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Glottalizations before word-initial vowels in English
(Bakalářská práce)

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Olomouc 2015

Prohlašuji, že jsem tuto diplomovou práci vypracoval samostatně a uvedl úplný seznam citované a použité literatury.

V Olomouci dne

Vlastnoruční podpis

I would like to express my immense gratitude to my supervisor
Mgr. Šárka Šimáčková, PhD. for her guidance
and an immense amount of patience.

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1. Introduction

In phonology of the English language, glottal stops have been shown to have many functions. They occur optionally before word-initial vowels in which case they function as the word boundary marker or the hiatus-avoiding strategy. Additionally, they may serve as the glottal reinforcement or the glottal replacement, for example as the allophone of /t/, depending on which variety of English is being spoken.

This work focuses on the word-initial vowels. The term ‘glottal stop’ does not serve the purposes of this research ideally since a large number of studies have shown that the full glottal stop, defined by single pulses of irregularity, is only one type of glottal gesture used in spoken language and it is not even the most often used one (Redi and Shattuck-Hufnagel 2001, Garellek 2012). In all further instances, I will be using the terminology for distinction of glottal gestures that was defined by Garellek (2012). When referring to glottal gestures, he was distinguishing between diplophonia – regular alternation in shape, duration or amplitude of glottal periods; creak – low F₀ accompanied by near-total damping of glottal pulses; aperiodicity – pulse-to-pulse irregularity, either as jitter or as visible noise and full glottal stop.

Many studies have previously researched various segmental, lexical, prosodic, segmental and sociolinguistic factors that influence the occurrence of glottal stops or glottalizations before vowels in the word-initial position in either British or American English. These factors being for example hiatus environments (Umeda 1978, Dilley et al. 1996, Pierrehumbert 1995, Mompeán and Gómez 2011), backness of a vowel (Umeda 1978), stress and/or pitch on the vowels (Pierrehumbert and Talkin 1992, Pierrehumbert 1995, Dilley et al. 1996), gender (Byrd 1994, Dilley et al. 1996), as well as presence of the preceding pause (Kohler 1994) and lexical properties of a word - content x function words (Umeda 1978). As the most important factors were identified prominence and phrasing (Garellek 2012). Not as much attention was given, however, to the difference in glottalizing word-initial vowels between American and British English.

The first goal of this study is to compare the overall quantity of usage of glottalizations between the mentioned English varieties. General American and Received Pronunciation, later referred to as GA and RP, were chosen for the varieties of

English that this study aims to contrast, as they represent the prototypical varieties of American and British English. The second research question is to determine, whether there is any difference in usage of glottal gestures between GA and RP with respect to the types of these gestures defined in this study.

To find satisfying answers for these research questions, an experiment was carried out, which compared speakers of GA and RP, who elicited speech samples based on specifically prepared stimuli which was focused on the given issue. The stimuli was elicited in two different modes of speech, namely in isolated sentences and in connected speech. Possible criteria for identification of glottalizations and distinction of the types of glottal gestures are discussed in the literature and the most suitable will be used. Elicited stimuli will be thoroughly analyzed in the chapter 4 and discussed in the chapter 5. All acquired information will be concluded at the end of this work. After ruling out other factors influencing the occurrence of glottal gestures in the analysis, I tried to acquire convincing data to prove the differences in the usage of glottalizations by speakers of GA and RP, or to prove that there are none. The task may appear to be quite difficult with respect to the fact that the glottalization rate may vary substantially from speaker to speaker based on individual preference (Dilley et al. 1996).

2. Literature Review

2.1. Use of glottalizations at a word boundary in English

To see an English text realised using words may in some regards give the reader a fallacious notion of the speech that appears to be segmented. Written words are separated by spaces which might induce one to think that speech sounds are uttered in the same way, i.e. there is a pause between the pronunciations of each word.

In English, however, the most native-like pronunciation is generally achieved by reading the written speech in a rather continuous manner using the so called linking strategies to transition from a word to word smoothly, uninterrupted by pauses, except for the ones that occur naturally due to the phrasing of the sentences.

The prosodic conditions rarely allow for the full use of linking and the completely uninterrupted speech might also interfere with the intelligibility of the speaker. At the instance where linking is not applied, the use of glottal gestures takes place. There can be a few rare exceptions, e.g. a “soft onset” in singing (Pálková 1994).

2.1.1. *Types of glottal gestures*

Glottalizations are consonant-like sounds created using whole or partial closure of the glottis (which is defined, as the space between the vocal cords). They are similar to consonants in that there is an obstruction of the airstream flowing from the lungs. For example, the most widely recognized glottal gesture the so called glottal stop [ʔ] is produced, when the vocal folds are tightly pressed together followed by a brief period of silence and released. This mechanism is the very much the same that is being used during the creation of the consonants in the category of plosives. This stop might be considered voiceless since there is no vibration of the vocal folds present. But because the position of the vocal folds is not associated with other voiceless sounds (i.e. with wide open vocal cords), an alternative viewpoint regards [ʔ] as neither voiceless nor voiced (Cruttenden 2008: 168).

There is a number of states in which the glottis can appear, which enables several types of glottal gestures to exist and they can perform several specific functions. These types and their respective functions will be elaborated upon in this paragraph in a thorough or a very brief manner, depending on whether such information is relevant to this study. All the states of glottis to be mentioned later are displayed in the figure 1.

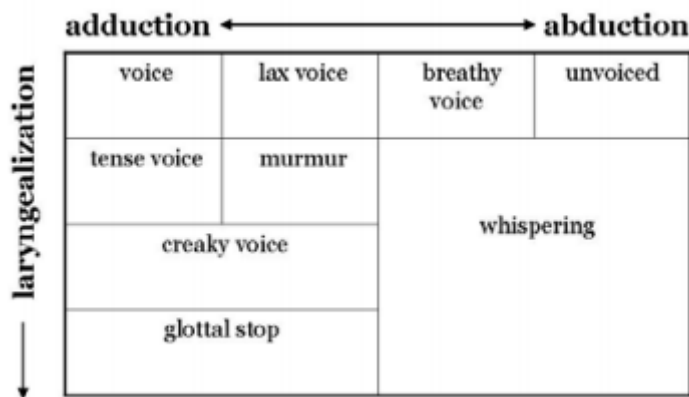


Figure 1 Two-dimensional model for phonation type classification (Gauffin, 1972)

Apart the usual realization of the voiceless fricative [h], which is considered a standard consonant, there is also a state, when there is a considerable airflow, as in an *h*-like sound, the vocal folds will be set vibrating while remaining apart a thus producing what is called a breathy voice, or murmur (Ladefoged 2010: 149). The symbol for this sound is [h̥].

During the phenomenon mostly referred to as the creaky voice or the creak, the arytenoid cartilages are tightly together, so that the vocal folds can vibrate only at the anterior end (Ladefoged 2010: 150). From the acoustic standpoint, this results in the total damping of glottal pulses (Redi and Shattuck Hufnagel 2001). The sounds created with a creaky quality may also be called laryngalized. Skarnitzl (2004) distinguishes up to six subtypes of the creak with respect to its regularity and temporal management, but some of them seem to almost correspond to his subtypes of the glottal stop. It might, however, prove to be useful to notice his division of creaks into those with regular and irregular pitch periods. The phenomenon of the creaky voicing can be seen in the figure 2, where we can observe a realization of a creak in between the two vowels [i] and [ɛ], which would be a suitable environment for the use of the linking strategy called linking /j/.

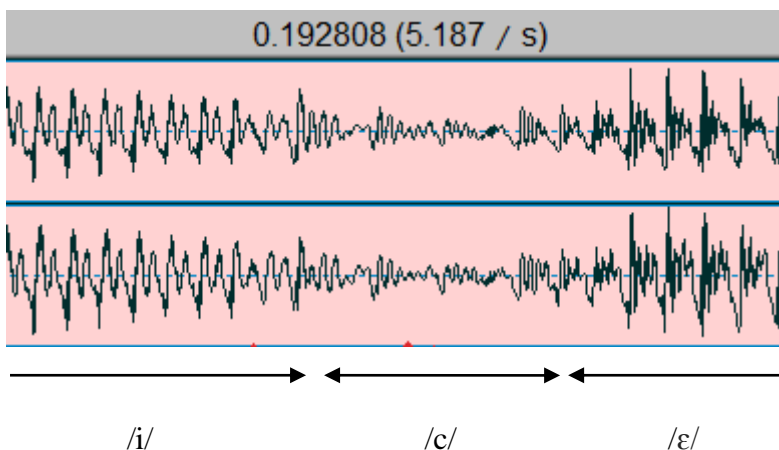


Figure 2 The realization of the creak by the speaker AMM1 in the phrase “three empty”.

There were several attempts to identify different subtypes of glottalizations. The most notable would be those of Huber (1988) and Redi and Shattuck-Hufnagel (2001). Together with the previously mentioned glottal stop and creak, they have established another subtypes as aperiodicity, diplophonia and glottal squeak. The last of these terms, the glottal squeak, was acoustically defined as a sudden shift to relatively high sustained f_0 with very low amplitude. This may theoretically occur anywhere in the word and is therefore not relevant to this study.

Aperiodicity is defined in the aforementioned paper by Redi and Shattuck-Hufnagel (2001) as irregularity in duration of glottal pulses from period to period. Diplophonia is then characterized by regular alternation in shape, duration or amplitude of glottal periods. Since these are only acoustic descriptions, an argument might be made that they are very similar to what Skarnitzl calls creak with regular and irregular pitch period.

The full glottal stop is the last glottalization to be discussed and also the most widely recognized of the glottal gestures. It is also referred to as the glottal plosive, since it shares several features with this class of consonants. Gimson (1962) describes its articulation as that of a plosive using the following statement:

“The obstruction to the air-stream is formed by the closure of the vocal cords, thereby interrupting the passage of air into the supra-glottal organs. The air pressure below the glottis is released by the sudden separation of the vocal cords. The compression stage of its articulation consists of silence, its presence being perceived

auditorily by the sudden cessation of the preceding sound or by the sudden onset (often with an accompanying strong breath effort) of the following sound.”

As previously mentioned, some phoneticians claim it to be voiceless, since there is no vibration of the vocal folds, others view it as a completely different category since it appears to be neither voiced nor voiceless on account of the position of the vocal folds.

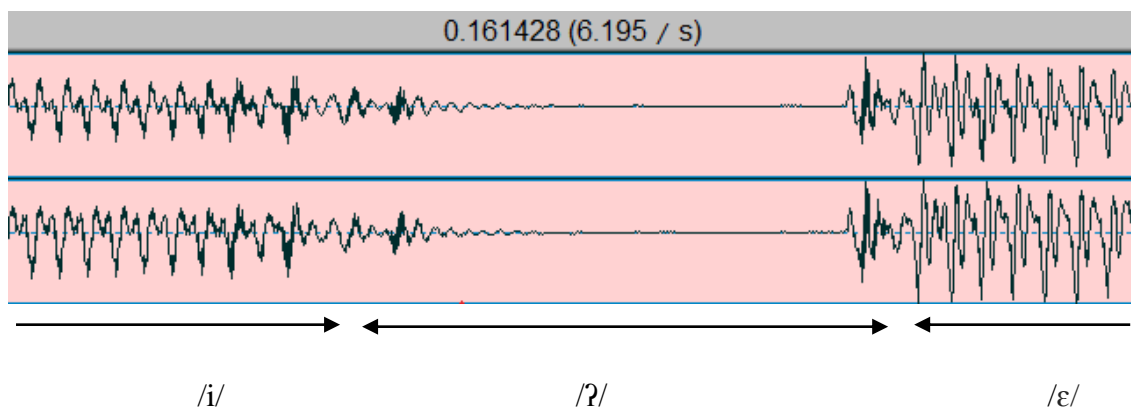


Figure 2.1.1.2 The realization of the full glottal stop by the speaker BRW1 in the phrase “three empty”.

2.1.2. Uses of glottal gestures

In British English, there have been identified four uses of the full glottal stop consonant. The four functions are namely the regular glottal reinforcement in RP, the extended glottal reinforcement in RP, the glottal replacement in RP and the other glottal replacement in other dialects (Ladefoged 2010, Gimson 1962).

Cruttenden (2008: 169-171) describes them in the following manner: regular glottal reinforcement in RP. In this case, the glottal stop serves as a boundary marker, when the initial sound of the second syllable is a vowel. Thus a hiatus of vowels belonging to different syllables (especially if the second vowel is accented), may in careful speech be separated by the glottal stop instead of being joined by a vocalic glide, e.g. *co-operate* [kəʊ`ɒpəreɪt], and even, when the second vowel is weakly accented, e.g. *day after day* [deɪ ʔaftə `deɪ]. By more careful speakers, the glottal stop is used in contexts where otherwise a linking or an intrusive /r/ would occur, e.g. *far off*, *law and order*. Additionally, any initial accented vowel may be reinforced by a full glottal stop

in order to put an emphasis on a word, whatever the preceding sound is, e.g. *It's* [ʔ] *empty*.

The extended glottal reinforcement in RP is a type of use of the glottal stop in which it serves as a reinforcement of /p,t,k/. Additionally, it can occur that /tʃ/ may be reinforced by the glottal closure which generally precedes it. The glottal closure and the oral closure are in a sequence just like other sequences of plosives. This type of reinforcement occurs in syllable-final position where a vowel, nasal, or lateral precedes and where a pause or a consonant follows (and for /tʃ/, where a vowel follows as well). Reinforcement is more likely to occur at the end of an accented syllable, for example in *reap*, *limp* for /p/ in *beat*, *bent* for /t/ in *beak*, *bank* for /k/, and in *rich*, *searched* for /tʃ/. To a certain extent, there is a free variation in English between glottal replacement and glottal reinforcement (Sullivan 1992:46).

Glottal replacement in RP is a phenomenon in which some speakers of RP replace syllable-final /p,t,k/ by [ʔ] when a consonant follows. In such pronunciations no oral closure is made. This replacement in RP is most common with /t/ as in: *that table*, *get down*, even when the following consonant is non-syllabic: *football*, *gatepost*. A portion of speakers of this dialect choose to replace the plosive element of the affricate /tʃ/ as in: *coach*, *catch*. The replacement of final /p,k/ by [ʔ] is much less frequent among RP speakers and occurs only when the following consonant is homorganic, e.g. *soap powder*, *back garden*.

And finally there is also a possibility of glottal replacement in other dialects of British English. The dialects most well-known for glottal replacement are Cockney and Estuary English. The function of glottal replacement occurs in the same position as in RP, but more frequently and in a wider range of contexts. Word-medially and intervocalically a /t/ following an accented vowel may be replaced by [ʔ], e.g. in *daughter*, *butter*, *potato*. In similar situations, the glottal replacement of /p,k/ occurs, e.g. in *supper*, *paper*.

English phoneticians and phonologists agree upon the fact that glottal stop is not a phoneme in English although it can be a phoneme in other languages like Arabic (Roach 2002:75). Instead, it is sometimes considered as an allophone of the voiceless plosives, especially, /t/ in some accents of English. Although it is sometimes considered as an allophone of the voiceless plosive /t/, it does not occur in complementary

distribution with the other allophones of this phoneme, but it only appears in free variation, i.e. there is no precise rule that regulates its occurrence (Faris 2010).

In American English, the full glottal stop has the function of regular glottal reinforcement in word-initial vowels, or serves as an allophone of voiceless stops, mostly of the plosive /t/.

It is important to note, that whichever function is being utilized, it is an optional feature, instead of an obligatory one.

The rest of the glottalizations in English usually serve the same role as the full glottal stop which is a syllable boundary marker. This is a complementary function to linking when dealing with hiatus environments.

Among these various types of glottal gestures, only the full glottal stop and the creaky voice (since this term comprises most of the other glottalizations for the purposes of this study) functioning as a boundary marker in front of a word-initial vowel will be relevant in this study.

2.1.3. Factors influencing the use of glottal gestures

A number of studies have investigated the factors that are affecting the frequency and the type of glottalization used. Some of them will now be discussed and the conclusions of the study by Garellek (2012), which has set up a goal to find out, which of these factors are the most prominent, will be summarized.

Firstly, the variation of the usage of glottalization across individual speakers must be examined to ascertain to which extent can there be any generalized claims. The findings in this area are almost striking. In a study carried out by Dilley, et al. (1996) there was identified a significant difference in the rate of using glottal gestures (from 13% up to 44%). Therefore Dilley, et al. recommend to evaluate the findings of most studies upon this subject with a major caution, especially the finding of studies with a low number of participants.

We can look upon the factors promoting the word-initial glottalization as belonging to one of four types. These four types are labelled as segmental, lexical, sociolinguistic, or prosodic. The segmental factors influencing the rate of using glottalizations in English are the presence of the hiatus environment (Dilley et al. 1996, Umeda 1978, Pierrehumbert 1995) and the preceding pause (Kohler 1994). Also, word-

initial back vowels have shown a tendency to be more frequently glottalized than non-back vowels (Umeda 1978). When it comes to the lexical factors, it has been found out that content words, i.e. the words with lexical meaning, seem to demonstrate a higher rate of glottalization than function words, the words that only carry a grammatical meaning (Umeda 1978). Sociolinguistically, females were shown to use glottalizations more than their male counterparts (Byrd 1994, Dilley et al.1996). Dilley et al. (1996), Pierrehumbert (1995), and Pierrehumbert and Talkin (1992) examined how the prosodic context influences the rate of glottalization and found out the following: The speakers are more likely to use glottalizations in front of word-initial vowels, when they occur at the beginning of a new intonational phrase. Another prosodic factor identified in the study by Pierrehumbert and Talkin (1992) is being referred to as “the presence of pitch accent on the target syllable vowel”. The initial vowel demonstrates higher probability to be preceded by a glottal gesture even if the pitch accent is situated in a different position later in the word. The third relevant finding of the previously mentioned researchers in the area of prosodic factors influencing the way the glottalizations are used, is how the realization of lexical stress affects this matter. The reduced vowels manifested much lower glottalization rates than the unaccented full vowels, which were glottalized at a lower rate than the accented full vowels.

Garellek (2012) set out a goal to identify the most prominent among the previously listed factors affecting the rate of glottalization. Most of his conclusions are concerned with the full glottal stop only. He found out that up to 95% of realized glottal stops are to be predicted by the prosodic factors, namely the prominence and phrasing.

2.2. Linking processes in English

The reason why fluent English speech sounds so connected is because of the so called linking strategies. These are phenomena that allow linking adjacent words into what seems to the listener as one unit. The most widely used of these techniques are: resyllabification after obstruents and sonorants, linking and intrusive /r/ and the vowel glides usually referred to as linking /j/ and linking /w/.

2.2.1 Resyllabification after obstruents and sonorants

Resyllabification is a process which enables the speaker to shift syllable boundaries. That results in a sound of a word that is being added to the syllable of the word that precedes or follows it. Thanks to this phenomenon, the syllable boundaries do not always correspond to the word boundaries. The linking process is then not exclusively used only in the hiatus environment, but can also take place after a consonant. In this study, the resyllabification that happens after two classes of consonants was distinguished, namely after obstruents and sonorants. An example of the first case might be visible in the sentence “*I love open spaces.*” The obstruent /v/ moves from the coda of the syllable that represents the word “love” to the onset of the first syllable in the word “open”. In the phonetic transcription it might be represented as follows: [lʌ vəʊpən] instead of [lʌv əʊpən]. Similar effect can be seen in the sentence “*He ran at full speed*”, this time for the resyllabification of sonorants though. Instead of this sentence being formed as five syllables, the word “at” is being reduced to a schwa which is added to the coda of the previous syllable.

2.2.2 Linking and intrusive /r/

In today’s English many speakers, especially of RP, are using word-final postvocalic /r/ as a linking form, when the following word begins with a vowel, i.e. in those cases where an [r] sound existed in earlier forms of English, as the spelling indicates (Gimson 1962: 204). An /r/ link may be inserted to the vowel endings of /ɑ,ɔ/ and to the single or complex vowels containing final [ə] (/ə, ɜ, ɪə, ɛə, ʊə/), e.g. in *far off, four aces*.

This usage extended to all /ɑ,ɔ,ə/ endings, even though there is no way to historically justify the spelling. This phenomenon is called the intrusive /r/. Some examples can be identified in the phrases *Russia and China, drama and music*. The usage of the intrusive /r/ has gained a social stigma among the users of RP and is often replaced by the usage of a vowel glide or a glottal stop. In this study, the linking and the intrusive /r/ have been merged into one category. In rhotic dialects of English such as GA, since the /r/ sound exists in those words normally, an environment for linking /r/ might be viewed as a case of resyllabification. For simplification, during the devised experiment, these instances will still be counted as linking /r/. An example of the

linking /r/ can be viewed in the figure 3 where it smoothly connects the two vowels /i/ and /ai/.

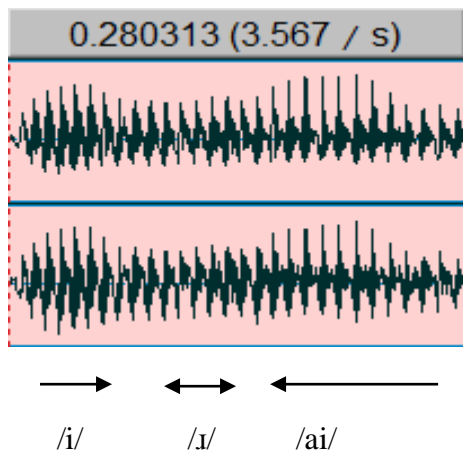


Figure 3 The pronunciation of the phrase “clear idea” by an American speaker.

2.2.3 Linking /j/

The last two prominent linking strategies are realized through the vowel glides /j/ and /w/. They occur between two vowels at word boundaries. The first of the two is referred to as the linking or by some sources the transient /j/. For the rest of the paper, I will be using only the term linking /j/. It appears after the word-final /i/, /ɪ/, /eɪ/, /aɪ/ or /ɔɪ/. The linking /j/ is not considered phonemic and must be distinguished from the phoneme /j/ as Cruttenden (2008: 306) illustrates this difference with the examples *my ears* [maɪ^hɪəz] and *my years* [maɪ jɪəz]. The use of the linking /j/ can be also seen in the figure 4.

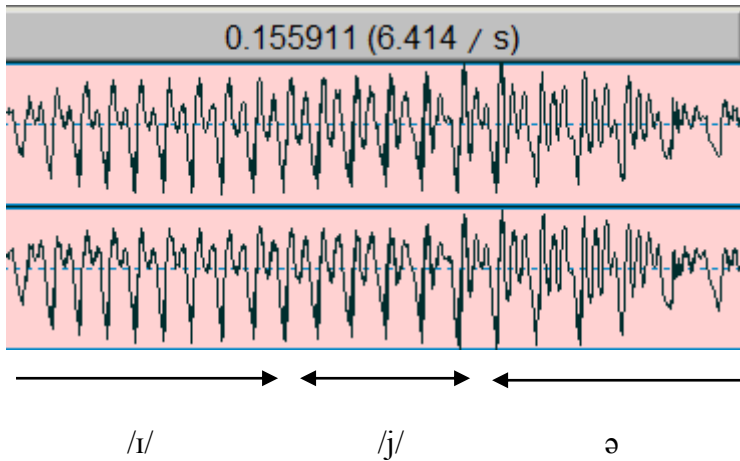


Figure 4 The insertion of the linking /j/ in the phrase “see us” uttered by an American speaker.

2.2.4 Linking /w/

The second vowel glide utilized as a linking strategy is the linking, sometimes called the transient /w/. In this paper, it will also be furthermore only referred to as the linking /w/. It appears after the word-final /ʊ/, /u/, /aʊ/, or /əʊ/. It is distinguished from the phonemic /w/ in the same manner a linking /j/ is distinguished from the phonemic /j/. *Two-eyed* [tu^waɪd] x *too wide* [tu wɑɪd] (Cruttenden 2008: 306). Its use is demonstrated in figure 5.

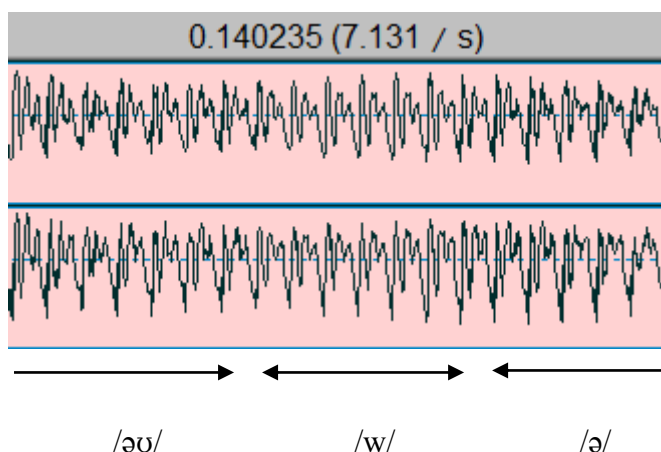


Figure 5 The insertion of the linking /w/ in the phrase “show us” uttered by an American speaker.

Most studies were examining the use of glottal gestures and linking within one variety of English. The differences of those uses across more varieties of English is still an area to be studied more thoroughly.

That is why the primary research question of this paper is to compare the overall use of glottal gestures between the two main varieties of English, the General American and the Received Pronunciation.

The secondary research question aims to focus additionally on the differences of the use of various types of glottal gestures between the two varieties of English.

3. Methodology

3.1. Participants

There are two groups of speakers participating in this study. These represent the umbrella varieties of British and American English. The first group consists of five speakers of General American English (abbreviated as GA). They are all middle aged men and women born in Arkansas with no regional accent. The second group is made of five speakers of Received Pronunciation (abbreviated as RP). They are all middle aged and live in Plymouth. From this point further, the three American men and two women will be referred to as AMM1, AMM2, AMM3, AMW1 and AMW2. One British male and four female participants are to be referenced as BRM1, BRW1, BRW2, BRW3 and BRW4.

3.2. Stimuli and data collection

The data were collected in two steps. In the first part of the study, the participants were asked to pronounce 33 simple short sentences. The first three of those were practice stimuli used to warm up the speakers and were not included into the analysis. The practice stimuli were followed by 30 sentences, where a glottal gesture could potentially appear at a word-initial position. These sentences demonstrated five types of environments, in which a linking can be applied when no glottal gesture is uttered to segment the words. The five environments and the number of sentences in which they occur are the following: 5 possible occurrences of linking /w/ (as in “*two articles*”); 5 possible occurrences of linking /j/ (as in “*we owe*”); 9 possible occurrences of linking /r/ (as in “*clear idea*”); 6 possible occurrences of resyllabification after obstruents (as in “*read out*”) and 5 possible occurrences of resyllabification after sonorants (as in “*small opening*”).

In the second part, the first page out of Douglas Adams’ series *The Hitchhikers Guide to the Galaxy* was selected to elicit samples of extended connected speech. In this segment, there were 86 words initiating with a vowel. Four of these were uttered with a substantial pause by every single participant and were therefore of no use in the experiment. Out of the remaining 82 words, 9 were identified as a context for linking /j/, 4 as a context for linking /w/, 7 as a context for linking /r/, 45 as a context for resyllabification after obstruents and 17 as resyllabification after sonorants.

3.3. Recording

All the American participants and BRW1 were recorded with the digital recorder in a recording studio at Palacký University in Olomouc. The rest of the British speakers was recorded at St Marc & St John University in Plymouth. The stimuli were presented in a form of a PPT presentation, one sentence at a time. After a brief pause, the short text followed.

3.4. Analysis

All the collected data were interpreted and annotated using Praat 5.4.01 (Boersma and Weenink 2008).

At every instance where the pause between the preceding word and the word initiating with a vowel exceeded 50 milliseconds there was a glottal stop identified which was not taken into account in the final results, as there was no possibility for any linking strategy to be applied.

Every glottal gesture in this study was classified as either a full glottal stop or a creak. Every glottalization other than a glottal stop was assigned to the label creak for the sake of clarity and simplicity. Glottal gestures such as diplophonia, aperiodicity, or breathy voicing were found to be too scarce and too difficult to distinguish to have their own label.

In addition to the five linking strategies described above, a sixth one was identified in the tokens uttered by the participants of this study. I will refer to it as a ‘smooth transition through vowel reduction’. In most instances in which this linking strategy occurred, it was an environment for linking *w* or linking *r* to appear. There was, however, no acoustic or audible cue for their presence. Neither was there any evidence of a glottalization. One or both vowels at the word boundaries were either reduced or made into a schwa sound. The distinction between this phenomenon and the usage of linking *r* can be seen in the figures 3.4.1 and 3.4.2.

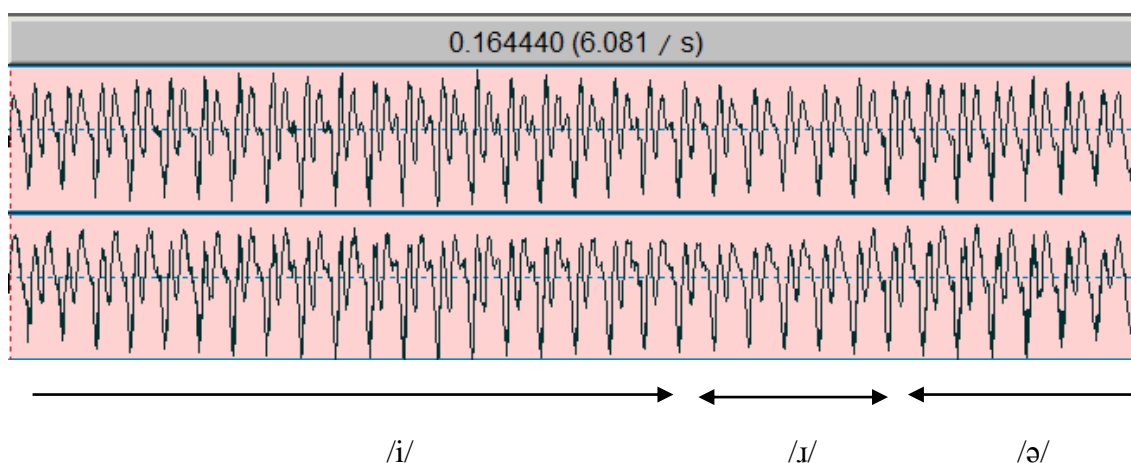


Figure 6 The phrase “appear again” pronounced by the speaker BRW1.

Linking /ɪ/ is being inserted between the front close (high) vowel and the schwa.

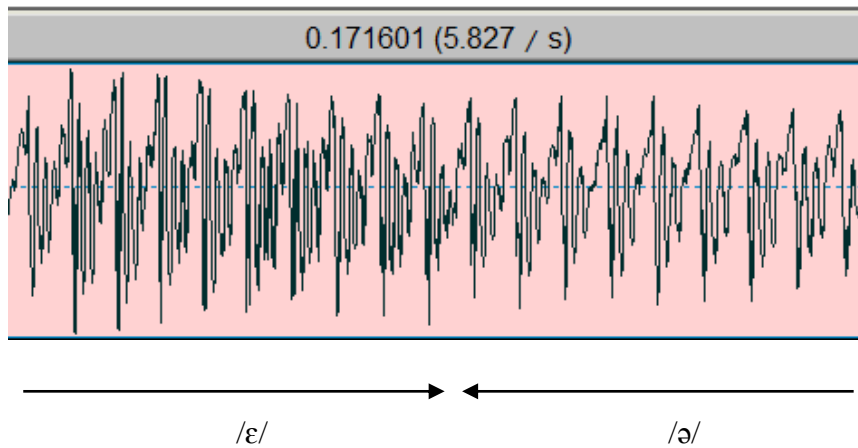


Figure 7 The phrase ‘‘appear again’’ pronounced by the speaker BRM1.

The first vowel becomes more low/open (more schwa-like) and transitions smoothly into the schwa.

The tokens, in which the pause between two words exceeded the length of 100ms were labelled as an intonation break and were not accepted as an occurrence of a glottal stop or a creak. All accepted tokens were subsequently statistically analysed with the repeated measures ANOVA test.

4. Results

4.1. General results

In this section, I will demonstrate the gathered data for each individual speaker, for the separate groups of American and British speakers, and finally also for the total group of all speakers that participated in this experiment. The data are demonstrated separately for the isolated sentences and for the connected speech.

Results for the isolated sentences (%)

	Linking %	Glottal gestures %	Glottal stops %	Creaks %
AM1	57,1	42,9	10,7	32,1
AM2	51,7	48,3	20,7	27,6
AM3	64,3	35,7	14,3	21,4
AMW1	58,6	41,4	24,1	17,2
AMW2	51,9	48,1	29,6	18,5
BRM1	58,6	41,4	20,7	20,7
BRW1	66,7	33,3	11,1	22,2
BRW2	66,3	36,7	6,7	30

BRW3	60	40	3,3	36,7
BRW4	85,2	14,8	3,7	11,1
Total AM	56,7	43,3	19,9	23,4
Total BR	66,4	33,6	9,1	24,5
Total	61,6	38,4	14,5	24

Table 1

Table 1 presents the results for the reading of the isolated sentences. The mean percentages of linking and of glottalization (the glottal gestures) with the five segmental environments combined are shown. Additionally, the mean percentages of full glottal stops and creaks produced by the individual speakers are given.

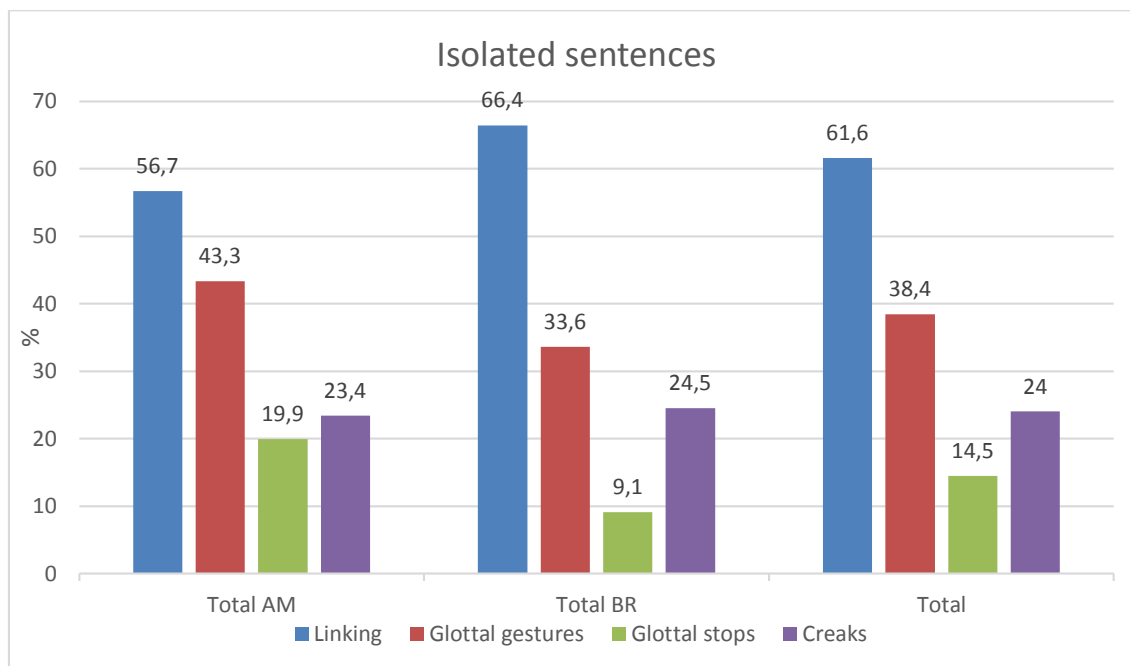


Chart 1

For the better overview of the results, the chart 1 depicts the results (in %) of the total usage of linking, glottal gestures, glottal stops and creaks in isolated sentences by both groups of speakers separately and then together.

Results for the connected speech (%)

	Linking %	Glottal gestures %	Glottal stops %	Creaks %
AM1	59,6	40,4	24,6	15,8
AM2	72,7	27,3	13,6	13,6
AM3	67,6	32,4	19,7	12,7
AMW1	57,6	42,4	28,8	13,6
AMW2	75	25	21,7	3,3
BRM1	71,2	28,8	16,9	11,9
BRW1	86,2	13,8	10,8	3,1
BRW2	63,8	36,2	10,1	26,1
BRW3	58,2	41,8	13,4	28,4
BRW4	66,7	33,3	12,5	20,8
Total AM	66,6	33,4	21,6	11,9
Total BR	69,2	30,8	12,7	18,1
Total	67,9	32,1	17,1	15

Table 2

Table 2 presents the results for the reading of the isolated sentences. The mean percentages of linking and of glottalization (the glottal gestures) with the five segmental environments combined are shown. Additionally, the mean percentages of full glottal stops and creaks produced by the individual speakers are given.

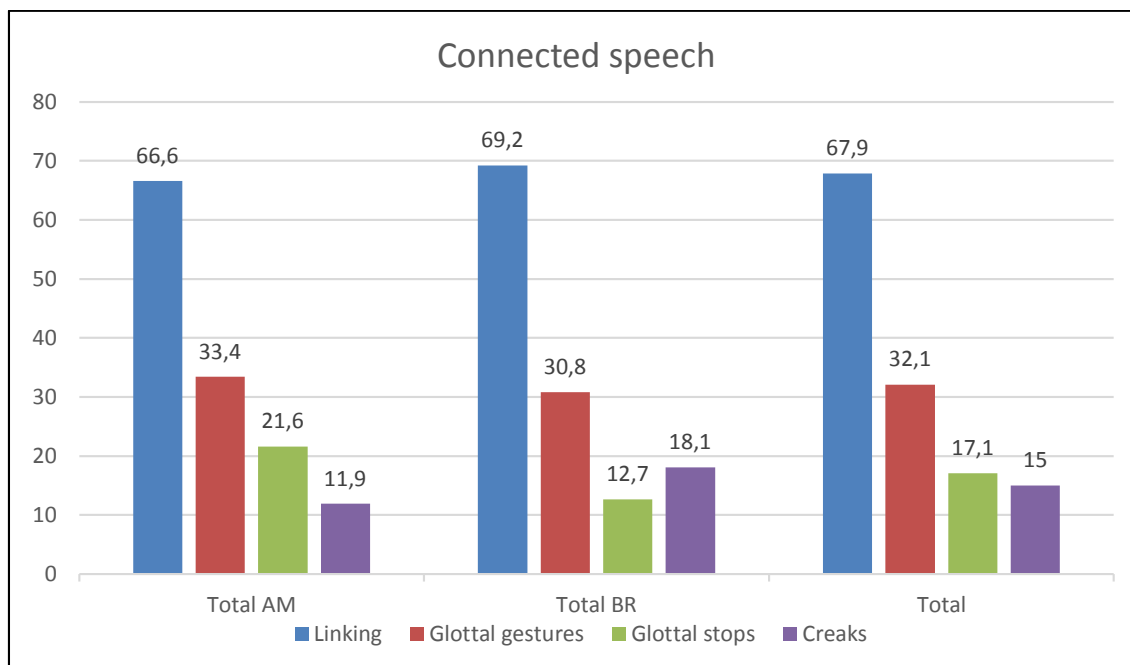


Chart 2

For the better overview of the results, the chart 2 depicts the results (in %) of the total usage of linking, glottal gestures, glottal stops and creaks in connected speech by both groups of speakers separately and then together.

Certain conclusions can be drawn based of these and charts alone, for the sake of accuracy, however, the paragraphs 4.2, 4.3 and 4.4 are containing the results of the repeated measures analysis of variance to identify, which differences can be determined to be statistically significant.

A series of Repeated Measures ANOVA was carried out to detect significant differences in the usage of the glottal gestures, creaks and glottal stops by the two groups of speakers in the five environments where a linking strategy could be utilized. Variety of English functioned as a between-subject variable and Mode of speech as a within subject variable. The difference in the overall use of glottal gestures, creaks and glottal stops combined, was not found to be significant in regards to the variety of English spoken. There were, however, some significant findings when I examined the usage of the types of glottal gestures individually.

The test were carried out for all contexts separately, for the combined groups of linking glides and resyllabifications and finally for all contexts together.

4.2. Occurrence of glottal gestures

Firstly, the rate of using glottal gestures in the linking /j/ environment was found to be significantly lower in the connected speech than in the separately uttered sentences ($F(1,8)=21,413$, $p<0,01$).

Secondly, the only significant difference in the area of the overall use of glottal gestures with respect purely to the variety of English spoken was in the utterances in the environment for linking /w/. In this particular context, the British citizens proved to use glottalizations less than their American counterparts ($F(1,8)=8,7747$, $p<0,05$).

When analysing the linking /j/ context and the linking /w/ context together and thus creating a category of linking glides, there was detected a significantly lower utilization of the glottal gestures in the connected speech rather than in the segment of the isolated sentences ($F(1,8)=13,523$, $p<0,01$), even though this trend can only be observed separately in the context for linking /j/ and not in the context for linking /w/.

In the linking /r/ context it was also proved that most of the speakers were more likely to articulate a glottal gesture in the separated sentences rather than in the spoken text passage ($F(1,8)=16,824$, $p<0,01$).

Moving onto the contexts for the resyllabification, the statistical analysis of the resyllabification of obstruents demonstrated trends similar to the previously investigated environments. The glottalizations tended to be used less frequently during an extended connected speech as opposed to the sentences spoken in isolation ($F(1,8)=15,107$, $p<0,01$).

The participants behaved in a similar fashion when presented with the contexts for resyllabification of sonorants ($F(1,8)=10,133$, $p<0,05$). In addition to that, however, one additional significant effect has been detected and that is the interaction between the Mode and Variety. ($F(1,8)=7,7636$, $p<0,05$). The American participants were using glottal gestures when pronouncing the isolated sentences with a noticeably higher rate than when reading the continuous text ($p<0,05$). In both of these contexts, the rate was also higher than that of the British participants ($p<0,05$; $p<0,01$). This effect is clearly visible in the figure 4.2.1.

Only a very slight and statistically insignificant difference was observed in the segment with connected speech.

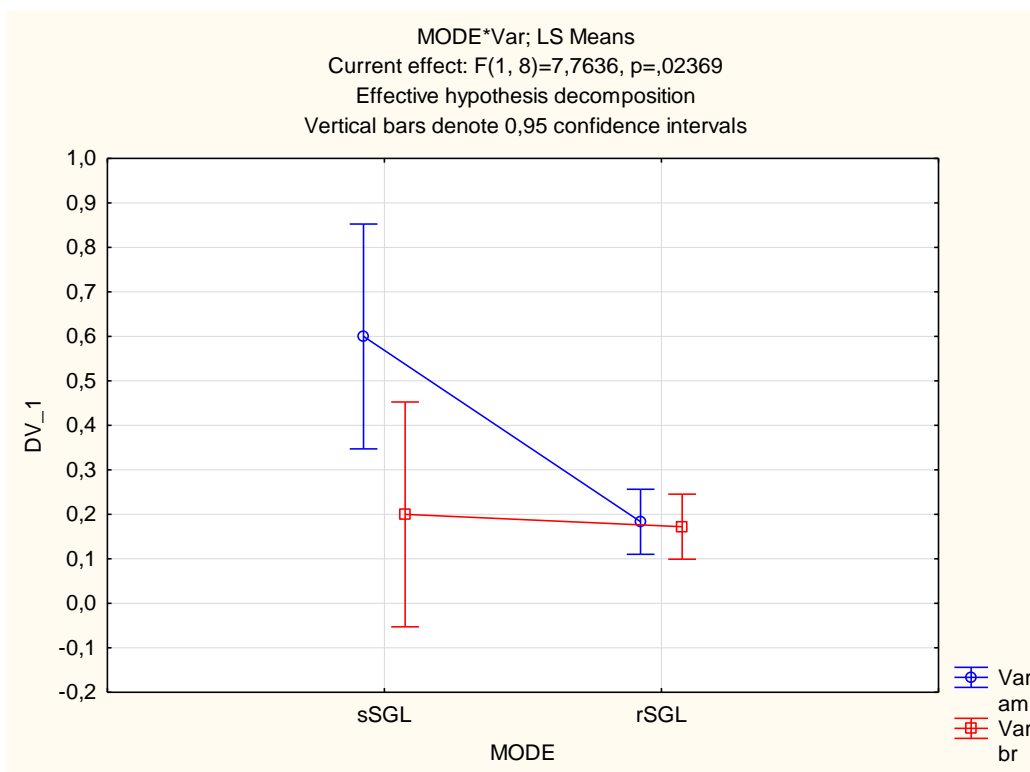


Figure 4.2.1 This figure shows the mean percentages of glottal gestures in the context of sonorant resyllabification for the American and British speakers in isolated sentences and the continuous text.

After combining the two resyllabification groups (after obstruents and after sonorants) into a group of resyllabification after consonants, it was found out that the only significant distinction in the use of glottal gestures was to be observed in the speech mode. The linking strategies were once again used more in the continuous uninterrupted speech rather than in the segmented sentences ($F(1,8)=34,542$, $p<0,001$), this effect was detected as highly significant, which is unsurprising, since it could be observed in the both resyllabification groups separately.

The final observed individual context was the linking /r/ context. Both groups of speakers were realizing the glottal gestures in a similar fashion, which meant utilizing them in the connected speech at a significantly lesser rate than in the sentence segment. ($F(1,8)=16,824$, $p<0,001$),

The last examined context group is the combined group of the linking glides, the linking /r/, and the resyllabification after consonants. The combined effect for the speech mode variable was determined as highly significant ($F(1,8)=61,930$, $p<0,001$).

As mentioned earlier, no significant effect of the variety of English used was to be observed.

4.3. Occurrence of creaks

When examining the use of creaks separately no significant enough difference in the usage across the varieties of English was detected. Only a few other effects have been observed.

Separately examined segmental contexts showed only one significant difference. Proportion of creaks differed between speech modes in the linking /r/ context. As was common in most of the contexts for glottal gestures combined, in the environment for linking /r/ the number of utterances of creaks was significantly higher in the connected speech ($F(1,8)=12,448$, $p<0,01$).

There is one additional result worth mentioning when examining separate contexts. The group of British speakers was utilizing creaks to segment their speech so much more frequently than the American group that the difference proved to be very close to being considered a significant one ($F(1,8)= 5,0633$, $p=0,055$).

Only when examining the combined group of the linking glides, the linking /r/, and the resyllabification of consonants were there more notable results to be discussed. The participants were less likely to produce creaks in the connected speech than they were when pronouncing separated sentences ($F(1,8)=13,043$, $p<0,01$). There was also detected a significant effect in the use of creaks in-between the three defined context groups ($F(2,16)=4,0735$, $p<0,05$). In the Tukey post-hoc test it was discovered that the significant difference among these contexts was the higher use of creaks in the linking /r/ context than in the environment for the resyllabification after consonants ($p<0,05$). The last distinguished effect detected via post-hoc Tukey test was significantly higher realisation of creaks in linking /r/ context by the speakers in the isolated sentences than that of the linking /r/ ($p<0,05$) and resyllabification after consonants ($p<0,05$) contexts in the connected speech segment.

4.4. Occurrence of glottal stops

The realization of glottal stops proved to be the only area where significant differences were found in the usage in-between the varieties of English as opposed to the mode of speech or linking context.

The first environment where a notable difference in the usage in-between the varieties of English was observed was the linking /j/ environment. The speakers of British nationality were realizing full glottal stops much less frequently than their American counterparts ($F(1,8)=10,259$, $p<0,05$).

The same effect was not observed for the linking /w/ environment, but when combining the contexts for linking /j/ and linking /w/ into the group of the linking glides, the effect still proves to be significant enough ($F(1,8)=10,983$, $p<0,05$).

The Americans also proved to use full glottal stops more often in the environment for the resyllabification after sonorants ($F(1,8)=22,364$, $p<0,01$). Another significant result was the use of glottal stops in various modes of speech depending on variety of English spoken ($F(1,8)= 12,187$, $p<0,01$). A post-hoc Tukey test revealed that number of utterances of full glottal stops in the resyllabification after sonorants context spoken by the American speakers in the segmented speech was significantly higher than that spoken by the British speakers in the segmented speech ($p>0,001$) and in the connected speech ($p<0,05$). In the connected speech, the Americans used significantly more glottal stops than the Britons in the segmented speech ($p<0,01$). There was also a difference within the speech mode by the British group of speakers. They were pronouncing full glottal stops much less frequently in the segmented speech than they did in the connected speech ($p<0,05$).

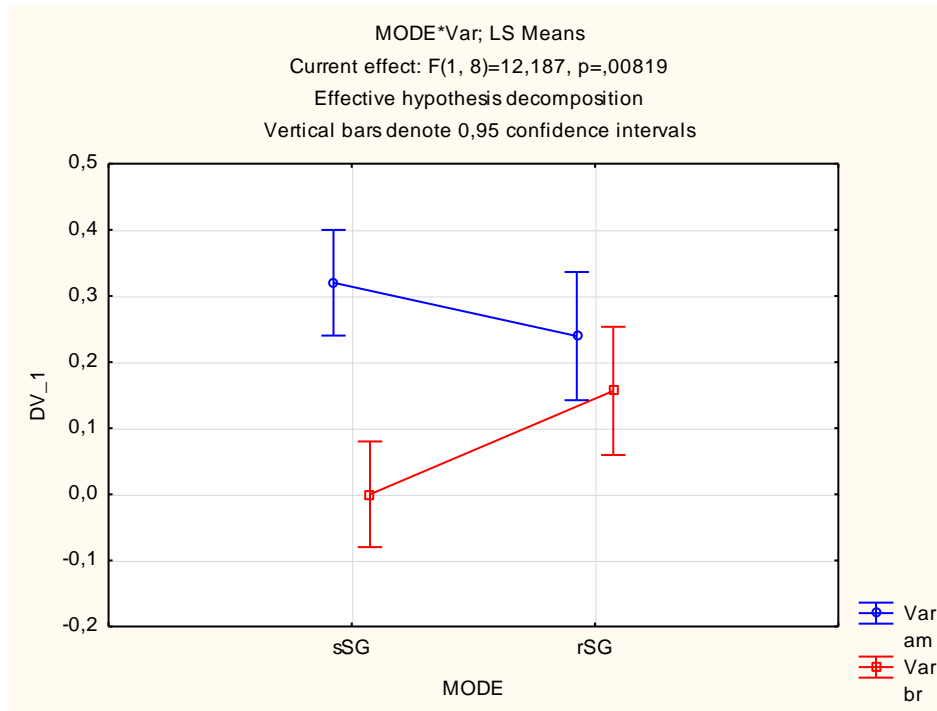


Figure 4.4.1 The graphical representation of the difference in usage of full glottal stops in the resyllabification after sonorants context in different modes of speech (reading out separate sentences and uninterrupted text) depending on the variety of English spoken (American English - GA, British English - RP).

Similar tendencies manifested for the resyllabification after consonants group ($F(1,8)=9,5839$, $p<0,05$), even though the difference was not deemed significant for the resyllabification after obstruents group alone.

In the linking /r/ context, the prevalence of American speakers in using glottal stops almost proved to be considered significant ($F(1,8)=5,1528$, $p=0,05289$).

As already stated at the beginning of the paragraph, in the group of all contexts combined, those being the linking glides, the linking /r/ and the resyllabification after consonants, the American participants demonstrated significant prevalence over the British participants in using full glottal stops ($F(1,8)=14,802$, $p<0,01$).

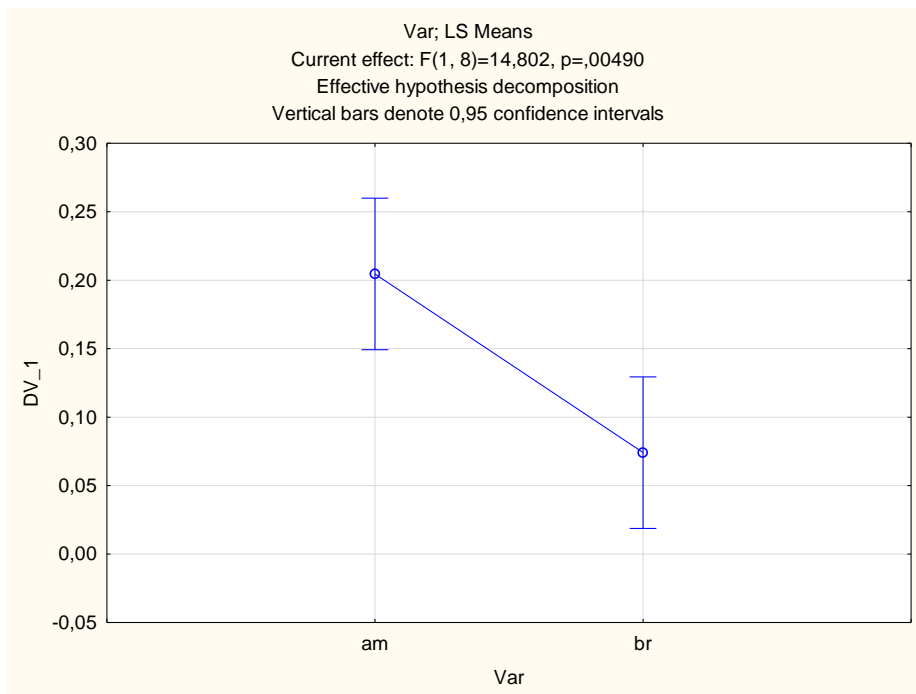


Figure 4.4.2 The representation of the significant deviation in the usage of full glottal stops by American and British speakers. The proportional difference as calculated from the tables 4.1.1 and 4.1.2 is 10,8% for the segmented and 8,9% for the connected speech.

The Tukey post-hoc test also discovered less frequent use of full glottal stop in the context for linking /r/ than in that of the resyllabification after consonants ($p < 0,01$).

5. Discussion

Due to the low number of participants and a huge variance of usage of glottal gestures from speaker to speaker based on individual preference, it is advisable not to overly generalize the results of this study alone. In the following set of paragraphs, there are a few conclusion based upon such premises.

Even though segmenting the speech using glottal gestures instead of utilizing the available linking strategies is in English language, in which the word-initial vowel preglottalization is considered highly optional, generally viewed as undesirable and it is often recommended to the learners of English as a foreign language (especially of those nationalities, in which language the preglottalization is very frequent like German,

Spanish, Czech, etc.) to avoid them to sound native-like, in this experiment the native speakers uttered some form of glottalization in about one in three instances (35,3% of the total), where some form of linking could have been used.

Since the spoken Received Pronunciation gives the impression of being more smooth and continuous than the American umbrella variety, it was hypothesized that the speakers of this variety of English would be using the available linking strategies to a greater extent than the speakers of General American. The results of the statistical analysis carried out in this study seem to indicate that the distinction, however, should not be considered significant in any context except for the linking /w/ context. Only the usage of full glottal stops seems to be significantly more prevalent by the American participants in this study over the British ones. This may still explain why the British English might seem more continuous to some listeners, since there is no full closure of the vocal folds during the creak and the voice obtains a ‘creaky’ quality instead of the airflow being stopped for a short time.

Most of the participants managed to reduce the rate at which they were producing glottal gestures during the connected speech segment from the relatively high rate in the isolated sentences segment.

During the connected speech segment of this study, the American participants were uttering full glottal stops with almost twice the rate they were uttering creaks. This phenomenon is quite inconsistent with the results of the study carried out by Garellek (2012), where the rate of the full glottal stops realized in connected speech was lower than that of other types of glottalizations. A possible explanation of the cause of this inconsistency might be the relatively small number of four speakers, whose readings were being analysed in the study. Therefore the individual variance across speakers in the use of glottalizations may have possibly been a major factor.

American participants

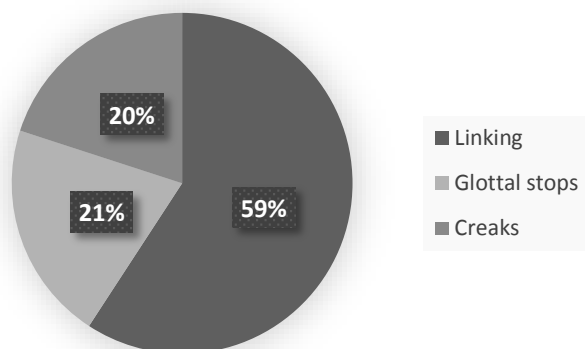


Figure 5.1 The total proportional distribution of linking strategies and glottal gestures applied by the speakers of General American in this study.

British participants

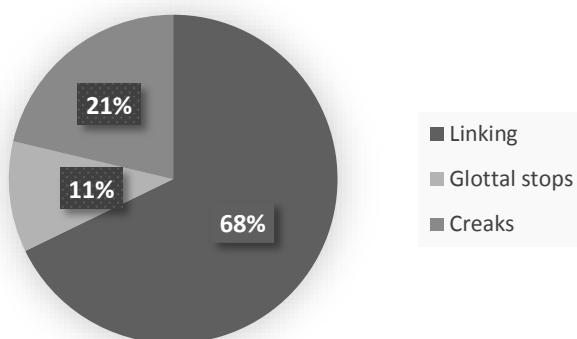


Figure 5.2 The total proportional distribution of linking strategies and glottal gestures applied by the speakers of Received Pronunciation in this study.

6. Conclusion

In this study, I was mainly concerned with the use of glottal gestures, also referred to as glottalizations, before word-initial vowels with the function of segmentation of the continuous speech rather than utilizing one of several linking strategies the English language has to offer. The main focus was to find out, if there was a difference in the use of these sounds between the speakers of American English and the speakers of

British English. For the purposes of pursuing this goal, two umbrella varieties were chosen to represent these varieties of English, namely General American and Received Pronunciation. To gain more thorough knowledge of the behaviour of the speakers of these varieties regarding to the use of glottal gestures, I decided to inspect it in two modes of speech. As it is used in the isolated read out sentences and also in the connected speech represented by the reading of a text of a single page of a book.

I laid down two main research questions. Firstly, is there a significant difference in the frequency of occurrence of glottal gestures in a speech uttered by the speakers of these two varieties of English? Secondly, is there a preference in using different types of glottalizations within these two groups of speakers?

To have been able to attempt to confidently answer these questions, I consulted various literature relevant to the use of glottal gestures and linking strategies in English. Afterwards, the literature was sorted in order to identify which studies were relevant to the American variety and which were concerned with the speakers of the British one. It was required to gather information about various types of glottalization and other factors determining the use of glottal gestures and their significance.

Subsequently it was necessary to devise an experiment in which a number of speakers of both varieties would participate. The American and the British speakers were asked to read out several single sentences and a single page of a book. These media were intentionally designed and chosen to contain many possible environments for all types of linking strategies used in the English language. All the data were then statistically analysed to ascertain the most significant differences.

The answer to the first research question based on the gathered data from this study proved to be a negative one. The overall use of glottal gestures was not found out to be significantly distinctive with regard to the frequency of occurrence between the speakers of American and British English. The only significant difference was observed in the context for the linking /w/, where the American speakers indeed used more glottalizations overall.

In this experiment the types of glottal gestures were divided into two groups. The full glottal stop and the creak. The realizations of other types of glottalizations identified in the available literature were not found to be numerous enough in this experiment to be represented as a separate group and were assigned to the creak group.

When examining the groups of separate glottalization types, there was discovered a convincingly strong predominance of using full glottal stops by the American speakers over the British speakers in both modes of speech. The same phenomenon was not at all observed for the creak category, a fact that is responsible for the negative results for the first research question.

Among other effects this research shows, that were not the main focuses of this study, it might be worth noticing the difference in the distribution of glottal gestures between the segmented and connected speech.

7. Shrnutí

V této studii jsem se zabýval výhradně užitím glotálních hlásek, také označovaných jako glotál, před samohláskami na začátku slova za účelem rozčlenění plynulé řeči raději než upotřebením jednoho z několika spojovacích jevů, jež je příznačný pro anglický jazyk. Hlavním cílem bylo zjistit, zda existuje rozdíl v užití těchto zvuků mezi mluvčími americké angličtiny a mluvčími britské angličtiny. Pro účely dosažení tohoto cíle byly vybrány dva standartní typy výslovnosti, jmenovitě General American a Received Pronunciation. K získání hlubších znalostí ohledně chování mluvčí těchto typů výslovnosti vzhledem k užití glotálních hlásek jsem se rozhodl zkoumat dva způsoby řeči. Takový jaký je užíván při čtení izolovaných vět a také při plynulé řeči reprezentované čtením textu jedné stránky z knihy.

Položil jsem dvě hlavní výzkumné otázky. Zaprvé, existuje výrazný rozdíl ve frekvenci výskytu glotálních hlásek vyslovených v řeči mezi řečníky těchto dvou dialektů angličtiny? Zadruhé, existuje nějaká preference v užití různých typů glotalizací mezi těmito dvěma skupinami řečníků?

Abych byl schopen se pokusit sebevědomě odpovědět tyto otázky, zkonultoval jsem různé zdroje literatury relevantní vůči užití glotálních hlásek a spojovacích jevů v angličtině. Poté jsem vyřídil dostupnou literaturu podle toho, abych byl schopen identifikovat, které studie se vážou k americké výslovnosti angličtiny, a které se zabývají s tou britskou. Bylo zapotřebí získat informace ohledně různých typů glotalizací a dalších faktorů, jež rozhodují o užití glotálních hlásek a ohledně důležitosti těchto faktorů.

Následně bylo potřeba navrhnout experiment, kterého by se zúčastnil počet řečníků z obou dialektů. Američtí i britští řečníci byli vyzváni, aby přečetli několik jednotlivých vět a následně jednu strany knihy. Tato média byla úmyslně zvolena a vytvořena tak aby obsahovala co nejvíce možných prostředí pro všechny možné spojovací jevy, jež se používají v anglickém jazyce. Všechna data byla následně statisticky zanalyzována za účelem zjištění nejvíce statisticky významných rozdílů.

Odpověď na první výzkumnou otázku založená na datech shromážděných v této studii se prokázala jako záporná. Celkové použití glotálních hlásek nebylo zjištěno jako významně rozdílné ve vztahu k frekvenci výskytu mezi mluvčími americké a britské angličtiny. Jediný významný rozdíl byl zpozorován v kontextu pro spojovací /w/, kde mluvčí americké angličtiny vskutku používali obecně více glotalizací.

Při tomto experimentu byly typy glotálních hlásek rozděleny do dvou skupin. Ráz a třepená fonace. Artikulací jiných typů glotalizací, jež byly identifikovány v dostupné literatuře nebyly v rámci tohoto experimentu uznány jako dostatečně početné, aby byly reprezentovány oddělenou skupinou a taky byly přiřazeny ke skupině třepené fonace.

Při zkoumání skupin rozdílných typů glotalizací byla nalezena silná převaha v užití rázu americkými mluvčími nad britskými mluvčími v obou způsobech řeči. Stejný úkaz nebyl zpozorován pro kategorii třepeného rázu, což je v podstatě fakt zodpovědný za negativní výsledek pro první výzkumnou otázku.

Mezi dalšími efekty, na něž tento výzkum poukazuje, jež nebyly hlavním zaměřením této studie, může stát za povšimnutí rozdíl mezi distribucí glotálních hlásek mezi segmentovanou a plynulou řečí.

Appendix

List of the used sentences:

Warming up sentences

I don't like strong tea.

My parents went to France.

They gave us free samples.

Linking j

Come to see us soon.

They always shout a lot.

We owe him some money.

I have three empty cans.

We applied for the grant.

Linking w

We flew over the mountains.

It won't do any good.

I'm going arrive late.

I read two articles today.

Can you show us the way?

Linking r

You need to cheer up.

Our enemies gave up.

I find her attractive.

The sun will appear again.

The door opened suddenly.

The cake is for everybody.

Four agents are missing.

Give me a clear idea.

Resyllabification after sonorants

I like the tale about fairies.

There was a small opening.

Who will answer my question?

She only bought one item.

He ran at full speed.

Resyllabification after obstruents

Put the cheese over there.

We need a good plan.

Please read out the names.

I love open spaces.

I move around a lot.

Bob always gets a beef steak.

The text for the connected speech:

Far **(R)** out || **?** in the **(J)** uncharted backwaters || **?** of the **(J)** unfashionable **S** end **O** of the western spiral **S** arm **S** of the Galaxy || lies **O** a small **S** unregarded yellow sun.

? Orbiting this **O** at **O** a distance **O** of roughly ninety-two million miles || **?** is **O** an **S** utterly **?** insignificant little blue green planet || whose **O** ape-descended life forms || **?** are so **(W)** amazingly primitive || that they still think digital watches || **?** are **(R)** a pretty neat **O** idea.

This planet has - || **?** or rather had - || **?** a problem, which was this: || most **O** of the people **O** on **O** it were **(R)** unhappy || for pretty much **O** of the time. || Many solutions were suggested for this problem, || but most **O** of these were largely concerned with the movements **O** of small green pieces **O** of paper, || which **O** is **O** odd || because **O** on the whole || **?** it wasn't the small green pieces **O** of paper || that were **(R)** unhappy.

? And so the problem remained; || lots **O** of the people were mean, || **?** and most **O** of them were miserable, || **?** even the ones with digital watches.

Many were **(R)** increasingly **(J)** of the **(J)** opinion || that they'd **O** all made **O** a big mistake **O** in coming down from the trees **O** in the first place. || **?** And some said || that **O**

even the trees had been S a bad move, ? and that no one should O ever have left the (J) oceans.

? And then, ? one Thursday, ? nearly two thousand years ? after one man had been nailed to (W) a tree for saying how great O it would be to be nice to people for (R) a change, ? one girl sitting S on her (R) own S in S a small cafe (J) in Rickmansworth ? suddenly realized what O it was ? that had been going wrong ? all this time, ? and she finally knew how the world could be made O a good ? and happy place. This time S it was right, ? it would work, ? and no one would have to get nailed to (W) anything.

Sadly, ? however, ? before she could get to (W) a phone to tell S anyone S about O it, ? a terribly stupid catastrophe (J) occurred, ? and the (J) idea was lost forever.

Annotation

- Author: Jan Waleczko
- Faculty and department: Philosophical Faculty, Department of English and American Studies
- Title: Glottalizations before word-initial vowels in English
- Supervisor: Mgr. Šárka Šimáčková, Ph.D.
- Number of characters: 58 928
- Number of appendixes: 2 + CD
- Number of references: 19
- Keywords: glottalizations, glottal stop, linking phenomena, resyllabification
- Description: The aim of this thesis was to determine if there is a difference in the rate and the type of glottal gestures used between the native speakers of American and British English. I consulted the available literature that was relevant to the topic and devised an experiment to identify any general difference in the usage. The rate of glottalizing was examined during the reading of separate sentences and connected speech.

Anotace

- Autor: Jan Waleczko
- Název fakulty a katedry: Filozofická fakulta, Katedra anglistiky a amerikanistiky
- Název práce: Glotalizace iniciálních samohlásek v angličtině
- Vedoucí práce: Mgr. Šárka Šimáčková, Ph.D.
- Počet znaků: 58 928
- Počet příloh: 2 + CD
- Počet titulů použité literatury: 19
- Klíčová slova: glotalizace, ráz, spojovací jevy, resylabifikace
- Charakteristika: Cílem této práce bylo zjistit, jestli se vyskytuje nějaký rozdíl v míře užití a typu glotalizací mezi rodilými mluvčími americké a britské angličtiny. Zkonzultoval jsem dostupnou literaturu, jež se týkala daného tématu, a navrhl experiment ke zjištění jakýkoliv obecných rozdílů v užití. Míra použití glotalizací byla zjišťována při čtení jednotlivých vět a souvislého textu.

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