The intelligibility of English verbs in the simple past tense: native and non-native speakers and Brazilian listeners

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ABSTRACT: This study investigated the intelligibility of English verbs in the simple past inserted in sentences. The verbs were produced by two adult native speakers of English and six adult nonnative speakers, and they were transcribed by 13 adult Brazilian listeners. Results indicated that the intelligibility rate of regular verbs was similar to the irregular ones, and that the intelligibility of verbs produced by BP talkers was similar to the Spanish talkers. The intelligibility rate of German talkers, on the other hand, was lower than the intelligibility of BP and Spanish talkers but higher than the intelligibility of verbs produced by native speakers.

Key-words: intelligibility; pronunciation; simple past; speakers' L1; Brazilian listeners.

Introduction

Intelligibility has been an important concern in the language learning process in the last decades. Smith and Nelson (1985) brought into light some issues including intelligibility and its correlation with speaker's and listener's proficiency, effort to communicate with native and non-native speakers of English, and attitudes towards different spoken varieties instead of native-like achievement in pronunciation, for

instance. In addition, the rise of English as an international language or language for communication, advocated by Crystal (2003), and the publication of different studies on intelligibility (e.g., BENT, BRADLOW, 2003; BRADLOW, PISONI, 1999; DERWING, MUNRO, 1995; MUNRO, DERWING, THOMPSON, 2007), have given a lot of importance to the investigation of language learner intelligibility.

Some studies have focused on intelligibility involving Brazilian learners of English (e.g., BECKER, 2013; CRUZ, 2004; FERNANDES, 2009; GONÇALVES, 2014; OLIVEIRA, 2014; RIELLA, 2013; SCHADECH, 2013). Only Fernandes' and Riella's studies investigated intelligibility of verbs but in both studies Brazilians were the talkers. Thus, briefly, the present study followed a different perspective and investigated how talkers' first language (L1), such as Brazilian Portuguese (BP), Spanish, German and English, affected Brazilian listeners' performance in a word recognition (intelligibility) test with English regular and irregular verbs in the simple past tense.

1. Review of literature

This section presents the concepts of intelligibility and reviews some empirical studies on this issue involving Brazilians and other L1 speakers learning English who participated as listeners or talkers in these studies.

1.1. Main concepts of intelligibility

Catford (1950) stresses that both speaker and hearer play an important role in situations in which language is used. In this scenario, Catford states that to produce an intelligible utterance, the speaker may choose the correct (a) linguistic forms, such as words, sounds, and word order that fit the community where the language is spoken, (b) linguistic and situational contexts, and (c) cultural backgrounds, while the hearer may correctly identify the linguistic forms s/he hears. Moreover, Catford warns that if these conditions are not attained, there is a loss in intelligibility.

Munro and Derwing (1995) point out that for both, listener and speaker, a foreign accent may cause misunderstandings since it makes the recognition of segments, words or larger structures, more difficult. Munro and Derwing also point out that even when a message is understood, foreign language (FL) accent may interfere in communication because listeners may become irritated with the accented message. Munro and Derwing (1995) also called attention to the fact that accented segments may require more time to be recognized than segments that are similar to the prototypes. Consequently, the recognition of larger units, such as syllables, also requires extra time, which in turn increases time for language processing and may result in lack of speech comprehension (MUNRO; DERWING, 1995). Moreover, Bradlow and Pisoni (1999) state that word recognition is a process that is influenced by some factors, such as, talker, listener,

utterance and situation in which it occurs, and that multi-talker voice and articulation may influence the intelligibility[1] of utterances that talkers produce.

Smith and Nelson (1985) define intelligibility as 'words/utterance recognition'' (p. 334), whereas Munro and Derwing (1995) define it as the extent to which an utterance is understood, highlighting that it is generally assessed by orthographic transcription of words or utterances. Munro, Derwing and Morton (2006) explain that an utterance can be highly accented but perfectly understood by the listener, that is, it may be accented but also intelligible.

Thus, in the present study, intelligibility referred to word recognition andwas measured by orthographic transcription of the target verbs. In other words, a token was considered intelligible if listeners transcribed it accurately[2].

Moreover, Munro and Derwing (2011) point out that intelligibility is crucial for successful communication in a second language (L2). However, Munro, Derwing and Morton (2006) advance that phonological properties of the speakers' output and stimulus properties, listeners' familiarity with accents and with a particular speaker, as well as listeners' L1 may interfere in the speaker intelligibility. The following section will review studies that address some of these variables.

1.2. Empirical studies involving intelligibility

The following brief review on intelligibility will start with studies involving non-native speakers of English from different L1s followed by few studies that involved Brazilian learners of English.

Taking into account the fact that word recognition (intelligibility) may be influenced by talker, listener, utterance and situation in which the word is pronounced, Bradlow and Pisoni (1999) investigated English native and non-native speakers' recognition of easy and hard[3] words produced by ten native speakers of American English (talkers). Listeners were 20 native speakers of American English and 20 non-native speakers of English whose L1 was Korean, Chinese, Russian, Japanese, Spanish, Bengali, Nepali and Dari. They had to listen to and identify the words recorded by the ten talkers in three different speaking rates. Results indicated that listeners easily identified words produced by the same talker and more often correctly identified easy words than hard words at the medium speaking rate since listeners got more used to the same talker's voice and articulation, facilitating the identification of words produced by the same talker. Furthermore, Bradlow and Pisoni (1999) also stated that numbers of years studying English and the age it started did not help listeners to better recognize hard words whereas the amount of exposure to English in an English speaking environment helped them to do so.

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[1] In this study, intelligibility was used interchangeably with the terms sentence and/or word recognition.
[2] See section 3.2 to check the procedures for data collection.
[3] Easy words are words that have few phonetic similar words while hard words have many phonetic similar words and for this reason listeners tend to have more difficulty with hard words than with easy words, according to Bradlow and Pisoni (1999).

Bent and Bradlow (2003) investigated intelligibility, comprehensibility and familiarity of English words by non-native English speakers and the possible influence of non-native English talkers in these processes. Five female talkers, one native speaker of English, and one low-proficient and one high-proficient English learners, native speakers of Chinese and Korean, participated in the study. Listeners were 21 Chinese, 10 Korean, 12 speakers of different L1s learning English and 21 native speakers of English.

Thus, Bent and Bradlow (2003) also found that low-proficient Chinese and Korean talkers were the least intelligible ones, whereas the native English talker and the high-proficient Chinese and Korean talkers were the most intelligible ones. They also found that high-proficient Chinese and Korean talkers were more intelligible for listeners with the same L1 backgrounds (Chinese and Korean L1 listeners), and that the low-proficient Korean was as intelligible as the native speaker of English. All together, these results suggest that there were a matched interlanguage (IL) speech intelligibility benefit in which L1 listeners benefited from sharing the L1 with the talker, and talker proficiency since high-proficient non-native speakers of English were more intelligible to the listeners than the low-proficient talkers.

Derwing, Munro and Thompson (2007) examined participants' comprehensibility and fluency development in a period of two years taking into account exposure to English outside the classroom. Participants were a group of Chinese (Mandarin) and a mixed group of Slavic (Russian and Ukrainian) immigrants in Canada. Listeners were thirty-three English native speakers (six male and twenty-seven female) who evaluated speakers' fluency and comprehensibility in English as an L2 using 7-point Likert scales, one for fluency and another for comprehensibility. Researchers found that Slavic speakers improved, a little at least, their comprehensibility and fluency in English, whereas Mandarin speakers did not improve over time. The study attributes the slightly better performance of the Slavic speakers to their more frequent exposure to English outside the classroom, in activities such as listening to the radio, watching TV, having ten-minute conversations with native speakers, and it also advances that the little improvement for the two groups may be connected to the lack of classroom instruction.

The issue of intelligibility has been in evidence in Brazil in more recent years when some studies have been conducted in this area. Becker (2013), Cruz (2004), Cruz and Blanche (2014), Cruz and Pereira (2006) and Oliveira (2014), for instance, investigated intelligibility of words and/or sentences in free speech or sentence reading, with no focus on specific sounds, in studies in which Brazilians were either the listeners or the talkers. There are few studies that have investigated the intelligibility of specific sounds in which Brazilians frequently were the talkers and their speech intelligibility was analyzed by native and non-native speakers of English (listeners) with different L1 backgrounds. Some examples are Gonçalves (2014), who examined the intelligibility of high front vowels, Schadech (2013), who investigated the intelligibility of rhotics in onsets, and Fernandes (2009) and Riella (2013), who conducted studies on the intelligibility of verbs ending in -ed. The following brief review will include Becker's study with Brazilian listeners and Fernandes' and Riella's studies on simple past tense -ed intelligibility, which were chosen because of their relevance for the present study. Like the present study, Becker (2013) had Brazilians as listeners and focused on the intelligibility of samples produced by speakers of different L1s. Furthermore, Riella

(2013) and Fernandes (2009) investigated the intelligibility of simple past forms, which is the focus of the present study.

Becker (2013) asked 80 Brazilian learners of English (listeners) to evaluate speech of eight speakers of English (talkers), two Mandarin, two Japanese, two German and two English (Americans) L1 speakers, in a paragraph reading task. Each of the four groups of 20 Brazilian listeners analyzed the intelligibility of two speakers from the same L1 by listening to the whole recording and indicating in percentages how much they had understood from that reading passage. Additionally, they listened to the text divided into small parts and wrote down what they understood, and listened to the whole recording again indicating which tokens were the most difficult for them to understand.

Becker's (2013) results indicated that overall, 77.2% out of 66 words produced by the Germans were correctly understood by the 20 Brazilian listeners who listened to utterances produced by these speakers. Likewise, 77% out of the 66 words produced by the Americans were correctly understood by Brazilians, and 80.1% out of 64 words produced by Mandarin speakers were accurately understood by Brazilians. However, only 61.3% out of 58 words produced by Japanese speakers were correctly understood by Brazilians. In addition, Becker also found that, among the comparisons between two groups of speakers, only those comparisons in which Japanese learners of English were included yielded statistical significant differences, suggesting that Brazilians had more difficulty in understanding English spoken by Japanese than by Mandarin, German or even American speakers. Note, however, that Becker's (2013) study did not control for speakers' proficiency, which makes it difficult to propose specific speaker's L1 effects.

Fernandes (2009) investigated the intelligibility of five upper-intermediate Brazilian EFL learners' production of English verbs ending in -*ed*. Five European Portuguese (EP) and five Hindi L1 speakers participated as listeners, each of them rating one speaker only. Brazilian learners audio-recorded short texts read aloud individually and stories based on the description of four pictures. Each EP and each Hindi listener first rated the story telling task, using a three-point intelligibility scale, and then, orthographically transcribed the texts read by one specific Brazilian speaker only.

Results showed that Brazilian Portuguese speakers' speech was rated as moderately intelligible in both tasks by both groups of listeners. However, listeners of Fernandes' (2009, 2010) studies indicated that rhythm and intonation affected their intelligibility rating in the story telling task, besides vowel epenthesis[4].Moreover, results of Fernandes' studies also demonstrated that it was more difficult for Hindi listeners to understand Brazilians' epenthesized speech than for EP listeners.

Riella (2013) investigated if vowel epenthesis in the Brazilians' speech affected intelligibility thus causing a breakdown in communication. In his study, 126 verbs ending in -*ed* were produced by two groups: (a) 46 (17 male and 29 female) Brazilian learners of English, whose proficiency levels, according to the Common European Framework Reference for Languages (CEFR) were from elementary (A1) to highly proficient (C2), and (b) two female native English speakers, one American and one British. There were 30 listeners, ten (nine American and one Australian) female native speakers of English

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[4] Addition of a vowel in the simple past tense -*ed* when it is not necessary (e.g., 'worked' [worked]) is a common pronunciation feature of Brazilian learners of English (e.g., ALVES 2004; DELATORRE, 2006; FERNANDES, 2009; FRESE, 2006; GOMES, 2009; MARIANO, 2009; PEREIRA, 1994)

(group 1 – G1), ten Brazilians students[5] of English (group 2 – G2) and ten English speakers with different L1 backgrounds (group 3 – G3), such as French (France), Spanish (Colombia and Chile), Korean, Dutch, Danish, Norwegian, besides one speaker from Belgium[6].

Brazilian learners of English and English native speakers individually audio-recorded readings of ten texts and reports of these texts in spontaneous speech, whereas listeners orthographically transcribed the first ten sentences they had listened to twice, and then listened one more time to each of them and indicated if talkers' speech was accented or not by using a five-point scale that ranged from 1 – no foreign accent – to 5 – very strong accent. Riella (2013) considered intelligible the verb that was transcribed with the -ed morpheme, unintelligible the stem verb transcription, and a break in communication when the space was blank in the answer sheet or when it was replaced by another word.

Results for the intelligibility test demonstrate that G1 and G2 had the same rate of 71% of accurate transcription of verbs ending in -ed even when there was vowel epenthesis in verb pronunciation and speakers' proficiency was low. However, the rate for accurate verb transcription dropped to 60% in G3 due to L1 influence, since it was a mixed L1 group, and due to Brazilian speakers' proficiency level, in which the less proficient BP speakers tended to be less intelligible. Riella reported that members of the three groups had problems with the transcription of the verbs 'concerned', produced by a low proficient Brazilian learner of English, and 'called', produced by the British speaker, which were frequently replaced by another word or not transcribed at all leaving the space for its transcription blank in the answer sheet. The researcher stresses that this difficulty with the British speaker pronunciation was also faced by the native speakers of English who acted as listeners, as they considered that the British speaker had a foreign accent.

Overall, Riella (2013) found that all listeners noticed the production of an epenthetic vowel in the pronunciation of regular verbs ending in -ed by Brazilians, which, however, according to the author, did not seem to have interfered in the results, since he considered that Brazilians were frequently understood by all listeners from different L1 backgrounds. Furthermore, the production of accented speech and lack of intelligibility increased as the proficiency level of Brazilians decreased. The author concluded that speakers of English as an international language relied on context and grammatical knowledge besides phonetic cues to perform the intelligibility task, contradicting Jenkins' (2000) suggestions that non-native speakers may base their analysis on phonetic cues alone. Riella (2013) points out that some verbs produced by native speakers of English, such as the verb 'seemed', produced by the American native speaker, and the verb 'called' produced by the British speaker, obtained low intelligibility rates, which he considered likely to be linked to the context provided by the sentences and/or to the fact that the listeners were not used to the British accent.

The two studies on intelligibility of verbs reviewed here have focused on regular verbs, but the present study investigates the intelligibility of both regular and irregular verbs that were produced by native and non-native speakers of English and transcribed

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[5] The author did not specify how many Brazilians were male or female.
[6] Riella did not specify which was the speaker's L1, if Dutch, French or German or if his informant spoke one, two or three of them besides English and/or BP.

by Brazilian listeners. Thus, the present study aimed to answer three research questions and to test two hypotheses:

RQ1: Does type of verb (irregular versus regular verbs with their different pronunciations) affect the intelligibility rates?

RQ2: How does the talkers' L1 affect word recognition of simple past tense verbs by Brazilian listeners learning English?
H1: Brazilian listeners will more easily recognize non-native talkers' productions of simple past tense verbs than native English talkers' productions.
Background: Bent and Bradlow (2003), Bradlow and Pisoni (1999).

H2: Brazilian listeners will more easily recognize talkers' production of simple past tense verbs produced by BP speakers or speakers whose L1 is more similar to BP (Spanish) than those whose L1 is more dissimilar to BP (German).
Background: Bent and Bradlow (2003), Bradlow and Pisoni (1999), Munro, Derwing and Morton (2006).

RQ3: Is there a correlation between listeners' L2 experience and their performance on the intelligibility test?

2. Method

This section briefly describes the listeners and talkers who volunteered to participate in this study, as well as the research instruments and procedures for data collection and analysis.

2.1. Participants

Participants of this study were eight talkers and thirteen listeners. Talkers were two native speakers (NSs) of English, an American male and an Australian female, and six non-native speakers (NNSs) of English, one Spanish male from Spain and a female from Argentina, one male and one female speakers of German both from Germany, and one male and one female BP speakers from the south of Brazil. The talkers' ages varied from 20 to 55 (M = 32.25) at the moment of data collection. The NNSs reported studying English at school, from 4 years for the male German speaker to 19 years for the Argentine female speaker of Spanish, mainly at junior high and high school, but also at language schools, which is especially true for Brazilians and the Argentine female Spanish speaker who also studied it at pre and elementary school. The NNSs also reported that their classes more frequently focused on grammar, reading and writing, and less frequently on listening and speaking, and even least frequently on pronunciation.

The participants who acted as listeners were thirteen Brazilian learners of English, enrolled at the English extracurricular course pre-intermediate level (level 4) at Universidade Federal de Santa Catarina (UFSC). Twelve of them were female and one was male, and their ages varied from 19 to 55 (M = 36.76) at the moment of data collection. They reported that the amount of formal English study at junior high, high school, and language schools varied from 1 to 17 years (M = 7.46). In addition, they explained that their English classes most frequently focused on grammar, less frequently on reading and writing, and least frequently on listening, speaking and pronunciation. On the other hand, all of them reported getting in contact with English at home by watching TV, listening to music, doing homework orat work by talking with other English speakers or reading scientific articles.

2.2. Materials and procedures for data collection and analysis

The materials for data collection were a 32 sentence list (see Appendix A), talker and listener profile questionnaires, and a Consent Form. Each of the 32 sentences contained a subject, one regular or irregular verb in the simple past tense and a complement. Among the 32 verbs, eight were irregular and 24 were regular verbs (eight for each of the three -ed allomorphs [t, d, ɪd], for example, 'skipped', 'saved', 'voted').

The eight talkers read all the sentences in the same order[7]. They read them in an acoustic booth at *Laboratório de Fonética Aplicada* (FONAPLI) from UFSC in order to obtain a good quality recording so that later the researchers could phonetically transcribe the verbs with the help of PRAAT software for segmentation and visual inspection. After audio-recording the sentences, talkers filled in the profile questionnaire which contained personal and education-related questions to elicit information such as age, time living or staying in an English speaking country, length of English study, where and what was studied in English classes.

Furthermore, with the help of PRAAT software, one audio file was organized containing one sentence of each of the three regular verb pronunciations and one with an irregular verb produced by each talker, which were later randomized as displayed in Appendix A. In order to administer the intelligibility test, this audio file, which included32 sentences, was presented to the group of 13 Brazilian listeners who were instructed to orthographically transcribe everything they had understood from each sentence after listening twice to each of them. The listeners analyzed a total of 416 sentences containing only one verb in each of them.

After the intelligibility test, listeners filled in a profile questionnaire to elicit personal information (e.g., age, sex) and details about their experience with English(e.g., time studying English, amount of formal study at home, contact with English in an informal manner through music, TV series or internet, possible time living or staying in an English speaking country and talking to both native and non-native speakers of English, whether they teach it, use it at work or to study for their tests or if they had already taken a proficiency test in English).Both talkers and listeners signed the consent form previous to the data collection.

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[7] All sentences are presented in Appendix A.

Following the data collection, data analysis started by defining how intelligibility would be operationalized in this study when analyzing the transcriptions of the past tense verbs by the Brazilian listeners. In this regard, the present study followed Derwing and Munro (1995) who considered that intelligibility may be accessed by orthographic transcription. In addition, it also followed Riella (2013) who considered (a)the verbs intelligible when they were transcribed in the past and(b) that there was a breakdown in communication when the verbs were not transcribed, replaced by another word, or when the sentences were not transcribed at all. In addition, the present study created a separate category for verbs transcribed in other forms, such as stem form, third person singular and continuous (-ing form). After classifying the verbs according to these three categories, the percentage of occurrence for each of them was calculated and the statistical tests were run in order to answer the research questions and test the research hypotheses. The following section presents and discusses the results.

3. Results and discussion

Altogether, the 13 listeners analyzed a total of 416 sentences encompassing a total of 104 irregular and 312 regular verbs (104 to each of the three -*ed* allomorphs [t, d, ɪd]). Results for the three categories of responses of all verbs transcribed by the Brazilian listeners – intelligibility, other forms of verb transcription and breakdown in communication – are displayed in Table 1.

Verb produced by all talkers	Intelligibility	Other verb forms	Breakdown
All verbs combined	158 (37.98)	83 (19.95)	175 (42.06)
All regular verbs	116 (37.17)	71 (22.75)	125 (40.06)
All irregular verbs	42 (40.38)	12 (11.53)	50 (48.07)

Table 1: Intelligibility, other verb forms, breakdown in communication for irregular and regular verbs (percentages in parenthesis).N for all verbs = 416; N for regulars = 312 and N for irregulars = 104

Overall, results displayed in Table 1 demonstrate that the rate for the breakdown in communication was higher than the rate for intelligibility, which was higher than the rate for other forms of verb transcription for all verbs combined, and even when all regular and irregular verbs were separated, indicating that the two types of verbs displayed a similar tendency. However, these results with low intelligibility rate for all verbs (37.98%), all regular verbs (37.17%) and all irregular verbs (40.38%) did not follow the tendency found in Riella's (2013) and Becker's (2013) studies in which the intelligibility rates of English regular verbs and sentences, respectively, were much higher than in the present study (higher than 70% for both Becker's and Riella's studies). Note however, that only Becker had Brazilians as listeners, but her study did not provide information about the listeners' proficiency level. It may be that the proficiency level of the listeners in the present study was much lower than in Becker's and Riella's.

To answer the first research question, the intelligibility rates for the regular and irregular verbs were examined separately. The dataset included eight irregular verbs plus

24 regular verbs (8 for each type of pronunciation, [t, d, ɪd]). Thus, the results were split according to these four groups of verbs in order to verify if any of them would yield different intelligibility rates. As can be seen in Table 2 and in Figure 1, the highest means for intelligibility (6.25) were obtained by two types of regular verbs: [t] and [ɪd], while the lowest mean was obtained by the regular verbs with the [d] pronunciation. Once again we can observe a lot of variation for all types of verb, with scores ranging from 0 to 13 (maximum score possible), 12 or 10. The box plot shows that the regular verbs with the [d] pronunciation were difficult for most listeners, with just one of them being able to correctly transcribe more than five of these verbs. In order to test the hypothesis that different types of verbs would yield different intelligibility rates, a Kruskal-Wallis test was run, and the results approached significance (p=.09), but the hypothesis could not be confirmed due to the high level of variability in the dataset.

Verb Type	Min.	Max.	Mean	SD
Irregular	1	13	5,25	4,30
Regular [t]	0	12	6,25	4,65
Regular [d]	0	10	2	3,50
Regular [ɪd]	0	12	6,25	4,71

Table 2. Descriptive statistics for results grouped per verb type.
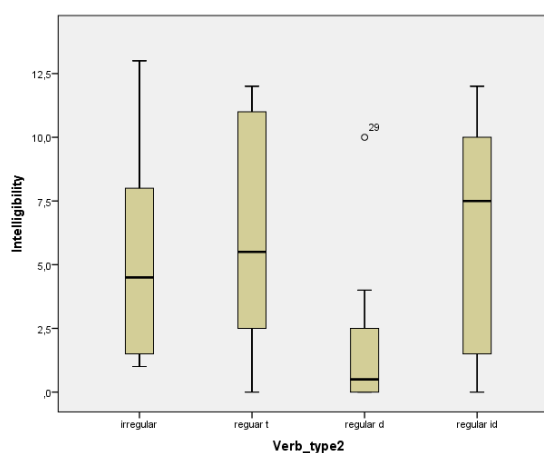

Figure 1. Box plot with results grouped per type of verb.

Changing the focus to the second research question, which inquired about the role of the speakers' L1 on intelligibility scores, Table 3 displays the results for each of the 32 verbs tested in the study. The first column lists the talkers, the second one, the type of production provided by each talker, the third one, the percentage of intelligible items, the fourth one, the percentage of other verb forms, and the last one, the percentage of breakdowns.

As can be seen in Table 3, from the 32 verbs tested, nine (listed towards the bottom of the table) were not produced in a target-like fashion, given that they were pronounced with some kind of coda change in the stem form, or with an epenthetic vowel. The verbs 'stopped' and 'missed' were produced in the stem form by the female and the male English native speakers, respectively, while the verbs 'watched' and 'came', and 'looked' and 'screamed' were produced with an epenthetic vowel by the female and male Spanish native speakers, and the verbs 'needed', 'made' and 'wrote' were produced with coda

modification (e.g., /t/ or /d/replaced by a flap)[8] by the female BP speaker, and the female and male native speakers of English, respectively. Note, however, that, similar to the verbs produced target-like (that is, in the past tense form), the verbs produced in one of the three non-target forms had high and low intelligibility rates.

Regarding verbs with high intelligibility, 'bought', 'visited' and 'kissed' were target-like produced by BP speakers whereas 'looked' and 'watched' were both produced by Spanish speakers with vowel epenthesis, a process that is also characteristic of Brazilians' speech in English. This similarity between Spanish talkers' production of these two regular verbs in the simple past and Brazilian learners' common pronunciation of regular verbs ending in -*ed* might have boosted the high intelligibility rates observed, corroborating Riella's (2013) results in which Brazilians' epenthesized productions were understood by listeners from different L1s, as well as Munro, Derwing and Morton's (2006) claim that accent familiarity enhances intelligibility. In addition, 'waited' was the only verb produced by a German talker that reached high intelligibility rates (84.61%). None of the verbs produced by NSs of English had high intelligibility rates (ranging from 0% to 46%).

Talker[9]	Target verb	Type of production	Intelligible	Other verb forms	Breakdowns
BPT2	Bought	Target-like	13 (100)	00 (0)	00 (0)
ST2	Voted	Target-like	02(15.38)	00 (0)	11 (84.61)
ET2	Trained	Target-like	00 (0)	08 (61.53)	05 (38.46)
GT2	Washed	Target-like	07 (53.84)	05 (38.46)	01 (7.69)
BPT1	Cheered	Target-like	00 (0)	00 (0)	13 (100)
GT1	Guided	Target-like	01 (7.69)	03 (23.07)	09(69.23)
BPT2	Played	Target-like	10 (76.92)	03 (23.07)	00(0)
GT2	Drove	Target-like	01(7.69)	00 (0)	12 (92.30)
ET2	Painted	Target-like	00 (0)	00 (0)	13 (100)
GT1	Laughed	Target-like	03(23.07)	00(0)	10(76.92)
ST1	Saved	Target-like	01(7.69)	00 (0)	12 (92.30)
BPT2	Visited	Target-like	12 (92.30)	01(7.69)	00(0)
GT1	Took	Target-like	06(46.15)	06(46.15)	01 (7.69)
ET1	Judged	Target-like	01 (7.69)	00 (0)	12 (92.30)
BPT1	Skipped	Target-like	02(15.38)	07 (53.84)	04 (30.76)
ST1	Avoided	Target-like	09(69.23)	04 (30.76)	00 (0)
GT1	Caused	Target-like	00 (0)	12 (92.30)	01 (7.69)
ST2	Had	Target-like	09(69.23)	04 (30.76)	00 (0)
BPT2	Kissed	Target-like	11 (84.61)	00 (0)	02(15.38)
GT2	Spelled	Target-like	00 (0)	01 (7.69)	12 (92.30)
ET1	Recorded	Target-like	06(46.15)	01 (7.69)	06(46.15)
BPT1	Slept	Target-like	01 (7.69)	00 (0)	12 (92.30)
GT2	Waited	Target-like	11(84.61)	00(0)	02(15.38)

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[8] It might have happened because all these verbs were followed by the article 'a' in sentences 14, 15 and 23 available in Appendix A.

[9]BPT, ST, GT and ET mean Brazilian Portuguese talker, Spanish talker, German talker and English talker and the numbers 1 and 2 refer to female and male speakers, respectively.

ET2	Wrote	Coda change	02(15.38)	00 (0)	11 (84.61)
BPT1	Needed	Coda change	09 (69.23)	04 (30.76)	00 (0)
ET1	Made	Coda change	03(23.07)	02 (15.38)	08 (61.53)
ET2	Missed	Stem	04 (30.76)	04(30.76)	05(38.46)
ET1	Stopped	Stem	00 (0)	10 (76.92)	03 (23.07)
ST2	Screamed	Epenthesis	04 (30.76)	06(46.15)	03(23.07)
ST2	Looked	Epenthesis	11(84.61)	01 (7.69)	01 (7.69)
ST1	Came	Epenthesis	07 (53.84)	00 (0)	06(46.15)
ST1	Watched	Epenthesis	12 (92.30)	01 (7.69)	00 (0)

Table 3: Results per verb, talker and listeners' analysis of each verb (percentages in parenthesis). N for each verb = 13.

On the other hand, verbs with low intelligibility were produced by talkers from all the four languages (e.g. BP, Spanish, German and English) involved in this study. For instance, the verbs 'skipped', 'slept' and 'cheered' produced by the female BP talker, 'voted' and 'saved', by the Spanish talkers, 'guided', 'drove', 'laughed', 'caused' and 'spelled' by the German talkers and 'wrote', 'judged', 'stopped' and 'painted' by the native speakers of English were all target-like but had low intelligibility rates possibly because they might have had very subtle differences from the target-like production or some accent ,such as vowel quality change in 'drove' and dark /l/[10] in 'spelled' by the male German talker; too much emphasis in the pronunciation of 'saved' by the female Spanish talker, hesitation in the production of 'voted' by the male Spanish talker, flap production in 'wrote' followed by the <a> grapheme by the male English talker. Thus, these results corroborate Bradlow and Pisoni's (1999) claim that talker, listener and articulation affect intelligibility results. In addition, following Munro and Derwing (1995), talkers' as well as listeners' FL accent may cause misunderstandings, as demonstrated by the high rates of breakdowns in communication in the present study, or possible loss of important information related to verb tense/aspect/person, which was the case of verbs transcribed in other forms instead of the simple past in this study.

In order to provide a focused answer to the second research question and to test its two accompanying hypotheses, the data were submitted to statistical analyses. It is important to keep in mind that hypothesis one predicted that listeners would find it easier to understand the verbs produced by non-native speakers than the ones produced by the native speakers of English. Furthermore, hypothesis 2 predicted that the listeners would benefit from listening to verbs produced by BP speakers and Spanish speakers, thus transcribing them correctly more often than the verbs produced by the German speakers, whose L1 is not similar to the listeners'.

In order to test hypotheses 1 and 2, which addressed the role of the speakers' L1 on the intelligibility rates, the data were split into four groups, each of them representing one of the L1 backgrounds of the talkers: German, English, Spanish, and BP. Table 4 and Figure 2 show the descriptive statistics for this analysis, which indicate that the highest means for intelligibility were obtained with the verbs produced by the BP talkers (7.25), followed by the Spanish talkers (6.88), the German talkers (3.63); the English speakers obtained the lowest intelligibility means (2). These results go in the direction predicted in

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[10]Brazilians have difficulty in producing and perceiving it (BARATIERI, 2006; MOORE JR, 2008)

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Hypotheses 1 and 2. However, there is a lot of variability in the intelligibility rates, as indicated by the high standard deviations, and we can see a wide range of scores, varying from 0 to nearly the maximum score (13) for the three groups of non-native speakers of English. Given that the data presented no normal distribution, a Kruskal-Wallis test was run to compare the intelligibility results for the four L1 groups. No significant differences across L1 groups were confirmed, although the overall p value approached significance (p=.061). Despite a clear tendency for the intelligibility rates to be higher for the BP and Spanish talkers, this facilitative effect of talkers who share their L1 with the listeners or whose L1 is similar to the listeners' could not be confirmed, probably due to the high variability for all L1 groups,.

Descriptive Statistics				
Talker_L1	Min.	Max.	Mean	SD
German	0	11	3,63	3,99
English	0	6	2,00	2,20
Spanish	1	12	6,88	4,12
BP	0	13	7,25	5,33

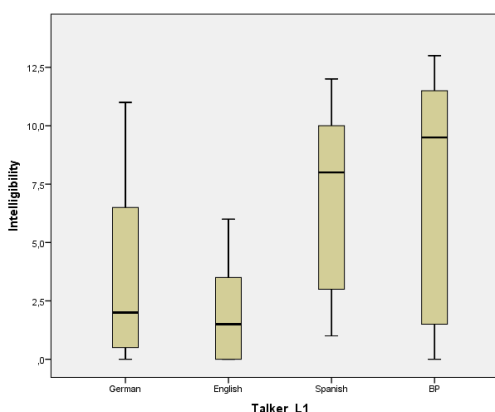Table 4. Descriptive statistics with results grouped
per Talker's L1.

Figure 2. Box plot with results grouped per Talker's L1.

To address the third research question, we turn now to a brief discussion of the listeners' profiles, which might help us to gain insights on their performance on the intelligibility test. The results reported below were obtained from the questionnaire that was administered to the listeners in order to gather information about their exposure to the target language both in class and outside the classroom environment.

Thus, according to results displayed in Table 5, Brazilian listeners had more contact with grammar in class followed by a moderate contact with reading and writing skills but less contact with listening and speaking skills and pronunciation, which may suggest that this lack of contact with skills that are more frequently used in oral communication interfered in these overall intelligibility test results. Moreover, five listeners had visited an English speaking country previously to the moment of data collection, but they reported they had had little opportunities to use English with native and non-native speakers there. None of them reported having contact with English native speakers in Brazil and four of them reported having some contact with non-native speakers in English, mainly their Brazilian classmates. Therefore, this lack of contact with English spoken by native and non-native speakers from different L1 backgrounds may have interfered in the low intelligibility rates observed in the present study. As reported in section 3.1, the Brazilian listeners had a mean of 7.69 years of English study, which

most likely took place in junior-high and high-school environments where teaching of English is restricted to one class per week and focuses on the development of reading comprehension. Again, the lack of focus on oral skills may have prevented these listeners from achieving high intelligibility rates.

Language study in class	Never or almost never	Sometimes	Most of the time	No answer
Grammar	1 (7.69)	0 (0)	11 (84.31)	1 (7.69)
Reading	2 (15.38)	7 (53.84)	1 (7.69)	3 (23.07)
Writing	3 (23.07)	4 (30.76)	4 (30.76)	2 (15.38)
Speaking	8 (61.53)	3 (23.07)	0 (0)	2 (15.38)
Listening	5 (38.46)	3 (23.07)	3 (23.07)	2 (15.38)
Pronunciation	8 (61.53)	3 (23.07)	0 (0)	2 (15.38)

Table 5: Frequency of language study in class (percentages in parenthesis).N = 13.

In an attempt to gain some insight about how the listeners' experience with English could be related to their performance on the intelligibility test, a composite variable was created using 12 questions from their profile questionnaire. These questions addressed the following issues: years studying English, number of daily hours studying speaking, listening, and pronunciation, number of days spent in an English-speaking country, number of hours talking in English with natives speakers of English, with speakers of other languages (in English), number of hours listening to English, watching TV in English and listening to music in English. All these numbers were added up resulting in the composite score displayed in Table 6, together with the scores for correct responses (i.e., transcriptions of the target verb forms) in the intelligibility test. The two scores were correlated using a Pearson correlation, given that the dataset presented normal distribution.

As can be seen in Figure 4, the results yielded a weak, positive correlation (r=.273), which reached no significance (p>.05). In conclusion, listeners' experience with English, as measured with the help of a questionnaire, is not related to their ability to understand the verbs produced by different groups of English speakers. Indeed, measuring L2 experience is a difficult endeavor, as explained by Trofimovich (2011).This is because L2 experience encompasses a number of possible encounters that learners may have with the L2, and many of these encounters are difficult to measure experimentally (TROFIMOVICH, 2011).

Participant	L2 Experience	Intelligibility Scores
1	18	16
2	24	9

3	16	8
4	28	10
5	31	13
6	32	18
7	23	9
8	16	12
9	25	13
10	35	8
11	39	15
12	16	10
13	33	12
Mean (SD)	25.85 (7.86)	11.77 (3.16)

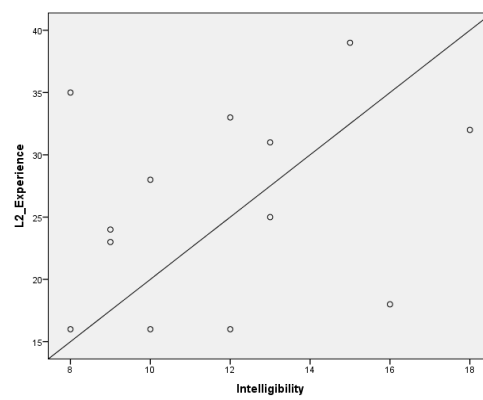Table 6. Correlations between listeners' L2 experience and performance on the Intelligibility Test.

Figure 4. Scatterplot for correlation between L2 experience and intelligibility.

Overall, results discussed so far demonstrated that the rates of intelligibility, other verb forms and breakdowns varied among the Brazilian listeners and among the verbs, suggesting that the acquisition process may not be linear or the same to all learners, as suggested by the Dynamic System Theory (DE BOT, LOWIE, VERSPOOR, 2007; ELLIS, 2007; LARSEN-FREEMAN, 1997; LOWIE, 2011, 2013; THOMSON, 2015; TROFIMOVICH, KENEDY, FOOTE, 2015). In addition, results of the present study also suggested that talkers' L1 and type of verb, whether regular or irregular, did not have a significant effect on verb intelligibility in the present study. However, the expected trend for talkers' L1 was found, with the talkers who shared the same L1 (BP) or whose L1 was similar (Spanish) to the listeners' being easier to understand than talkers whose L1 was English or German. Furthermore, the regular verb whose pronunciation of the *-ed* morpheme was [d] was found to lead to lower intelligibility rates, which deserves further investigation.

While L2 experience is an important factor in L2 studies, results of the present study suggest that Brazilian learners of English do not seem to have enough contact with the English language in its oral form, either at school or outside it, which may have affected the results of the present study, reinforcing the claim that Brazilians may have difficulty in recognizing English regular and irregular verbs in the simple past tense. Moreover, the way this construct was operationalized in the present study did not allow us to examine its relationship with the listeners' performance on the intelligibility test.

Taken together, results of the present study emphasize the need for Brazilian learners of English to be exposed more frequently to the English language spoken by its native and non-native speaker or have pronunciation classes to increase awareness on English pronunciation. If adopted, these two procedures would help Brazilian learners of English to better recognize words, verbs in this specific case, increasing intelligibility and decreasing the breakdowns in communication, which, in turn, would improve face-to-face or on-line interaction among speakers of English with different L1 backgrounds.

Conclusion

This study investigated the intelligibility of 416 English verbs in the simple past tense by Brazilian listeners, which were produced by eight talkers, two BP, two Spanish, two German and two English native speakers.

Although the research hypothesis regarding talkers' L1 were not confirmed by the statistical test, a clear trend in the direction pointed in the literature was found. Brazilian listeners tend to understand better past tense verbs that are produced by talkers who share the same L1 or who speak an L1 that is typologically closer to their L1 (Spanish). On the other hand, understanding native speakers of English is more challenging than understanding other non-native speakers, which comes as no surprise given the little contact that the listeners reported having with spoken English, being it with native-speakers of English or speakers of other languages. The exploratory question about the influence of verb type showed a clear tendency for the verbs whose past tense morpheme is pronounced as [d] to lead to lower intelligibility rates. Comparing these results to those obtained in production studies, it is observed that they followed the tendency found in Frese (2006), who observed more pronunciation problems (e.g., vowel epenthesis) in verbs that must be pronounced as [d] but followed the opposite tendency found in Delatorre (2006), in which verbs that must be pronounced as [t] were more problematic (were produced with higher rates of vowel epenthesis) for Brazilian learners of English.

In conclusion, the present study has raised interesting questions about learning to recognize regular and irregular verbs in the L2. When the learner is exposed to a variety of accents, developing new phonetic and phonological categories for the L2 becomes a challenge. Furthermore, the few opportunities to use the language for communication may slow down this development and the ability to understand the L2 and communicate successfully. An increase in the contact with English spoken by its speakers from different L1 backgrounds, either in class or outside, in parallel with pronunciation teaching in order to increase awareness on pronunciation, would probably help Brazilian learners of English to increase the intelligibility of words, as verbs, to decrease breakdowns in communication and, consequently, improve face-to-face or on-line interaction with English speakers who have different L1 backgrounds. However, this improvement seems to be non-linear, varying among learners.

A inteligibilidade dos verbos da língua inglesa no passado simples: falantes nativos e não-nativos do inglês e ouvintes brasileiros

RESUMO: Este estudo investigou a inteligibilidade de verbos da língua inglesa no passado inseridos em sentenças, produzidos por dois falantes adultos nativos e seis não-nativos do inglês e avaliados por treze ouvintes brasileiros adultos aprendizes de inglês. Os resultados demonstraram que a inteligibilidade dos verbos regulares e irregulares foi similar; bem como a inteligibilidade dos verbos produzidos por falantes de PB e espanhol. Porém, a inteligibilidade dos verbos produzidos por falantes de alemão foi menor que a dos falantes de línguas românicas, mas maior do que a inteligibilidade dos verbos produzidos por nativos do inglês.

Palavras-chave: inteligibilidade; pronúncia; passado simples; L1 do falante; ouvintes brasileiros.

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APPENDIX A

List of sentences, verbs and speakers in the randomized order

01 BPT2: She bought a new car.
02 ST2: They voted in the elections.
03 ET2: Students trained for the test.
04 GT2: Mary washed her dress.
05 ST1: They came by bus.
06 BPT1: The stadium cheered him.
07 GT1: Tom guided visitors.
08 ET1: Bob stopped smoking.
09 BPT2: She played piano.
10 GT2: He drove for 18 hours.
11 ST1: They watched a movie.
12 ET2: Helen painted her bedroom.
13 GT1: The audience laughed out loud.
14 BPT1: He needed a job.
15 ET1: She made a cake.
16 ST1: The pilot saved all passengers.
17 BPT2: I visited my family.
18GT1: They took a trip.
19 ST2: She looked for a new job.
20 ET1: They judged a robber.
21 BPT1: They skipped some exercises.
22 ST1: Models avoided eating.
23 ET2: He wrote a letter.
24 GT1: The driver caused an accident.
25 ST2: The family had breakfast together.
26 BPT2: Suzy kissed her father.
27 GT2: The teacher spelled his name.
28 ET1: He recorded a video.
29. BPT1: Kids slept for 10 hours.
30 ST2: Children screamed a lot.
31 ET2: He missed some classes.
32. GT2: They waited for the train.