE and NSE listeners? Hypothesis 4 predicted that less proficient listeners would assign higher comprehensibility rates, and that Brazilians in general would assign higher comprehensibility rates than NSE.

Once again intra and inter-rater reliability was tested, this time through the Cronbach's alpha test[31], which was run 3 times: first, with the ratings assigned to one recording that was played twice; second with ratings assigned to all tested words (accurate and accented productions), and finally with the rates assigned to the productions of a NSE.

The next step was to analyze the comprehensibility means, which required a classification of the values from the scale used to collect listeners' comprehensibility evaluations, which were interpreted as follows: tokens that obtained means ranging from 0 to 1.99 were considered very difficult to comprehend; means ranging from 2 to 3.99 were considered difficult to comprehend; means ranging from 4 to 5.99 were considered not very easy to comprehend; means ranging from 6 to 7.99 were considered easy to comprehend, and finally, means ranging from 8 to 9 were considered very easy to comprehend.

Finally, Kruskall-Wallis tests[32] were run to investigate whether the difference among groups of listeners was significant, and

[31] Cronbach's alpha test consists on a "a measure of internal consistency, it is the ratio of variability attributable to subjects divided by the variability attributed to the intersection between subjects and items" (Larson-Hall, 2010, p. 391).

[32] The Kruskall-Wallis test is "a non-parametric counterpart to the one-way ANOVA. It should be used when you have one variable with three or more levels and one dependent variable" (Larson-Hall, 2010, p. 395).

Mann-Whitney U tests[33] were carried out so as to find out between which groups the significant differences lay.

Research Question 3 was: *How are the dimensions of comprehensibility and intelligibility associated for the different groups of listeners?* Hypothesis 6 predicted that intelligibility would be compromised, while comprehensibility scores would be high, especially for Extra and PPGI listeners.

A first attempt to answer this research question consisted in creating contingency tables with Chi-square values, but that was not possible since for some groups intelligibility categories of transcriptions did not vary. Therefore, this question was answered by comparing the frequencies of transcriptions of intelligibility scores with comprehensibility mean scores, in an attempt to find a pattern between the directions of these two dimensions.

Finally, the last Research Question was: *Which group of NSE listeners has more difficulty in understanding the Brazilian accented /ɹ/ in English words regarding the dimensions of comprehensibility and intelligibility?* Hypothesis 7 predicted that familiar NSE listeners would assign higher comprehensibility ratings and would be able to transcribe more words accurately. The first step to answer this research consisted in the operationalization of answers given by the NSE regarding their familiarity with BP and the BP accent, as already explained in section 3.1.2. Having divided NSE in 2 groups (familiar and unfamiliar listeners), contingency tables were created with the types of transcriptions (intelligibility measure), which were then confronted with comprehensibility means assigned to the BPSE productions.

[33] The Mann-Whitney test "assesses whether there is a statistically significant difference between the mean ranks of the two conditions" (Dancey & Reidy, 2004, p. 527).

3.5. Summary of the chapter

This chapter described the four groups of participants who took part in this study, namely the speakers (40 BPSE and 1 NSE), the Extra listeners (21 less proficient L2 speakers), the PPGI listeners (24 high proficiency L2 speakers), and the NSE listeners (28 listeners to be divided in 2 groups regarding their familiarity with the BP accent to answer Research Question 4). Different instruments were designed to gather data from speakers and listeners, and the language of each instrument matched the participant's L1, so as to avoid misinterpretations resulting from lack of knowledge in the L2. The procedures to collect data consisted in recording the speakers, selecting the speech samples and then submitting them to listeners' evaluations through an intelligibility and comprehensibility test, available in the website www.comprehendingl2speech.com. The analysis of data was also discussed in this chapter, which was done mainly through statistical tests in SPSS. The next chapter reports and discusses the results, keeping in mind the theoretical issues raised in chapter 2.

CHAPTER 4
RESULTS AND DISCUSSION

The aim of this chapter is to present the results of the data collection and discuss them in the light of the literature summarized in chapter 2. In order to fullfil this purpose, the research questions and their hypotheses will be revisited once again, followed by the respective results and analyses.

4.1. The non-target production of /ɹ/ and the issue of intelligibility

Having found that some of the BPSE who took part in this research produced the /ɹ/ sound as a fricative, it is important to investigate how this non-target production can affect intelligibility for the three groups of listeners that participated in this study, as stated in Research Question 1 "How does the non-target pronunciation of English word-initial /ɹ/ by BPSE affect intelligibility according to BPSE and NSE listeners?". Three hypotheses were stated for this question:

H1. The transfer of the fricatives [h] or [χ] as allophones for the word-initial position /ɹ/ will cause unintelligibility for the listeners in general (Lieff & Nunes, 1993).

H2. BPSE listeners (PPGI and Extra) will provide more accurate transcriptions of the BPSE utterances in comparison to the NSE listeners, since BPSE participants share an L1 background and therefore will be more attuned to the Brazilian accent in English.

H3. Less proficient listeners (Extra) will perform better than more proficient L2/NSE listeners in the intelligibility tasks[34], since

[34] In this study, task will be defined according to Bygate, Skehan, and Swain (2001) "a focused, well-defined activity, relatable to pedagogic decision making, which requires learners to use language, with an emphasis on meaning,

they will not be able to notice the difference between [ˈɹæbɪts] and [ˈhæbɪts] (Bent & Bradlow, 2003; Hayes-Harb, Smith, Bent, & Bradlow, 2008; van Wijngaarden, Steeneken, & Houtgast, 2002).

Since the answer to this research question is based on data provided by listeners, it is vital to check inter-rater and intra-rater reliability before moving on to the results concerning intelligibility, so as to verify if these participants were consistent when rating speakers' productions (Larson-Hall, 2010). As Bachman (2004) explains, inter-rater reliability analysis helps us to estimate how similar different groups of raters are when rating in the same task. Conversely, intra-rater reliability analysis can give us an estimate of how consistent the same rater is when rating the same task in different times.

Checking intra and inter-rater reliability is one of Munro's recommendations (2008) to clarify the findings of intelligibility and comprehensibility studies. As Munro explains, most researchers do not report this information, although it may explain differences among groups of listeners (e.g., listeners from different L1 backgrounds). Therefore, in the following two sections I report the results concerning intra and inter-raters' reliability in the intelligibility data.

4.1.1. Intra and inter-rater reliability with non-target and target productions

Intra-rater reliability analysis was carried out as a way of checking if listeners were consistent when transcribing the missing words. This was done by playing two recordings produced by the same speaker twice and then comparing the listeners' orthographic transcriptions for these audio files. One of the recordings contained the non-target production of the word 'ropes' (produced as [hoʊps] by

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to attain an objective, and which elicits data which may be the basis for research".

Speaker 36), and the other one contained the target production of the word ‘rabbits’ (produced as [ˈɹæbɪts] by Speaker 74). Table 3 displays the comparison between the orthographic transcriptions for the word ‘ropes’, and Table 4 shows the same comparison for the word ‘rabbits’. In both tables the results are separated per groups of listeners.

Table 3

Inter and Intra-Rater Reliability per Group of Listeners for 'Ropes' [houps] (Non-Target Pronunciation) Produced By Speaker 36

	Listeners' transcriptions of speakers' recordings	**'Ropes' pronounced as [ˈhoʊps] by Speaker 36 Time 1**	**'Ropes' pronounced as [ˈhoʊps] by Speaker 36 Time 2**
PPGI	[hoʊps] transcribed as 'hopes'	23 (95.8%)	23 (95.8%)
	[hoʊps] transcribed as 'ropes'	1 (4.2%)	1 (4.2%)
	Total	24	24
Extra	[hoʊps] transcribed as 'hopes'	20 (95.2%)	21 (100%)
	[hoʊps] transcribed as 'ropes'	1 (4.8%)	0
	Total	21	21
NSE	[hoʊps] transcribed as 'hopes'	27 (96.4%)	27 (96.4%)
	[hoʊps] transcribed as 'ropes'	1 (3.6%)	1 (3.6%)
	Total	28	28
Total listeners	[hoʊps] transcribed as 'hopes'	70 (95.9%)	71 (97.3%)
	[hoʊps] transcribed as 'ropes'	3 (4.1%)	2 (2.7%)
	Total	73	73

Number of participants in each group: PPGI = 24; Extra= 21; NSE= 28.

The non-target pronunciation of 'ropes' [hoʊps], which was produced by Speaker 36's and played twice during the data collection,

was transcribed similarly by the listeners in both presentations. According to Table 3, the non-target production of this word was transcribed as ‘hopes’ by most listeners (70 in the first time and 71 in the second time), and only a few of them (3 in the first time and 2 in the second time) transcribed it as the target pronunciation ([ˈɹoʊps]). Although the carrier sentence made sense with the target and non-target production of the word ‘ropes’, probably some listeners were able to recognize that Speaker 36, who produced [hoʊps] meant to say ‘ropes’. This could also be a test effect, because this carrier sentence was presented for the first time with the target production of the word ‘ropes’, which may explain why some listeners were expecting to hear ‘ropes’.

Only one listener from the Extra group transcribed it differently in the second time, maybe because in the second time this listener realized that what the speaker meant to say was ‘ropes’, and not ‘hopes’, as he had thought before. This guess could have been corroborated by the recordings that contained the target production in the same carrier sentence, produced by the BPSE and the NSE. Thus, this can be considered a result of the effect of familiarity with the recordings, given that listeners had to listen to the same sentence recorded by different speakers at least four times (counting target and non-target productions). Therefore, except for this listener, it can be argued that listeners transcribed the same production similarly at both presentations times, meaning that there is high intra and inter-rater reliability.

The same analysis was carried out with the NSE accurate production of the word ‘rabbits’. The recording of this production was played twice, and therefore, besides expecting listeners to transcribe it as ‘rabbits’ (since it was accurately produced by a NSE), it was also expected that they would transcribe it similarly in the second time they listened to it. If this was the case, then intra and inter-rater reliability could be considered to be high, which was in fact the result of this analysis, as can be seen in Table 4.

Table 4

Intra and Inter-Rater Reliability per Group of Listeners for 'Rabbits' [ˈɹæbɪts] Produced By NSE Speaker 74

	Listeners' transcriptions of speakers' recordings	**'Rabbits' pronounced as [ˈɹæbɪts] by Speaker 74 - Time 1**	**'Rabbits' pronounced as [ˈɹæbɪts] by Speaker 74 - Time 2**
PPGI	[ˈɹæbɪts] transcribed as 'rabbits'	23 (95,8%)	23 (95,8%)
	[ˈɹæbɪts] transcribed as 'habits'	1 (4,2%)	1 (4,2%)
	Total	24	24
Extra	[ˈɹæbɪts] transcribed as 'rabbits'	19 (90,5%)	20 (95,2%)
	[ˈɹæbɪts] transcribed as 'habits'	2 (9,5%)	1 (4,8%)
	Total	21	21
NSE	[ˈɹæbɪts] transcribed as 'rabbits'	28 (100%)	28 (100%)
	Total	28	28
Total listeners	[ˈɹæbɪts] transcribed as 'rabbits'	70 (95,9%)	71 (97,3%)
	[ˈɹæbɪts] transcribed as 'habits'	3 (4,1%)	2 (2,7%)
	Total	73	73

Number of participants in each group: PPGI = 24; Extra= 21; NSE= 28.

The target pronunciation of ‘rabbits’ [ˈɹæbɪts] was also played twice during the data collection and was transcribed similarly by listeners in both situations. According to Table 4, the target production of this word was transcribed as ‘rabbits’ by most listeners (70 in the first time and 71 in the second time), and only a few of them (3 in the first time and 2 in the second time) transcribed it as ‘habits’. The difference lies in the Extra and PPGI groups. Speaker 36 recording of the word ‘rabbits’ was presented to the listeners before its non-target production (which was recorded by Speaker 16). Thus, a possible explanation for the fact that these listeners transcribed it as ‘habits’ in the first time they listened to this target production and to this carrier sentence is that they got confused with other carrier sentences that contained target and non-target productions of word-initial /ɹ/ and concluded that, in fact, the speaker intended to say ‘habits’, instead of ‘rabbits’. In other words, writing ‘habits’ for a recording that contained its target counterpart [ˈɹæbɪts] may be the result of a test effect. Another possible explanation is that these listeners were not paying much attention and misunderstood the word intended by the speaker. However, the majority of listeners were able to recognize the intended word both times, which was expected, since it was produced as the target form. Thus, we can conclude that besides high intra-rater reliability, there is also high inter-rater reliability.

Other NSE productions were analyzed so as to complement the inter-rater reliability analysis. Table 5 below provides information about the way listeners transcribed other missing words from NSE 74’s recordings (‘ropes’, ‘rug’, ‘rated’, ‘rabbits’). Note, however, that this analysis is different from the previous ones discussed in this section, as it focuses on words produced at a single time only, as our goal is to analyze the performance of listeners across groups (inter-rater reliability).

Table 5

Inter-Rater Reliability of Listeners' Transcriptions of the Words 'Ropes', 'Rug', 'Rated', and 'Rabbits' Accurately Produced By NSE in Time 1

Groups	Listeners' transcriptions of NSE recordings	NSE recording of 'ropes' [ɹoʊps]	NSE recording of 'rug' [ɹʌg]	NSE recording of 'rated' ['ɹeɪtɪt]	NSE recording of 'rabbits' ['ɹæbɪts]
PPGI	TP transcribed accurately[1]	22 (91.7%)	18 (75%)	18 (75%)	24 (100%)
	TP transcribed as the NT pair[2]	2 (8.3%)	6 (25%)	6 (25%)	0
	N = 24				
Extra	TP transcribed accurately	17 (81%)	18 (85.7%)	15 (71.4%)	19 (90.5%)
	TP transcribed as the NT pair	2 (9.5%)	3 (14.3%)	6 (28.6%)	2 (9.5%)
	TP transcribed as another word[3]	2 (9.5%)	0	0	0
	N = 21				
NSE	TP transcribed accurately	28 (100%)	28 (100%)	28 (100%)	28 (100%)
	N = 28				
Total	TP transcribed accurately	67 (91.8%)	64 (87.7%)	61 (83.6%)	71 (97.3%)
	TP transcribed as the NT pair	4 (5.5%)	9 (12.3%)	12 (16.4%)	2 (2.7%)
	TP transcribed as another word	2 (2.7%)	0	0	0
	N = 73				

TP = Target Production

Number of participants in each group: PPGI = 24; Extra= 21; NSE= 28.

[1] For instance, 'ropes' transcribed as 'ropes' by the listeners.

[2] For instance, 'ropes' transcribed as 'hopes' by the listeners.

[3] For instance, 'ropes' transcribed as 'whole' by the listeners.

Here it is possible to see a variation in comparison to Table 3. Since some listeners from the Extra and PPGI groups transcribed the accurate productions as their non-target pairs (e.g., 'ropes' [ɹoʊps] transcribed as 'hopes'), and a few listeners from the Extra group (2.7%) even transcribed the word 'ropes' as a completely different word (e.g., 'ropes' [ɹoʊps] transcribed as 'whole'). Since the Extra group was the one that had more difficulty in transcribing the target productions accurately and whose listeners were not as proficient as the others, one can argue that this can be explained in terms of proficiency level, meaning that maybe these listeners did not know these words or were not able to recognize them the first time they heard them. NSE listeners, on the other hand, transcribed all the words accurately, so that it can be concluded that they were not influenced by test effects in the case of these words.

Although some BPSE listeners were not able to accurately recognize all the tested words that were produced by the NSE speaker, the percentage of listeners in both BPSE groups that transcribed these words accurately is still high. In the PPGI group, the percentage of listeners who transcribed the words correctly ranged from 75% (for 'rug' and 'rated') to 100% (for 'rabbits'). In the Extra group, the percentage of listeners who transcribed the words correctly ranged from 71.4% (for 'rated') to 90.5% (for 'rabbits'). Apparently, 'rated' was the most difficult word for BPSE listeners to understand when pronounced accurately by a NSE, while 'rabbits' was understood by most of them.

In sum, high levels of inter-rater reliability were found in this study, which means "the more agreement among listeners, the less "subjectivity" there must be in their judgments, and the more evident it is that the listeners share a response to particular stimulus properties" (Munro, 2008, p. 207). In other words, it means that the listeners agreed with each other in relation to the intelligibility of the missing words.

After analyzing intra and inter-rater reliability, the next step consists of verifying whether or not the non-target productions affect intelligibility. The data provided by the three groups of listeners were then analyzed in the following section.

4.1.2. BPSE non-target productions and intelligibility

Given that listeners' responses were, in general, consistent, their transcriptions were once more analyzed with the intent of checking if speakers' productions of /ɻ/ in word-initial position were intelligible, even though they were not produced accurately, and also as a way of verifying if there is a difference in the way the groups of listeners evaluated intelligibility.

First, listeners' transcriptions of speakers' non-target productions were classified and coded into three groups: a) non-target production transcribed as non-target (e.g., [hoʊps] transcribed as 'hopes'); b) non-target production transcribed as the target pair (e.g., [hoʊps] transcribed as 'ropes'); c) non-target productions transcribed as another word (e.g., [hoʊps] transcribed as 'whole'). Then, contingency tables were created with different speakers' non-target productions of the same word to check how intelligible these productions were. The data from the contingency tables were used to run statistical tests called Chi-square test for group independence, which "calculate[s] the difference between the scores you observed and the scores you would expect in a particular situation and divide by the expected score" (Larson-Hall, 2010, p. 208). In other words, this test was used to find group differences, in case they exist.

For example, the word 'ropes' was produced as 'hopes' [hoʊps] by Speaker 39 and Speaker 16. These recordings were then transcribed by three groups of listeners (PPGI, Extra, and NSE), and 3X3 and 3X2 group independence Chi-square tests[35] were run to verify if there is a significant difference among these groups concerning the way they transcribed the word in question.

[35] The following variables were entered to run Chi-square tests: 1) Groups of listeners (with 3 levels) and 2) the types of transcriptions of the 2 non-target productions of 'ropes' (with 3 levels in the first time and 2 levels in the second time).

The analyses of the Chi-square test results were based on Dancey and Reidy (2004), who advise reporting Cramer's V[36] value for categorical variables with more than 2 levels. According to these authors, Cramer's V value should be squared in order to obtain the effect size, which accounts for "how much of the variance in one variable is accounted for by the other variable" (Larson-Hall, 2010, p. 161). For example, if a Chi-square test yields a Cramer's V value of .097 we can say that there is no difference among the groups, because .097 squared equals .009, meaning that the relationship between the variables being studied is close to zero (close to .10).

This method differs somewhat from the method used by Munro and Derwing (1995a; 1995b; 1997), and Munro, Derwing, and Morton (2006) to analyze intelligibility. These authors usually count the number of correct transcriptions and compute them into percentages, so that they are able to calculate the average intra-class correlations by listener groups (Cronbach's alpha). Even though this method also makes sense, it does not take into account the way the tested words were transcribed (they are simply classified into correct or incorrect transcriptions). Nevertheless, in this study it seems important to look at the possible transcriptions to hypothesize about the factors that lead the listeners to perform in that way, and this is why I chose to analyze the results in more detail. Table 6 displays the frequency of listeners who transcribed the word 'ropes' pronounced as [hoʊps] as 'hopes', 'ropes', or as another word, as well as the Chi-square coefficient.

[36] Cramer's V is "a measure of effect used for tests of association; it is a correlation coefficient, interpreted in the same way as Pearson's *r*" (Dancey & Reidy, 2004, p. 274).

Table 6

Contingency Table with the Frequency of Listeners' Transcriptions of 'Ropes' Pronounced as [houps] By 2 Different Speakers and The Chi-Square Coefficients[37]

Group	Recording of 'ropes' pronounced as [houps] by Speaker 39			Recording of 'ropes' pronounced as [houps] by Speaker 16	
	[houps] transcribed as 'hopes'	**[houps] transcribed as 'ropes'**	**[houps] transcribed as another word**	**[houps] transcribed as 'hopes'**	**[houps] transcribed as 'ropes'**
PPGI	17 (70.8%)	0	7 (29.2%)	23 (95.8%)	1 (4.2%)
Extra	11 (52.4%)	3 (14.3%)	7 (33.3%)	20 (95.2%)	1 (4.8%)
NSE	20 (71.4%)	3 (10.7%)	5 (17.9%)	27 (96.4%)	1 (3.6%)
Total	48 (65.8%)	6 (8.2%)	19 (26%)	70 (95.9%)	3 (4.1%)
Chi-Square	χ^2=5,167; p = .271; df = 4; Cramer's V = .188; p = .271			χ^2=.043; p = .979; df = 2; Cramer's V=.024; p = .979	

Number of participants in each group: PPGI = 24; Extra= 21; NSE= 28.

By analyzing the first part of the table above (Speaker 39's production), we notice that the majority of listeners (65.8%) transcribed the non-target production of 'ropes' [houps] as 'hopes', indicating that replacing the retroflex [ɹ] with the fricative [h] resulted in unintelligibility. For some listeners (mainly for the BPSE listeners) this word was not even understood as its target counterpart 'ropes', but as a completely different word, especially the first time it was presented

[37] The SPSS tables containing the results are provided in APPENDIX K.

(26%). This may have been a result of the way the whole utterance was pronounced, meaning that the speaker used the wrong intonation in the whole sentence, besides pronouncing the preceding word in a non-target way.

Only 8.2% of the listeners (3 from the Extra group and 3 from the NSE group) were able to infer that the speaker meant to say 'ropes' instead of 'hopes', and that could be related to the fact that the target pronunciation of this word was presented before its non-target counterpart. In the second non-target production of the word 'ropes' [hoʊps] as produced by Speaker 16, even more listeners transcribed it as 'hopes', which supports the previous statement that the replacement of the retroflex sound with the fricative resulted in unintelligibility. In the second production, however, listeners no longer transcribed it as another word, meaning that most of them (95.9%) were sure the speaker intended to say 'hopes'. Here, familiarity with the sentences seems to have played a role.

A 3X3 group independence Chi-square test was carried out to find out whether there was a significant relationship between the groups and the way listeners transcribed the word 'ropes' pronounced as [hoʊps] by Speaker 39. The χ^2 value of 5.167 had an associated probability value of .271 (df = 4), showing that such an association is likely to have arisen as a result of sampling error. Cramer's V was found to be .188 (p = .979) – thus only 3.5% of the variation in the frequencies of transcriptions can be explained by level of proficiency or L1 background sharing. It can therefore be concluded that there is not a significant association between transcriptions and groups. In other words, the three groups of listeners transcribed the words in a similar way.

For the word 'ropes' pronounced as [hoʊps] by Speaker 16, a 3X2 group independence Chi-square test was run. The χ^2 value of .043 had an associated probability value of .979 (df = 2), showing that such an association is likely to have arisen as a result of sampling error. Cramer's V was found to be .024 (p = .979 – thus only .05% of the variation in the frequencies of transcriptions can be explained by level

of proficiency. Therefore there is an even less significant association between transcriptions and groups regarding the second non-target production of ‘ropes’. In sum, there is not a significant difference in the way the three groups of listeners transcribed the two non-target productions of ‘ropes’, meaning that all of them found the speakers’ productions highly unintelligible. In other words, Hypothesis 1 was supported.

Hypothesis 2 was formulated based on Bent and Bradlow's matched interlanguage speech intelligibility benefit (2003), which predicts that intelligibility is higher for listeners who share an L1 background with the speakers. This hypothesis was not supported here, since PPGI listeners understood even less than NSE, especially in the first occurrence of the non-target production of ‘ropes’. Similarly, Hypothesis 3 took into account studies like the ones conducted by Imai et al. (2003), and van Wijngaarden et al. (2002), whose results indicated that listeners who were less proficient in the L2 were able to recognize more words produced by NNS. Results for the first occurrence of ‘ropes’ appear to be in accordance with this proposition, but the non-significant chi-square does not allow support for this hypothesis either. For the second occurrence, the results do not even tend toward to support of the hypothesis. The same analysis was carried out with 3 non-target productions of ‘rug’ [hʌg] by Speakers 35, 10, and 17, and the results can be viewed in Table 7.

Table 7

Contingency Table with the Frequency of Listeners' Transcriptions of 'Rug' Pronounced as [hʌg] By 3 Speakers[38] and the Chi-Square Coefficient[39]

Group	Recording of 'rug' pronounced as [hʌg] by Speaker 35			Recording of 'rug' pronounced as [hʌg] by Speaker 10			Recording of 'rug' pronounced as [hʌg] by Speaker 17		
	[hʌg] transcribed as 'hug'	[hʌg] transcribed as 'rug'	[hʌg] transcribed as another word	[hʌg] transcribed as 'hug'	[hʌg] transcribed as 'rug'	[hʌg] transcribed as another word	[hʌg] transcribed as 'hug'	[hʌg] transcribed as 'rug'	[hʌg] transcribed as another word
PPGI	24 (100%)	0	0	24 (100%)	0	0	24 (100%)	0	0
Extra	16 (76.2%)	4 (19%)	1 (4.8%)	16 (76.2%)	3 (14,3%)	2 (9.5%)	18 (85.7%)	2 (9.5%)	1 (4.8%)
NSE	27 (96.4%)	0	1 (3.6%)	28 (100%)	0	0	28 (100%)	0	0
Total	67 (91.8%)	4 (6.8%)	2 (1.4%)	68 (93.2%)	3 (4.1%)	2 (2.7%)	70 (95.9%)	2 (2.7%)	1 (1.4%)
Chi-Square	χ^2=9.920; p = .042; df = 4; Cramer's V = .261; p = .042			χ^2=13.291; p = .010; df = 4; Cramer's V = .302; p = .010			χ^2=7.747; p = .101; df = 4; Cramer's V = .230; p = .101		

Number of participants in each group: PPGI = 24; Extra= 21; NSE= 28.

[38] The following variables were entered to run Chi-square tests: 1) Groups of listeners (with 3 levels) and 2) the types of transcriptions of the 3 non-target productions of 'ropes' (with 3 levels).

[39] The SPSS tables containing the results are provided in APPENDIX K.

Table 7 shows that PPGI listeners were unanimous in transcribing [hʌg] as ‘hug’ in all situations. Only one NSE (3.6%) transcribed it as ‘rug’ the first time s/he heard it. More variation was observed among the Extra listeners, since some of them transcribed the word in question as ‘rug’, and as a word different from its target and non-target counterpart. The number of listeners who did so decreased as the same sentence was produced again by a different speaker, which suggests that familiarity with the content played a role in this test. As for the Extra listeners who transcribed the tested word as ‘rug’, it is possible that the effect that they were able to infer that the intended word could be linked to their lower level of proficiency, as predicted by Hypothesis 3. L1 background, on the other hand, did not appear to influence the results, since PPGI listeners had almost the same performance as the NSE listeners. Still, once again the substitution of the retroflex [ɻ] with the fricative [h] in the word ‘rug’ made it unintelligible for these listeners, since most of them thought the speakers meant to say ‘hug’.

The 3X3 group independence Chi-square tests revealed differences among the groups concerning the way they transcribed this non-target production. In the first case (Speaker 35), Cramer’s V was found to be .261 (p = .042). Thus, even though Cramer’s V value can be considered significant, the relationship between level of proficiency and intelligibility explains only 6.8% of the results. In the second case (Speaker 10), Cramer’s V was found to be .302 (p = .010) – thus, significant but with only 9.12% of the variation in the frequencies of transcriptions being explained by level of proficiency. In the third case (Speaker 17), similar results were found. Cramer’s V was .230 (p = .01). Even though this result is also significant, it only accounts for 5.29% of the cases, and therefore it can be argued that there is a weak association between the listeners’ level of proficiency/L1 background advantage and intelligibility of the non-target production of the word ‘rug’.

Table 8 displays information about the way the non-target productions of ‘rated’ [ˈheɪtɪt] were transcribed by the three groups of listeners.

Table 8

Contingency Table with the Frequency of Listeners' Transcriptions of 'Rated' Pronounced As [ˈheɪtɪt] By 2 Speakers[40] and the Chi-Square Coefficient[41]

Group	Recording of 'rated' pronounced as [ˈheɪtɪt] by Speaker 16		Recording of 'rated' pronounced as [ˈheɪtɪt] by Speaker 07	
	[ˈheɪtɪt] transcribed as 'hated'	**[ˈheɪtɪt] transcribed as 'rated'**	**[ˈheɪtɪt] transcribed as 'hated'**	**[ˈheɪtɪt] transcribed as 'rated'**
PPGI	24 (100%)	0	24 (100%)	0
Extra	20 (95.2%)	1 (4.8%)	20 (95.2%)	1 (4.8%)
NSE	28 (100%)	0	28 (100%)	0
Total	72 (98.6%)	1 (1.4%)	72 (98.6%)	1 (1.4%)
Chi-Square	χ^2=2.511; p = .285; df = 2; Cramer's V = .185; p = .285		χ^2=2.511; p = .285; df = 2; Cramer's V = .185; p = .285	

Number of participants in each group: PPGI = 24; Extra= 21; NSE= 28.

The results displayed in Table 8 suggest that all listeners, except for one from the Extra group transcribed the production

[40] The following variables were entered to run Chi-square tests: 1) Groups of listeners (with 3 levels) and 2) the types of transcriptions of the 2 non-target productions of 'ropes' (with 2 levels in both times).

[41] The SPSS tables containing the results are provided in APPENDIX K.

[ˈheɪtɪt] as ‘hated’, corroborating the previous results that showed that the substitution of the retroflex with the fricative resulted in unintelligibility. In this case, this was the first time listeners were exposed to this carrier sentence, meaning that they listened to the non-target production of the word ‘rated’ before listening to its target production. This is probably the reason for having fewer listeners inferring that the speakers meant to say ‘rated’, and this corroborates the supposition that test effect interfered with the results, although the conclusion regarding the effect of the substitution of the retroflex /ɻ/ with the fricative /h/ is still valid.

Similarly to the chi-square results reported in Tables 6 and 7, the relationship between listeners’ levels of proficiency/L1 background advantage and intelligibility of the non-target pronunciation of the word ‘rated’ explains only a small percentage of the cases (3.42%), and therefore, we can assume that there is a weak and non-significant association between these variables in this study. Finally, the results of chi-square tests for the non-target productions of the word ‘rabbits’ are displayed in Table 9.

Table 9
Contingency Table with the Frequency of Listeners' Transcriptions of 'Rabbits' Pronounced As [ˈhæbɪts][42] By 2 Speakers and the Chi-Square Coefficient[43]

Group	Recording of 'rabbits' pronounced as [ˈhæbɪts] by Speaker 16		Recording of 'rabbits' pronounced as [ˈhæbɪts] by Speaker 07		
	[ˈhæbɪts] transcribed as 'habits'	[ˈhæbɪts] transcribed as 'rabbits'	[ˈhæbɪts] transcribed as 'habits'	[ˈhæbɪts] transcribed as 'rabbits'	[ˈhæbɪts] transcribed as another word
PPGI	24 (100%)	0	23 (95.8%)	1 (4.2%)	0
Extra	11 (52.4%)	10 (47.6%)	12 (57.1%)	9 (42.9%)	0
NSE	23 (82.1%)	5 (17.9%)	23 (82.1%)	4 (14.3%)	1 (3.6%)
Total	58 (79.5%)	15 (20.5%)	58 (79.9%)	14 (19.2%)	1 (1.9%)
Chi-Square	χ^2=15.758; p = .000; df = 2; Cramer's V = .465; p = .000		χ^2=13.068; p = .011; df = 4; Cramer's V = .299; p = .011		

Number of participants in each group: PPGI = 24; Extra= 21; NSE= 28.

Different from the transcriptions for the words 'rug' and 'rated', more variance was obtained in the way listeners transcribed the non-target production of the word 'rabbits'. Most PPGI and NSE listeners transcribed it as 'habits', but surprisingly, almost half of the Extra listeners transcribed it as 'rabbits'. Thus, the replacement of the

[42] The following variables were entered to run Chi-square tests: 1) Groups of listeners (with 3 levels) and 2) the types of transcriptions of the 2 non-target productions of 'ropes' (with 2 levels in the first time and 3 levels in the second time).

[43] The SPSS tables containing the results are provided in APPENDIX K (p. 158).

retroflex [ɻ] with the fricative [h] in the word 'rabbits' did not affect Extra listeners' intelligibility as much as the other productions previously analyzed did, or as much as the other groups' intelligibility. This difference among the groups was confirmed by chi-square tests, since a Cramer's V value of .465 was found in the first case (p = .000). Even though highly significant, it means that the relationship between level of proficiency/L1 background can explain only 21% of the cases, which decreases to 8.9% in the second time this non-target production was transcribed. The fact that the non-target production of the word 'rabbits' was more intelligible for Extra listeners than for the other BPSE and NSE might be linked to the hypothesis that less proficient listeners recognize more words with non-target pronunciations than more proficient listeners and even NSE.

In addition to the quantitative analysis of listeners' transcriptions, their answers to the last item of the questionnaire (see Appendix J, p. 142-143) were also computed. The questionnaire item was introduced like this: *Below you can see some sounds and sound pairs which are often mispronounced by people who are learning English. Based on your familiarity with Brazilian Portuguese and/or on the recordings you listened to, mark the degree to which you think these mispronunciations would hinder your understanding of Brazilians' speech on the scale below Pronunciation of "r" (e.g.,* ***r****iver, ca****r****)*[44]. The scale used by listeners to tell to what extent the non-target production of /ɻ/ hinders intelligibility ranged from 0 to 9, in which 0 meant "It hinders a lot" and 9 referred to "It does not hinder". The analysis reveals that most of them believe that the non-target production of this sound really hinders intelligibility, since most of them assigned rates below 5.99, which would correspond to "not very easy to comprehend", the Extra group being the one that assigned harsher rates (Table 10). Extra listeners were the ones who recognized more words, meaning that they were able to notice that speakers intended to say 'rabbits' instead of 'habits', an inference that probably required more effort. As a result,

[44] Although I asked about other pronunciation problems, my analysis will focus on what the informants said about the rhotic sound only.

they considered the non-target production of this sound a greater source of unintelligibility in comparison to the other groups.

Table 10

Level of Unintelligibility Caused By the Non-Target Production of/ɹ/

Value	PPGI[a]		Extra[b]		NSE[c]	
	%	Cumulative %	%	Cumulative %	%	Cumulative %
0	25,0	25,0	14,3	14,3	14,3	14,3
1	12,5	37,5	4,8	19,0	7,1	21,4
2	8,3	45,8	14,3	33,3	14,3	35,7
3	12,5	58,3	19,0	52,4	17,9	53,6
4	4,2	62,5	14,3	66,7	7,1	60,7
5	8,3	70,8	9,5	76,2	7,1	67,9
6	4,2	75,0	4,8	81,0	7,1	75,0
7	8,3	83,3	14,3	95,2	7,1	82,1
8	8,3	91,7	4,8	100,0	14,3	96,4
9	8,3	100,0	100,0		3,6	100,0
Total					100,0	

a. N=24; b. N=21; c. N=28

When asked about other pronunciation difficulties faced by Brazilians that could lead to a loss of understanding, some of the listeners restated the substitution of /ɹ/ with /h/[45]. For instance, Listener 49 from the PPGI group wrote that "[Brazilians] pronounce 'r' as 'h': Robert becomes 'Hobertchi'. Listener 44 from the Extra group simply stated that "R, they pronounce it wrongly", and Listener 61 from the

[45] The number of listeners who mentioned the non-target production of the retroflex as a possible source of unintelligibility corresponds to the following percentages: Extra = 28.57%, NSE = 21.42%, and PPGI = 8.33%.

NSE group claimed that "/r/ is probably the most problematic, i.e. 'retired' is pronounced as /hetiud/".

In sum, when listening to the four tested words ('ropes', 'rug', rated' and 'rabbits') that contained a non-target pronunciation of the retroflex [ɻ] by different BPSE, most listeners transcribed them as their non-target counterpart, namely, 'hopes', 'hug', 'hated', and 'habits'. More variance was found among listeners from the Extra group, who transcribed the tested word as a completely different one, or transcribed them as its target counterpart. Moreover, Extra listeners were the ones who most believed that the non-target production of the retroflex hinders intelligibility. However, Cronbach's Alpha results do not indicate a strong relationship between level of proficiency and intelligibility of the non-target pronunciation of /ɻ/ in neither of the tested words. Hazan and Markham (2004, as cited in Munro et al., 2006) also reported a weak relationship between intelligibility and between-listener differences, and this led them to state that deviations in speech may interfere more in intelligibility results than the characteristics shared by listeners in different groups (Hazan & Markham, 2004, as cited in Munro et al., 2006, p. 113-114).

Transcribing the tested word differently from its target/non-target counterpart can also be related to other pronunciation problems in the word, or even in the whole sentence, so that the listener could not rely on the context when trying to figure out what the speaker intended to say. The sentence itself did not provide a very broad context and may not have helped the listeners much. In addition, the sentence made sense no matter if the missing word was produced accurately or accented. Another factor related to this might be the quality of the recording or the sound device used to listen to the recordings, as well as background noise, or simply distraction of the listener.

Regarding the transcription of [ˈhæbɪts] as 'rabbits', for example, one possible explanation is that the Extra listeners were not able to recognize the difference between [ɻ] and [h].

The most intelligible non-target production for the groups in general was ‘rabbits’, even though it was pronounced as [ˈhæbɪts], for it was transcribed as ‘rabbits’ by 20% of the listeners in the first time, and 19.2% in the second time it was presented. Conversely, the least intelligible non-target productions was ‘rated’, pronounced as [ˈheɪtɪt], which was transcribed as ‘hated’ by 98% of the listeners both times it was presented to them. These results could be related to word-frequency, but, as shown in Table 2 (p.49), ‘rabbits’ is not as frequent as ‘habits’, and therefore, if word-frequency played a role in this study Extra listeners would not have transcribed ‘rabbits’ so often. This explanation does work for the least intelligible word though, since its non-target counterpart is much more frequent in English.

The results presented in this section support Hypothesis 1, which stated that when dealing with minimal pairs in English, the substitution of word-initial /ɹ/ with other allophones of the archiphoneme /R/ in Portuguese (e.g., ‘rug’ pronounced as [hʌg] can be understood as ‘hug’) would hinder intelligibility. However, results did not confirm Hypothesis 2, regarding the advantage of L1 background sharing, and results were not significant enough to confirm Hypothesis 3 concerning level of proficiency, although results seem to point to this direction. The next section will discuss the results of the second research question, which focuses on the impact of the non-target pronunciation of the retroflex /ɻ/ on listeners’ comprehensibility.

4.2. The non-target production of /ɻ/ and the issue of comprehensibility

The second research question was “how does the non-target pronunciation of English word-initial /ɹ/ by BPSE affect comprehensibility according to BPSE and NSE listeners?”. The hypotheses that followed this question were:

H4. Lower proficiency BPSE (Extra) will assign higher comprehensibility rates in comparison to the other groups of listeners,

because they will not be able to notice the difference between the target and non-target productions.

H5. Brazilian listeners in general will assign higher comprehensibility rates to BPSE non-target pronunciation of /ɹ/ in comparison to NSE (Bent & Bradlow, 2003; Harding, 2011; Imai, Flege, & Walley, 2003; Major, Fitzmaurice, Bunta, & Balasubramanian, 2002; Munro & Derwing, 2006).

Before discussing the non-target production of /ɹ/ and the issue of comprehensibility, the scores assigned to one recording that was played twice were submitted to Cronbach's alpha test so as to check intra and inter-rater reliability. In other words, if scores assigned to the recording were similar in both times it was played (within and across groups), it could be argued that the listeners were consistent when rating speakers' productions.

4.2.1. Rater-reliability with comprehensibility scores

Inter-rater reliability was checked by correlating the rates assigned by each group of listeners separately, when rating the word 'ropes' produced by Speaker 36 in time 1 and time 2. The purpose was to check whether the same listeners would rate the same token in a similar manner in both times, thus indicating strong inter-rater reliability. Bearing this in mind, Cronbach's alpha test[46] was used to test inter-rater reliability. Larson-Hall (2010) states that there is acceptable inter-rater reliability when Cronbach's alpha value is above .70, with a p-value lower than .05. Table 11 displays the results of the Cronbach's alpha test for the word 'ropes' pronounced as [ˈhoʊps] by Speaker 36

[46] Cronbach's alpha test consists on a "a measure of internal consistency, it is the ratio of variability attributable to subjects divided by the variability attributed to the intersection between subjects and items" (Larson-Hall, 2010, p. 391).

both times it was presented to the three groups of listeners. The scores are presented in Appendix L (p. 166) and the SPSS table with Cronbach's alpha information is presented in Appendix M (p. 169).

Table 11

Intra-Rater Reliability in Scores Assigned to the Same Recording Repeated Twice per Group of Listeners[47]

Group	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Sig.	N of Tested Recordings[48]
PPGI	.822	.822	.000	2
Extra	.923	.923	.000	2
NSE	.926	.936	.000	2

Number of participants in each group: PPGI = 24; Extra= 21; NSE= 28.

Given that all Cronbach's alpha values are significant ($p < .05$) and above .80, it can be assumed that listeners assigned similar values for the same production, meaning that there is high intra-rater reliability. This result is in agreement with Derwing and Munro (2008), who advise using listeners' rates to measure speakers' comprehensibility, since this method provides reliable results. This reliability test was also run with all tested words (both target and non-target productions). Given that the values are also above .85 ($p < .05$), Cronbach's alpha results once again suggest that there is high intra-rater reliability, as can be seen in Table 12.

[47] Variables entered to run Cronbach's alpha test: Listener's scores for 'ropes' pronounced as [hoʊps] by Speaker 36 in Time 1 and Time 2.

[48] 2 refers to the number of productions that were evaluated for comprehensibility by listeners and computed in order to get the Cronbach's alpha value.

Table 12
Inter-Rater Reliability in Scores Assigned to All Tested Words

Group	**Cronbach's Alpha**	**Cronbach's Alpha Based on Standardized Items**	**Sig.**	**N of Tested Recordings**[49]
PPGI	.880	.888	.000	26
Extra	.881	.887	.000	26
NSE	.921	.931	.000	26

Number of participants in each group: PPGI = 24; Extra= 21; NSE= 28.

Another way of analyzing listeners' reliability is to take a look at the scores assigned by the listeners to the productions of a NSE (Speaker 74). Although comprehensibility is not only compromised by a foreign accent and NS themselves might not be totally understood due to other factors, such as "poor vocal projection, excessive glottal fry (very low-pitched speech of weak intensity), covering one's mouth while speaking, ineffective pausing" (Munro, 2010, p.11), as well as speaking rate, accent, etc., it was still expected that the NSE productions would be considered easier to understand than the Brazilians' productions. Based on this assumption, most scores assigned to the NSE target productions of the words 'ropes', 'rug', 'rated', and 'rabbits' were expected to be close to 8 in a scale ranging from 0 to 9, in which 0 meant 'very difficult to comprehend' and 9 meant 'very easy to comprehend'.

[49] 26 refers to the number of target and non-target productions that were evaluated for comprehensibility by listeners and computed in order to get the Cronbach's alpha value.

The comprehensibility mean rates assigned to the NSE productions are displayed in Table 13 (complete SPSS tables and graphs are provided in Appendix N, p. 177).

Table 13
Comprehensibility Mean Scores Assigned to the NSE Productions (Rater-Reliability)

Group		**Comp. mean for 'ropes' [ɹoʊps]**	**Comp. mean for 'rug' [ɹʌg]**	**Comp. mean for 'rated' ['ɹeɪtɪt]**	**Comp. mean for 'rabbits' ['ɹæbɪts]**	**Mean**
PPGI	**Mean**	**6,12**	**6,71**	**6,79**	**7,67**	**6.82**
	Min.	0	2	0	0	
	Max.	9	9	9	9	
Extra	**Mean**	**6.33**	**7.38**	**7.05**	**7.81**	**7.14**
	Min.	0	2	0	2	
	Max.	9	9	9	9	
NSE	**Mean**	**8.18**	**7.89**	**8.36**	**8.32**	**8.18**
	Min.	5	6	3	5	
	Max.	9	9	9	9	

Number of listeners in each group: PPGI = 24; Extra= 21; NSE= 28.

In order to analyze the results from Table 12 and other results that concern the matter of comprehensibility, the values from the scale used to collect listeners' comprehensibility evaluations were interpreted as follows: 0-1.99 = very difficult to comprehend; 2-3.99 = difficult to comprehend; 4-5.99 = not very easy to comprehend; 6-7.99 =

easy to comprehend; 8-9 = very easy to comprehend. In general, comprehensibility mean scores ranged from ‘easy to comprehend’ (PPGI and Extra scores = 6.82 and 7.14, respectively) to ‘very easy to comprehend’ (NSE scores = 8.18). Even though higher rates were expected for NSE productions, it is still possible to argue that listeners were reliable, since the majority of them assigned values above 5 to NSE productions.

Having confirmed a high level of rater reliability, comprehensibility of non-target BPSE productions scores for the different groups of listeners can now be analyzed.

4.2.2 BPSE non-target productions and comprehensibility results

In order to obtain the level of comprehensibility of the tested words, the mean rates for each word were computed, and the results can be visualized in Table 14.

Table 14

Comprehensibility Mean Rates for BPSE Non-Target Productions

Groups		'Ropes' pronounced as [hoʊps]	'Rug' pronounced as [hʌg]	'Rated' pronounced as [ˈheɪtɪt]	'Rabbits' pronounced as [ˈhæbɪts]	Total Mean
PPGI	Minimum	1.33	5.67	2.50	3.0	
	Maximum	9.0	9.00	9.00	9.0	
	Mean[50]	**6.31**	**8.44**	**7.60**	**7.04**	**7.34**
	SD	1.79	.81	1.59	1.70	
	N = 24					
Extra	Minimum	2.67	4.67	5.0	0.50	
	Maximum	9.0	9.0	9.0	8.50	
	Mean	**6.0**	**7.53**	**7.16**	**6.38**	**6.76**
	SD	1.94	1.22	1.39	2.24	
	N = 21					
NSE	Minimum	.33	3.33	3.0	1.0	
	Maximum	9.0	9.0	9.0	8.0	
	Mean	**5.55**	**7.5**	**7.01**	**5.05**	**6,27**
	SD	2.29	1.4	1.51	2.06	
	N = 28					
Total	Minimum	.33	3.33	2.50	.50	
	Maximum	9.0	9.0	9.00	9.00	
	Mean	**5.93**	**7.82**	**7.25**	**6.08**	**6.77**
	SD	2.04	1.25	1.50	2.16	
	N = 73					

Comprehensibility mean rates from Table 14 reveal that BPSE non-target productions were, in general, evaluated by listeners as easy to understand (M=6.77), although there is a small variation among groups. Higher rates were assigned by PPGI and Extra listeners, which may be due to the fact that they share an L1 background with the speakers, as predicted by Bent and Bradlow's matched interlanguage speech intelligibility benefit (2003). The fact that PPGI listeners gave

[50] Categorization: 0-1.99 = very difficult to comprehend; 2-3.99 = difficult to comprehend; 4-5.99 = not very easy to comprehend; 6-7.99 = easy to comprehend; 8-9 = very easy to comprehend.

higher rates to BPSE productions than Extra listeners may be linked to the fact that Extra listeners have more difficulty processing the L2 accent, although Extra listeners were more accurate in recognizing words that were produced with an accent.

When taking a look at the results per word, it is possible to notice that the non-target production of 'ropes' received lower scores in comparison to the others, and therefore was more difficult for listeners to comprehend. On the other hand, the non-target production of the word 'rug' was the easiest one for listeners to comprehend. Although word-frequency explains most of the data obtained in speech production, it does not relate well with perception results. For instance, from the 4 tested words, 'ropes' is the most frequent one in oral speech (853 occurrences in COCA), but listeners' evaluations indicate that it was the most difficult word to understand. Similarly, 'rug' is not frequent in oral speech (472 occurrences in COCA), which explains why it was pronounced with an accent so many times (9), but according to listeners, it was the easiest one to understand. Therefore, this issue remains unanswered.

Given that BPSE non-target productions of the retroflex /ɻ/ were considered 'easy' and 'very easy' to comprehend, and that there was a small variation in the ratings assigned by the groups of listeners, the next step in the data analyses was to check if this variation was significant or not. In order to choose the appropriate test to pursue this objective, the data distribution was analyzed and it was possible to conclude that it was not normally distributed (see data in Appendix O, p. 191). Based on this information, Kruskall-Wallis tests[51] were run to investigate if the difference among groups was significant. The main results can be visualized in more detail in Table 15.

[51] The Kruskall-Wallis test is "a non-parametric counterpart to the one-way ANOVA. It should be used when you have one variable with three or more levels and one dependent variable" (Larson-Hall, 2010, p. 395).

Table 15
Differences among Groups of Listeners Regarding the Comprehensibility Scores (Kruskall-Wallis Test Results)[52]

	Compr. mean for 'Ropes' pronounced as [ˈhoʊps]	Compr. mean for 'Rug' pronounced as [ˈhʌg]	Compr. mean for 'Rated' pronounced as [ˈheɪtɪt]	Compr. mean for 'Rabbits' pronounced as ˈhæbɪts]	Compr. total mean for non-target productions
Chi-Square	1,517	12,035	3,157	12,816	7,024
df	2	2	2	2	2
Asym p. Sig.	,468	,002	,206	,002	,030

Number of listeners in each group: PPGI = 24; Extra= 21; NSE= 28.

When analyzing the results concerning the overall non-target productions mean rates (last column in Table 15), one could argue that significance was achieved (p=.03) and thus there is a difference in the way the three groups rated speakers for comprehensibility. However, this was not true for all words when they were analyzed separately, given that significance was achieved only for the non-target productions of 'rug' (p=.002) and 'rabbits' (p=.002). Taking this into account, Mann-Whitney U tests[53] were carried out so as to find out between which groups the significant difference lies. The summarized results are reported in Table 16, and the SPSS tables can be seen in more detail in Appendix P (p. 193).

[52] Grouping Variable: Groups

[53] The Mann-Whitney test "assesses whether there is a statistically significant difference between the mean ranks of the two conditions" (Dancey & Reidy, 2004, p. 527).

Table 16

Mann-Whitney Test Results

Tests	Asymp. Sig.[a] for 'Ropes' pronounced as [hoʊps]	Asymp. Sig. for 'Rug' pronounced as [hʌg]	Asymp. Sig. for 'Rated' pronounced as [ˈheɪtɪt]	Asymp. Sig. for 'Rabbits' pronounced as ˈhæbɪts]	Asymp. Sig. for the 4 non-target productions
Extra X NSE	,543	,871	,831	,024	,347
PPGI X NSE	,217	,002	,094	,001	,008
PPGI X Extra	,592	,003	,178	,232	,145

a. 2-tailed

Number of listeners in each group: PPGI = 24; Extra= 21; NSE= 28.

Given that more than one test was run, Larson-Hall (2010) explains that the regular alpha value of .05 should not be considered statistically significant. Instead, the author recommends using Bonferroni Adjustments for tests in which few comparisons were run. In order to adjust the alpha level, "simply divide 0.05 by the number of tests that you are using and that is your critical value" (Larson-Hall, 2010, p. 380). Thus, the ideal alpha level in this case should be lower than .004, since 12 tests were run.

Results from the Kruskall-Wallis test (Table 15) have suggested that there was a significant difference in comprehensibility rates assigned to the non-target productions of 'rug' and 'rabbits' by the groups. In fact, by analyzing the Mann-Whitney tests, it is possible to notice that there is a significant difference ($p<.01$) between the PPGI and the NSE groups regarding the way listeners evaluated the non-target productions of the words 'rug' and 'rabbits', which may be an indicator of the L1 background advantage. A significant difference was also found between the PPGI and the Extra group concerning the evaluation of the non-target productions of 'rug', which corroborates the findings of Imai et al. (2003), for example.

In conclusion, results indicate that NSE were harsher in their evaluations of NNS speech, which may be linked to the L1

background advantage, and therefore Hypothesis 5 was supported. Contrary to the findings of intelligibility, PPGI assigned higher comprehensibility scores than Extra listeners and Hypothesis 4 was not supported. A possible explanation is that the Extra group was not able to notice the non-target production of the rhotic and they had to spend more effort to understand what the speakers intended to say.

Having discussed the intelligibility and comprehensibility of non-target productions, it is now necessary to analyze whether and how these dimensions are related, as inquired in Research Question 3.

4.3. The non-target production of /ɹ/ and the issues of intelligibility and comprehensibility

It appears that results from Research Questions 1 and 2 are contradictory. While the majority of listeners were not able to produce accurate orthographic transcriptions of what the speakers intended to say and the intelligibility level in general was low, at the same time listeners assigned relatively high rates to BPSE productions, meaning that they considered speakers to be highly comprehensible. In other words, listeners evaluated the BPSE non-target productions as easy to understand, but they were not able to recognize what the speakers meant to say. As a way of investigating this issue, Research Question 3 was designed: "How are the dimensions of comprehensibility and intelligibility associated for the different groups of listeners?". The hypothesis stated for this question was:

H6. Listeners will transcribe the word according to what they heard and intelligibility will be compromised, while they will assign higher rates for comprehensibility, because they will believe they transcribed what the speaker actually intended to say. In this sense, lower proficiency listeners will perform better in intelligibility and comprehensibility tasks than other Brazilians, who will perform better than the NSE.

In order to answer this question, intelligibility data was compared with comprehensibility means rates. Table 17 shows the comparison for the non-target production of 'ropes'.

Table 17

Comparison between Intelligibility and Comprehensibility Data for 'Ropes' Pronounced as [houps]

Group	Recording of 'ropes' pronounced as [houps] by Speaker 39				Recording of 'ropes' pronounced as [houps] by Speaker 16		
	[houps] transcribed as 'hopes'	[houps] transcribed as 'ropes'	[houps] transcribed as another word	CM[a]	[houps] transcribed as 'hopes'	[houps] transcribed as 'ropes'	CM
PPGI	17 (70.8%)	0	7 (29.2%)	4.75	23 (95.8%)	1 (4.2%)	7.04
Extra	11 (52.4%)	3 (14.3%)	7 (33.3%)	4.62	20 (95.2%)	1 (4.8%)	6.76
NSE	20 (71.4%)	3 (10.7%)	5 (17.9%)	4.57	27 (96.4%)	1 (3.6%)	6.00
Total	48 (65.8%)	6 (8.2%)	19 (26%)		70 (95.9%)	3 (4.1%)	

a. Comprehensibility Means

Results from Table 17 suggest that as intelligibility decreased (i.e., the non-target production was transcribed as 'hopes' instead of 'ropes'), comprehensibility rates increased. For instance, 14.3% of Extra listeners transcribed the word accurately the first time they heard the non-target production and the comprehensibility mean rate was 4.62, against 6.76 the second time they heard the non-target production, in which they accurately transcribed fewer words (4.8%). Listeners from this group were probably more certain that the second speaker intended to say 'hopes', a result from the use of minimal pairs and ambiguous sentences in the test. However, results from Table 18 do not corroborate this idea.

Table 18

Comparison between Intelligibility and Comprehensibility Data for 'Rug' Pronounced as [hʌg]

Group	Recording of 'rug' pronounced as [hʌg] by Speaker 35				Recording of 'rug' pronounced as [hʌg] by Speaker 10				Recording of 'rug' pronounced as [hʌg] by Speaker 17			
	[hʌg] transcribed as 'hug'	[hʌg] transcribed as 'rug'	[hʌg] transcribed as another word	CM	[hʌg] transcribed as 'hug'	[hʌg] transcribed as 'rug'	[hʌg] transcribed as another word	CM	[hʌg] transcribed as 'hug'	[hʌg] transcribed as 'rug'	[hʌg] transcribed as another word	CM
PPGI	24 (100%)	0	0	8.71	24 (100%)	0	0	8.62	24 (100%)	0	0	8.00
Extra	16 (76.2%)	4 (19%)	1 (4.8%)	7.43	16 (76.2%)	3 (14.3%)	2 (9.5%)	8.14	18 (85.7%)	2 (9.5%)	1 (4.8%)	7.05
NSE	27 (96.4%)	0	1 (3.6%)	7.32	28 (100%)	0	0	8.18	28 (100%)	0	0	7.00
Total	67 (91.8%)	4 (6.8%)	2 (1.4%)		68 (93.2%)	3 (4.1%)	2 (2.7%)		70 (95.9%)	2 (2.7%)	1 (1.4%)	

Table 18 shows that the second time that listeners heard the non-target production of ‘rug’, comprehensibility mean rates increased, although intelligibility decreased for Extra listeners. PPGI intelligibility did not change over the 3 recordings, but comprehensibility scores did: they increased the second time and then decreased the third time. NSE intelligibility did not change either, and comprehensibility scores followed the same pattern as the PPGI group. In the case of this production, there seems to be no association between comprehensibility and intelligibility results, except for the Extra group, which might be an effect of the minimal pairs used in the test. Similar results were found for the non-target production of ‘rated’.

Table 19

Comparison between Intelligibility and Comprehensibility Data for ‘Rated’ Pronounced as [ˈhɛɪtɪt]

Group	**Recording of ‘rated’ pronounced as [ˈhɛɪtɪt] by Speaker 16**			**Recording of ‘rated’ pronounced as [ˈhɛɪtɪt] by Speaker 07**		
	[ˈhɛɪtɪt] transcribed as ‘hated’	**[ˈhɛɪtɪt] transcribed as ‘rated’**	**CM**	**[ˈhɛɪtɪt] transcribed as ‘hated’**	**[ˈhɛɪtɪt] transcribed as ‘rated’**	**CM**
PPGI	24 (100%)	0	8.58	24 (100%)	0	6.63
Extra	20 (95.2%)	1 (4.8%)	8.43	20 (95.2%)	1 (4.8%)	5.90
NSE	28 (100%)	0	7.61	28 (100%)	0	6.43
Total	72 (98.6%)	1 (1.4%)		72 (98.6%)	1 (1.4%)	

Results from Table 19 reveal the same pattern found in Table 18. Although intelligibility is stable over the two productions, the second time comprehensibility scores were lower for all groups, and a possible explanation lies in test effect, which might have led listeners to confusion. Nonetheless, Table 20 reports a different pattern.

Table 20

Comparison between Intelligibility and Comprehensibility Data for 'Rabbits' Pronounced as [ˈhæbɪts]

Group	Recording of 'rabbits' pronounced as [ˈhæbɪts] by Speaker 16			Recording of 'rabbits' pronounced as [ˈhæbɪts] by Speaker 07			
	[ˈhæbɪts] transcribed as 'habits'	[ˈhæbɪts] transcribed as 'rabbits'	CM	[ˈhæbɪts] transcribed as 'habits'	[ˈhæbɪts] transcribed as 'rabbits'	[ˈhæbɪts] transcribed as another word	CM
PPGI	24 (100%)	0	7.46	23 (95.8%)	1 (4.2%)	0	6.22
Extra	11 (52.4%)	10 (47.6%)	6.81	12 (57.1%)	9 (42.9%)	0	5.95
NSE	23 (82.1%)	5 (17.9%)	5.57	23 (82.1%)	4 (14.3%)	1 (3.6%)	4.54

Results from Table 20 show that as intelligibility decreased, comprehensibility mean scores increased. This is a different pattern, which suggests a test effect, since the listeners probably got confused with the target and non-target productions and therefore the comprehensibility rates assigned by then are not logic.

In sum, taking into account the results discussed in this section, it is not possible to state whether there is or not an association between the dimensions of comprehensibility and intelligibility, as found in studies like the ones conducted by Derwing & Munro (1995a,

1997), and Hypothesis 6 was not supported. Finally, the results for the last research question will be discussed.

4.4. The non-target production of /ɹ/ and the issue of familiarity

Research Question 4 inquired about the effect of familiarity: "Which group of NSE listeners has more difficulty in understanding the Brazilian accented /ɹ/ in English words regarding the influence of familiarity in the dimensions of comprehensibility and intelligibility?". The hypothesis for this research question was:

H7. Familiar NSE listeners will be more accurate when transcribing the tested words (intelligibility measure) and will assign higher rates to BPSE productions (comprehensibility measure) (Cruz, 2008; Derwing & Munro, 1997; Gass & Varonis, 1984; Munro & Derwing, 2006).

To answer this research question, the NSE group was divided according to level of familiarity with BP, resulting in two groups of 14 listeners each, namely the familiar listeners (NSE-F) and unfamiliar listeners (NSE-U). Contingency tables with Chi-square values were created. Comprehensibility mean scores were also computed as a way of analyzing intelligibility and comprehensibility together. Table 21 shows the results for the non-target productions of 'ropes'[54].

[54] The details from the Chi-square tests can be viewed in SPSS tables provided in APPENDIX Q (p. 196).

Table 21

Contingency Table of NSE Transcriptions of 'Ropes' Pronounced As [houps], the Chi-Square Coefficient and Comprehensibility Mean Scores

Group	Recording of 'ropes' pronounced as [houps] by Speaker 39				Recording of 'ropes' pronounced as [houps] by Speaker 16		
	[houps] transcribed as 'hopes'	[houps] transcribed as 'ropes'	[houps] transcribed as another word	CM	[houps] transcribed as 'hopes'	[houps] transcribed as 'ropes'	CM
NSE-F	10 (71.4%)	3 (21.4%)	1 (7.1%)	5.36	13 (92.8%)	1 (7.1%)	5.93
NSE-U	10 (71.4%)	0	4 (28.56%)	3.79	14 (100%)	0	6.07
Total	20 (71.4%)	3 (10.7%)	5 (17.8%)		27 (96.4%)	1 (4.1%)	
Chi-Square	χ^2=4.800; p = .091; df = 2; Cramer's V = .414; p = .091				χ^2=1.037; p = .309; df = 1; Cramer's V=.192; p = .309		

Number of participants in each group: NSE-F = 14; NSE-U=14.

According to Table 21, intelligibility was higher for NSE-F (21.4% and 7.1%). Comprehensibility mean scores assigned by NSE-F were higher only in the first production. A 3X2 group independence Chi-square test was carried out to find out whether there was a significant relationship between the groups and the way listeners transcribed the word 'ropes' pronounced as [houps] by Speaker 39. The χ^2 value of 4.800 had an associated probability value of .091 (df = 2), showing that this association is likely to have arisen as a result of sampling error. Cramer's V was found to be .414 (p = .091) – thus only 17% of the variation in the frequencies of transcriptions can be explained by familiarity with the BP accent. It can therefore be concluded that there is not a significant association between transcriptions and groups.

An even weaker association was found for the second production, to which a 2X2 group independence Chi-square was carried out. With a χ^2 value of 1.037 (p= .309; df = 1), this association is likely to have arisen as a result of sampling error. Cramer's V was found to be .192 (p = .091) – thus only 3.7% of the variation in the frequencies of transcriptions can be explained by familiarity with the BP accent. In sum, although NSE-F seem to have performed better in the intelligibility task then NSE-U, the relationship between familiarity with the BP accent and transcriptions accuracy explains only a small portion of the results. Although NSE-F assigned higher comprehensibility rates in the first non-target production (NSE-F=5.36 against NSE-U=3.79), the opposite happened in the second instance (NSE-U=6.07 against NSE-F=5.93). Similar results were found in the analysis of the non-target production of the word 'rug' in Table 22.

Table 22

Contingency Table of NSE Transcriptions of 'Rug' Pronounced as [hʌg], the Chi-Square Coefficient and Comprehensibility Mean Scores

Group	Recording of 'rug' pronounced as [hʌg] by Speaker 35			Recording of 'rug' pronounced as [hʌg] by Speaker 10		Recording of 'rug' pronounced as [hʌg] by Speaker 17	
	[hʌg] transcribed as 'hug'	[hʌg] transcribed as 'rug'	CM	[hʌg] transcribed as 'hug'	CM	[hʌg] transcribed as 'hug'	CM
NSE-F	13 (92.8%)	1 (7.1%)	6.79	14 (100%)	8.14	14 (100%)	7.00
NSE-U	14 (100%)	0	7.86	14 (100%)	8.21	14 (100%)	7.00
Total	27 (96.4%)	1 (4.1%)		28 (100%)		28 (100%)	
Chi-Square	χ^2=.1.037; p = .309; df = 1; Cramer's V=.192; p = .309			No statistics were computed because this was a constant		No statistics were computed because this was a constant	

Table 22 shows that NSE-F reacted differently only in the first production of 'rug'. Chi-square and Cramer's V values were the same as the second production 'ropes', presented in Table 21, meaning that the variable of familiarity accounts for only 3.7% of the data. Because all listeners from both groups provided the same transcriptions for the second and third realizations of 'rug', statistics could not be computed. Different from what was predicted in Hypothesis 7, NSE-U assigned higher rates for comprehensibility, except in the third production, for which equal scores were assigned by the groups. The next table displays information about the non-target productions of 'rated'.

Table 23

Contingency Table of NSE Transcriptions of 'Rated' Pronounced As [ˈheɪtɪt], the Chi-Square Coefficient and Comprehensibility Mean Scores

Group	Recording of 'rated' pronounced as [ˈheɪtɪt] by Speaker 16		Recording of 'rated' pronounced as [ˈheɪtɪt] by Speaker 07	
	[ˈheɪtɪt] transcribed as 'hated'	CM	[ˈheɪtɪt] transcribed as 'hated'	CM
NSE-F	14 (100%)	7.36	14 (100%)	6.36
NSE-U	14 (100%)	7.86	14 (100%)	6.50
Total	28 (100%)		28 (100%)	
Chi-Square	No statistics were computed because this was a constant		No statistics were computed because this was a constant	

Number of participants in each group: NSE-F = 14; NSE-U=14.

Once again listeners from both groups behaved equally, and comprehensibility rates assigned by NSE-U were slightly higher. However, Table 24 reveals different results for the word 'rabbits'.

Table 24

Contingency Table of NSE Transcriptions of 'Rabbits' Pronounced As [ˈhæbɪts], the Chi-Square Coefficient and Comprehensibility Mean Scores

Group	Recording of 'rabbits' pronounced as [ˈhæbɪts] by Speaker 16			Recording of 'rabbits' pronounced as [ˈhæbɪts] by Speaker 07			
	[ˈhæbɪts] transcribed as 'habits'	[ˈhæbɪts] transcribed as 'rabbits'	CM	[ˈhæbɪts] transcribed as 'habits'	[ˈhæbɪts] transcribed as 'rabbits'	[ˈhæbɪts] transcribed as another word	CM
NSE-F	11 (78.5%)	3 (21.4%)	6.07	11 (78.5%)	3 (21.4%)	0	4.21
NSE-U	12 (85.7%)	2 (14.2%)	5.07	12 (85.7%)	1 (7.1%)	1 (7.1%)	4.86
Total	23 (82.1%)	5 (17.8%)		23 (82.1%)	4 (14.2%)	1 (3.5%)	
Chi-Square	χ^2=.243; p = .622; df=1; Cramer's V= .093; p = .622			χ^2=2.043; p = .360; df = 2; Cramer's V = .270; p = .360			

Number of participants in each group: NSE-F = 14; NSE-U=14.

The analysis of the transcriptions for the non-target productions of 'rabbits' reveals that listeners from the NSE-F groups performed slightly better than NSE-U in the intelligibility test. A 2X2 group independence Chi-square test was carried out to find out whether there was a significant relationship between the groups and the transcriptions provided for Speaker 39 production. The χ^2 value of .243 (p= .091; df = 1) shows that this association is likely to have arisen as a result of sampling error. Cramer's V was found to be .093 (p = .622), which suggests that only .08% of the variation in the frequencies of transcriptions can be explained by familiarity with the BP accent. Thus, there is not a significant association between transcriptions and groups. For the second production a 3X2 group independence Chi-square test

was carried out, which resulted in a χ^2 value of 2.043 (p= .360; df = 2), with a Cramer's V of .270. Therefore, only 7.3% of the results can be explained in terms of familiarity with the BP accent. Like the other analysis, comprehensibility scores do not follow a pattern, since NSE-F mean score is higher in the first production and lower in the second one. In sum, apparently, familiarity with BP does not explain the results presented in this section.

4.5. Summary of the chapter

In summary, these are the main findings reported in this chapter: a) the substitution of word-initial /ɹ/ with a fricative really hindered intelligibility, and either L1 background sharing and level of proficiency did not increase intelligibility as it would be expected; b) in what concerns comprehensibility, on the other hand, L1 background sharing seems to have played a role, since NSE were harsher in their evaluations of NNS speech, but level of proficiency once again did not interfere on the results; c) when analyzing the results from intelligibility and comprehensibility, it was not possible to find an association between these dimensions, and d) similarly to the other variables, familiarity with BP did not influence the results, contrary to what was expected. Moreover, throughout the results it is possible to find evidences that the test should be reformulated in order to avoid test effects and obtain more reliable results.

Next chapter will discuss the main findings of this research and point out the limitations of the study, as well as possible pedagogical implications and ideas for further research.

CHAPTER 5
CONCLUSION

The objective of this chapter is to summarize the main results presented throughout the previous chapters, as well as discuss the pedagogical implications of these findings, the limitations of the study and suggestions that may contribute to future research in the area.

5.1. Summary of overall results

Although the focus of this study was not to investigate the issue of transfer, the first findings concern the transfer of the production of rhotics from BP to English in word-initial position. After analyzing the recordings, it was concluded that: a) only a few BPSE transferred the BP r-sounds to English (in word-initial position), which may be the result of the type of test administered or the speakers' L2 proficiency level b) the non-target pronunciation of word-initial /ɻ/ was the fricative, since this is also the speakers' allophone for <r> in BP; c) the words that were most frequently pronounced with a non-target production of /ɻ/ in word-initial position were "rug" and "rated", while the r-sound in the word "right" was pronounced as a retroflex by all the participants, probably due to the high occurrence of this word in English.

Other results relate to intelligibility and comprehensibility of the non-target productions of /ɻ/. In sum, the non-target production of the retroflex [ɻ] in the four tested words ('ropes', 'rug', rated' and 'rabbits') resulted mainly in the transcription of 'hopes', 'hug', 'hated', and 'habits', meaning that pronouncing <r> as a glottal fricative causes unintelligibility, which corroborates Hypothesis 1. The non-target productions were more intelligible for the Extra group, which may be due to listeners' level of proficiency, which is lower in relation to the other groups (a prediction made in Hypothesis 3). However, Cronbach's Alpha results do not indicate a strong relationship between level of proficiency and intelligibility of the non-target pronunciation of /ɻ/ in none of the tested words. Data on intelligibility did not confirm

Hypothesis 2 either, according to which L1 background sharing would facilitate BPSE intelligibility.

As for comprehensibility results, it can be said that mean rates decrease following this order: PPGI, Extra, NSE. A possible explanation relies on Bent and Bradlow's (2003) matched interlanguage speech intelligibility benefit, which argues that listeners who share an L1 with the speaker will have an advantage over listeners from other L1s. In fact, this difference was significant between PPGI and NSE group and between the Extra and PPGI group for the words 'rug' and 'rabbits' in the first case and for 'rug' in the second. Therefore, this finding seems to support Hypothesis 4 and 5, which concern the L1 background advantage and the less proficient listeners. It was hypothesized that less proficient listeners had to spend more time and effort trying to distinguish between the minimal pair, because they were not able to notice that the listeners were in fact replacing the pronunciation of the rhotic with the fricative.

When trying to find an association between intelligibility and comprehensibility, it was not possible to come to a conclusion, for the two dimensions do not follow a pattern. While in some cases comprehensibility increases with intelligibility, in others, the two dimensions go in opposite directions or decrease, contrary to what was predicted in Hypothesis 7. Similar results were found regarding the familiarity variable, since there was not a pattern or significant differences between the familiar and unfamiliar groups of NSE, as found in studies like the ones conducted by Derwing and Munro (1995a, 1997), for instance. Actually, in some recordings NSE-U performed better on the intelligibility task in comparison to NSE-F, and Hypothesis 7 was not supported.

Overall, the non-target production of /ɻ/ hindered BPSE intelligibility and comprehensibility according to listeners. Although some differences among groups were noticeable in the results, they were not statistically significant, and therefore it is not possible to state that the variables of level of proficiency, L1 background advantage and familiarity with an accent have any influence on the intelligibility and

comprehensibility of BPSE speech regarding the production of the retroflex in word-initial position.

5.2. Pedagogical Implications

Derwing and Munro's concern (2008) perfectly illustrates the importance of studies like the present one for ESL teaching: "We have to know where to put the focus. If not, there is a risk of teaching things that are salient, but which will not result in actual improvement in communication for the speaker" (p. 482)". In the context of EIL, the objective is to focus on intelligibility, and therefore to focus on the features that are important to assure communication. Thus, it is vital to investigate which aspects or productions really affect intelligibility. The steps to reach this aim, according to the same authors are: "First, more research should be conducted on intelligibility to establish the most effective ways of assessing it and to identify the factors that contribute to it. No single approach to intelligibility assessment can take into account all the subtleties that might influence a listener" (Derwing & Munro, 2005, p. 391).

Hence, it is expected that the results gathered in this study will help teachers to set priorities when teaching BPSE. The results from this research highlight that the non-target production of the rhotic, at least in word-initial position, affects intelligibility and comprehensibility of both NSE and other BPSE from different levels of proficiency.

This research also serves the pedagogical purpose of offering the perspective from other L2 users, a claim made by Derwing and Munro (2008). As mentioned earlier, in the context of EIL, not only the NSE perspective matters, but instead it is vital to consider the effect of L2 speech on the interlocutors with whom the L2 speaker "is more likely to interact with" (Munro et al., 2006). For example, in this study, some cases indicate that sharing an L1 with the speaker might facilitate intelligibility and comprehensibility, although communication problems are likely to take place if BP speakers are using English to communicate. This situation is likely to happen in contexts where BP

speakers have to interact with each other and with speakers of other languages using English as a Lingua Franca, such as international events or business meetings. Therefore, it is important to understand the specificities of each group and guarantee that aspects that improve intelligibility are taught to learners of ESL.

5.3. Limitations of the study and suggestions for further research

The results presented in this thesis suggest that changes in the method of data collection are necessary to investigate whether or not the transfer process really occurs with the production of English <r> by BP speakers as a way to obtain more reliable answers. As mentioned in the Method Chapter, the use of a sentence-reading task to collect data from the speakers was important to control for the phonological environment, the length of the sentences, the position of the rhotic in the word, among other features. However, more extensive samples resembling real life interactions are obviously recommended for future research. As mentioned by Deus (2009), it may be better to record BSPE while they are producing free speech, since this is a harder task than reading, and consequently, it could lead them to produce more non-target productions of word-initial <r>. This procedure was followed by Osborne (2010), which may explain why this researcher was able to identify higher percentages of transfer than Deus (2009).

However, a loss of control is implied in tasks using extemporaneous speech, and the alternative procedure of paraphrasing proposed by Algethami et al. (2011) seems to be a balanced solution for this methodological dilemma. In addition, in order to verify if all the possible pronunciations of word-initial <r> in BP are transferred to English, it is necessary to collect data from Brazilians who speak different BP dialects. Testing BPSE of different proficiency levels may also enlighten us regarding to what extent BPSE transfer the rhotic sounds from BP to English.

Another problem concerning the method applied in this research is related to the use of minimal pairs and ambiguous sentences.

Cruz (2005) claims that minimal pairs end up biasing the listeners. In fact, it is really hard to find examples in real life in which minimal pairs result in misunderstanding due to non-target productions, and it appears that the data obtained in this study are more related to perception itself rather than intelligibility. This does not mean that the results reported here should not be taken into account, but they can be complemented with future investigations that work with non-ambiguous sentences. As a matter of fact, a multiplicity of methods can be useful so as to obtain a more detailed analysis of what hinders intelligibility and comprehensibility the most.

The fact that more students were able to participate in the research because of the website is an advantage of using the internet for research purposes. Students from different university campuses enrolled in online programs are usually left out because of the distance from the central campus, even though they are more accustomed to using the internet for academic purposes than regular students.

There are certainly some limitations, such as the quality of the recordings (participants need a good microphone, and a silent place to record themselves); the amount of necessary instruction (without the assistance of the researcher, participants need more information; and a special design of the instruments is required); the variety of browsers, which generates a compatibility problem; the quality of internet access, among other things. Even so, it can be argued that this study is innovative for reaching participants that otherwise would not have had the chance to be part of the study if the data had not been collected online.

Using a web-site for data gathering was also important to collect data from NSE listeners who were not (so) familiar with BP. If these listeners lived in Brazil they would be much more familiar with BP and a comparison between groups would not have been possible.

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APPENDICES

Appendix A

Speakers' Profiles

Speakers' ID	Status	Gender	Age	Place where the speaker lived most of his/her life	Current education status	Course	Foreign languages the participant speaks (besides BP)
PilotSpeaker 7	BPSE	Female	23	Florianópolis - SC	Some College - In Progress	Secretariado Executivo	English; French
PilotSpeaker 8	BPSE	Female	26	Assu - RN	Master's Program – In Progress	Mestrado em Letras Inglês	English
PilotSpeaker 9	BPSE	Female	43	Florianópolis - SC	Some College - In Progress	Letras Inglês	English
PilotSpeaker 10	BPSE	Female	29	Cascavel - PR	Some College - In Progress	Letras Inglês	English; Spanish; Italian
PilotSpeaker 14	NSE	Male	26	Londres - Londres	Master's Program – In Progress	Mestrado em Letras Inglês	English; French, Italian; Portuguese

Speaker15	BPSE	Female	34	São Paulo - SP	Some College - In Progress	Letras Inglês	English
Speaker16	BPSE	Female	42	Frederico Westphalen - RS	Some College - In Progress	Letras Inglês	English; German
Speaker17	BPSE	Male	46	Porto Alegre - RS	Some College - In Progress	Letras Inglês	English; Spanish
Speaker18	BPSE	Male	19	Tijucas - SC	Some College - In Progress	Letras Inglês	English
Speaker19	BPSE	Male	18	Petrolândia - SC	Some College - In Progress	Letras Inglês	English
Speaker20	BPSE	Male	19	Florianópolis - SC	Some College - In Progress	Letras Inglês	English
Speaker21	BPSE	Male	18	Joinville - SC	Some College - In Progress	Letras Inglês	English; German; Japonese
Speaker22	BPSE	Female	18	São José - SC	Some College - In Progress	Letras Inglês	English; French
Speaker23	BPSE	Male	18	Palhoça - SC	Some College - In Progress	Letras Inglês	English; Italian

Speaker24	BPSE	Male	23	São José - SC	Some College - In Progress	Letras Inglês	English
Speaker25	BPSE	Female	18	Florianópolis - SC	Some College - In Progress	Letras Inglês	English
Speaker26	BPSE	Male	19	Brusque - SC	Some College - In Progress	Letras Inglês	English; Spanish
Speaker27	BPSE	Male	20	Chopinzinho - PR	Some College - In Progress	Letras Inglês	English; Spanish
Speaker30	BPSE	Female	33	Florianópolis - SC	Some College - In Progress	Letras Inglês	English
Speaker32	BPSE	Female	47	Florianópolis - SC	Some College - In Progress	Secretariado Executivo	English
Speaker33	BPSE	Male	26	São José - SC	Some College - In Progress	Secretariado Executivo	English; Spanish
Speaker34	BPSE	Female	19	Florianópolis - SC	Some College - In Progress	Secretariado Executivo	English
Speaker35	BPSE	Female	22	Florianópolis - SC	Some College - In Progress	Secretariado Executivo	English; French

Speaker36	BPSE	Female	22	Florianópolis - SC	Some College - In Progress	Secretariado Executivo	English; Spanish
Speaker37	BPSE	Female	26	Pelotas - RS	Some College - In Progress	Secretariado Executivo	English; Spanish
Speaker38	BPSE	Female	36	Curitiba - PR	Some College - In Progress	Secretariado Executivo	English
Speaker39	BPSE	Male	19	Florianópolis - SC	Some College - In Progress	Secretariado Executivo	English
Speaker43	BPSE	Female	16	Águas de Chapecó - SC	Some College - In Progress	Letras Inglês - EaD	English; Spanish
Speaker44	BPSE	Female	32	Concórdia - SC	Some College - In Progress	Letras Inglês - EaD	English; Spanish
Speaker46	BPSE	Male	33	São José - SC	Some College - In Progress	Letras Inglês - EaD	English; Spanish
Speaker53	BPSE	Female	44	Porto Alegre - RS	Some College - In Progress	Letras Inglês - EaD	English; Spanish
Speaker54	BPSE	Male	27	Florianópolis - SC	Some College - In Progress	Letras Inglês	English; French

Speaker56	NSE	Male	21	Taylosville - Utah	High School Graduate		Portuguese
Speaker71	BPSE	Male	20	Alegrete - RS	Some College - In Progress	Letras Inglês UNINFRA	English
Speaker73	BPSE	Female	27	Brusque - SC	Some College - In Progress	Letras Inglês - EaD	English; Spanish; Italian; German
Speaker74	BPSE	Male	19	Concórdia - SC	Some College - In Progress	Letras Inglês - EaD	English; Spanish;
Speaker75	BPSE	Female	21	Florianópolis - SC	Some College - In Progress	Secretariado Executivo	English
Speaker76	BPSE	Female	24	Campos Novos - SC	Some College - In Progress	Secretariado Executivo	English
Speaker81	BPSE	Male	34	São Leopoldo - RS	Some College - In Progress	Letras Inglês - EaD	English
Speaker83	BPSE	Male	28	Araranguá - SC	Some College - In Progress	Letras Inglês - EaD	English; Spanish;
Speaker88	BPSE	Male	39	São Leopoldo - RS	Some College - In Progress	Letras Inglês - EaD	English

Appendix B

PPGI Profiles

Listener's ID	Age	Gender	Place where the participant lived most of his/her life	Current Education Status	Foreign languages the participant speaks (besides BP)
Listener3	33	F	Rio de Janeiro - RJ	Doctoral Degree	Spanish, English
Listener4	25	M	Teresina - PI	Masters Degree	English, Spanish
Listener5	25	F	Garopaba - SC	Doctoral Degree	English
Listener8	30	F	Petrópolis - RJ	Masters Degree	English, Spanish, French
Listener10	26	F	Gaspar - SC	Doctoral Degree	English, Spanish, German
Listener11	44	F	Florianópolis - SC	Doctoral Degree	English
Listener12	28	F	Florianópolis - SC	Masters Degree	English, French
Listener13	41	F	Florianópolis - SC	Doctoral Degree	Spanish, English, Italian
Listener15	31	F	Rio Grande - RS	Masters Degree	English
Listener16	26	M	Dois Irmãos - RS	Masters Degree	German, English, Spanish
Listener21	40	F	Blumenau - SC	Doctoral Degree	English, French
Listener25	33	F	Porto Alegre - RS	Doctoral Degree	English, French

Listener39	29	F	Chapecó - SC	Masters Degree	English, Spanish
Listener49	49	F	Panambi - RS	Masters Degree	English, French, Spanish, German
Listener50	39	M	Porto Alegre - RS	Masters Degree	English
Listener51	44	M	São Paulo - SP	Masters Degree	English, Spanish
Listener52	29	F	São Lourenço - MG	Masters Degree	English, Spanish
Listener54	47	F	São Paulo - SP	Masters Degree	English, Spanish
Listener56	28	F	Criciúma - SC	Doctoral Degree	English, Spanish
Listener62	32	F	São Bento do Sul - SC	Masters Degree	English, French
Listener64	30	F	Pelotas - RS	Masters Degree	English
Listener68	33	F	Santos - SP	Masters Degree	English, Spanish
Listener71	30	F	Torres - RS	Masters Degree	English, Spanish
Listener75	41	F	Maringá - PR	Doctoral Degree	English, Spanish, Japanese, French

Appendix C

Extra Profiles

Listener's ID	Age	Gender	Place where the participant lived most of his/her life	Current Education Status	Course	Foreign languages the participant speaks (besides BP)
Listener23	20	M	São José - SC	Some University - In progress	Relações Internacionais	English, German, Spanish, French
Listener24	25	M	Florianópolis - SC	Masters Degree	Ciências da Computação	English
Listener26	23	F	Florianópolis - SC	Specialization	Administração	English, Spanish
Listener27	24	F	Varginha - MG	Some University - In progress	Letras Alemão	German, Spanish, English
Listener29	20	M	Bento Gonçalves - RS	Some University - In progress	Ciências Biológicas	English
Listener32	29	M	Florianópolis - SC	University Degree	Economia	English
Listener33	23	F	São Miguel do Oeste - SC	Specialization	Farmácia e Bioquímica	English, Spanish

Listener41	20	M	São Paulo - SP	Some University - In progress	Engenharia de Produção Mecânica	English
Listener43	24	F	Concórdia - SC	Some University - In progress	Ciências Econômicas	English
Listener44	27	M	Florianópolis - SC	Other	Curso para concurso	English
Listener45	31	F	Florianópolis - SC	Specialization	Economia e Gestão Publica	English, Italian
Listener47	20	M	Manaus - AM	Some University - In progress	Engenharia de Produção Mecânica	English
Listener58	31	M	Uruguaiana - RS	Doctoral Degree	Engenharia de Alimentos	English, Spanish
Listener59	50	M	Florianópolis - SC	Masters Degree	Sistemas de Informação	English, Spanish
Listener60	20	M	Florianópolis - SC	Some University - In progress	Matemática	English, French

Listener63	19	M	Tijucas - SC	Some University - In progress	Ciências da Computação	English, Spanish
Listener65	22	M	Criciúma - SC	Some University - In progress	Engenharia de Controle e Automação	English, Spanish
Listener67	36	M	Catanduvas - SC	Masters Degree	Ciências da Computação	English
Listener69	25	M	São Paulo - SP	Specialization	Engenharia Civil	English, Japanese
Listener72	23	F	Florianópolis - SC	University Degree	Administração	English, Spanish
Listener74	22	M	São José - SC	Some University - In progress	Administração	English, Spanish, French

Appendix D

NSE Profiles

	Listener's ID	Age	Gender	Birth Place	Level of Education	Course
FAMILIAR LISTENERS	NListener3	21	M	Frederick - Maryland - USA	High School	
	NListener4	22	M	Provo - Utah - USA	Some University - In progress	Mechanical Engineering
	NListener5	32	F	West Midlands - Birmingham - England	Some University - In progress	Letras
	NListener9	50	M	Pawtucket - Rhode Island - USA	Some University - In progress	Project Management
	NListener16	60	F	High Wycombe - Bucksinghamshire - UK	Specialization	*Life long learning teaching diploma and blended-learning*
	NListener18	48	M	Sydney - New South Wales - Australia	Doctoral Degree	Literature
	NListener23	25	F	Santa Ana - California - USA	Masters Degree	Gestão de Design
	NListener28	33	M	La Jolla - California - USA	Masters Degree	Computer Science
	NListener42	28	M	Bronx - NY - US	Other	Computer Electronics technician
	NListener43	62	M	Pretty Good - London - England	Specialization	BA Social Sciences & PGCE
	NListener47	61	M	Springfield - Massachusetts - USA	Doctoral Degree	English Literature
	NListener50	18	M	London - London - England	Some University - In progress	History
	NListener60	23	M	St. Louis - Missouri - USA	Some University - In progress	Linguistics
	NListener69	42	M	Denver - Colorado - USA	Doctoral Degree	SLA

	Listeners' ID	Age	Gender	Birth Place	Level of Education	Course
UNFAMILIAR LISTENERS	NListener6	19	F	Glens Falls - NY - USA	Some University - In progress	Radiology
	NListener13	21	M	Aurora - Illinois - USA	Some University - In progress	College
	NListener21	55	M	Chicago - Illinois - USA	University Degree	Criminal Justice, Sociology
	NListener32	61	F	Hobart - Tasmania - Australia	Tech School Graduation	Cabinet Maker
	NListener38	39	M	Perth - Western Australia - Australia	Some University - Incomplete	Information Technology
	NListener39	22	M	Chicago - Illinois - USA	Some University - In progress	Philosophy
	NListener49	24	M	Johnson City - Tennessee - USA	University Degree	Physics and Spanish Literature
	NListener52	53	F	Middlesex - London - England	Specialization	Music
	NListener53	55	F	Haslemere - Surrey - UK	Masters Degree	Psychology of Education
	NListener58	21	M	Christchurch - Canterbury - NZ	Some University - In progress	Defence Studies and German
	NListener59	40	F	Fairfield - California - USA	Doctoral Degree	English Linguistics
	NListener61	30	F	Prescott - Arizona - USA	Post-Doctoral	Linguistics
	NListener71	47	M	London - London - England	University Degree	English
	NListener72	47	F	Yonkers - NY - USA	University Degree	Finance

Appendix E

Operationalization of listeners' answers regarding their knowledge of BP and Brazilians' accent in English so as to split them into 2 groups and analyze the familiarity variable. A value was assigned to the questions and respective options in order to obtain the total number (0-10), which was then classified like this: listeners' scores ranging from 0 to 6,99 fell into the *unfamiliar category*, while listeners' scores ranging from 7 to 10 were categorized as *familiar* listeners.

1. **Please list the other languages you speak in the order you have learned them and mark the option that corresponds to your proficiency level in each language (1,00).**

    a) Very good = 1
    b) Good = 0,66
    c) Not so good = 0,33
    d) The listener does not speak Portuguese = 0

2. **How long have you been studying/speaking Portuguese? (1,00)**

    a) less than a month = 0,25
    b) 1 to 3 months = 0,50
    c) 3 to 6 months = 0,75
    d) More than 6 months = 1,00
    e) The listener does not speak Portuguese = 0

3. **Have you ever been to Brazil?**[55]

[55] In this question only one answer was taken into consideration, meaning that if the listener reported that s/he had lived and visited Brazil, only the value assigned for option 3.2 was counted. The second option received a higher value because listeners who lived in Brazil probably had more contact with the Brazilian accent in comparison to those who only visited Brazil.

3.1. I've been to Brazil ___times (1,00)
a) Once = 0,25
b) 2-3 times = 0,50
c) 4-5 times = 0,75
d) 6 times or more = 1,00
e) The listener does not speak Portuguese = 0

OR

3.2. I've been living in Brazil for _____. (2,00)
a) Less than a month = 0,50
b) 1 to 2 months = 1,00
c) 3 to 6 months = 1,50
d) More than 6 months = 2,00
e) The listener does not speak Portuguese = 0

4. How long have you been talking to Brazilian Portuguese native speakers in English? (2,00)[56]

a) less than a month = 0,50
b) 1 to 3 months = 1,00
c) 3 to 6 months = 1,50
d) More than 6 months = 2,00

5. How many times have you heard Brazilian Portuguese native speakers talking in English? (1,00)

a) Only once = 0,25
b) A few times (less than 5) = 0,50
c) Some times (more than 5 and less than 15) = 0,75
d) Many times (more than 15) = 1,00

6. How often do you hear Brazilian Portuguese native speakers talking in English? (1,00)

a) Hardly ever (e.g., once a year) = 0,25
b) Sometimes (e.g., once a month) = 0,50

[56] This question received a higher value because listeners who have interacted for a longer time with Brazilians in English will probably be more used to their accent and therefore more aware of the pronunciation difficulties that these people face when learning the language.

c) At least once a week = 0,75
d) Very often (e.g., almost every day) = 1,00

7. Do you notice a difference in the way that Brazilian Portuguese speakers pronounce the words in English and the way that native English speakers do? (1,00)

( ) Yes = 1,00 ( ) No = 0

8. Do you consider yourself familiar with the Brazilian accent in English? (1,00)

( ) Yes = 1,00 ( ) No = 0

Appendix F
Results regarding NSE level of familiarity

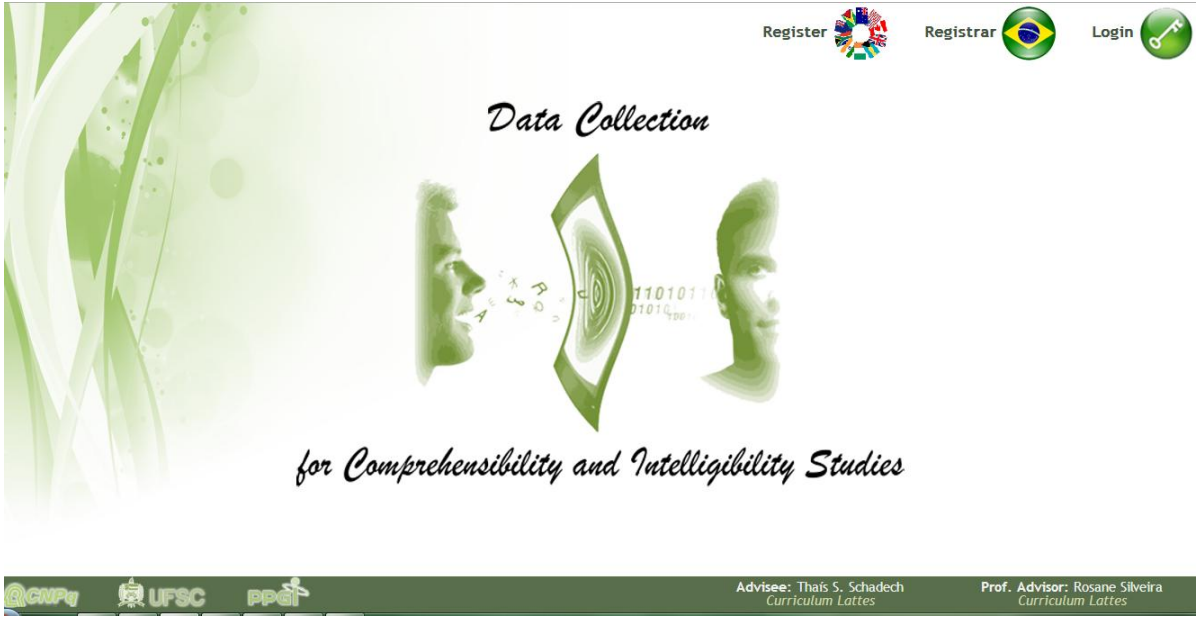
Listeners	Questions[57]								Total	Category
	1	2	3	4	5	6	7	8		
NListener3	1	1	2	2	1	1	1	1	10	Familiar
NListener4	1	1	2	2	1	0,75	1	1	9,75	Familiar
NListener5	1	1	2	2	1	1	1	1	10	Familiar
NListener6	0	0	0	2	1	1	1	1	6	Unfamiliar
NListener9	0	0	1	2	1	1	1	1	7	Familiar
NListener13	0,66	1	0	2	0,75	0,25	1	1	6,66	Unfamiliar
NListener16	0,66	1	1,5	2	1	0,75	1	1	8,91	Familiar
NListener18	1	1	2	2	1	1	1	1	10	Familiar
NListener21	0	0	0	0	0	0	0	0	0	Unfamiliar
NListener23	1	1	2	1,5	0,75	0,5	1	1	8,75	Familiar
NListener28	1	1	2	2	1	1	1	1	10	Familiar
NListener32	0	0	0	2	1	1	1	0	5	Unfamiliar
NListener38	0	0	0,5	2	1	1	1	1	6,5	Unfamiliar
NListener39	0,33	1	0	2	1	0,5	1	1	6,83	Unfamiliar
NListener42	0,66	1	2	2	1	1	1	1	9,66	Familiar
NListener43	0,33	1	2	2	1	1	1	1	9,33	Familiar
NListener47	1	1	1	2	1	1	1	1	9	Familiar
NListener49	0,33	1	0	2	1	0,5	1	1	6,83	Unfamiliar
NListener50	1	1	2	0,5	1	0,5	1	1	8	Familiar
NListener52	0	0	0	2	1	0,5	1	1	5,5	Unfamiliar
NListener53	0	0	0	0	0	0	0	0	0	Unfamiliar
NListener58	0	0	0	0	0	0	0	0	0	Unfamiliar
NListener59	0	0	0	0	0	0	0	0	0	Unfamiliar

[57] The questions and their alternatives can be visualized in APPENDIX E

NListener60	1	1	0,25	2	1	0,75	1	1	8	Familiar
NListener61	0	0	0	2	1	0,75	1	1	5,75	Unfamiliar
NListener69	0,33	1	0,25	2	1	0,75	1	1	8	Familiar
NListener71	0	0	0,25	2	1	1	1	0	5,25	Unfamiliar
NListener72	0	0	0	0	0	0	0	0	0	Unfamiliar

Appendix G

Homepage of the website *Comprehending L2 Speech*, designed for the research, available at www.comprehendingl2speech.com:



Appendix H

Speakers' Instrument

Home Logout

TERMO DE CONSENTIMENTO

Prezado Participante

Este questionário é parte de uma pesquisa de mestrado conduzida sob a supervisão da Professora Doutora Rosane Silveira, na Universidade Federal de Santa Catarina. Eu gostaria de convidá-lo para participar da coleta de dados desta pesquisa, cujo foco é na pronúncia. Os dados coletados servirão como base para a conclusão de minha dissertação, a ser defendida em dezembro de 2012. Mais informações sobre o estudo poderão ser fornecidas após a coleta de dados, de forma que as mesmas não influenciem as suas escolhas ao responder as perguntas.

É importante lembrar que a sua identidade não será revelada, bem como qualquer informação pessoal que possa identificá-lo. Caso você concorde em participar desta pesquisa, você será requisitado a: **1)** responder perguntas sobre alguns dados pessoais (ex.: idade, cidade onde reside, conhecimento de línguas estrangeiras, etc.) e **2)** ler 20 frases em inglês e 20 frases em português **(com gravação de áudio).** Primeiramente você terá tempo para ler sobre os procedimentos e clarificar qualquer dúvida que você venha a ter. Ao final da pesquisa/defesa da dissertação, os dados serão publicados (com a sua identidade protegida).

Agradeço desde já pela sua colaboração.

Atenciosamente,

Thaís Suzana Schadech

☐ Eu **concordo** em participar desta pesquisa e permito que o pesquisador utilize os dados por mim fornecidos.

Dados para Login

Por favor, crie um usuário e senha para que depois você possa logar e realizar as gravações das frases. O nome de usuário e a senha deve conter pelo menos 6 (seis) caracteres.

Nome de Usuário:

Senha:

Parte I - Dados Pessoais

1 - Nome completo:

2 - Data de nascimento:

3 - Email:

4 - Local de nascimento: Cidade Estado Pais

5 - Local onde morou maior parte do tempo: Cidade Estado Pais

6 - Local onde reside atualmente: Cidade Estado Pais

Parte II - Nível de Escolaridade

7 - Marque o nível de escolaridade completo caso não esteja mais estudando OU o tipo de curso que está cursando no momento.

- Ensino Médio
- EnsinoTécnico
- Graduação Incompleta (TRANCADA ou DESISTÊNCIA)
- Graduação em Andamento
- Graduação
- Especialização
- Mestrado
- Doutorado
- Pós-doutorado
- Outro

Defina o curso de acordo com a opção marcada: *(ex.: Administração, Téc. em Enfermagem)*

Parte III - Conhecimento de Línguas Estrangeiras

8 - Quais línguas você fala além do português? Digite as línguas por ordem de aprendizado e marque a alternativa que melhor representa seu nível de proficiência.

		Muito Bem	Bem	Razoavelmente
1:		○	○	○
2:		○	○	○
3:		○	○	○
4:		○	○	○
5:		○	○	○
6:		○	○	○

Parte IV - Leitura e Gravação das Frases

9 - Leia e grave as seguintes frases, tomando os seguintes cuidados: faça uma pausa entre a leitura das frases e, caso queira reformular a pronúncia de alguma palavra, você deverá dar uma pausa e ler a frase toda novamente.

1. She abandoned two rabbits.
2. I thought they were three.
3. Can you give me a rug?
4. The text is about radial development.
5. Do you ride in the countryside?
6. He is with Ms. Albert.
7. She rated his performance so bad!
8. This is such a tangle!
9. Did you see one or two rats?
10. I could hear the buzz.
11. Have you seen the roof?
12. This is faith.
13. Do you still have any ropes?
14. What does the word 'temple' mean?
15. Everything depends on the rank you choose.
16. We couldn't find any trays.
17. There used to be many racks in the office.
18. You made it worth it.
19. I'm talking about the rights.
20. What's the problem with your knees?

CONTINUAR

Parte V - Leia e grave as seguintes frases, tomando os seguintes cuidados: faça uma pausa entre a leitura das frases e, caso queira reformular a pronúncia de alguma palavra, você deverá dar uma pausa e ler a frase toda novamente.

1. Que cara é essa?
2. Ele é muito rico.
3. Esta é minha barraca.
4. A lua está bonita.
5. A jarra caiu.
6. Bati o carro.
7. Você recebeu a carta?
8. Era uma farsa.
9. Que dia lindo!
10. Comprei uma arara.
11. Fiz uma rima.
12. Nunca vi o mar.
13. Negócio fechado.
14. O bar fechou.
15. Odeio baratas.
16. Ela tem duas casas.
17. Quantos ratos!
18. Ele voltou a andar.
19. Ele tem uma harpa.
20. Que dia é hoje?

FINALIZAR

Appendix I

PPGI and Extra Instrument

TERMO DE CONSENTIMENTO

Prezado Participante

Este questionário é parte de uma pesquisa de mestrado conduzida sob a supervisão da Professora Doutora Rosane Silveira, na Universidade Federal de Santa Catarina. Eu gostaria de convidá-lo para participar da coleta de dados desta pesquisa, cujo foco é na pronúncia. Os dados coletados servirão como base para a conclusão de minha dissertação, a ser defendida em dezembro de 2012. Mais informações sobre o estudo poderão ser fornecidas após a coleta de dados, de forma que as mesmas não influenciem as suas escolhas ao responder as perguntas.

É importante lembrar que a sua identidade não será revelada, bem como qualquer informação pessoal que possa identificá-lo. Caso você concorde em participar desta pesquisa, você será requisitado a: **1)** responder perguntas sobre alguns dados pessoais (ex.: idade, cidade onde reside, conhecimento de línguas estrangeiras, etc.) e **2)** ouvir alguns arquivos de áudio e avaliá-los. Todo o procedimento demora aproximadamente uma hora. Primeiramente você terá tempo para ler sobre os procedimentos e clarificar qualquer dúvida que você venha a ter. Ao final da pesquisa/defesa da dissertação, os dados serão publicados (com a sua identidade protegida).

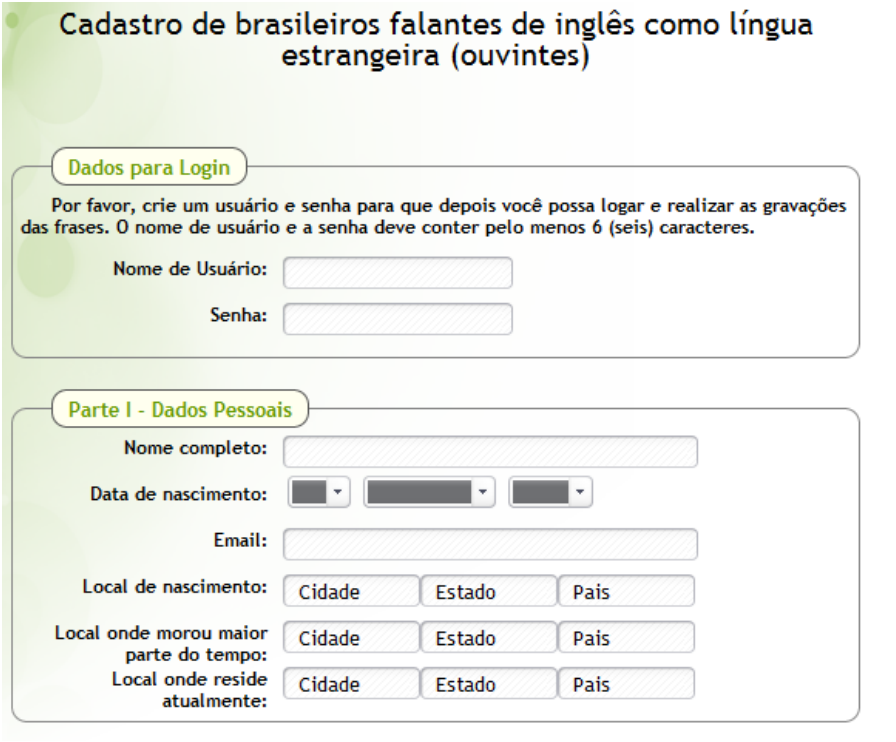
Agradeço desde já pela sua colaboração.

Atenciosamente,

Thaís Suzana Schadech

☐ Eu **concordo** em participar desta pesquisa e permito que o pesquisador utilize os dados por mim fornecidos.

CONCORDO NÃO CONCORDO


Cadastro de brasileiros falantes de inglês como língua estrangeira (ouvintes)
Dados para Login
Por favor, crie um usuário e senha para que depois você possa logar e realizar as gravações das frases. O nome de usuário e a senha deve conter pelo menos 6 (seis) caracteres.
Nome de Usuário:
Senha:
Parte I - Dados Pessoais
Nome completo:
Data de nascimento:
Email:
Local de nascimento:
Cidade
Estado
Pais
Local onde morou maior parte do tempo:
Cidade
Estado
Pais
Local onde reside atualmente:
Cidade
Estado
Pais

Parte II - Nível de Escolaridade

7 - Marque o nível de escolaridade completo caso não esteja mais estudando OU o tipo de curso que está cursando no momento.

- ○ Ensino Médio
- ○ EnsinoTécnico
- ○ Graduação Incompleta (TRANCADA ou DESISTÊNCIA)
- ○ Graduação em Andamento
- ○ Graduação
- ○ Especialização
- ○ Mestrado
- ○ Doutorado
- ○ Pós-doutorado
- ○ Outro

Defina o curso de acordo com a opção marcada: _____ *(ex.: Administração, Téc. em Enfermagem)*

Parte III - Conhecimento de Línguas Estrangeiras

8 - Quais línguas você fala além do português? Digite as línguas por ordem de aprendizado e marque a alternativa que melhor representa seu nível de proficiência.

		Muito Bem	Bem	Razoavelmente
1:		○	○	○
2:		○	○	○
3:		○	○	○
4:		○	○	○
5:		○	○	○
6:		○	○	○

Parte IV - Questionário para verificação de compreensibilidade e inteligibilidade

1 - Instruções

Você ouvirá várias frases em inglês lidas por diferentes falantes. Após ouvir a leitura de cada frase, você deverá seguir os seguintes passos, conforme o exemplo abaixo:

2 - Exemplo:

1) Preencha o espaço em branco com a palavra que você ouviu (para ouvir o áudio, clique no ícone abaixo):

Scarlett is _____ years old.

RESPOSTA: Scarlett is twelve years old.

Atenção: Você poderá ouvir o arquivo de áudio somente duas vezes!

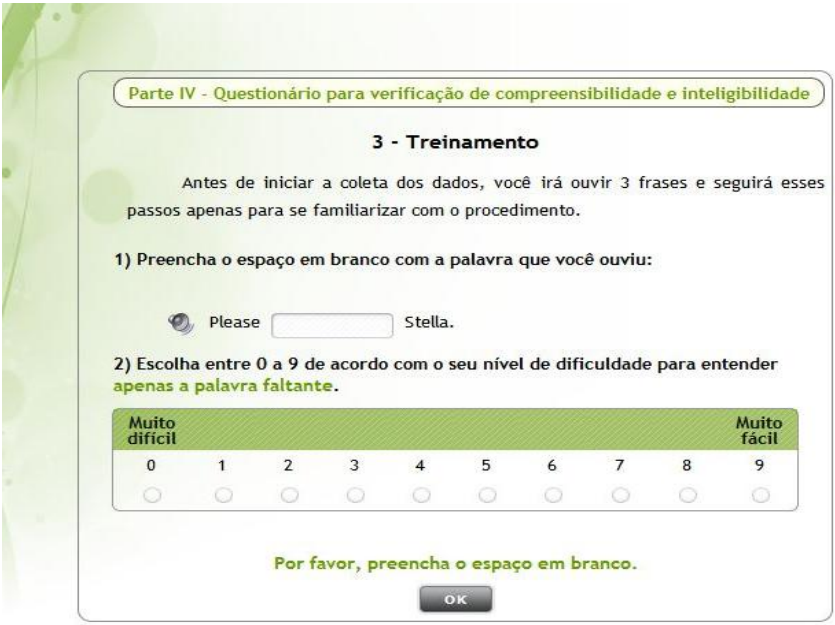
2) Escolha entre 0 a 9 de acordo com o seu nível de dificuldade para entender apenas a palavra faltante.

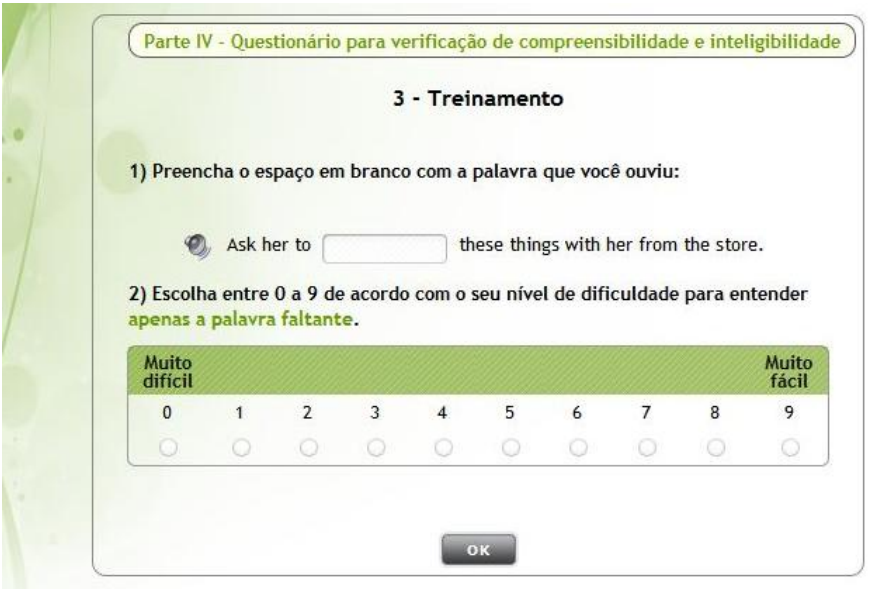
Muito difícil									Muito fácil
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

Atenção: Você não poderá deixar o espaço em branco e/ou deixar de marcar um número na escala antes de passar para a frase seguinte.

3) Certifique-se de ter clicado na classificação de sua escolha e clique em OK para passar para a próxima frase.

OK


Parte IV - Questionário para verificação de compreensibilidade e inteligibilidade
3 - Treinamento
Antes de iniciar a coleta dos dados, você irá ouvir 3 frases e seguirá esses passos apenas para se familiarizar com o procedimento.
1) Preencha o espaço em branco com a palavra que você ouviu:
Please
Stella.
2) Escolha entre 0 a 9 de acordo com o seu nível de dificuldade para entender apenas a palavra faltante.
Muito difícil
Muito fácil
0 1 2 3 4 5 6 7 8 9
Por favor, preencha o espaço em branco.
OK


Parte IV - Questionário para verificação de compreensibilidade e inteligibilidade
3 - Treinamento
1) Preencha o espaço em branco com a palavra que você ouviu:
Ask her to
these things with her from the store.
2) Escolha entre 0 a 9 de acordo com o seu nível de dificuldade para entender apenas a palavra faltante.
Muito difícil
Muito fácil
0 1 2 3 4 5 6 7 8 9
OK

Parte IV - Questionário para verificação de compreensibilidade e inteligibilidade

3 - Treinamento

1) Preencha o espaço em branco com a palavra que você ouviu:

And we will go meet her _____ at the train station.

2) Escolha entre 0 a 9 de acordo com o seu nível de dificuldade para entender apenas a palavra faltante.

Muito difícil									Muito fácil
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

OK

Aviso

Leia antes de prosseguir

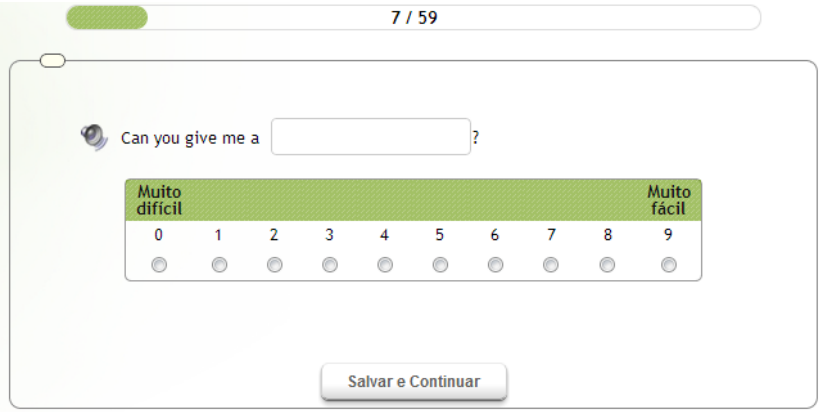
Você ouvirá várias frases em inglês lidas por diferentes falantes. Após ouvir a leitura de cada frase, você deverá seguir os passos apresentados anteriormente.

É importante lembrar que só será possível ouvir o áudio de cada frase duas vezes.

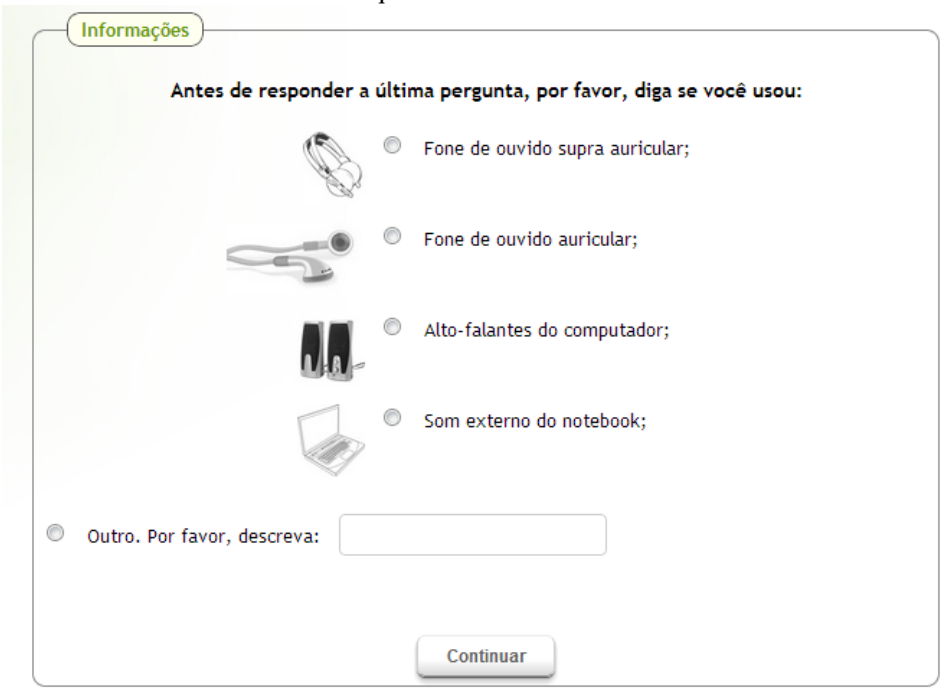
Caso aconteça algum problema enquanto você estiver avaliando os áudios, tudo o que já havia sido respondido **não será perdido**. Basta efetuar o login novamente e você será automaticamente redirecionado para continuar de onde parou.

CONTINUAR

Example of a screen from the intelligibility and comprehensibility test:



After hearing to all the recordings, the listeners were asked to answer 2 questions:



Parte V - Pronúncia

Abaixo são apresentados alguns sons e pares de sons que geralmente não são pronunciados corretamente por pessoas aprendendo a falar inglês. Assinale o grau até o qual você acredita que esses erros de pronúncia dificultam a compreensão da fala dos brasileiros de acordo com a escala abaixo:

a) Pronúncia do "th" (ex.: think, brother):

Dificulta muito a compreensão									Não dificulta a compreensão
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

b) Pronúncia das vogais em geral (ex.: bed, bad):

Dificulta muito a compreensão									Não dificulta a compreensão
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

c) Pronúncia do "r" (ex.: river, car):

Dificulta muito a compreensão									Não dificulta a compreensão
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

d) Pronúncia das consoantes nasais (ex.: seem, sing):

Dificulta muito a compreensão									Não dificulta a compreensão
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

e) Pronúncia do "ch" e "sh" (ex.: cheap, sheep):

Dificulta muito a compreensão									Não dificulta a compreensão
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

f) Pronúncia do "l" (ex.: well, fall):

Dificulta muito a compreensão									Não dificulta a compreensão
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

g) Pronúncia do "s" e "z" (ex.: muscle, muzzle.)

Dificulta muito a compreensão									Não dificulta a compreensão
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

h) Além desses, existe algum outro som que você acha que representa uma dificuldade para os brasileiros aprendizes de inglês e que torna a fala deles mais difícil de entender? Exemplifique com ao menos uma palavra.

Salvar e Continuar

Appendix J

NSE Instrument

CONSENT FORM

Dear Participant

This questionnaire is part of a Master's study that I have been carrying out under the supervision of Professor Dr. Rosane Silveira at Universidade Federal de Santa Catarina (Federal University of Santa Catarina), Brazil. **I would like to invite you to participate in the data collection process of this study.** The research focus is on pronunciation, and the conclusion of this study will form the basis of my thesis to be defended in December 2012. More information about the research can be provided after the data has been collected, so as not to influence your decisions in answering the questions that follow.

Your identity, as well as any personal information that could be used to identify you, will remain confidential. If you agree to take part in this study, you will be asked to **1)** answer a questionnaire about your personal details (e.g.: age, place of residence, knowledge of foreign languages, etc.); **2)** listen to some audio files and evaluate them; and **3)** answer a final question about pronunciation problems that may hinder your understanding. The whole procedure is estimated to take about forty minutes. First, you will have time to read about the procedures and clarify any doubts you might have about them. The results of this research will be made public.

Thank you in advance.

Sincerely,

Thaís Suzana Schadech

☐ **I agree/disagree** to take part in this research study and I allow the researcher to use the data that I will provide.

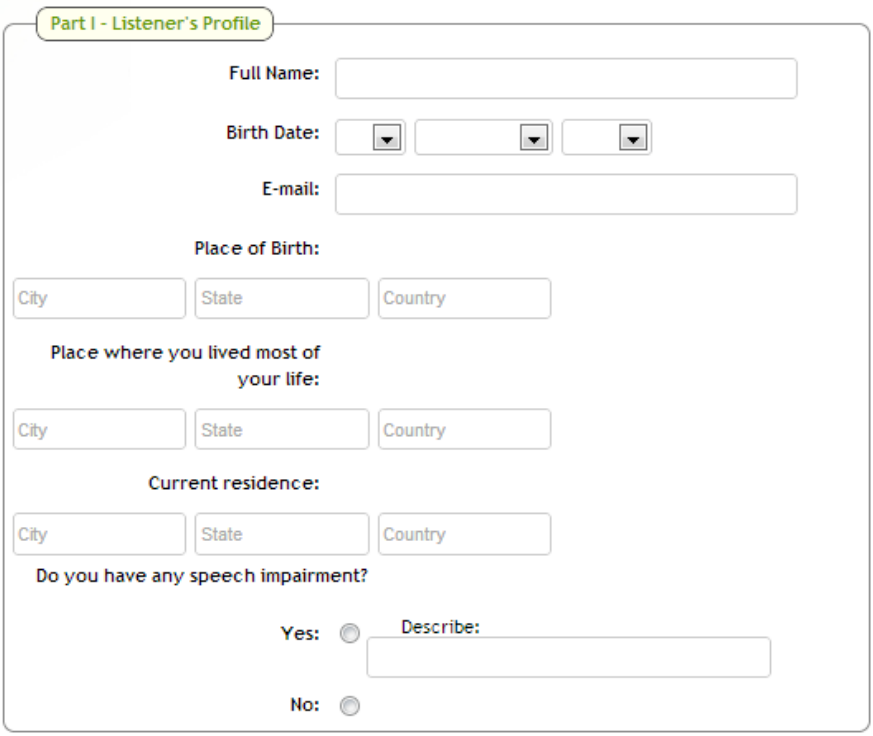
I Agree | I Disagree

Login

Please, create an username and a password for you to log in later on. ATTENTION! Your username must contain at least 6 digits, and it must not contain any spaces, special characters, or accents on letters.

Username:

Password:


Part I - Listener's Profile
Full Name:
Birth Date:
E-mail:
Place of Birth:
City
State
Country
Place where you lived most of your life:
City
State
Country
Current residence:
City
State
Country
Do you have any speech impairment?
Yes:
Describe:
No:

Part II - Level of Education

Please mark the level of education completed in case you are not a student anymore OR the type of course you are currently taking:

- ○ High School Graduation
- ○ Tech School Graduation
- ○ Some College - DROP-OUT
- ○ Some College IN PROGRESS
- ○ College Degree
- ○ Specialization
- ○ Master's Degree
- ○ Doctoral Degree
- ○ Postdoctoral Degree
- ○ Other

Write down the course according to the alternative you marked above: _____ *(e.g.: Law, computer technician)*

Part III - Knowledge of Foreign Languages

Do you speak other languages besides English?

Yes: ◉ No: ○

Please list the other languages you speak in the order you have learned them and mark the option that corresponds to your proficiency level in each language:

		Very Good	Good	Not so Good
1:		○	○	○
2:		○	○	○
3:		○	○	○
4:		○	○	○
5:		○	○	○
6:		○	○	○

Is any of the languages you listed above Portuguese?

Yes: ◉ No: ○

- ○ Brazilian Portuguese
- ○ European Portuguese
- ○ Other. Please, describe:

Part IV - Familiarity with Brazilians and with the Brazilian accent in English

How long have you been studying/speaking Portuguese?

- ○ Less than a month
- ○ 1 to 3 months
- ○ 3 to 6 months
- ○ More than 6 months

Have you ever been to Brazil?

Yes: ◉ No: ○

For how long?

☐ I've been to Brazil [ ] time(s).

☐ I've been living in Brazil for [ ]

Have you ever heard a Brazilian Portuguese native speaker talking in English?

Yes: ◉ No: ○

How long have you been talking to Brazilian Portuguese native speakers in English?

○ Less than a month

○ 1 to 3 months

○ 3 to 6 months

○ More than 6 months

How many times have you heard Brazilian Portuguese native speakers talking in English?

- ○ Only once
- ○ a few times (less than 5);
- ○ some times (more than 5 and less than 15);
- ○ many times (more than 15);

How often do you hear Brazilian Portuguese native speakers talking in English?

- ○ Hardly ever (e.g. once a year);
- ○ Sometimes (e.g. once a month);
- ○ At least once a week;
- ○ Very often (e.g. almost every day);

Do you notice a difference in the way that Brazilian Portuguese speakers pronounce the words in English and the way that native English speakers do?

Yes: ◉ No: ○

Do you consider yourself familiar with the Brazilian accent in English?

Yes: ◉ No: ○

Submit

Part IV - Questionnaire for Intelligibility and Comprehensibility Verification

1 - Instructions

You will listen to different speakers reading several sentences in English. Then you will be asked to follow some steps according to the example below:

2 - Example:

1) Fill in the gap with the word you heard (to listen to the audio file, please click on the icon bellow):

Scarlett is _____ years old.

RESPONSE: Scarlett is twelve years old.

Attention: You can only play the audio file twice!

2) Choose from 0 to 9 according to the level of difficulty to understand the missing word:.

Very difficult									Very easy
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

Attention: You cannot leave a blank space and you must choose a number from the scale before moving on to the next sentence.

3) Be sure you selected a number from the scale and then click on OK to go to the next sentence.

Save and Continue

Part IV - Questionnaire for Intelligibility and Comprehensibility Verification

3 - Training Session

Before starting the data collection process itself, you will be asked to listen to three sentences and follow the steps presented above, in order to familiarize yourself with the process.

1) Fill in the gap with the word you heard:

Please _____ Stella.

2) Choose from 0 to 9 according to the level of difficulty to understand the missing word:.

Very difficult									Very easy
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

Save and Continue

Part IV - Questionnaire for Intelligibility and Comprehensibility Verification

3 - Training Session

1) Fill in the gap with the word you heard:

Ask her to _____ these things with her from the store.

2) Choose from 0 to 9 according to the level of difficulty to understand the missing word:.

Very difficult									Very easy
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

Save and Continue

Part IV - Questionnaire for Intelligibility and Comprehensibility Verification

3 - Training Session

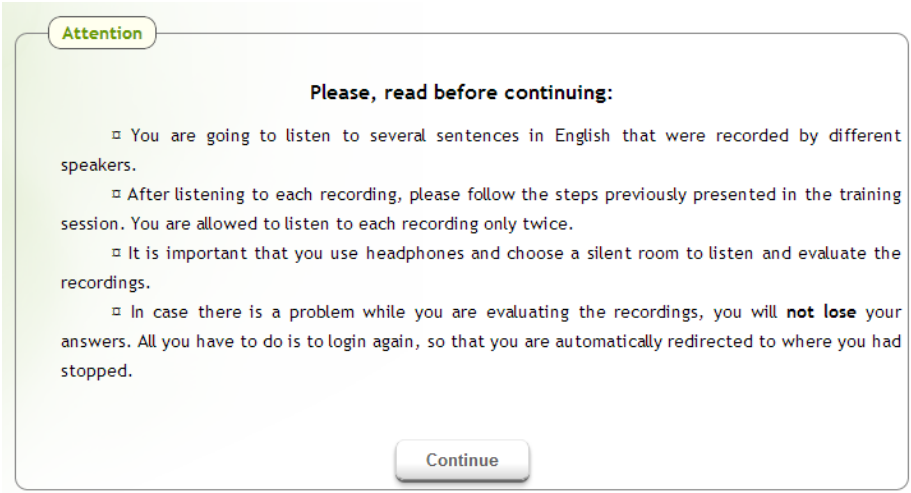
1) Fill in the gap with the word you heard:

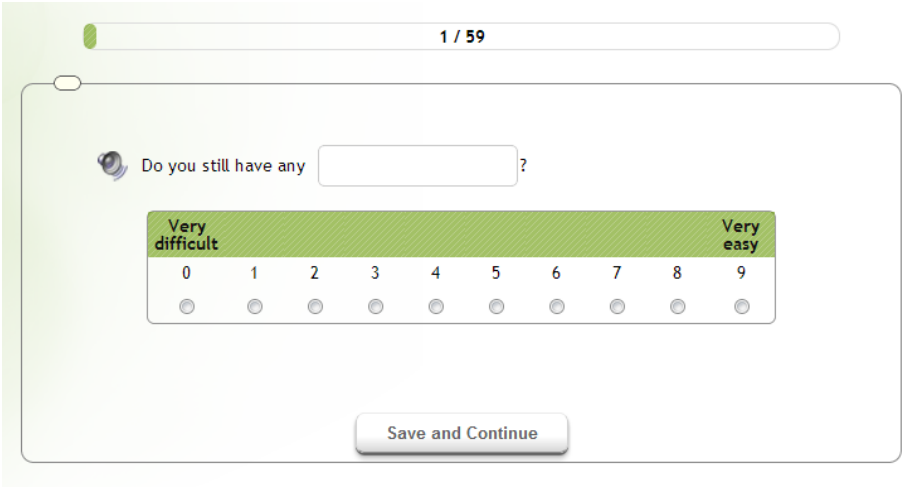
And we will go meet her _____ at the train station.

2) Choose from 0 to 9 according to the level of difficulty to understand the missing word:.

Very difficult									Very easy
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

Save and Continue


Attention
Please, read before continuing:
¤ You are going to listen to several sentences in English that were recorded by different speakers.
¤ After listening to each recording, please follow the steps previously presented in the training session. You are allowed to listen to each recording only twice.
¤ It is important that you use headphones and choose a silent room to listen and evaluate the recordings.
¤ In case there is a problem while you are evaluating the recordings, you will not lose your answers. All you have to do is to login again, so that you are automatically redirected to where you had stopped.
Continue


1 / 59
Do you still have any ?
Very difficult
Very easy
0 1 2 3 4 5 6 7 8 9
Save and Continue

Information

Before you move on to the last question, please tell if you used:

Headphones;

Earphones;

Computer speakers;

Notebook external sound;

Other. Please, explain:

Continue

Part V - Pronunciation

a) Pronunciation of "th" (e.g.: think, brother):

It hinders a lot									It is does not hinder
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

b) Pronunciation of vowels in general (e.g.: bed, bad):

It hinders a lot									It is does not hinder
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

c) Pronunciation of "r" (e.g.: river, car):

It hinders a lot									It is does not hinder
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

d) Pronunciation of nasal consonants (e.g.: seem, sing):

It hinders a lot									It is does not hinder
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

e) Pronunciation of "ch" and "sh" (e.g.: cheap, sheep):

It hinders a lot									It is does not hinder
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

f) Pronunciation of "l" (e.g.: well, fall):

It hinders a lot									It is does not hinder
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

f) Pronunciation of "l" (e.g.: well, fall):

It hinders a lot									It is does not hinder
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

g) Pronunciation of "s" and "z" (e.g.: muscle, muzzle.)

It hinders a lot									It is does not hinder
0	1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○	○

h) Besides these mispronunciations, are there any others you think that hinder your understanding of Brazilians' speech? Please demonstrate using at least one word that exemplifies the mispronunciation:

Save and Continue

Appendix K
Chi-square Results

1) Results reported in Table 4 (p. 11)

a) Recording of 'ropes' pronounced as [houps] by Speaker 39

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5,167[a]	4	,271
Likelihood Ratio	7,037	4	,134
Linear-by-Linear Association	2,000	1	,157
N of Valid Cases	73		

a. 3 cells (33,3%) have expected count less than 5. The minimum expected count is 1,73.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,266	,271
	Cramer's V	,188	,271
	N of Valid Cases	73	

b) Recording of ‘ropes’ pronounced as [houps] by Speaker 16

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	,043[a]	2	,979
Likelihood Ratio	,043	2	,979
Linear-by-Linear Association	,013	1	,909
N of Valid Cases	73		

a. 3 cells (50,0%) have expected count less than 5. The minimum expected count is ,86.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,024	,979
	Cramer's V	,024	,979
	N of Valid Cases	73	

2) Results reported in Table 5 (p. 14)

a) Recording of 'rug' pronounced as [hʌg] by Speaker 35

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9,920[a]	4	,042
Likelihood Ratio	10,199	4	,037
Linear-by-Linear Association	,147	1	,702
N of Valid Cases	73		

a. 6 cells (66,7%) have expected count less than 5. The minimum expected count is ,29.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,369	,042
	Cramer's V	,261	,042
	N of Valid Cases	73	

b) Recording of 'rug' pronounced as [hʌg] by Speaker 10

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13,291[a]	4	,010
Likelihood Ratio	13,407	4	,009
Linear-by-Linear Association	,001	1	,977
N of Valid Cases	73		

a. 6 cells (66,7%) have expected count less than 5. The minimum expected count is ,58.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,427	,010
	Cramer's V	,302	,010
	N of Valid Cases	73	

c) Recording of 'rug' pronounced as [hʌg] by Speaker 17

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7,747[a]	4	,101
Likelihood Ratio	7,801	4	,099
Linear-by-Linear Association	,001	1	,970
N of Valid Cases	73		

a. 6 cells (66,7%) have expected count less than 5. The minimum expected count is ,29.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,326	,101
	Cramer's V	,230	,101
	N of Valid Cases	73	

3) Results reported in Table 6 (p. 16)

a) Recording of 'rated' pronounced as [ˈheɪtɪt] by Speaker 16

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2,511[a]	2	,285
Likelihood Ratio	2,527	2	,283
Linear-by-Linear Association	,004	1	,948
N of Valid Cases	73		

a. 3 cells (50,0%) have expected count less than 5. The minimum expected count is ,29.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,185	,285
	Cramer's V	,185	,285
	N of Valid Cases	73	

b) Recording of ‘rated’ pronounced as [ˈheɪtɪt] by Speaker 07

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2,511[a]	2	,285
Likelihood Ratio	2,527	2	,283
Linear-by-Linear Association	,004	1	,948
N of Valid Cases	73		

a. 3 cells (50,0%) have expected count less than 5. The minimum expected count is ,29.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,185	,285
	Cramer's V	,185	,285
	N of Valid Cases	73	

4) Results reported in Table 7 (p. 18)

a) Recording of 'rabbits' pronounced as [ˈhæbɪts] by Speaker 16

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15,758[a]	2	,000
Likelihood Ratio	18,813	2	,000
Linear-by-Linear Association	2,037	1	,154
N of Valid Cases	73		

a. 2 cells (33,3%) have expected count less than 5. The minimum expected count is 4,32.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,465	,000
	Cramer's V	,465	,000
	N of Valid Cases	73	

b) Recording of 'rabbits' pronounced as [ˈhæbɪts] by Speaker 07

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13,068[a]	4	,011
Likelihood Ratio	13,226	4	,010
Linear-by-Linear Association	,182	1	,670
N of Valid Cases	73		

a. 5 cells (55,6%) have expected count less than 5. The minimum expected count is ,29.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,423	,011
	Cramer's V	,299	,011
	N of Valid Cases	73	

Appendix L

Intra-rater reliability with listeners' rates for the repeated recording of the word 'ropes' per group

1) PPGI listeners' rates to 'ropes' pronounced as [hoʊps]

PPGI Listeners	'Ropes' pronounced as [hoʊps] by Speaker 36 Time 1	'Ropes' pronounced as [hoʊps] by Speaker 36 Time 2
Listener03	9	9
Listener04	8	9
Listener05	8	7
Listener08	8	8
Listener10	9	7
Listener11	9	9
Listener12	9	9
Listener13	4	5
Listener15	1	3
Listener16	7	6
Listener21	2	3
Listener25	9	8
Listener39	7	1
Listener49	9	9
Listener50	8	8
Listener51	9	9
Listener52	4	7
Listener54	5	7
Listener56	6	5
Listener62	8	9
Listener64	7	9
Listener68	7	9
Listener71	9	9
Listener75	7	7

2) Extra listeners' rates to 'ropes' pronounced as [hoʊps]

Extra Listeners	**'Ropes' pronounced as [houps] by Speaker 36 Time 1**	**'Ropes' pronounced as [houps] by Speaker 36 Time 2**
Listener23	**3**	2
Listener24	6	4
Listener26	9	9
Listener27	9	9
Listener29	6	8
Listener32	9	9
Listener33	7	5
Listener41	6	3
Listener43	5	4
Listener44	9	9
Listener45	7	7
Listener47	7	8
Listener58	7	7
Listener59	3	5
Listener60	9	8
Listener63	9	9
Listener65	9	8
Listener67	8	8
Listener69	5	6
Listener72	0	2
Listener74	9	9

3) NSE listeners' rates to 'ropes' pronounced as [houps]

NSE Listeners	'Ropes' pronounced as [houps] by Speaker 36 Time 1	'Ropes' pronounced as [houps] by Speaker 36 Time 2
NListener03	**1**	0
NListener04	7	5
NListener05	8	8
NListener06	7	7
NListener09	6	8
NListener13	8	7
NListener16	5	6
NListener18	7	8
NListener21	2	5
NListener23	6	6
NListener28	6	6
NListener32	9	9
NListener38	6	5
NListener39	0	0
NListener42	8	8
NListener43	6	5
NListener47	9	9
NListener49	8	8
NListener50	0	0
NListener52	6	4
NListener53	9	9
NListener58	7	8
NListener59	7	8
NListener60	7	6
NListener61	6	6
NListener69	7	5
NListener71	2	6
NListener72	8	9

Appendix M
Reliability – Cronbach's alpha results

Warnings

For split file Groups=PPGI - Listener, the determinant of the covariance matrix is zero or approximately zero. Statistics based on its inverse matrix cannot be computed and they are displayed as system missing values.

For split file Groups=Extra - Listener, the determinant of the covariance matrix is zero or approximately zero. Statistics based on its inverse matrix cannot be computed and they are displayed as system missing values.

1) Groups = Extra

a) Case Processing Summary[b]

		N	%
Cases	Valid	21	100,0
	Excluded[a]	0	,0
	Total	21	100,0

a. Listwise deletion based on all variables in the procedure.

b) Reliability Statistics[a]

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,881	,887	26

c) Summary Item Statistics[a]

	Mean	Min.	Max.	Range	Max. / Min.	Variance	N of Items
Item Variances	5,414	,757	12,148	11,390	16,044	6,136	26
Inter-Item Correlations	,231	-,493	,861	1,355	-1,746	,078	26

d) Item-Total Statistics[a]

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Hated1C	171,52	904,062	,304	.	,880
Hopes1C	175,33	914,833	-,012	.	,890
Hug1C	172,52	910,662	,086	.	,883
Hopes2C	173,19	852,662	,426	.	,877
Hug2C	171,81	920,762	-,021	.	,884
Habits1C	173,14	860,529	,350	.	,879
Hated2C	174,05	861,748	,373	.	,879
Hopes2_1C	173,33	853,933	,427	.	,877
Hug3C	172,90	883,690	,234	.	,882
Habits2C	174,00	861,300	,390	.	,878
Ropes1C	173,62	814,948	,652	.	,871
Rug1C	172,95	874,748	,257	.	,882
Rabbits1C	172,38	854,648	,481	.	,876
Rug2C	173,86	797,429	,654	.	,870
Rated1C	174,57	852,257	,277	.	,884
Rabbits2C	172,48	829,062	,622	.	,872
Rug3C	172,57	816,757	,779	.	,868
Rated2C	172,90	847,590	,400	.	,878
Rated3C	172,43	822,357	,715	.	,870
Rabbits3C	172,14	863,529	,547	.	,875
Rug4C	173,10	813,690	,772	.	,868
Ropes2C	172,48	843,162	,697	.	,872
Ropes3C	174,05	853,248	,529	.	,875
Rabbits1_2C	171,76	877,290	,500	.	,877
Rated4C	172,71	822,314	,699	.	,870
Ropes4C	173,00	831,500	,604	.	,873

e) Intraclass Correlation Coefficient[d]

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	,222[b]	,129	,391	8,403	20	500	,000
Average Measures	,881[c]	,793	,943	8,403	20	500	,000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b. The estimator is the same, whether the interaction effect is present or not.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

1) Group = PPGI

a) Case Processing Summary[b]

		N	%
Cases	Valid	24	100,0
	Excluded[a]	0	,0
	Total	24	100,0

a. Listwise deletion based on all variables in the procedure.

b) Reliability Statistics[a]

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,880	,888	26

c) Summary Item Statistics[a]

	Mean	Min.	Max.	Range	Maximum / Minimum	Variance	N of Items
Item Variances	4,380	,476	8,810	8,333	18,490	6,090	26
Inter-Item Correlations	,233	-,409	,871	1,280	-2,132	,057	26

d) Item-Total Statistics[a]

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Hated1C	175,79	738,868	-,027	.	,883
Hopes1C	179,62	734,245	-,023	.	,891
Hug1C	175,67	721,362	,447	.	,878
Hopes2C	177,33	669,014	,541	.	,873
Hug2C	175,75	719,761	,407	.	,878
Habits1C	176,92	667,036	,652	.	,870
Hated2C	177,75	680,543	,389	.	,877
Hopes2_1C	177,21	669,911	,537	.	,873
Hug3C	176,37	701,810	,486	.	,875
Habits2C	177,75	712,804	,174	.	,882
Ropes1C	178,25	707,500	,140	.	,887
Rug1C	176,87	708,114	,329	.	,878
Rabbits1C	176,12	730,810	,117	.	,881
Rug2C	178,67	655,188	,563	.	,872
Rated1C	177,17	688,754	,479	.	,875
Rabbits2C	176,92	686,949	,459	.	,875
Rug3C	177,67	633,710	,750	.	,866
Rated2C	177,58	641,384	,740	.	,866
Rated3C	176,96	686,042	,494	.	,874
Rabbits3C	176,71	694,650	,369	.	,877
Rug4C	177,62	637,027	,873	.	,863
Ropes2C	178,08	642,949	,655	.	,869
Ropes3C	179,50	674,261	,427	.	,876
Rabbits1_2C	176,42	695,732	,653	.	,873
Rated4C	176,54	705,129	,455	.	,876
Ropes4C	178,12	632,375	,715	.	,866

e) Intraclass Correlation Coefficient[d]

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	,219[b]	,132	,373	8,306	23	575	,000
Average Measures	,880[c]	,798	,939	8,306	23	575	,000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b. The estimator is the same, whether the interaction effect is present or not.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

2) NSE Group

a) Case Processing Summary[b]

		N	%
Cases	Valid	28	100,0
	Excluded[a]	0	,0
	Total	28	100,0

a. Listwise deletion based on all variables in the procedure.

b) Reliability Statistics[a]

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,921	,931	26

c) Summary Item Statistics[a]

	Mean	Minimum	Maximum	Range	Maximum / Minimum	Variance	N of Items
Item Variances	3,246	,935	8,258	7,323	8,830	5,059	26
Inter-Item Correlations	,342	-,128	,862	,990	-6,720	,032	26

d) Item-Total Statistics[a]

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Hated1C	178,11	697,210	,477	,985	,919
Hopes1C	181,14	643,757	,597	,922	,918
Hug1C	178,39	675,210	,513	,989	,919
Hopes2C	179,71	647,249	,636	,990	,917
Hug2C	177,54	703,443	,535	,983	,919
Habits1C	180,14	669,831	,604	,991	,917
Hated2C	179,29	655,323	,721	,995	,915
Hopes2_1C	179,61	661,877	,523	,989	,919
Hug3C	178,71	664,878	,738	,965	,915
Habits2C	181,18	654,226	,518	,989	,920
Ropes1C	177,54	704,480	,550	,997	,919
Rug1C	177,79	701,656	,583	,977	,918
Rabbits1C	177,54	711,517	,373	,979	,921
Rug2C	179,21	658,989	,629	,957	,917
Rated1C	178,21	685,582	,567	,930	,918
Rabbits2C	177,86	703,164	,561	,990	,919
Rug3C	177,82	698,152	,634	,957	,918
Rated2C	177,36	689,423	,645	,987	,917
Rated3C	177,64	709,571	,451	,894	,920
Rabbits3C	177,39	723,433	,215	,982	,922
Rug4C	178,61	684,618	,697	,980	,916
Ropes2C	178,07	703,328	,482	,956	,919
Ropes3C	180,36	660,905	,687	,992	,915
Rabbits1_2C	177,86	702,720	,445	,991	,920
Rated4C	177,46	706,406	,608	,973	,919
Ropes4C	178,32	693,411	,484	,959	,919

e) Intraclass Correlation Coefficient[d]

	Intraclass Correlation[a]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	,310[b]	,208	,466	12,685	27	675	,000
Average Measures	,921[c]	,872	,958	12,685	27	675	,000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. Type C intraclass correlation coefficients using a consistency definition-the between-measure variance is excluded from the denominator variance.

b. The estimator is the same, whether the interaction effect is present or not.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Appendix N
Frequency and means of comprehensibility scores for the NSE productions (inter-rater reliability)

1) Group = PPGI

a) Statistics

		Ropes	Rug	Rated	Rabbits
N	Valid	24	24	24	24
	Missing	0	0	0	0
	Mean	6,12	6,71	6,79	7,67
	Minimum	0	2	0	0
	Maximum	9	9	9	9

Frequency Table

Ropes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	2	8,3	8,3	8,3
	1	1	4,2	4,2	12,5
	2	1	4,2	4,2	16,7
	4	1	4,2	4,2	20,8
	5	5	20,8	20,8	41,7
	6	1	4,2	4,2	45,8
	7	2	8,3	8,3	54,2
	8	4	16,7	16,7	70,8
	9	7	29,2	29,2	100,0
	Total	24	100,0	100,0	

Rug

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	2	8,3	8,3	8,3
	3	3	12,5	12,5	20,8
	4	1	4,2	4,2	25,0
	5	1	4,2	4,2	29,2
	6	3	12,5	12,5	41,7
	7	1	4,2	4,2	45,8
	8	3	12,5	12,5	58,3
	9	10	41,7	41,7	100,0
	Total	24	100,0	100,0	

Rated

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	4,2	4,2	4,2
	3	1	4,2	4,2	8,3
	4	3	12,5	12,5	20,8
	5	1	4,2	4,2	25,0
	6	3	12,5	12,5	37,5
	7	4	16,7	16,7	54,2
	8	2	8,3	8,3	62,5
	9	9	37,5	37,5	100,0
	Total	24	100,0	100,0	

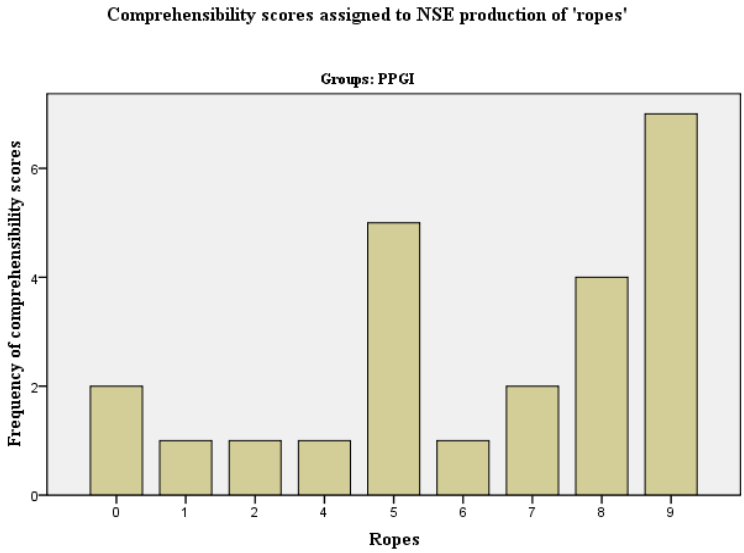
Rabbits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	4,2	4,2	4,2
	4	1	4,2	4,2	8,3
	6	1	4,2	4,2	12,5
	7	4	16,7	16,7	29,2
	8	7	29,2	29,2	58,3
	9	10	41,7	41,7	100,0

Rug

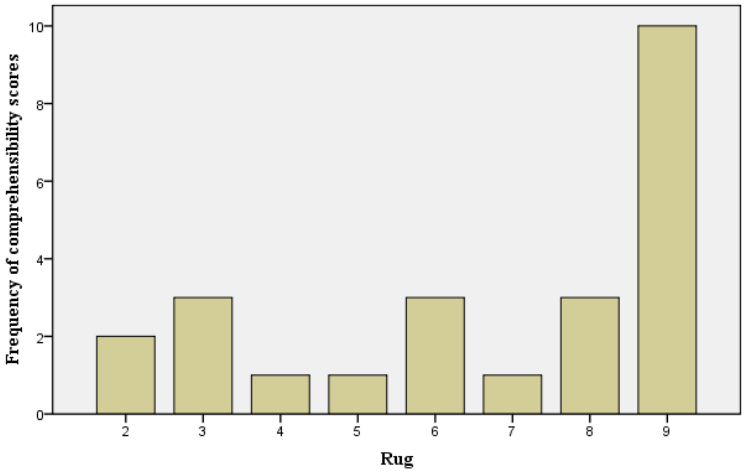
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	2	8,3	8,3	8,3
	3	3	12,5	12,5	20,8
	4	1	4,2	4,2	25,0
	5	1	4,2	4,2	29,2
	6	3	12,5	12,5	41,7
	7	1	4,2	4,2	45,8
	8	3	12,5	12,5	58,3
	9	10	41,7	41,7	100,0
	Total	24	100,0	100,0	

a) Bar Charts



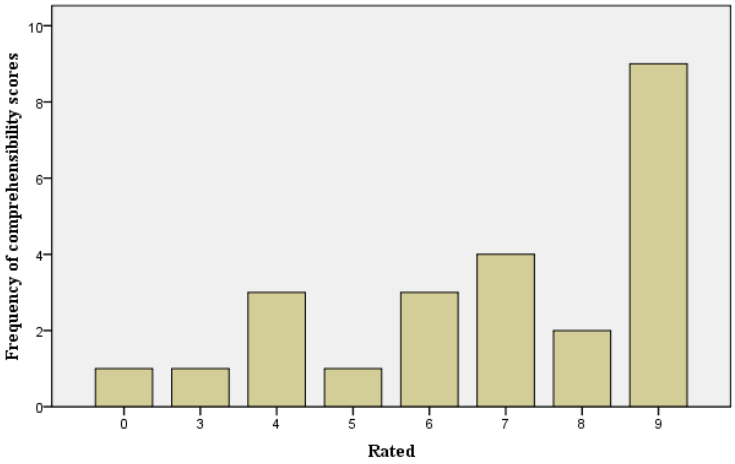
Comprehensibility scores assigned to NSE production of 'rug'

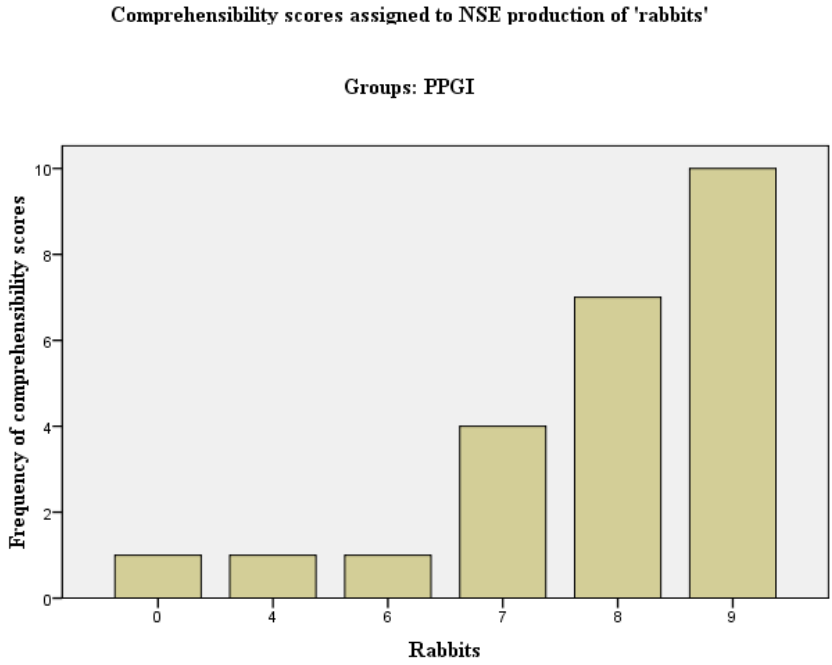
Groups: PPGI



Comprehensibility scores assigned to NSE production of 'rated'

Groups: PPGI





2) Group = Extra

a) Statistics

		Ropes1C	Rug3C	Rated2C	Rabbits3C
N	Valid	21	21	21	21
	Missing	0	0	0	0
	Mean	6,33	7,38	7,05	7,81
	Minimum	0	2	0	2
	Maximum	9	9	9	9

b) Frequency Tables

Ropes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	4,8	4,8	4,8
	1	1	4,8	4,8	9,5
	4	3	14,3	14,3	23,8
	5	2	9,5	9,5	33,3
	6	3	14,3	14,3	47,6
	7	2	9,5	9,5	57,1
	8	3	14,3	14,3	71,4
	9	6	28,6	28,6	100,0
	Total	21	100,0	100,0	

Rug

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	4,8	4,8	4,8
	3	1	4,8	4,8	9,5
	4	2	9,5	9,5	19,0
	6	1	4,8	4,8	23,8
	7	1	4,8	4,8	28,6
	8	6	28,6	28,6	57,1
	9	9	42,9	42,9	100,0
	Total	21	100,0	100,0	

Rated

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	2	9,5	9,5	9,5
	3	1	4,8	4,8	14,3
	6	3	14,3	14,3	28,6
	7	2	9,5	9,5	38,1
	8	4	19,0	19,0	57,1
	9	9	42,9	42,9	100,0
	Total	21	100,0	100,0	

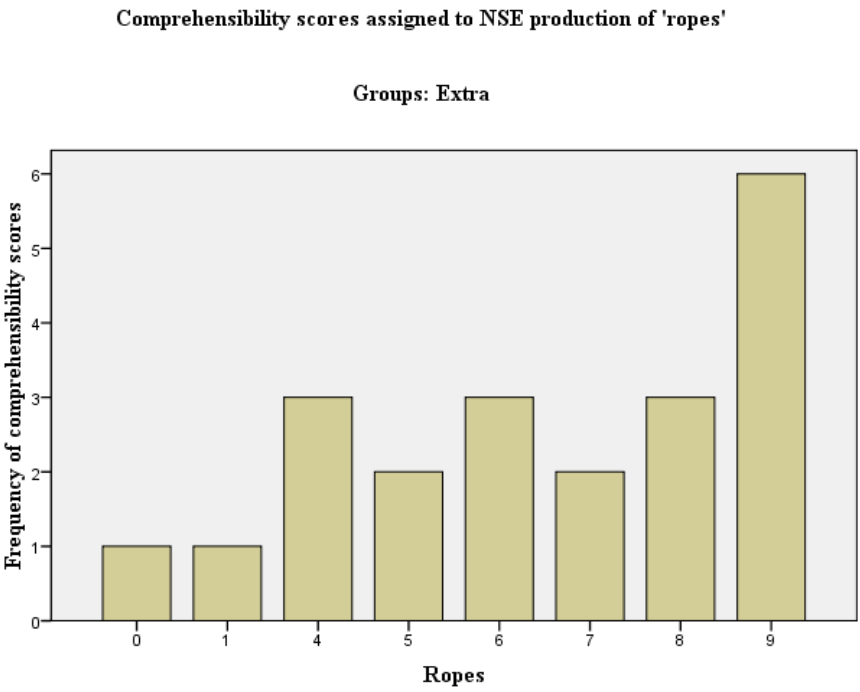
Ropes

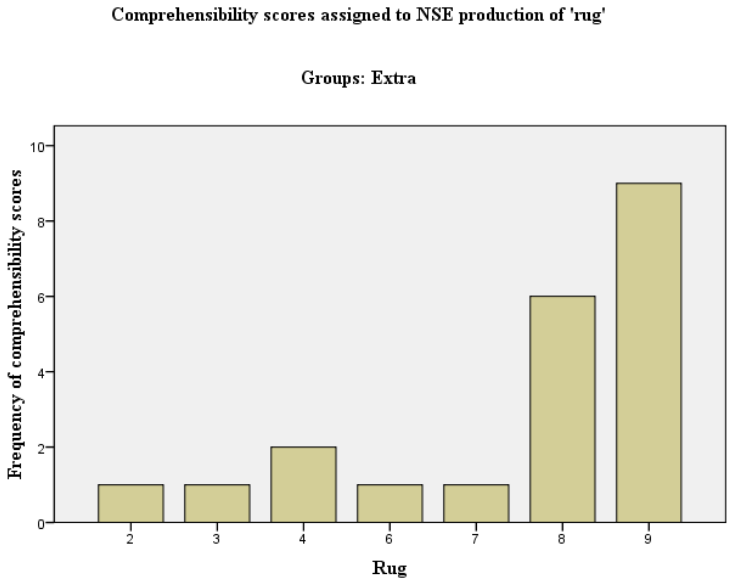
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	4,8	4,8	4,8
	1	1	4,8	4,8	9,5
	4	3	14,3	14,3	23,8
	5	2	9,5	9,5	33,3
	6	3	14,3	14,3	47,6
	7	2	9,5	9,5	57,1
	8	3	14,3	14,3	71,4
	9	6	28,6	28,6	100,0

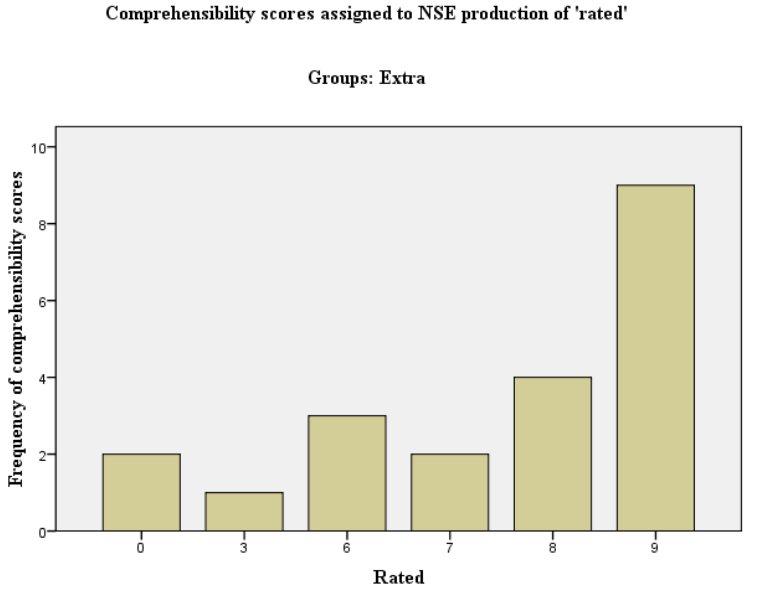
Rabbits

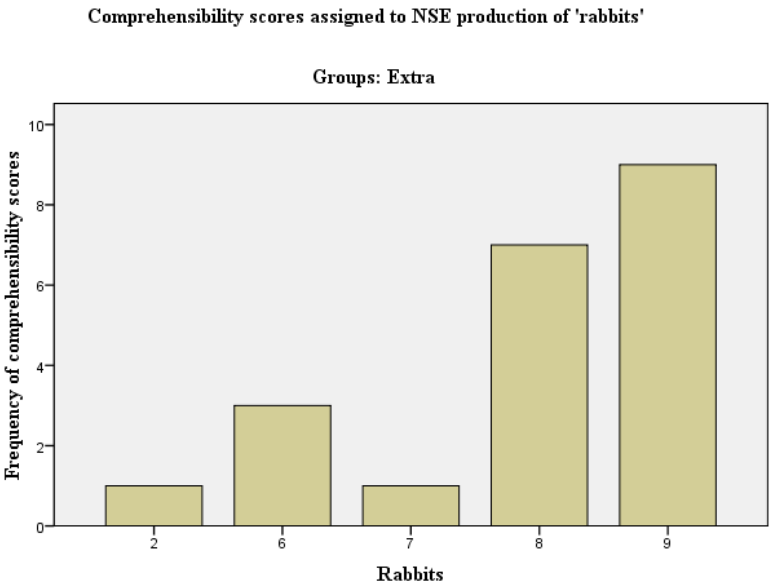
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	4,8	4,8	4,8
	6	3	14,3	14,3	19,0
	7	1	4,8	4,8	23,8
	8	7	33,3	33,3	57,1
	9	9	42,9	42,9	100,0
	Total	21	100,0	100,0	

c) Bar Charts


Comprehensibility scores assigned to NSE production of 'ropes'
Groups: Extra
Frequency of comprehensibility scores
0
1
2
3
4
5
6
0
1
4
5
6
7
8
9
Ropes


Comprehensibility scores assigned to NSE production of 'rug'
Groups: Extra
Frequency of comprehensibility scores
0
2
4
6
8
10
2
3
4
6
7
8
9
Rug


Comprehensibility scores assigned to NSE production of 'rated'
Groups: Extra
Frequency of comprehensibility scores
0
2
4
6
8
10
0
3
6
7
8
9
Rated



3) Group = NSE

a) Statistics

		Ropes1C	Rug3C	Rated2C	Rabbits3C
N	Valid	28	28	28	28
	Missing	0	0	0	0
	Mean	8,18	7,89	8,36	8,32
	Minimum	5	6	3	5
	Maximum	9	9	9	9

b) Frequency Tables

Ropes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5	1	3,6	3,6	3,6
	6	2	7,1	7,1	10,7
	7	3	10,7	10,7	21,4
	8	7	25,0	25,0	46,4
	9	15	53,6	53,6	100,0
	Total	28	100,0	100,0	

Rug

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	6	5	17,9	17,9	17,9
	7	5	17,9	17,9	35,7
	8	6	21,4	21,4	57,1
	9	12	42,9	42,9	100,0
	Total	28	100,0	100,0	

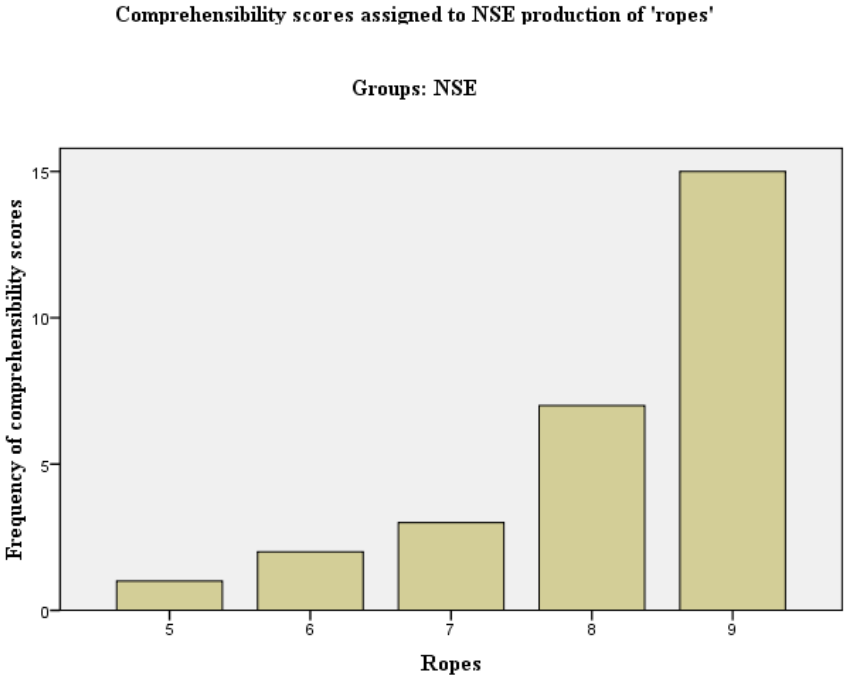
Rated

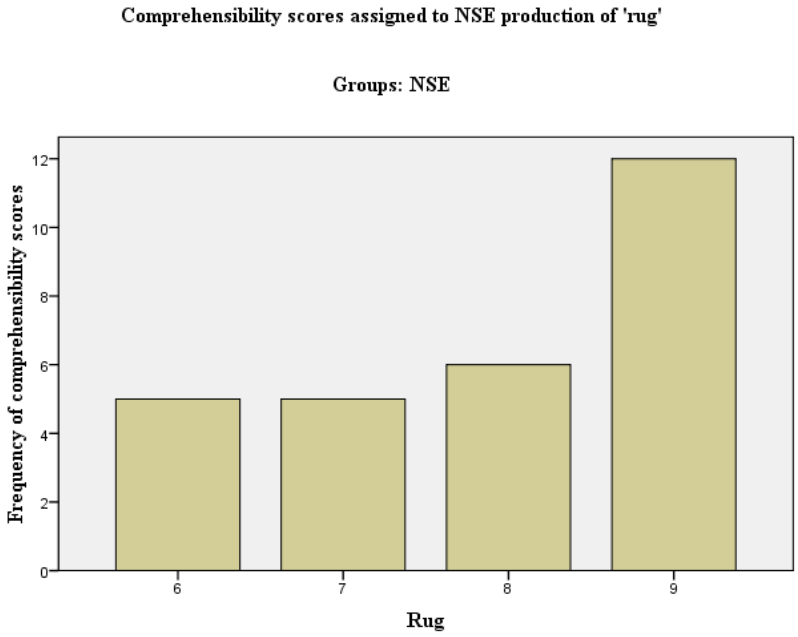
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	1	3,6	3,6	3,6
	5	1	3,6	3,6	7,1
	7	2	7,1	7,1	14,3
	8	4	14,3	14,3	28,6
	9	20	71,4	71,4	100,0
	Total	28	100,0	100,0	

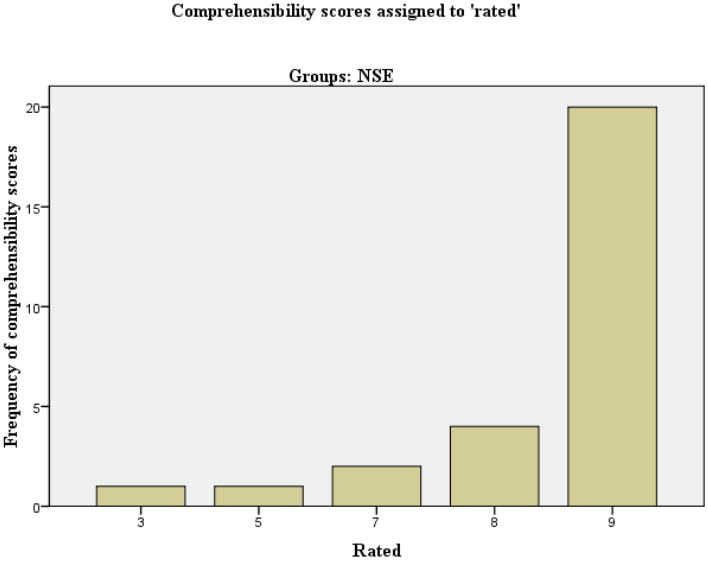
Rabbits

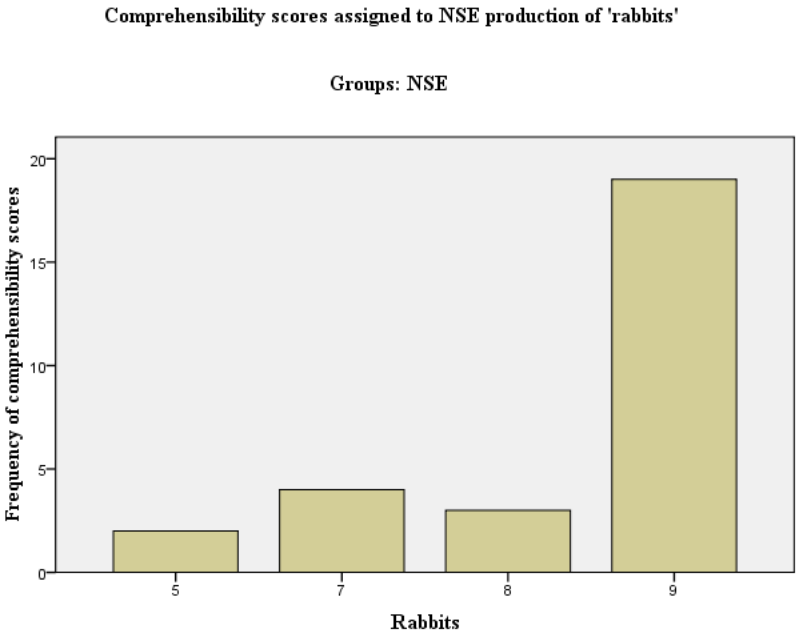
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5	2	7,1	7,1	7,1
	7	4	14,3	14,3	21,4
	8	3	10,7	10,7	32,1
	9	19	67,9	67,9	100,0
	Total	28	100,0	100,0	

c) Bar Charts




Comprehensibility scores assigned to NSE production of 'rug'
Groups: NSE
Frequency of comprehensibility scores
0
2
4
6
8
10
12
6
7
8
9
Rug


Comprehensibility scores assigned to 'rated'
Groups: NSE
Frequency of comprehensibility scores
0
5
10
15
20
3
5
7
8
9
Rated


Comprehensibility scores assigned to NSE production of 'rabbits'
Groups: NSE
Frequency of comprehensibility scores
20
15
10
5
0
5
7
8
9
Rabbits

Appendix O
Descriptive Statistics

1) Group = PPGI	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Compr. Total Mean for Non-target productions	24	4,54	4,33	8,88	7,3524	1,08702	1,182	-,971	,472	1,190	,918
Compr. Total Mean for Target productions	24	4,69	4,12	8,81	6,9245	1,32197	1,748	-,513	,472	-,708	,918
Valid N (listwise)	24										

2) Group = Extra	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Compr. Total Mean for Non-target productions	21	5,04	3,67	8,71	6,7718	1,30495	1,703	-,676	,501	,124	,972
Compr. Total Mean for Target productions	21	6,25	2,75	9,00	7,0149	1,59882	2,556	-1,286	,501	1,700	,972
Valid N (listwise)	21										

3) Group = NSE	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
compr. Total Mean for Non-target productions	28	6,04	2,46	8,50	6,2827	1,56661	2,454	-,759	,441	-,143	,858
compr. Total Mean for Target productions	28	3,25	5,56	8,81	7,6496	,93917	,882	-1,001	,441	,286	,858
Valid N (listwise)	28										

Appendix P
Mann-Whitney Test Results

1) Extra X NSE

Ranks

	Groups	N	Mean Rank	Sum of Ranks
Compr. Mean for Hopes	Extra - Listener	21	26,43	555,00
	NSE Listener	28	23,93	670,00
	Total	49		
Compr. Mean for Hug	Extra - Listener	21	24,62	517,00
	NSE Listener	28	25,29	708,00
	Total	49		
Compr. Mean for Hated	Extra - Listener	21	25,50	535,50
	NSE Listener	28	24,62	689,50
	Total	49		
Compr. Mean for Habits	Extra - Listener	21	30,31	636,50
	NSE Listener	28	21,02	588,50
	Total	49		
compr. Total Mean for Non-target productions	Extra - Listener	21	27,21	571,50
	NSE Listener	28	23,34	653,50
	Total	49		

Test Statistics[a]

	Compr. Mean for Hopes	Compr. Mean for Hug	Compr. Mean for Hated	Compr. Mean for Habits	compr. Total Mean for Non-target productions
Mann-Whitney U	264,000	286,000	283,500	182,500	247,500
Wilcoxon W	670,000	517,000	689,500	588,500	653,500
Z	-,608	-,163	-,213	-2,263	-,940
Asymp. Sig. (2-tailed)	,543	,871	,831	,024	,347

a. Grouping Variable: Groups

2) PPGI X NSE

Ranks

	Groups	N	Mean Rank	Sum of Ranks
Compr. Mean for Hopes	PPGI - Listener	24	29,29	703,00
	NSE Listener	28	24,11	675,00
	Total	52		
Compr. Mean for Hug	PPGI - Listener	24	33,33	800,00
	NSE Listener	28	20,64	578,00
	Total	52		
Compr. Mean for Hated	PPGI - Listener	24	30,27	726,50
	NSE Listener	28	23,27	651,50
	Total	52		
Compr. Mean for Habits	PPGI - Listener	24	34,27	822,50
	NSE Listener	28	19,84	555,50
	Total	52		
compr. Total Mean for Non-target productions	PPGI - Listener	24	32,56	781,50
	NSE Listener	28	21,30	596,50
	Total	52		

Test Statistics[a]

	Compr. Mean for Hopes	Compr. Mean for Hug	Compr. Mean for Hated	Compr. Mean for Habits	compr. Total Mean for Non-target productions
Mann-Whitney U	269,000	172,000	245,500	149,500	190,500
Wilcoxon W	675,000	578,000	651,500	555,500	596,500
Z	-1,234	-3,061	-1,675	-3,439	-2,673
Asymp. Sig. (2-tailed)	,217	,002	,094	,001	,008

a. Grouping Variable: Groups

3) PPGI X Extra

Ranks

	Groups	N	Mean Rank	Sum of Ranks
Compr. Mean for Hopes	PPGI - Listener	24	23,98	575,50
	Extra - Listener	21	21,88	459,50
	Total	45		
Compr. Mean for Hug	PPGI - Listener	24	28,33	680,00
	Extra - Listener	21	16,90	355,00
	Total	45		
Compr. Mean for Hated	PPGI - Listener	24	25,44	610,50
	Extra - Listener	21	20,21	424,50
	Total	45		
Compr. Mean for Habits	PPGI - Listener	24	25,17	604,00
	Extra - Listener	21	20,52	431,00
	Total	45		
compr. Total Mean for Non-target productions	PPGI - Listener	24	25,67	616,00
	Extra - Listener	21	19,95	419,00
	Total	45		

Test Statistics[a]

	Compr. Mean for Hopes	Compr. Mean for Hug	Compr. Mean for Hated	Compr. Mean for Habits	compr. Total Mean for Non-target productions
Mann-Whitney U	228,500	124,000	193,500	200,000	188,000
Wilcoxon W	459,500	355,000	424,500	431,000	419,000
Z	-,536	-2,962	-1,345	-1,194	-1,457
Asymp. Sig. (2-tailed)	,592	,003	,178	,232	,145

a. Grouping Variable: Groups

Appendix Q
Chi-Square Results – NSE familiarity

1) 'ropes' pronounced as [hoʊps]

a) 'ropes' pronounced as [hoʊps] by Speaker 39

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4,800[a]	2	,091
Likelihood Ratio	6,086	2	,048
Linear-by-Linear Association	4,418	1	,036
N of Valid Cases	28		

a. 4 cells (66,7%) have expected count less than 5. The minimum expected count is 1,50.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,414	,091
	Cramer's V	,414	,091
	N of Valid Cases	28	

b) 'ropes' pronounced as [hoʊps] by Speaker 16

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,037[a]	1	,309		
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	1,423	1	,233		
Fisher's Exact Test				1,000	,500
Linear-by-Linear Association	1,000	1	,317		
N of Valid Cases	28				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,50.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-,192	,309
	Cramer's V	,192	,309
	N of Valid Cases	28	

2) 'rug' pronounced as [hʌg]

a) 'rug' pronounced as [hʌg] by Speaker 35

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,037[a]	1	,309		
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	1,423	1	,233		
Fisher's Exact Test				1,000	,500
Linear-by-Linear Association	1,000	1	,317		
N of Valid Cases	28				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is ,50.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-,192	,309
	Cramer's V	,192	,309
	N of Valid Cases	28	

b) 'rug' pronounced as [hʌg] by Speaker 10

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	28

a. No statistics are computed because Hug2 is a constant.

Symmetric Measures

		Value
Nominal by Nominal	Phi	.[a]
	N of Valid Cases	28

a. No statistics are computed because Hug2 is a constant.

c) 'rug' pronounced as [hʌg] by Speaker 17

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	28

a. No statistics are computed because Hug3 is a constant.

Symmetric Measures

		Value
Nominal by Nominal	Phi	.[a]
	N of Valid Cases	28

a. No statistics are computed because Hug3 is a constant.

3) 'rated' pronounced as [ˈheɪtɪt]

a) 'rated' pronounced as [ˈheɪtɪt] by Speaker 16

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	28

a. No statistics are computed because Hated1 is a constant.

Symmetric Measures

		Value
Nominal by Nominal	Phi	.[a]
	N of Valid Cases	28

a. No statistics are computed because Hated1 is a constant.

b) 'rated' pronounced as [ˈheɪtɪt] by Speaker 07

Chi-Square Tests

	Value
Pearson Chi-Square	.[a]
N of Valid Cases	28

a. No statistics are computed because Hated2 is a constant.

Symmetric Measures

		Value
Nominal by Nominal	Phi	.[a]
	N of Valid Cases	28

a. No statistics are computed because Hated2 is a constant.

4) 'rabbits' pronounced as [ˈhæbɪts]

a) 'rabbits' pronounced as [ˈhæbɪts] by Speaker 16

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	,243[a]	1	,622		
Continuity Correction[b]	,000	1	1,000		
Likelihood Ratio	,245	1	,621		
Fisher's Exact Test				1,000	,500
Linear-by-Linear Association	,235	1	,628		
N of Valid Cases	28				

a. 2 cells (50,0%) have expected count less than 5. The minimum expected count is 2,50.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-,093	,622
	Cramer's V	,093	,622
	N of Valid Cases	28	

b) **'rabbits' pronounced as [ˈhæbɪts] by Speaker 07**

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2,043[a]	2	,360
Likelihood Ratio	2,476	2	,290
Linear-by-Linear Association	1,855	1	,173
N of Valid Cases	28		

a. 4 cells (66,7%) have expected count less than 5. The minimum expected count is ,50.

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,270	,360
	Cramer's V	,270	,360
	N of Valid Cases	28	