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THE FUNCTION OF GLOTTALIZATION OF WORD-INITIAL VOWELS IN CZECH AND ENGLISH

FUNKCE GLOTALIZACE SAMOHLÁSEK
NA ZAČÁTKU SLOVA V ČEŠTINĚ A ANGLIČTINĚ

Master's diploma thesis

By

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I declare that I worked on this thesis independently. All primary and secondary sources are listed in the References section.

In Olomouc ……. …….

Jakub Bortlík

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Děkuji svým rodičům za lásku a život.

Gratias ago Deo meo in omni memoria vestri.

List of abbreviations

AmEn – American English

BrEn – British English

C – Consonant

Cz – Czech

CzEn – Czech English, i.e. En spoken as L2 by native speakers of Cz

En – English

EstEn – Estuary English

F0 – fundamental frequency

GA – General American

IPA – International Phonetic Alphabet

L1 – first (native) language

L2 – second (foreign) language

MorCz – Moravian Czech

RP – Received Pronunciation

Sk – Slovak

Sorb – Sorbian

V – Vowel

VOT – Voice onset time

Phonetic symbols and signs

In transcriptions we use a simplified version of the International Phonetic Alphabet (cf. Appendix A), since we respect some of the traditional transcription usage of Czech and English.

/…/ – phonemic (broad) transcription
[…] – allophonic (narrow) transcription

Symbols used in the text that differ from the IPA:

	Phonetic value	**Example**
	Vowels	
e	short, front, open-mid; or lax, front, mid to open-mid	Cz *pes* “dog” [pes] BrEn *bed* [bed]
eː	long front, open-mid	Cz *péče* “care” ['peːtʃe]
ʌ	lax, central, open-mid	BrEn *butter* ['bʌtə] AmEn *money* ['mʌ̃ɾ̃i]
	Consonants	
r	alveolar trill or tap	Cz *práce* “work” ['praːtse]
ɹ	alveolar or retroflex approximant	BrEn *read* [ɹiːd] AmEn *right* [ɹaɪt]
	Other symbols	
ʔ	creak or other kind of glottalization	Cz *po obědě* “after lunch” ['pɔ ʔɔbjeɟe]

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1 INTRODUCTION

Glottalization, an umbrella term for the glottal stop [ʔ] and various other forms of nonmodal phonation, has in the last decades drawn attention of phoneticians and phonologists not only in the domain of English and Czech but in other languages as well, such as other Slavic languages, German and Finnish.[1] In Czech it is best known to signal vowels at the beginnings of words or morphemes (Palková et al. 2004, 71), in English its use has been studied in other contexts as well: Nonmodal phonation frequently occurs at the ends of utterances and in many dialects of English glottalization is associated with certain voiceless consonants, e.g. as an allophone of syllable-final /t/ (Redi and Shattuck-Hufnagel 2001, 407).

In the present thesis we are primarily concerned with glottalization of word-initial vowels, and glottalization in other contexts is only dealt with for clarity in cases where these phenomena coincide. In both Czech and English glottalization is used as a type of voice onset in vowel-initial words after a pause and as a boundary and prominence marker in continuous speech, but it does not fulfill the distinctive function of a phoneme. Its use is considered completely facultative in English (Gimson 2001, 169) and to a large degree also in Czech (Palková 1997, 325). Despite this basic systemic similarity, indications exist that the actual frequency of glottalization of word-initial vowels in Czech and English differs significantly, which is obvious when we consider the two languages separately and also when they interact directly in the case of foreign learners.

We attempt to present a more or less complete review of literature on the topic and to outline possibilities for future research. After some

1 See (Rubach 2000), (Rodgers 1999) and (Lennes et al. 2006) respectively.

preliminary notes on the interlingual approach and some we summarize in Chapter 2 the commonly used terminology (some terminological questions are discussed later in due places) the previously described acoustic characteristics and categorizations of glottalization, and the possible causes for variation of these characteristics. In Chapter 3 we discuss some phonetic and phonological characteristics of Czech and English, which are relevant for the study of glottalization of word-initial vowels. In Chapter 4 different functions of glottalization in Czech and English are presented: the role as voice onset; the role in prosody and lastly some sociolinguistic factors. Chapter 5 presents possible questions, hypotheses and some conditions for a comparative research.

1.1 Interlingual approach

There are two main reasons for studying glottalization in Czech while taking English into account. Firstly, the form and function of the phenomenon in English is more thoroughly described. There are significant differences between the ways various languages employ it, even to that extent that a pronunciation which in one language has a phonemic function can in another language be considered a voice disorder (Gordon and Ladefoged 2001, 383).[2] This is, however, not the case of glottalization in Czech and English. Skarnitzl successfully used studies on American English (see 2004a, 2004b for references) to make the first steps toward an acoustically detailed categorization of nonmodal phonation in Czech.

The other reason for a comparative study is the fact that glottalization is an important cause of foreign accent in English spoken by Czechs (Czech English). The influence of Czech as the native or first

2 In the case of glottalization and phonation, this would apply mainly to exotic languages of Asia and Africa (cf. Gordon and Ladefoged 2001). There are not such vast differences among European languages, although Danish is sometimes jocularly compared to a throat disease by speakers of other Scandinavian languages and by speakers of Danish themselves.

language (L1) on the increased glottalization rates in English as the foreign or second language (L2) was observed by Volín (2003), and by Bissiri and Volín (2010); and the influence of L1 on the perception skills of Czech English speakers was studied by Bissiri et al. (2011). An analogous approach, examining the influence of English as L1 on the performance in Czech, would provide a more balanced view on the interaction of Czech and English glottalization techniques and thus lead to a deeper understanding of the phenomenon of pre-vocalic glottalization as a whole.

2 ACOUSTICS OF GLOTTALIZATION

2.1 Terminology

2.1.1 Transcription

The IPA symbol for the glottal stop is [ʔ]. Sometimes alternative symbols are used to denote glottalization without having to specify the acoustic quality or to decide minute terminological problems. For instance, Dilley, Shattuck-Hufnagel and Ostendorf (1996, 429) use an upside-down question mark, similar to the inverted glottal stop sign [ʖ] to indicate glottalization. We use the symbol [ʡ][3] to transcribe glottalization without further specification of its acoustic form, mainly because the symbol is available for annotation in the Praat software. We further use the IPA diacritic symbol tilde below [◌̰] for other glottalized segments (usually creaky voice).

Some authors do not transcribe pre-glottalization in words that are initial in an utterance even when glottalization is the topic. Gimson transcribes the example of Cockney *I hate him* as [ɑɪ 'ʔæɪ ʔɪm] (2001, 170), either because he considers glottalization in the first diphthong automatic as opposed to the emphatic glottal reinforcement of the vowels after /h/ dropping in the example,[4] or because he does not expects the utterance-initial [ɑɪ] to be glottalized (cf. Section 4.1). In contrast, Duběda (2005) consistently transcribes English and Czech vowel-initial words with preceding [ʔ] even when glottalization is not the topic and he does not use [ʔ] for vowel-initial words in the transcription of some other languages.

3 This symbol is normally reserved for the epiglottal plosive in the IPA.

4 This would be similar to Gimson's (2001) choice not to transcribe initial devoicing of voiced obstruents after a pause, as in *day after day* [deɪ ʔɑftə 'deɪ], instead of [d̥eɪ] even though devoicing in that position is the typical pronunciation.

2.1.2 Contexts

It has been mentioned above that glottalization is a term which covers a wide range of acoustic and articulatory phenomena and its scope can differ with respect to its function in individual languages and dialects. That is why there inevitably are differences in terminology in various linguistic branches and traditions.

Generally speaking, glottalization is the articulation of sounds consisting of or accompanied by various kinds of nonmodal phonation, typically by the partial or full closure of the glottis (i.e. the opening between the vocal folds), especially where this characteristic of voicing has no phonemic function[5]. In English this applies primarily to the following four contexts:

(a) glottalization of syllable- and word-initial vowels;

(b) glottalization of voiceless stops /p/, /t/, /k/ and of the voiceless affricate /tʃ/ in syllable-final position, e.g. *reap* [ɹiːˀp], *bench* [benˀtʃ];

(c) glottal replacement of /t/ before consonants, e.g. *beaten* ['biːˀn], in some varieties also intervocalically, e.g. in the Scottish pronunciation of *butter* ['bʌˀɚ]; still less frequently of /p/ and /k/ *cup of tea* [kʌˀə 'tˢɪə]; and occasionally also of /f/, as in *half a minute* [ɑːˀ ə 'mɪnɪˀ] (Gimson 2001);

(d) glottalization in phrase-final position, where it usually spreads over more segments or even several syllables.

Glottal reinforcement is the traditional term used for the glottalization of initial vowels under (a), as well as for glottalization of voiceless

5 As mentioned above, glottalization in Czech and English is not phonemic, unlike for instance the phoneme of Arabic represented with the symbol *hamza*, which is usually described as a glottal stop; or the so-called *stød* in Danish (“ranging in form from a clear glottal plosive to creaky voicing of the adjacent sounds”) (Duběda 2005, 69–70).

consonants under (b). In older literature the notion was that this reinforcement, just like glottal replacement (c), has the form of a full glottal stop (also called glottal plosive), which occurs before the particular vowel or consonant (see Pierrehumbert and Talkin 1992), which is why it is sometimes called pre-glottalization. Machač and Skarnitzl (2009) found preglottalization as “a sort of manneristic expression of some Czech radio broadcasters” also before voiced consonants at utterance beginnings after a pause where “the vocal folds start vibrating before the articulating organs reach their target”, e.g. *na* “at” [ʔna] (see Section 4.1.1).

The term pre-vocalic glottalization is sometimes used for glottal replacement of /t/ before vowels (cf. Docherty et al. 1996). It is not widely used in the sense of glottalization of syllable- and word-initial vowels, even though it quite fittingly describes both phenomena, which can, moreover, quite often coincide in some dialects, e.g. Estuary English *Get off!* ['ge(ʔ) 'ʔɒf]. Although it is necessary to keep the phenomena apart, the term pre-vocalic glottalization can, in a given context, be used for either of them. It can help to avoid the somewhat unwieldy expression “glottalization of word-initial vowels”. Yet, pre-vocalic glottalization is a somewhat broader term than glottalization of word-initial vowel, since it can also apply to vowels occurring at the beginnings of syllables within words (cf. Section 4.2.1).

Glottal replacement under (c) is sometimes called glottalling and in works dealing with consonant-related glottalization, glottalization itself can be used either in its general sense to cover all categories (a)–(d), or more specifically to denote glottal reinforcement under (b) as opposed to complete replacement (cf. Docherty et al. 1996).

2.1.3 Acoustic variants

Gimson's suggestion that “there is no acoustic manifestation of the glottal plosive other than the abrupt cessation or onset of the adjacent sound” (2008, 169) can be accepted only as an “ideal” articulation, since numerous studies based on acoustic analyses have shown that the full glottal stop is by far not the only and not even the most common form of glottal reinforcement used in English. “A full glottal stop (with complete obstruction of airflow at the glottis)” was considered “quite unusual” already by Pierrehumbert and Talkin (1992, 94). It seems therefore inappropriate to use the term glottal stop for all articulations that give the impression of glottal reinforcement.[6]

In his account of pre-vocalic glottalization in German Rodgers (1999) deals with this terminological problem in a way, that is not completely satisfactory. He uses the term glottalization in two different ways, either in a broader sense as any kind of pre-vocalic glottalization or, more specifically, as glottalization in the form other than a full glottal stop, and to avoid confusion he specifies this meaning as “simple glottalization”. This usage, however, leads to descriptions like “glottal stop with or without glottalization,” (179) which may be quite unambiguous in the context, but still sounds almost like a contradiction in terms.

We use the term glottalization either in its general meaning given in Section 2.1.2, to cover all domains (a)–(d), or according to context as specifically glottalization of word-initial vowels, or to denote a glottalized segment without having to specify its acoustic characteristics, where older literature would use glottal stop instead. When necessary, we distinguish other meanings explicitly (such as phrase-final glottalization).

With new findings about the highly variable acoustic nature of glottalization in all contexts, adequate categorization and terminology had to be introduced. Sections 2.3–2.7 present an overview and

6 For instance “… the word airline … begins phonetically with a glottal stop realized as creaky voice” (Beckman and Elam 1997, 14), also cf. Section 2.4.

discussion of the commonly used terms, such as glottal stop, breathy voice, creaky voice (vocal fry), creak, diplophonia, aperiodicity and glottal squeak.

2.1.4 "Ráz"

Out of the phenomena belonging to glottalization, the one traditionally dealt with in descriptions of Czech was the glottal stop. It has been, usually not without reservation, called *ráz* and it was, similarly to English linguistics, until recently often understood as the canonical or full glottal stop occurring at the beginning of syllable- or word-initial vowels, e.g. *Eva a Olga* "Eva and Olga" ['ʔeva ʔa 'ʔɔlga], and sometimes also in post-vocalic positions and before consonants, e.g. emphatic *ne!* "no!" ['ʔneʔ] (Pavelková 2001, 78–79). The term *ráz* "thrust, impulse" was introduced to denote a glottal plosive by Frinta (1909). However, various other terms have been in use, usually with respect to different needs of those employing them. In singing *pevné nasazení* "firm onset" was common, in physiology *tvrdý hlasový začátek* "hard voice onset" (Hála 1962, 359).

One of the objections against the term *ráz* was the fact that the word also means "character, nature" in Czech. Other linguists used different terminology, e.g. *hlasivková explozíva* „glottal plosive" (Chlumský 1928); or *předraz* (Hála 1962, 359). Even those using the term *ráz* usually add *tzv.* "so-called" to it (see Pavelková 2001).

Since Skarnitzl (2004a, 2004b) reported significant acoustic variability of *ráz,* it has been proposed to broaden the meaning of the term to cover all acoustically and/or articulatorily different glottal gestures that occur in the mentioned positions and play the role of a boundary signal. Chlumský's (1928) more systematic term *hlasivková explozíva* would be reintroduced to describe the full glottal stop and new terminology would be required for other forms of glottalization, such as

třepená fonace “creaky voice” or *dyšná fonace* “breathy voice”. In cases where these phenomena do not signal syllable-initial vowels, such as phrase-finally, where creaky voice often spreads over several segments, they would not be called *ráz* (Palková et al. 2004, 71–72).

2.2 Phonation types

Ladefoged (1971; in Gordon and Ladefoged 2001) suggested that it is possible to describe the different ways the human voice can be formed as a continuum (Figure 1) with respect to the degree of the opening of the glottis.

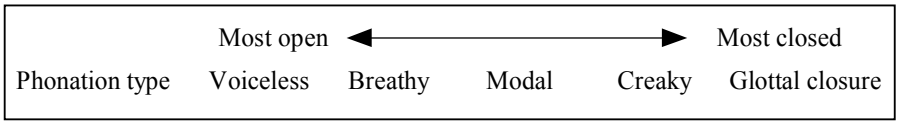

Figure 1. Continuum of phonation types with respect to the opening of the glottis (after Gordon and Ladefoged 2001).

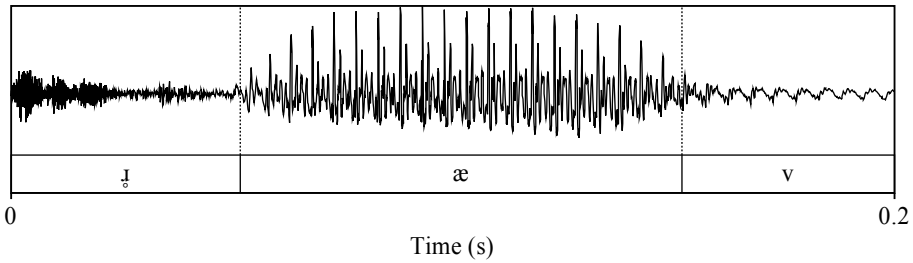

Figure 2. Modal voicing composed of regular pulses in the vowel [æ] and in the voiced fricative [v], as occurring in the word (*t*)*rav*(*eler*). Cf. the devoiced approximant [ɹ̥] characterized by irregular noise friction.

Modal phonation (Figure 2[7]) lies in the middle of this continuum, and it is formed of pulses regular in frequency and strength when the “vocal

7 This and all subsequent waveforms and spectrograms in Chapters 2–4 have been extracted from example recordings of American English (2012) and Czech (2012) owned by the IPA, using the program *Praat* (Boersma and Weenink 2012). There is one female speaker for each language.

folds are brought sufficiently close together that they vibrate when subjected to air pressure from the lungs" (Gimson 2001, 11).

The frequency of the basic vibration over the whole length of the vocal folds is called the fundamental frequency (F0) and along with the strength (amplitude) of the pulses it is the main element that decides whether voice is regular or irregular (nonmodal).

The regularity of the vocal folds vibration can be modulated to produce nonmodal phonation by changing the opening between the folds or by changing other configurations in the vocal tract. Modal phonation can be disturbed by the vibration of the so-called false vocal folds above the true vocal folds, or by raising or lowering of the larynx (Gimson 2001, 277). Variation in phonation can in some cases be a sign of an undesirable voice disorder, it is, however, in many languages employed as a non-pathological modification for various purposes, mainly:

(a) "to convey a particular attitude or emotion" such as anger (277);
(b) as "a necessary part of the set of phonological contrasts", such as voiced – voiceless – creaky (Gordon and Ladefoged 2001, 383);
(c) "as allophonic variants of modal phonation in certain contexts" (391).

Pre-vocalic and phrase-final glottalization in Czech and English come under (c), since they are based on non-modal phonation but are only allophonic variants, since they do not have contrastive function. They do, however, have prosodic and stylistic function as will be shown in Chapter 4. In the following we are not yet exclusively concerned with glottalization of word-initial vowels, since the same or corresponding acoustic and perceptual characteristics can be found in phrase-final positions as well, and categorizations are often based on material from both contexts.

Vast variation between individual speakers has been noted in studies on the acoustic characteristics of glottalization (Redi and Shattuck-Hufnagel 2001); in studies on the prosodic influence on the glottal waveform (Stevens 1994; in Dilley, Shattuck-Hufnagel and Ostendorf 1996); as well as on the overall rate of glottalization and the significance of different factors that influence glottalization rates (Dilley, Shattuck-Hufnagel and Ostendorf 1996).

This variation has been found in samples of read as well as of spontaneous speech and it has been "reported that the acoustic characteristics of waveforms that are perceived as glottalized can vary substantially from utterance to utterance, or even within utterances" (Redi and Shattuck-Hufnagel 2001, 410). The variation, both in rate and form of glottalization, can be based simply on physiological differences in the vocal organs of speakers, or it can have other, linguistic, causes, which will be discussed in Chapter 4. The findings make it clear that it is necessary to study glottalization tendencies in more speakers (Dilley, Shattuck-Hufnagel and Ostendorf 1996, 439).

"In order to investigate the factors that influence these acoustic differences, many researchers have found it helpful to develop categories of glottalization events" (Redi and Shattuck-Hufnagel 2001, 411). Categorizations can be based on perceptual criteria and/or on the analysis of waveforms and/or spectrograms, according to the aim of the study in case.

2.3 Glottal stop

The canonical glottal stop (called *hlasivková explozíva* in Czech) (Figure 6) can be found on the closed extremity of the phonation continuum. It is formed by the tight compression of the vocal folds,

obstructing the airstream from the lungs (this is the so-called hold phase of the stop), so that below the glottis, air pressure increases until it “is released by the sudden separation of the vocal folds” (Gimson 2001, 168).

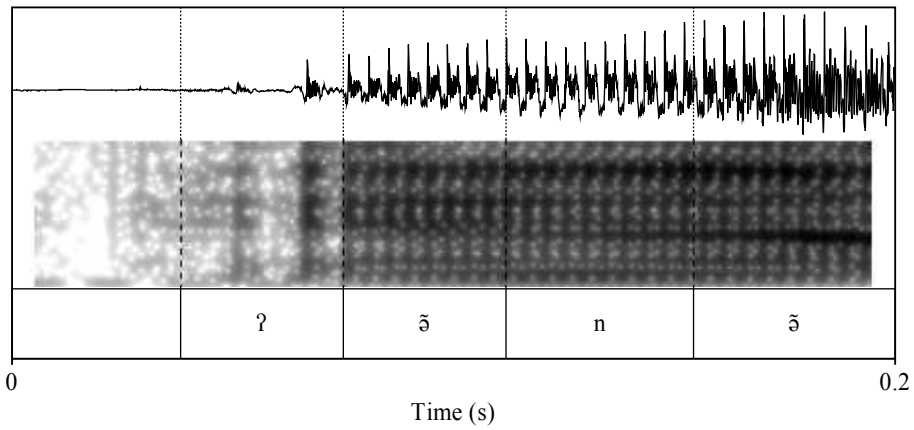

Figure 3. A canonical glottal stop in the phrase-initial expression *And a*(*t*) characterized by one strong irregular pulse just before the beginning of modal voicing in the first [ə̃], the weak pulse in front can be classified as glottal flatulence (see Section 2.3.1).

This definition, based on articulatory criteria, can be completed by the condition that the “sudden release … shows as one or two pulses of irregularity in the waveform” (Skarnitzl 2004a, 58) and these glottal pulses may be distinguished from the following vowel by their higher or lower spectral intensity (Machač and Skarnitzl 2009, 127–128). Machač and Skarnitzl do not restrict the number of glottal pulses in a glottal stop as long as there is a hold phase and they recommend (mainly for the purposes of phonetic segmentation) to regard the glottalized portion together with the hold phase as a segment on its own, based on its irregularity (2009, 130) and to accept that the neighboring vowels can be very short (131) (cf. Figure 4).

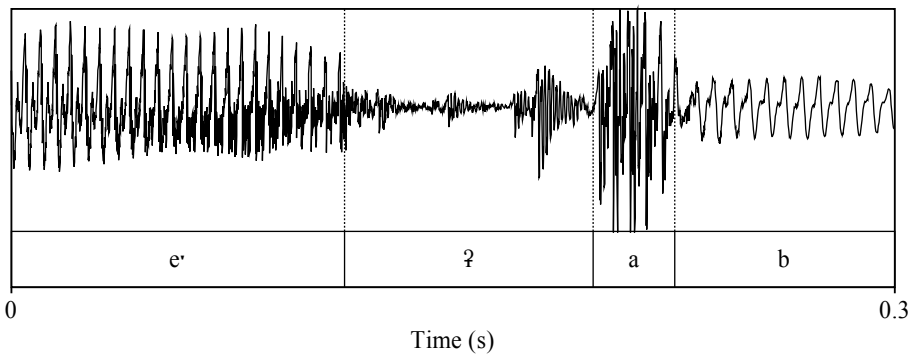

Figure 4. An example of glottalization "occupying" a great part of [a] in the expression (*dokáž*)*e ab*(*y*) "succeeds in". As a result there is a considerable difference in length between the fully voiced portions of two phonologically short vowels /e/ and /a/. Still, the irregular pulses in [ʔ] share the formant values of [a] and both vowels can be identified as "short" (cf. Section 2.3).

2.3.1 Variants of [ʔ]

Skarnitzl (2004b) found further variation in the production of the glottal onsets in Czech in front of the conjunction *a* "and" in the speech of professional newsreaders. He observed two main tendencies:

(a) the hold phase can be preceded by additional pulses of irregularity, which "are directly linked to the preceding segment" (73). Because of its peculiar shape Skarnitzl calls this type the barbell glottal stop;

(b) the hold phase can be interrupted by a weaker glottal pulse, which "is clearly separated from the pulses on the extreme sides of the segment". Skarnitzl calls this weaker pulse glottal flatulence because of the unpredictability of its occurrence within the hold phase (74) (see Figure 6).

There seems to be a temporal difference in these additional pulses in that the pulses of the barbell glottal stop are as if added and increase

the duration of the glottalized segment, they may occupy a portion of the preceding sound, on the other hand, “the flatulence pulses occupy the space that would normally have been the hold phase” (75).

Because of the phase of silence when the vocal folds are not vibrating, the glottal stop is usually classified as voiceless. On the other hand, since other voiceless sounds are associated with the wide opening of the vocal folds, the glottal stop, which is characterized by the vocal folds being pressed together, is sometimes viewed as neither voiceless nor voiced (Gimson 2001, 168). However, if we consider the possible irregular pulses at either side of or during the hold phase to be part of the glottal stop, we can ascribe some voicing to it. Other forms of glottalization, which are perceptually equivalent to the glottal stop, such as creaky voice, are on the other hand by definition voiced and it has been mentioned in Section 2.1 that canonical glottal stops have been in certain contexts found rather rare in comparison to other (usually voiced) articulations, e.g. by Docherty and Foulkes who reported “the virtual absence of ‘canonical’ glottal stop or glottalised stop articulations in any of the data” in a study on glottalized /t/ in Newcastle English (1999, 1040).

The glottal stop, nevertheless, shares some aspects with other voiceless sounds. In English, “where [ʔ] substitutes for /p, t, k/ … it has the usual effect of voiceless plosives in shortening preceding vowels” (Gimson 2001, 168) and in Czech it shares the usual effect of other voiceless sounds on the devoicing of preceding voiced obstruents (see Section 3.1).

2.4 Creaky voice

Creaky voice, called *třepená fonace* in Czech, is placed near the closed end of the phonation continuum. The terms creak and creaky voice are used with slight differences by different authors. Huber (1988; in Skarnitzl 2004a) uses the term creak for "sustained low F0 accompanied by near-total damping of individual glottal pulses," and creaky voice for "period-to-period irregularity", which corresponds to what Redi and Shattuck-Hufnagel call aperiodicity (2001; in Skarnitzl 2004a). See Figure 4 for an example of creak and creaky voice.

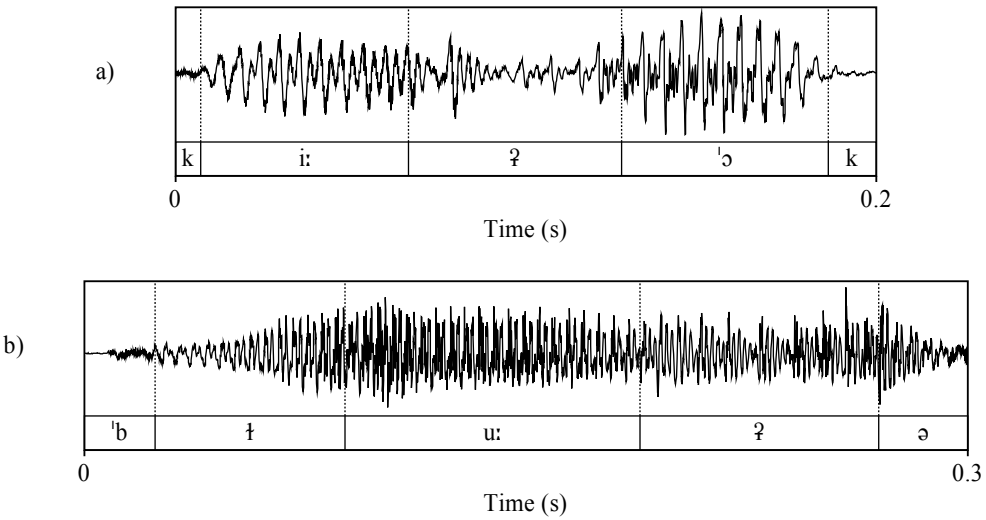

Figure 5. Examples of glottalization at the boundary of two vowels: in a) are irregularities in glottal pulses and reduced amplitude found in the expression (*nějа*)*ký ok*(*amžik*) "a short while", corresponding to aperiodicity or creaky voice; in b) is low F0 but individual pulses are relatively regular, constituting a creak, in the words *blew a*(*s*).

Gimson defines creaky voice as one of the possible voice qualities that is produced by "an excessively slow rate of vibration of the vocal folds" (Gimson 2001, 277), however, he does not (incorrectly, as we have seen) consider its use as an alternative for the pre-vocalic and pre-consonantal glottal stop (in the positions given under (a)–(c) in Section 2.1.2). Creaky voice is also sometimes called vocal fry, pressed or stiff phonation (e.g. Gerratt and Kreiman 2001; in Skarnitzl 2004a).

Skarnitzl (2004a) found that Czech speakers in his sample used at the beginning of the conjunction a “and” various glottal gestures that did not fully correspond to the terminology already available, and he categorized them according to two criteria: regularity and temporal arrangement. He defined continuous creaks with glottal pulses “[lasting] throughout the whole segment”; creaks with hold preceded by a silent phase; and barbell creaks preceded by a silent phase and by additional “glottal pulses at the beginning … of the segment” (62). Each type could then be labeled as irregular or (relatively) regular,[8] thus arriving at six categories.

What distinguishes creaks with hold from canonical glottal stops, and barbel creaks from barbell glottal stops in Skarnitzl's system, is the number of pulses that occur at either side of the hold phase. If there are more than two pulses, the item is categorized as a creak. Although, it seems questionable whether the number of pulses is a more important criterion for categorization than the presence of a hold phase which is the fundamental characteristic of a stop (Bortlík 2009). An alternative interpretation, namely to count creaks containing a hold phase among glottal stops would influence the interpretation of some tendencies in Skarnitzl's data with respect to acoustic variation with segmental context (see Section 2.7).

It is obvious that among such variability, material can be found that will be difficult to categorize. Figure 6 shows an example of glottalization that shares characteristics of Skarnitzl's barbell creaks and barbell glottal stops, in that the hold phase is preceded by several irregular pulses, but it is followed by only one, very weak irregular pulse.

8 The notion of regularity in these in itself quite irregular phenomena is “based on the variation coefficient … of the duration of pitch periods” (Skarnitzl 2004a, 62). Since nonmodal phonation is by definition irregular, such “regular” creaks would still show other kinds of irregularity, e.g. changes in amplitude or a hold phase.

Still the segment gives a perceptually clear impression of glottalization of the word-initial vowel.[9]

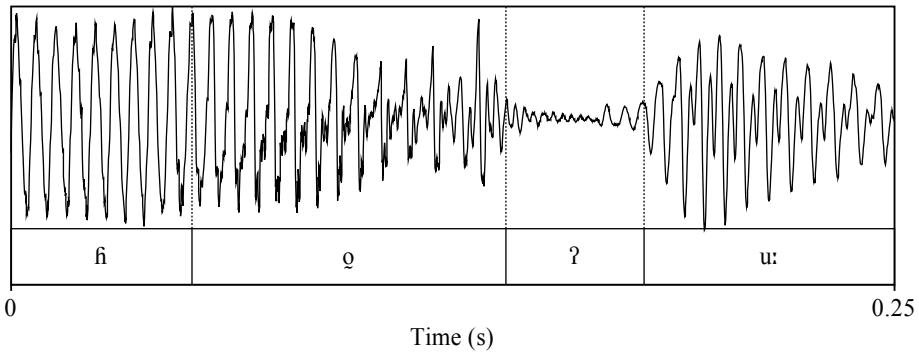

Figure 6. Example of glottalization in the phrase-final expression marného úsilí "futile endeavor", with a hold phase [ʔ], preceded by a segment with irregular F0, but followed by only one weak irregular pulse at the beginning of the following vowel. The segment would be more correctly categorized as a glottal stop rather than a creak with hold, the hold phase being the decisive criterion.

Machač and Skarnitzl (2009) use a different, simpler two-categories system which, still, does not avoid certain terminological inconsistencies. They use the term glottal stop in a general sense of pre-vocalic glottalization and then redundantly call the canonical glottal stop "plosive-like" (125); their second category is creaky glottal stop which is in fact not a genuine stop, since it contains glottal pulses throughout the whole segment (128). In our opinion, an advantage of the concept is that it does not restrict the number of pulses in a glottal stop, thus it would categorize Skarnitzl's (2004a) creaks with hold as glottal stops on account of the hold phase.

9 The irregularity of glottal pulses in the [o̰] (*marnéh)o*, which precedes the word-initial vowel can be caused, or at least reinforced, by phrase-final position of the (see Section 4.2.3.4), since the segment occurs near the end of a major intonational phrase break, in the sentence *Konečně se severák vzdal marného úsilí* "And at last, the North Wind gave up the attempt." The word *marného* itself, however, does not occur at the very end of the phrase and only the last vowel in the following word *úsilí* is glottalized.

2.5 Breathy voice

Another widely used term for a specific voice quality is breathy voice, which is called *dyšná fonace* in Czech. It "is characterized by vocal cords that are fairly abducted … and have little longitudinal tension [which] results in some turbulent airflow through the glottis and the auditory impression of 'voice mixed in with breath'" (Gordon and Ladefoged 2001, 385).

Hála describes a similar phenomenon, *znělý přídech* "voiced aspiration", as a form of laryngeal stricture that can appear at a syllable boundary between vowels which is, however, weaker than *ráz*, i.e. the glottal stop and equivalent forms of glottalization (1962, 281). It is, however, described more in terms of breath intensity rather than of phonation typology and its occurrence in places other than the intervocalic syllable boundary is not discussed. It is in fact similar to the voiced allophone of English /h/, which for some speakers can appear in voiced contexts, usually between vowels and is articulated as "a kind of breathy vowel or [(slightly)] voiced glottal fricative [ɦ]" (Gimson 2001, 191). Similarly, Palková distinguishes *dyšný hlasový začátek* "breathy voice onset" as an alternative to soft voice onset and to glottalization in word-initial vowels, which can in some languages, English being one of them, serve as a voiceless variant of initial /h/ (1997, 56) and we come back to this in Section 4.1 when we deal with voice onsets.

2.6 Diplophonia and glottal squeak

Another previously described category of nonmodal phonation is called diplophonia, which is a term used by Redi and Shattuck-Hufnagel (2001) and others. It "is defined as alternations in shape, amplitude, or duration of successive pitch pulses" (Skarnitzl 2004a, 58), but Skarnitzl's sample of Czech did not provide tokens that would make it possible to distinguish diplophonia from creaky voice.

Further, Redi and Shattuck-Hufnagel distinguish a relatively rare occurrence the so-called glottal squeak, which they describe as "a sudden shift to relatively high sustained F0, which [has] usually very low amplitude" (2001, 414), and which could almost exclusively only be found in the neighborhood of other glottalized segments".

In the sample of the conjunction *a* "and" taken from Czech radio news, Skarnitzl (2004a) did not find manifestations of the less frequent glottalization types. He found it impossible to differentiate between creaky voice and diplophonia; there were only very few tokens where other kinds of glottalization were accompanied by breathiness; and there were no tokens that would have a glottal squeak.

However, the fact that the distinction between these less frequent categories could not be supported, was possibly due to the different context in which glottalization was analyzed and due to the prosodic and stylistic characteristics of the sample. Skarnitzl only analyzed pre-vocalic glottalization, but Redi and Shattuck-Hufnagel (2001) acquired their material from phrase-final glottalization. Clear examples of other types of glottalization in Czech might be found under different conditions (cf. Chapter 4).

2.7 Variation with segmental context

By segmental context in the study of word-initial glottalization is usually meant the directly preceding allophone and this is how we, too, use this term, even though preceding pause and glottalization of the preceding segment can, in a sense, be considered segmental context too, they are more appropriately dealt with as part of the function of glottalization, because they are more than allophonic context responsible for

differences in frequency with which glottalization occurs, as will be show in detail in Section4.2.

The preference for a particular kind of glottalization in word-initial vowels, i.e. for variants of the glottal stop and of creak, can be influenced by some characteristics of the preceding sound. Skarnitzl found tendencies with respect to voicing. Among the glottalization types which contained a hold phase, there was the tendency for voiced contexts (i.e. vowels and sonorant consonants) to be associated with barbell glottal stops and barbell creaks, rather than with variants which have irregular pulses only at the end of the hold phase, directly at the onset of voicing in the word-initial vowel.

The irregular glottal pulses occurring in front of the hold phase were interpreted as possibly glottalization of the preceding segment, which seems quite obvious, especially since such pulses were found to lengthen the glottalized segment, however, while such “post-glottalization” in the form of creak was already known, Skarnitzl believed to report the occurrence of a single glottal pulse in front of the hold phase of a glottal stop for the first time (2004b, 76). On the whole, 92% of the tokens that appeared in voiced contexts either contained irregular glottal pulses in the preceding segment or were voiced throughout which can be interpreted as a strong tendency to retain some voicing in glottal gestures if the preceding segment was also voiced, in voiced context only 50% of the glottalized tokens had any kind of a hold phase (cf. Skarnitzl 2004a).

In contrast, canonical glottal stops and creaks with hold (i.e. those instances of glottalization not preceded by additional pulses like those in the barbell types and continuous creaks), mostly appeared in voiceless contexts. 61% of either voiceless consonants or instances of breath (cf. Section 4.2.3.2) were followed directly by a hold phase, and 81% of the voiceless contexts were followed by some kind of a hold phase. This

seems again quite understandable, since in preceding voiceless segments and in breath “the vocal folds are not vibrating … and the articulation of voiceless contexts is tenser than that of voiced consonants” (Skarnitzl 2004a, 62). Continuous creaks were, nevertheless, on the whole the most frequent type of glottalization in Skarnitzl's sample (41%),[10] regardless of whether the preceding context was voiced or voiceless (67). Figure 7 shows two different forms of glottalization after the voiceless plosive [k], one continuous creak and one token with a hold phase.

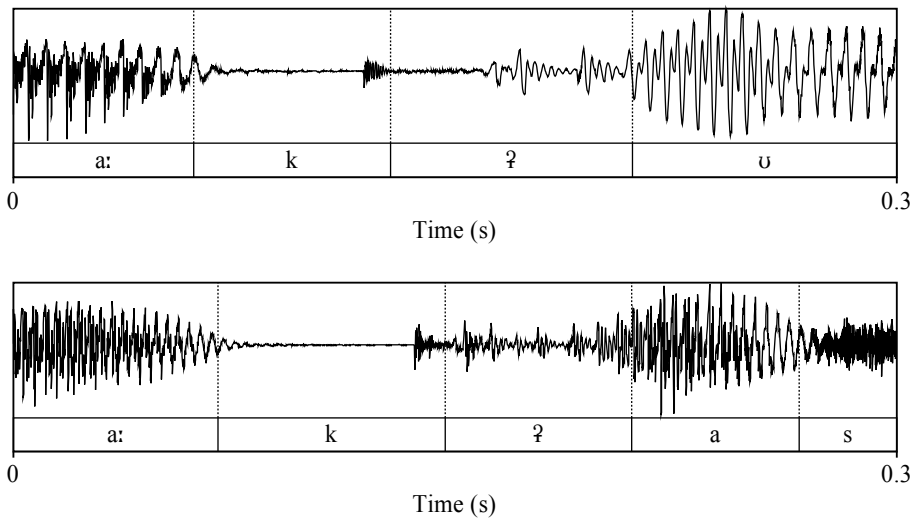

Figure 7. Variation of word-initial glottalization in Czech occurring phrase-medially with preceding [k]. In a) taken from the utterance (*Seve*)*rák uz*(*nat*) “the North Wind … to confess”: a glottal stop with two stronger irregular pulses and one weaker pulse. It could possibly be categorized as creak with hold in Skarnitzl's (2004a) terminology. In b) a continuous creak with glottal pulses sustained throughout the whole segment; occurring in the phrase (*Sever*)*ák a* (*Slunce*) “the North Wind and the Sun”.

“[W]hen Skarnitzl compares the stops and creaks with respect to the voicing context, he notices that creaks appear noticeably more often after voiced sounds. The author suggests this is a way how to save articulatory energy, since a change from modal phonation of a voiced

10 Irregular creaks were more common than regular ones (Skarnitzl 2004a, 67).

sound to a creak is easier than a complete interruption” (Bortlík 2009). His categories creak with hold and barbell creak, however, also contain such an interruption. If these subtypes of creak were, on the basis of containing a hold phase, categorized as glottal stops instead, the tendency for stops to be associated with voiceless contexts, as observed by Skarnitzl, would be weaker, while at the same time the tendency for creaks to appear in voiced contexts would increase. However, it seems unreliable to interpret any tendencies in groups that contain only from two to twelve tokens, as was the case with all the subtypes of creak in Skarnitzl's data.

Segmental context has also been analyzed with respect to its role in predicting glottalization rates, in English e.g. by Dilley, Shattuck-Hufnagel and Ostendorf (1996) and in Czech by Pavelková (2001) and we deal with this aspect in the respective section 4.2.1.1).

3 WORD LINKING PHENOMENA

Some aspects of the segmental context can be analyzed from the point of view of acoustics, as well as from the point of view of its function in prosody, for to study the influence of segmental context on glottalization of word-initial vowels only makes sense in connected speech.

There are differences between Czech and English as regards the possible sounds that can occur at the ends of words and can become segmental context for word-initial vowels. There are also differences between major dialects of these two languages, and some of these differences are relevant to glottalization. They lie, for one thing, in the available phonemic inventories and the phonotactics; and for another, in the phonological rules that apply to ends of words and to linking to the following word. In this chapter we deal with some aspects of the phonology and phonetics of voicing in consonants and of possible linking phenomena so we can refer to it later when we deal with the function of linking in the context of prosody (Section 4.2).

3.1 Voice assimilation

One possible option for segmental context has already been mentioned, namely voicing. There is only little difference in the voicing of vowels and sonorants in Czech and English. Significant differences, however, can be found in obstruents.

Vowels are by definition voiced (Gimson 2001, 33), however, in English they can under certain conditions completely or partially lose voicing. This is quite common “in unaccented syllables between voiceless consonants” though it is only “most likely to occur with short vowels (particularly /ə/) and before voiceless plosives” (93) (e.g. *quant̲ity* ['kw̥ɑntə̥ti]), which prevents these devoiced vowels from occurring

before word-initial vowels. Sonorant consonants, i.e. nasals and approximants are also canonically voiced but they can become partially devoiced in English (e.g. *play* [pl̥eɪ]), under conditions which again practically exclude these devoiced allophones from word-final position and thus from the occurrence before word-initial vowels (even when syllabic in final position, e.g. *cotton* ['kʰɑtⁿn̩], this devoicing would probably take place only before pause or before another voiceless consonant) (cf. 197).

Obstruents, i.e. stops, fricatives and affricates can, in contrast, form pairs in which voicing is the main distinctive feature. These distinctions are, however, maintained very differently in Czech and English and for the class of stops they can be described in terms of voice onset time, "that is, [of] the moment at which the voicing starts relative to the release of a closure" (Ladefoged 1993, 142). The following description is inevitably an oversimplification, since we are only interested at this point in the basic mechanisms of voicing in as much as they relate to the topic of glottalization of word-initial vowels, that is mainly for consonants in final position. However, as will be shown in Section 3.3 dealing with resyllabification, comparison to initial and medial positions is useful, since in a string of connected speech, sounds in the coda appear at what is analogical to other positions (cf. *at all* vs *a tall*) and the distinctions between phonologically voiced and voiceless sounds can be decisive for the recognition of the word boundary.

It is necessary to distinguish between phonological and phonetic voicing. Thus in Czech, the distinction between phonologically voiced and voiceless obstruents is neutralized in final position: Both groups are realized either as voiceless or as voiced. They are voiceless – which for phonologically voiced obstruents is called final devoicing – before a pause, or when followed by a voiceless consonant or a sonorant (e.g.

/plɔd/ “fruit” and /plɔt/ “fence” are both realized as [plɔt]; *plod spadl* “the fruit fell” and *plot spadl* both become ['plɔt 'spadl]). If obstruents are followed by a (phonetically) voiced obstruent in the next word, the distinction is again neutralized: Both phonologically voiced and voiceless are realized as voiced (e.g. *plod byl* “the fruit was” and *plot byl* “the fence was” become ['plɔd bɪl]). In some (mainly Moravian) dialects, final obstruents are realized as voiced also before sonorants (*plot ležel* “the fence lay” MorCz ['plɔd 'leʒel]), i.e. not only sonorant consonants but also before vowels if there is no glottalization (Palková 1997, 329).[11]

Glottalization in the word-initial vowel has the same effect on preceding obstruents as do voiceless consonants in that position (Volín 2003, 13). In all positions obstruents should be either voiced[12] or voiceless and the voicing of a group of obstruents is determined by the (phonetic) voicing of the last one in the group, which is why Czech is said to have regressive assimilation (Palková 1997, 328), e.g. *část domu* “part of the house” /'ʧaːst 'dɔmʊ/ ['ʧaːzd 'dɔmʊ].

In English, on the other hand, the distinction between phonologically voiced and voiceless pairs of obstruents, and mainly of plosives, is not that straightforward and on the level of allophones it cannot be sufficiently accounted for by using only the two categories (cf. Gimson 2001, 193). Voicing of English obstruents differs according to position in the word and accentuation (i.e. prosody) and for stops there can be found at least three basic configurations of the timing of voicing and the articulatory activity, although more detailed accounts can distinguish as

11 Different rules, however, apply to final obstruents in lexical words and in prepositions and prefixes, thus the standard pronunciation of *pod mostem* “under the bridge” is ['pɔd mɔstem] both in Bohemian and Moravian Czech (see Palková 1997, 328–332).

12 Full voicing is, however, an ideal. In real speech obstruents and sonorants can undergo partial devoicing in initial position (cf. Machač and Skarnitzl 2009, 132–134). Since this can only happen after a pause it is not of major importance for pre-vocalic glottalization and linking.

much as five different configurations (153). These four phonetic categories are:

(a) fully voiced, e.g. *again* [ə'gen];
(b) partially or fully devoiced, e.g. *go* ['g̬oʊ̯], *bag* [bæg̬], or voiceless unaspirated, e.g. *sky* ['skaɪ]; and
(c) voiceless aspirated, e.g. *come* ['kʰʌm] (cf. Gimson 2001, 151–152).

In other obstruents, i.e. in fricatives and affricates similar three categories can be more similarly described as:

(a) fully voiced (e.g. *lazy* ['łeɪzi]);
(b) partially or fully devoiced (e.g. *lose* [łuːz̬]); and
(c) completely voiceless (e.g. *loose* [łu·s]) (cf. Gimson 2001, 178).

English voice assimilation is in general progressive, which means that phonologically voiceless obstruents in final position cause following voiced obstruents to devoice (e.g. *first day* /'fɝːst 'deɪ/ ['fɝːst̚ 'd̥eɪ]). Phonologically voiced obstruents are voiced if they are followed by another voiced sound (e.g. *bad news* ['bæ·d 'nuːz̬]), and although final devoicing of obstruents is quite frequent in English in final position before a pause, and before voiceless consonants (e.g. *bad singer* ['bæ·d̥ 'sɪŋɚ]), it is often only partial and the distinction between voiced and voiceless is usually not neutralized,[13] because the allophones still differ in their articulatory energy (lenis vs fortis); in their constriction times, in the possible preglottalization and in the effect on the preceding segment, i.e. sonorants are shorter before phonologically voiceless obstruents (Gimson 2001, 168).[14]

13 For exceptions like *he was sent* /wɒz/ [ˌhi wəs 'sent] see Gimson (2001, 283).
14 The distinction may be neutralized in positions that are not of much interest for the study of pre-vocalic glottalization, such as in clusters of fricatives and plosives, when

If a voiced obstruent is followed by a glottalized vowel, it is likely to behave as if followed by a voiceless consonant, i.e. it may retain some voicing, it influences the preceding segment and can still be distinguished from a voiceless sound in the same position (e.g. *the bug is* [ðə 'bʌ·g̬ 'ʔɪz̬] vs *the buck is* [ðə 'bʌʔk 'ʔɪz̬]).

3.2 Phonotactics

Phonotactics describe how individual phonemes of a language can be combined into syllables and words. The phonotactics of Czech and English differ in many respects, but their basic word structure is similar.[15] Czech and English both combine phonemes into syllables, the center of the syllable, the nucleus is usually a vowel but it can be a sonorant consonant as well. Additional consonants can form the onset and/or the coda, in front of and after the nucleus, respectively (Gimson 2001, 51; Palková 1997, 270–271).

Although there is usually little doubt about the number of syllables in a word because of the prominence of syllable nuclei, the attachment of consonants either as the coda of one syllable or as the onset of the following syllable is not always clear and numerous phonological theories try to explain it. In some accounts segments that can be attached to two different syllables, i.e. they share characteristics of both the typical coda and the onset, are called ambisyllabic and the syllable boundary is thought to go through these segments (Duběda 2005, 131).

According to Palková (1997), The motivation for division is based mainly on: (a) the contrast of sonority; (b) on the analogy with frequently used syllable types where the division is clear; (c) on morphology (270).

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the preceding voiceless fricative creates a protected position in which the following accented voiceless plosive is not aspirated, *dis̲c̲ussed*, and the following voiced plosive is devoiced *dis̲g̲ust*, both words can be pronounced identically, although Gimson (2001, 152) suggests that the difference may remain, based on the different strength of articulation of the voiceless and voiced plosives.

15 As opposed to e.g. Japanese and Mandarin Chinese “whose sound system is based on open syllables” (Duběda 2005, 136).

In Czech the general tendency is to confirm to the prevailing CV syllable type and the division regularly overrides the morphological structure (e.g. *ro.zum* instead of *roz.um* “reason”, *pou.kaz* instead of *po.u.kaz* “voucher”).

In Czech, syllables with a consonantal onset (most frequently CV, CVC CCV and CCVC) are more frequent than in English. Ludvíková found that in a sample of spoken text of 10,000 words the frequency of syllables beginning with consonants was more than 91%, syllables beginning with a vowel (V, VC) amounted to only 7% (1987, 105).

The frequency of vowels at the beginnings of words is slightly higher, “in a Czech text there is altogether about … 12% of words beginning with a vowel” Ludvíková (1987, 102). The higher percentage when compared with vowels at the beginnings of syllables (that means also word-medially) is due to the high frequency of function words, such as the conjunctions *a* “and”, *aby* “in order to”, the pronoun *on* “he”, etc., and due to the very frequent prefixes *o-* and *u-*.

More stress-timed languages, English being one of them, tend to have “fewer CV syllables and a wider range of syllable types” (Adsett and Marchand 2012, 271). One study showed that CV syllables make up 34% of all English syllable types (272). In Czech, on the other hand, they can be almost twice as frequent, Ludvíková (1987) found 60%. Mines, Hanson and Shoup (1978) found the ratio of consonants and vowels at the beginning of words in conversational English to be 76% and 24% respectively, so initial vowels were twice as frequent as in Czech according to Ludvíková's (1987) study, although her analysis was based on a different (written) style.

The fact that vowel-initial words are less frequent in Czech than in English can be important for the differences of pre-vocalic glottalization in these two languages, since it has been found that rare words are more

likely to be glottalized and in Czech many words beginning with vowels are rare, or considered formal, as will be shown in Section 4.4. The tendency to use pre-vocalic glottalization after a pause or after a word-final vowel can be seen as an attempt to avoid a purely vocalic onset or hiatus and to adjust the syllable to the preferred CV type (cf. Duběda 2005, 136).

3.2.1 Prosthetic consonants

Prosthesis is the addition of consonants at the beginning of a vowel-initial word. Neither in Czech nor in English is glottalization of word-initial vowels perceived as an individual consonant because it is not contrastive, in fact, speakers often do not at all realize that they use it (Weingart 1932). However, since other languages use glottal stops and equivalent glottal gestures as individual phonemes (Gordon and Ladefoged 2001), it seems possible to regard glottalization of word-initial vowels as a kind of prosthetic consonant. Bělič defines *ráz* as "a not independent voiceless consonantal element" that is regularly used as prosthesis pre-vocalically after a pause and more or less facultatively in other positions, among others at word boundary (1972, 72–73).

The tendency of Czech to avoid word-initial vowels shows itself in the fact that in (inter)dialects, various other prosthetic consonants are often inserted before initial vowels. Even though these occurrences are mostly considered sub-standard, some of them are quite pervasive and can occur even in formal contexts, as is the case with the most frequent of these sounds, the prosthetic [v] before /ɔ/. Common Czech, which is the most widespread interdialect, can often have *vokno* instead of standard *okno* "window" (see Pavelková 2001, 82).[16] Other common occurrences in dialects, which, however, do not occur in Common Czech, are

16 Prosthetic or hiatus [v] can even occasionally become lexicalized and occur before vowels than other /ɔ/, such as in the word *kakavíčko* "little cocoa", derived from non-standard *kakavo*.

prosthetic [ɦ] and [j]. Prosthetic [ɦ] is on the decline even in dialects. Prosthetic [j] is also not as productive as prosthetic [v], however, there exists a frequent variant which occurs medially or at word boundaries between vowels, the so-called hiatus [j] (cf. Section 3.4).

Since the tendency to insert prosthetic and hiatus consonants has been in Czech for centuries, many words which etymologically had initial consonants entered standard Czech with prosthetic consonants in the onset or with hiatus consonants word-medially (e.g. *jahoda* "strawberry", *vázat* "bind", *pavouk* "spider"). This is attested also in loan words which etymologically had initial vowels (e.g. *jeptiška* "nun", cf. German *Äbtissin* "abbess"; *varhany* "pipe organ") (Bělič 1972, 73–76). As is the case with many dialectal features of Czech, cognates which exemplify certain tendencies can be found in other Slavic languages. So in standard Slovak there is no prosthetic [j] (cf. Sk *iskra* vs Cz *jiskra* "spark"[17]), or, in contrast, prosthetic [w] or [v] is standard before /ɔ/ and /ʊ/ in Sorbian (cf. Sorb *woni* vs Cz *oni* "they") (Omniglot 2012).

However, the insertion of prosthetic consonants in any variety is a variously strong tendency rather than a rule, and there can also be a tendency to drop some initial consonants that originated as prosthetic or at hiatus. This is particularly the case for standard Czech [j], so it is possible for one speaker of North-East Bohemian Czech to say at the same time *jakorát* "precisely" and *ináč* "otherwise" instead of standard *akorát* and *jinak* (Bělič 1972, 74). Likewise, hiatus [j] can be left out, and North-East Bohemian can have *naíst se* instead of standard Czech *najíst se* "have something to eat". Hiatus in these cases is usually retained and only sometimes, in more segmented speech is there any glottal reinforcement (74).

17 However, Slovak has limited glottal reinforcement of word-initial vowels, cf. Section 4.1.1.

Voiceless prosthetic [h] or [ʰ] is also known in English, yet it is not as significant a dialectal feature like prosthetic consonants in Czech, but rather an occasional overcorrection, which has historically come to existence as a reaction to the opposite tendency in dialects and uneducated speech not to pronounce initial /h/ (Bohnert 2005). Even in standard (or educated) pronunciation, there is some variation in the realization of the letter *h* in initial position in words of Latin and French origin (e.g. for *herb* both /hɝːb/ and /ɝːb/ are possible in AmEn), but this acceptable variation lies in not pronouncing an *h* that is present in writing, not the other way round, i.e. inserting a prosthetic [h].

However, greater variation in the realization of initial [h] used to be an important shibboleth of low social status (Bohnert 2005) and is still today "usually considered characteristic of uneducated speech," (Gimson 2001, 192), with the exception of the weak forms of certain function words, such as of the pronouns *him* [ɪm], *her* [ɜː], [ə], or of the auxiliary verb *have* [əv], [v] (192). In non-initial position these weak forms are used as clitics, they are linked to the preceding word and no glottalization is inserted in front of them, e.g. *Did you see him?* [ˌdɪdʒʊ 'siːɪm].

Initial /h/ is regularly dropped in Australian English and in the less prestigious variants of most dialects in England and Wales and such words are usually treated as vowel-initial, e.g. *a hill* [ən 'ɪɬ], although there can also be "a trace of the boundary marking function of /h/ … in the use of [ʔ], or at least a weak glottal constriction," so that Cockney can have *I hate him* [ɑɪ 'ʔæɪ ʔɪm]) (Gimson 2001, 192–192).[18] Attempts to avoid this stigmatized pronunciation can lead to overcorrections in the form of a weak glottal gesture or a weak [h] or [ʰ], as mentioned above e.g. *an egg* [ə 'ʔeg] or [ə 'ʰeg]) (Gimson 2001, 192).

18 Gimson's note that Australian English "does not use glottal stop" (2001, 90) most probably relates to glottal replacement of /t/ which is a prominent feature of Cockney that has been a prominent source of phonetic features in Australian English.

What seems important with respect to pre-vocalic glottalization is the fact that /h/ dropping, which in some cases applies also to standard speech, is a sign of the higher “tolerance” in English to word-initial vowels as opposed to the Czech tendency toward the CV syllable type.

3.3 Resyllabification and juncture

Resyllabification takes place when a consonant in the onset is attached to the preceding syllable or, which is more relevant to our topic, the other way round, when a consonant, or a group of consonants in the coda of one syllable become the onset of the next syllable (Duběda 2005, 98). This can happen both word-medially or at word boundaries. In standard Czech pronunciation resyllabification of final consonants to following words beginning with vowels is inhibited by glottalization (98) (see Figure 8), especially in careful speech which aims at particular intelligibility (Pavelková 2001, 83).

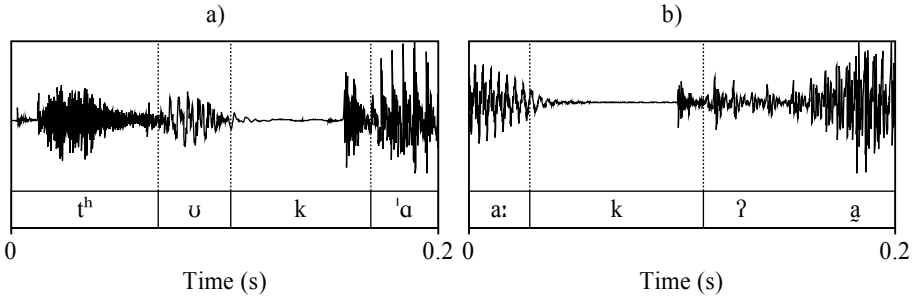


Figure 8. In a) is an example of linking of final [k] to the following accented vowel in the English phrase *took o*(*ff*): juncture is maintained by the lack of aspiration in [k]. Resyllabification is inhibited in b) by glottalization before an unaccented vowel in the Czech phrase (*sever*)*ák a* “the North Wind and”.

Resyllabification, however, occurs in dialects and in nonstandard pronunciation (e.g. *prodal auto* ['prɔ.da.laʊ.tɔ]) (Duběda 2005, 98), and though it is sometimes considered incorrect (Palková 1997, 325), the use of glottalization to prevent it is not prescribed as long as the syllable boundary is maintained by other means. Moreover, context is another

important factor in distinguishing pairs like *suchem* “by dryness” and *s uchem* “with the ear”, should the latter be pronounced without glottalization ['s‿ʊxem]. Resyllabification is, however, standard for certain morphemes word-medially (see Section 3.2).

Word and morpheme boundaries in connected speech are sometimes called juncture. The prosodic marking of phrase boundaries – which necessarily are also word boundaries – is dealt with in Section 4.2.3.[19] At this point we would like to mention some phonetic characteristics of speech sounds that can signal juncture within utterances and we come back to the function of glottalization as a boundary signal later. Even in continuous speech there can be found such characteristics that are typical for sounds occurring either before or after a pause (Roach 2009). The presence of these junctural characteristics in morphologically adequate positions can be interpreted as evidence that resyllabification has not taken place.

Among these features in English are some of the characteristics of consonants mentioned above, notably the distinction between voiceless and voiced obstruents in initial position (aspiration in voiceless stops if accented) and in final position (shortening of sonorants before voiceless consonants). Among other factors there are different voice assimilation patterns (*I scream* [ˌaɪ 'skɻiːm] vs *ice cream* ['ăɪs ˌkɻ̥iːm]), and the duration of vowels (final lengthening) and also of consonants ([n] can be longer in *a name* than in *an aim*) (Gimson 2001, 291). Figure 9 shows examples of different ways voiceless stops behave with respect to their position and accentuation.

Gimson notes that “such junctural cues are only potentially distinctive” and “[j]unctural oppositions are, in fact, frequently neutralized in connected speech or may have such slight phonetic value

19 As will be shown in Section 4.2.3 the term disjuncture is used for the phonetic qualities that mark phrase boundaries.

as to be difficult for a listener to perceive," still, they "provide cues to word identification additional to the large number provided by the context" so the distinction (291).

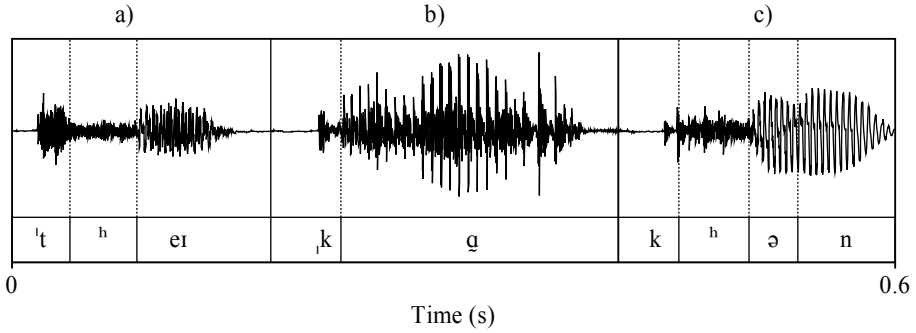


Figure 9. The difference between English voiceless stops appearing in front of a vowel. In a) is [tʰ] in accented initial position *ta*(*ke*): voiceless and aspirated. In b) is [k] in final position occurring in front of an accented word-initial vowel (*cloa*)*k o*(*ff*): voiceless but unaspirated, glottalization of the following vowel is caused by phrase-final position. In c) is [kʰ] in unaccented initial position *con*(*sidered*): still strongly aspirated (time ratio retained).

In English, resyllabification theories can explain some features of pronunciation (such as the assimilation of /d/ and /j/ in the expression *Did you?* /'dɪd juː/ ['dɪdʒuː]), it certainly takes place in some contexts, although "[i]t is quite possible that [it] is strongly inhibited in formal styles, where word boundaries and grammatical junctures are more salient than in the relaxed and unreflecting style of every-day speech" (Labov 1995). Even though resyllabification is responsible for the existence of words like *a newt* and *an apron* created by wrong division from *an ewt* and *a napron*, and it is the cause of some natural misunderstandings, such as *a knife too* understood as *an ice cube* (Labov 1995), generally, English does not require the initial vowel to be glottalized to maintain the word boundary. Complete rightward resyllabification is not the default process for cases when a word-final plosive borders on a word-initial vowel, here the junctural cues are well preserved (Labov 1995).[20]

20 In a few expressions, such as *at home* and *not at all* resyllabification does, in fact,

In fact, the mechanism of leftward resyllabification has been used as a possible explanation of the so-called flapping of /t/ and /d/ which in some major dialects, such as GA, corresponds to glottal replacement of /t/ in many dialects in Great Britain. When syllable-final /t/ and /d/ appear intervocalically, they are under certain circumstances produced as alveolar flaps [ɾ], e.g. *better* ['beɾə˞].[21] Both flapping and glottalling can occur also when the following vowel belongs to the next word and while flapping requires the word-initial vowel to be produced without glottalization, e.g. *Get away!* GA ['geɾ‿ə'weɪ], glottalling cannot really be differentiated from word-initial glottalization, cf. Cockney ['geʔ ə'weɪ].[22]

3.4 Hiatus and liaison

Hiatus is the situation when two vowels that belong to different syllables appear immediately next to each other. This can happen within words (e.g. *co-operate*; *pootevřený* "slightly open") or at word boundaries (e.g. *the answer*; *těžká otázka* "a difficult question") and there are different ways how this is treated in Czech and in English.

In Czech the disyllabic nature of the hiatus at word boundaries and at the boundary of prefix and root is sometimes considered to be a sufficient boundary marker, provided that the vowels do not merge into one syllable, because the disyllabic vocalic joint is not part of the (synchronically) domestic lexicon. Moreover, context is another important factor in distinguishing pairs like *suchem* "by dryness" and *s uchem* "with the ear" (Vachek 1968, 123). The undesirable possibility

take place and they are commonly pronounced as [ə'tʰəʊm] and [nɒt ə 'tʰɔːɬ], although, as Gimson notes, "they may be considered as constituting, in effect, composite word forms" (290).

21 For a complete discussion of the phonological and phonetic accounts of flapping see (Šimáčková 1999).

22 Glottal replacement of /t/ before accented vowels and before a pause is one of the innovations on the verge of RP, although, before unaccented vowels it is still considered substandard (Gimson 2001, 83).

of two vowels merging exists especially if the vowels correspond to the existing diphthongs (e.g. *po ulici* “on the street” vs *pouze* “only”) and if identical vowels appear next to each other and are equivalent to long vowels (e.g. *po obědě* “after lunch” vs *póza* “a pose”). To inhibit this merger, particularly in standard pronunciation, glottalization is recommended to separate the vowels, especially at prefix or preposition boundary (Palková 1997, 326). We pay more attention to actual variation in Section 4.2.

Another way to prevent the formation of a hiatus is to insert between the vowels the so-called hiatus consonants. Hiatus consonants are usually semivowels with similar characteristics like those of the vowels involved. The most common insertion happens in Czech when the first vowel in hiatus is a high front vowel /ɪ/ or /iː/, in such cases a hiatus [j] is inserted, e.g. *medium* ['meːdɪjʊm]. This semivowel insertion, however, occurs only word-medially, as opposed to glottalization that can occur both word-initially and under certain condition also word-medially,[23] so that the expression *hloupý idiot* “stupid idiot” is not pronounced *['ɦlɔʊpiː‿'jɪdɪʔɔt], but ['ɦlɔʊpiː '(ʔ)ɪdɪjɔt] (Rubach 2000, 273).

3.4.1 Hiatus in English

Actual or potential hiatus is more frequent in English than in Czech because of their different phonotactics. Hiatus is treated differently with respect to what kind of vowels appear next to each other, and there are differences in various dialects, the most prominent dialectal difference being the so-called /ɹ/ dropping and /ɹ/ insertion (see Gimson 2001, 84). Basic possible solutions are:

(a) hiatus is retained (e.g. GA *law and order* ['ɬɔːˑənˑ'ɔɹdəˠ]);

(b) a linking semivowel is inserted (e.g. GA *the other* [ðiːʲˑ'ʌðəˠ];

23 Glottalization in word-medial position is, however, restricted so it does not appear before suffixes, e.g. *Nováková* “Mrs Novák” *['nɔvaːk,ʔɔvaː], cf. Section 4.2.1.

(c) glottalization separates the two vowels (e.g. RP ['lɔː ʔən‿'ɔːdə]).

The insertion of these hiatus sounds in English is called liaison. When the first part in a potential hiatus is a high vowel, e.g. /iː/, /uː/, or a rising diphthong, such as /aɪ/, /aʊ/, linking is maintained by semivowels with similar quality: [ʲ] and [ʷ]. See Figure 10 for an example of linking [ʲ]. These semivowels are, however, not as strong as their phonemic counterparts [j] and [w], so that juncture still exists between them and the following vowel (Gimson 2001, 289).[24] In British English "[a]lternative pronunciations, more frequent in faster speech, in the case of the sequences of diphthong plus following vowel, involve the absorption of the second element of the diphthong … giving renderings like … *window open* /'wɪndə əʊpən/" (Gimson 2001, 290), thus creating another hiatus.

In many dialects another sound that can be inserted between vowels that would otherwise create a hiatus is [ɹ]. This is a feature of the so-called non-rhotic dialects. In these dialects the phoneme /ɹ/ is only realized before vowels. Many British dialects are non-rhotic and so are some dialects in the USA and in other English speaking countries. In these dialects, if the /ɹ/ in a word is not followed by a vowel it is silent, such as the second /ɹ/ in the word *brother* /'bɹʌðəɹ/ which becomes BrEn ['bɹʌðə] before a pause or before a word that begins with a consonant. When a vowel follows (either in the same word or in the next) the /ɹ/ is realized and linked to the following vowel (BrEn *brother Adam* ['bɹʌðəɹ‿'ædəm]). This is called linking [ɹ] (Gimson 2001, 288–289).

Some syllables and words can end in a vowel that in non-rhotic dialects is associated with the linking [ɹ], while there is no final /ɹ/ on the phonological level. These vowels are /ɑː/, /ɔː/ and those containing a final [ə], such as /eə/ or /ɪə/ (288). In non-rhotic dialects there is still the

24 Cf. juncture neutralization in Section 3.3.

tendency, based on analogy, to insert in these cases an [ɹ] if a vowel follows in the next word, e.g. *vodka and tonic* EstEn ['vɒd̥ kəɹ‿ən 'tʰɒnɪʔk], sometimes even when the following vowel is in the same word, e.g. *strawy* EstEn ['stɹɔːɹi]. Such [ɹ] sounds are called intrusive, because they are not historically justified and not represented in the orthography (289).

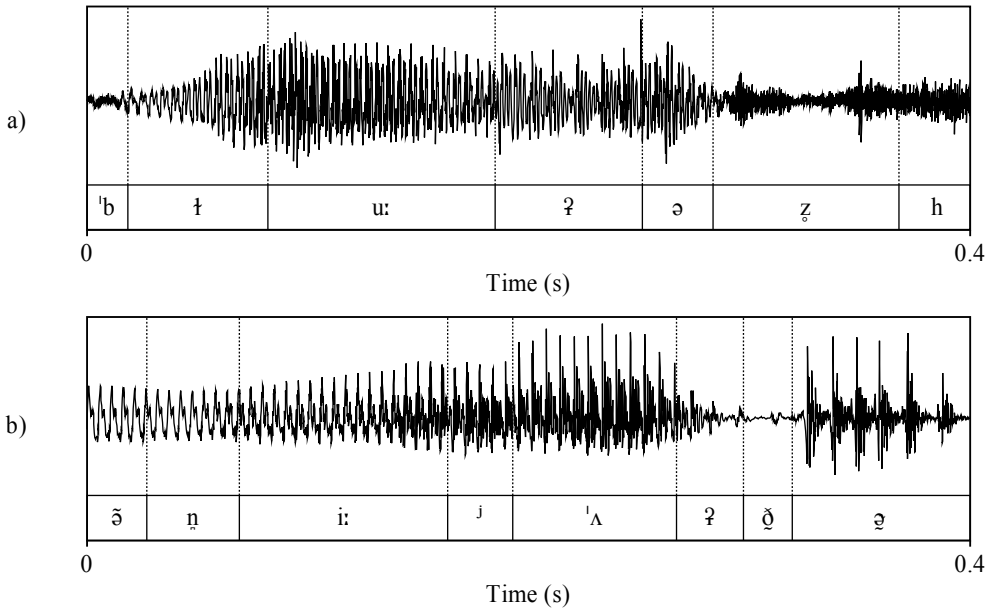


Figure 10. Different realizations of vowel-vowel boundaries in English. In a) is creaky voice within the phrase *blew as h*(*ard*), the unaccented [ʔə] gives strong perceptual impression of glottalization. In b) is an example of linking with the semivowel [ʲ] in *than the o*(*ther*), with modal voicing throughout most of [ʌ]. Irregularities at the end of the vowel and in the following segments are due to phrase boundary.

Intrusive [ɹ], especially within words, and to a lesser degree also linking [ɹ], are a matter of style in non-rhotic dialects such as Receive Pronunciation. Particularly in “refined” types of RP and in careful speech hiatus, or glottalization are consciously employed not only to avoid intrusive [ɹ], but often also in places where [ɹ] insertion is justified by the spelling (e.g. *brother Adam* ['bɹʌðəɹ 'ʔædəm]). However, the unconscious use of intrusive [ɹ] can be heard even from those who consciously oppose it (288).

Rhotic dialects, such as GA and Scottish English, i.e. those that pronounce the phoneme /ɹ/ not only before vowels but in all positions, do not have any linking [ɹ] insertion on which to base an analogy for intrusive [ɹ] insertion and so in expressions like *I saw it* they will produce either a hiatus or glottalize: [aɪ 'sɔː (ʔ)ɪt], whereas a speaker of a non-rhotic dialect with [ɹ] insertion could pronounce it as [aɪ 'sɔːɹ‿ɪt] (see Gimson 2001, 85–86).[25]

25 It is questionable whether an intrusive [ɹ] would be inserted at a position like *window open* if the diphthong /əʊ/ would be simplified in fast speech to [ə] as mentioned above, EstEn ?['wɪndəɹ‿'əʊpən].

4 FUNCTIONS OF PRE-VOCALIC GLOTTALIZATION

It has been noted in the Introduction and throughout Chapter 2 that nonmodal phonation appears in various contexts. We are now interested in glottalization of word-initial vowels, and other forms (namely phrase-final, pre-consonantal glottalization) will be mentioned only in so far as they coincide with pre-vocalic glottalization at word boundaries.

In Chapter 2 we described variation in the acoustics of glottalization. There has also been reported striking variation in the rate at which it is used, with differences between individual speakers (Redi Shattuck-Hufnagel 2001, 410) and between speakers of different languages. Consequently, these differences can influence the L2 production, so Czech speakers of English have been found to glottalize word-initial vowels strikingly more often than native British English speakers (Bissiri and Volín 2010).

Various sources of this variation have been analyzed for glottalization in English and those found to be most important can be classified as either:

(a) prosodic factors (such as phrasing and prominence); or
(b) sociolinguistic factors (e.g. dialect, style, gender, etc.) (Redi and Shattuck-Hufnagel 2001, 426).

Pre-vocalic glottalization serves both as a boundary signal and a prominence marker both in English and Czech, however it seems to be associated with different prosodic constituents in each language and there seems to be a different level of facultativeness. Furthermore,

glottalization of word-initial vowels (and sometimes of consonants as well) is one of the possible voice onsets after pause.

4.1 Voice onset

It has been argued whether glottalization after a pause is a matter of voice mechanics or a reflex of the prosodic boundary that is usually associated with pauses. In Czech the use of pre-vocalic glottalization as voice onset is considered to be automatic (Palková 1997, 325) which can be understood as occurring in every word-initial vowel after a pause.

Dilley, Shattuck-Hufnagel and Ostendorf (1996, 436) analyzed a corpus of American English radio news recordings and they found that the rate of glottalization of word-initial vowels after a pause was “only” 64%. That is less than the rates of glottalization which were observed when the target syllable was preceded by a segment that was itself glottalized (85%). When preceded by both a pause and glottalization the rate was 87%, which suggests that pauses were not even the more important factor among these two.

The influence of preceding pauses and glottalization was interpreted as a reflex of the prosodic boundary rather than the consequence of mechanical constraints.[26] Though the authors did not reject the possibility that mechanical factors could play a role, they supported their interpretation by the data, since prosodic boundaries were the most important factors in predicting glottalization rates even when there were no pauses or glottalized segments before the word-initial vowel (436).

The seeming difference between English and Czech with respect to glottalization after a pause cannot, however, be confirmed by any analysis of pauses in Czech connected speech that could be compared to the findings by Dilley, Shattuck-Hufnagel and Ostendorf (1996). On the

26 “[M]echanical constraints of starting a vowel after a [silent] pause and offset delay of cessation of preceding glottalization” (Dilley, Shattuck-Hufnagel and Ostendorf 1996, 436). For a discussion of different kinds of pauses see Section 4.2.3.2.

other hand, an indication that English, too, uses glottalization after pauses automatically, is its persistent occurrence in the pronunciation of isolated words in electronic dictionaries, which holds true for both British and American English (cf. for instance Oxford University Press 2012). The possibly different role of pauses in Czech and in English has not been sufficiently reflected in studies on glottalization in Czech and Czech English (cf. Section 4.2.3).

4.1.1 Soft onset

According to Palková, in the so-called soft onset the vocal folds are drawn near to each other and they are smoothly brought to vibration by the stream of air from the lungs, with gradual increase of amplitude of the glottal pulses. This type of onset occurs in Czech "in vowels and voiced consonants after preceding voiceless consonants [e.g. *pes* 'dog', *šli* 'they went'] or at the beginning of voiced consonants after a pause" (Palková 1997, 55).

However, in the case of word-initial vowels, soft voice onset usually requires special training, since glottalization is the default. It is preferred, for instance, in singing, to save the vocal folds from too much strain and to decrease air consumption (56). Interestingly, in the (British) English tradition of singing training, glottalization is applied as a syllable boundary marker "in cases where a regular linking /r/ is permissible, e.g. in *later on*, *far off*, *four aces*" (Gimson 2001, 169).

A slightly different concept of onsets is presented by Machač and Skarnitzl (2009) who use the terms hard and soft glottal onset for cases when the articulation of voiced sounds after a pause lags behind glottal activity and they call both variants preglottalization (135–136), whereas in Palková's (1997) concept (pre)glottalization and soft onset would be contrasting categories. Just like soft onset described by Palková, soft glottal onset is characterized by "gradual increase of the amplitude of

glottal cycles” which is, in the case of consonants, “accompanied by a schwa-like vocalic element.” Hard glottal onset, on the other hand, “[involves] an abrupt, high-intensity beginning of phonation” and it corresponds to traditionally described pre-vocalic glottalization or to glottalization of consonants in affected speech (Machač and Skarnitzl 2009, 136).

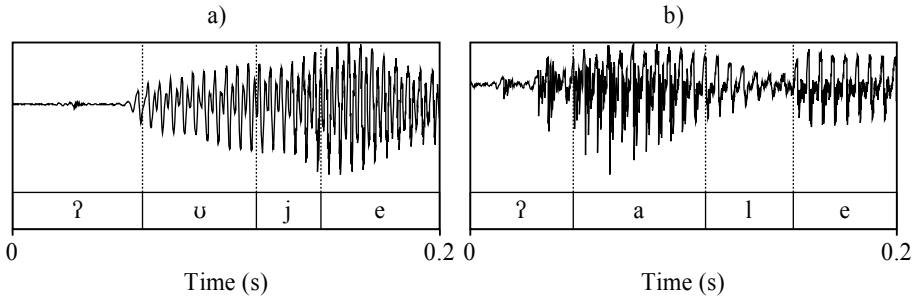


Figure 11. Examples of different strength of word-initial glottalization in Czech. In a) is the glottal onset in phrase-initial *uje*(*dnali*) “they agreed”, with regular pulses, still giving the impression of [ʔ]. In b) are distinctly irregular glottal pulses in phrase-initial *ale* “but”, producing strong sense of glottalization.

Figures 11 and 12 show varying degree of glottalization after a pause in both Czech and English. Under a) in Figure 11 is a Czech vowel-initial token which gives the impression of glottalization, despite the regularity of pitch periods, probably because of the sudden start of phonation after the vocal folds are held together. The very weak disturbance during the hold phase is probably caused by the adduction of the vocal folds, whereas a soft onset requires the vocal folds to be brought near to each other lightly without a firm constriction. This might be the case in example a) in Figure 12 where, despite the irregularities in the waveform, the token doesn't give a definite impression of glottalization particularly because of the gradual increase of amplitude and probably because of the lack of a hold phase with the vocal folds completely compressed.

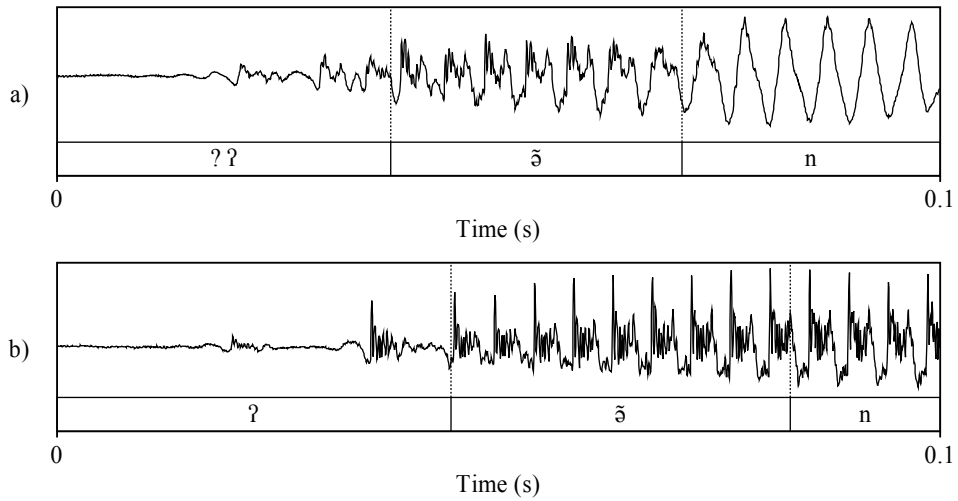


Figure 12. Examples of varying glottalization strength in American English. In a) is phrase-initial *And* giving barely any impression of glottal marking, with gradual increase of amplitude but with irregularities in the glottal pulses, possibly without full closure of the glottis. In b) is clear glottalization in phrase-initial *And*. Here the perceptual and visual evidence of glottalization is clear thanks to the strong irregular pulse.

There is some indication from personal observation, although scarce and untested, that the soft onset after a pause might be used in some Czech dialects. This assumption is based on a speaker of Eastern Moravian Czech who, when trying to repeatedly exemplify the difference between standard Czech *jiný* "different" and its dialectal form *iný*, pronounced these words as ['jɪ̯niː] and ['ɪ̯niː] respectively. There was no audible initial glottalization in the dialectal form, thus both words were rendered almost indistinguishable.[27] This would not be the case if the dialectal form was pronounced as ['ʔɪ̯niː], i.e. with glottalization, which would probably be the typical pronunciation for speakers of Bohemian Czech, who might pronounce a similar dialectal form *inačí* as ['ʔɪnatʃiː], if they tried, as this speaker did, to distinguish the initial sounds by placing particular emphasis on them.

27 The higher articulation of /ɪ/ making it even closer to the palatal approximant /j/ (cf. Palková 1997, 211).

This notion can be supported by the fact that Czech dialects in the eastern part of Moravia form a continuum and share phonological, phonetic and other aspects with Slovak (Bělič 1972, 16). According to Rubach, neither standard nor colloquial Slovak has any "glottal stop insertion at all" and "any trace of a glottal stop anywhere in the phonological string," which can be understood as not even after a pause, is characteristic of a Czech accent in Slovak (2000, 274). This may well be the case for most native Czech speakers, however, it does not have to apply to speakers of Eastern Moravian dialects who share with Slovak other relevant aspects of pronunciation, such as the voiced production of obstruents before vowels at word and morpheme boundaries (see Bělič 1972, 256).

However, contrary to Rubach's assumption about the total lack of the "glottal stop" in Slovak, isolated vowel-initial words in native Slovak are regularly pronounced with pre-vocalic glottalization, similarly to pronunciation examples in English electronic dictionaries (cf. Forvo 2012).[28] Moreover, Bělič considers glottalization of word-initial vowels after a pause to be the regular pronunciation on the whole Czech-speaking territory, even in Eastern Moravia (cf. Bělič 1972, 73).

4.1.2 Breathy onset

We mentioned above that Palková distinguishes the breathy voice onset as a third alternative to the soft and hard (glottal) onset. It is characterized by a loosened tension in the vocal folds, which results in a short friction before the onset of modal voice itself. However, this breathy onset is not really used in Czech, and in English it corresponds to the voiceless pronunciation of initial /h/ (1997, 56). We

28 *Forvo* is a kind of online pronunciation dictionary created by volunteering native speakers of numerous languages and despite the poor quality of many recordings it contains some usable illustrative material.

Bělič's assumption that prosthetic [ɦ] in Czech probably originated as a kind of voiced (breathy) onset, when the voicing starts before the articulators get into place for the initial vowel (or consonant) (1972, 75) seems incomplete, since Machač and Skarnitzl (2009) show that this timing of voicing and articulation results in a kind of soft (glottal) onset, whereas [ɦ], just like its voiceless counterpart [h], also has a friction component. This consonantal component in the early voice onset can be understood as an attempt to avoid a purely vocalic onset and as a boundary signal softer than the full glottal stop or creaky voice.

4.2 Boundary signal

The phonotactics of a language can restrict the occurrence of speech sounds or some of their allophonic characteristics (such as aspiration or length) to certain positions in a morpheme, syllable or word. When these phenomena occur at the beginning or end of such a unit they are called boundary signals, since in a stretch of continuous speech they make it possible to identify these positions. Junctural cues, too, are boundary signals but they usually apply to word and syllable boundaries, while boundary signals also mark phrase boundaries and can include pauses as well.

Glottalization in Czech is a clear boundary signal – it occurs at the beginning of certain words and morphemes which on the phonological level start with a vowel (Duběda 2004, 95). In most English dialects a similar role is played by the glottal fricative /h/ which only occurs at the beginning of words and some base morphemes (such as *ahead*) however, unlike pre-vocalic glottalization, this boundary signal is a phoneme, i.e. it distinguishes the meaning in pairs like *ill* and *hill*.

On the other hand, glottalization in English is not an unambiguous boundary signal, since it can also frequently occur in positions other

than pre-vocalic, such as for the reinforcement of voiceless stops, and in some dialects it can be used pre-vocalically as an allophone of these stops, mainly of /t/. Even in Czech, however, the boundary-signalling function of pre-glottalization is in most cases facultative, i.e. if it is realized it is interpreted as a boundary signal, not every word or morpheme-initial vowel, however, has to be marked that way.

4.2.1 Orthoepic prescriptions

Czech orthoepy has traditionally recommended or – under certain conditions, such as in formal public speeches – prescribed the marking of vowel-initial words and some vowel-initial morphemes with glottalization, often with respect to the phonetic characteristics of the word or segment that precedes the vowel-initial word. Pavelková (2001, 79) lists the positions where pre-vocalic glottalization can possibly occur within an utterance as follows. While cases (a)–(d) are also possible in English and equivalent examples can be found, there are no non-syllabic prepositions in English like in Czech under (e):

(a) at the boundary of lexical words (e.g. *malé ucho* “little ear”),
(b) within compounds (e.g. *modrooký* “blue-eyed”);
(c) between the prefix and the base (e.g. *kooperace* “co-operation”)
(d) after a syllabic preposition (e.g. *do Afriky* “to Africa”);
(e) after a non-syllabic preposition (e.g. *v Africe* “in Africa”).

While Weingart (1932; in Pavelková 2001, 81) considered pronunciation without glottalization nonstandard in any position, the first official orthoepy (Hála 1967; in Pavelková 2001, 81) tolerated its omission except after non-syllabic prepositions and in front of the conjunctions *a*, *i* “and”. In the most recent pronunciation norm (Hůrková 1995, 25–26), glottalization is only required in standard pronunciation after non-

syllabic prepositions *k* “towards”, *s* “with”, *v* “in” and *z* “from”,[29] and it is recommended to professional speakers (such as for the newsreaders in the media) in several other circumstances, with various combinations of morphosyntax and preceding segment, mostly to avoid hiatus, which is supposed to enhance the intelligibility of speech, since it “prevents the unacceptable merging of words” (25).

It is, however, uncertain how precisely did and do such orthoepic prescriptions and recommendations reflect the actual linguistic reality not only of the professionals who are supposedly bound by them, but mainly of normal speakers who are often unaware of such norms or whose actual pronunciation differs from that which they consider correct. In our opinion the need for codification exists particularly when a phenomenon is not stable or certain. Even with earlier descriptive works it is uncertain how far the authors were influenced by their ideal image of the language (Bělič 1972, 73).

> Vachek (1968) postulated not just a mere decrease in usage but a simultaneous shift in the function of glottalization from a boundary marker to a signal of emotion and emphasis (125). He argued that in most cases, where glottalization can mark the boundary between preposition and the governed word or between prefix and the root, pronunciation without glottalization does not cause ambiguity since there are other clues to recognize the boundary. … [This] led him to the conclusion that even a complete elimination of [pre-vocalic] glottalization would hamper neither the functional effectiveness of the utterance nor the signalization of the boundaries (123). In his view, the emotionality connected with glottalization showed itself not only in the utterances expressing a warning (*Neopovaž se!* “Don't you dare!” ['neʔopovaš se] as opposed to neutral *On se toho neopováží* “He won't dare” ['on se toho 'neopovaːžiː]), hesitation or other uncertainties (*Já to neumím, opravdu!*

29 Research about the Czech speakers' attitude toward the pronunciation norm has shown that in these cases pronunciation without glottalization, such as *v okně* “in the window” ['fɔkɲe] and the Moravian ['vɔkɲe], are by the majority of speakers considered non-standard, however, even by those who use these forms themselves (Hůrková 1995, 26). This is a similar mismatch of real and proclaimed pronunciation as in the case of intrusive [r] in British English.

['jaː to 'neʔumiːm 'ʔopravdu]). He also interprets in this sense those instances of postvocalic or preconsonantal glottalization that are by other authors excluded from consideration just for their paralinguistic quality (cf. Volín 2003, 13).

Vachek did not expect “ráz” to become [exclusively an emotionality marker] and to lose completely its function as a boundary signal, since its occurrence is always restricted to positions of word or prefix boundary. He supposed that the result could be the impossibility of using “ráz” only as a boundary marker without any indication of emotionality. But forty years after his postulate, no such definite change seems to have taken place. Despite some objections, it is mostly accepted that glottalization is on the decrease (Hůrková 1995, 26), nevertheless it certainly has not become a purely emotional marker. The style of speech is thought to be the most important criterion of its usage. (Bortlík 2009, 14)

In English, on the other hand, glottal marking of initial vowels in connected speech is optional, moreover, linking is a neutral mechanism; glottalization is often a signal of special emphasis and its overuse not only does not enhance intelligibility, on the contrary, in can produce “a very jerky effect” (O'Connor 1995, 101) or be “typical of some foreign learners of English” (Gimson 2001, 291). Still, word-initial vowels in English are frequently glottalized, but rather than by syntax, by the preceding segment or by orthoepy the use is governed by prosody.

4.2.1.1 Segmental context

Pavelková analyzed a small sample of recordings of Bohemian Czech spoken at town-hall meetings to find out what the rate of glottalization was in spontaneous public speech. She considered syntactic structure, where only the boundary of lexical words provided enough tokens to allow statistical analysis and among these she found significant differences for vowel-vowel and for consonant-vowel boundaries. The rates were higher when the preceding vowel was the same as the target vowel (74% glottalized tokens), than when the vowels differed (58%).

Higher rates were also observed for preceding sonorant consonants (76%) than for phonologically[30] voiceless obstruents (56%). Voiced obstruents were too scarce in the sample to allow meaningful comparison (2001, 82).

According to Dilley, Shattuck-Hufnagel and Ostendorf, the influence of the segmental level on rates of glottalization of word-initial vowels in English depends on prosody and it is much smaller than the influence of phrase boundaries, pauses and preceding glottalization, and pitch accent. For recordings of American English in the style of FM radio news, they found segmental context significant only in phrase-medial positions and only in the case of preceding vowels and liquids, i.e. if the word-initial vowel was preceded by a vowel or liquid there was a greater probability that it would be glottalized. Nasals, fricatives and stops did not make any significant difference within phrases and no class (not even vowels) did in phrase-initial positions where the phrase boundary was the dominant factor causing word-initial vowels to be glottalized no matter what was the preceding segment (1996, 437).

These findings are not necessarily inconsistent with Pavelková's (2001) observation, since she did not analyze the role of prosodic structure, however, glottalization rates in Dilley, Shattuck-Hufnagel and Ostendorf's study were generally much lower in non-phrase-initial position (around 15–30% for different segmental classes) and even in phase-initial position they did not exceed 50% if there was no preceding pause or phrase-final glottalization (1996, 437).

30 Pavelková (2001) sorted the data according to the underlying phonological voicing and only subsequently analyzed whether the segment was produced as voiced (therefore without [ʔ]) or voiceless (either with or without [ʔ]). She also found prosthetic [v], even if the context was rather formal. In contrast, Skarnitzl (2004a, b) analyzed only allophonic voicing and only for the purpose of determining the preferred acoustic qualities of glottalization, not to find out glottalization rates.

4.2.2 Position in intonational phrase

Prosodic variables, mainly intonational phrase boundaries and pitch accent on the target syllable (see Section 4.3) have been found to significantly increase glottalization rates in American English (Dilley, Shattuck-Hufnagel and Ostendorf 1996). Some studies have also found connections between prosody and the form of glottalization in English (e.g. Stevens 1994; in Redi, Shattuck-Hufnagel 2001). Skarnitzl, on the other hand, reported that "[p]rosodic structure does not seem to influence the physical appearance of glottal stops" in Czech (2004b, 77). However, what Skarnitzl in fact payed attention to, was syntactic structure. These two structures are interdependent, yet, their effect on glottalization should not be confused (cf. Section 5.1.3.1).

Descriptions of the prosodic structure of languages usually distinguish a hierarchy of constituents which denote different levels of grouping within stretches of continuous speech, from syllables on the bottom to utterances at the top. Concepts and terminologies can differ across linguists and across languages, especially "at the midlevels of the hierarchy" between moras and utterances (Shattuck-Hufnagel and Turk 1996, 207). We adhere to the concept of intermediate and full intonational phrases that is also used by the ToBI (Tones and Break Indices) transcription system, the method for transcribing prosody (Silverman, et al. 1992),[31] since these constituents have been repeatedly used in the study of glottalization phenomena in English.

Intonational phrases are stretches of continuous speech that are marked by boundary signals, phrase accents and boundary tones. These characteristics are language specific and we deal with the differences between Czech and English phrasing in the following sections. Intonational phrases can span from single sounds in extreme cases (e.g.

31 It was originally devised for transcribing some aspects of (Mainstream American) English prosody but has since then been adapted for other languages (Ohio State University 2012).

the interjection *Oh!*) to complete utterances that on the syntactic level correspond to sentences.

In Czech, the established hierarchy of prosodic units is *slabika* "syllable" – *mluvní takt* "stress unit, prosodic word" – *promluvový úsek* "tone unit" – *výpovědní celek* "utterance" (Palková 1997, 269; Palková et al. 2004, 66). The tone unit consists of at least one stress unit and it can constitute one complete utterance (Palková 2006, 227). Thus it corresponds to both intermediate and full intonational phrases. However, even though it is not captured in the terminology, there is the possibility of the distinction between two levels of prominence of tone unit boundaries in more complex utterances (229).

In English the distinction between full and intermediate intonational phrases (as well as between lower levels of prosodic hierarchy) is based on the analysis of the F0 contour (intonation) and on the strength of disjuncture at the boundary which is perceived by the listener/transcriber (Beckman and Elam 1997). The intonational and accentual characteristics are:

(a) every intonational phrase contains at least one pitch-accented syllable;
(b) phrase accents mark the ends of intermediate phrases;
(c) boundary tones additionally mark the ends of full intonational phrases.

The sense of disjuncture is based on several acoustic characteristics of utterances, which can be variously combined. Among the most important in English are:

(a) optional pause at phrase boundary;

(b) preboundary lengthening (syllables occurring in phrase-final position tend to be longer than syllables within phrases);
(c) degree of F0 changes in phrase accents and boundary tones (Beckman and Elam 1997);
(d) “changes in the speed with which unaccented syllables are produced” (Gimson 2001, 255).

Studies have shown that in English the boundaries between intonational phrases are also marked by glottalization: Word-initial vowels are much more likely to be glottalized when they occur at phrase boundaries than within intonational phrases. Moreover, full intonational phrase boundaries show even higher glottalization rates than boundaries of only intermediate phrases (Dilley, Shattuck-Hufnagel and Ostendorf 1996).

The marking of phrase boundaries with glottalization occurs both at the beginnings (in word-initial vowels) as well as at the ends of phrases (phrase- or utterance-final glottalization). Phrase-final glottalization can be observed in Czech too (see Figure 13) but it is not the main point of interest for us, except for cases where phrase-final and word-initial glottalization coincide (see Section 4.2.3.4).

We mentioned in Section 4.1 that Dilley, Shattuck-Hufnagel and Ostendorf (1996) found preceding glottalization and preceding pause to be significant causes of pre-vocalic glottalization at phrase boundaries. The reason to believe that the boundaries themselves were a major cause of pre-glottalization is the fact that glottalization rates of word-initial vowels at phrase boundaries were high even when there was no preceding pause or glottalization (432).

Where there is no prosodic boundary glottalization is less likely to occur. Similar applies to word-initial /h/, which serves as a boundary signal in English. Pierrehumbert and Talkin found that /h/ in phrase-initial positions was more strongly articulated than phrase-medially

(1992, 111) and similar findings applied to glottalization of word-initial vowels (114). In Section 3.2.1 we mentioned that initial /h/ is frequently omitted in unaccented pronouns that are linked to the preceding word as clitics. This can be explained similarly as the absence of glottalization in these positions as an extreme weakening of the boundary signal.

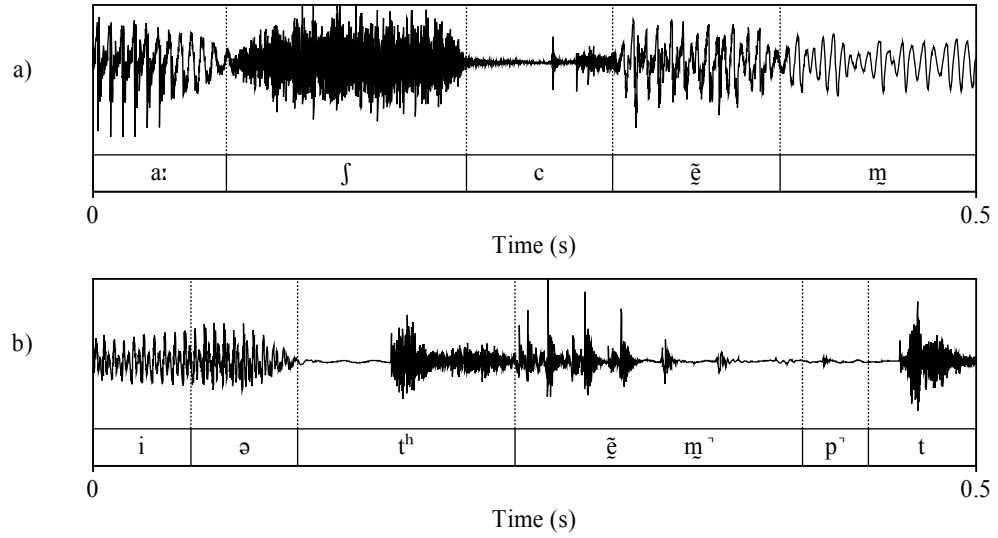


Figure 13. Examples of phrase-final glottalization: In a) the waveform of the word (*pl*)*áštěm* "with the cloak": modal voicing of [aː] and irregular pitch periods in [ɛ̰m̰]. In b) the waveform of the expression *the attempt*, showing regular voicing of [i‿ə] and strong glottalization of [ɛ̰m̰] in the form of irregular pitch periods and diminishing amplitude; supported by the glottal reinforcement of the voiceless plosives [p] and [t].

The influence of prosodic phrasing on glottalization in Czech has not yet been studied directly, however, some results exist for Czech English, where glottalization has been shown "more pervasive and therefore less influenced by overall prosodic structure [i.e. by phrase position], than in BrE" (Bissiri and Volín 2010, 27, our note in brackets). Czech speakers of English glottalized the totality of the vowel-initial tokens at phrase boundaries (as opposed to 50% of the tokens glottalized by native speakers); they glottalized slightly less at non-phrase boundaries, but still at least 78% of the tokens (as opposed to 14–29% tokens by the

native speakers); and individual CzEn speakers used full glottal stops in 74–88% of all vowel-initial tokens (28).[32]

This is surprising since if the high rate of glottalization by Czech speakers of English is to be attributed to the influence of their L1, we might expect that they would have not only similar glottalization rates but also would use similar techniques. We mentioned in Section 2.7 that Skarnitzl (2004a) found the most frequent type of glottalization in his sample to be the creaks (60%) and only 59% of glottalized tokens contained any kind of a hold phase (and so they could be considered glottal stops in case Bissiri and Volín used a different categorization than that we discussed in Chapter 2). In Bissiri and Volín's study creaky voice was used by individual Czech English speakers only in 3–23% of all vowel-initial tokens (2010, 28).[33] It seems that the influence of L1 with respect to glottalization in L2 cannot be really evaluated if the actual usage in the first language is not analyzed as well.

It is necessary to bare in mind that Skarnitzl (2004a) and Bissiri and Volín (2010) used material from different kinds of speakers. While Skarnitzl analyzed the speech of professional newsreaders, native speakers of Czech, Bissiri and Volín compared professional BrEn speakers with Czech students of English. From what was said in Section 4.2.1 about the orthoepic requirements for professional speakers in Czech, we might expect that the speakers in Skarnitzl's study would use glottalization at least on an average rate if not more frequently and that they would use clear examples of glottalization (cf. Skarnitzl 2004a, 59). Unfortunately, Skarnitzl (2004a, 2004b) was only interested in the acoustic properties and categories of pre-vocalic glottalization and he does not say what was the total number of occurrences of the

32 If we exclude the cases where linking or contraction (*it is* → *it's*) was used, we find out that full glottal stops amounted to 84–97% out of all glottalization types (cf. Bissiri and Volín 2010, 28).

33 Since tokens with creaky voice were less numerous than glottal stops they made up approximately the same percentage among glottalized tokens as they did among all vowel-initial tokens (cf. Bissiri and Volín 2010, 28).

conjunction *a* where he looked for glottalized segments, so his data cannot be used to compare the overall glottalization rates.

It can be useful to compare pre-vocalic glottalization in Czech with the situation in German since the two languages have, at least theoretically, a similar overall usage of glottalization of word and morpheme-initial vowels. German speakers have been found to glottalize significantly more often in phrase-initial than in phrase-medial position and to use full glottal stops more often phrase-initially than other, "weaker", forms of glottalization (Rodgers 1999, 195).

For the purposes of interlingual comparison of glottalization it seems necessary to study both the production of L1 and L2 in the same speaker if we want to be able to analyze the influence of the native language. Should Czech speakers really use different glottalization techniques in L1 and L2, we could not discard the possibility that there is also a different effect of prosody on glottalization in L1 and L2, or a different effect of segmental context for that matter, and all the differences might be caused or at least influenced by other variables, possibly by the foreignness itself.

4.2.3 Phrase boundary marking

We listed in the previous section the ways disjuncture between intonational phrases is marked in English. Since glottalization is one of them, it is useful to compare the other possibilities in English with the ways phrase boundaries are marked in Czech so that we can evaluate the role of pre-vocalic glottalization.

4.2.3.1 Pause at phrase boundary

We have discussed in Section 4.1 the possibility that a preceding pause is an important factor which influences glottalization. In his comparison of pre-vocalic glottalization in the preposition *of* in CzEn and in BrEn Volín (2003) suggests that "utterance initial words [e.g. 'Of course, …']

are, by definition, not linked to the preceding material on lower prosodic levels" (14) and he excluded these cases from his sample for the sake of studying linking phenomena. This can be interpreted as the exclusion of word-initial vowels after a pause. We do not consider it appropriate for several reasons to completely exclude phrase-initial words which are preceded by a pause from the analysis of pre-vocalic glottalization.

A pause is just one of the ways how to mark intonational phrase boundaries and if it is missing, listeners still have at their disposal other signals for boundary recognition. Besides, as will be discussed below, a silent pause is not the only possibility of pause realization. The English version of ToBI distinguishes a type of phrase break, break index 2,[34] which presents a mismatch between the two criteria for phrase break recognition, intonation and disjuncture: It is characterized by either "a strong disjuncture marked by a pause or virtual pause, but with no tonal marks … [or by] a disjuncture that is weaker than expected at what is tonally a clear intermediate or full intonation phrase boundary" (Beckman and Elam 1997, 35).

Dilley, Shattuck-Hufnagel and Ostendorf found that prosodic boundaries increase glottalization rates, but they only found these results for clear breaks between intermediate and full intonational phrases (break indices 3 and 4 respectively). They considered the tokens at break 2 as phrase-medial (1996, 432). However, since the authors of ToBI "suspect that both types of [Break index] 2 will be explained ultimately by a better understanding of the complexities of discourse structure" (Beckman and Elam 1997, 35), it seems plausible that glottalization of word-initial vowels could contribute to the better understanding of break 2, which shares important characteristics with break 3.

34 "Break indices represent a rating for the degree of juncture perceived between each pair of words and between the final word and the silence at the end of the utterance" (Beckman and Elam 1997, 31).

A break with index 2 before a potential phrase beginning with *Of course* could be distinctly marked with intonation, but there would be no actual or virtual pause (see the following section). Such phrasing can be used e.g. in rapid speech "to hold the floor or to convey a sense of urgency" (Beckman and Elam 1997, 35). Glottalization can then be seen as another option for strengthening or, if missing, for weakening the sense of disjuncture.

Perception tests by Palková (1974) have shown that in Czech, too, pauses are identified as a phrase boundary signal. In fact, for an average listener they proved to be "the most prominent stimulus for determining the phrase boundary" (31), however, "these cases were necessarily also characterized by the melodic contour at their end" (30). A distinct intonation pattern can, on the other hand, be a sufficient boundary signal without a pause. Other signals, such as changes in speech rate, and repetitions of melodically marked minor phrases[35] are also usually effective only in combinations (31).

4.2.3.2 Silent pause, filled pause and breath

It has been mentioned in Section 4.1 and again in the preceding section that there are different kinds of pauses. The differences lie in their acoustic characteristics, for one thing, and in their function, for another.

First of all, there can be a silent pause, i.e. a region in the sound continuum filled with neither any voiced nor voiceless sounds. When Dilley, Shattuck-Hufnagel and Ostendorf (1996) analyzed the influence of pauses on glottalization rates, they counted stretches of at least 50 ms of silence as pauses,[36] since they found "very few silent regions of less than

35 Such repetitions of minor phrases (called *přízvukový takt* "word-stress group" in Palková's older terminology) are perceived as highlighted within the context and form together one major phrase (or *promluvový úsek* "discourse segment") (Palková 1974, 30). This kind of phrasing which is realized throughout the whole "discourse segment", however, only accounts for a minority of cases of phrase marking, the majority being marked directly at the boundary (31).

36 They made sure that the silence was not, in fact, the hold phase of a full glottal stop (Dilley, Shattuck-Hufnagel and Ostendorf 1996, 431). Skarnitzl found the average duration of different kinds of glottal stops in Czech to be 65.6–83.8 ms (2004b, 75),

50 ms in [their] data" and they cited others who had shown that "pauses of 50 ms or more are used by listeners in syntactic disambiguation" (431).

Silent pauses are the inevitable effect of the need to draw breath at some point during speaking and sometimes the category breath is used as equivalent to a silent pause (e.g. Skarnitzl 2004a), although pauses can be planned independently of breathing, e.g. when "striving for an effect of judicious deliberation" (Beckman and Elam 1997, 36).

Other pauses, on the other hand, can "sound disfluent, as if the speaker were hesitating as he searches for the next word" (36). Such pauses are frequently used by speakers to hold the floor and are often filled with hesitation noises such as [əː] or [mː] (Gimson 2001, 276), or with other material, hence the term filled pause. In fact, a similar effect on the listener can be produced by a virtual pause which is neither an actual silence, nor a stretch of filler sounds but rather a pause-like prolongation of segmental material, which can occur even at the beginning of the word after the boundary, such as in the /l/ in a hesitating or deliberate pronunciation of the expression *the | least* (Beckman and Elam 1997, 35–36).

Filled pauses and virtual pauses can support the sense of disjuncture just as well as silent pauses do, so that they can be present at clear intonational phrase boundaries, but at the same time they can be immediately followed by a word-initial vowel. Utterance and phrase-initial words beginning with vowels such as *Of course* should therefore be set aside in an analysis of pre-vocalic glottalization only if they are actually preceded by silence. In a comparison of Czech and English, glottalization rates should be analyzed separately for all cases of a preceding silent pause, even in the absence of a clear tonally marked

so they could well be mistaken for a pause.

phrase boundary, because of the indication of the difference in the preferred voice onset (see Section 4.1).

4.2.3.3 Preboundary lengthening

English syllables are lengthened within phrases when they are accented (cf. Section 4.3.1), but lengthening of phrase-final syllables is also one of the important ways to signal phrase boundaries (Beckman and Elam 1997). Such preboundary lengthening usually correlates with tonal marking of boundaries.

In contrast, according to Palková (1997, 170) distinct phrase-final lengthening is not part of the standard pronunciation in Czech, but it is rather a feature of Common Czech or even a peripheral pronunciation feature (324). A possible explanation for this is that phrase-final lengthening, as well as accent-induced lengthening, applies mainly to syllable nuclei, i.e. to vowels. Since the quantity of Czech vowels has a strong distinctive function[37] (Palková 1997, 171) and their whole form is quite stable, any major variation in them can influences the intelligibility and/or the stylistic quality of an utterance (170). The fact that vowel quantity in Czech is distinctive and on the phonemic level independent of stress is also one of the important sources of difficulty for foreign learners of Czech, so that the inability to master the proper distinction between short and long vowels is often the cause of their foreign accent.

Vocalic length, however, is not an absolute quantity, but just like with other prosodically influenced variables its interpretation depends on the contrast with its phonemic and phonetic context. The changes of speech rate that Palková (1974, 31) names among other boundary signals

37 The distinction between Czech long and short vowels is in the first place a matter of length. Even though there is also a difference in quality between some of the pairs, e.g. /iː/ vs /ɪ/ (Palková 1997, 171), it is smaller than the difference which can be found in English pairs like pool /puːl/ vs pull /pʊl/. The distinction between English vowels is based mainly on their quality, while their quantity is subject to stronger variation, with respect to segmental context, position and prosody (see Gimson 2001, 95).

should, in fact, show in the duration of vowels at various phrasal positions. In Figure 14 there is an example of differences in the length of phonemically short vowels. One of them, namely /e/, is lengthened in preboundary position, while others, two /ɪ/'s, are quite short, probably because they occur in unstressed function words at the beginning of a phrase. The lengthened vowel is at least as long as one of the phonemically long vowels in the same utterance. Yet, the lengthened /e/ is only about half as long as another long vowel which occurs in the same phrase-final word and is likewise lengthened. Thanks to the phonetic and lexical context the utterance does not sound unnatural and the vowels can be identified correctly as either long or short.

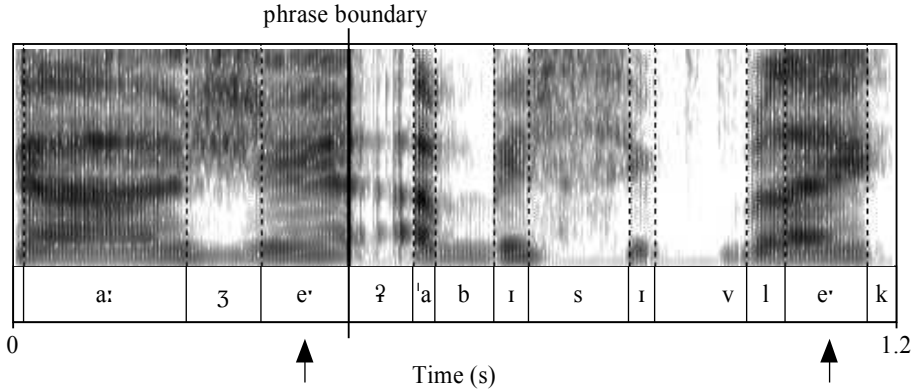


Figure 14. Change of speech rate at phrase boundary: lengthening in pre-boundary vowels in (*do*)*káže, aby si* (*pocestný s*)*vlék*(*l*) "succeeds in making the traveler take ... off". Arrows indicate two phonemically distinct vowels /e/ and /eː/ which are produced approximately with the same length, because the short /e/ is lengthened in preboundary position. Notice also the difference in length between phonemically short vowels /e/ and the /ɪ/'s.

With respect to Palková's (1997) suggestions about the stability of Czech vowel length and the possible variation, it is uncertain to what degree do native Czech speakers/listeners rely on preboundary lengthening as a boundary signal both in Czech and consequently in English. If they did not rely on it as strongly as native English speakers do, the other boundary signals, glottalization being one of them, might be more important for them than for native English speakers.

4.2.3.4 Phrase-final glottalization

Dilley, Shattuck-Hufnagel and Ostendorf (1996) found glottalization of the preceding segment to be an important influence on glottalization rates in the following word-initial vowel and they asked the question whether this was the reflex of the prosodic boundary or a purely mechanical result of delayed cessation of glottalization.

For Redi and Shattuck-Hufnagel (2001) one reason to believe that the actual cause for this was the prosodic boundary, rather than mechanical constraints, is that phrase-final glottalization is itself a reflex of prosodic boundaries and it is, at least to a certain degree, independent of other boundary-related events. It seems to be independent of low F0 (which frequently occurs at boundaries), since glottalization has been also found at phrase boundaries with the speaker's voice in its midrange or rising (particularly in word-initial vowels) (426).

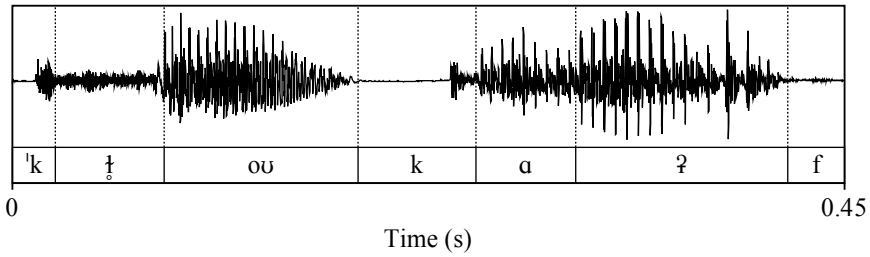


Figure 15. Interference of preboundary and pre-vocalic glottalization in the expression *cloak off*. Even though the vowel [ɑ] is not really pre-glottalized, it gives the impression of pre-glottalization because of the raised amplitude and irregular pitch periods in its greater part represented by [ʔ]. This irregularity is, however, caused by phrase-final position.

Under certain conditions, pre-vocalic glottalization can coincide with “following” phrase-final glottalization as well, e.g. when the word-initial vowel occurs in a phrase-final syllable. Figure 15 shows an example of preboundary glottalization in the word *of*, which results in the impression of pre-glottalization of [ɑ], even though there is no irregularity at the beginning of the vowel.

Just like with preboundary lengthening, it is uncertain to what degree do Czech speakers and listeners use phrase-final glottalization as a boundary marker. Even though its existence in Czech is recognized (see Palková et al. 2004, 72), it has not, to our knowledge, been systematically studied. It is plausible, that it might, just like in English, influence glottalization in the following segments, and so it is necessary to consider this aspect in any study on glottalization of word-initial vowels at phrase boundaries.

4.3 Prominence marker

4.3.1 Word stress and pitch accent

The difference between prominence on the level of words and on the level of phrases is sometimes expressed in the distinction between stress and accent, respectively. Some concepts specify that accent is the "actual acoustic prominence that can be objectively detected in a particular utterance" (Palková 1997, 157), whereas stress is the "potential characteristic of a syllable in a word that accent can [but does not have to] be realized on it" (157). This distinction is frequently used for English, in the Czech phonological tradition, on the other hand, it is not usual to distinguish between the abstract and real prominence on the level of words and so the term *přízvuk* can correspond to both stress and accent in the sense given above (Palková et al. 2004, 66).

There are important differences in the stress patterns of Czech and English. Gimson describes the English stress[38] as "free, in the sense that the main accent is not tied to any particular point in the chain of syllables constituting a word," but it is also fixed, sometimes called lexical, in the sense that it "always falls on a particular syllable of any given word," even though larger rhythmic patterns in whole utterances

38 In fact, Gimson avoids the term *stress* altogether because of the different and ambiguous ways in which it has been used in linguistics (Gimson 2001, 24).

can cause certain exceptions (2001, 221). Czech word stress, in contrast, is generally fixed on the first syllable, however, it can be realized on the preceding syllabic preposition to form a prosodic word, e.g. *židle* “chair” ['ʒɪdle] but *na židli* “on the chair” ['na‿ʒɪdlɪ] (Palková 1997, 157).[39] Further, monosyllabic words can lose stress and can be variously attached to the preceding of following word (cf. 280–282)

Accent is one of the ways to assign prominence within higher prosodic units. Prominence is, however, used for various purposes, it can have different effects on various listeners and it is achieved by various means. It is interpreted “on the basis of the whole linguistic complex” – acoustic, syntactic (by means of word order) and semantic (lexical) factors are often not distinguished by the listener (165, 298).

Accent in English is mostly characterized by pitch movements on the accented syllable and is hence called pitch accent. These pitch movements are usually accompanied by durational changes: Accented syllables are lengthened and unaccented ones are reduced, which is one of the major features of rhythmical phrasing (Gimson 2001, 250) and it also means that the realization of accent determines to a large degree the use of weak and full forms of certain lexical words (252).[40] Unaccented syllables are more likely than accented ones to be run together in one intonational phrase[41] with the appropriate linking techniques and without the use of pre-vocalic glottalization (308).

Czech *větný přízvuk* “sentence stress” is mainly based on the contrast of various acoustic qualities within the given context, they are often

39 The only major exceptions in Czech are some dialects of North-East Moravia and Moravian Silesia, which have penultimate stress, just like their Polish neighbors (Bělič 1972, 272, 288); and foreign words and expressions that are used as citations and that are only partially adapted to the Czech pronunciation and often retain the stress pattern they have in the original language, e.g. *chargé d'affaires* Cz [ʃarʒeda'fe:r] (Hůrková 64).

40 The vowel in the pronoun *you* can be realized differently according to accentuation and position: *You are very happy, aren't you?* RP [jʊə 'veɹi 'hæpiʲ‿'ɑ:ntju:] with full vowels in accented syllables or in final position.

41 The degree of reduction can vary according to style or speech rate and can lead to complete elision of syllables, e.g. *there are a lot of* [ðəɹə 'lɒtəv].

realized in the whole stress unit. Most frequently the contrast is based on intonation (pitch changes on the accented syllable); on the changes of loudness; and less importantly on other features, such as changes of speech rate or delimitation of individual stress units (Palková 1997, 298–299).

Pitch accent has been found to be an important factor in predicting glottalization occurrence in English, yet not as crucial a factor as phrase boundaries. Pierrehumbert and Talkin found that that pitch period irregularity of pre-glottalization in phrase-medial position was greater when the vowel-initial syllable was accented (1992, 115) and stressed syllables had a high rate of glottalization both phrase-medially and phrase-initially, whereas reduced syllables only had high rate at phrase boundaries.

Figure 16 shows an example of how phrase boundaries can be a more important factor for pre-glottalization than accent on the target syllable. Even if a phrase-initial vowel is not accented and reduced it can be glottalized as opposed to a phrase-medial accented vowel which is may be linked to the preceding word.

Dilley, Shattuck-Hufnagel and Ostendorf (1996) found substantial differences in glottalization rates for several combinations of (a) phrase position (initial vs medial); (b) accent (none, on the target syllable, later in the word); and (c) vowel reduction (reduced vs unaccented full vowels). Pitch accent on the target syllable reliably increased glottalization rates; if there was an accented syllable later in the vowel-initial word, the initial vowel was still more likely to be glottalized than a word with no accent, but this tendency was only evident in certain phrasal contexts, particularly where it didn't coincide with the influence of phrase boundaries (436). Vowel reduction proved, similarly to segmental context, a less reliable cue for predicting glottalization – the

difference between reduced and unaccented full vowels was significant mainly in phrase-initial contexts (435).

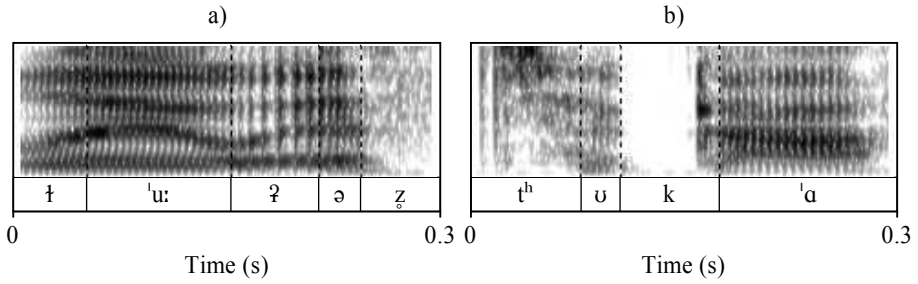


Figure 16. In a) is the spectrogram of (*b*)*lew as*. The unaccented [ə] is glottalized because of a minor phrase boundary divides it from the preceding ['uː]. In b), on the other hand, is an example of the phrase-medial occurrence of *took o*(*ff*). Despite the accent on ['ɑ] there is no glottalization because of the linking of the preceding [k].

The tendency to glottalize accented syllables more often than unaccented syllables, can be seen as an additional marking of an already prominent syllable and this tendency can be expected for Czech as well, since it is said to be more common in emphatic speech, which can be understood as accented (Hůrková 1995, 25).

Bissiri and Volín (2010) who found phrase boundaries to be less significant predictors of glottalization in CzEn than in native BrEn did not distinguish pitch-accented and unaccented vowels. In fact, the role of pitch accent in the sample would not have been possible to estimate for tokens occurring at phrase boundaries, since these were virtually all glottalized,[42] but it might have played a role within intonational phrases, where there were some non-glottalized tokens (26).

Again, we can compare the role of accent in Czech with the situation in German, even more so, because German probably influenced the Czech initial-stress pattern and it has been often seen as a major influence on glottalization in Czech (cf. Vachek 1968, 122). Rodgers (1999) found that in German vowels that bear the sentence accent are

42 Except for only one token in the sample out of about 280 word-initial vowels where glottalization was possible (26).

more likely to be preceded by a full glottal stop and unaccented syllables are more likely to have some “weaker” form of glottalization or no glottalization at all (196).

4.4 Sociolinguistic and stylistic variation

4.4.1 Role of dialect and style

We have mentioned throughout the previous sections that dialects can be an important factor in glottalization, either because of their differing phonotactics, phonemics or because of the preferred prosodic realizations of utterances. Since we are comparing the influence of prosody on glottalization in two languages, i.e. dialects in a very broad sense, we are in fact combining two points of view most of the time, but a few comments should be made on the role of dialect in a narrower sense as well.

In English, different major dialects, such as British, American and Scottish English can have their own standard pronunciations, although there is no official body which would impose them (cf. Gimson 2001, 77). The use of dialect in Czech, on the other hand, is by definition “non-standard” (cf. Bělič 1972, 9), even though various dialectal aspects often correspond to standard Czech. The intrusion of dialectal features into a speaker's production of standard language is to a greater extent a matter of style, although it affects various linguistic levels differently. Some dialectal features are less likely to occur in formal contexts than others because they are used more consciously. Speakers of Moravian Czech are less likely to use their dialectal vocabulary or vocalic inventory in formal styles (such as Hanak *staré bék* “old bull” instead of standard *starý býk*) but they will use the same voice assimilation patterns both in formal and informal contexts (such as *na shledanou*

“good bye” ['na zɦledanoʊ] as apposed to Bohemian ['na sxledanoʊ]).[43] Since the use of glottalization is to a great extent unconscious (cf. Weingart 1932; and Ladefoged 1993, 48) it can be expected that it is influenced by the dialect of the speakers even when they aim at standard pronunciation.

> [However, t]he theory that the rate of glottalization varies significantly with dialect is not generally accepted. In the first half of the 1960s Hála held that it was indisputable that glottalization was more frequent in Bohemia than in Moravia. He saw a possible reason for this in the somewhat faster and staccato Bohemian speech style as apposed to the Moravian slower and legato style. And he probably meant not only the dialects but also the standard language spoken in Bohemia and Moravia, respectively (Hála 1962, 360). Vachek, six years later, supported this view when he argued for the emotional quality of glottalization. According to him, the form of emphatic negation ['neʔe] was completely usual in Moravia, while glottalization as a boundary signal was practically unknown there (Vachek 1968, 124). Bělič, on the contrary, maintained that it was optional in the whole country, it depended more on the speech rate and the carefulness of the pronunciation and was not used frequently in ordinary speech. He ascribed the perhaps slightly greater frequency of glottalization in Prague to the relatively stronger segmentation of the speech in urban pronunciation (Bělič 1972, 73).
>
> What might have contributed to this difference of opinion is the fact that Moravian and Bohemian pronunciation differ in the way the preceding obstruents behave when glottalization in the following vowel is not used. … The pronunciation [of a nonsyllabic prepositions as the] voiced allophone is typical for Moravian speakers and considered nonstandard (e.g. MorCz *k oknu* ['gɔknʊ], *v okně* ['vɔkɲe]) (Hůrková 1995, 25, 26). When the final obstruent is part of a full-meaning word … pronunciation without glottalization is accepted in the case of final devoicing (e.g. *hned odešel* ['ɦnet‿'ɔdeʃel]) but the voiced variant is regarded Moravian dialect ['ɦned‿'ɔdeʃel] (Palková 1997, 327). And since the variant with final devoicing, [more common in Bohemia], is more similar to the pronunciation with glottalization, it is easier to identify the Moravian variant as not glottalized. (Bortlík 2009, 17–18)

43 Cf. (Bělič 1972, 324–327) on the creation of interdialects under the semi-conscious influence of standard Czech.

Formal styles may be more conducive to glottalization in English since it is possible that they inhibit resyllabification (Labov 1995). Umeda (1978) also found higher rates of glottalization in rare words than in common words (in Dilley, Shattuck-Hufnagel and Ostendorf 1996, 424). Many vowel-initial words in Czech are formal or rather rare and formality and special need for comprehensibility are often cited as causes for glottalization (e.g. Pavelková 2001). One factor of formal styles in Czech is the variation in lexicon. Formal expressions generally and synonyms for words of domestic origin in particular are often borrowings of Latin, Greek and other origin and they often begin with the vowels /a/ and /e/, e.g. marked *aplaus* vs neutral *potlesk*, *exploze* vs *výbuch*, *impulz* vs *podnět*. Therefore, formal styles in Czech not only require glottalization more for a clearer articulation, they also give more opportunity to use it. There is among the domestic words beginning with /a/ and /ɪ/ a considerable number of grammatical words that are very common, e.g. *a* “and”, *aby* “in order to”, *ano* “yes”; *i* “and”, *inu* “well”; some of them are used both in formal and in informal styles, others are more formal, such as *ano* vs *jo*, and *inu* vs *zkrátka*, *no*.

The use of prosthetic consonants is also a matter of dialect and of style, and so formal expressions and loanwords, influenced by standard speech usually do not have prosthetic [v] even in dialects that generally use it, e.g. *otec* “father”, *okupace* “occupation” and proper names, such as *Oliver* are not likely to have a prosthetic [v] (cf. Bělič 1972, 76). Speakers who in their native dialect use prosthetic consonants can be more conscious about the vocalic beginning of such words when adhering to standard pronunciation in formal styles and could be more likely to mark these word-initial vowels with glottalization.

4.4.2 Spontaneous vs read speech

Rodgers (1999) found highly significant differences in the rates and acoustic forms of glottalization in samples of spontaneous and read German. Once again, the comparison of Czech with German with respect to glottalization of word-initial vowels seems beneficial, since both languages share the potential for high glottalization rates, yet the linguistic reality seems to be less certain with respect to its actual usage. Even though it can be argued that “[i]nitial vowels in German are canonically realized with a glottal stop” (175) and other forms, such as creaky voice used to be condemned by prescriptivists, Rodgers' descreptive analysis showed that creaky voice was “the most common phonatory correlate of juncture”, which is the same result Skarnitzl (2004a) found for his sample of Czech.

Furthermore, Rodgers found that full glottal stops were more common in read speech, while creaky voice and realizations without any glottalization were more frequent in spontaneous speech. This, again corresponds to the findings of Bissiri and Volín (2010), who found full glottal stops in read Czech English to be much more frequent than other types of glottalization and than linking, contrary to Skarnitzl's (2004a) findings, even though Skarnitzl, too, analyzed samples of read speech. His subjects, however, were professional newsreaders, which seems to be another important factor.

In contrast, Dilley, Shattuck-Hufnagel and Ostendorf (1996) examined pre-vocalic glottalization in a small sample of spontaneous English and they “found a similar distribution of glottalization at intonational phrase onsets and pitch accented syllables” (439) as in a bigger sample of read speech.

4.4.3 Professionalism

Rodgers (1999) suggests that “phonetically naïve” speakers “more accurately represent the speech community” than professionals (250). His reservation against professionalism is, however, directed against the kind of prescriptivist approach, with which an earlier study on glottalization in German from the 1960s “used a small number of professional speakers, predominantly male” who read mostly classical literature and were expected to adhere to the orthoepic prescriptions (175).

Professional Czech newsreaders, on the other hand, who were also expected to reflect the “greater need for comprehensibility in radio broadcasting” (Skarnitzl 2004a, 59), and might thus likewise be expected to produce glottal gestures at least on an average level, showed very different results than Czech students of English reading BBC news bulletins in Bissiri and Volín's (2010) study. Even though it is impossible to draw any conclusions from Skarnitzl's data about the overall glottalization rate of Czech newsreaders, it seems plausible that the present day professional speakers do not necessarily adhere too strictly to orthoepic prescriptions (which may be conservatively understood as the to demand for full glottal stops (cf. Hůrková 1995, 25)), but their professionalism can show in the ability to produce clearly intelligible utterances with a more natural and fluent style than unprofessional speakers even in the case of reading.

4.4.4 Gender

The analyses of the role of gender in the variation of glottalization often present contradictory results. Redi and Shattuck-Hufnagel (2001, 408–409) present an overview of some of the previous findings and they suggest that “[t]he factors which contribute to gender differences in rate

of glottalization may be anatomical, sociolinguistic, structural, or perhaps a combination” (2001, 409).

5 RESEARCH PROPOSAL

Previous research has shown that nonprofessional native speakers of Czech read English texts with much higher glottalization rates than professional native British English speakers and it indicates that they are not significantly influenced by prosodic structure, in contrast to the native speakers of English. At the same time these nonprofessionals showed very different preferences for glottalization types than professional native speakers of Czech. It is therefore possible that the differences between native and nonnative English speakers were due to the different style, professionalism and the obvious fact that the Czechs were speaking a foreign language.

With respect to the literature review presented above we would like to present a research proposal with the following main research question and hypotheses:

Does prosodic structure influence the use of pre-vocalic glottalization in native and nonnative speech of Czech and English speakers?

We expect that:

1. native speakers of Czech have higher overall glottalization rates than native speakers of English both in the respective L1 and L2;
2. both native speakers of Czechs and native speakers of English have higher glottalization rates and are less influenced by the prosodic structure (phrase position and accent) in their L2 than in their L1;

3. in their L1, Czechs have higher glottalization rates at phrase boundaries and in accented syllables phrase-medially and in unaccented syllables;
4. in their L1, Czechs and native speakers of English use more strongly articulated glottal gestures (full glottal stops) at phrase boundaries than phrase-medially and in accented syllables than in unaccented syllables;

5.1 Method – production test

The production test should make it possible to assess the role which prosodic structure and segmental context play in the frequency and form of glottalization with these speakers and what kind of relationship is there between their performance in L1 and L2.

5.1.1 Speakers

The choice of speakers should control in the first place the variables of native language and dialect, gender, experience (nonprofessional).

5.1.2 Control of segmental context

Study material that would make it possible to control and compare some prosodic and segmental variables in two different languages can be obtained from samples of read speech. The segmental component is easier to control since the underlying phonemic structure is largely determined by the text. The actual phonetic realization depends on a number of factors (such as speech rate and style) and it can show significant variability, however, precise control of the allophonic realization is not necessary. It is sufficient to analyze the influence of whole classes of sounds on glottalization.

In the case of foreign speakers, the allophonic variability depends on various additional factors such as experience, L1 influence, etc. and it is possibly less consistent. A speaker can, for instance, use features from various F2 accents. Even in any natural utterance in one's native language, however, mispronunciations and disfluencies occur (see Machač 2006, 182), but their number can be reduced if the reader gets familiar with the text in advance.

5.1.2.1 Target word and target vowel

If soliciting material is to represent natural language, the phonotactic characteristics of the particular language should be taken into account. Target words should not be rare, since the experiment is not testing knowledge but the application of phonological rules. For the same reason, target vowels should be chosen primarily from those that are frequently used at beginnings of words (long vowels in Czech are very rare at word beginnings). For the sake of comparison of glottalization of vowel-initial words in Czech and English, only words with initial stress in English should be selected.

5.1.3 Control of prosodic context

Prosodic realization of a given text is less controllable than the segmental, however, some aspects of the text increase the probability that it will be read with the desired prosodic characteristics.

5.1.3.1 Prosody and syntax

There are various lexical and syntactic aspects of a text which increase the probability that it will be produced with the desired prosodic characteristics. In the case of the present study we will be interested in how syntax can influence the placement of intonational phrase boundaries and accents. According to Gimson in English “[m]ost commonly, intonational phrases correspond with clauses” (2008, 264).

Yet, others argue that “there is also considerable optionality” in prosodic phrasing (Frazier, Carlson and Clifton 2006, 246), which can differ according to “the speaker's preference or style” (245).

It seems that the relationship between prosody and grammar does not work in one direction only, rather than that, there exists a mutual influence. There are certain syntax-prosody mapping constraints (244) so that some prosodic realizations are determined by the syntactic and lexical structure of an utterance, but at the same time, prosody consistently influences the analysis of sentences. So, optional prosodic boundaries (|) can determine the meaning of a sentence such as *Johnny | and Sharon's | in-laws* (246). Similarly, primary and secondary accents, are employed for important communicative purposes, to determine the meaning of otherwise ambivalent syntactic structures (see Beaver and Velleman 2011). However, just like the use of phrase boundaries, accentuation can be governed by individual style (see e.g. Hirschberg and Terken 1993, 1362).

Similarly, the division of an utterance into intonational phrases in Czech is facultative, but is often relevant for the meaning of the utterance and, at the same time, “the linguistic characteristics of the text motivate and influence” this division (Palková 1997, 288).

5.1.3.2 Phrasing

Obligatory phrase breaks in English come after e.g. “an initial subordinate clause (‘*After it rained,…*’), of flanking an appositive structure (‘*Lance Armstrong, the cyclist,…*’) or a parenthetical aside (‘*Lance, as you know,…*‘)” (Frazier, Carlson and Clifton 2006, 245).

Possible prosodic configurations for analysis are: phrase-initial vs phrase-medial, and accented vs deaccented. Phrase breaks of different depth could be analyzed. The stimuli should be controlled for length, because it is an important factor in determining phrasing (Palková 1997,

292). “The global pattern of prosodic boundaries consistently [influences] sentence analysis” (Frazier, Carlton and Clifton 2006, 246) since prosodic phrasing is based on the contrast within the context rather than on absolute values.

5.1.3.3 Accent

Accentuation and de-accentuation can be influenced by the text: To elicit a token of a deaccented word-initial vowel, the word has to be “without communicative significance – unfocused, unimportant, highly predictable” (Beaver and Velleman 2011, 1675). The target syllable should come after the nuclear stress or possibly also after the secondary accent to minimize possibility of the target syllable to be accented (see Gimson 2001, 257).

The predictability (and de-accentuation) of a word cannot be sufficiently explained by givenness, additional requirements are: the same surface position (e.g. direct object and prepositional object) and the same grammatical function (e.g. direct but not prepositional object) of an expression in the current utterance as in the prior context (Hirschberg and Terken 1993, 1362).

5.1.4 Example English stimuli

Phrase-initial position:

As you can see, uncle Tony hasn't come home yet.

As he told me before, everybody can come to the party.

During the flight, eight people became sick.

After what he did, only few people still believed him.

Phrase-medial position, accented:

Martin didn't see aunt Jackie, he saw *uncle* Jackie.

We have got flour, but we will need some more *eggs*.

She didn't meet sergeant Brown, she met *officer* Brown.

Although it was just past 10 p.m., he said good *evening* to me.

Phrase-medial, deaccented:

Our neighbors never BUY apples, they GROW apples themselves.

Father didn't want Jack to return home, his *mother* asked him to.

When he was sick, he wrote letters, but he didn't *meet* anybody.

Did the speaker make a *good* argument or a *bad* argument?

5.1.5 Example Czech stimuli

Phrase-initial position:

Než jsme šli do kina, umyli jsme všechno nádobí.

Buď tak hodný, otevři mi dveře.

Zrovna když nedával pozor, okno se potichu otevřelo.

I když Jana neměla ráda cukr, ochutnala babiččinu bábovku.

Phrase-medial position, accented:

Ten člověk ve vlaku jistě nebyl Petr, ten jezdí do práce autem.

Adam nemyslel tu pochvalu vážně, byla to ironie.

Eva ráda tvoří sochy, nejradši však maluje obrazy.

Učitelka neříkala, zavři tu knihu, řekla zavři atlas.

Phrase-medial, deaccented:

Alešovi rodiče si nepůjčili auto, říkal jsem, že si koupili auto.

Ota říkal, že si *založí* účet v bance, ne že ho zruší.

Náš nový šéf není jen trochu aktivní, je *hrozně* aktivní.

Alena nestudovala *moderní* umění, studovala lidové umění

Shrnutí

Ve své magisterské diplomové práci se věnuji tématu glotalizace samohlásek na začátku slova v češtině a angličtině a to nejprve s ohledem na její akustickou charakteristiku a poté s ohledem na funkci, kterou v těchto jazycích plní. Poté formuluji hlavní výzkumnou otázku a z ní vycházející hypotézy. Na závěr shrnuji několik zásad, jichž by se měl držet experimentu, který by měl tyto hypotézy ověřit.

Při studiu glotalizačních jevů lze využít srovnání s češtiny s angličtinou minimálně ze dvou důvodů a sice proto, že v angličtině je forma a funkce tohoto jevu lépe popsána, a za druhé proto, že rozdílnost užití glotalizace v těchto jazycích se promítá do české výslovnosti angličtiny, respektive je jedním ze zdrojů českého přízvuku.

V mnoha jazycích světa má glotalizace fonematickou hodnotu, tzn. rozlišuje význam jazykových jednotek. V angličtině a češtině má funkci „pouze“ hraničního signálu či alofónu, přičemž v angličtině má jeho užití více podob než v češtině. Jedná se především o glotalizaci samohlásek na začátku slov (též v ČJ); glotální posílení některých neznělých souhlásek, případně jejich úplné nahrazení (pouze AJ); a o glotalizaci objevující se na konci promluvového úseku (také v ČJ).

Glotalizace patří mezi jevy z okruhu tzv. nemodální fonace. Jde o tvorbu hlasu odlišné od běžného fonačního mechanismu, při kterém hlasivky kmitají ve střední poloze, tzn. ani příliš napjatě, ani příliš volně. Při běžné, modální fonaci se tvoří zvukové vlny s pravidelnou amplitudou, frekvencí a tvarem. Při různých druzích nemodální fonace se naopak tvoří zvukové vlny různě nepravidelné, v závislosti na mechanice hlasivkové aktivity a dalších nastavení hlasového ústrojí (může dojít například též k rozkmitání tzv. nepravých hlasivek), v krajních případech rozevření či sevření hlasivkové štěrbiny (glottis, odtud glotalizace) se

hlas přestává tvořit zcela, k čemuž dochází při dýchání či artikulaci neznělých hlásek a při tvorbě hlasivkové explozívy. Hlasivková explozíva byla dříve nazývána „ráz“, po prozkoumání její akustické variability bylo nicméně považováno za vhodné terminologii zpřesnit a ráz se nyní chápe jako střechový termín pro různé realizace hraničního signálu.

Mezi tyto realizace patří již zmiňovaná hlasivková explozíva, jejíž produkce probíhá pevným sevřením hlasivek, vzrůstem tlaku vzduchu proudícího z plic a náhlým uvolněním sevření hlasivek, které se zpravidla projeví nepravidelností v obraze zvukové vlny. Při ne zcela těsném sevření hlasivek dochází i nadále k jejich kmitání avšak jeho pravidelnost je narušena zvýšeným napětím. Vzniká tak takzvaná třepená fonace, v případě opačném, při zvýšeném uvolnění hlasivek při fonaci se hlas obohacuje o šumovou složku dechu a vzniká tak fonace dyšná. Oba tyto druhy nemodální fonace mohou být realizací rázu, tedy hraničního signálu, nebo se mohou vyskytovat i v jiných pozicích, například, jak už bylo zmíněno, na konci úseku či promluvy.

V angličtině i v češtině byly přitom popsány i další druhy či poddruhy glotalizačních jevů a jako jeden z faktorů, který se projevuje v jejich variabilitě, byl nalezen segmentální kontext, tzn. povaha předcházející hlásky (především její znělost či neznělost).

Využití glotalizace slov začínajících na samohlásku již bylo nastíněno, v češtině jde především o hraniční signál, který zdůrazňuje předěl slov, přičemž ale automaticky dochází k jeho realizaci i po pauze, kdy se dá považovat za jeden ze způsobů hlasového začátku. Konkurenčním hlasovým začátkem je tzv. hlasový začátek měkký, který nachází v češtině využití např. na začátku znělých souhlásek po pauze. Jako začátek samohlásky se používá jen výjimečně, snad v dialektech a záměrně při zpěvu pro menší spotřebu dechu.

Z výsledků některých studií vyplývá, že v angličtině je měkký hlasový začátek poměrně častý, nicméně přímé experimentální potvrzení této dedukce či srovnání s češtinou nám není známo.

S preferovaným hlasovým začátkem souvisí i otázka stavby slabiky, a četnosti výskytu samohlásek na začátku slova. Angličtina umožňuje vokalický začátek slova častěji než čeština a snad proto v ní neexistuje tak velká snaha slova začínající vokálem zvýrazňovat. Naproti tomu čeština mnohem jednoznačněji preferuje konsonantický začátek slova a vkládání rázu jakožto svého druhu praetury může být vnímáno jako snaha o zamezení přeslabikování.

Přeslabikování je nicméně jev, ke kterému v češtině dochází, koncové souhlásky bývají za určitých okolností připojený k následujícímu slovu začínajícímu na samohlásku a stávají se její praeturou, což může mít negativní vliv na porozumění, což je taky důvod, proč se kodifikace české výslovnosti snaží přeslabikování zabránit.

Naproti tomu angličtina používá jisté pseudo-přeslabikování zcela běžně, ba dokonce jeho přílišné nedodržování a oddělování slov začínajících na samohlásku pomocí glotalizace, má za následek vznik nechtěného dojmu přílišné emfáze, a je častým znakem cizího přízvuku u českých či německých mluvčí angličtiny.

Užití rázu může mít vliv na artikulaci předcházející souhlásky. V češtině a také v angličtině českých mluvčích se tento vliv rovná vlivu neznělé souhlásky, tzn. způsobuje asimilaci znělosti, respektive ztrátu znělosti předcházejícího znělého párového konsonantu.

V angličtině naproti tomu nedochází k úplné ztrátě znělosti na konci slov a často ani před jinou neznělou souhláskou, i když však k takové ztrátě znělosti dojde, další alofonní znaky umožňují většinou rozeznat fonologicky znělé hlásky od neznělých. Pochopitelně tu napomáhá i kontext.

V případě hiátu, tzn. setkání se dvou samohlásek, které patří k různým slabikám existuje tendence tuto hranici nějak vymezit, děje se to buď užitím glotalizace, nebo hiátových hlásek. V angličtině jsou tyto vkládané hlásky velmi časté a jsou běžnou součástí vázání slov do vyšších prozodických celků.

Jelikož v angličtině glotalizace samohlásek na začátku slov neslouží nutně k identifikaci slovních předělů, je jejím užitím možné dodávat důraz různým částem výpovědi. To se děje buď na hranicích intonačních frází/úseků a promluv, nebo u slov, která získávají tzv. melodický přízvuk.

Čeští mluvčí angličtiny pak, pokud použijí v cizím jazyce strategii z jazyka mateřského, používají glotalizaci mnohem častěji než rodilí mluvčí. Studie naznačují, že užívají jiné, respektive dokonce výraznější formy glotalizace, než jaké byly v jiné studii nalezeny jako v češtině častější.

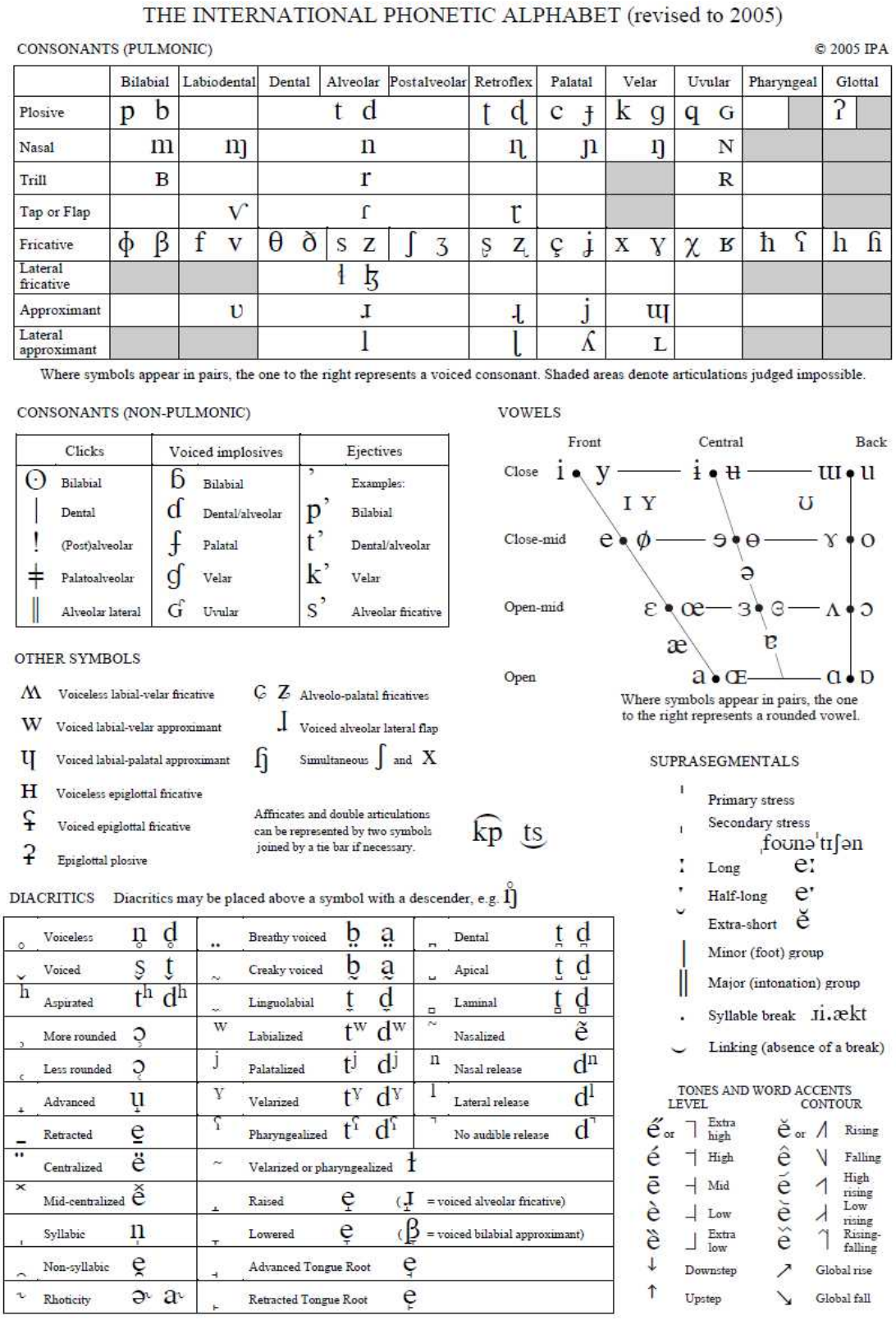
Mezi anglickou a českou prozódií existují i další rozdíly, jako třeba rytmus, užití akcentu pro zdůraznění, poloha přízvuku ve slově, dloužení na konci úseku, nebo naopak krácení uvnitř úseku i tyto rozdíly by mohly s rozdílným užitím glotalizace v těchto jazycích souviset.

Jako vhodné doplnění studia glotalizace v české angličtině se nám jeví prozkoumání skutečného stavu v samotné češtině, neboť dosavadní poznatky jsou spíše intuitivního charakteru, případně vycházejí z kodifikace české výslovnosti, která nemusí nutně odpovídat skutečnému stavu. Dá se očekávat, že například mluvčí české a moravské češtiny zacházejí s glotalizací odlišně. Na druhou stranu by porozumění českému akcentu v angličtině mohlo pomoci analogické srovnání s anglickou/americkou češtinou, které by mohl ukázat, do jaké míry je odlišná výslovnost Čechů v angličtině způsobena konkrétními vlastnostmi češtiny a do jaké míry jde o projev cizího akcentu obecně. Na

stavu věci se totiž může kromě odlišných glotalizačních strategií v obou jazycích podílet i faktor zkušenosti mluvčího v cizím jazyce.

To by bylo možné ověřit výzkumem založeném na analýze anglických a českých textů čtených jednou skupinou českých a jednou skupinou anglických/amerických mluvčích. Bylo by vhodné pokusit se kontrolovat segmentální stránku a prozodickou strukturu, tj. členění na promluvové úseky a přízvuk, ačkoliv ty lze pomocí syntaktického formování stimulů ovlivnit jen částečně a ne zcela spolehlivě. Bylo by vhodné doplnit též výzkum o analýzu volného mluveného projevu.

Appendix A – IPA chart



Taken from: http://www.langsci.ucl.ac.uk/ipa/IPA_chart_(C)2005.pdf

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Anotace diplomové práce

Název: The Function of Glottalization of Word-Initial Vowels in Czech and English

Název v češtině: Funkce glotalizace samohlásek na začátku slova v češtině a angličtině

Autor: Bc. Jakub Bortlík

Katedra: Katedra anglistiky a amerikanistiky

Vedoucí práce: Mgr. Šárka Šimáčková, PhD.

Rozsah práce: v s., 92 s. (131 000 znaků)

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Klíčová slova: glotalizace, čeština, angličtina, prozódie, nemodální fonace, třepená fonace, hraniční signál, hlasový začátek

Klíčová slova v AJ: glottalization, Czech, English, prosody, nonmodal phonation, creaky voice, boundary marker, voice onset

Charakteristika práce:
Tato magisterská diplomová práce se zabývá glotalizací samohlásek na začátku slova v češtině a angličtině. Podává přehled terminologie a akustických jevů, které jsou pod termín glotalizace zahrnovány. Práce shrnuje další fonologické a fonetické charakteristiky obou jazyků, které s glotalizací souvisí. Následně se věnuje funkci, kterou glotalizace v těchto jazycích plní: funci hlasového začátku, hraničního signálu a prostředku prominence, zmiňuje se též o sociolingvistických příčinách variability. Práce je zakončena návrhem výzkumu funkce glotalizace v prosodické struktuře češtiny a angličtiny se zřetelem na produkci rodilých a nerodilých mluvčích.

Charakteristika práce v angličtině:
This master's diploma thesis deals with glottalization of word-initial vowels in Czech and English. It gives an overview of terminology and the acoustic phenomena that come under the term glottalization. The thesis sums up other phonological and phonetic characteristics in both languages which are related to glottalization. Then it deals with the function glottalization fulfills in these languages: the function of voice onset, boundary signal and prominence marker. It mentions also sociolinguistic causes of variability. The thesis is concluded with the proposal for the research of the function of glottalization in the prosodic structure of Czech and English with respect to the production of native and nonnative speakers.

Jazyk práce: Angličtina