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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

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Olomouc 2012

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

In Olomouc ....

Jakub Bortlík

Acknowledgments

I would like to express my gratitude to my supervisor
Mgr. Šárka Šimáčková, Ph.D., who always inspires and motivates me and helps me to accept responsibility for myself.

Děkuji svým rodičům za lásku a život.

List of abbreviations

AmEn – American English
BrEn – British English
CV – Syllable composed of a single consonant followed by a single vowel
Cz – Czech
En – English
F0 – fundamental frequency
IPA – International Phonetic Alphabet
L1 – first (native) language
L2 – second (foreign) language
RP – Received Pronunciation
Sk – Slovak

Phonetic symbols and signs

We use a simplified version of the International Phonetic Alphabet (cf. Appendix A), and we take into consideration the traditional transcriptions of Czech and English.

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

Symbols used in the thesis that differ from the IPA transcription

	Phonetic value	**Example**
	Vowels	
e	short front, mid-open	Cz *pes* “dog” [pes] BrEn *bed* [bed]
eː	long front, mid-open	Cz *péče* “care” [peːtʃe]
	Consonants	
r	alveolar trill or tap	Cz *práce* “work” [praːtse]
ɹ	alveolar or retroflex approximant	AmEn *right* [ɹaɪt]
	Other symbols	
ʔ	glottal stop	Cz *po obědě* “after lunch” [pɔ ʔɔbjeɟe]
ʔ̞	glottalization	

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1 Introduction

Glottalization, an umbrella term for the glottal stop and various forms of non-modal 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 (Rubach 2000), German (Rodgers 1999) and Finnish (Lennes et al. 2006). 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. Non-modal 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, glottalization in other contexts is dealt with only marginally, in cases where the different phenomena coincide. In both Czech and English pre-vocalic glottalization is used as a type of voice onset in words beginning with a vowel and as a boundary marker, but it does not fulfill the distinctive function of a phoneme[1] and its use is facultative, in English completely (Gimson 2001, 169) and in Czech to a large degree (Palková 1997, 325). The actual use, however, differs greatly, which is obvious when we consider the two languages separately and also when we see them in direct interaction 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 preliminary notes on the interlingual approach and some terminological questions, we go on, in

1 Unlike for instance the glottal stop in Arabic or the Danish stød (Duběda 2005, 69–70).

Section 2, to summarize the previously described acoustic characteristics and categorization of pre-vocalic glottalization, and the possible causes for variation of these characteristics.

In Section 3 different functions of glottalization in Czech and English are presented, firstly the role as voice onset; secondly the role in prosody and lastly some sociological factors.

Section 4 and Section 5 present possible questions, hypotheses and some conditions for a comparative research.

1.1 Interlingual study of glottalization

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 non-modal 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 language (L1) on production performance in English as the

2 In the case of glottalization and phonation, this would apply mainly to exotic languages of Asia and Africa. There are not such vast differences among European languages, although speakers of Scandinavian languages often say about speakers of other Scandinavian languages that their language is not a language but a throat disease.

foreign language (L2) was studied by Volín (2003), and by Bissiri and Volín (2006); and the influence on perception skills by Bissiri et al. (2011). An analogous approach, examining the influence of English as L1 on the performance in Czech, would provide a deeper understanding of the phenomenon of pre-vocalic glottalization as a whole, and a more balanced view on the use of glottalization as a cause of Czech accent in English in particular.

1.2 Terminology

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 with accompanying full or partial closure of the glottis, especially where it has not phonemic function. In English this applies primarily to these four domains:

(a) glottalization of syllable- and word-initial vowels (see Dilley, Shattuck-Hufnagel and Ostendorf 1996) (Figure 1);

(b) glottalization of voiceless stops /p, t, k/ and of the voiceless affricate /tʃ/ in syllable-final position, e.g. *reap* [ɹiːʔp], *bench* [benʔtʃ] (see Gimson 2001, 170) (Figure 1);

(c) glottal replacement of /t/ before consonants, e.g. *beaten* [biːʔn] (Ladefoged 1993, 53); in some varieties also intervocalically, e.g. Cockney *butter* [bʌʔə], less frequently /p, k/ (Docherty et al. 1999) and occasionally also /f/ (Gimson 2001, 170);

(d) glottalization in utterance-final position, where it can spread over a few segments or even several syllables (Bőhm and Shattuck-Hufnagel 2007).

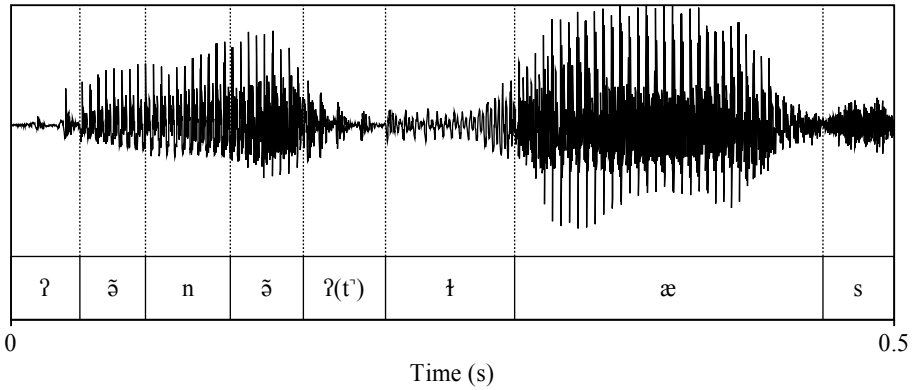

Figure 1. Phrase-initial utterance *And at las*(*t*) exemplifying two different kinds of glottalization use in English: glottalization of word initial vowel /æ/ in phrase-initial position, and (pre)glottalized voiceless stop /t/ in final position (possibly without alveolar closure and).

Glottal replacement under (c) is sometimes called *glottalling* and in works dealing with consonant-related glottalization, *glottalization* can be used either in its more general sense (to cover all categories (a)–(d), or more specifically to denote the so-called *glottal reinforcement* under (b) as opposed to complete replacement (see Docherty et al. 1999). Glottal reinforcement is the traditional term used for the phenomena under (a) and (b), and in older literature the notion was that the reinforcement happens in the form of a full *glottal stop,* symbolized with [ʔ] in the IPA (Pierrehumbert and Talkin 1992).

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, 179) can be accepted only as an ideal articulation, since numerous studies 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 (see e.g. Bissiri and Volín 2010; Dilley, Shattuck-Hufnagel and Ostendorf 1996). It seems therefore inappropriate to use the term glottal stop for *all* articulations that give the impression of a (traditionally understood) glottal stop.[3] We therefore use the term *glottalization*

3 For instance “… the word airline … begins phonetically with a glottal stop

either in its general meaning given above, or according to context as specifically *pre-vocalic* glottalization, where older literature would have used glottal stop instead, and when necessary we distinguish other meanings explicitly (such as *utterance-final* glottalization).

With new findings about the highly variable acoustic nature of pre-vocalic glottalization, adequate categorization and terminology had to be introduced. Section 2.1 presents an overview of the commonly used terms *glottal stop, breathy voice, creaky voice (vocal fry), creak, diplophonia, aperiodicity and glottal squeak*.

Out of the phenomena belonging to glottalization, the one traditionally dealt with in descriptions of Czech is the glottal stop. It has been, usually not without reservation, called *ráz.*[4] And it was, similarly to English linguistics, understood as the canonical or full glottal stop (see Palková 1997, 55) occurring at the beginning of syllable-initial vowels *Eva a Olga* [ʔeva ʔa ʔɔlga] and sometimes also in post-vocalic positions and before consonants, e.g. emphatic *ne!* [ʔneʔ] (Pavelková 2001, 78–9).[5]

Since Skarnitzl (2004a, 2004b) reported significant acoustic variability of *ráz,* it has been proposed to broaden the term to cover all glottal gestures that occur in the mentioned positions and play the role of a boundary signal. Chlumský's (1928) term *hlasivková explozíva* would be reintroduced to describe the full

realized as creaky voice" (Beckman and Elam 1997, 14).

4 The term *ráz* "thrust, impulse" for a glottal plosive was introduced by Frinta (1909; in Pavelková 2001, 78). 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" in Czech. Others have 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).

5 *Creaky voice* in Czech was possibly already described by Lehiste (1965; in Gordon and Ladefoged 2001, 392) though the paper is inaccessible and the reference by Gordon and Ladefoged (2001) is inconclusive.

glottal stop and new terminology would be required for other forms of glottalization, such as *třepená fonace* or *dyšná fonace*. In cases where these phenomena do not signal syllable-initial vowels, such as phrase-finally, they would not be called *ráz* (Palková et al. 2004, 71–2).

Sometimes the symbol [ʖ], the inverted glottal stop sign, is used to denote glottalization without precise specification of the acoustic quality (see Dilley, Shattuck-Hufnagel and Ostendorf 1996, 429). We use the symbol [ʔ][6] to indicate glottalization without further specification, because of its availability for description in the Praat software. We further use the IPA diacritic symbol tilde below [̰] for glottalized segments.

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

2 Acoustic characteristics

2.1 Modal vs non-modal phonation

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 2) with respect to the degree of the opening of the glottis.

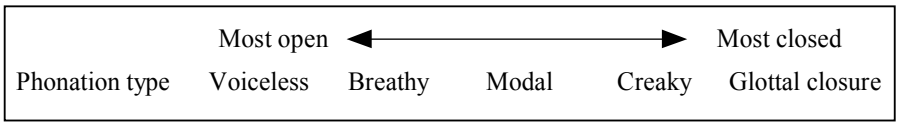

Figure 2. Continuum of phonation types (after Gordon and Ladefoged 2001).

Modal phonation (Figure 3)[7] lies in the middle of this continuum, and it is formed of pulses regular in frequency and strength when the "vocal 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 or by changing other configuration in the vocal tract, such as vibration of the false vocal folds, or raised and lowered larynx (Gimson 2001, 277). Variation in phonation can in some cases be a sign of

7 This and all subsequent waveforms have been extracted in the program *Praat* (Boersma and Weenink 2012) from recordings of American English and Czech owned by the (IPA). There are two speakers, one for each language, both female.

an undesirable voice disorder, it is, however, in many languages employed as a non-pathological modification for various purposes, e.g. (a) “to convey a particular attitude or emotion” (293); (b) as “a necessary part of the set of phonological contrasts” (Gordon and Ladefoged 2001, 383); or (c) “as allophonic variants of modal phonation in certain contexts” (391).

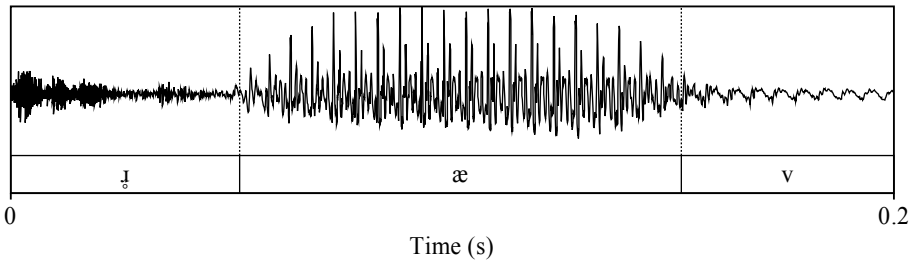

Figure 3. Example of modal voicing, regular pulses, in the vowel /æ/ and in the voiced fricative consonant /v/, as occurring in the word (*t*)*rav*(*eler*) (AmEn speaker). Cf. the devoiced alveolar approximant /ɹ̥/ characterized by noise friction.

Glottalization of word-initial vowels and utterance-final glottalization in Czech and English come under (c), since they do not have contrastive function. They do, however, have prosodic and stylistic function as will be shown in Section 3. In the following we are not yet exclusively concerned with word-initial glottalization, since the same or corresponding acoustic and perceptual characteristics can be found in utterance-final positions as well, and categorization is often based on material from both contexts (e.g. Redi, Shattuck-Hufnagel 2001).

2.1.1 Acoustic variation with individual speaker

Vast variation between individual speakers has been noted in studies on the acoustic characteristics (e.g. 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 (439) 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 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 (Redi and Shattuck-Hufnagel 2001, 426), or it can have other causes as well, these will be discussed later on.

These findings also make it clear that it is necessary to study glottalization tendencies in more speakers (Dilley, Shattuck-Hufnagel and Ostendorf 1996, 439). And "many researchers have found it helpful to develop categories of glottalization events," "in order to investigate the factors that influence these acoustic differences" (411). Categorization can be based on perceptual criteria and/or on the analysis of waveforms, with respect to the aim of the study in case.

2.1.2 Glottal stop

The *canonical* glottal stop (*hlasivková explozíva* in Czech) (Figure 4) 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, so that below the glottis, air pressure increases until it "is released by the sudden separation of the vocal folds" (Gimson 2001, 168).

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).

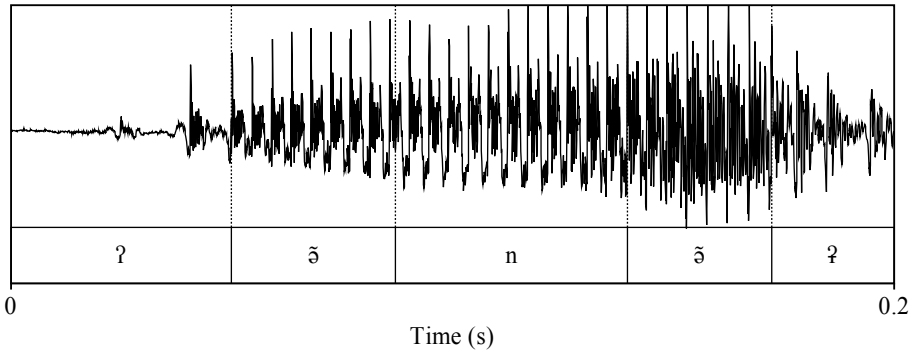

Figure 4. An example of the canonical glottal stop in the utterance-initial phrase *and at* (female AmEn Speaker). One weak and one stronger irregular pulse just before the beginning of modal voicing in the nasalized [ə].

Because of the phase of silence when the vocal folds are not vibrating, the glottal stop is usually classified as voiceless. Since other voiceless sounds are, however, 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 (179). It nevertheless shares some aspects with other voiceless sounds,[8] since 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 has the usual effect of other voiceless sounds on the devoicing of preceding voiced obstruents (Palková 1997, 326), see Section 3.2.1 on voice assimilation.

2.1.2.1 Variants of the glottal stop

Skarnitzl (2004b) found further variation in the production of the glottal stop 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

8 See Section 3.2.1 on how glottalization resembles voiceless sounds in Czech.

segment” Because of its peculiar shape Skarnitzl calls this type the *barbell glottal stop* (73). (b) the hold phase can also 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 5).

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, “the flatulence pulses occupy the space that would normally have been the hold phase” (75).

2.1.3 Creaky voice and other glottalization types

Creaky voice, the proposed equivalent in Czech is *třepená fonace* (Palková et al. 2004, 72), 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 *creak* for “sustained low F0 accompanied by near-total damping of individual glottal pulses.” *Creaky voice* is used for “period-to-period irregularity”, which corresponds to what Redi and Shattuck-Hufnagel call *aperiodicity* (in Skarnitzl 2004, 59). See Figure 5 for an example of creaky voice.

Gimson defines *creaky voice* as one of the possible *voice qualities* that is produce by “an excessively slow rate of vibration of the vocal folds”, he doesn't consider its use as an alternative for the glottal stop in the positions given under (a)–(c) in Section 1.2 (Gimson 2001, 277). Creaky voice is also sometimes called *vocal fry, pressed* or *stiff phonation* (Gerratt and Kreiman 2001; in Skarnitzl 2004a).

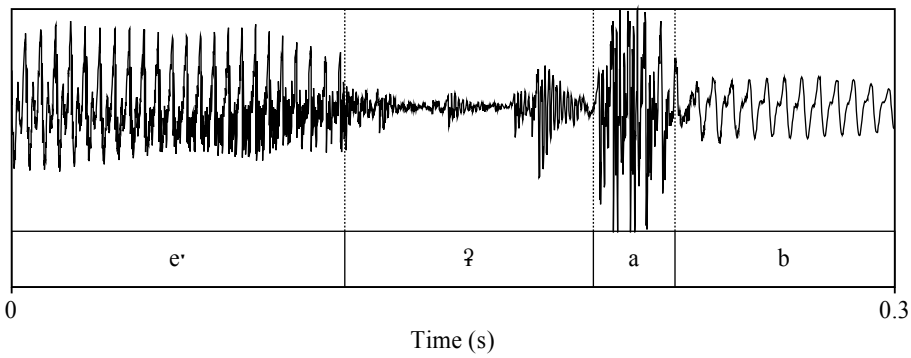

Figure 5. An example of creaky voice between vowels in the phrase (*dokáž*)*e ab*(*y*) "succeeds in", characterized by reduced amplitude and F0, as well as irregularity of the glottal pulses (Cz speaker). Notice also that the strongly glottalized segment "occupies" a considerable part of /a/ (cf. Section 3.3.5).

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 extant, 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 additional "glottal pulses at the beginning … of the segment" (62). Each type could then be labeled as irregular or (relatively) regular,[9] 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

9 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).

fundamental characteristic of a stop (Bortlík 2009, 11). 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 variation with segmental context (see Section 2.2).

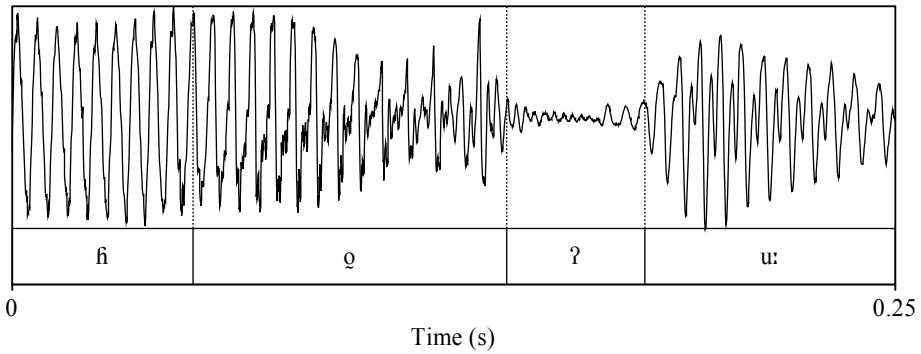

Figure 6. Example of glottalization in the phrase-initial utterance *marného úsilí* "futile endeavor" (Cz speaker), with a hold phase [ʔ], preceded by a segment with irregular F0, but followed by only one weak irregular pulse at the beginning of the following vowel.

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 only by one irregular pulse. Still the segment gives a perceptually clear impression of glottalization of the word-initial vowel.[10]

10 Irregularity in the glottal pulses of the preceding segment /ɔ/ (*marnéh)o* can be caused, or at least reinforced, by utterance-final position (see Section 3.3.2), 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 voicing in the following segments of *úsilí* is modal (cf. Section 2.1).

2.1.3.1 Diplophonia, glottal squeak and breathy voice

Skarnitzl found it impossible to differentiate in his sample between creaky voice and other categories of nonmodal phonation. One of these is *diplophonia*, which is 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 the Czech sample didn't provide tokens that would make it possible to distinguish diplophonia from creaky voice (59).

Redi and Shattuck-Hufnagel (2001) distinguish, furthermore, *glottal squeak*, “as a sudden shift to relatively high fundamental frequency which is then sustained for several periods. Glottal squeak was typically produced with low amplitude, and accompanied by other manifestations of glottalization” and again, Skarnitzl did not find any tokens that would exhibit these features.

Another quite widely used category of voice quality is *breathy voice* (e.g. Gimson 2001, 277). In Czech the equivalent is *dyšná fonace*. 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). In the sample of the conjunction *a* “and” occurring in Czech radio news, Skarnitzl (2004a) found only very few tokens where other kinds of glottalization were accompanied by breathy voice (59).

However, the fact that the distinction of these less frequent categories could not be supported, was possibly due to the prosodic (see Section 3.3) and the stylistic (see Section 3.4) characteristics of the sample. Clear examples of diplophonia, glottal squeak and breathiness might be found under different conditions.

2.2 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 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 greater detail in Section 3.3.

The preference for a particular kind of glottalization in word-initial vowels, for variants of the glottal stop and of creak, can be influenced by some characteristics of the preceding sound, Skarnitzl (2004a) found tendencies with respect to voicing. Among the types which contain 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 the variants which have irregular pulses only at the beginning of the word-initial vowel. This was interpreted as a possible glottalization of the preceding segment, which seems quite obvious, 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).

Canonical glottal stops and creaks with hold, in contrast, mostly appear in voiceless contexts (after voiceless consonants or breath[11]), which seems, again, quite obvious since in these cases "the vocal folds are not vibrating … and the articulation of voiceless contexts is tenser than that of voiced consonants" (Skarnitzl 2004a, 62, 67).

11 Cf. 3.3.5 on glottalization after pause.

Continuous creaks were the most frequent type on the whole,[12] regardless of whether the preceding context was voiced or voiceless.

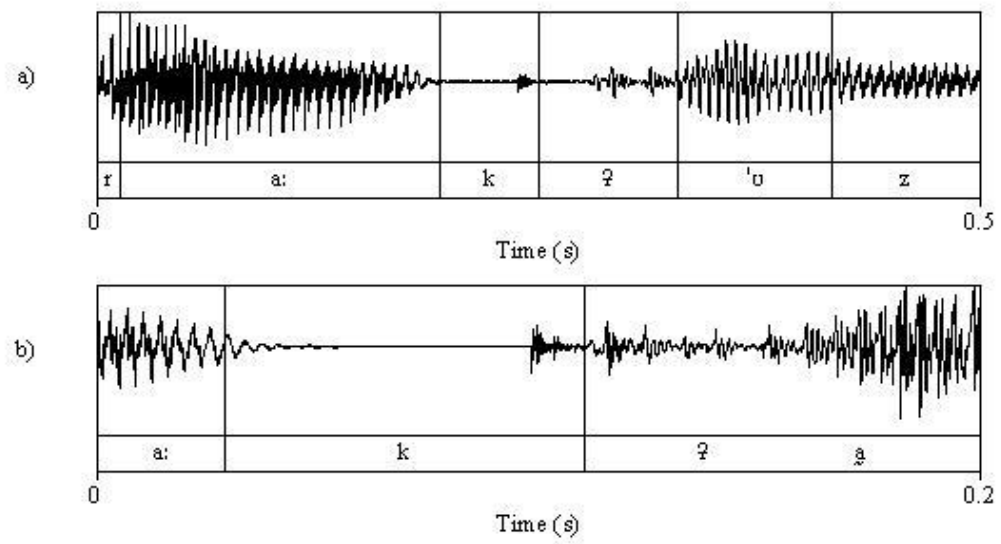

Figure 7. Variability of word-initial glottalization occurring phrase-medially, with preceding voiceless consonant. Under a) taken from the utterance (*Seve*)*rák uz*(*nat*) "the North Wind … to confess" (Cz speaker): a glottal stop with two stronger irregular pulses and some weaker pulses. It could possibly be categorized as creak with hold. Under b) an example of a continuous creak, with pulses sustained throughout the whole segment; occurring in the phrase (*sever*)*ák a* "the north wind and" (same speaker).

"[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 sound to a creak is easier than a complete interruption" (Bortlík 2009, 11). Creaks with hold and barbell creaks, however, also contain such interruption. It these subtypes of creak were, on the basis of their containing a hold phase, categorized as stops instead, the tendency for stops to be associated with voiceless contexts would be weaker, while at the

12 And among them irregular creaks were more common than regular ones (67).

same time the tendency for creaks to appear in voiced contexts would increase (cf. Skarnitzl 2004a, 66; and also cf. Figure 7 showing a voiceless stop followed by a continuous creak and either a glottal stop or creak with hold).[13]

Segmental context has also been analyzed with respect to its role in predicting glottalization rates, in English by e.g. Dilley, Shattuck-Hufnagel and Ostendorf (1996) and in Czech by Pavelková (2001) and we deal with this aspect in the respective section (3.3.3).

13 Though it is somewhat unreliable to interpret any tendencies for groups that contain only from two to twelve tokens, as was the case with all the subtypes of creak in Skarnitzl's (2004a) data.

3 Functions of glottalization

It has been noted in the Introduction and throughout Section 2 that there are different purposes to which nonmodal phonation is used, we are now interested in glottalization of word-initial vowels and other forms (phrase-final, pre-consonantal) will be mentioned only in so far as they coincide at word boundaries.

We have described in Section 2 the variation in the acoustics of glottalization. There has also been reported striking variation in the rate at which it is used among individual speakers (Redi Shattuck-Hufnagel 2001, 410) and among speakers of different languages. E.g. 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 and the most prominent among them seem to be the influence of prosodic factors “such as structure and prominence, and socio-linguistic factors such as dialect and gender” (Redi and Shattuck-Hufnagel 2001, 426). Since we are comparing glottalization in two languages (dialects in a very broad sense), we are in fact combining two points of view most of the time, but we will comment on the role of dialect in the usual sense of the word in particular, as well.

3.1 Voice onset after pause

It has been argued whether glottalization after pause is a matter of voice mechanics or a reflex of the prosodic boundary that is usually associated with pause. Dilley, Shattuck-Hufnagel and Ostendorf (1996, 436) found in their corpus of radio news style

recordings of American English, that the rate of glottalization of word-initial vowels after 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 pause was not even the more important factor among these two.

The influence of preceding pause and glottalization was “[interpreted] as a reflex of the prosodic boundary” rather than the consequence of mechanical constraints[14] “although both factors could play a role” (436). There seems to be an important difference between English and Czech with respect to glottalization after pause. In Czech the use of glottalization as voice onset is considered to be automatic (Palková 1997, 325) which can be understood as occurring in every word-initial vowel after pause. The role of pause in Czech and in English has not, in our opinion, been sufficiently reflected in studies on glottalization in Czech and English (see Section 3.3.5).

3.1.1 Soft onset vs glottalization

Another kind of voice onset, the so called *soft onset* with gradual increase of amplitude of the glottal pulses, 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 pause” (Palková 1997, 55). However, in the case of word-initial vowels, it usually requires special training.

14 “[M]echanical constraints of starting a vowel after a pause and offset delay of cessation of preceding glottalization” (Dilley, Shattuck-Hufnagel and Ostendorf 1996, 436). The condition of “*starting* a vowel after a pause” (emphasis added) answers, in our opinion, the possible objection that the authors could have included in the category of pause not only *silent* pauses, but also the so-called *filled* pauses, those instances of hesitation consisting of filler sounds such as [ə] or [m] (Gimson 2001, 276), which would make it impossible to draw from the data any conclusions about the predominant voice onset in English. Dilley, Shattuck-Hufnagel and Ostendorf (1996) do not explicitly make this distinction (cf. Section 2.1.3..

It is preferred, for instance, in singing, to save the vocal folds from too much strain and to decrease air consumption (see Palková 1997, 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).

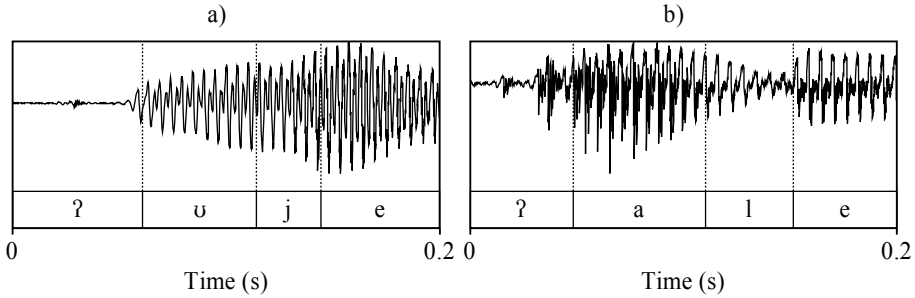

Figure 8. Examples of different strength of word-initial glottalization in Czech. Under a) almost soft onset in phrase-initial *uje*(*dnali*) "they agreed", still giving the impression of [ʔ]. Under b) distinctly irregular glottal pulses in phrase-initial *ale* "but", producing strong sense of glottalization (same speaker).

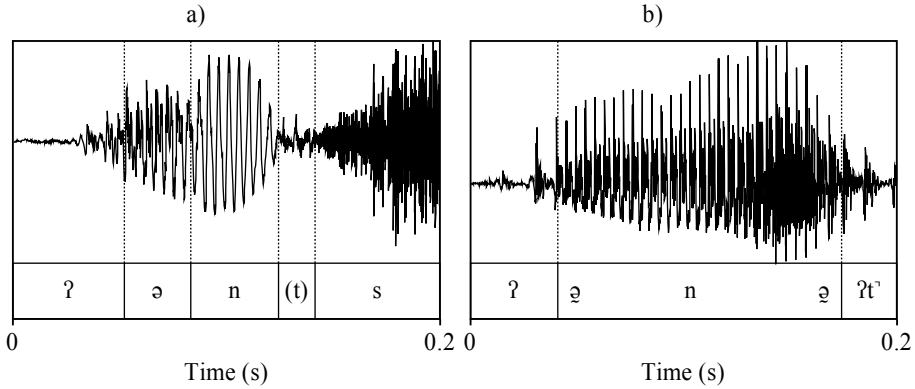

Figure 9. Examples of varying glottalization strength in American English. Under a) weak glottalization, with gradual increase in amplitude and almost regular pitch periods, occurring in the phrase-initial utterance *and s*(*o*), giving only slight impression of glottal marking. Under b) clear glottalization in the phrase-initial utterance *and at*, perceptual evidence of glottalization is strong (same speaker).

Figures 8 and 9 show varying degree of glottalization after pause in both Czech and English. Example in Figure 8, Box a) gives the impression of glottalization, despite the regularity of pitch periods, possibly because of the sudden start of phonation

and the, though weak, disturbance, probably caused by the compression of the vocal folds.

There is some indication from personal observation, albeit scarce and untested, that the soft onset after pause might be used in 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[15], thus both words were rendered almost indistinguishable. This would not be the case if he pronounced the dialectal form as [ʔɪ̯niː], which would probably be the typical strategy for speakers of Bohemian Czech, if trying, as this speaker did, to distinguish the initial sounds, and placing particular emphasis on them.

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 we understand as not even after pause, is characteristic of a Czech accent in Slovak (2000, 274). This would 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 aspects of pronunciation, such as the voiced production of obstruents before vowels at word and morpheme boundary (see Bělič 1972, 256). Contrary to our assumption, however, Bělič considers glottalization of word-initial vowels after pause to be the regular pronunciation on the whole territory, even in Eastern Moravia (cf. Bělič 1972, 73).

15 The higher articulation of /ɪ/ making it even closer to the palatal approximant /j/.

3.1.2 Syllable and word phonotactics

Phonotactics describe how the individual phonemes of a language can be combined into syllables and words. There are some restrictions, which have, however, to be understood in as descriptions, not prescriptions.

The phonotactics of Czech and English differ in many respects, but their basic word structure is similar (as opposed to, e.g. Chinese). 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 coda, in front and after the nucleus, respectively (Gimson 2001, 51; Palková 1997, 270–1).

In Czech syllables with a consonantal onset are more frequent than in English. Ludvíková (1987, 105) found that in a sample of spoken text of 10,000 words the frequency of syllables (that means also word-medially) beginning with consonants was more than 91%, syllables beginning with a vowel (V, VC) amounted to only 7%. 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” (102). The higher percentage when compared with vowels at the beginnings of syllables is due to the high frequency of the function words, such as conjunctions *a* (“and”), aby (“in order to”), the pronoun *on* “he”, etc., and due to the prefixes *o-* and *u-*.

English, as a more stress-timed language, has “fewer CV[16] syllables and a wider range of syllable types” (Adsett and Marchand 2012, 271) and one study showed CV syllables to make up 34% of all syllable types (272), in Czech, in contrast, they can be almost twice as frequent, Ludvíková (1987) found 60%. Mines, Hanson and Shoup found the ratio of consonants and vowels at

16 I.e. syllables composed of a vowel and a one-consonant onset.

beginnings of words in conversational English 76% and 24% respectively.

This can be important for glottalization of word initial vowels in Czech, 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 3.4. Also, the tendency to insert glottal stops before word-initial vowels can be seen as an attempt to avoid a purely vocalic onset, and to adjust the syllable type to the preferred CV(C) type. Pre-vocalic glottalization is not perceived as an individual consonant in Czech or English, in fact, speakers often do not at all realize that they produce them, but in other languages glottal stops are individual phonemes, so it seems that glottalization in word-initial vowels can be seen as a kind of prosthetic consonant.

3.1.2.1 Prosthetic consonants and dialects

The tendency of Czech to avoid word-initial vowels shows itself in the fact that in (inter)dialects, various *prosthetic* consonants are often inserted before initial vowels (even within words). Even though these features are 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/ (see Pavelková 2001, 82). Other common occurrences are prosthetic [j] and [ɦ].

The tendency to insert prosthetic consonants has been in Czech for centuries and so many words have become part of standard Czech (e.g. *jiný* “other”, *pavouk* “spider”). This is attested also by loan words which etymologically had initial vowels (e.g. *jeptiška* “nun” cf. German *Äbtissin* “abbess”; *varhany* “pipe organ”). As is the case with many dialectal features of Czech, cognates and can be found in other Slavic languages that exemplify certain tendencies. So in Slovak there is no prosthetis [j] (cf. Sk *iskra* vs

Cz *jiskra* “spark”), or, on the contrary, prosthetic [w] is standard before /ɔ/ and /ʊ/ in Sorbian (cf. Sorbian *wuspěch* vs Cz *úspěch* “success”).

Prosthetic [ʰ] is known in English, as well, yet it is not as much a dialectal feature but rather an occasional overcorrection, that has historically came to existence as a reaction to the tendency in dialects and uneducated speech not to pronounce initial /h/ (Bohnert 2005). Even in 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. *herb*, both /hɜ˞ːb/ and /ɜ˞ːb/ are acceptable in AmEn). But in words of other (Germanic) origin, greater variation in the realization of initial *h*, the so-called /h/ insertion and /h/ dropping, used to be an important shibboleth of social status (Bohnert 2005). /h/ dropping 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 the pronoun *he*, or the auxiliary verb *have* (192).

3.2 Word linking phenomena

By definition, 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 their function in prosody. To study segmental context for glottalization of word-initial vowels only makes sense in connected speech. In this section we cover the phonology of linking phenomena so we can refer to it later when we deal with the linking in the context of prosody, namely in phrasing (Section 3.3.2).

There are differences in Czech and in 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, that are relevant to glottalization. These differences lie, for one thing, in the available phonemic and allophonic inventories, in the phonotactics; and for another, in the phonological rules that apply to ends of words and to linking of words within higher units.

3.2.1 Final devoicing and 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), unless devoiced, which is common in English “in unaccented syllables between voiceless consonants” though this is only “most likely to occur with short vowels (particularly /ə/) and before voiceless plosives,” (93) which is not the case of vowels occurring before word-initial vowels. Sonorant consonants, i.e. nasals, laterals, approximants and trills are also voiced but can become partially devoiced in English under conditions which again practically exclude the (partially) devoiced allophones, except when syllabic, from the occurrence before word-initial vowels (Gimson 1965).

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 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 inevitable an oversimplification, since we are only interested at this point with the basic mechanisms of voicing in as much as they relate to the topic of glottalization of

word-initial vowels,[17] that is mainly in final position. However, as will be shown in Section 3.3.2 dealing with resyllabification, comparison to initial and medial positions is useful, since in a string of connected speech, sounds that occur in final positions, appear at what is analogical to other positions (cf. *at all* vs *a tall*).

It is necessary to distinguish between phonological and phonetic voicing. Thus in standard Czech, the distinction between phonologically voiced and voiceless obstruents is neutralized in final position (e.g. /plɔd/ “fruit”, /plɔt/ “fence” are both realized as [plɔt]), unless followed by a voiced obstruent in the next word (/plɔt bɪl/ “the fence was” [plɔd bɪl]) In that case, both groups are voiced and the distinction is again neutralized. In some (mainly Moravian) dialects, final obstruents are realized as voiced also before sonorants, i.e. not only sonorant consonants but also before vowels if there is no glottalization (Palková 1997, 329). 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 are either fully voiced or fully devoiced and the voicing of a group of obstruents is determined by the voicing of the last obstruent, that is why Czech is said to have *regressive assimilation* (Palková 1997, 328). The stops are always released.

In English, in contrast, the distinction between “voiced” and “voiceless” sounds is not that straightforward and it cannot be sufficiently maintained by using only the two options. Voicing of English obstruents differs according to position within word and there can be found at least three basic configurations of the timing of voicing and constriction. In stops these three are: voiced; voiceless unaspirated; and voiceless aspirated (Ladefoged 1993,

17 For an exhaustive description of Czech obstruents see (Palková 1997, 210–35) and for an overview of voice assimilation rules (328–332). For English obstruents see (Gimson 2001, 150–193).

143). In other obstruents, such as fricatives, the three categories can be more aptly described as fully voiced, partially voiced and voiceless.

English voice assimilation is progressive, which means that phonologically voiceless obstruents in final position cause following voiced obstruents to devoice, and voicing is retained in phonologically voiced obstruents at least partially even in final position before pause or before a voiceless consonant, and fully if followed by a voiced sound. The distinction between voiced and voiceless in final position is not neutralized (for exceptions cf. Gimson 2001, 283). If a voiced obstruent is followed by a glottalized vowel, the obstruent retains some voicing and can still be distinguished from a voiceless sound in the same position. The distinction is also maintained by the influence of the final consonant on preceding vowels and sonorants: A voiceless consonant shortens the duration of the preceding segment. Voiceless stops /p, t, k/ are often unreleased in final position, there is also a tendency not to release final /d/ (Labov 1995).

3.2.2 Resyllabification and juncture

Resyllabification happens when a consonant, or a group of consonants at the end of one word become the initial part of the first syllable in the following word (Duběda 2005, 98). In standard Czech pronunciation this is inhibited by glottalization (98) (Figure 10), especially in careful speech that aims at particular intelligibility (Pavelková 2001, 83), but it occurs in dialects and in nonstandard pronunciation (Duběda 2005, 98). Resyllabification is sometimes considered incorrect but the use of glottalization is not prescribed as long as the syllable boundary is maintained (Palková 1997, 325).

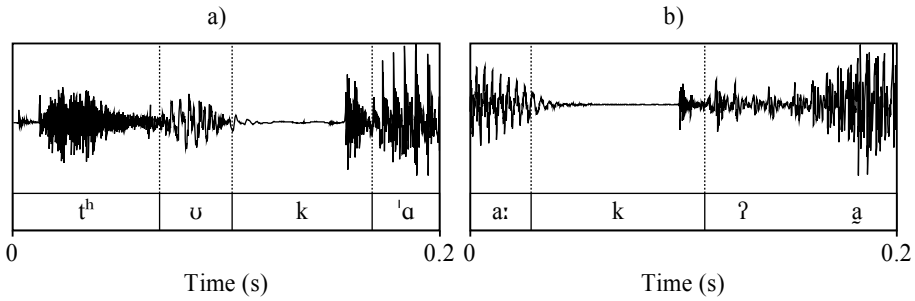

Figure 10. Difference between a) linking of a final consonant to the following accented vowel in English, *took o*(*ff*); and b) glottalization before an unaccented vowel in Czech, (*sever*)*ák a* "the north wind and".

In English resyllabification can be used to explain some features of pronunciation (such as the assimilation of /d/ and /j/ in the expression *Did you?* /dɪd juː/ [dɪdʒuː]), it 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). Complete resyllabification is not the default process for cases when a word-final consonant borders on a word-initial vowel. It can be inhibited in various ways. When there are features in the speech continuum that mark word and morpheme boundaries despite the considerable modification of the citation forms of words, these features are called juncture. "[S]uch junctural cues are, [however] only potentially distinctive and, in any case, merely provide cues to word identification additional to the large number provided by the context. Junctural oppositions are, in fact, frequently neutralized in connected speech or may have such slight phonetic value as to be difficult for a listener to perceive" (Gimson 2001, 291).

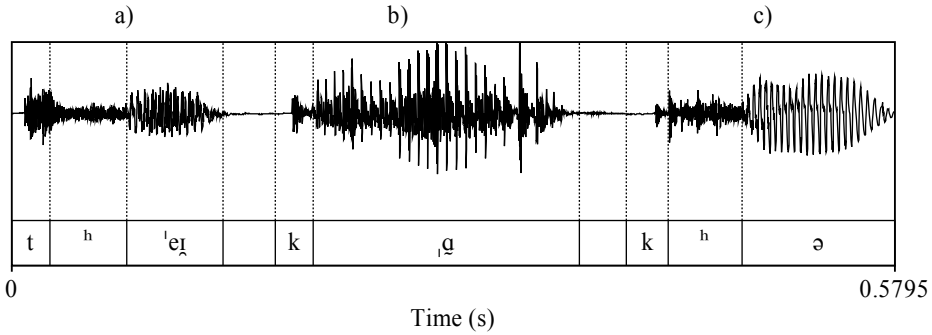

Figure 11. The difference between English voiceless stops appearing in front of a vowel. Under a) a voiceless plosive in accented initial position *ta*(*ke*): voiceless and aspirated. Under b) a voiceless plosive in final position appearing in front of an accented word-initial vowel (*cloa*)*k o*(*ff*): voiceless but unaspirated, glottalization of the following vowel is caused by phrase-final position. Under c) a voiceless plosive in unaccented initial position *co*(*nsidered*): still strongly aspirated (the same AmEn speaker in a–c). Time ratio retained.

Among these features in English are some of the characteristics of consonants mentioned above, notably the distinction of voiceless and voiced obstruents in initial position (aspirated voiceless stops, especially if accented) and in final position (shortening of sonorants before voiceless stops). Among other factors are different voice assimilation patterns (*I scream* [aɪ skɹiːm] vs *ice cream* [ăɪ skɹ̥iːm]) and duration of consonants (*a name* vs *an aim*) (Gimson 2001, 291). Figure 11 shows examples of different ways voiceless stops behave with respect to their position.

3.2.3 Hiatus and liaison

Hiatus is the appearance of two vowels that belong to different syllables immediately next to each other. This can happen within words or at word boundaries and there are different ways to treat this. 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 joint

is not part of the (synchronically) domestic lexicon (Vachek 1968, 123; in Bortlík 2009, 14).

The possibility 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, glottalization is recommended to separate the vowels, especially at prefix of preposition boundary (Palková 1997, 326). It is however uncertain how much such recommendations reflect the actual linguistic reality, since in our opinion the need for codification is particularly there, where there is some variation, where some phenomenon is not certain. And even with some descriptive works, “we cannot be completely sure, whether … authors depicted the real state of thins, [or whether] they might have been influenced by their ideal” (Pavelková 2001, 81). We pay more attention to actual variation in Section 3.3.

Another possibility for hiatus is to insert the so-called hiatus consonants, usually semivowels with similar characteristics like those of the vowels involved. This happens in Czech e.g. when the first vowel in hiatus is /i/ and a hiatus [j] or [ʲ] is inserted, e.g. *medium* [meːdɪjʊm]. This semivowel insertion, however, occurs only word-medially, as opposed to glottalization that occurs word-initially, so that the expression *hloupý idiot* is not pronounced *[ɦloʊpiː‿jɪdɪʔɔt], but [ɦloʊpiː (ʔ)ɪdɪjɔt] (Rubach 2000, 273).

3.2.3.1 Liaison in English

In English hiatus is more frequent than in Czech because of their different phonotactics (see Section 3.1.2). It 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 difference being r-dropping and r-insertion (see Gimson 2001, 84).

Basic possible solutions are: (a) hiatus is retained; (b) glottalization separates the two vowels; or (c) a linking semivowel is inserted (see Figure 12). The insertion of these sounds is called liaison.

When the first part in hiatus is a high vowel, e.g. /iː/, /uː/, or a rising diphthong, such as /aɪ, aʊ/, linking is maintained by semivowels [ʲ] and [ʷ]. These semivowels are, however, not as strong as their counterparts [j] and [w], so that juncture still exists between them and the following vowel (Gimson 2001, 289) (cf., however, Section 3.2.2 on juncture neutralization). “Alternative 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. Notice, that no linking [ɹ] is inserted in this position.

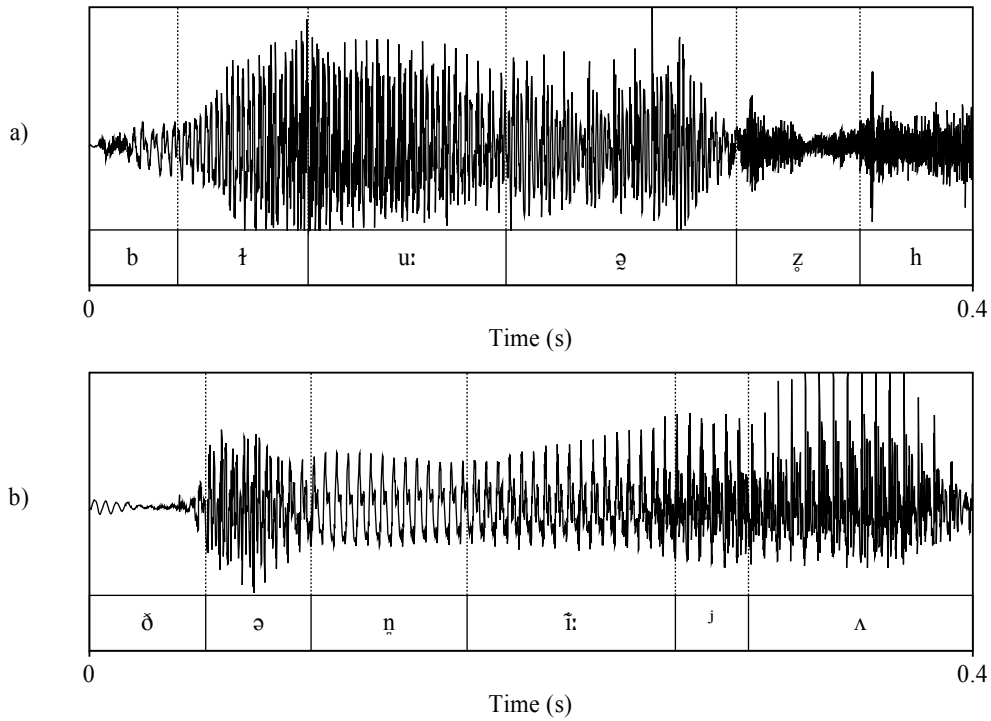

Figure 12. Different realizations of vowel-vowel boundaries in English. Under a) creaky voice within the phrase *blew as h*(*ard*), /æ/ gives strong perceptual impression of glottalization. Under b) en example of linking with the semivowel [j] *than the o*(*ther*). There are no unusual irregularities in the waveform.

In many dialects another sound that can be inserted between vowels in a hiatus is [ɹ], these dialects are called non-rhotic and it is characteristic for them that the phoneme /ɹ/ is only realized before vowels. Many British dialects are non-rhotic and so are some dialects in the USA and other English speaking countries. If the /ɹ/ in a word is not followed by a vowel it is silent *brother* /bɹʌðəɹ/ becomes [bɹʌðə]. When a vowel follows (either in the same word or in the next) the /ɹ/ is realized and linked to the vowel (*brother Adam* [bɹʌðəɹ‿ædəm]). This is called a *linking* /r/ (Gimson 2001, 288–9).

Some syllables and words can end in a vowel that in non-rhotic dialects is associated with linking /ɹ/, such as /ə, ɔː/, but are not followed by the final /ɹ/ on the phonological level. In non-rhotic dialects there is still the tendency in these cases, based on

analogy, to insert [ɹ] before following vowels, e.g. vodka and tonic [vɒdkəɹ‿ən tɒnɪk]. Such [ɹ] sounds are called *intrusive*, because they are not historically justified and not represented in the orthography (289). Rhotic dialects, such as General American and Scottish English, i.e. those that pronounce /ɹ/ in all positions, not only before vowels, 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 could pronounce it [aɪ 'sɔːɹ‿ɪt] (see Gimson 2001, 85–86).

Intrusive [ɹ], and to a lesser degree also linking [ɹ], are a matter of style in non-rhotic dialects such as Received Pronunciation. Particularly in "refined" variants of RP and in careful speech hiatus, or glottalization are consciously employed not only to avoid intrusive [ɹ], but often also in places where the [ɹ] insertion is justified by the spelling. However, the unconscious use of intrusive [ɹ] can be heard even from those who consciously oppose it (Gimson 2001, 288).

3.3 Function in prosody

"Prosody is the organization of speech into a hierarchy of units or domains, some of which are more prominent than others. That is, prosody serves both a grouping function and a prominence marking function in speech" (Keating 2003). It is the way "how features of pitch, loudness, and length work to produce accent, rhythm, and intonation" (Gimson 2001, 6). Keating (2003) argues that "when a speaker plans for the phonetic aspects of speech production, prosodic structure organizes the treatment of possibly every feature in every segment, and the interactions of segments" and that "one aspect of this dependence is the relation between

the strength of a prosodic position, and the phonetic strength of a segment in that position" (122).

Prosodic variables, mainly (a) intonational phrase boundaries, and (b) pitch accent on the target syllable, have been linked to variation in glottalization rates in American English (Dilley, Shattuck-Hufnagel and Ostendorf 1996); in Czech English and English the role of phrase boundaries was compared (Bissiri and Volín 2010) and some studies have found connections between prosody and the form of glottalization in English (e.g. Stevens 1994; in Redi, Shattuck-Hufnagel 2001). Skarnitzl reports that "[p]rosodic structure does not seem to influence the physical appearance of glottal stops" (2004b, 77), what he, however, payed attention to was, in fact, syntactic structure. These two structures are interdependent, yet, the effect of syntax on glottalization can be only indirect.

3.3.1 Prosody and syntax

There are various aspects (lexical and syntactic) which increase the probability that a text will be preduced with the desired prosodic characteristics, i.e., in the case of the present study, with intonational phrase boundaries at the required positions and with the required (de)accentuation. According to Gimson in English "intonational phrases [most commonly] correspond with clauses" (2008, 279). Still, "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 rather than the relationship between prosody and grammar being unidirectional, there exists a mutual influence. There are certain syntax-prosody mapping constraints (244) so that some prosodic realizations are determined by syntactic and lexical structure of an utterance, but at the same time, prosody consistently influences analysis of sentences, which is true for optional prosodic boundaries (246), and very much so for primary

and secondary accents, which are employed for important communicative purposes (Beaver and Velleman 2011). But just like the use of phrase boundaries, accenting can be governed by individual style (see e.g. H&T, 1362). Similarly, division of an utterance into intonational phrases in Czech is facultative, but it often is relevant for the meaning of the utterance and, on the other hand, "the linguistic characteristics of the text motivate and influence"[18] this division (Palková 1997, 288).

3.3.2 Position within intonational phrase

In the description of the acoustic form of a language it is usually possible to distinguish some kind of hierarchy. Concepts and terminologies differ across linguists and across languages, but some of the basic constituents that have been repeatedly used in the study of glottalization phenomena in English are *full* and *intermediate intonational phrases* and are based on TOBI (Tones and Break Indices) by Silverman, et al. (1992).

Intonational phrases are stretches of consinuous speech that are marked by boundary signals, by tones and by pitch accents. They can span from single sounds in extreme cases (e.g. the interjection *Oh!*) to cover several prosodic words. The distinction between these two categories is based on the strength of disjuncture that is perceived by the labeller (Beckman and Elam 1997). Disjuncture is produced by the speaker in several ways, which can be combined: (a) syllables occurring in phrase-final positions tend to be longer than syllables within phrases (see Section 3.3.6); (b) pause can occur at phrase boundaries (see Section 3.3.5); (c) the end of an intermediate phrase is marked by a phrase accent; (d) and the end of a full intonational phrase is additionally marked with a boundary tone. Furthermore, (e) every

18 If not stated otherwise, translations from Czech primary and secondary sources are our own.

intonational phrase contains at least one pitch-accented syllable (see Section 3.3.6) (Beckman and Elam 1997).

In Czech the corresponding units are *mluvní takt* “intermediate phrase”, and *promluvový úsek* “full intonational phrase”.

Studies have shown that in English the boundaries between these intonational phrases are also marked by glottalization and that significant differences exists between intermediate and full intonational phrases. Words beginning with vowels are much less likely to be glottalized when they occur within an intonational phrase (Dilley, Shattuck-Hufnagel and Ostendorf 1996). Pitch-accent is another frequent cause of glottalization.

The marking of phrase boundaries with glottalization occurs both at the beginning (in word-initial vowels) as well as at the end of the phrase (phrase- or utterance-final glottalization). Utterance-final glottalization can be observed in Czech too (Figure 13) but it is not the main point of interest for us, except for cases where utterance-final and word-initial glottalization coincide (see Section 3.3.4).

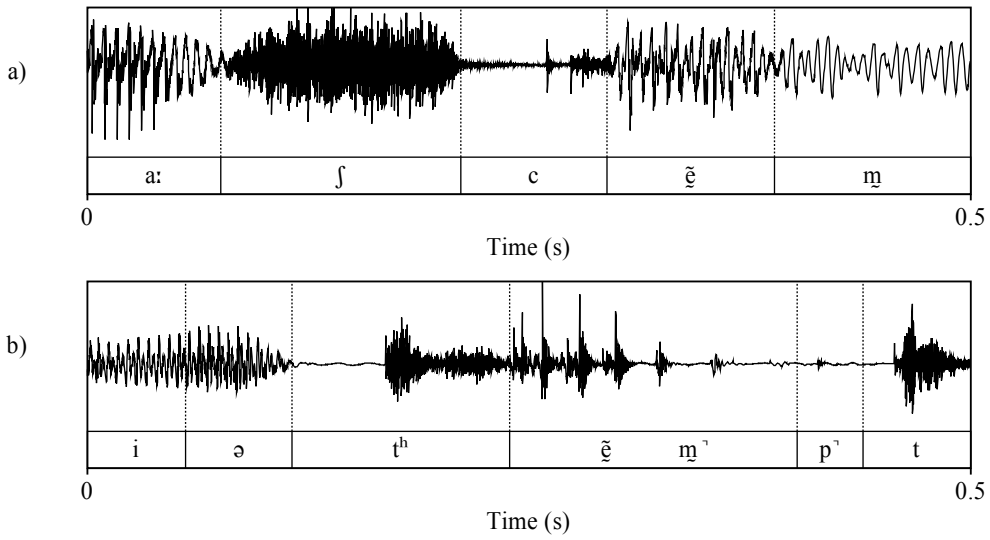

Figure 13. Under a) the waveform of the utterance (*pl*)*áštěm* “with the cloak”, occurring in phrase-final position (Cz speaker). Modal voicing af /aː/ to the left` irregular pitch periods in /em/. Under b) the waveform of the phrase-final utterance *the attempt* (AmEn speaker). Regular voicing of [iə] to the left; strong glottalization of /em/ in the form of irregular pitch periods and diminishing amplitude in the middle; very weak release of [p] and the much stronger final [t].

The influence of intonational 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 prosodic structure”, i.e. by phrase position, than in native British English (Bissiri and Volín 2006, 27). Czech speaker of English glottalized the totality of the tokens (as opposed to 50% of the tokens glottalized by native speakers) (28), and individual speakers used full glottal stops in 74–88% of tokens. 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 them to use not only similar glottalization rates but also similar techniques, and we have seen in Section 2.2 that Skarniztl (2004a) found the most frequent type of glottalization in his sample to be the irregular continuous creak.

In Bissiri and Volín's study creaky voice was used by individual Czech English speakers only in 3–23% of all tokens. It seems that the influence of ones native language on the acquired language with respect to glottalization is not as straightforward as we could expect.

3.3.3 Prosody and segmental context

We have seen in section 3.2 that English has means of connecting words beginning with vowels to the preceding words and that the means depend on the particular sound the preceding word ends with (both on the phonological and on the allophonic level). Czech orthoepy, in contrast, recommends or (in certain conditions, such as formal public speeches) prescribes the marking of word boundaries with glottalization, especially for certain combinations of syntax and sound (such as the non-syllabic prepositions *k* “towards”, *s* “with”, *v* “in”, or earlier also for

conjunctions *a*, *i* “and”). Still, variation in the actual use of liking techniques or rate of glottalization exists: in English glottalization is often produced and in Czech it is often omitted.

According to Dilley, Shattuck-Hufnagel and Ostendorf (1996), the importance of the segmental level for glottalization in English depends on prosody. For FM radio news style recordings of American English, they found segmental context significant only in phrase-*medial* positions and only in the case of preceding vowels and liquids, that means, if the word-initial vowel was preceded by a vowel or nasal there was a greater probability that it would be glottalized. Nasals, fricatives and stops did not make any significant difference within phrases and neither class (not even vowels) did in phrase-*initial* positions where the phrase boundary was the dominant factor (1996, 437).

Preceding segmental context might be more relevant for glottalization rates in Czech. Pavelková (2001) 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, than when the vowels differed. Higher rates were also observed for preceding sonorant consonants than for phonologically[19] voiceless obstruents (voiced obstruents were too scarce in the sample to allow meaningful comparison) (82). Pavelková, however, did not pay attention to the role of prosody and only considered syntactic structure, where only the boundary of lexical words provided enough tokens to allow statistical analysis.

19 Pavelková (2001) sorted the data according to the underlying phonological aspect of voicing and only subsequently analyzed whether the segment was produced as voiced or voiceless. 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.

3.3.4 Preceding glottalization

We have mentioned in Section 3.1 that Dilley, Shattuck-Hufnagel and Ostendorf (1996) found glottalization of the preceding segment to be an important influece 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.

One reason to believe that the actual cause for this was the prosodic boundary, rather than mechanical constraints, is that utterance-final glottalization is itself a reflex of prosodic boundaries and is, at least to a certain degree, independent of other boundary-related events, such as low F0 (Redi and Shattuck-Hufnagel 2001, 426).

Under certain conditions, following glottalization can coincide with pre-vocalic glottalization as well, e.g. when the word-initial vowel occurs in a phrase-final syllable (see Figure 14).

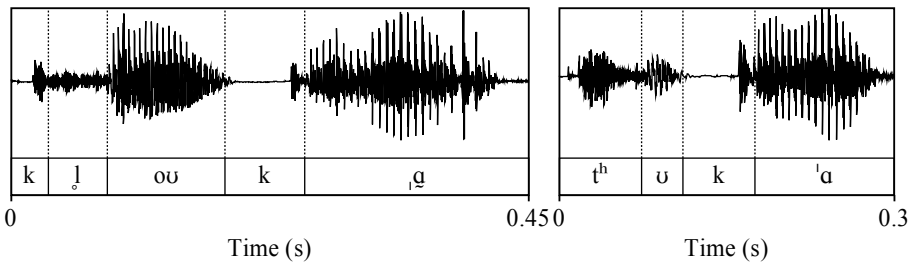

Figure 14. The waveform to the left shows phrase-final occurrence of (*take his*) *cloak o*(*ff*), where phrase-final glottalization extends through most of /ɑ/ and reinforces the only weak accentuation to give the impression of word-initial glottalization as well. Notice also the final lengthening. The waveform to the right represents phrase-medial occurrence of *took o*(*ff*) *his cloak*. Despite the accent on /ɑ/ (see Section 3.3.6) there is no perceptible glottalization.

3.3.5 Pause at phrase break

We discussed in Section 3.1 the possibility that preceding pause is an important factor which influences glottalization. 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 so, in his comparison of glottalization in the case of the preposition "of" in Czech English and in native British English, he excluded these cases for the sake of studying linking phenomena. This can be interpreted as the exclusion of word-initial vowels after pause. We, however, consider it appropriate for several reasons to include such instances into the analysis.

TOBI, the system for transcribing English prosody, distinguishes a type of phrase break (break index 2[20]) that is characterized by either "a strong disjuncture marked by a pause or virtual pause, but with no tonal marks: i.e. a well-formed tune continues across the juncture [or by] a disjuncture that is weaker than expected at what is tonally a clear intermediate or full intonation phrase boundary" (35). Pause is just one of the ways how to signal intonational phrase boundaries and if it is missing, speakers still have at their disposal preboundary lengthening (cf. Section 3.3.5), boundary tones (see Beckman and Elam 1997, 35), "changes in the speed with which unaccented syllables are produced" (Gimson 2001, 255), and, as has been shown in Section 3.3.2, glottalization.[21]

A break of size index 2 before the phrase beginning with "Of course, …" could be distinctly marked with intonation, but there would be no pause and/or preboundary lengthening on the

20 "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).

21 Dilley, Shattuck-Hufnagel and Ostendorf (1996) only consider in their account clear breaks between intermediate and full intonational phrases (break indices 3 and 4) and do not analyze the effect of breaks of size 2 on glottalization (432). But considering the influence which deeper phrase boundaries have on glottalization rates, it seems probable that break 2 can also be associated with higher rates of glottalization.

preceding segment. Such phrasing can be used e.g. in rapid speech “to hold the floor or to convey a sense of urgency” (35). Glottalization would then be another way to deepen or, if missing, to soften the sense of disjuncture.

Perception tests by Palková (1974) have shown that in Czech, too, pause is identified as a phrase boundary signal, however, not on its own, but in combination with a characteristic tone contour. A distinct intonation pattern can, on the other hand, be a sufficient boundary signal without pause. Other clues are usually effective only in combination and include changes in speech rate, repetition of melodically marked minor intonational phrases[22] (31).

3.3.5.1 Silent pause, filled pause and breath

It has been mentioned in Sections 3.1 and again in the preceding section, that there are different kinds of pause. The differences lie in the acoustic characteristics, for one thing, and in the functions, for another.

First of all, there can be a silent pause, that is a region in the sound continuum filled with neither any voiced nor voiceless sounds. Dilley, Shattuck-Hufnagel and Ostendorf (1996) found “very few silent regions of less than 50 ms in [their] data” and they cite others who showed that “pauses of 50 ms or more are used by listeners in syntactic disambiguation” (431). Silent pauses are also the inevitable effect of the need to draw breath at some point during speaking and some use the category *breath* as an equivalent for silent pause (e.g. Skarnitzl 2004a), although pauses

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

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 often *filled* with hesitation noises, such as [ə] or [m] (Gimson 2001, 276), or with other material, and are used by speakers to hold the floor. The same effect on the listener can, in fact, be produced by a pause-like prolongation, i.e. by a *virtual* pause, that is, neither an actual silence, nor a stretch of filler sounds (Beckman and Elam 1997, 35).

3.3.6 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*. In some concepts 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 doesn't have to] be realized on it” (Palková 1997, 157).

Czech and English differ both in their stress and accent patterns. English stress is free, also called lexical, which means that it belongs to the inherent characteristics of individual words (157). Czech stress is fixed on the first syllable.[23]

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 (Palková 1997, 165). It is interpreted on the basis of the whole linguistic complex: acoustic, syntactic (by

23 Accent can, however, be shifted on the preceding syllabic preposition (to form a prosodic word). The only major exception in Czech are some dialects of North-East Moravia and Moravian Silesia, which have penultimate stress (Bělič 1972, 272, 288).

means of word order) or semantic and these factors are often not distinguished by the listener.

Accent in English is mostly characterized by pitch movements and is hence called *pitch accent*. Reduction of unaccented syllables and lengthening of accented syllables are major features of rhythmical phrasing (Gimson 2001, 250). They influence the use of weak and full forms of lexical words[24] (252–5) and unaccented syllables are more likely than accented ones to be run together in one intonational phrase[25] with the appropriate linking techniques and without the use of pre-vocalic glottal stops (308).

We have also mentioned lengthening of phrase-final syllables as one of the ways to signal phrase boundaries, which in English correlates with tonal marking of boundaries. However, in Czech distinct utterance-final lengthening is not part of the standard, but rather a feature of Common Czech or even peripheral pronunciation (Palková 1997, 324). Utterance-final lengthening applies mainly to syllable nuclei, i.e. to vowels (see Figure 15). And since the quantity of Czech vowels has a strong distinctive function[26] (Palková 1997, 171) and their whole form is quite stable, any major variation therefore substantially influences intelligibility and/or the stylistic quality of an utterance (170) and it is also one of the important sources of foreign accent for many learners of Czech.[27]

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24 E.g. *You are happy, aren't you?* BrEn [jʊə 'hæpi 'ɑːntʃuː] with unreduced vowels if accented or in final position.

25 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* [ðəɹɚ 'lɒtəv].

26 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 /uː/ – /PULL/. The distinction between English vowels, on the other hand, is based mainly on their quality, while their quantity is subject to stronger variation, e.g. with respect to position within word or utterance (see Gimson 2001, 95).

27 Cf., however, Figure 5, which shows an example of considerable difference between two phonologically short vowels in the phrase *dokáže, aby* “succeds in”. Both /e/ and /ɪ/ are short on the underlying level, but

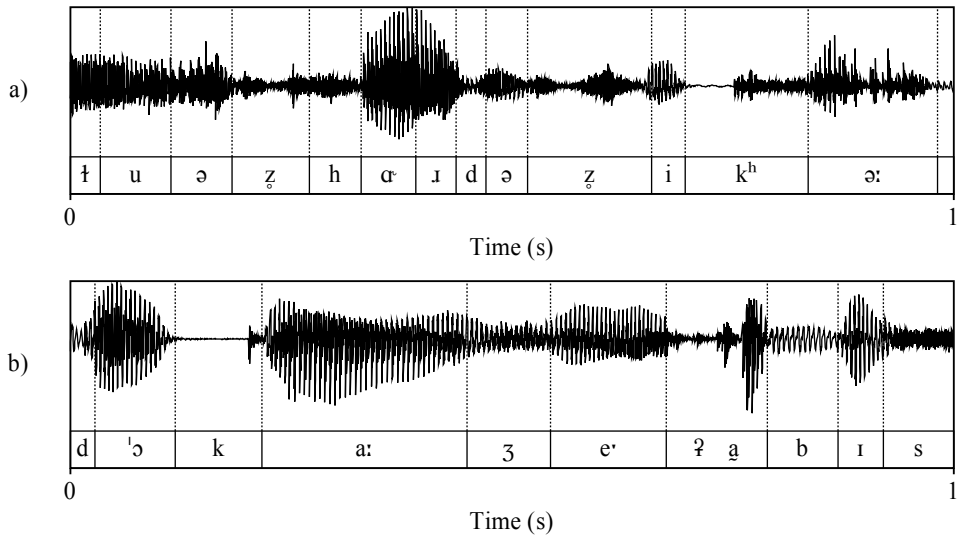


Figure 15: Examples of phrase-final lengthening: a) in English there is significant difference in length between unaccented vowels and the vowel with secondary accent in the final syllable, (*b*)*lew as hard as he could*; a) in Czech there is some lengthening of the phrase-final syllable and some shortening in the following lexical word, the phrase is *dokáže, aby s*(*i*) "succeeds in".

Pitch-accent in English has been found an important factor in predicting glottalization by Dilley, Shattuck-Hufnagel and Ostendorf (1996), who also found substantial differences in glottalization rates for several combinations of (a) phrase position (initial vs medial); (b) accent (none, on the target syllable, or later in the word); and (c) vowel reduction (reduced vs full vowels). Vowel reduction proved, similarly to segmental context, a less reliable clue for predicting glottalization occurrence (435) and the placement of accent in the target word played a role only in certain phrasal contexts.

The tendency to glottalize accented syllables more often than unaccented syllables, can be seen as an additional marking of an already prominent syllable.

Bissiri and Volín (2010) who found phrase boundaries to be less significant predictors of glottalization in Czecy English than in

native British English did not distinguish pitch-accented and unaccented vowels. In fact, pitch accent would not have been possible to estimate for tokens occurring at phrase boundaries in the sample, since these were all glottalized,[28] but it might have played a role *within* intonational phrases, where there were some non-glottalized tokens (26).

3.4 Sociolinguistic and stylistic variation

We have mentioned throughout the thesis 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.

There are some other related factors such as the role of style. Formal styles may be more conducive to glottalization in English since it is possible that they inhibit resyllabification (Labov 1995). And "rare words are, [in general] more frequently glottalized than common words, but … the words all, only, and other, although common are also frequently glottalized," which "is probably because these words are often used rather emphatically" (Umeda 1978; in Dilley, Shattuck-Hufnagel and Ostendorf 1996, 424).

In Czech formality and special need for comprehensibility are often cited as causes for glottalization (Pavelková 2001). One factor of formal styles in Czech is also variation in lexicon. Formal synonyms for words of domestic origin are often borrowings of Latin, Greek or other origin and often begin with vowels /a, e/, e.g. marked *aplaus* vs neutral *potlesk*; *exploze* vs *výbuch*, *impulz* vs *podnět*. At the same time, however, there is among the domestic words beginning with /a, ɪ/ a considerable number of (a) grammatical words, wich are very common, e.g. *a* "and", *aby* "in

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

order to”, *ano* “yes”; *i* “and”; (b) onomatopoetic words, interjections, e.g. *á* “ah”, *aha* “I see”, *ahoj* “hello”; “inu” well.

Contradictory assumptions exist about the role of *spontaneous* vs *read* speech. Rodgers (1999) thinks that in German “read speech is likely to be more carefully spoken, being elicited in a formal context, yet it may also be more fluent and lack hesitations and disjuncture phenomena” (178).

4 Research questions and hypotheses

1. Bissiri and Volín (2010) have shown, that Czech speakers of glottalization in English are influenced by their native language. Equivalent questions can be asked about Czech spoken by native speakers of English. How frequently do native speakers of English use glottalization in Czech? (Do they use it for similar purposes, i.e. marking of phrase boundaries and pitch-accent? Do they use similar linking techniques as in English? Does glottalization trigger final devoicing like in Czech?)

Hypotheses:
Since glottalization in English is less frequent (especially within phrases/tone units) than in Czech, English native speakers can be expected to glottalize less when speaking Czech than Czech native speakers. (Vowels in unaccented syllables within intonational phrases should show the least frequency of glottalization. Word-initial vowels without glottalization would be linked to the preceding segment by either pseudo-resyllabification or by linking semivowels. Whether the lack of final devoicing as a sign of foreign accent in American/English Czech might support linking without glottalization, and whether the transfer of BrEn intrusive [ɹ] or GA flapping e.g. *forget it* [fə'gɛɾɪt] would take place is questionable.)

2. How does glottalization production by native Czech speakers in their L1 correlate to their performance in English? Does a comparison of the performance in native and foreign language confirm the results of Bissiri and Volín (2010)? (Do Czechs use similar means of connecting/dividing words in Czech and English? Does the frequency with which they glottalize in the native language correspond to that in the foreign language?)

Hypothesis:

Literature suggests a phonetically wide range of glottal gestures used alongside canonical glottal stops as a boundary and emphatic marker. The tendencies in glottalization formation are likely to be transferred from L1 to L2, therefore, Czech speakers of English will probably use similar glottal gestures and glottalization strategies both in Czech and English. They are likely (as they have already been shown) to glottalize more often than English natives and the differences between individual speakers could be matched with the differences they perform in Czech.

3. What are the differences in transfer of glottalization strategies from Czech to English and from English to Czech?

Is one glottalization strategy (Czech or English) easier to learn than the other? (Is it easier to learn to glottalize more frequently or less frequently? How does proficiency influence production and perception of glottalization in the foreign language?)

Hypotheses:

Since learning to eliminate glottalization (by Czech learners of English) requires the mastering of specific linking techniques it can be expected to be more difficult than learning to glottalize at a higher rate when glottalization is already optionally possible in the native language (by English/American learners of Czech). However, it can be presumed that learning by instruction and learning by imitation reach a different degree of success.

Inexperienced English/American speakers of Czech can be expected to glottalize less because the transfer of linking techniques from English will be stronger, however, a tendency to glottalize more could exist because of a greater number of disfluences.

5 Research proposal

5.1 Speakers

The choice of speakers should control in the first place the variables of native language and dialect and experience.

5.2 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.

5.2.1 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.

5.2.1.1 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.

Target vowels should be chosen primarily from those that are frequently used at beginnings of words (longs vowels in Czech are very rare at word beginnings). For the sake of comparison of Czech and English, only words with initial stress in English could be selected.

5.2.2 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.

5.2.2.1 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.

5.2.2.2 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).

5.2.3 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 *un*cle 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?

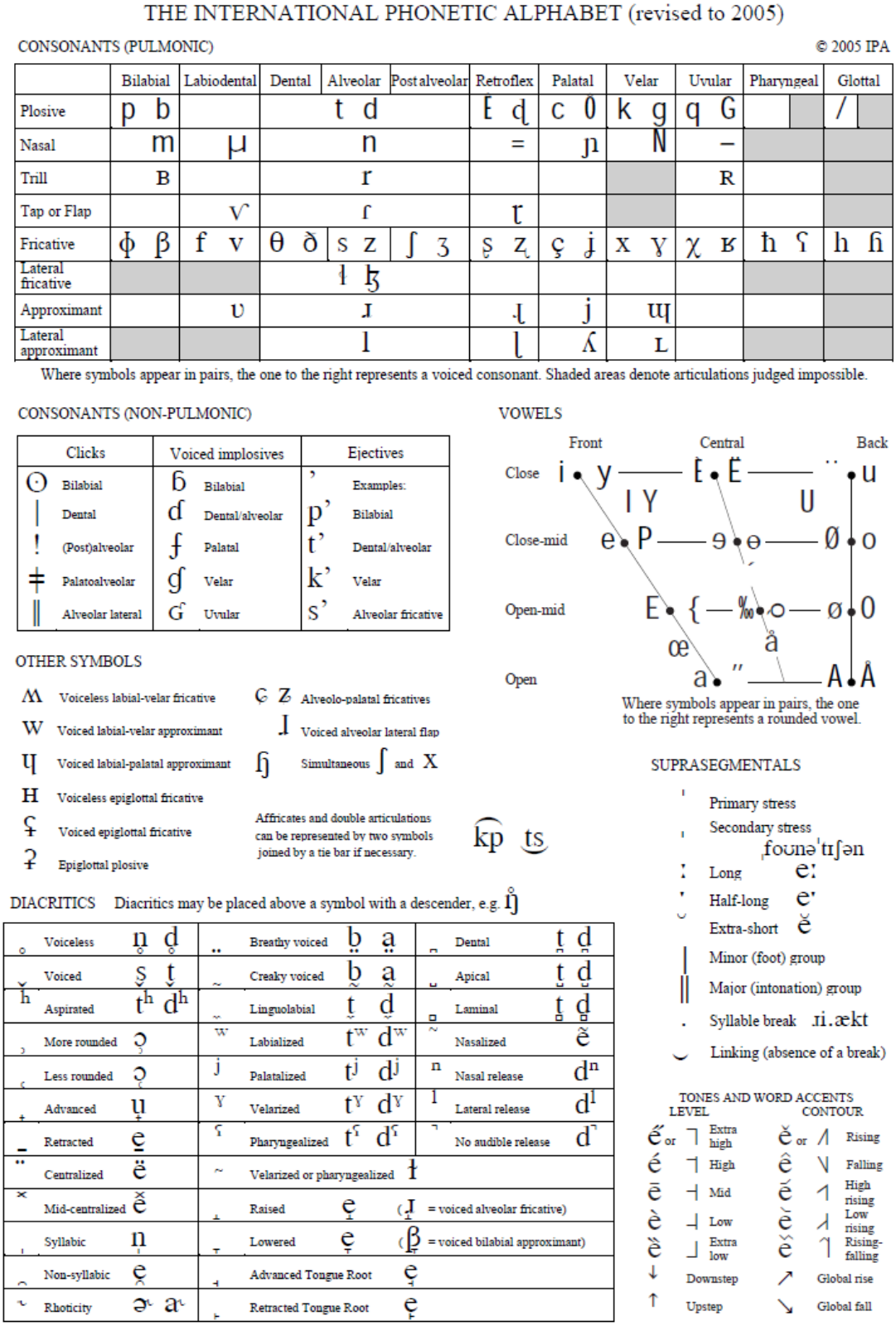
5.2.4 Example Czech stimuli

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

Appendix A – IPA chart



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

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 několik výzkumných otázek a na závěr se věnuji přípravě experimentu, který by měl umožnit, na tyto otázky odpovědět.

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 pretury 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 preturou, 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 ekvivalentní 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.

V možném výzkumu 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 zformování stimulů ovlivnit jen částečně a ne zcela spolehlivě. Bylo by vhodné doplnit též výzkum o analýzu volného mluveného projevu.

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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: 61 s. (81 600 znaků)

Počet titulů použité literatury: 48

Klíčová slova: glotalizace, čeština, angličtina, prozódie, nemodální fonace, třepená fonace

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

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 jevy obou jazyků, které s glotalizací souvisí a následně se věnuje funkci, kterou glotalizace v jazyku plní, a to především z hlediska prozodické struktury, zmiňuje se však i o sociolingvistických příčinách variability.

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 features in both languages which are related to glottalization and then it deals with the function glottalization fulfils in language, especially with respect to prosodic structure, it mentions, however, also sociolinguistic causes of variability.

Jazyk práce: Angličtina