

Linking Versus Glottalization: (Dis)connectedness of Czech- Accented English

Šárka Šimáčková
Palacký University
Olomouc

Václav Jonáš
Podlipský
Palacký University
Olomouc

Kateřina Kolářová
Palacký University
Olomouc

Abstract

Our two studies examine the ability of advanced EFL learners to link words together in continuous speech. Specifically, they ask to what extent Czech learners of English can use resyllabification or linking sounds (linking r, transient glides j/w) to connect vowel-initial words to the preceding context and to what extent they mark such words with glottalization as in their L1. Study 1 examined whether the tendency to resyllabify in the learners' native dialect, Moravian Czech, was reflected in differential rates of the different linking types. Resyllabification was indeed the most common linking type but only for obstruents. Study 2 extended our earlier observation that reading in synchrony with a model speaker led to greater connectedness in non-native speech and it tested synchronous reading as a training method. Most our learners increased linking while reading along with a recording but failed to transfer this ability into post-test production.

Glottalization of word-initial vowels is a persistent feature in Czech-accented English. Even so, devoting time to reducing or eliminating it

from learners' pronunciation may appear unnecessary. After all, English native speakers themselves optionally use glottalization. It could also be argued that glottalization does not harm intelligibility of accented speech, instead, it makes word boundaries more distinct (Bissiri, Lecumberri, Cooke, & Volín, 2011). Glottalization and linking are simply opposite strategies for repairing onsetless syllables, with linking resulting in weakening of word boundaries and glottalization having a boundary-strengthening effect.

However, there are reasons for trying to train Czech learners of English to connect their speech. While both strategies occur in both Czech and English, the rates of glottalization and linking in the two languages are quite different. For example, Volín (2012) reports 65.5% – 100% glottalization for 10 Czech professional newsreaders while Dilley, Shattuck-Hufnagel, & Ostendorf (1996) report glottalization rates between 13% and 44% for their 5 American English newsreaders. Thus, transferring L1 Czech treatment of onsetless word-initial syllables into L2 English necessarily results in excessive glottalization, which is likely to be perceptually disruptive as it distorts the rhythm of a non-native utterance. Inserting a glottal stop before a weak vowel breaks up the foot, and interferes with native listeners' rhythmical expectations of stress-timing. When a sequence such as *give us an idea* is pronounced as [ˌgɪv ʔʌs ʔən ʔaɪ'diə], the unstressed syllables gain prominence and the glottal stops contribute to the perception of syllable-timed rhythm. By giving prominence to wrong words, glottalization may also cause pragmatic confusions.

Although increased word-initial glottalization is likely to interfere with intelligibility only in specific prosodic contexts, it certainly contributes to the overall perception of foreign-accentedness. A foreign accent may be negatively reflected in listeners' biases against the speaker (Gluszek & Dovidio, 2010; Lev-Ari & Keysar, 2010). Overuse of glottalization may give the impression of the speaker's uncertainty because the speech sounds too careful, halting, or labored. It may also have the opposite effect of making speakers sound overemphatic, forceful, and even rude. The latter is stereotypically connected with German-accented English which also suffers from abundant glottal stopping (Eckert & Barry, 2005).

LINKING AND GLOTTALIZATION IN ENGLISH

English employs several types of linking. A word-final consonant may be resyllabified into an initial onsetless syllable as in the sequence *feel*

excluded. The final resyllabified consonant may also be an *r*, e.g. in *far away*. In non-rhotic varieties this “etymological” *r* would not be pronounced if it could not be linked to the vowel at the beginning of the next word, hence the label “linking *r*”. When two vowels occur on either side of the juncture, a final high front and back vowel may be linked to the initial vowel in the next word by a transient glide *j* or *w* respectively, as in *see us* or *show us*. A final non-high vowel may in a non-rhotic accent be linked to the vowel at the beginning of the next word by an epenthetic *r*, e.g. in *saw us*, though occurrence of such (non-etymological) *r* is highly variable and sociolinguistically conditioned (Mompeán-Gonzalez & Mompeán-Guillamón, 2009).

Although English favors linking, glottalization is by no means uncommon. Instructional materials mention it as a means of resolving hiatus, i.e. separating adjacent vowels, and of accentuation in emphatic speech (Cruttenden, 2001; Wells, 2008). Phonetic studies show the rate of glottalization to be highly variable across as well as within speakers and they try to determine the conditioning factors. In her frequently cited study, Umeda (1978) noted the importance of non-phonological factors: the glottalization rate changed with the tempo of her 5 readers’ speech and increased with the lexical difficulty of the texts, as measured by the ratio of vowel-initial function to content words and the lexical frequency of the vowel-initial content words. Segmental context had a smaller effect but a word-initial vowel was more likely to be preglottalized if it was back and/or if it followed a word-final vowel. The effect of hiatus on the likelihood of glottalization has been since shown in other studies (e.g. Dilley et al., 1996; Mompeán & Gómez, 2011). However, the best predictor of within subject variation in word-initial glottalization of vowels in English is the prosodic structure of an utterance – the prosodic prominence and the presence of a prosodic boundary. A word-initial vowel is more likely to be preglottalized if it is stressed, if it is a full vowel in a word marked with a pitch accent, and especially if it occurs at the boundary of an intonational phrase. Conversely, an unstressed reduced vowel at the beginning of a word inside a phrase is least likely to be preglottalized (Dilley et al., 1996; Garellek, 2012; Umeda, 1978).

When discussing the rate of glottalization in English it is important to bear in mind the variety of English being described. We are not aware of a study directly comparing British and American English with respect to prevocalic glottalization, however we suspect that American speakers use it more often. First, most empirical studies of glottalization were carried out with American speakers, though one recent study (Mompeán &

Gómez, 2011) focused on linking *r* context in British English and it reported the occurrence of glottalization in 31.5% of all potential cases. Second, many British educational materials specifically recommend foreign learners to link words in connected speech (Cruttenden, 2001; O'Connor, 1980; Pennington, 1996; Roach, 2012).

LINKING AND GLOTTALIZATION IN CZECH

As indicated above, Czech EFL learners' first language strongly biases them against linking in English. In spoken Czech, a glottal stop is regularly inserted before a vowel at the beginning of a word and even a prefixed stem. Sequences and words such as *znát obor* "know the discipline" and *podobor* "sub-discipline" are pronounced as [zna:t ʔobor] and [potʔobor]. Regular occurrence in the word (morpheme) initial position makes glottalization a reliable boundary marker. Indirect evidence from Czech EFL learners suggests that native speakers of Czech can effectively use glottalization as cue in parsing continuous speech (Bissiri et al., 2011).

Despite its high frequency, glottalization in Czech is subject to variation. In standard pronunciation such glottalization is obligatory (Palková, 1997) but in less careful speech styles glottalization may give way to linking. Additionally, there is an effect of gender. In Volín's (2012) study, female and male newsreaders glottalized 97% and 88% of all word-initial vowels respectively, while in spontaneous dialogue female talkers glottalized 65% and male talkers only 41% of word-initial vowels. More relevantly to our current investigation, there are regional differences in glottalization and linking. The existing empirical studies of glottalization in Czech and Czech-accented English (Bissiri et al., 2011; Bissiri & Volín, 2010; Volín, 2003; 2012) have been carried out with speakers from Bohemia, the western part of the country. However, it has been known for some time that speakers in Moravia (i.e. the east), who also automatically glottalize word-initial vowels to break up hiatus, tend to resyllabify word-final consonants (Hála, 1962; Vachek, 1968; Palková, 1997). A sequence such as *hned uvidíš* "you'll see right way" would be most probably pronounced with final devoicing and a glottalized initial vowel [fɪnɛt.ʔu.vɪ.jiːʃ] by a Bohemian speaker and with a resyllabified voiced stop [fɪnɛ.du.vɪ.jiːʃ] by a Moravian speaker.

The current paper focuses on advanced learners of English whose L1 is Moravian Czech. The goal of the paper is twofold: *Study 1* aims to determine whether and how the proportion of linking to glottalization

varies with the segmental context in our learners' speech. *Study 2* tests whether reading in synchrony with a native speaker model leads to a higher proportion of linking to glottalization in the learners' English and whether the proportion changes differently in different segmental contexts.

STUDY 1

Given the tendency towards resyllabification in the learners' L1, Moravian Czech, and the lower rates of linking in hiatus contexts in the L2 English input, we can make the following predictions about the incidence of resyllabification, linking /r/, and hiatus resolution by gliding in their L2 speech. First, resyllabification, i.e. linking a word-initial vowel to the preceding consonant, will be more likely than gliding in hiatus contexts, i.e. linking a word-initial vowel to the preceding vowel with a transient [j] or [w]. Second, linking /r/, i.e. resyllabification of a word-final /r/, will also be more likely than gliding, but it will be less likely than resyllabification of other consonants. This is because both between- and within-speaker variation in whether or not a word-final /r/ is pronounced can be observed in Czech English, although the accent is prevalently rhotic. In addition, the less experienced of the non-rhotic speakers are likely to use the r-less forms of r-final words even prevocally. A schematic summary of these predictions about the likelihood of linking in Czech learners' English is given in (1).

- (1) resyllabification of a final C > linking r > transient [j] and [w]

To test these predictions, we elicited Czech learners' productions of English sentences containing vowel-initial words in different linking contexts.

Method

Stimuli. The stimulus set comprised 60 short sentences covering five linking-glottalization contexts, shown in Table 1. Twenty sentences contained a vowel-initial target word placed after a word ending in a high vowel. In half of these cases the final high vowel was front, producing a context for transient [j] insertion, in the other half it was back, producing a transient [w] insertion context. In another 20 sentences the word preceding the vowel-initial target ended in the letter *r* creating an opportunity for the pronunciation of a linking *r*. The last 20 sentences contained word-final consonants followed by vowel-initial targets. Half of

the consonants were voiced obstruents and half were sonorants, i.e. /l/ and nasals. Voiceless obstruents were excluded to avoid irregularities connected with initialization of voicing. Also, final voiceless stops may themselves be preglottalized, which may lead to glottalization of the following vowel.

Table 1. An overview of the linking-glottalization contexts and example stimuli.

	Context	N of stimuli	Linking type	Example
high V	i_V	10	transient [j]	I have <i>three empty</i> cans.
	u_V	10	transient [w]	I read <i>two articles</i> today.
final r	r_V	20	linking r	<i>Four agents</i> are missing.
final C	obs_V	10	resyllabification	I <i>love open</i> spaces.
	son_V	10	resyllabification	He <i>ran across</i> the street.

Twenty of the target words began in schwa, including five uses of the indefinite article. Ten words started in a front vowel, /ɛ/, /æ/, or /eɪ/, the remaining thirty started in one of the non-front vowels /ʌ, ɑ, ɔ, ɒ, aʊ, aɪ/. High vowels were avoided to make potential transient glides clearly identifiable.

To reduce variability in glottalization due to prosody, all sentences were pronounceable as a single intonational phrase. They had 4 to 7 words, averaging 6.6 syllables. The target word in each sentence never followed a significant prosodic break. The placement of a nuclear accent was not controlled for.

The validity of the stimulus set was tested with a native speaker of Standard Southern British English (SSBE) who produced linking in all sixty target sequences.

Procedure. The stimulus sentences were presented on a computer screen separately to each participant, one by one in random order. The data were collected by two graduate students who were close to the participants in age and easily created an informal atmosphere. The data collector always instructed each participant to read the displayed sentence once for practice, then read it out loud as naturally as possible, and finally say it facing him or her. Though the third repetition was expected to be the most natural one, in the end we mostly judged the second versions as the most fluent ones and used them for analysis.

Participants. Twenty-five advanced learners of English (level C1 of the Common European Framework of Reference for Languages) from central Moravia, 19 female and 6 male, participated in the study. They were undergraduate students majoring in English. Three female and one male participant were eventually excluded because of excessive pausing (see the following section).

Analysis

Target sequences were analyzed both auditorily and by viewing spectrograms and waveforms in Praat (Boersma & Weenink, 2012). Monitoring several acoustic correlates of perceived glottalization described in previous studies (e.g. Dilley et al., 1996; Skarnitzl, 2004), each token was classified either as a full glottal stop (a period of silence followed by a burst and an onset of voicing), as non-canonical glottalization (including aperiodicity, creak, and diplophonia), or a case of linking (no glottalization detected auditorily or visually).

For each vowel-initial target we measured any silent interval that preceded its onset and scored it as 1 if the interval was shorter than 50 ms, as 2 if it was between 50 and 100 ms or as 3 if it was longer. The average pause score fell between 1.1 and 1.7 for most participants. However four participants with a distinctly slower tempo exhibited an average pause score higher than 2.5 and they were excluded from further analyses.

Results and Discussion

Pooling data from all participants together, 35% of target sequences were realized with a full glottal stop, 25% with non-canonical glottalization, and 40% were linked. As is evident from Figure 1, these values conceal a great deal of variation between subjects, which is in line with studies reporting variation in native English speech.

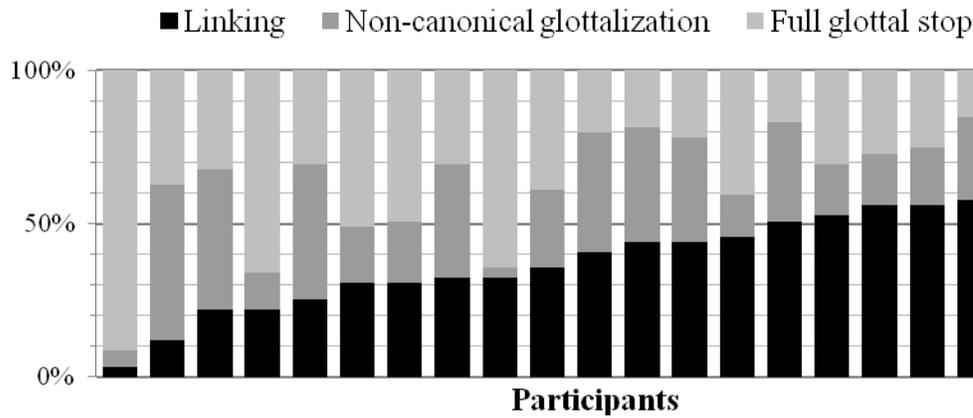


Figure 1. Proportions of linking to glottalization in target sequences for individual participants.

The average rate of glottalization (canonical and non-canonical combined) at 60% is lower than the rates reported for 4 university students reading news bulletins in Bissiri & Volín (2010). The difference is probably due to our exclusion of the phrase-initial context, the greater simplicity of our reading material, as well as regional differences (Bissiri & Volín tested speakers of Bohemian Czech).

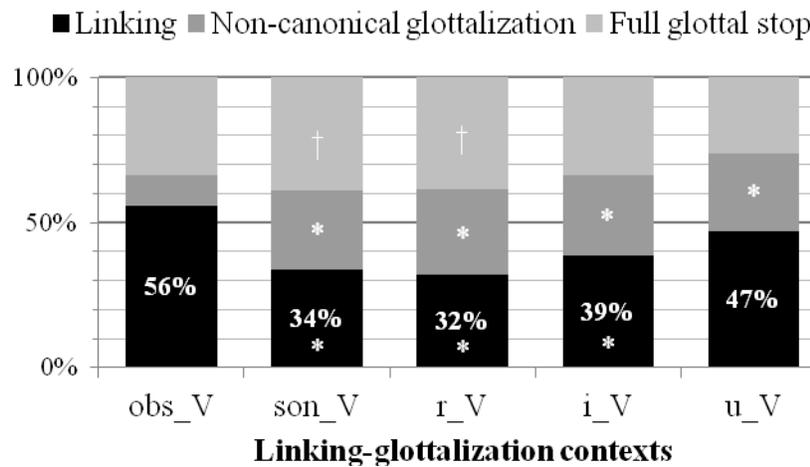


Figure 2. Mean proportions of linking to glottalization in target sequences for different contexts. Post-hoc Tukey HSD ($\alpha = .05$): * significantly different from obs_V, † sign. different from u_V.

Figure 2 shows the proportions of linking to glottalization in target sequences across all participants split up by the different linking contexts. The proportions of linking, of canonical and of non-canonical

glottalization were submitted as the dependent variables to three separate repeated-measures (RM) ANOVAs with the linking context as the factor. The main effect of context was significant for all three dependent variables ($F[4, 80] > 3.3, p < .05$). Post-hoc Tukey tests showed that the word-final obstruent context (obs_V) differed from the rest: it produced a significantly ($p < 0.05$) higher rate of linking than the final high front vowel (i_V), linking *r* (r_V) and final sonorant contexts (son_V); the difference in linking from the final high back vowel (u_V) was not significant. Also, it had significantly less non-canonical glottalization than any other context ($p < 0.01$). The post-hoc tests further found a significant difference in the proportion of full glottal stops between the final high back vowel context (u_V) and the sonorant (son_V) and linking *r* (r_V) contexts.

Our prediction that resyllabification of the final consonant would be more common than the occurrence of transient glides in the hiatus context in Moravian Czech English was confirmed for obstruents but not for sonorants. Our prediction about linking *r* was not confirmed. Final *r* patterned with the other sonorants and was not linked to the target more often than the preceding high vowels.

STUDY 2

The motivation for this study comes from our earlier examination of the effects of tempo on the incidence of linking vowel-initial words to the preceding context in the speech of Czech EFL learners reported in this volume (Šimáčková, Kolářová, & Podlipský, 2013). One of our methods of manipulating speech tempo was having participants read in synchrony with model recordings. The learners were not only able to change the tempo according to the model but in the normal speech tempo they also produced a significantly higher proportion of linking inside intonational phrases when reading along with the native-speaker recording than when they read alone. Responsible for this rise in connectedness was almost exclusively an increased rate of resyllabification.

In the current study we follow two goals. First, we want to test whether Moravian Czech learners of English can be trained to reduce glottalization of word-initial vowels in favor of linking using the method of synchronous reading. Second, we want to test the prediction that, if effective, the training will produce different increases of the linking to glottalization ratio in the different segmental contexts. Based on the

literature reviewed in *Study 1* and its results, it could be hypothesized that resyllabification is likely to increase more than linking in hiatus contexts.

Method

A pre-test and a post-test, consisting in a sentence reading task, were used to assess any treatment-induced changes. Half of the stimuli from *Study 1* were used as the material on the pre-test and half on the post-test. Each half contained the same number of target sequences in the five segmental contexts: 10 hiatus contexts (5 *j*-glide and 5 *w*-glide insertions), 10 linking *r* contexts, and 10 resyllabification contexts (5 final obstruents and 5 sonorants). Targets beginning in unstressed vowels were also evenly split between the pre- and post-tests. Participants were recorded exactly one week before and after treatment. The method of classifying the recorded tokens into cases of linking or glottalization was also the same as in *Study 1*.

Participants. The participants were Czech advanced learners of English (level C1), all undergraduate students majoring in English, who were attending two parallel classes of a course in phonetics, forming a Synchronous Reading group and a control Listening group. The topic of linking was not covered in the course until after the post-test and the participants were unaware of the purpose of the experiment. Students who did not complete all training/control sessions were excluded, which resulted in reducing the size of the groups to 11 participants each, i.e. 22 altogether, 18 female and 4 male. None of the participants had taken part in *Study 1*.

Training. The training comprised of four weekly 25-to-35-minute sessions. They took place in a computer lab with each participant using a computer and wearing headphones. Sanako Study 1200 – Tutor software, version 5.00, familiar to the participants, was used to play the training materials. The software enabled us to monitor what the participants heard and said and to instruct them individually.

The training materials were 2 sets of sentences and 2 coherent texts rich in word-initial vowels, with the contexts for [j] and [w] insertion, linking *r*, and resyllabification balanced. They were recorded by native English speakers – two male SSBE speakers and two Americans, male and female. The American male speaker produced several preglottalized vowels when reading the texts and so only the recordings of his sentences were used.

The materials gradually increased in complexity. In Week 1, twenty 6-to-10-word sentences, each repeated three times in random order, were used to create four 60-sentence training blocks: one by a British speaker, one by an American, and two with all speakers mixed. In Week 2, blocks created analogously used seventeen 8-to-14-word sentences, with the other British and American speaker in the single-speaker blocks. In Week 3 and 4, the materials were two texts of 141 words in 16 clauses and 136 words in 19 clauses respectively, read by the American female and one of the British male speakers each. The Week 4 text was recorded twice – once at normal tempo and once spoken faster.

Participants in the Synchronous Reading group were told that the aim of the training was to build up their fluency in English. Before training began, they tried reading in synchrony with a short recording from the BBC radio. During the training itself, the participants performed synchronous reading individually, although the number of times they heard each recording was controlled. Even with practice, some participants found synchronous reading challenging and so in the first two weeks the number of times they read the sentences was increased from the planned 8 to 12 repetitions. In Week 3, the participants read with the recorded text 8 times. In Week 4, they read with the normal and the fast version of the second text 8 times in total. At the end of this session they were recorded reading the text in synchrony with the British normal-tempo version.

Participants in the control Listening group were told they were doing attention and memory tasks. They heard the same recordings for the same number of times as the Synchronous Reading group without producing them. To ensure that the participants actually listened to the recordings played repeatedly, they were given attention focusing tasks, such as word monitoring, true-or-false statements, paraphrasing, focus on grammar, the speakers' native accent, etc.

Results and Discussion

On the pre-test, pooling data from both participant groups together, 34% of all target sequences were realized with a full glottal stop, 22% with non-canonical glottalization, and 44% were linked. Figure 3 presents the mean linking-glottalization proportions for all participants split by linking context. The proportions of linking, of non-canonical glottalization and of full glottal stops were submitted to 3 separate RM ANOVAs with linking context as the within-subject factor. The linking context did not affect the

proportion of full glottal stops ($p > .1$) but it had a significant effect on the proportion of linking ($F[4, 84] = 9.26, p < .001$) and of non-canonical glottalization ($F[4, 84] = 8.00, p < .001$). Post-hoc Tukey HSD tests ($\alpha = .05$) revealed that this was because linking was significantly higher in obs_V contexts, i.e. as resyllabification of obstruents, than in all other contexts and this increase was at the expense of non-canonical glottalization which was in turn significantly lower in obs_V than in all other contexts. This is almost an exact replication, and thus further confirmation, of the patterns observed in *Study 1* with different participants (compare Figures 2 and 3) showing that resyllabification of obstruents is more common than the other types of linking in Moravian Czech English.

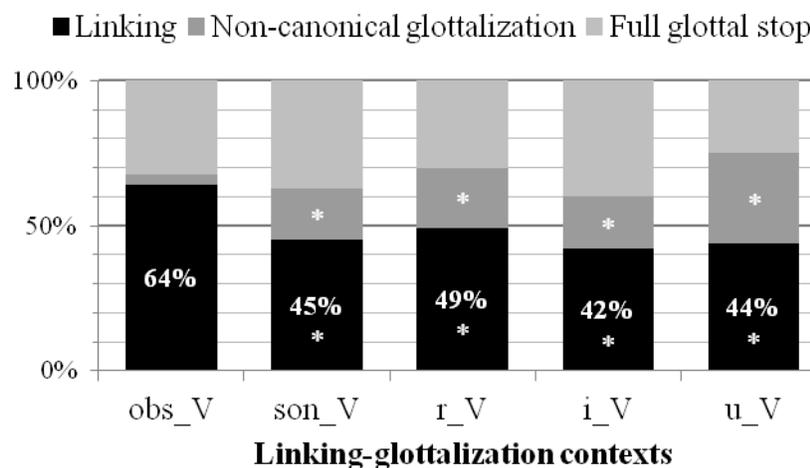


Figure 3. Measurements of the pre-test productions of all participants: Mean proportions of linking to glottalization in target sequences for different contexts. Post-hoc Tukey HSD ($\alpha = .05$): * significantly different from obs_V.

In order to see whether the Synchronous Reading group increased linking during training we compared the mean proportion of overall linking in the recordings from the last training session to that in the pre-test. On average, linking rose from 39 to 44%, which was not a significant difference when assessed by a paired-samples t -test. However, inspection of the data showed that 7 out of the 11 participants did increase linking when they read in synchrony with the English model as compared with the pre-test and for these participants a paired t -test found a significant pre-test vs. training difference ($t[6] = 3.7, p = .01$). It should be noted that the continuous text with as many as 25 words in a sentence used in the

last training session was a more difficult material than the simple 4-to-7-word sentences read separately on the pre-test and thus the pre-test and training data do not compare well.

We next compared the results of the pre-test with the post-test. A series of RM ANOVAs was run on the proportions of linking, non-canonical and canonical glottalization overall, as well as for each linking context separately, with participant group as the between-subject factor and linking context and pre-/post-test as the within-subject factors. These analyses found absolutely no significant pre-/post-test improvements, even when for the Synchronous Reading group only data from the 7 participants who increasing linking during training were used. Unfortunately, synchronous reading turned out to have a short-lived effect on connectedness of these participants' speech. Inspection of the data showed that only one participant transferred increased linking while reading in synchrony with a model into reading on her own.

GENERAL DISCUSSION

Based on what we know about glottalization/linking in Moravian Czech and in English, we made predictions about Moravian Czech learners' ability to link a vowel at the beginning of a word to the preceding word-final sound. We expected the learners to produce more linking in resyllabification contexts, less in linking-*r* contexts, and even less in hiatus contexts. Our two studies converged in partially confirming this expectation: in the speech of our participants, resyllabification of final obstruents, but not sonorants, was more common than glottalization and more common than linking in hiatus contexts. Final *r* and other final sonorants and vowels were linked less frequently.

The difference between resyllabifying obstruents and sonorants is not easily attributable to transfer from L1. No such difference is mentioned in the existing sources on Czech since little empirical work has been done on resyllabification in Moravian Czech. Our informal probing into intuitions of native speakers does not suggest any differences either. It should be noted that only voiced obstruents were used in our target sequences. Resyllabification of voiced obstruents might be an L2 strategy of how to maintain word-final voicing, an uneasy task for speakers whose L1 dictates complete devoicing at the end of the word.

After non-resyllabified devoiced obstruents we observed a clear preference for a full glottal stop, the proportion of non-canonical forms of glottalization being significantly lower in this context compared to a

preceding sonorant or vowel. The difference may be ascribed to saving articulatory effort. Creaks and other forms of non-canonical glottalizations, during which glottal pulsing becomes irregular but does not stop completely (cf. Skarnitzl, 2004), may be more common in the voiced contexts because here they require less effort than an insertion of a full glottal stop which involves a complete interruption and subsequent initiation of voicing. In a voiceless context, after a completely devoiced non-resyllabified obstruent, non-canonical glottalizations do not provide such an effort-saving advantage.

In our earlier work we saw that learners of English could reduce glottalization of word-initial vowels when they read in synchrony with a native model. In the current *Study 2*, synchronous reading also induced a rise of linking in seven out of eleven participants. However, they could only produce more linking while they spoke alongside a model. When they read alone on the post-test one week after the last training session, the proportion of linking dropped to the level before the training for all but one participant. We could speculate that this result is partly due to differences between the materials on the pre- and post-test, since the lexical frequency of the target words was not controlled for and neither was the placement of nuclear accent. Still, our results did not provide evidence of any advantage of reading in synchrony with model recordings as a training method over just listening to the recordings.

REFERENCES

- Bissiri, M. P., Lecumberri, M. L. G., Cooke, M., & Volín, J. (2011). The Role of Word-Initial Glottal Stops in Recognizing English Words. In P. Cosi, R. De Mori, G. Di Fabbrizio & R. Pieraccini (Eds.), *Proceedings of Interspeech 2011* (pp. 165-168). Florence: ISCA
- Bissiri, M. P., & Volín, J. (2010). Prosodic structure as a predictor of glottal stops before wordinitial vowels in Czech English. In R. Vích (Ed.), *Proceedings of the 20th Czech-German Workshop on Speech Processing* (pp. 23-28). Prague: Academy of Science.
- Boersma, P. & Weenink, D. (2011). Praat: doing phonetics by computer [Computer program]. Version 5.0.40, retrieved 11 November 2011 from <http://www.praat.org/>
- Cruttenden, A. (2001). *Gimson's pronunciation of English*. London: Arnold.
- Dilley, L., Shattuck-Hufnagel, S., & Ostendorf, M. (1996). Glottalization of word-initial vowels as a function of prosodic structure. *Journal of Phonetics*, 24(4), 423-444.
- Eckert, H., & Barry, W. (2005). *The Phonetics and Phonology of English Pronunciation: A Coursebook with CD-ROM*. Trier: WVT.
- Garellek, M. (2012). Glottal stops before word-initial vowels in American English: distribution and acoustic characteristics. *UCLA Working Papers in Phonetics*, 110, 1-23.

- Gluszek, A., & Dovidio, J. F. (2010). The way they speak: A social psychological perspective on the stigma of nonnative accents in communication. *Personality and Social Psychology Review*, 14(2), 214-237.
- Hála, B. (1962). *Uvedení do fonetiky češtiny na obecně fonetickém základě*. Praha: ČSAV.
- Lev-Ari, S., & Keysar, B. (2010). Why don't we believe non-native speakers? The influence of accent on credibility. *Journal of Experimental Social Psychology*, 46(6), 1093-1096.
- Mompeán-Gonzalez, J., & Mompeán-Guillamón, P. (2009). /r/-liaison in English: An empirical study. *Cognitive Linguistics*, 20(4), 733-776.
- O'Connor, J. D. (1980). *Better English Pronunciation*. Cambridge: Cambridge University Press.
- Palková, Z. (1997). *Fonetika a fonologie češtiny*. Prague: Karolinum.
- Pennington, M. C. (1996). *Phonology in English language teaching: An international approach*. London; New York: Longman.
- Roach, P. (2009). *English Phonetics and Phonology*. Cambridge; New York: Cambridge University Press.
- Šimáčková, Š., Kolářová, K., & Podlipský, V.J. (2014). Tempo and connectedness of Czech-accented English Speech. *Concordia Working Papers in Linguistics*, 5, 668-678.
- Skarnitzl, R. (2004): Acoustic categories of nonmodal phonation in the context of the Czech conjunction "a". In Z. Palková & J. Veroňková (Eds.), *AUC Philologica 1/2004, Phonetica Pragensia X* (pp. 57-68). Prague: Karolinum.
- Umeda, N. (1978). Occurrence of glottal stops in fluent speech. *The Journal of the Acoustical Society of America*, 64, 88-94.
- Vachek, J. (1968). *Dynamika fonologického systému současné spisovné češtiny: studie a práce lingvistické 8*. Praha: ČSAV.
- Volín, J. (2003): The preposition "of" and glottal stops in Czech English. In A. Grmelová & M. Farrell (Eds.), *Prague Conference on Linguistics and Literary Studies Proceedings* (pp.10-19). Praha: UK PedF.
- Volín, J. (2012). Jak se v Čechách "rázuje". *Naše řeč*, 95(1), 51-54.
- Wells, J. C. (2008). *Longman pronunciation dictionary*. Harlow: Pearson Education Limited.