

The aspiration of voiceless stops by Brazilian learners in contexts of authentic communication

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This paper aims at studying the production of aspiration by Brazilian learners of English. Aspiration is a quick projection of air released after voiceless stops when they are found in stressed syllables before vowel sounds. It is measured in milliseconds and is usually longer in native speakers than learners (Alves & Magro 2011). Most importantly, aspiration contributes decisively to intelligibility (Jenkins 2000). So, an understanding of the way aspiration operates in the speech of learners is important to help them improve their oral communication abilities. We analysed the recordings of ten students of Letters who were at intermediate or advanced levels of command of the language, totalizing 1590 occurrences. Those recordings compose the oral corpus LINDSEI-BR, which is the Brazilian branch of the LINDSEI project. Instead of controlled activities of reading texts in laboratories, the participants could talk freely about a variety of topics, in a context which was very similar to spontaneous speech in authentic communication. The length of aspiration was analysed using the software PRAAT. Our results revealed aspects regarding the students' production of aspiration which had not been detected in similar studies and, thus, can provide future ones with other ways of looking into the phenomenon.

Keywords: pronunciation; aspiration; Brazilian learners

1. Introduction

The area of English teaching and learning is characterized by a swing in the pendulum regarding the focus which is devoted to certain linguistic aspects. One of them has deserved little or no attention by the most prestigious methodological approaches and methods of the latest decades, but which otherwise has witnessed a revival in interest in the literature: pronunciation (Celce-Murcia *et al.* 2010).

Its importance today is unquestionable. The globalized world demands the ability of communicating adequately in various contexts and good pronunciation is crucial for intelligibility, which is the ability to understand others and make oneself understood (Jenkins 2000).

Nevertheless, the teaching of pronunciation is approached by several theoretical points of view and there is no consensus about which aspects should be taught to learners nor about their order of presentation. With the aim of offering directions to teachers and educational institutions about priorities to be dealt with in the area, Jenkins (2000) proposed the *Lingua Franca Core*. It is composed by some elements which, according to the author, would be fundamental for international intelligibility. One such element is aspiration.

For this reason, we decided to investigate the production of aspiration by Brazilian learners of English. In order to do so, we took into consideration several aspects which interact to constitute their specific way of speaking: the role of perception in learning, the interference of the mother tongue (from now on, L1) and the possibility of fossilization of phonological items in the target language (L2).

2. Theoretical background

Regarding learners' pronunciation, one of the most important aspects is perception. Its relevance has been investigated since the first part of the XIX century, although it has been underestimated in the literature (Escudero 2007). The problems related with perception can be classified as:

- a. phonological, which are the ones referring to acoustic processing and which derive exclusively from deficient reception of sounds, for example, the word *sat* [sæt], perceived and pronounced as *set* [sɛt] because of the difficulty that Brazilian learners have in perceiving the phoneme /æ/, which is not part of the phonemic inventory of Brazilian Portuguese;
- b. derived from spelling versus phonological relationships, which are those caused by the lack of knowledge about the ways English phonology works, for example, the relationship between the spelling and the pronunciation of words (Pennington 2007). In order to illustrate the point, one of the most common mistakes in Brazilian learners' speech is to say the word *apple* like [ˈɛɪpəl], because of the fact they do not know that, when followed by a double consonant, the vowel *a* is always pronounced /æ/ in stressed syllables.

The importance of perception becomes evident when we consider that English has lots of phonological features which do not exist in Portuguese, in all levels of speech: segmental, intersegmental and suprasegmental. In the segmental level, for example, there are vowel and consonant sounds like /θ/, /ŋ/, /ð/, /æ/, /ʌ/, /b/ and /u:/. In the intersegmental level, which is the level of words, is our object of study, aspiration, as well as other features like stress, vowel length before voiced consonants, and so on. Finally, in the suprasegmental level, which is the level of prosody, we have sentence stress and intonation as examples.

Such phonological features are challenges for the learner, be it because they demand a new way of positioning the speech organs to which they are not used to, in the case of the phonemes that do not exist in the L1, or because of the fact that the learner may simply not be able to notice them. We can conclude from this reasoning that the learner will benefit from classroom interventions which, first, make them aware of the existence of those phonological features and, later, provide them with opportunities of practice, as several studies indicate (Blanche 2004; Lima Júnior 2010; Tost 2013; Kissling 2013).

Another crucial aspect for our work is the influence of the learners' L1 in the acquisition¹ of the L2. That influence has been a theme of debate for a long time in the literature. It has assumed a negative role in some learning theories which culminated, for example, in its banishment from the L2 classroom with the goal of minimizing its interference over learning (He 2012). However, nowadays there are other lines of investigation which go in the opposite direction, that is, which postulate that the use of the students' L1 in the classroom may be positive (Mello 2005; Hall & Cook 2012; He 2012). This idea is important for our work, since we believe that one of the ways of incorporating the phonological aspects of an L2 is by comparing them with the structures from the L1, as Pennington (2007) postulates when she proposes that the acquisition of the phonological system of the L2 stems from the phonological inventory of the L1, the same applying to their written representations. The author emphasises that acquisition occurs by means of general comparisons of the similarities between the two systems, through which the learner categorizes the new aspects.

In the area of phonology, the interference of L1 works in various ways, but it is known that the phonological items from the L2 that do not exist in the L1 may go unnoticed by the learners (Keys 2002), which is the case of aspiration. That makes evident the relationship between perception problems and the L1 interference.

¹ Here we use the term *acquisition* with the general meaning of learning.

One last aspect that is related to this interference is fossilization. It can be characterized as relatively stable stages of deviant forms of the L2 found in the learners' interlanguage, and which may last for quite variable periods, sometimes being lifelong. This means that one specific learner may never acquire a certain phonological feature (Shormani 2013). This author, in his comprehensive study of the phenomenon, mentions other authors who make use of terms such as "permanent transference", "manifestation of difficulty in getting rid of L1 parameters" or the "co-occurrence of multiple factors related to the interference of L1" in order to define the concept. Han (2004: 219) corroborates this line of thinking when mentioning that the causes of fossilization may lie, among other aspects, in the 'lack of instruction, the lack of corrective feedback and language transfer'. On the other hand, according to Shormani (2013), the learners who exhibit fossilization in a specific item are not doomed to stand still in their command of the language, for proper instruction may lead them to overcome their difficulties. Spada & Lightbown (1999) defended this point of view when they suggested that explicit instruction in pronunciation, including the use of contrastive metalanguage, may help learners overcome otherwise stable interlanguage stages. This is extremely important for all those involved with L2 teaching and learning, since it means the possibility of success for learners who would possibly be resigned to limitations in their knowledge of the language. Studies like França (2011) indicate that, with experience and exposure to the language, advanced learners incorporated aspiration in their speech. However, the author does not let it clear whether those learners were exposed to explicit teaching.

After discussing some of the factors that may exert influence over the production of aspiration by learners, we will now define this concept. It is a phonological phenomenon characterized by a short projection of air following the production of the voiceless stops /p/, /k/ and /t/, when these are found in stressed syllables and before vowel sounds. It is signalled with the symbol /^h², for example, in words like port [p^hɔrt]. This projection of air lasts for some milliseconds and this time period is usually longer in native speakers, compared to language learners (Alves & Magro 2011; Prestes 2012). In order to analyse the learners' speech, we will use the values proposed by Lisker & Abramson (1964), which are, in milliseconds: /p/ - 58, /t/ - 70, /k/ - 80³. These variations in the values are due to factors such as the articulation point, the size of the contact area

² According to the International Phonetic Alphabet: www.arts.gla.ac.uk/IPA/ipa.html (accessed December 1, 2016)

³ This may vary according to factors such as the speaker, word prominence or speech rate.

of the articulators and the speed of the movement of the articulators (Cho & Ladefoged 1999).

Aspiration is important for intelligibility for it avoids misunderstandings which may be generated in speech. There may be cases in which a person interprets the voiceless stop as its voiced counterpart, for example, the word “pea” may be mistaken with “bee” if the speaker does not produce aspiration (Jenkins 2000).

Another example may be given in prosody, a phonetic level that demands from the learner the knowledge of phonological elements such as sentence stress, for example. A possible source of difficulty here lies in the fact that there is a distinction in the kinds of words which are stressed or not. There are two categories: the first one is composed by the so-called function words, which work as a syntactic support for the construction of sentences and are not usually stressed⁴. Examples of this category are articles, prepositions and auxiliary verbs in the affirmative form. The second category, content words, are those which carry meaning and are usually stressed, like nouns, adjectives or adverbs. As an example, learners may have difficulty with the auxiliary *can*. The stressed form of this verb, with aspiration, is used in negatives; also, the final /t/ of the negative *can't* is usually unreleased, which may lead learners interpret it as affirmative, and so produce the stressed form in affirmatives too. This problem becomes more relevant when we consider the high frequency of this verb in the language.

It follows that Brazilian learners' perception of the existence of aspiration is influenced by the interference of their L1, where the phenomenon does not exist. This way, we may predict a great percentage of problems in their speech regarding this aspect. Besides, we must take into consideration those lexical items which were learned in the first stages of contact with the L2, without the learners' awareness of aspiration. Eskildsen (2008) postulates that those kinds of items may suffer the process of fossilization and be harder to change. Thus, we expect that the learners will find it difficult to produce aspiration in this case.

In summary, we may outline the following picture: aspiration is a phonological feature of the English language which is fundamental for intelligibility and that does not belong to the phonological inventory of Portuguese. Its production may be influenced by aspects related to learners' perception, the interference of their L1 and the fossilization of certain lexical items. This being so, our hypothesis is that an analysis of Brazilian learners' speech will reveal high levels of absence of aspiration. In this study we will investigate whether the production of aspiration can be influenced:

⁴ Function words may receive stress if it is the speaker's intention to emphasise them.

- a. by the different points of articulation of the voiceless stops (bilabial /p/, alveolar /t/, and velar /k/);
- b. by the level of the command of the language, associated or not with the fact that the learner may have lived in English speaking countries;
- c. by the stage when the speaker incorporated certain lexical items in his inventory, for we believe that those items learned inadequately in the first contacts with the L2 may be fossilized;
- d. by any specific context, be it in the intersegmental or the suprasegmental level.

3. Methodology

The use of corpora has become a relevant tool in the area of L2 teaching and learning, for it provides studies with an empirical basis (Gries 2011). McCarthy (2008) and Frankenberg-Garcia (2012), for example, highlight the importance of teacher education for the use of corpora in their lessons. In the area of pronunciation, learner corpora have been especially valuable and their applications allow for a deeper understanding of topics like the interference of L1 in learners' speech, the determination of problematic areas in the L2 for speakers of a specific L1, or even the development of textbooks and syllabuses (Belz 2004; Sardinha 2004; Anderson & Corbett 2009; Romer 2011). Having this in mind, this work aimed initially at identifying aspects and contexts of the phonological system of the L2 which are particularly challenging for Brazilian learners, and that are related to aspiration.

As a means of checking the relevance of our results, we will compare them with others found in the literature, which used Brazilian learners as participants, for example, Zimmer (2006), Alves & Magro (2011) and França (2011). However, we want to highlight that our study took a different approach. Our participants were involved in activities that elicited spontaneous speech and not pre-fabricated texts which were read in laboratories, which was the case of the aforementioned studies. Besides, we tried to identify specific contexts which cause more difficulties to Brazilian learners as a way to provide a more detailed view of aspiration.

Therefore, we utilized the recordings of interviews with ten Brazilian learners of English, who were at intermediate and advanced levels of command of the language. They were students of the course of Letters in two state universities. Those recordings are an excerpt from a total of 50, which compose the LINDSEI-BR, the Brazilian branch of the international corpus LINDSEI (Lou-

vain International Database of Spoken English Interlanguage), based in Belgium. The recordings are composed by semi-structured interviews in which the participants perform a variety of activities with a wide possibility of choice of themes. They may choose the course of their ideas, which makes the activities very similar to spontaneous speech. Thus, our data are constituted by an oral corpus in contexts which are really close to authentic communication between English language users.

The interviews are transcribed after being recorded. They are marked-up using the same conventions; later, revisions and transcription validations are undertaken. However, the corpus is not only directed towards studies about the oral features of the language. In that matter, the only phonological aspects which appear in the transcription conventions are: the pronunciation of the article *the* before vowel sounds is marked “the[i:]”; syllable lengthening in situations where it shouldn’t happen is marked “:.”; and the article *a* pronounced as “a[ei]”.

The absence of phonological aspects in the transcriptions results in the omission of some features of learners’ pronunciation, which would be crucial for studies intending to understand how they interact in the learners’ speech. This way, the creation of new phonological conventions would have the potential to offer new data for researchers, teachers and textbooks authors. In order to do so, it will be necessary the inclusion of other symbols, for example, taken from the IPA, with the goal of representing other phenomena like the inadequate production of a consonant or vowel sound; word or sentence stress; and aspiration. Processes of transcription of phonological features in language corpora have already been undertaken. This is the case of the General Service List, which had pronunciation aspects analysed and transcribed by Gilner & Morales (2008).

When we started thinking about the transcription of aspects related to aspiration, we took into consideration two situations: its absence in contexts where it is mandatory (more common) or its presence where it is not expected. This way, we decided to create the symbol /^h?/ for the first case (absent mandatory aspiration) and the symbol /^h !/ for the second case (production where it is not expected). So, as an example, the word *total*, which demands aspiration in the first /t/, will be transcribed as [t^h?əʊtəl] if the speaker does not produce it; it will be transcribed as [t^həʊt^h !əl] if the aspiration is produced in the first syllable but it is also produced in the second, where it shouldn’t be.

Regarding the process of measuring the length of aspiration, we are referring to intervals of time which last milliseconds, or one thousand times less than a second. The human ear does not have the precision needed to conduct such enterprise without the use of a tool. For this reason, we used the software Praat

because it allows the researcher to execute such measuring in a satisfactory way. In figure 1 we can have an idea of how it works:

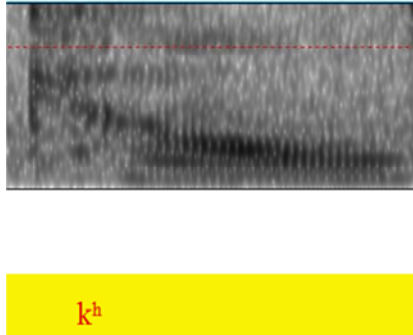


Figure 1. Aspirated /k/ in the word ‘counselor’. The blurred grey area between the consonant and the vowel sounds is the aspiration

It is convenient to mention some specific contexts found in the recordings analysis. First, when a given lexical item presented more than one context where aspiration was possible (even if it was wrong), the measures were marked in the sequence the contexts appeared. As an example, a participant said the word “communicate”, in which the phoneme /k/ might be inadequately aspirated in both the first and third syllables. The results were 33 and 41 milliseconds, respectively, showing that the participant did not produce aspiration, according to the mean values specified in this paper.

The boundaries between words were not considered, for the phenomenon is not predicted in such context. However, some cases were found, for example, in the fragment “... spot I have...”, the phoneme /t/ was aspirated by the speaker.

In other situations, the shift in word stress changed the expectation of the presence of aspiration. This was the case of the word “interference”, for example, whose pronunciation is [ɪntərˈfɪərəns], in which there is no aspiration because the phoneme /t/ is not in a stressed syllable. A learner put the stress in the second syllable, which would lead to the production of aspiration. However, this did not happen and the word was pronounced [ɪntʰɪərəns], showing a mistake in the production of aspiration.

Finally, another situation we found occurred in the production of the word *identity*. The phoneme correspondent to the first /t/ was pronounced inadequately with aspiration. Besides, the vowel phoneme following it was omitted, resulting in the production [aɪˈdɛntʰɪ]. Such phenomenon has been described in the

literature, as in Shockey (2011). In this case, one of the conditions for the occurrence of aspiration, the existence of a vowel sound after the voiceless consonant, is challenged.

It is not our goal here to discuss cases such as this or aspiration in boundaries between words, but we decided to mention them because other researchers might get interested in conducting investigations in the area.

Finally, for the analysis of the results we will utilize a binary categorization, which means that aspiration will be classified either as present or absent. All data and results will be discussed in the light of this categorization.

4. Results and discussion

We registered a total of 1,590 occurrences of contexts where aspiration was possible. As we will take inconsistencies into consideration, it is necessary to determine the conditions under which this feature was analysed.

Firstly, we defined inconsistency in this study as the co-occurrence of two forms, aspirated and non-aspirated, in the same position in a specific lexical item. After defining it, we needed a criterion to classify a production as consistent or inconsistent. We decided to determine that any item whose difference in aspiration production percentages (either correct or not) were bigger than 33% would be considered inconsistent. In practice, if a speaker produces an item correctly three times and incorrectly one time (one in four, or 25%), the production will be considered consistent and correct. If, on the other hand, the item is produced correctly two times and incorrectly one time (one in three, or 33.3%), the production will be considered inconsistent. This criterion was determined arbitrarily because we believe that a proportion bigger than one third in the correct production of any item means that the learner's interlanguage is in process of consolidation of the adequate form, but exhibits a small percentage of deviant forms. In the following table we can observe the frequency of occurrence of aspiration in the three voiceless stops:

Table 1. Production of aspiration (asp.) in percentages, having as a basis Lisker & Abramson (1964), in milliseconds: /p/ - 58, /t/ - 70, /k/ - 80

Phoneme	Correct mandatory asp.	Absent mandatory asp.	Inconsistent mandatory asp.	Correct non - asp.	Production of non - mandatory asp.	Inconsistent non - mandatory asp.
/p/	19.7%	72.4%	7.9%	90.4%	4%	5.6%
/t/	34.7%	58.7%	6.6%	76.3%	19.1%	4.6%
/k/	17.5%	69.8%	12.7%	82.4%	12.7%	4.9%

The phoneme /t/ showed the biggest level of correct mandatory production (34.7%). On the other hand, the percentage of 19% in the production of non-mandatory aspiration for this phoneme was also the highest. These are probably cases of intralinguistic influence. The lexical item *painting* deserves to be mentioned, for the phoneme /t/ was aspirated by all speakers who used it (6 in 10). The ending *-tor* also called our attention, for it was aspirated in most of the cases in items like *translator* and *creator*.

Regarding the phonemes /p/ and /k/, the percentage of correct mandatory aspiration in /p/ was slightly bigger than in /k/ (19.7% against 17.5%)⁵, differently from what is described in the literature (Zimmer 2006; Alves & Magro 2011; França 2011), which shows /p/ as having a smaller percentage of correct aspiration. However, the level of absent mandatory aspiration in /p/ was slightly higher than in /k/, 72.4% against 69.8%. This is due to the higher inconsistency in /k/ than in /p/ (12.7% against 7.9%).

The analysis of the table allows us to conclude that the interference of the L1 may be a cause of such results. As the L1 does not have aspiration, low levels of its correct production were expected, which in fact happened (the average was 23.96%, considering the three phonemes). We also expected that correct non-aspiration would exhibit a high percentage, which was also confirmed (the average, in this case, was 83.03%).

We also set to investigate if the level of command of the language, associated with the fact that a learner has lived in an English speaking country, would have any influence over the production of aspiration. Because of that, the results were grouped taking each participant in isolation and arrived at table 2:

⁵ A test of proportion will be performed to see if this difference is significant.

Table 2. Results of the individual production of aspiration by the learners, in percentages. Advanced (A) and Intermediate (I) command of the language is identified for each speaker.

Phoneme	Aspiration	Result	Speakers (percentage)										Totals	
			01 (A)	02 (I)	03 (I)	04 (I)	05 (A)	06 (I)	07 (A)	08 (I)	09 (A)	10 (I)		
/p/	Present	Correct	39	0	13	22	50	0	33.3	0	20	20	19.7	
		Wrong	44	100	87	78	42	100	33.3	100	60	80	72.4	
		Inconsist.	17	0	0	0	8	0	33.3	0	20	0	7.9	
	Totals		100	100	100	100	100	100	100	100	100	100	100	
	Absent	Correct	76	80	100	80	73	95	100	100	100	100	90.4	
		Wrong	6	20	0	0	9	5	0	0	0	0	4	
		Inconsist.	18	0	0	20	18	0	0	0	0	0	5.6	
	Totals		100	100	100	100	100	100	100	100	100	100	100	
	/t/	Present	Correct	67	31	6	17	65	0	62	22	67	10	34.7
			Wrong	13	56	94	83	24	100	33	61	33	90	58.7
Inconsist.			20	13	0	0	11	0	5	17	0	0	6.6	
Totals			100	100	100	100	100	100	100	100	100	100	100	
Absent		Correct	72	62	60	87	62	95	95	84	57	89	76.3	
		Wrong	24	38	36	13	19	5	0	12	33	11	19.1	
		Inconsist.	4	0	4	0	19	0	5	4	10	0	4.6	
/k/		Present	Correct	38	31	10	0	45	0	0	8	43	0	17.5
			Wrong	46	46	90	79	30	100	80	84	43	100	69.8
			Inconsist.	16	23	0	21	25	0	20	8	14	0	12.7
	Totals		100	100	100	100	100	100	100	100	100	100	100	
	Absent	Correct	81	80	90	88	60	100	82	93	50	100	82.4	
		Wrong	12	20	10	12	10	0	18	7	38	0	12.7	
		Inconsist.	7	0	0	0	30	0	0	0	12	0	4.9	
	Totals		100	100	100	100	100	100	100	100	100	100	100	

The figures reveal great differences in the participants' performance: numbers 1, 5, 7, and 9 lived abroad and have a more advanced command of English. They have, in general, much higher percentages of correct production of aspiration. On the other hand, the ones which had not lived abroad and had a lower knowledge of the language, like numbers 3 and 6, exhibited very low levels of production of mandatory aspiration. This way, it seems that the production of mandatory aspiration goes hand in hand with more advanced levels of command of the language. This may be related to exposure to native speakers' speech, which reinforces the importance of perception in language learning.

As for the items learned in the initial stages of contact with the L2, these are a challenge for learners because, if they were learned without the production of aspiration, they may have fossilized. This may explain the low correct percentages in the production of words like attention, course, important, kind, parents, people, person, picture, possible, put, story, teach, teacher, teaching and vaca-

tion, all of them less than 50%. These results go in line with the data obtained by Soares (2012). On the other hand, it is worth mentioning that fossilization may be reverted through instruction, as pointed out by Eskildsen (2008).

Corpus Linguistics is essentially descriptive and adopts, as one criterion of study of a language, the frequency with which certain lexical items are used in everyday life. Therefore, it is important to know which items learners use more frequently so that more precise interventions may be figured out to help them overcome their difficulties. Moreover, the most frequent items allow for a more detailed analysis of how a variety of aspects interact in the production of speech. This way, we proceeded to the analysis of the most frequent items in every recording. We only considered those which appeared four times or more in order to guarantee a variety of production contexts. The results are in the following table:

Table 3. Shortest and longest values of production of aspiration for the most frequent items, in milliseconds

Speaker	Shortest and longest values of production of aspiration for the most frequent items, in milliseconds
01	because 31 – 104; important 12 – 79 (p) e 28 – 47 (t); kids 29 – 114; Mexican 24 – 53; okay 40 – 110; paint 65 – 172; people 25 – 78 (1° p) e 22 – 47 (2° p); person 18 – 128; special 18 – 29; spent 12 – 100; teach 48 – 74; teacher 22 – 44;
02	because 34 – 56; can 30 – 56; context 11- 34 (k) e 12 – 20 (t); person 11 – 22; pictures 10 – 19; second 15 – 44; speak 10 – 15; speech 10 – 26; text 13 – 26; think (t) 12 – 39; understand 12 – 32; writing 23 – 41
03	because 38 – 91; picture 27 – 50; start 32 – 60;
04	because 36 – 67; can 39 – 100; okay 35 – 73; store 26 – 42;
05	barbecue 76 – 108; because 27 – 173; camping 43 – 100 (k) e 12 – 34 (p); could 52 – 81; people 18 – 49 (1° p) e 11 – 28 (2° p); polite 31 – 95; Spain 12 – 136; started 39 – 76 (1° t); stay 22 – 43; stayed 30 – 41; ten 49 – 155; time 42 – 120; two 94 – 125
06	because 44 – 81; experience 14 – 19; time 64 – 84;
07	because 13 – 63; country 44 – 85; cultural 43 – 76; culture 41 – 83; kind 28 – 75; okay 26 – 62; people 13 – 48 (1° p) e 16 – 48 (2° p); Picture 10 – 22; quite 26 – 71; Slovakia 26 – 80; sometimes 34 – 85; tell 19 – 89; time 27 – 108; together 28 – 62; took 37 – 60; touch 18 – 57; town 41 – 71; Turkey 21 – 53 (t) e 26 – 61 (k); two 24 – 84;
08	because 26 – 60; called 38 – 85; could 22 – 68; people 10 – 54 (1° p); story 25 – 49; talk 23 – 52; talking 15 – 39 (t);
09	because 25 – 136; can 29 – 93; can't 32 – 83; kill 33 – 121; killers 39 – 87; okay 22 – 92; scary 28 – 45; town 31 – 61
10	because 23 – 90; candidate 51 – 69; okay 67 – 126; Picture 12 – 38; started 35 – 57 (1° t);

The most salient result is the great difference in the length of aspiration production in lots of items, mostly in the speech of more advanced learners (1, 5, 7 and 9). Apparently, certain contexts favour and others inhibit the production of aspiration. We try to explain this later. The variation was smaller in the other learners' speech, what is consistent with their general lower levels of production of mandatory aspiration. Based on the data from table 3, we made table 4, which shows the most frequent items in a variety of contexts. Our goal was to detect specific communicative situations which may exert some degree of influence

over the production of aspiration. Each context is represented by, at least, two occurrences. The values represent the average length of aspiration in the items, in milliseconds.

Table 4. Length of aspiration in specific items, in a variety of contexts, measured in ms

Speaker number and items	Speech at normal speed; lexical items produced without pauses before or after	Longer syllables	Fast speech	Lexical items produced before, after or between pauses
01				
because	55.00	80.00	39.00	55.40
kids	66.00	91.67		80.00
okay	78.50		42.50	69.30
people	39.50 – 28.25			40.80 – 29.60
spent	28.00	67.71		21.67
02				
because	34.00	45.67		47.00
can	39.07	50.50		46.00
pictures	12.00			13.57
think	26.43			19.50
understand	16.00			21.60
03				
because	71.00			60.25
04				
because	46.83			50.00
can	54.25			62.25
okay	44.50			59.50
05				
because	45.50	79.20		49.00
06				
because	33.50		27.47	32.27
country	60.33		52.33	57.00
quite	46.75			42.67
07				
because	57.33	66.75		61.00
08				
because	30.00	44.40		
09				
because	34.50	112.50		43.67
okay		60.75		50.75
scary	31.33			35.00
10				
because	46.63	90.00		88.25
could	60.75			66.50
stay	31.00			34.00

The first category, speech at normal speed with lexical items produced without pauses before or after, had 26 occurrences, of which 18 (or 69%) were shorter and 6 (23%) longer, when compared with other contexts. The production of longer syllables exhibited 11 occurrences, of which 10 (or 91%) were longer than the other contexts. Fast speech was detected in four opportunities, all of them shorter than the others. Finally, the presence of pauses before and/or after the items produced 26 occurrences and a more balanced picture: 6 shorter (23%), 9 in between (35%) and 11 longer (42%).

Although our results may not produce generalizations because of the reduced size of the sample, some tendencies were detected which, in our point of view, deserve to be submitted to other investigations in order to be confirmed or not: syllables which are longer in duration (that is, specially lengthened because of hesitation or emphasis, for example) seem to favour the production of aspiration, whereas fast and normal speed speech seem to inhibit it. The presence of pauses before and/or after the lexical items exerted a more balanced influence over aspiration, with a slight predominance of the production of longer length. Such influence is more easily evident if the participants were analysed separately, but this is not our goal.

5. Conclusions

We will first make an outline of our study: aspiration is a phonological feature that has an impact over the intelligibility of English language users. Problems in its production may cause misunderstandings in communication. Among the factors that interact in its perception and production by the participants in our study, the interference of their L1 is one of the most important. It has a negative influence, for the learners are led not to perceive or produce aspiration. Moreover, the items learned in the first contacts with the language may be fossilized (or stabilize) in deviant forms in their interlanguage.

In order to approach the phenomenon, we studied the recordings of interviews made with ten Brazilian learners of English, who were at intermediate and advanced levels of command of the language. The answers to the questions raised in the introduction were as follows, keeping always in mind the reduced size of our sample. Therefore, can aspiration be influenced by:

- a. the point of articulation of the voiceless stops?
Apparently yes. The phoneme /t/ presented higher levels of correct production of aspiration, both where it was mandatory and where it was not. Besides, differently from results from similar studies in the area, the level of

correct production for /p/ was higher than for /k/⁶, as well as the level of mistakes, due to higher percentages of inconsistencies for /k/;

- b. the level of command of the language, associated with the fact that the learner has lived in an English speaking country?

More advanced levels of command of the language seem to influence positively the production of aspiration. In our study, it was always conjugated with the fact that the learner had lived in an English speaking country. Evidently other kinds of investigation are needed, for example, with advanced learners who do not have lived abroad or with learners with varied levels of command of the language but who have lived abroad.

- c. the stage in which the learner incorporated certain lexical items in his inventory?

It also seems to be the case. Our results confirm other studies in the area (Eskildsen 2008; Soares 2012) which demonstrate that those items learned in the initial stages of contact with the language tend to exhibit higher percentages of inadequate production of aspiration, possibly because of fossilization.

- d. any specific context?

It looks as if the presence of longer syllables before and/or after the lexical item seems to favour the production of aspiration, when compared with normal speed or fast speeches.

The limitations of this study point to the need of other investigations in the area. The design of one activity in the interviews led the participants to produce certain lexical items with a bigger frequency, like *painter*, *painting*, *painted*. New data collecting instruments may privilege the occurrence of a more varied spectrum of possibilities for the participants' width of speech. Similarly, it is necessary to compare learners with more varied command of the language, as well as ones who have lived in English speaking countries with others who have not. Finally, our study brings to light results about certain contexts of production of aspiration which had not been explored in previous studies, so we may give a contribution to future investigations.

⁶ Although some inferential statistics will be necessary to confirm it.

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References

- Alves, U.K. & Magro, V. 2011. Raising awareness of L2 phonology: explicit instruction and the acquisition of aspirated /p/ by Brazilian Portuguese speakers. *Letras de Hoje* 46(3): 71-80.
- Anderson, W. & Corbett, J. 2009. *Exploring English with online corpora: an introduction*. New York: Palgrave Macmillan.
- Belz, J.A. 2004. Learner corpus analysis and the development of foreign language proficiency. *System* 32: 577-591.
- Blanche, P. 2004. Using dictation to teach pronunciation. *Linguagem & Ensino* 7(1): 175-191.
- Celce-Murcia, M., Brinton, D.M. & Goodwin, J.M. 2010. *Teaching pronunciation*, 2nd ed. Cambridge: Cambridge University Press.
- Cho, T. & Ladefoged, P. 1999. Variations and universals in VOT: evidence from 18 languages. *Journal of Phonetics* 27: 207-229.
- Escudero, P. 2007. Second-language phonology: the role of perception. In M. Pennington (ed.), *Phonology in Context*. New York: Palgrave Macmillan, 109-134.
- Eskildsen, S.W. 2008. Constructing another Language - Usage-Based Linguistics in Second Language Acquisition. *Applied Linguistics* 30(3): 335-337.
- França, K.V. 2011. A aquisição da aspiração das plosivas surdas do inglês por falantes do português brasi-leiro: implicações teóricas decorrentes de duas formas de descrição dos dados. MA diss., Universidade Católica de Pelotas.
- Frankenberg-Garcia, A. 2012. Raising teachers' awareness of corpora. *Language Teaching* 45(4): 475-489.
- Gilner, L. & Morales, F. 2008. Elicitation and application of a phonetic description of the General Service List. *System* 36: 517-533.
- Gries, S.T. 2011. Nota introdutória do editor. *Revista Brasileira de Linguística Aplicada* 11(2): 277-294.
- Hall, G. & Cook, G. 2012. Own-language use in language teaching and learning. *Language Teaching* 45(3): 271-308.
- Han, Z. 2004. Fossilization: five central issues. *International Journal of Applied Linguistics* 14(2): 212-242.
- He, A.E. 2012. Systematic use of mother tongue as learning/teaching resources in target language instruction. *Multilingual Education* 2(1).
<http://multilingual-education.springeropen.com/articles/10.1186/2191-5059-2-1>
 (accessed December 1, 2016).
- Jenkins, J. 2000. *The Phonology of English as an International Language*. Oxford: Oxford University Press.
- Keys, K.J. 2002. First language influence on the spoken English of Brazilian students of EFL. *ELT Journal* 56(1): 41-46.

- Kissling, E.M. 2013. Teaching pronunciation: is explicit phonetics instruction beneficial for FL learners? *The Modern Language Journal* 97(3): 720-744.
- Lima Júnior, R.M. 2010. Uma investigação dos efeitos do ensino explícito da pronúncia na aula de inglês como língua estrangeira. *Revista Brasileira de Linguística Aplicada* 10(3): 747-771.
- Lisker, L. & Abramson, A. 1964. Cross-language study of voicing in initial stops: acoustical measurements. *Word* 20: 384-422.
- McCarthy, M. 2008. Accessing and interpreting corpus information in the teacher education context. *Language Teaching* 41(4): 563-574.
- Mello, H.A.B. 2005. Examinando a relação L1-L2 na pedagogia de ensino de ESL. *Revista Brasileira de Linguística Aplicada* 5(1): 161-184.
- Pennington, M. (ed.) 2007. *Phonology in context*. New York: Palgrave Macmillan.
- Prestes, S.P.C. 2012. Análise acústica da produção de consoantes oclusivas iniciais por falantes nativos de PB. *Anais do X Encontro do Celsul - Círculo de Estudos Lingüísticos do Sul*, Cascavel: Universidade Estadual do Oeste do Paraná.
<http://docplayer.com.br/5481235-Analise-acustica-da-producao-de-consoantes-occlusivas-iniciais-por-falantes-nativos-de-pb.html> (accessed December 1, 2016).
- Romer, U. 2011. Corpus research applications in second language teaching. *Annual Review of Applied Linguistics* 31: 205-225.
- Sardinha, T.B. 2004. *Lingüística de Corpus*. Barueri: Manole.
- Shockey, L. 2011. Shortcuts in casual english pronunciation. In D. Jones (ed.), *English pronouncing dictionary*. Cambridge: CUP.
- Shormani, M.Q.A. 2013. Fossilization and plateau effect in second language acquisition. *Language in India* 13(2): 763-784.
- Soares, V.H.M. 2012. L1 Brazilian Portuguese phonetic interference on L2 English: An Analysis Based on Corpora. BA diss., Universidade Federal de Minas Gerais.
- Spada, N. & Lightbown, P.M. 1999. Instruction, first language influence, and developmental readiness in second language acquisition. *The Modern Language Journal* 83(1): 1-22.
- Tost, G. 2013. Bettering pronunciation through reading aloud and peer appraisal. *Bellaterra Journal of Teaching & Learning Language & Literature* 6(1): 35-55.
- Zimmer, M.C. 2006. A desaspiração de plosivas surdas iniciais na transferência do conhecimento fonético do português brasileiro (L1) para o inglês (L2). 6 CELSUL, 2004, Florianópolis. *Anais do 6 Encontro do Celsul*. Florianópolis: Universidade Federal de Santa Catarina.