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# BAKALÁŘSKÁ PRÁCE

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# Výskyt iniciálních glotalizací ve slovenské angličtině

# The occurrence of word-initial glottalization in Slovak English

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**Declaration of Authorship**

Hereby I declare that the following BA thesis is my own work for which I used only the sources and literature mentioned.

Prague, June 7, 2012

Signature

## Abstract

The features of prosodic structure were shown to influence the occurrence of word-initial glottalization in English. The aim of the present thesis is to analyze the occurrence of glottalization in word-initial vowels in Slovak English in relation to prosodic structure, specifically to word stress and position in the intonational phrase. The semantic status of words (lexical vs. grammatical) is also considered. The first part provides a brief overview of key concepts in second language acquisition with focus on acquisition of second language phonology. In addition, a summary of previous research on glottalization is given. The empirical part of this thesis is based on the recordings of 15 Slovak speakers of English. The results suggest that Slovak speakers use glottalization extensively in their production of English. This should be taken into consideration when looking for better methods for teaching English pronunciation.

**Keywords:** glottalization, prosodic structure, Slovak, English, foreign accent

## Abstrakt

Doterajší výskum ukázal, že vlastnosti prozodickej štruktúry vplývajú na výskyt glotalizácie na začiatku slov v angličtine. Cieľom tejto práce je analýza výskytu glotalizácie v samohláskach na začiatku slov v angličtine Slovákov. Tento jav je skúmaný vo vzťahu k prozodickej štruktúre reči, predovšetkým k slovnému prízvuku a intonačným frázam. Sémantický status slov (lexikálne vs. gramatické slová) bol tiež vzatý do úvahy. Práca najprv ponúka zhrnutie z oblasti akvizície cudzieho jazyka so zameraním na osvojovanie si zvukovej stránky cudzieho jazyka. Poskytnutý je aj prehľad doterajších poznatkov o charaktere a výskyte glotalizácie. Empirická časť práce ja založená na nahrávkach pätnástich Slovákov hovoriacich po anglicky. Výsledky štúdie naznačujú, že slovenskí hovoriaci využívajú glotalizáciu pomerne často. Tento fakt by mal byť vzatý do úvahy pri hľadaní lepších metód učenia anglickej výslovnosti.



**Kľúčové slová:** glotalizácia, prozodická štruktúra, slovenčina, angličtina, cudzí prízvuk

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# 1. Introduction

The presence of a foreign accent in non-native speakers of English can be manifested in many ways. One of the manifestations is the excessive use of glottalization. Glottal gestures are realized by means of a complete or partial closure of the vocal folds. In native English, word-initial glottalization is used only exceptionally to add emphasis. When it is used more extensively by non-native speakers of English it can create an impression of unnatural disconnected speech.

The first part of the present thesis provides a theoretical background and key concepts in Second language acquisition with focus on acquiring a second language pronunciation. Various factors which influence learning pronunciation are described. The next section deals with the differences between the Slovak and English sound systems on segmental as well as suprasegmental level. The most common errors in English of Slovak speakers are also described. Later, the phenomena of glottalization are presented in more detail, mainly from the acoustic point of view. The various realizations of glottalization are described and categorized according to suggestions from previous research.

The empirical part is based on 15 recordings of Slovak speakers of English. The aim of our research is to analyse the occurrence of glottalization in word-initial vowels in relationship to prosodic structure, more specifically to word stress and position in intonational phrase. Glottalization in lexical and grammatical words is also considered. Statistical tests are run to determine whether the observed differences in distribution of glottalized and non-glottalized tokens in various categories (e.g. in stressed and unstressed syllables) are significant.

# 2. Theoretical background

## 2.1 Acquiring a second language sound system

Since the present thesis focuses on English as spoken by Slovak language learners it is appropriate to consider some questions in the area of Second Language Acquisition (SLA). Learning a second language is a process of acquiring rules on multiple levels of the given second language (L2). For the purposes of the present thesis, we will narrow down our discussion to the acquisition of L2 sound system.

One of the most crucial problems in discussion of acquisition of L2 phonology is the question which standard should be taught in the classroom. In a recent article on teaching pronunciation, Joanna Smith (2011) points out that at present, there is no internationally accepted standard pronunciation of English. For teaching purposes, most commonly used accents are Received Pronunciation (RP) and General American (GA). But even with these models of English pronunciation, it is not guaranteed that all EFL teachers master them to such an extent as to provide their students with highly accurate pronunciation. In fact, many teachers share with their foreign language students the same problem – the presence of a foreign accent in their English pronunciation. Before looking specifically at pronunciation problems of the Slovak learners of English, we will discuss some major factors which influence the learning of pronunciation in general.

### 2.1.1 Major factors influencing the learning of pronunciation

It is a well known fact that some individuals are better learners of a second language than others. The aim of this chapter is to examine some major factors which have an impact on learning second language pronunciation as well as language as a whole. Kráľová (2005) divides the factors influencing acquisition of a second language into two major categories. The first category called structural factors includes *sound interference* discussed in the first half of this chapter. Other factors influencing the learning of a second language are non-structural. These include age, aptitude, motivation, attitude and socio-psychological influences (Gas & Selinker, 2008). Kráľová (2005) operates with similar list but adds physiological factors. As opposed to structural factors, which are defined in terms of L1-L2 contact, non-structural factors are extra-lingual. We will discuss them briefly in second part of this chapter focusing on their impact on learning pronunciation.

In 1972, Larry Selinker coined the term *interlanguage.* Interlanguage (IL) represents the basic assumption in SLA research. "This concept validates learners' speech, not as a deficit system, that is, a language filled with random errors, but as a system of its own with its own structure" (Gass & Selinker, 2008 p. 14). Gass & Selinker (2008) point out that interlanguage comprises so called *new forms* as they do not have the origin neither in the native language (NL) nor in the target language (TL). The learners themselves create a structure based on the linguistic data they are exposed to, formulating an internalized system.

This process of internalization is called *fossilization*, a concept which generally describers the cessation of learning. Fossilization of a linguistic form, feature, or rule can be defined in the following way: "to become permanently established in the interlanguage of a second language learner in a form that is deviant from the target-language norm and that continues to appear in performance regardless of further exposure to the target language" (Flexner & Hnack, 1988, p. 755 cited in Gass & Selinker, 2008, p. 14). Long (2003) suggests that it would be more appropriate to use the term *stabilization* of linguistic form, rather than fossilization, since it is difficult to determine when learning has ceased.

*Language transfer*

It is undeniable that the native language is one of the crucial factors which influence learning a second language. Numerous studies have been carried out in the subfield of SLA know as *language transfer*. Robert Lado, in his influential book *Linguistics Across Cultures,* deals with the situation of L2 learners and their reliance on their native language:

> Individuals tend to transfer the forms and meanings, and the distribution of forms and meanings of their native language and culture to the foreign language and culture—both productively when attempting to speak the language and to act in the culture, and receptively when attempting to grasp and understand the language and the culture as practiced by natives.
>
> (p. 2, cited in Gass & Selinker, 2008, p. 89)

Cenoz & Lecumberri (1999) point out that transfer from the first language influences the second language pronunciation both at segmental and suprasegmental levels. It has been observed that the pronunciations of second language learners who share the same native language exhibit common features. In order to become a successful producer of near-native sounding pronunciation an individual must be able "to disassociate phonological aspects of

the L1 and L2 and thus minimise the transfer of phonological features from one language to the other" (Carey, 2009, web).

Gass & Selinker (2008) explain that there is a distinction between positive transfer (also known as *facilitation*) and negative transfer (also known as *interference*). Facilitation refers to transfer which results in use of correct forms in the production of a second language. The term interference, on the other hand, is used when talking about negative impact of the first language resulting in the use of incorrect forms in a second language. For example, the French learners of English may find it easier to acquire English vocabulary since the two languages share many cognates. On the other hand, the same learners may have problems with pronunciation of the /h/ sound at the beginning of English words, since, in French, it is usually omitted.

*Non-structural factors*

The question of age has always played a crucial role in SLA research. It is commonly assumed that early exposure to a second language increases the probability of achieving a higher degree of proficiency. This assumption, known as the *Critical Period Hypothesis* (CPH) was formulated by Lennenberg (1967), who asserted that after puberty "automatic acquisition from mere exposure to a given language seems to disappear, and foreign languages have to be taught and learned through a conscious and laboured effort. Foreign accents cannot be overcome easily after puberty" (p. 176, cited in Gass & Selinker, 2008, p. 406). Although adults seem to have an initial advantage, children prove to have a greater ability to reach native-like level, especially concerning the phonological aspect of the given second language. One of the possible explanations of why adult learners are less successful learners is the fact that cerebral maturation reaches its peak in the early teens. Lennenberg (1967) "speculated that adults 'inevitably' speak foreign languages with an accent if L2 learning begins after childhood, because the ability to learn new forms of pronunciation is inhibited as the result of the 'firm structuring' of neural processes through cerebral lateralization" (paraphrased in Flege, 1987, p. 163). Another view is provided by Moyer (1990) who attributes the age disadvantage to the "neurological or motor skill constraints, such as entrenched articulatory habits or restricted perceptual targets for phonetic categories" (p. 82, cited in Gass & Selinker, 2008, p. 407). Gass & Selinker (2008) point out that there remains a question whether there is a gradual decline or a sudden drop-off in the ability to learn successfully.

Motivation, as the need to learn a second language or the attitudes towards the second language and its speakers, has recently been considered a more influential factor of L2 learning than age (Kráľová, 2005). The need of an individual to belong to a group or establish a relationship with another individual (integrative motivation) may play a crucial role in learning a second language and its pronunciation.

One of the non-structural factors of anatomic-physiological origin is the so called *phonematic hearing.* An individual with good phonematic hearing is able to perceive, discriminate, transform and decode the foreign language material. Good phonematic hearing also includes the ability to correctly reproduce heard sounds with appropriate articulatory movements. This is connected with other, rather special, factors influencing learner's pronunciation – the ability to imitate and the ability to switch from one language to the other (Kráľová, 2005).

Kráľová (2005) points out that pedagogic aspect of SLA is also an important one. She argues that quality of teacher guidance is a more dominant factor than length of learning. What also plays an important role in learning of L2 pronunciation is the emotional attitude towards the teacher, which might influence the willingness of the learner to imitate the teacher's pronunciation. Intensity of contact with native speakers or residence in the country of the target language are also very influential factors.

### 2.1.2 Difficulties with the English pronunciation

Gass & Selinker summarize Eckman's (1977) *Markedness Differential Hypothesis,* which was based on a phonological theory of markedness. "One way to think of markedness is that an unmarked form, whether phonological or syntactic, is one that is more common, more usual in the world's languages than a marked one" (Gass & Selinker, 2008, p. 179). Unmarked phonological forms are also called *phonological universals,* meaning that they are common to all known languages. Examples of marked phonological forms in English are the dental fricatives. Based on this hypothesis, it is possible to predict which nationalities of EFL learners will have greater or lesser difficulties with English pronunciation.

*Segmental level*

There are several factors which contribute to the status of English as a language with difficult pronunciation. Firstly, it is the frequent lack of correspondence between sound and spelling due to historical and social events in the development of English language (Cenoz &

Lecumberri, 1999). This might prove especially difficult for learners whose first language (L1) shows a high correspondence of sound and spelling such as Slovak or Italian.

Another source of pronunciation difficulties is the difference between L1 and L2 sets of phonemes. L2 learners often find it difficult to pronounce English phonemes which do not have counterparts in their native tongue. The learner usually employs the phonetic repertoire of his native tongue to pronounce English words, which results in an accented pronunciation. One of the common pronunciation problems encountered by EFL learners on the segmental level is an incorrect realization of the quantity and quality of English vowels. For example, EFL learners are not always aware of vowel shortening before fortis consonants (e.g. bad [bæd] vs. bat [bӕt]). In terms of vowel quality, the English open front vowel /æ/ may often be realized simply as mid front /e/ due to insufficient openness. Other pronunciation problems include incorrect realization of the dental fricatives /θ/ and /ð/, or the final *ng* cluster and lack of awareness of /ə/ in unstressed syllables and weak forms.

EFL learners employ various strategies in their L2 pronunciation which often result in errors or unnatural production. Carey (2009) provides a useful list which includes avoidance, substitution, over-generalization, hypercorrection, overcompensation, elision, epenthesis, stylistic variation, and letter to sound rule confusion. In the section 2.2, we will take a closer look at some of these in the specific relation of Slovak as L1 and English as L2.

*Suprasegmental level*

Even after successful acquiring of all individual phonemes, the learner often "suffers" with foreign accent in his or her pronunciation. This may be due to deficiencies at the suprasegmental level of English sound system. EFL learners at a higher level of proficiency still struggle with unnatural intonation, which is often transferred from L1, or incorrect stress placement. Also, the speech rhythm of an EFL learner is often perceived as one the manifestations of foreign accent. We will discuss prosody of the English language in more detail later comparing it to Slovak prosody.

## 2.2 Comparative description of the Slovak and English sound systems

In this chapter, we will compare the sound systems of Slovak and English emphasizing the differences which might serve as sources of pronunciation errors in Slovak English. The notion of *error* will be treated as a deviation from standard English pronunciation with reference to general British Received Pronunciation. We will discuss both segmental and

suprasegmental levels looking at some individual errors present in Slovak English as they were investigated and described by Kráľová (2005).

### 2.2.1 Segmental level

There is a quantitative difference in the inventory of vocalic phonemes in Slovak and English. While English has 20 vocalic phonemes, Slovak only has 15. English vowels are primarily differentiated by their quality, which is less relevant in Slovak vowels. Slovak vowels are primarily differentiated by their quantity, which is only an allophonic aspect of English vowels depending on their phonetic context (especially on following lenis or fortis consonant). A significant difference between Slovak and English vowels is the change in quality of English vowels in unstressed syllables, where they are markedly reduced. In Slovak, the difference between vowels in stressed and unstressed syllables is expressed by the degree of intensity (Kráľová, 2005).

The difference between Slovak and English diphthongs is also worth mentioning. While English employs eight diphthongs /eɪ/, /aɪ/, /ɔɪ/, /aʊ/, /əʊ/, /ɪə/, /eə/, /ʊə/, Slovaks use only four /ia/, /ie/, /iu/, /uo/. Although both English and Slovak diphthongs are realized as glides from one vocalic sound to another, there is a significant difference between these two sets. In English diphthongs, the first part is much longer and stronger than the second part which is shorter and quieter (Roach, 1991). For example, in the word *tie*, the /a/ sound is significantly longer and more prominent part of the /aɪ/ diphthong than the /ɪ/ sound. In Slovak diphthongs, it is the second part that is longer and more prominent (Pauliny, 1979). In other words, English diphthongs can be described as *falling* as opposed to Slovak diphthongs which are *rising*.

In terms of the number of consonant phonemes, the English inventory comprises 24 elements and Slovak sound system uses 27 consonants. While Slovak lacks English dental fricatives /θ/ and /ð/, English does not employ Slovak consonants such as palatal lateral approximant /ʎ/ and velar fricative /x/. English r-sound is a postalveolar approximant /ɹ/, while Slovak /r/ is an alveolar trill. Velar nasal /ŋ/ is a separate phoneme in English, while in Slovak, it is only combinatory variant of /n/ in position before *k* and *g*. English /w/ and /v/ are separate phonemes. In Slovak, the closest sound to English /w/ is /u̯/, which can appear in the postsonant position as an allophone of /v/.[1] A dominant feature of Slovak consonants is the contrast between voiced and voiceless counterparts which can be neutralized. Neutralization

[1] E.g. in the word *ovca* (sheep) *v* is pronounced as [u̯] - [ou̯tsa]

in Slovak is regressive, i.e. a consonant is neutralized due to the influence of the following segment or due to the absence of any following segment. Neutralization usually occurs at morphemic boundaries, across word boundaries, and at the end of word (Pauliny, 1979). For example *b* in the word *rybka* /ripka/ (little fish) is pronounced as /p/ due to neutralizing influence of voiceless /k/ in the following morpheme. In English, the primary attribute of consonants is the contrast between fortis and lenis which cannot be neutralized. Another significant difference between Slovak and English consonant systems is aspiration. While English fortis plosives in initial position of stressed syllables are significantly aspirated, Slovak sound system does not employ aspiration (Kráľová, 2005).

Common segmental errors in Slovak pronunciation of English include phoneme substitution, phoneme omission or addition, and incorrect realization of a phoneme. The study of Slovak-English sound interference carried out by Kráľová (2005) showed that the most common error in Slovak English is the substitution of lenis dental fricative /ð/, most frequently by /d/ but also by /t/ and /z/. Other common errors include substitution of /θ/, /w/, /v/, and /æ/, incorrect pronunciation of final consonant cluster *-ng* and the *-ed* suffix, and incorrect realization of postalveolar /r/. Incorrect lengthening and shortening of vowels is also quite common, as well as insufficient vowel reduction in unstressed syllables (Kráľová, 2005).

### 2.2.2 Suprasegmental level

Word stress in Slovak has a fixed position on the first syllable of the word. The stress has delimitative function, which means it can signal word boundaries. Word stress in English can be on any syllable of the word and is morphologically distinctive. English vowels in unstressed syllables are significantly reduced. Slovak vowels in stressed and unstressed syllables maintain the same quality and are differentiated by the degree of intensity. In combinations of a one-syllable preposition with the following word, there is a tendency, in Slovak, to place the stress on the preposition, as it creates a unit typical for Slovak rhythm (Sabol, 1979). In English, prepositions are always unstressed unless they need to be emphasized (Kráľová, 2005).

Both Slovak and English belong among languages with stress-timed rhythm which is based on periodic recurrence of accented elements (Kráľ & Sabol, 1989, p. 156). English, however, is considered a more rhythmic language with a greater tendency towards isochrony than Slovak. While English foot functions as a rhythmic unit, foot in Slovak has the role of a

sense unit (Kráľová, 2005).[2] It has also been suggested, though to our knowledge not empirically verified, that Slovak displays features of moraic rhythm.

The most frequent types of intonation patterns in English are fall and fall-rise. In Slovak, the most frequent patterns are fall and rise. English tone has gliding effect, while Slovak tone is rather gradational. The first stressed syllable in a tone-unit has a higher pitch in English than in Slovak. Overall, intervals between highest and lowest pitches are usually bigger in English than in Slovak In other words, English has greater intonation range. Since English is an analytical language with relatively fixed word order, the functional load of intonation is higher than is Slovak. Therefore, English prosody plays a more important role in signalization of the functional sentence perspective than it does in Slovak (Kráľová, 2005; Firbas 1992).

The most common suprasegmental error in Slovak English is incorrect placement of word stress. Under the influence of Slovak stress pattern, the learners incorrectly put stress on the first syllable. This is especially common in international words which have a similar form in both languages. Kráľová (2005) illustrates this on the word *professors* which was in majority of cases pronounced as [ˈprɒfesɔːrs] instead of [prəˈfesəʳz]. Incorrect stress placement in international words can also be caused by the influence of vowel quantity in Slovak counterparts of the English words. For example, the word *academy* (in Slovak *akadémia* [ˈakadeːmija]) was often pronounced as [ekeˈdemi] which was according to Kráľová caused by the interference of *é* /eː/ in the Slovak counterpart.

Other suprasegmental errors of Slovak English learners include inadequate phrasal intonation, monotonous intonation, and inadequate speech rate. Another problem of Slovak EFL learners is speech discontinuity which was perceived mainly because of too long pauses and hesitation phenomena (Kráľová, 2005). However, there is yet another reason why native speakers often perceive English of foreign learners as discontinuous. Volín asserts that "one of the reasons why Czech English sounds so discontinuous is the lack of linking. The main culprit in this case is the glottal stop […]" (2002, p. 63). The following chapter will examine this phenomenon in greater detail.

[2] Kráľová postulates this assertion according to Skaličková's (1982) contrastive analysis of Czech and English.

## 2.3 Glottalization

Before discussing the notion of glottalization it will be useful to explain differences between modal and nonmodal phonation as they were examined from various points of view. With focus on nonmodal phonation, we will summarize the attempts to provide classification and basic terminology. Finally, we will discuss glottalization and its functions in prosodic systems of English and Slovak.

### 2.3.1 Modal and nonmodal phonation

From physiological point of view, *modal phonation* can be described as a regular vibration of the vocal folds. Figure 1 shows a schematic diagram of the cycle of vocal fold vibration. When the vocal folds are closed, an airstream passing from the lungs creates increasing subglottal pressure which causes the vocal folds to gradually open. When the pressure is released, vocal folds are closed again and the cycle repeats. The rapid closing and opening of the vocal folds creates quasi-periodic interruptions in the airstream coming to the cavities of the vocal tract (Skarnitzl, 2011).

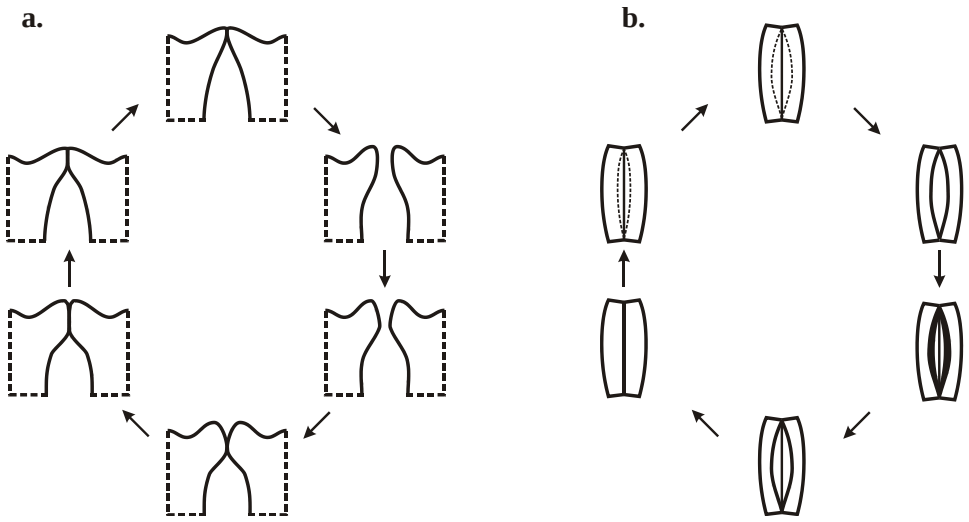


**Figure 1.** A schematic diagram of the cycle of vocal fold vibration: a. front view, b. view from above the vocal folds. Note that the vocal folds a composed of an upper part and a lower part.
(Adapted from Skarnitzl, 2011, p. 31.)

From the acoustic point of view, modal phonation includes "the range of fundamental frequencies normally used for speaking or singing" (Gerratt & Kreiman, 2001). Bőhm, Both, and Németh use the term *regular phonation* referring to "the regular vibration of the vocal folds, resulting in a quasi-periodic speech waveform (i.e. the length, the amplitude and the

shape of adjacent periods show only slight differences)" (2010, p. 43). Vowels are a common example of the quasi-periodicity of modal phonation (see Figure 2).

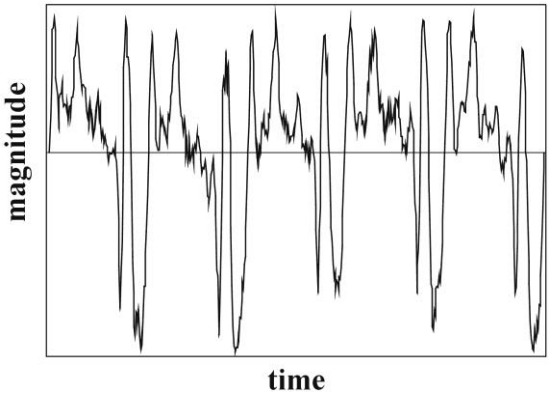


**Figure 2.** Waveform of the vowel /a/, an example of modal phonation with nearly identical successive periods (Adapted from Skarnitzl, 2004, p. 57)

*Nonmodal phonation*, on the other hand, refers to any deviation from normal modal phonation. Attempts to define nonmodal phonation have been made from various points of view. We will focus on perceptual and acoustic observations, and summarize categorization of nonmodal phonation. Acoustic properties which serve as cues for determining phonation types are the variation in amplitude, period, and shape of the successive pitch periods. Perceptually, characteristics such as interruption, hoarseness or roughness can be ascribed to perceived sounds of non-modal phonation.

### 2.3.2 Categorization of nonmodal phonation

First of all, it must be pointed out that nonmodal phonation has been the object of study of professionals from several disciplines – apart from phoneticians, we may mention especially applied disciplines such as speech pathology or speech therapy. That has resulted in different terms being used for the same phenomenon (i.e., for the same type of phonation), as well as in one label being applied for different types of phonation.

Gerrat & Kreiman attempted to reconcile a large number of previously suggested terms in the studies from various scientific fields. They propose three main patterns of nonmodal phonation which proved valid from perceptual, acoustic, as well as physiological point of view. The first two types are *period-doubled phonation* and *amplitude-modulated phonation.* Both types can be subsumed under a superordinate term *supraperiodic phonation*, as they both "demonstrate a repeating pattern [of waveforms] that extends over more than one

apparent glottal cycle" (Gerrat & Kreiman, 2001, p. 367). While period-doubled phonation is based on "pairs of vocal cycles alternating in period and/or amplitude," the waveform of amplitude-modulated phonation "resembles a relatively high-frequency wave modulated by a much lower frequency envelope" (Ibid. p. 368). Both types of supraperiodic phonation are shown in Figure 3 and Figure 4.

The third category of nonmodal phonation according Gerrat & Kreiman (2001) is referred to as *vocal fry,* also called creak, creaky voice, laryngealization, glottalization, and pulse register phonation. Vocal fry is defined as "a train of discrete laryngeal excitations, or 'pulses', of extremely low frequency, with almost complete damping of the vocal tract between excitations" (Gerrat & Kreiman, 2001, p. 375). For illustration, see Figure 5. Gerrat & Kreiman conclude that all three types of nonmodal phonation "are characterized by a consistent change in the *kind* of vocal fold vibration, relative to modal phonation, and this change is accompanied by consistent changes in the acoustic signal and perceptual quality of the voice" (2001, p. 377).

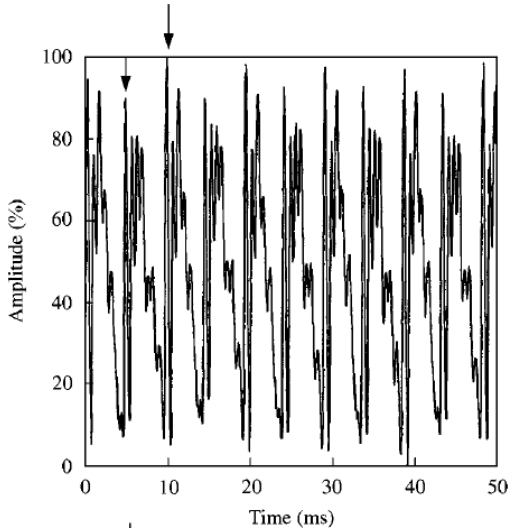


**Figure 3.** Acoustic waveform of a period-doubled phonation. Arrows indicate the two repeating cycles. (Adapted from Gerrat & Kreiman, 2001, p. 367.)

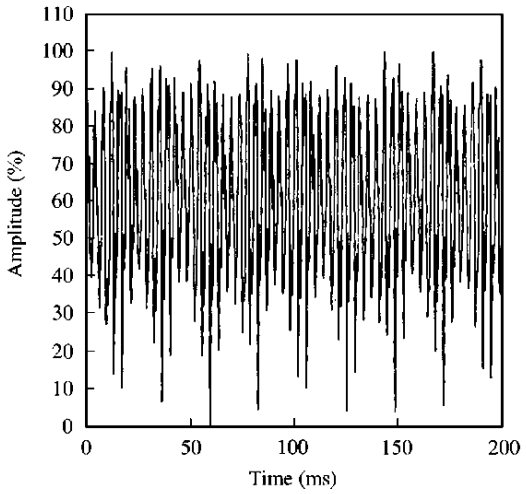


**Figure 4.** Acoustic waveform an amplitude-modulated phonation. (Adapted from Gerrat & Kreiman, 2001, p. 368.)

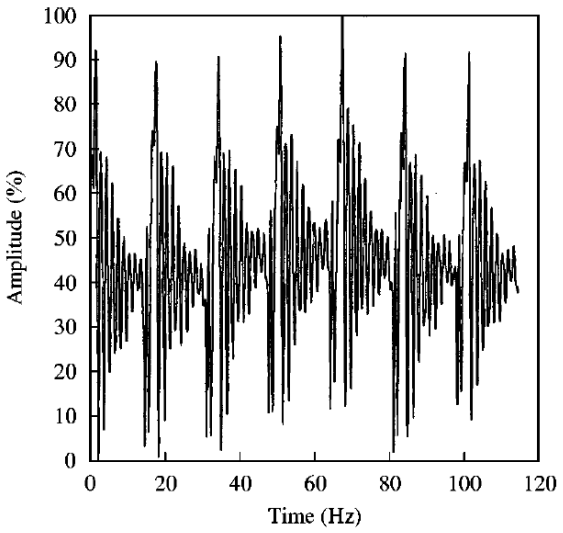


**Figure 5.** Acoustic waveform of a vocal fry showing damping between pulses.
(Adapted from Gerrat & Kreiman, 2001, 375.)

Other authors use the term *glottalization* to encompass any type of nonmodal phonation. Redi & Shattuck-Hufnagel work in their study (2001) with four types of glottalization. The first category, *aperiodicity* refers to irregularity in duration of glottal pulses from period to period. The second, *creak* is characterized by prolonged low fundamental frequency accompanied by almost total damping of glottal pulses. The third type is called *diplophonia,* defined as regular alternation in shape, duration, or amplitude of glottal periods. In Gerrat & Kreiman's description, diplophonia would be considered as a type of supraperiodic phonation. The fourth category developed by Redi & Shattuck-Hufnagel is *glottal squeak,* or a sudden shift to relatively high sustained fundamental frequency with usually very low amplitude (2001, p. 414).

Skarnitzl describes the manifestations of glottalization as they "lie along the phonation continuum" (2004, p. 58). In his study on nonmodal phonation before the Czech conjunction "a", Skarnitzl proposes two major categories – *glottal stop* and *creak* (see Figure 6 and Figure 7). Glottal stop, corresponding to the closed extreme on the phonation continuum, is articulated as "a complete closure of the vocal folds and its sudden release, which shows as one or two pulses of irregularity in the waveform" (Skarnitzl, 2004, p. 58). Glottal stop is further divided into two major types – the canonical form and the so called *barbell glottal stop.* The latter appeares as the canonical form "preceded by one or two pulses directly linked to the preceding segment, thus resembling the shape of a barbell" (Ibid. p. 58). Creak, which lies towards the closed end on the phonation continuum, was divided into several subtypes.

According to the temporal arrangement of the glottal segment, Skarnitzl proposes *continuous creak, creak with hold,* and *barbell creak.* According to the regularity of the pitch period within the glottal segment, two other types are suggested – *creak with regular pitch period* and *creak with irregular pitch period.*

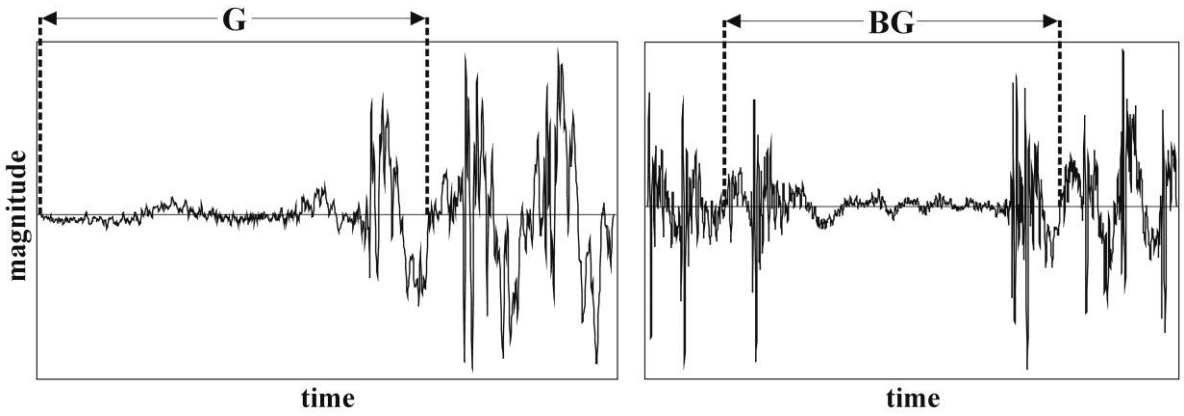


**Figure 6.** Waveform of a canonical glottal stop (left) and barbell glottal stop (right). (Adapted from Skarnitzl, 2004, p. 60.)

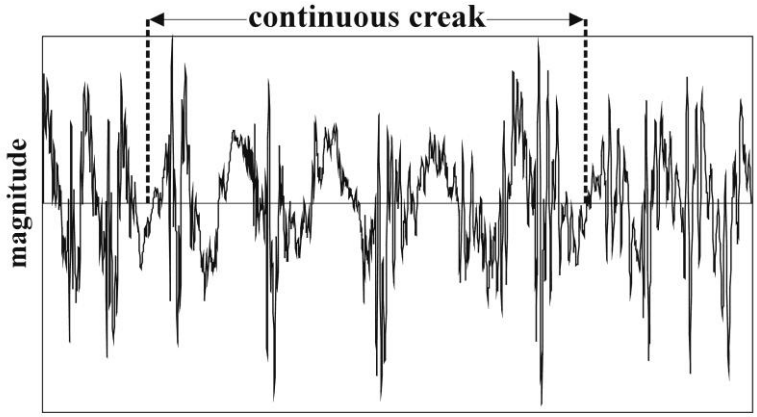


**Figure 7.** Waveform of a continuous creek. (Adapted from Skarnitzl, 2004, p. 63.)

Previously described categories of glottalization may occur in various positions. For example, creak usually occurs in phrase-final position. On the other hand, glottal stops usually occur in phrase-initial or word-initial position. In the following sections, we will focus on glottalization occurring before word-initial vowels.

### 2.3.3 Glottalization in connected speech

Bissiri *et al.* (2011) point out three main functions of glottalization in the world's languages: 1) phonemic contrast, 2) prosodic structure marking, and 3) signalling affect or emphasis. For example, a language which uses a glottal gesture to make a phonemic contrast is Jalapa Mazatec, a language spoken in a region in Mexico. The speakers use creaky voice quality to distinguish the word /já̰/ meaning "he wears" from the word /já/ meaning "tree" (Gordon & Ladefoged, 2001).

In the Czech language, glottal stops [ʔ] are part of the standard pronunciation and serve as markers of word boundaries (Volín, 2002). The speakers often insert them before word-initial vowels. To our best knowledge, glottalization in Slovak has not been widely investigated. Pauliny (1979), in his phonetic transcriptions of phrases containing vowel-initial words, does not provide glottal stops as an alternative in pronunciation. For example *chlap ani nejedol* (the man did not even eat) is transcribed as /xlab aňi ňejedol/, or the phrase *jesť a piť* (to eat and drink) is transcribed as /jezď a piť/. This implicitly implies that standard Slovak does not employ glottalization before word-initial vowels.

In English, the use of glottal stops before word-initial vowels is only exceptional. Glottal stops are usually inserted when the speaker wants to give a word special emotional charge or contrastive emphasis (Volín, 2002). In neutral English, words beginning with vowels are usually connected with the preceding item by means of linking phenomena: *pseudo-resyllabification, linking [r], intrusive [r], transient [j],* and *transient [w]*.

Pseudo-resyllabification occurs when a word-final consonant is linked to the following word-initial vowel. This type of linking creates an impression that the syllable boundaries are shifted and do not align with word boundaries, e.g. *made in India* /ˈmeɪ.dɪ.ˈnɪn.dɪ.ə/

Linking [r] appears where word-initial vowel is preceded by a silent *r* at the end of the preceding word. Silent *r*'s are written but not pronounced in non-rhotic accents of English (i.e., those in which a post-vocalic *r* is not pronounced, such as in the word *part* /pɑːt/; in contrast, this *r* would be realized in rhotic accents, / pɑːrt /). However, silent *r*'s are pronounced before word-initial vowels as a linking element (Volín, 2002). For example the final *r* in the word *prepare* /prɪˈpeə/ is not pronounced when followed by another consonant or silence. However, it is pronounced in a phrase such as *prepare it* /prɪˈpeərɪt/.

Intrusive [r] appears in the same intervocalic context as linking [r]. The difference is, however, that intrusive [r] is not represented in spelling and cannot thus be considered as an underlying component of the word in the same way that it is in words like *part* or *four*. Speakers of non-rhotic accents of English, especially within Great Britain, sometimes insert r-

sounds between word-final and word-initial vowels just “to avoid intervocalic glottal stops and to prevent two vowels from direct contact” (Volín, 2002, p. 65). This for example occurs in a phrase such as *I saw it* /aɪˈsɔːrət/, or even within a word, such as *drawing* /drɔːrɪŋ/.

Transient [j] is pronounced before a word-initial vowel if it is preceded by a word-final /iː/, /ɪ/, /eɪ/, /aɪ/, or /ɔɪ/. It is “an articulatory by-product without a phonemic status” (Volín, 2002) therefore it is usually transcribed as ₍j₎. E.g. *slowly open the envelop* /ˈsləʊlɪˈ₍j₎əʊpn̩ ðiˈ₍j₎envələʊp/. Transient [w] behaves in a similar way as transient [j]. It is pronounced before word-initial vowels if they are preceded by word-final /ʊ/, /uː/, /aʊ/, or /əʊ/ and is transcribed as ₍w₎. E.g. *true answer* /truːˈ₍w₎ɑːnsə/.

So far, we have discussed glottalization in terms of segmental context. In the following section, we will look at glottalization of word-initial vowels considering its position within higher units of prosodic structure.

### 2.3.4 Glottalization and the prosodic structure

We understand the term *prosodic structure* on two essential levels. Firstly, it is the alternation of stressed and unstressed syllables as well as accented and unaccented words. Secondly, it is the tendency of speakers to create a hierarchical structure of different-sized prosodic units by means of rhythm and intonation. For example, syllables are grouped into words, words into phrases, and smaller phrases into larger phrases.

Dilley *et al.* (1996) examined glottalization of word-initial vowels as a function of prosodic structure in native English. They based their analysis on three types of prosodic context – position in the intonational phrase, presence of pitch accent on the target syllable or word, and realized lexical stress. Segmental context – presence of a pause, consonant (including stops), or vowel – was also considered. They found out that “intonation-phrase-initial position and pitch-accented placement influence glottalization of word-initial vowels” (Dilley *et al.*, 1996, p. 432). The speakers tended to glottalize significantly more often at the beginning of intonational phrases. Also the presence of a pitch-accent increased the likelihood that a word-initial vowel would be glottalized. The rate of glottalization was also high after pauses which occurred frequently at intonational phrase boundaries. Within intonational phrases, preceding vowel context proved conducive to glottalization (Dilley *et al.*, 1996).

Bissiri & Volín (2010) analyzed the occurrence of glottal stops before word-initial vowels in Czech English in relationship to phrase boundaries. They compared Czech speakers of English with British speakers and found out significant differences. At phrase boundaries, Czech speakers glottalized almost 100 % of the tokens, while British speakers glottalized 50

% of the tokens. At non-phrase boundaries, Czech speakers showed slightly lower frequencies of glottalization, and British speakers seldom used glottalization.

Besides research exploring the production of glottalization in non-native speakers of English, there are also studies which focus on the perceptual aspect of glottalization. Volín *et al.* (2012) observed the effect of word-initial glottalization on word monitoring in Slovak speakers of English. The aim of the experiment was to examine the differences between reaction times to words with and without glottalization. Volín *et al.*(2012) argue that the use of glottalization in Slovak is reportedly low and that the speakers of Slovak prefer to link the word-initial vowels to the preceding consonant. Slovak participants of the perception test were compared to Czech participants. Volín *et al.* (2012) hypothesized that "the Slovak listeners, who only use glottal stops to highlight words (similarly to the English) will have shorter reaction times to words with glottal segment than the Czech listeners, to whom the glottalization of word-initial vowels does not signal anything special" (Volín *et al.,* 2012, in print). The results showed that the words with pre-glottalized word-initial vowels were spotted faster than words which were linked to the preceding words. Slovak listeners did not differ significantly from the Czech listeners.

## 2.4 Hypotheses and research questions

The experimental part of the present thesis will examine the presence of word-initial glottalization in Slovak speakers of English. The vowel-initial target words will be observed mainly in prosodic context, specifically in relationship to word stress and position in intonational phrases. Lexical vs. grammatical status of word with the target vowels will also be taken into account. Our first hypothesis is based on the previously made assumption that speakers of the Slovak language do not glottalize:

> H1: Slovak speakers of English do not employ word-initial glottalization extensively and use linking phenomena instead.

However, production of speech in English as a foreign language requires a higher cognitive effort than production of the mother tongue. This may result in lesser fluency and forming more intonational boundaries which can increase the probability of glottalization. Another reason for increased occurrence of glottalization may be inability to use linking phenomena in production of English. These assumptions led us to an alternative hypothesis:

H2: Glottalization in Slovak English is employed before majority of word-initial vowels.

Following research questions will help us test the hypotheses:

1. How does the position in the intonational phrase influence the presence of word-initial glottalization in Slovak English?
2. What is the impact of lexical stress on the presence of word-initial glottalization?
3. How does the lexical or grammatical status of target words influence the presence of word-initial glottalization?
4. Are there significant differences in the glottalizing of male and female speakers / individual speakers?

# 3. Method and Material

## 3.1 Recording and the participants

Recordings of Slovak speakers of English were obtained in the studio of the Institute of Phonetics at the Faculty of Arts of Charles University in Prague. The signal was recorded from the AKG C4500 B-BC condenser studio microphone directly into the sound card of the computer, using 32-kHz sampling rate. 25 university students of Slovak nationality aged from 19 to 26 were recorded. The participants were asked to fill out a consent form where they provided information on their background in studying English and longer stays in English-speaking countries. At least intermediate level of English was required. All participants were asked to read the same text, a BBC news bulletin. They had about 10 minutes to read the text and prepare difficult parts. They were asked to repeat the whole sentence or phrase if they made a significant error. All recorded readings were around 3 minutes and 30 seconds long. Subsequently, recordings of 15 speakers with similar level of fluency were selected.

## 3.2 Data processing

The selected recordings were analyzed in the computer programme Praat 5.3.11. (Boersma & Weenink, 2012), which is designed for phonetic analyses. The first step was to search for the target vowels. The text contained 108 word-initial vowels, out of which all vowels preceded by a pause (at least 80 ms) were excluded. These can be expected to begin with glottalization most of the times, due to irregular movement of the vocal folds as they begin to vibrate after a period of silence. The remaining 1359 target vowels were analyzed in more detail. For determining the boundaries between given segments, we consulted Machač & Skarnitzl (2009).

Based on perceptual as well as acoustic cues, we labelled the preceding segment of each word-initial vowel as ʔ if it proved to be a manifestation of glottalization. The criteria used for determining the presence of glottalization are described in section 3.4. If the word-initial vowel was linked directly to the preceding phoneme without glottalization, we labelled the preceding segment with symbol of the particular phoneme.

By means of a point tier, each target vowel was labelled with symbols providing information about the word in which the vowel was found. The labels represented information about the stress of the word-initial syllable, about the position of the word within intonational phrase and about the semantic function of the word (see Table 1 and Figure 8). Deciding

whether a syllable with the target vowel was stressed or unstressed was not carried using the "dictionary form" of words, since the students were not expected to realize the stress correctly in all instances. So as to be able to determine the effect of actually realized stress, it was necessary to listen to of all individual speakers and their renditions of the target words, as some of them often stressed syllables which are not stressed in standard English pronunciation. For example, the word *attempts* was by some speakers pronounced as /ˈætəmpts/. Determining the boundaries between intonational phrases also required attentive listening as each speaker had a distinctive way of phrasing. Only intermediate intonational phrases were taken into account.

| | Label | Explanation |
|---|---|---|
| Lexical stress | s | the target vowel is in a stressed syllable |
| | u | the target vowel is in an unstressed syllable |
| Position within intonational phrase | i | phrase-initial position |
| | m | phrase-medial position |
| | f | phrase-final position |
| Semantic function of the word | l | lexical word |
| | g | grammatical word |

**Table 1**. Labels used in point tier to mark three categories of information about words containing the target vowels.

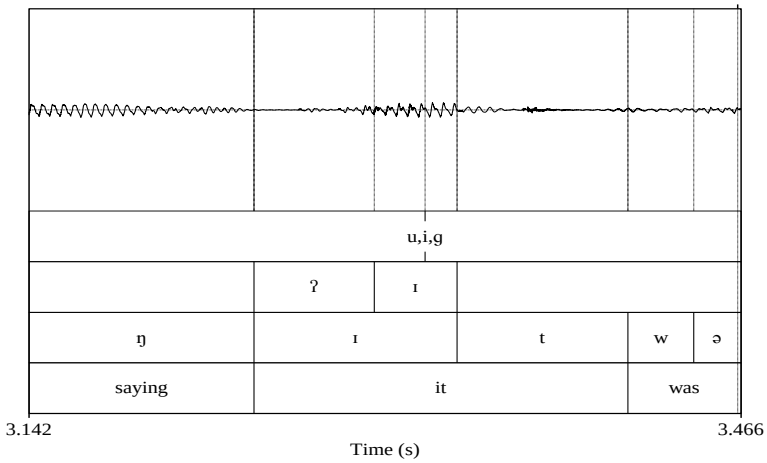


**Figure 8**. Marking the information about the word *it* containing a target vowel /ɪ/ preceded by a glottal stop. The first (point) tier of the textgrid shows that the word is unstressed (u), it occurs in phrasal-initial position (i), and it is a grammatical word (g).

After all word-initial vowels were labelled, a Praat script was used to extract the data into a table. By means of filters in Microsoft Excel we obtained desired counts needed for statistical analyses.

### 3.3 Statistical analyses

Given the material and our research question, we were primarily interested in comparing occurrences of glottalization in different categories and in specifying whether the differences are statistically significant or not. Such comparisons are carried out using the chi-square test.

Firstly, contingency tables with various parameters were created (e.g. Table 3 and Table 4). These showed differences in distributions within selected categories, for example occurrence of glottalization in stressed and unstressed syllables. By means of chi-square test we determined whether the differences in distributions were statistically significant. The results obtained from each test contain the value of $\chi^2$, the number of degrees of freedom, the amount of analyzed items and the *p* value, for example $\chi^2$ (2, $n$ = 389) = 14,1; $p < 0.001$.

According to Volín (2007, p. 36), the boundary for statistically significant results is, in social sciences, regarded to be $p < 0.05$. Values of $p < 0.001$ are considered highly significant, while those between $0.05 < p < 0.1$ are described as marginally significant. Specifically, a value of $p = 0.02$ means that there is a 2% probability that the discovered differences are merely a property of the analyzed sample. In other words, there is a 98% probability that the differences truly exist and they may be generalized for the population that we are investigating (Volín, 2007, p. 37).

### 3.4 Criteria for glottalization

We relied on two basic criteria when determining whether the target vowels are or are not glottalized. Perceptual level was primary. In order to mark a segment as glottalized, a salient auditory impression of a glottal gesture was required. Perceptual impression was usually accompanied by visual evidence in form of irregularity in the acoustic waveform. The irregularities could manifest themselves in several ways (*cf.* also section 2.3.2 and references cited therein). Most frequently, glottalization was realized as a sequence of irregular pitch periods (creak) which was easily distinguishable from regular pitch period of the following vowel. However, the transition from creak to the vowel was often rather gradual and it was sometimes difficult to determine a boundary between the neighbouring segments. In any case, we were primarily interested in the presence of glottalization and not its temporal scope with

respect to the following vowel. Reduction in amplitude was also labelled as glottalization. Although it did not show irregularity of pitch periods, it was usually strong enough on perceptual level. Glottalization in form of canonical glottal stops was rather infrequent. More often, barbell glottal stops, as described by Skarnitzl (2004), were found.

## 4. Results and discussion

In the following sections, we are going to analyze the occurrence of glottalization in Slovak speakers of English depending on the prosodic and semantic status of the target words. First of all, we will examine results for all our speakers. The second subsection will present an analysis of differences between genders and among individual speakers.

### 4.1 Overall results

After excluding all word-initial vowels preceded by a pause, the total number of 1359 vowels was analyzed. Of all these, 1006 (74 %) vowels were realized as glottalized and 353 vowels were directly linked to the preceding segment by means of linking phenomena (pseudo-resyllabification and transients). Already this very general result seems to suggest that our second hypothesis (H2) is very likely to be confirmed. A possible explanation for the extenstive glottalization in Slovak speakers of English could be that Slovaks do glottalize in their mother toungue. Volín *et al.* (2012) suggest that the traditional descriptions in the Slovak grammar books may not be valid any more and that the younger generation of Slovaks uses more glottal stops than the older generations used to. Use of glottaliztion in English would then be a result of sound interference.

Analysis of the presence of glottalization in stressed and unstressed syllables revealed that out of 376 recorded stressed syllables, 350 were glottalized (see Table 2 and Figure 9). In other words, 93 % of all word-initial vowels in stressed syllables were preceded by glottalization. In the case of unstressed syllables, approximately 66 % of word-initial vowels in were glottalized. A chi-square test showed that the difference between the occurrences is statistically highly significant: $\chi^2$ (1, $n$ = 1359) = 98,2; $p < 0.001$. It is evident that word stress is an influential factor on word-initial glottalization in Slovak English: specifically, according to our expectations, words beginning with stressed syllables and therefore with more emphasis tend to be glottalized more frequently than word beginning with unstressed syllables.

| | Stressed syllable | Unstressed syllable | Total |
|---|---|---|---|
| Glottalization + | 350 | 656 | 1006 |
| Glottalization – | 26 | 327 | 353 |
| Total | 376 | 983 | 1359 |

**Table 2.** Occurrence of glottalization in stressed and unstressed syllables.

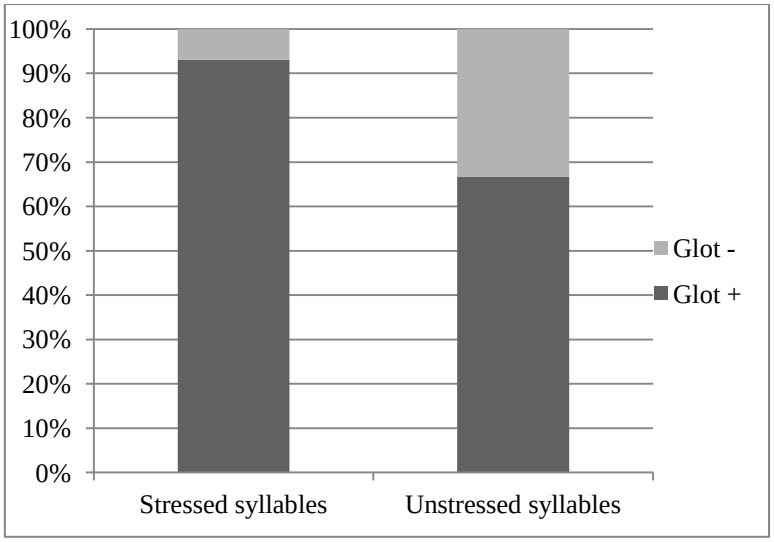


**Figure 9.** Percentages of glottalized and non-glottalized initial vowels in stressed and unstressed syllables.

Further, we looked at the presence of glottalization relative to position of the word-initial vowels within intonational phrase (see Table 3). Since there were only 12 occurrences of the target vowels in phrase-final position, they were merged into one group with phrase-medial word-initial vowels. We named the category *non-phrase-initial position*. The results showed that 93 % of word-initial and at the same time phrase-initial vowels were glottalized. In the case of non-phrase-initial vowels, 64 % were glottalized (see Figure 10). A chi-square, test showed that the result is statistically highly significant: $\chi^2$ (1, $n$ = 1359) = 134; $p < 0.001$. Thus, it is natural that phrase-initial position of word-initial vowels markedly increases the probability of glottalization. It should be pointed out that only those phrase-initial vowels were included in the analyses which did not occur after a pause, where the presence of glottalization is all but certain (see also section 3.2.).

| | Phrase-initial | Non-phrase-initial | Total |
|---|---|---|---|
| Glottalization + | 418 | 588 | 1006 |
| Glottalization – | 28 | 325 | 353 |
| Total | 446 | 913 | 1359 |

**Table 3.** Occurrence of glottalization in word-initial vowels relative to position in the intonational phrase.

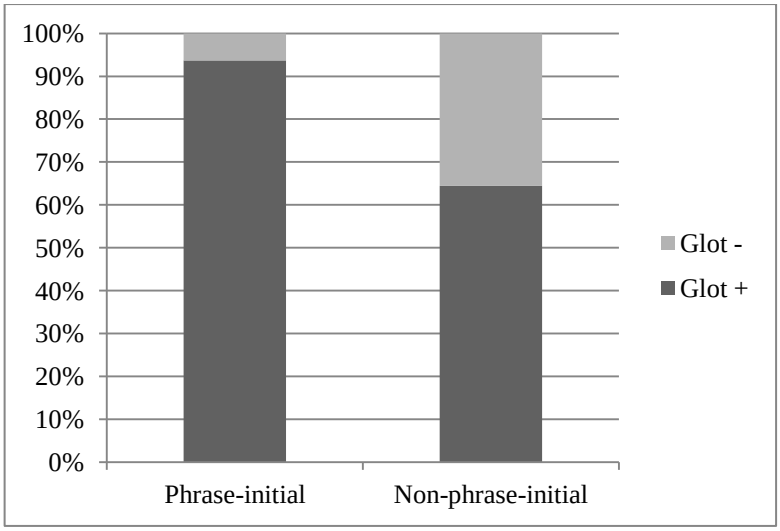


**Figure 10.** Percentages of glottalized and non-glottalized initial vowels in phrase-initial and non-phrase-initial position.

Subsequently, we analyzed the presence of glottalization relative to the semantic status of the analyzed vowel-initial words. Table 4 compares the numbers of glottalized vowels at the beginning of lexical and grammatical words. The results showed that only 58 % of initial vowels in lexical words were glottalized, while in grammatical words, 89 % of initial vowels were glottalized (see Figure 11). A chi-square test confirmed a high significance of this result: $\chi^2$ (1, $n$ = 1359) = 168; $p < 0.001$. This leads us to the assumption that grammatical vowel-initial words tend to be glottalized more often by Slovak speakers of English than lexical vowel-initial words. This result is somewhat surprising. We would expect that lexical words, which carry the semantic load and are usually more prominent, should be more likely to be glottalized, since one of the functions of glottalization is giving a word more emphasis. This may be connected with the fact that Slovak speakers of English often fail to reduce grammatical words, as it happens in native English. That means that the grammatical words in the production of Slovak speakers may remain as prominent as the lexical words. In a future research, it might be interesting to find out the word class of the grammatical words because the tendency to glottalize more may also be related to the fact that in Slovak, monosyllabic preposition are realized as stressed (see section 2.2.2.).

| | Lexical word | Grammatical word | Total |
|---|---|---|---|
| Glottalization + | 389 | 617 | 1006 |
| Glottalization – | 278 | 75 | 353 |
| Total | 667 | 692 | 1359 |

**Table 4.** Occurrence of glottalized initial vowels in lexical and grammatical words.

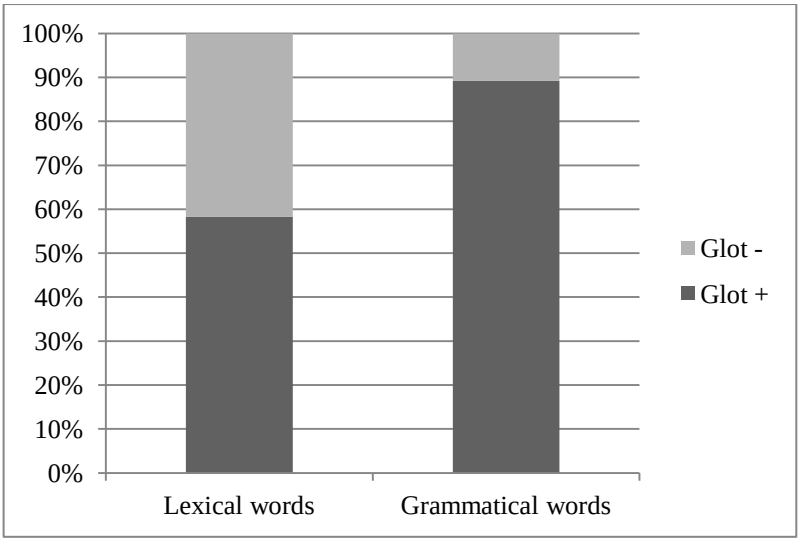


**Figure 11.** Percentages of glottalized initial vowels in lexical and grammatical words.

In further analysis, we combined the factors of stress and phrasal position for glottalized lexical and grammatical words. Again, we worked with two categories of position in the intonational phrase – phrase-initial and non-phrase-initial position. Figure 12 shows the influence of stress and phrasal position on glottalization in the initial-vowels of lexical words. We can see that the combination of word stress and phrasal-initial position greatly increases the probability of a vowel-initial lexical word to be glottalized. A chi-square test confirmed the high statistical significance of this assumption: $\chi^2$ (1, $n$ = 389) = 14,1; $p < 0.001$.

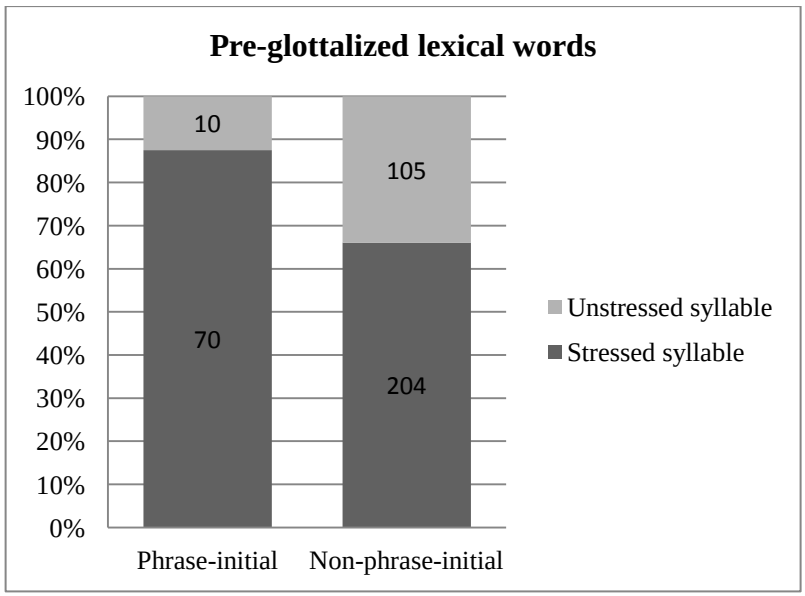


**Figure 12**. Factors of word stress and position in intonational phrase in the glottalized initial vowels in the lexical words.

Figure 13 shows the same relationship for glottalized vowel-initial grammatical words. In this case, however, the results show a striking difference. It seems that while in lexical words it was the stressed phrase-initial context which was most conducive to glottalization, in grammatical words it is the combination of unstressed syllable within an intonational phrase. A chi-square test showed that the results are statistically highly significant: $\chi^2$ (1, $n$ = 617) = 10.8; $p < 0.001$. It is exactly this context – unstressed grammatical words within an intonational phrase – where we would expect the lowest tendency to glottalize in native speakers of English. This may be one of the phenomena which are responsible for the Slovak accent in English.

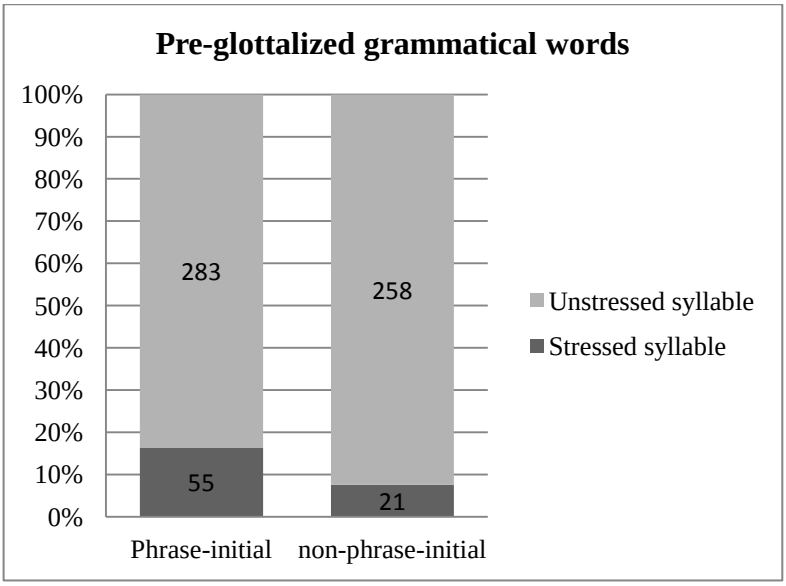


**Figure 13.** Factors of word stress and position in intonational phrase in the glottalized initial vowels in the grammatical words.

## 4.2 Differences between genders and individual speakers

In the speech material, 8 male speakers provided 715 word-initial vowels and 7 female speakers 664 word-initial vowels for the analyses. Separate analyses of glottalization in male and female speakers did not show any significant difference. Figure 14 shows that male speakers and female speakers display very similar proportions of glottalized and non-glottalized tokens.

Studies examining the effects of the learner's gender provide varied results. While some studies did not find any correlation between the learner's gender and pronunciation ability, others (e.g., Weiss, cited by Leather & James 1996) indicate that females are more

inclined towards using the prestige accent of the L2 than males (as they are in their L1, according to Leather & James 1996). In Bacon & Finnemann's (1992) study, females reported "higher levels of motivation, strategy use, comprehension, positive affect, willingness to confront, and exposure to authentic input" (p. 490).


**Figure 14.** Percentage of glottalized and non-glottalized tokens for male and female speakers.

On average, each speaker provided 90 vowels for analysis. Figure 15 shows the proportions of glottalized and non-glottalized tokens for individual speakers. We can see that the speaker TREB displays the lowest percentage of glottalized tokens. In comparison with other analysed speakers, his speech was more fluent and more abundant with linking phenomena. Although the speaker RADM is a student of English and American Studies, the occurrence of glottalized tokens in his production is comparable with other speakers who do not study English as their major.

Among female speakers, however, we can see a notable difference between more experienced speakers of English and the less experienced ones. The speakers KANA and PETA are students of English and American Studies, and the speaker HORA received a high-quality instruction in the English language during the high-school years. These three speakers glottalized in approximately 20 % fewer cases than the rest of the female speakers.

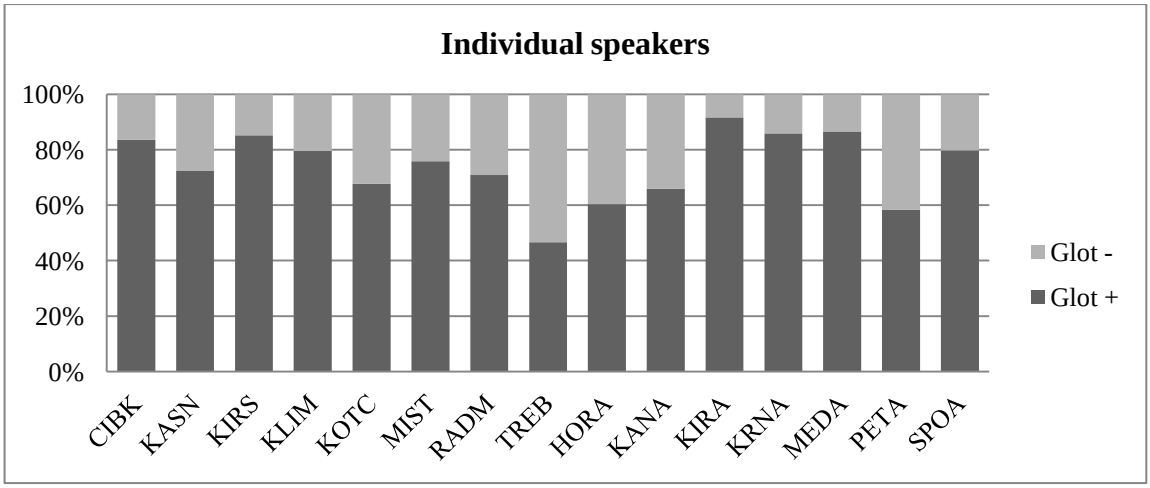


**Figure 15.** Percentages of glottalized and non-glottalized tokens in individual speakers. Each speaker was given a code containing four letters. The codes for female speakers end with an A.

## 5. General discussion and conclusion

The aim of the present BA thesis was to analyse the occurrence of word-initial glottalization in Slovak English. The research focused on word-initial vowels in relationship to prosodic structure, more specifically to word stress and position in intonational phrase. The question whether glottalized vowels occurred more in lexical or grammatical words was also considered. Statistical tests were run to determine whether the observed differences in distributions of glottalized and non-glottalized tokens in various contexts were significant. The research was based on 15 recordings of Slovak speakers of English who read the same text, a BBC bulletin.

The research was built on two hypotheses. The first hypothesis was based on the assumption that Slovaks do not use glottalization in their mother tongue, therefore, they will not glottalize extensively in English either. This hypothesis was not confirmed. Instead, the second hypothesis – that Slovak speakers use glottalization in their production of English to a large extent – was confirmed.

Out of all analyzed word-initial vowels, 74 % were labelled as glottalized. Analysis of the presence of glottalization in stressed and unstressed syllables revealed that 93 % of all word-initial vowels in stressed syllables were glottalized. It was confirmed that word stress is an influential factor on word-initial glottalization in Slovak English. As we expected, words beginning with stressed syllables and therefore with more emphasis were glottalized more frequently than words beginning with unstressed syllables.

Then we analyzed glottalization in relation to position of the target vowels in the intonational phrases. The results showed that 93 % of word-initial vowels which occurred in phrasal-initial position were preceded by glottalization. In the case of non-phrase-initial target vowels 64 % were glottalized. This result is expectable, since phrase-initial context in conducive to glottalization.

Subsequently, we examined the occurrence of glottalization in lexical and grammatical words. The results showed that 58 % of initial vowels in lexical words were glottalized, while in grammatical words 89 % of initial vowels were glottalized. We would expect an opposite tendency. Lexical words, which carry the semantic load and are usually more prominent, are more likely to be glottalized since one of the functions of glottalization is giving a word more emphasis. Excessive glottalization of initial vowels in grammatical words may result in the impression of a discontinuous speech.

In further analysis we took all glottalized tokens and divided them according to their position in lexical and grammatical words. In the analysis, two factors were combined – the presence of word stress and position in intonational phrase. The results showed that if an initial vowel of a lexical word is placed in a stressed syllable and at the same time in phrase-initial position, it is very likely to be glottalized. For grammatical words, the tendency appeared somewhat opposite. The majority of the grammatical words with vowel-initial glottalization were unstressed and placed in the middle of an intonational phrase. This phenomenon is quite deviant from what we would expect in native speakers of English, and could be responsible for foreign accentedness of Slovak English.

Analysis of glottalization in male and female speakers did not show a significant difference. Both male and female speakers glottalize in approximately 74 % of cases. Analysis across individual speakers provided more significant differences. The results showed that speakers with a higher level of proficiency in English and a more fluent speech glottalize less than the rest of the speakers. The reason may be that they make less phrasal boundaries and thus avoid contexts conducive to glottalization.

Overall, the results of our experiment showed that Slovaks glottalize extensively in their production of English. One of the reasons for this may be that Slovak do glottalize in their mother tongue. The use of glottalization in English would then be the result of language interference. Volín *et al.* (2012) have already suggested that younger Slovaks probably use glottalization more often in comparison with older generations. It was shown that Slovak listeners were quite reliant on word-initial glottalization in perception of English words. That may lead us to the assumption that Slovak EFL learners use word-initial glottalization to mark the word boundaries in an attempt to make the structure of the speech more tangible and comprehensible.

However, it should be desirable to teach students of English that they should avoid excessive glottalization in their speech. Inappropriate presence of glottal elements may contribute to foreign accentedness in the speaker's performance. It might even hinder mental processing of speech since excessive use of glottalization can produce unnatural or unpredictable rhythmic configurations (Volín *et al.,* 2012). This kind of knowledge could be especially useful for speakers with a high level of proficiency who would like to approximate native-like pronunciation.

In our experiment, we examined read performances of the speakers. In future research, the occurrence of glottalization in Slovak English should also be explored in the context of spontaneous speech. However, more importantly, the phenomenon of glottalization

should be firstly investigated in the Slovak language itself. To our knowledge, no detailed analysis of the use of glottal stops has been conducted so far.

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## Zhrnutie

Cieľom tejto bakalárskej práce je preskúmať výskyt glotalizácie v samohláskach na začiatku slov v angličtine Slovákov a to najmä v súvislosti s prozodickou štruktúrou reči. Pred popisom samotného výskumu sa práca venuje zhrnutiu poznatkov z oblasti akvizície cudzieho (Second language acquisition, SLA) jazyka s dôrazom na osvojovanie si výslovnosti. Je dôležité predstaviť niekoľko pojmov, ktoré s touto problematikou úzko súvisia.

Je známe, že pre niektorých jednotlivcov je učenie sa cudzieho jazyka jednoduchšie ako pre iných. Kráľová (2005) rozdeľuje faktory ovplyvňujúce osvojovanie si cudzieho jazyka na dve základné kategórie. Prvou kategóriou sú štrukturálne faktory, medzi ktoré patrí aj takzvaný *jazykový transfer*. Tento koncept opisuje vplyv materinského jazyka na cieľový cudzí jazyk, či už ide o vplyv pozitívny, alebo vplyv negatívny, ktorý sa tiež nazýva *interferencia.* Túto problematiku rozvinieme neskôr v diskusii o ťažkostiach, ktoré majú Slováci pri učení sa angličtiny.

Druhou kategóriou faktorov, ktoré vplývajú akvizíciu cudzieho jazyka, sú neštrukturálne factory, ktoré zahŕňajú vek, schopnosti, motiváciu, postoj, socio-psychologické vplyvy a fyziologické faktory. Najpálčivejšou otázkou v tejto súvislosti je faktor veku. Podľa tzv. hypotézy kritického obdobia (Critical period hypothesis) je možné predpokladať, že po dosiahnutí určitého veku sa schopnosť naučiť sa cudzí jazyk na úrovni rodeného hovoriaceho výrazne znižuje. To sa týka hlavne učenia sa výslovnsoti cudzieho jazyka. V súvislosti s osvojovaním si cudzojazyčnej výslovnosti je treba spomenúť pojem fonematický sluch. Ide o schopnosť jedinca citlivo vnímať a dekódovať zvukový materiál cudzieho jazyka a úspešne ho napodobniť. Fonematický sluch môžeme, podľa Kráľovej (2005), zaradiť medzi anatomicko-fyziologické faktory.

Dôležitým aspektom pri akvizícii cudzieho jazyka je aj faktor pedagogický. Kráľová (2005) sa domnieva, že kvalita pedagogického vedenia je častokrát dôležitejšia než dĺžka výučby. Motivácia a postoj študenta tiež zohrávanú dôležitú rolu pri prijímaní nových podnetov z cudzieho jazyka.

Je niekoľko ďalších konceptov, ktoré je dobré spomenúť v diskusii o osvojovaní si cudzieho jazyka. Jedným zo základných predpokladov teórie SLA je pojem *medzijazyk* (interlanguage). Ide o koncept, v ktorom je jazyk jednotlivca, osvojujúceho si cudzí jazyk, samostatným systémom s vlastnou štruktúrou, ktorý obasuje tzv. *nové formy*. Tieto formy nemajú pôvod ani v materinskom jazyku ani v cieľovom jazyku. Jedinec si ich tvorí sám na

základe informácií, ktorým je pri osvojovaní si cudzieho jazyka vystavený. Tu hovoríme tiež o procese *fosilizácie.* Tento pojem opisuje zastavenie procesu učenia sa. V dôsledku fosilizácie sa určité jazykové pravidlo natrvalo usádza v medzijazyku jednotlivca vo forme, ktorá nezodpovedá norme cieľového jazyka. Naďalej sa objavuje v produkcii jednotlivca bez ohľadu na to, či je cudziemu jazyku ďalej vystavovaný (Gas & Selinker, 2008).

Dostávame sa s k angličtine a k problémom, s ktorými sa stretávajú jej slovenskí študenti. Je niekoľko faktorov, ktoré prispievajú k statusu angličtiny ako ako jazyku s ťažkou výslovnsťou. V prvom rade je to častá nezhoda medzi zvukom slova a jeho hláskovaním. Toto je obzvlášť problémom jednotlivcov, ktorých materinský jazyk vykazuje zančnú zhodu medzi výslovnosťou a hláskovaním. Takým jazykom je, samozrejme, aj Slovenčina.

Častým zdrojom výslovnostných problémov v slovenskej angličtine je rozdiel v sadách hlások slovenčiny a angličtiny. Ide o rodziely kvantitatívne ako aj kvalitatívne. Mnohé fonémy v angličtine nemajú v Slovenčine náprotivky. Študent je nútený nahrádzať neznáme fonémy tým, čo nájde v zvukovom repertoári svojho materinského jazyka. V angličtine sa jedná napríklad o dentálne frikatívy /θ/ a /ð/, ktoré sú v angličtine Slovákov nahrádzané hláskami /f/ a /d/. Medzi samohláskami sú problematické napríklad nedostatočne otvorené /æ/ a nedostatočné redukované /ə/.

Čo sa týka suprasegmentálnej úrovne, časté chyby v produkcii angličtiny Slovákov sú neprirodzená intonácia a nesprávny slovný, či vetný prízvuk. Taktiež neprirodzený rytmus a členenie prejavu na mešie frázy môžu byť vnímané ako manifestácie cuzdieho prízvuku v angličtine. Zdrojom suprasegmentálnych chýb je najmä negatívny transfer z materinského jazyka. Napríklad slovný prízvuk, ktorý je slovenčine na prvej slabike slova sa často chybne uplatňuje aj v slovách anglických.

Aby sme diskusiu zúžili na jav skúmaný v emprickej časti tejto práce, zamerajme sa teraz na pojem glotalizácie. Tento jav sa dá najlepšie objasniť na rozdiele medzi modálnou a nemodálnou fonáciou. Pod modálnou fonáciou si môžme predstaviť pravidelné vibrácie hlasiviek, ktoré spôsobujú kvázi-periodické vlnenie vzduchu prichádzajúceho do vokálneho traktu. Typickým zvukom modálnej fonácie sú samohlásky. Naopak, nemodálna fonácia sa vyznačuje nepravidelným pohybom hlasiviek pri väčšom napätí. Zvuk, ktorý vzniká pri nemodálnej fonácii by sa dal opásať ako prerušovaný, drsný alebo chrapľavý. Pri skúmaní druhov fonácie z akustického hľadiska, je potrebné všímať si vlastnosti, ako sú zmeny v amplitúde, perióde a základnej frekvencii. Nemodálna fonácia sa označuje aj pojmom glotalizácia. Skarnirzl (2004) rozlišuje dva základné typy glotalizácie – glotálny ráz (glottal stop) a chrapot (creak).

Glotalizácia má v rôznych jazykoch rôzne funkcie. V angličtine sa iniciálna glotalizácia používa ako prostriedok kladenia dôrazu na slovo, je teda viac-menej zriedkavá, aj keď existujú kontexty, v ktorý sa vyskytuje častejšie ako v iných. Dilley *et al.* (1996) zistil, že glotalizácia v angličtine sa najčastejšie vyskytuje na začiatku intonačných fráz a v slovách, ktoré nesú vetný prízvuk. V češtine glotalizácia slúži ako signál prozodických hraníc a je používaná relatívne často. V slovenčine tento jav doposiaľ nebol detailnejšie preskúmaný. Z literatúry, ktorú máme k dispozícii sa dá predpokladať, že glotalizácia v slovenčine nie je často používaná. Namiesto toho sú slová priamo na seba viazané.

Experimentálna časť tejto práce skúma výskyt glotalizácie pred samohláskami na začiatku slov v angličtine Slovákov. Na základe zistení z literárnych prameňov sme sformulovali nasledovné hypotézy.

H1: Slováci v angličtine nepoužívajú iniciálnu glotalizáciu, namiesto toho slová viažu.
H2: Glotalizácia v slovenskej angličtine sa vyskytuje pred väčšinou iniciálnych samohlások.

Druhá, alternatívna hypotéza je založená na predpoklade, že produkcia v cudzom jazyku si vyžaduje väčšie kognitívne úsilie ako produkcia v materskom jazyku. To môže mať za následok zhoršenú plynulosť prejavu a následné tvorenie väčšieho množstva intonačných fráz, čo zvyšuje pravdepodobnosť glotalizácie. Ďalším dôvodom pre používanie glotalizácie je neschopnosť viazať slová v angličtine.

Metóda nášho výskumu spočívala v dvoch základných krokoch. Najprv sme zabezpečili rečový materiál, ktorý pozostával z nahrávok 15 slovenských študentov s porovnateľnou úrovňou anglčtiny. Všetci čítali ten istý anglický text. Potom nasledovala analýza v programe Praat, kde sme vyhľadali cieľové hlásky a určili, či sú predchádzané glotalizáciou alebo nie. Kritériá pre určovanie, či bol segment glotalizovaný boli založené na už spomenutých percepčných a akustických hľadiskách.

Celkové výsledky experimentu ukázali, že Slováci používajú iniciálnu glotalizáciu pomerne často. Z celkového počtu 1359 cieľových vokálov, 1006 bolo realizovaných s glotalizáciou, čo tvorí 74 %. Čiastkové výsledky pre výskyt glotalizácie v závislosti na prízvučných a neprízvučných slabikách tiež ukázali vysoké hodnoty. 93 % iniciálnych vokálov, ktoré sa nachádzali v prízvučných slabikách bolo glotalizovaných. U neprízvučných slabík to bolo 66 %. V ďalšej analýze sme pozorovali výskyt glotalizácie vo vzťahu s pozíciou v intončnej fráze. Hlásky boli rozdelné do dvoch základných kategórií podľa toho,

či sa nachádzali na začiatku intonačnej frázy (phrase-initial), alebo v rámci nej (non-phrase-initial). Výsledky opäť ukázali vysoký výskyt glotalizácie najmä na začiatku intonačných fráz, kde boli samohlásky glotalizované v 93 % prípadov. V rámci intonačných fráz bolo glotalizovaných 64 % iniciálnych vokálov.

V ďalšom pozorovaní sme sa sústredili na výskyt glotalizácie v lexikálnych a gramatických slovách. Výsledok tejto analýzy bol do istej miery prekvapivý. Ukázalo sa, že iniciálne vokály v gramatických slovách (členy, predložky atď.) boli glotalizované v 89 % prípadov a vokály v lexikálnych slovách v 59 % prípadov. Prekvapivosť tohoto výsledku spočíva v tom, že glotalizáciu by sme očakávali viac práve u lexikálnych slov, ktoré nesú význam a mali by byť oproti gramatickým slovám prominentnejšie. Pri všetkých výsledkoch sme previedli štatistickú analýzu pomocou testu Chí-kvadrát, ktorý vo všetkých prípadoch potvrdil, že ide o štatisticky vysoko významné výsledky.

V ďalšej analýze sme pozorovali rozdiely vo výskyte glotalizácie u mužov a žien. Výsledky ukázali, že medzi ženami a mužmi nie je v tomto ohľade žiadny výrazný rozdiel. Obe pohlavia využívali glotalizáciu v približne 73 % iniciálnych vokálov. Výraznejšie rozdiely sa objavili medzi jednotlivými hovoriacimi. Ukázalo sa, že vyššia úroveň angličtiny sa podpisuje pod znížený výskyt glotalizácie iniciálnych vokálov. Dôvodom môže byť predpoklad, že v plynulejšej reči sa počet intonačných fráz znižuje a tým klesá aj počet glotalizácií na začiatku fráz. Taktiež, hovoriaci s vyššou úrovňou angličtiny lepšie zvládajú viazanie slov, ktoré v mnohých kontextoch glotalizáciu nahrádza.

Všetky výsledky nášho experimentu sa prikláňajú k našej druhej hypotéze, ktorá tvrdí, že Slováci často využívajú glotalizáciu iniciálnych vokálov v prejave čítanej angličtiny. V budúcnosti by bolo dobré prekúmať glotalizáciu aj v spontánnom prejave v angličtine Slovákov. V prvom rade, však, bude potrebné opísať jav glotalizácie v Slovenčine samotnej. Volín *et al.* (2012) už naznačil, že mladí Slováci pravdepodobne využívajú glotalizáciu častejšie ako staršie generácie. Časté glotalizovanie v angličtine by potom mohlo byť dôsledkom jazykovej interferencie. Druhá možnosť by mohla spočívať v tom, že aj keď Slováci nevyužívajú glotalizáciu vo svojom materskom jazyku, využívajú ju v angličtine, aby si vytvorili pre nich zrozumiteľnejšiu štruktúru reči. Glotalizácia by mohla tejto snahe značne pomôcť, keďže pomocou nej je reč členená na menšie, lepšie zrozumiteľné celky.

Z pedagogického hľadiska by sme mali upozorniť na to, že nadmerné využívanie glotalizácie môže viesť k efektu diskontinuálnej reči, čo môže byť označené ako jeden z prejavov cudzieho prízvuku v angličtine. Ďalšie poznatky o glotalizácii by teda mohli prispieť

k tvoreniu učebných metód, ktoré by pomohli študentom na pokročilej úrovni angličtiny dosiahnuť výslovnosť blížiacu sa výslovnosti rodeného hovoriaceho.