

Czech spoken in Bohemia and Moravia

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As a western Slavic language of the Indo-European family, Czech is closest to Slovak and Polish. It is spoken as a native language by nearly 10 million people in the Czech Republic (Czech Statistical Office n.d.). About two million people living abroad, mostly in the USA, Canada, Austria, Germany, Slovakia, and the UK, claim Czech heritage (Ministry of Foreign Affairs of the Czech Republic 2009). However, it is not known how many of them are native speakers of Czech.

Sociolinguistically, the language situation in the Czech Republic bears diglossic features. There is a substantial gap between formal, highly codified language and the language used in everyday situations. Our aim is to describe the way most people speak most of the time rather than artificial orthoepic norms (for the latter see Palková 1997: 320–345).

Geographically, in the western part of the country (Bohemia and western Moravia) pronunciation is relatively homogeneous compared to the greater dialectal diversity of the east (the rest of Moravia), where several dialectal areas can be distinguished (Cvrček 2010: 24). Still, there are a number of features common to Moravian dialects, distinguishing them clearly from the pronunciation of Bohemia and allowing native speakers to identify someone as either Bohemian or Moravian. The present paper elaborates on the earlier illustration of Czech (Dankovičová 1997a) by describing the differences between Bohemian Czech (BC), spoken by more than six million Czech citizens, and Moravian Czech (MC), spoken by about three-and-a-half million Czech citizens. At the same time, our illustration provides additional information about what both varieties have in common.

The transcriptions of the sample text are based on recordings of a 32-year-old male native speaker of BC from the south of Bohemia, and a 44-year-old female native speaker of MC from the east of Moravia. Examples given throughout the text are recorded by the Bohemian speaker and, where MC differs from BC, also by the speaker from Moravia.

Consonants

	Bilabial		Labio-dental		Alveolar		Post-alveolar		Palatal		Velar		Glottal	
Plosive	p	b			t	d			c	j	k	g		
Affricate					ts		tʃ	ɖʒ						
Nasal		m				n				ɲ				
Fricative			f	v	s	z	ʃ	ʒ			x			h
Trill						r								
						ʀ								
Approximant										j				
Lateral approximant						l								

p	pa:t	<i>pád</i>	‘a fall’	ɲ	ɲadra	<i>ňadra</i>	‘bosom’
b	ba:t sɛ	<i>bát se</i>	‘to fear’	r	ra:t	<i>rád</i>	‘glad’
t	ta:t	<i>tát</i>	‘melt’	ʀ	ʀa:t	<i>řád</i>	‘order’
d	da:t	<i>dát</i>	‘give’	f	fa:tʃ	<i>fáč</i>	‘bandage’
c	ca:pota	<i>tápota</i>	‘footprint’	v	va:t	<i>vát</i>	‘blow (wind)’
ʃ	ja:bel	<i>d’ábel</i>	‘devil’	s	sa:t	<i>sát</i>	‘suck’
k	ka:t sɛ	<i>kát se</i>	‘repent’	z	za:c	<i>zád</i>	‘stern (ship)’
g	ga:za	<i>gáza</i>	‘gauze’	ʃ	ʃa:l	<i>šál</i>	‘scarf’
ts	tsa:r	<i>cár</i>	‘shred’	ʒ	ʒa:k	<i>žák</i>	‘pupil (school)’
tʃ	tʃa:p	<i>čáp</i>	‘stork’	x	xa:pat	<i>chápat</i>	‘understand’
ɖʒ	ɖʒajf	<i>džajv</i>	‘jive’	h	ha:tka	<i>hádká</i>	‘quarrel’
m	ma:ta	<i>máta</i>	‘mint’	l	la:t	<i>lát</i>	‘berate’
n	na:pat	<i>nápad</i>	‘idea’	j	ja:tra	<i>játra</i>	‘liver’

The consonant inventories of BC and MC are the same. Phonemes /ɖʒ/, /g/ and /f/ came into Czech with borrowings. The youngest and most easily identified as foreign is /ɖʒ/, whereas /f/, as the oldest of the three, occurs in a few native Czech words, such as *foukat* /foukat/ ‘blow’ and *doufat* /doufat/ ‘hope’. Phonetic implementation of consonant phonemes does not differ in BC and MC either. In the stop series, /b d g/ are prevoiced (i.e. voiced during closure) and contrast with voiceless unaspirated /p t k/. While /d/ is realized as apico-alveolar, /t/ is more likely to be lamino-dental (Machač 2006: 139–141). A stop before another stop is generally released. The release of palatal stops is affricated (Machač & Skarnitzl 2004: 30–31). Intervocally, /d/ is sometimes reduced to [r] (Machač & Skarnitzl 2009: 37–38), and /v/ becomes a labio-dental approximant [ʋ] (Skarnitzl & Volín 2005). Sibilants /ʃ ʒ tʃ ɖʒ/ are non-retroflex post-alveolars articulated with tongue blade rather than with the tongue tip (Žygis 2003). Both /r/ and /ʀ/ are trills though commonly realized with a single contact. Phonetically, the sound /ʀ/ is a period of friction interrupted at the beginning by a contact or contacts created by a retracted apico-alveolar gesture (see Figure 1). The approximant /l/ is mainly pronounced apico-alveolar, although a velarized pronunciation without a firm tongue tip contact is not unusual (Šimáčková 2009). Sonorants /r/, /l/, and marginally also /m/ and /n/, become syllabic between two consonants or after a consonant at the end of a word, e.g. *vlk* [vɫk] ‘wolf’, *kopr* [kɔpr] ‘dill’, *Rožmberkové* [roʒmberkove:] ‘House of Rosenberg’, *sedmáct* [sednna:tst] ‘seventeen’. Alveolar /n/ as well as bilabial /m/ commonly undergo place assimilation. Before labiodentals, /n/ and /m/ change into [ɱ], e.g. *konference* [komferentse] ‘conference’, *tramvaj* [tramvaj] ‘tram’. The alveolar nasal

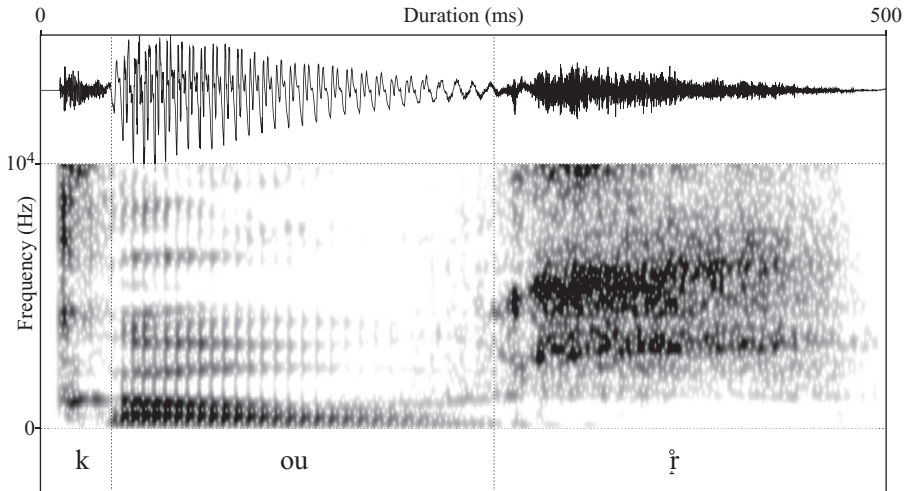


Figure 1 A devoiced allophone of Czech /r/ in the BC speaker's production of the word *kouř* 'smoke'.

is realized as velar before /k/ and /g/. Word-internally only sequences [ŋk] and [ŋg] are permitted, e.g. *tenká* [teŋka:] 'thin (f)', while across the word boundary place assimilation is optional, e.g. *ten kout* [teŋ kout] ~ [tɛn kout] 'the corner'. Sequences /ns/, /nz/, /nʃ/ and /nʒ/ are optionally pronounced with an epenthetic stop, e.g. *ženská* [ʒɛntska:] 'female', *Honza* [ɦondza] 'Johnny', *zmenšovat* [zmentʃovat] 'make smaller', *manžel* [mandʒɛl] 'husband'. Plosives followed by homorganic nasals may have a nasal release, e.g. *pocestný* [pɔtsɛstⁿni:] 'traveler'. In fast casual speech, sequences /dn/ and /dɲ/ may be rendered [nⁿ] and [ɲ^ɲ], e.g. *jednou* [jɛnⁿnou] 'once', *hodně* /ɦodɲɛ/ [ɦɔɲ^ɲɛ] 'a lot of' (Volín 2010: 53). Stop-fricative sequences, especially if voiceless, may be simplified to affricates, e.g. *dětská* [jɛtska:] 'children's (adj, f)', *větší* [vjɛtʃi:] 'bigger'.

Obstruent voicing

The key source of differences between pronouncing consonants in Bohemian and in Moravian Czech are voice assimilations. In addition, there is a difference in how voice assimilation interacts with word-final devoicing.

Both in BC and MC, obstruents devoice word-finally, e.g. *závod* [za:vot] 'race', *rez* [rɛs] 'rust'. In connected speech, BC and MC differ with respect to final obstruent devoicing when the next word begins in a vowel, e.g. *závod aut* 'car race'. Speakers of BC insert a glottal stop before the initial vowel and devoice the word-final obstruent: [za:vot ʔaut]. In MC the final obstruent becomes the onset of the following syllable and keeps its voicing [za:vo.daut]. In both varieties, word-final devoicing usually does not occur if the following obstruent is voiced (compare *bez dechu* [bez dexu] 'out of breath' and *bez tebe* [bes tebe] 'without you'). This is because Czech prefers adjacent obstruents to agree in voicing.

Underlying mismatches in the voicing of adjacent obstruents are usually resolved by voice assimilation which is generally regressive. The voicing agreement is obligatory word-internally, thus *prošba* 'plea' is pronounced as [prozba] and *lebka* 'skull' as [lepka]. Across a word boundary, voicing of adjacent obstruents varies within and across speakers. In BC, regressive voicing assimilation in consonant clusters applies in fewer contexts than in MC. First, a BC exception to the regressive direction of voice assimilation is the cluster /sfi/

pronounced as voiceless [sx] (e.g. *shoda* [sxoda] ‘agreement’, *shnít* [sxɲi:t] ‘rot’), although in a small number of words voiced [zɦ] occurs (e.g. *shora* [zɦora] ‘from above’, *shluk* [zɦluk] ‘cluster’). More notably, in MC but not in BC is word-boundary regressive assimilation triggered by sonorants as well as obstruents, yielding MC pronunciations such as *k lesu* [g lesu] ‘to the forest’.

In this context, it is important to discuss the classification of sounds /v/ and /r/ as sonorant or obstruent. The labiodental ‘fricative’ /v/ behaves as an obstruent in that it undergoes voice assimilation (e.g. in *vplout* [fplout] ‘sail into’, *krev teče* [krɛf tɛtʃɛ] ‘blood flows’) but at the same time it has some properties of sonorants. First, like other sonorants it does not trigger voice assimilation within a word, e.g. *tvar* [tvar] ‘shape’, *sval* [sval] ‘muscle’. Second, in MC always, but in BC only about half of the time, /v/ triggers voice assimilation across a word boundary, e.g. *napsat větu* [napsat vjetu] ~ [napsad vjetu] ‘write a sentence’ (Volín & Skarnitzl 2006). And third, in both MC and BC, it is phonetically often weakened to the approximant [ʋ] (Skarnitzl & Volín 2005). The sound /r/ is usually paired off with the alveolar trill /r/ in tables of Czech consonant phonemes. However, it is in fact an obstruent. Phonetically it is a trilled fricative (see above), phonologically, it does not behave as a sonorant in that it cannot occupy the position of a syllable nucleus, and unlike /r/ and other sonorants which do not devoice contextually, it loses voicing word-finally and when it is adjacent to a voiceless obstruent, e.g. *kouř* [kouř] ‘smoke’, *dviřka* [dviřka] ‘little door’, *přes* [přɛs] ‘over’. In addition, /r/ triggers voicing agreement across a word boundary in both Czech varieties (e.g. *až řekneš* ‘when you say’ pronounced as [aʒ řɛkɲɛʃ] and *jak řekneš* ‘how you say’ as [jag řɛkɲɛʃ]), although in BC only obstruents do that.

Two obstruent phonemes lack an opposite voicing counterpart at the same place of articulation – the voiceless velar fricative /x/ and the voiced glottal fricative /ɦ/. The two fricatives are connected through processes of final devoicing and voice assimilation. In devoicing contexts /ɦ/ is substituted by [x], e.g. in *snih taje* [sɲi:x tajɛ] ‘snow is melting’, *lehká* [lɛxka:] ‘light (f)’. In voicing contexts, /x/ has the voiced allophone [ɣ], e.g. *prach země* /prax zɛɲɲɛ/ [praɣ zɛɲɲɛ] ‘dust of the earth’, but there are speakers who pronounce [ɦ] here instead, i.e. [praɦ zɛɲɲɛ]. Another allophone arising from voicing assimilation is [dʒ] substituted for /ts/, e.g. *moc dobrá* /mɔts dobra:/ [mɔdʒ dobra:] ‘very good (f)’.

Vowels

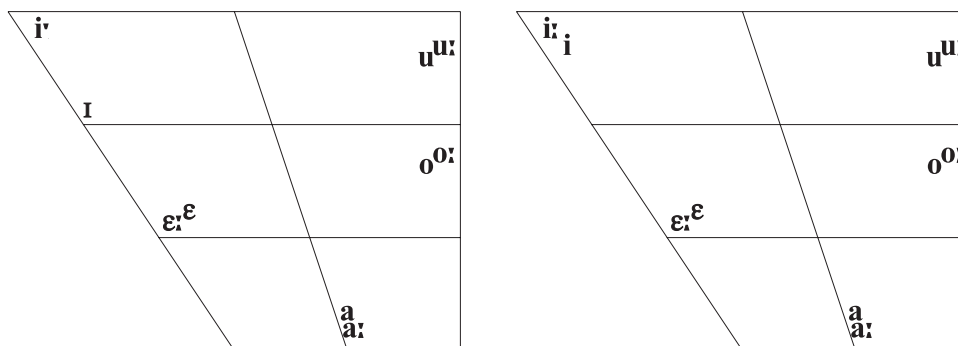


Figure 2 Bohemian Czech (left) and Moravian Czech (right) monophthongs in the IPA chart.

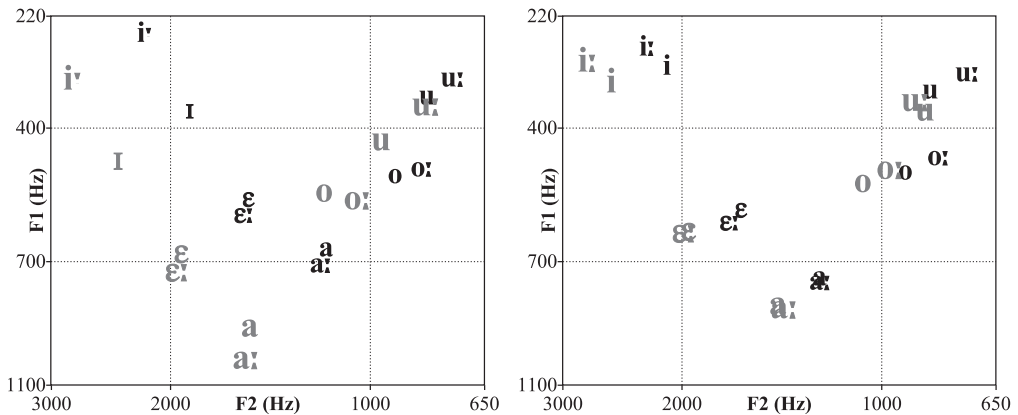


Figure 3 F1 and F2 values of Bohemian (left) and Moravian (right) monophthongs produced by three speakers per gender per variety. The vowels were embedded in a number of different consonantal contexts in monosyllabic Czech words. Larger grey symbols represent average F1 and F2 of vowels produced by women, smaller black symbols represent average values of vowels produced by men. Although the marks are in Hz, the axes have logarithmic scaling.

BOHEMIAN CZECH		MORAVIAN CZECH			
ɪ	sɪt	ɪ	sɪt	<i>syt</i>	‘full (of stomach)’
iː	siːt	iː	siːt	<i>sít</i>	‘to sow’
ɛ	sɛt	ɛ	sɛt	<i>sed</i>	‘sitting position’
ɛː	lɛːk	ɛː	lɛːk	<i>lɛk</i>	‘cure’
a	sat	a	sat	<i>sad</i>	‘orchard’
aː	saːt	aː	saːt	<i>sát</i>	‘suck’
o	sok	o	sok	<i>sok</i>	‘rival’
oː	goːl	oː	goːl	<i>gól</i>	‘goal’
u	sut	u	sut	<i>sud</i>	‘barrel’
uː	uːt	uː	uːt	<i>úd</i>	‘limb’
ou	sout	ou	sout	<i>soud</i>	‘court of law’
au	raut	au	raut	<i>raut</i>	‘banquet’
ɛu	ɛuro	ɛu	ɛuro	<i>euro</i>	‘euro’

The Czech vowel inventory contains ten monophthongs and three diphthongs. The monophthongal vowel system has been described as consisting of five different vowel qualities /i ɛ a o u/ occurring in two quantities, i.e. as short and long vowels. More recently, it has been accepted (see e.g. Dankovičová 1997a) that the short–long distinction in the high front vowel pair is not realized on the basis of duration only but entails a qualitative difference as well. This is especially clear in BC where the short counterpart of the ‘long’ high front vowel is realized as mid-high [ɪ]. It can be seen in Figure 3 that for BC speakers the two (mid-)high front vowels differ in their F1 and F2 values to a much larger extent than they do for MC speakers. As a consequence, BC speakers rely less on the durational difference between the short and the long high front vowel. Podlipský et al. (2009) show that the long high front vowel is only about 1.3 times longer than its short counterpart, while the long:short ratio is about 1.7 for the other four vowel pairs. This is why in this illustration the high front vowels are transcribed as [iː ɪ] for BC. In MC, the high front vowels are spectrally more similar, the primary difference between them being duration, hence the transcription [iː i]. The front mid vowels in both varieties are realized as mid-low, i.e. as [ɛ] and [ɛː], while the corresponding

mid-back vowels /o/ and /o:/ remain mid, resulting in less vowel height symmetry between front and back vowels (see Figures 2 and 3).

In Czech, short vowels are about 3.5 times more frequent than their long counterparts (Ludvíková 1987: 93). In both varieties, long /o:/ occurs very rarely and almost exclusively in loanwords, e.g. *tón* /to:n/ ‘tone’, *óda* /o:da/ ‘ode’. In BC, the vowel /ɛ:/ is also infrequent because in many native morphemes it is replaced by /i:/ (e.g. ‘small (n)’: *malé* /male:/ in MC and *malý* /mali:/ in BC; ‘length’: *délka* /de:lka/ in MC and *dýlka* /di:lka/ in BC).

The diphthongs are /au/, /ɛu/ and /ou/ in both Czech varieties, but /au/ and /ɛu/ occur only in loanwords and interjections, e.g. *euro* /ɛuro/ ‘euro’, *leukémie* /lɛuke:mijɛ/ ‘leukemia’, *autor* /autor/ ‘author’, *au* /au/ ‘ouch’.

Phonetically, short vowels in both varieties may be subject to articulatory undershoot induced by increased speech tempo or casual speech style (see Volín 2010: 44).

Phonotactics

Phonotactically, Czech allows as many as four consonants in a syllable onset (*pstruh* /pstrux/ ‘trout’) and three in a coda (*pomst* /pomst/ ‘revenge (gen pl)'), although this is rare and about half of all syllables are in fact CV (Palková 1997: 272). A number of Czech onset clusters violate the sonority hierarchy (e.g. *mzda* /mzda/ ‘wage’, *rtuť* /rtuc/ ‘mercury’, *pták* /pta:k/ ‘bird’) but the complexity of these structures is often reduced in actual pronunciation. One strategy is insertion of a short epenthetic vowel, e.g. *lpět* [lɔpɛt] ‘adhere to’, *dbát* [dɔba:t] ‘observe (a rule)’. Another strategy is deletion, e.g. *kerá* [kera:] ‘which (f)’. Most words beginning with the cluster /j/+C are lexicalized also without the /j/ (*jméno* /jme:no/ ~ /me:no/ ‘name’, *jde* /jde/ ~ /de/ ‘go (3sg)’, *jsem* /jsɛm/ ~ /sɛm/ ‘I am’). The preference for the canonical CV structure is also evident in strategies repairing onsetless syllables. In MC, a coda of the preceding syllable will usually be resyllabified into the missing onset (*závod aut* ‘car race’ [za:vo.daut], see above), otherwise a glottal stop is used, e.g. *nejupřímější* [nejʔupři:mɛjʃi:] ‘the most sincere’, *Sezame, otevři se.* [sezameʔotɛvři sɛ] ‘Open, Sesame.’. In BC, glottal stop insertion is preferred and resyllabification is relatively infrequent. When it does occur the resyllabified obstruent is never voiced as it is in MC, e.g. *závod aut* is in BC [za:votʔaut], possibly [za:vo.taut], never *[zavo.daut]. In BC frequent native words beginning with /o/ are also lexicalized with a prothetic /v/, e.g. *oči* /oʃi/ ~ /voʃi/ ‘eyes’.

Suprasegmentals

Czech has stress fixed to the first syllable of a word, with the exception that a monosyllabic preposition mostly forms a single metrical unit with the following word and bears stress, e.g. *moře* [mořɛ] ‘sea’ vs. *do moře* [domořɛ] ‘into the sea’. As is common in fixed-stress languages (see Cutler 2005: 273), phonetic realization of Czech stress is weak (Volín 2010: 57). Vowel duration does not function as a cue to stress, it is reserved for marking vowel quantity contrasts which occur independently of stress, e.g. *uhel* [ʔuɦɛl] ‘charcoal’ vs. *úhel* [ʔu:ɦɛl] ‘angle’, *plocha* [ploxa] ‘area’ vs. *plochá* [ploxa:] ‘flat (f)’. Nevertheless, vowel duration is variable to some extent: final syllables in intonation phrases are subject to substantial lengthening (e.g. Dankovičová 1997b).

Czech rhythm has proved difficult to classify using acoustic measures (e.g. Dankovičová & Dellwo 2007). As is typical of syllable-timed languages, Czech exhibits little vowel reduction. On the other hand, compared to syllable-timed languages, Czech allows more complex consonant clusters, which contributes to relatively greater variability of consonant-interval durations.

It should be noted that prosodic structure exerts influence on word-boundary phenomena such as assimilations, glottal stop insertion and resyllabification (as described in the previous section). In both dialects, the preference for glottal stop insertion as opposed to resyllabification increases across stronger prosodic boundaries.

Transcription

Bohemian Czech

|| 'severa:k a 'sluntse se 'fia:dali | gdo 'zɲɪx je 'silnejši: || 'f tom 'spatřili 'poťsɛst'ne:ɦio
 || 'kteri: 'kra:řel 'zahalen 'pla:řcem || 'ʔujed'nali 'tedi || ʒe 'ten se ma: 'považovad 'za
 silnejši:ɦio || gđo 'přvɲi: 'doka:ʒe | 'ʔabi si 'poťsɛst'ni: 'svle:kl 'pla:řc || tu 'zařjal 'severa:k
 'foukad 'ze řji: 'si:ři || 'ʔale řji:m vi:řs 'foukal | 'ci:m 'vi:řs se 'poťsɛst'ni: 'zahaloval 'do
 'sve:ɦio 'pla:řce || 'koneřjne se 'severa:g 'vzdal 'marne:ɦio 'ʔu:sili: || 'pag 'zařjalo 'sluntse
 'svi:cit 'ʔa 'řra:t || 'ʔa 'za nejaki: 'ʔokamžik 'poťsɛst'ni: || 'ktere:mu 'bilo 'ɦorko || 'sxojil
 'pla:řc || 'tak musel 'severa:k 'ʔuznad | ʒe 'sluntse 'je 'silnejši: ||

Moravian Czech

|| 'severa:k ʔa 'sluntse se 'fia:dali || gđo 'zɲifi je 'silnejši: || 'f tom 'spatřili 'poťsɛst'ne:ɦio
 || 'kteri: 'kra:řel 'zahalen 'pla:řcem || 'ʔujednali 'tedi || ʒe 'ten se ma: 'považovad 'za
 silnejši:ɦio || gđo 'přvɲi: 'doka:ʒe || 'ʔabi si 'poťsɛst'ni: 'svle:kl 'pla:řc || tu 'zařjal 'severa:k
 'foukad 'ze řji: 'si:ři || 'ʔale řji:m vi:řs 'foukal || 'ci:m 'vi:řs se 'poťsɛst'ni: 'zahaloval do
 'sve:ɦio 'pla:řce || 'koneřjne se 'severa:g 'vzdal 'marne:ɦio 'ʔu:sili: || 'pag 'zařjalo 'sluntse
 'svi:cit a 'řra:t || 'ʔa 'za nejaki: 'okamžik 'poťsɛst'ni: | 'ktere:mu 'bilo 'ɦorko || 'zɦojil
 'pla:řc || 'tağ 'musel 'severa:k 'ʔuznat || ʒe 'sluntse 'je 'silnejši: ||

Orthographic version

Severák a Slunce se hádali, kdo z nich je silnější. V tom spatřili pocestného, který kráčel zahalen pláštěm. Ujednali tedy, že ten se má považovat za silnějšího, kdo první dokáže, aby si pocestný svlékl plášť. Tu začal Severák foukat ze vši síly, ale čím víc foukal, tím víc se pocestný zahaloval do svého pláště. Konečně se Severák vzdal marného úsilí. Pak začalo Slunce svítit a hrát a za nějaký okamžik pocestný, kterému bylo horko, shodil plášť. Tak musel Severák uznat, že Slunce je silnější.

References

- Cutler, Anne. 2005. Lexical stress. In David B. Pisoni & Robert E. Remez (eds.), *The handbook of speech perception*, 264–289. Oxford: Blackwell.
- Cvrček, Václav. 2010. Obecné poučení o češtině [General information about the Czech language]. In Václav Cvrček (ed.), *Mluvnice současné češtiny* [Grammar of contemporary Czech], 21–26. Prague: Karolinum.
- Czech Statistical Office. N.d. *Národnost a mateřský jazyk* [Nationality and mother tongue]. [http://www.kvarty.czso.cz/csu/2003edicniplan.nsf/t/57004FD47A/\\$File/Kapitola5.pdf](http://www.kvarty.czso.cz/csu/2003edicniplan.nsf/t/57004FD47A/$File/Kapitola5.pdf) (accessed 20 July 2011).
- Dankovičová, Jana. 1997a. Czech. *Journal of the International Phonetic Association* 27(1–2), 77–80.
- Dankovičová, Jana. 1997b. The domain of articulation rate variation in Czech. *Journal of Phonetics* 25(3), 287–312.
- Dankovičová, Jana & Volker Dellwo. 2007. Czech speech rhythm and the rhythm class hypothesis. *The 16th International Congress of Phonetic Sciences* (ICPhS 16), Saarbrücken, Germany, 1241–1244.
- Ludvíková, Marie. 1987. Číslo a hláskách [Speech sounds in figures]. In Marie Těšitelová (ed.), *O češtině v číslech* [Czech language in figures], 91–108. Praha: Academia.
- Machač, Pavel. 2006. *Temporální a spektrální struktura českých explozív* [Temporal and spectral structure of Czech plosives]. Ph.D. dissertation, Charles University.
- Machač, Pavel & Radek Skarnitzl. 2004. Selected acoustic properties of the Czech palatal plosives. In Robert Vích (ed.), *The 13th Czech-German Workshop – Speech Processing*, 29–35. Prague: The Academy of Sciences of the Czech Republic.
- Machač, Pavel & Radek Skarnitzl. 2009. *Principles of phonetic segmentation*. Prague: Epoque.
- Ministry of Foreign Affairs of the Czech Republic. 2009. *Češi v zahraničí* [Czechs living abroad]. http://www.mzv.cz/public/8f/6d/d4/449991_313064_novostatistika22009.doc (accessed 20 July 2011).

- Palková, Zdena. 1997. *Fonetika a fonologie češtiny s obecným úvodem do problematiky oboru* [Phonetics and phonology of Czech]. Prague: Karolinum.
- Podlipský, Václav Jonáš, Radek Skarnitzl & Jan Volín. 2009. High front vowels in Czech: A contrast in quantity or quality? *Interspeech 2009*, Brighton, UK, 132–135.
- Šimáčková, Šárka. 2009. Variable quality of the Czech lateral liquid: A perception experiment with young Czech listeners. In Frank Kügler, Caroline Féry & Ruben van de Vijver (eds.), *Variation and gradience in phonetics and phonology*, 125–139. Berlin & New York: Mouton de Gruyter.
- Skarnitzl, Radek & Jan Volín. 2005. Czech voiced labiodental continuant discrimination from basic acoustic data. *Interspeech 2005*, Lisbon, Portugal, 2921–2924.
- Volín, Jan. 2010. Fonetika a fonologie. In Václav Cvrček (ed.), *Mluvnice současné češtiny* [Grammar of contemporary Czech], 35–64. Prague: Karolinum.
- Volín, Jan & Radek Skarnitzl. 2006. Fonologická výjimečnost české znělé labiodentály [Phonological singularity of the Czech voiced labiodental]. In Zdena Palková & Jana Janoušková (eds.), *Kapitoly z fonetiky a fonologie slovanských jazyků* [Chapters from phonetics and phonology of Slavic languages], 253–268. Prague: Charles University.
- Žygis, Marzena. 2003. Phonetic and phonological aspects of Slavic sibilant fricatives. In Tracy A. Hall & Silke Hamann (eds.), *Papers in phonology and phonetics* (ZAS Papers in Linguistics 32), 175–213. Berlin: ZAS.