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Vowel Length in Scottish English

Bakalářská práce

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Prohlašuji, že jsem bakalářskou práci na téma "Vowel Length in Scottish English" vypracovala samostatně pod odborným dohledem vedoucí bakalářské práce a za použití pramenů uvedených v závěru bakalářské práce.

V Olomouci dne ……. .....

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Hana Dvořáková

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Charakteristika:

Práce se zabývá délkou samohlásek ve skotské angličtině a faktory, které ji ovlivňují. Cílem práce je shrnout dosavadní poznatky na toto téma a navrhnout výzkumnou studii, která by vliv jednotlivých faktorů porovnala a analyzovala jejich interakci. Ve skotské angličtině není samohlásková délka pevně spojena s kvalitou samohlásky, jak je tomu v jiných variantách anličtiny, především v RP, ale je ovlivňována fonetickým kontextem. Prokazatelně zde působí tzv. Aitkenovo pravidlo, které popisuje, jaký vliv má na samohláskovou délku její hláskové okolí, zatímco vliv jiných faktorů zatím nebyl dostatečně prozkoumán. Proto tato práce kromě teoretické části obsahuje rovněž návrh výzkumu, který by zkoumal vliv přízvuku na samohláskovou délku ve skotské angličtině a analyzoval jeho interakci s Aitkenovým pravidlem.

ANNOTATION

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Characteristics:

The thesis is focused on vowel length and vowel duration in Scottish English, and the influencing factors. The aim is to summarize the information on this theme and to propose a research project that would compare the effect of the influencing factors, and that would analyse their interaction. In Scottish English, vowel length or vowel duration is not closely bound to vowel quality, as in the other forms of English, especially in RP, but it is determined by its phonetic context. Provably, Aitken's law operates here, describing the effect of the following sound on vowel duration, while the effect of other factors has not yet been examined sufficiently. Therefore, the thesis proposes a research project that would examine the effect of stress on vowel duration in Scottish English, and that would analyze its interaction with Aitken's law.

1 Introduction

This thesis focuses on vowel length in Standard Scottish English. Although vowel length distinguishes this accent of English from Received Pronunciation (RP henceforth) in a very particular way, literature lacks a comprehensive systematic description of current state of vowel length in Scottish English. The actual alternations of vowel length depend on many factors both in RP and in Scottish English, but in neither of these two variants of English the rules governing interaction of those factors are described sufficiently. Even though vowel length rules are stated both for RP and Scottish English, recent studies tend to point at their inconclusiveness.

As a geographical variation of English, Scottish English is governed by phonological rules which are different from those operating in RP. The allophonic variation resulting from the effect of these rules, moreover operating on a phonemic system which is also modified in Scottish English, along with vocabulary and grammar, distinguishes Scottish English from RP English and other English accents.

Vowel length in Scottish English, regarded as allophonic, causes a lot of confusion. This thesis aims to give a description of vowel length in Scottish English, to review the factors that influence vowel length in Scottish English, and to propose a project which would investigate the influence of stress as a specific factor affecting vowel length, and its interaction with other factors influencing vowel length in Scottish English. For the theoretical background this study relies on findings of linguists who have examined allophonic variations in vowel length in Scottish English, namely J. Derrick McClure (1977 and 1994), Nigel Hewlett, Ben Matthews, James M. Scobbie (1999), and Monika Pukli (2004), and linguists who examined vowel length in English in general, namely D. B. Fry (1955), and Thomas H. Crystal and Arthur S. House (1988).

The theoretical review will conclude with an outline of a research study of Scottish vowel length. The study will focus on Standard Scottish English (SSE henceforth) which is described by McClure (1994) as one of one of national standards of English. It is "an autonomous speech form, having the status of one among the many national forms of the international English language. … Within Scotland it is widely spoken in all regions ..., and is the characteristic speech of the professional class and the accepted norm in schools (McClure 1994, 79 – 80). Wells considers SSE simply as "Standard English spoken with a Scottish accent" (Wells 1982, 395).

Although SSE "originated as a compromise between London standard English and Scots" (McClure 1994, 79), it should not be confused with Scots, which is the traditional dialect spoken in central, southern, and north-eastern Scotland. The boundary between these ways of speaking, according to Wells, is well noticeable in rural areas whereas „in urban areas and particularly in the industrial cities, there is a continuum of variation such as that one cannot make a clear-cut distinction" (Wells 1982, 395).

Since this paper focuses on Standard Scottish English, the proposed study will focus on college-educated professionals living in Scotland, being native speakers of Scottish English.

This thesis is structured as follows. In chapter 2 vowel length in RP English is discussed, chapter 3 deals with vowels in SSE, special attention being paid to vowel length. Since vowel length in SSE is influenced by phonological rules which do not operate in RP, we will summarize the interaction of the general English vowel length rules with the special rule affecting SSE referred to as Scottish vowel length rule (SVLR henceforth). We will then set apart the unexplored factors influencing vowel length in SSE which SVLR does not relate to. Proceeding from the general rules operating in RP a possible influence of the unexplored factors on vowel length in SSE will be discussed, and finally in chapter 4 a research study will be proposed which would test them in practice.

2 Vowel length

This chapter will provide the introduction to vowel length as well as the elementary description of phonological rules which influence it in RP English.

Vowel duration is determined by articulation. “The length of a sound is the length of time during which it is held on continuously in a given word or phrase” (Jones 1964, 232). While there is no doubt that quality of vowel phonemes is considered as their distinctive feature, quantity of vowels in RP may be considered by linguists either to be phonemic or allophonic. Nevertheless, we cannot say that one analysis is better than the other. If we look at them closely, we can even find that neither of them describes vowel length as definitely phonemic or definitely allophonic.

2.1 Phonemic and allophonic vowel length

Gimson, followed by Roach, suggests that vowel length in RP English is phonemic. English vowels are classified as short or long according to their length. Roach emphasizes that they are only *relatively* short or long, without any fixed boundaries between these two categories, because a vowel duration depends also on the context, both segmental and suprasegmental.

Gimson lists short vowels as follows: /ɪ, e, æ, ɒ, ʊ, ʌ, ə/. As long monophthong vowels he classifies /iː, uː, ɑː, ɔː, ɜː/ (Cruttenden 2008, 92). Furthermore, Roach (1991, 19) states that only the symbols before the length marks differentiate the phonemes, while the length marks are additional, because they only signalize phonetic lengthening.

Cambridge and Oxford dictionaries use this set of vowel symbols with the length marks, too. Furthermore, they extend it with symbols of so called weak vowels /i/ and /u/. “The symbol /i/ represents a vowel

that can be sounded as either /iː/ or /ɪ/, or as a sound which is a compromise between them. … In the same way, the two vowels represented /uː/ and /ʊ/ must be kept distinct but /u/ represents a weak vowel that varies between them." (Oxford Advanced Learner's Dictionary 2011)

English vowel length is by no means regarded phonemic by everybody. Jones (1964) classifies vowels according to their quality and he derives vowel length from their tenseness/laxness: He differentiates vowels according to muscular tension of tongue and lips needed to pronounce a vowel. He states that "tense vowels are those which are supposed to require considerable muscular tension on the part of the tongue; lax vowels are those in which the tongue is supposed to be held loosely" (Jones 1964, 39).

Following Jones, Ladefoged states that the difference between them "can be discussed in terms of the different kinds of syllables in which they can occur. … None of the vowels /ɪ, ɛ, æ, ʊ, ʌ/ … can appear in stressed open syllables" (Ladefoged 2001, 81). Furthermore, he establishes the pairs of vowels consisting of one lax and one tense vowel similar in quality, explaining that "the lax vowel is shorter, lower, and slightly more centralized than the corresponding tense vowel" (Ladefoged 2001, 81). Although he defines laxness by means of quantity like this, he considers vowel length non-phonemic, maintaining that "in most varieties of English, variations in lengths are completely allophonic" (Ladefoged 2001, 232).

It is obvious that even though he replaces the short/long opposition by the lax/tense opposition, trying to evade phonemic vowel length in this way, he cannot avoid it in the definition of laxness and tenseness. In saying that the lax vowel is shorter than the corresponding tense vowel he accepts that vowel length is somehow implemented in tenseness or laxness of a vowel. It appears that vowel length in RP English cannot be purely allophonic then. If it was, tense vowels would be possibly realizable as short and lax vowels would be realizable as long, which is actually impossible in RP English (but possible in SSE which will be discussed below).

It appears, that substitution of a tense/lax opposition for a short/long opposition is more or less matter of terminology. Within Jones's and Ladefoged's approach, a term of phonemic length is replaced by tenseness and as a result only allophonic vowel length remains.

2.2 Contextual influences on vowel length in RP English

Whether the conclusion of the discussion above is that vowel length is phonemic or that it is allophonic, it has no impact on the fact that duration of a vowel depends on the context in which it occurs, both segmental and suprasegmental.

Concerning the segmental context, there are several phonological rules relating to vowels in all accents of English. They describe which variation of a phoneme will appear in a specific segmental context.

One of those factors influencing vowel length is the actual length of the word in which a vowel occurs, or rather, the number of syllables in the word. A vowel will be longest in a monosyllabic word, shorter in a disyllabic word and shortest in a word with more than two syllables.

Vowel length is also influenced by the structure of a syllable. What affects the duration of a vowel is not the onset of the syllable, but only the coda. A vowel will be longer in an open syllable than in a closed syllable. Even though this is claimed as a general rule influencing vowel length, it did not have the expected effect on vowel length in a research study by T. H. Crystal and A. S. House (1988). The study examined the durations in American English, nevertheless its conclusions are applicable to RP English as well.

Although the aim of the study was to explore the effect of stress on speech sounds, it is obvious from the measurements that there is no regular distinction between the mean duration of vowels followed by

a consonant and that of vowels followed by a word boundary, which does not match with the general rule. The partial results are shown in Table 1. Since the object of these measurements was a vowel length in word-final syllables, the influence of pauses following the measured words can be observed too, and apparently their effect is much more significant than presence or absence of coda.

Table 1. Mean durations of four short vowels and seven long vowels, in milliseconds. The stress conditions: unstressed and primary or secondary stressed. V stands for vowel, C stands for consonants, # stands for word boundary. Also the presence or absence of following pause is taken into account.

	Unstressed	Stressed
	Short vowels	
V # no pause	49	65
VC # no pause	58	86
V # pause	65	-
VC # pause	83	147
	Long vowels	
V # no pause	77	115
VC # no pause	78	140
V # pause	107	253
VC # pause	127	196

There is also a rule governing closed (terminated) syllables or better, vowels immediately followed by a consonant. If a vowel occurs before a consonant, its length is influenced by the fact that the consonant is voiced or voiceless (Chen, 1970). Ladefoged states that “a given vowel is longest

in an open syllable, next longest in a syllable closed by a voiced consonant, and shortest in a syllable closed by a voiceless consonant" (Ladefoged 2001, 83). In addition, Gimson states that if voiced /m, n, ŋ, l, r/ which do not have voiceless counterparts close a syllable, vowel before them is "approximately halfway between that before other voiced consonants and before voiceless consonants" (Cruttenden 2008, 95).

Gimson also refers to a study by K. Wilk from 1965 which showed that a rule of shortening vowels before voiceless consonants affects various vowels in a various degree. These differences are demonstrated in Table 2. The length was measured in csecs. in accented monosyllables. According to the data in Table 2 it is obvious that shortening of long vowels and diphthongs is more striking than shortening of short vowels. That corresponds to Jones's statement that length of short vowels depending upon their environment varies less in degree so that these variations "are, however, not sufficiently noticeable to be of importance for practical linguistic work" (Jones 1964, 235).

In Standard Scottish English, Scottish vowel length rule which is discussed in section 3.2 acts in a very similar way, also influencing various vowels in a various degree.

Table 2. The duration of English vowels. Measured in csecs. in accented monosyllables.

	word-final	+ voiced C	+ nasal C	+ voiceless C
Short vowels	30.6	17.2	13.3	10.3
Long vowels		31.9	23.3	16.5
Diphthongs		35.7	26.5	17.8

A research by Crystal and House (1988), which was primarily focused on the influence of stress on vowel duration, brought surprising results comparing the duration of vowels followed by voiced obstruents with those followed by voiceless obstruents, which confirmed Crystal's and Houses' previous conclusions: “The mean differences in vowel duration preceding voiced and voiceless consonants in word-final position – without being specifically prepausal – do not signal the voicing characteristic of the consonant, … ; in those instances where a difference does obtain, it is likely to be misleading” (Crystal and House 1988, 1578). Obviously, these conclusions contradict the general rule of pre-fortis clipping.

The essential factor influencing vowel duration is also the presence or absence of stress. A vowel is longer when occurring in a stressed syllable than the same vowel in an unstressed syllable. The perception of stress is produced along with duration also by speech-sound amplitude and fundamental frequency (Crystal and House 1988, 1574). Their relevance for examining the stress is not equal. While a study by D. B. Fry (1955) resulted in a conclusion that “the duration ratio has a stronger influence on judgments of stress than has the intensity ratio” (Fry 1955, 767), another research by Philip Lieberman (1959) showed that “the fundamental frequency seems most relevant” (Lieberman 1959, 453). Still, Lieberman admits that the judgment of stress depends on multiple cues. And although he presents a program attempting to resolve the process of this judgment, he closes the discussion with a statement that “no conclusion with regard to the most important single acoustic correlate of syllable stress can be made” (Lieberman 1959, 454).

Regardless of the discussion about the relevance of those particular cues, vowel duration and stress are closely connected: Vowel length increases with stress. Crystal and House (1988) examined the influence of stress on vowels in various contexts and the results were unambiguous. Comparing stressed and unstressed vowels, the stressed vowels were twice as long as

the unstressed, in general. Further, Crystal and House (1988) compared how much stress can influence short vowels versus long vowels. The results are shown in Table 3, reflecting a significant lengthening in both cases. Obviously, stressed short vowels are generally even longer than unstressed long vowels.

Considering the facts about the influence of presence or absence of coda, we can say that stress affects vowel length much more than following sounds.

Table 3. A comparison of mean durations of short and long vowels; measured in milliseconds.

	Unstressed	Stressed
Short vowels	56	93
Long vowels	78	141

3 Vowels in Stadard Scottish English

As was said above, in Scottish English vowels are different from those in RP English both in their phonemic inventory and their allophonic realizations. To understand the complexity of vowel length in Scottish English, its vowel inventory will be introduced at first, then the set of vowels which SVLR operates on will be set apart and finally Scottish vowel length rule itself will be discussed.

3.1 Scottish vowel inventory

Phonemic vowel inventory in Scottish English is different from that in RP English. Wells (1982) gives a detailed description of Standard Scottish English vowel system, considering geographical and social diversity of Scottish English speakers, often digressing from SSE to depict all variants possible in Scottish English. Giegerich (1992) describes vowel inventory in SSE as well, but his description is more abstract and far from detailing dialectical variations.

Compared to RP, there is no phonemic vowel length in Standard Scottish English, and SSE vowel system is different also in the absence of certain vowel contrasts. Generally we may say that it lacks pairwise oppositions of /u/ - /ʊ/, /ɔ/ - /ɒ/ and an opposition /ɑ/ - /æ/. It has single phonemes /u/, /ɔ/, and /a/ instead. Vowels which are missing in SSE system are the lax ones which in RP occur only in closed syllables. The remaining tense vowels /u/, /ɔ/, /a/ replace them, therefore *pool/pull, cam/calm* or *cot/caught* are homophones in SSE.

But we should note that this is rather a simplified description. According to Wells (1982, 401 – 403), while the merger of /u/ and /ʊ/ is a phenomenon common to all Scottish accents regardless of geographical and

social distinctions, the occurrence of the opposite phonemes to /ɔ/ and /a/ is not impossible in SSE. Some speakers do have a contrast between phonemes /ɔ/ and /ɒ/, or /ɑ/ and /a/, depending on their geographical and social backgrounds. In connection with this, Wells mentions Abercrombie from 1979 who claimed that "contrastive /ʊ/ implies the presence of contrastive /ɒ/, and contrastive /ɒ/ implies the presence of contrastive /ɑ/, but not the reverse" (Wells 1982, 403 – 404).

The complexity of the occurrence of /ɑ/ and /a/ also lies in a fact that they alternate as allophones [ɑ] and [a] according to their segmental context rather than they would behave like contrastive phonemes, which was found out in a study focused on a small group of speakers from Edinburgh University, by Winston in 1970 (see Wells 1982, 403).

In the phonemic vowel system of SSE phoneme /ë/ occurs which is not present in RP phonemic vowel inventory. Wells (1982, 404) describes it as "somewhat less open than cardinal 3 and considerably centralized," assigning it only to some speakers as a contrast to a phoneme /ɛ/. It can be commonly heard in words such as *heaven*, *next* or *twenty*. Phonemes /ɪ/ and /ʌ/ are, according to Wells, in educated Scottish accent of much the same quality as in RP English.

Unstressed vowels are considered by Wells (1982) quite problematic. In most Scottish accents there is /ɪ/ or /ʌ/ instead of RP vowel /ə/, while in Edinburgh speech a phoneme /ə/ occurs. A phoneme /i/ in word-final positions, e. g. in *happy*, is typically replaced by /e/, even if the word is suffixed then.

Concerning diphthongs, SSE lacks /eɪ/ and /oʊ/ and it has monophthongs /e/ and /o/ instead. Then, e. g. *make* is pronounced as /mek/, and *goat* is pronounced as /got/. Instead of RP diphthong /ɔɪ/ SSE has /ɒɪ/, and RP diphthong /aʊ/ is in SSE replaced by a diphthong which is better characterized by a symbol /ʌu/, having many sociolinguistic variations.

The situation of RP diphthong /aɪ/ is rather complicated in SSE.

It can be realized as lengthened [ae] or non-lengthened [ʌi] because it is affected by Scottish vowel length rule. It is the only diphthong which SVLR operates on. And it is the only case in which SVLR causes not only length variations but also a change of quality of vowel. The perplexity of /aɪ/ is further discussed also in Chapter 3.2 within the discussion on SVLR being not a purely allophonic phonological rule.

Geigerich compares the vowel inventory in RP English and SSE to conclude that "SSE has a considerably smaller inventory of vowel phonemes than, say, RP has" (Giegerich 1992, 53). On the other hand, in SSE a large scale of allophonic variations of vowels occurs, provided also by SVLR. Table 4 illustrates phonemic vowel system of SSE in comparison with RP to summarize the previous description and to see the differences better.

Table 4. A comparison of vowel systems of RP and SSE.

RP	SSE
/u/ - /ʊ/	/u/
/ɔ/ - /ɒ/	/ɔ/ - (/ɒ/)
/ɑ/ - /æ/	/a/ - (/ɑ/)
/ɛ/	/ɛ/ - (/ë/)
/ʌ/	/ʌ/
/i/ - /ɪ/	/i/ - /ɪ/
/ə/	/ə/
/eɪ/	/e/
/oʊ/	/o/
/aɪ/	/ae/ ~ /ʌ/
/aʊ/	/ʌu/
/ɔɪ/	/ɒɪ/

3.2 Scottish vowel length rule and context for vowel length alternations in SSE

"SVLR was first formulated in 1962 by A. J. Aitken (after whom it is also called Aitken's Law), although its effects had been observed much earlier, in dialect studies like Patterson (1860), Murray (1873), Watson (1923) and Zai (1942)" (McMahon 1991, 33).

According to SVLR, Scottish vowels and diphthongs are longer if they occur before voiced fricatives /v, ð, z, ʒ/, before /r/, before a word boundary /#/ and also before a morpheme boundary /+/. That means that they are longer not only in open syllables but also before inflectional suffixes, even if those suffixes do not begin with voiced fricatives.

SVLR applies to SSE together with other general rules for English vowel allophones described in Chapter 2.2, some of which are modified by SVLR. Provided that vowel length in RP English is influenced by stress, length of a word, and termination of a syllable, SVLR in SSE relates only to termination of a syllable, other general phonological rules concerning the influence of stress and length of word on vowel length in SSE being unmodified, or better, not examined enough to be considered as modified in SSE. The interaction between SVLR and general phonological rules valid in RP English are discussed more closely in Chapter 3.4.

Vowel length alternations before morpheme boundaries appear to be problematic. According to Giegerich (1992, 231), they cannot be considered purely allophonic. A lengthened form of a vowel preceding a morpheme boundary might be considered as a distinct phoneme rather than being an allophone. The reason for this conclusion is the fact that the fundamental property of allophones is their complementary distribution which means that two different allophones of one phoneme cannot possibly occur in the same phonetic context. If two different phones differentiate meaning of a word, they are realizations of two different phonemes.

Although vowel length in SSE is generally considered to be allophonic, length of a vowel before morpheme boundary should be considered as distinctive feature in fact. Since the phonetic context of vowel remains the same regardless of the presence or absence of morpheme boundary while vowel length varies, changing a meaning of a word, there should be no doubt that vowel length is phonemic here. Applying this conclusions e. g. to a diphthong /ai/, we cannot unambiguously state that the variations [ae] and [ʌi] are allophones or that they are separated phonemes (if they were, slash brackets would be used), because if they occur before a morpheme boundary, they should be considered phonemic, but in other SVLR cases they should be considered allophonic. Scobbie, Turk and Hewlett (1999, 1617) qualify this contrast caused by "the presence of a post-vocalic morpheme boundary" as "quasi-phonemic" or "marginal".

3.3 Vowels affected by SVLR

However simple the vowel inventory of SSE seems, Scottish vowel length rule complicates the situation in three ways. Pukli (2004) lists them as three fundamental phonological questions concerning firstly what vowel phonemes SVLR operates on, secondly why SVLR happens in the particular contexts, and thirdly whether it shortens long vowels, lengthens short vowels, or it should be regarded as a rule which simply causes alternating of vowels unspecified for length. In this thesis we will consider SVLR as a rule lengthening short vowels.

Pukli (2004), dealing with the question of which phonemes are affected by SVLR, discovers that there is no definite answer. She reviews the literature on this question very briefly but sufficiently, pointing at confusion in the matter. We can sum up Pukli's observations: According to Aitken

(1981), McClure (1977), and Wells (1982) SVLR in SSE involves all vowels except /ɪ, ʌ/. Giegerich (1992) states that SVLR relates only to tense vowels /i, e, a, u, o, ɔ/ and /ai/, while McMahon (1991) argues that it affects even lesser group of vowels, that is /i, e, u, o/ and /ai/ plus sometimes /a, ɔ/. Pukli also summarizes an empirical study by McKenna from 1988 showing that only /i/ and /u/ alternate in the SVLR, while Scobbie, Turk and Hewlett's research (1999) demonstrates that SVLR operates not only on /i, u/ but also on /ai/.

Finally, Pukli points out that no survey has been made yet, that would examine the entire vowel set of a sufficient number of speakers in any region. Nevertheless, we can set apart vowels that all mentioned linguists agree on to be affected by SVLR, and vowels that are not. Proceeding from their conclusions, we can claim without any doubts that subjects to SVLR are /i/ and /u/, and it seems very probable that also a diphthong /ai/ is affected, because McKenna from 1988 is the only one who does not mention it, the others considering it as affected. By contrast, resulting from the conclusions above, the only vowels that SVLR definitely does not operate on are /ɪ/ and/ʌ/. The other vowels are of uncertain state.

Although we divided Scottish vowels into these three groups, we cannot ignore the fact that the data which we are considering are only partial. This division is based on results rising from not sufficient material and therefore it cannot be regarded as definite. The question of different impact of SVLR on different vowels in different regions deserves complete research.

3.4 The interaction of SVLR and general English vowel length rules in SSE

To recapitulate what has been said so far, in Standard Scottish English both general English vowel length rules and SVLR operate. Their

effect on vowel length and their interaction are illustrated bellow in Table 5. In Table 5 there are three contexts influencing length of vowels in English: length of a word, stress, and presence and voicing of the following consonant. Their variables are arranged left to right according to relative vowel durations resulting from general phonological rules described in Chapter 2.2. Those phonological rules should not be examined in isolation. Their interaction has cumulative effect, so that the longest vowels should be in stressed, open monosyllables.

Table 5. Possible phonetic contexts for vowels in RP according to the eventual effect on vowel duration. C stands for consonant.

	Shorter > ---------- Vowel duration ------ > Longer
Sound following a vowel	voiceless C → voiced C → no coda (open syllable)
Stress	unstressed → stressed
Length of word	three and more syllables → disyllabic → monosyllabic

In SSE, Scottish vowel length rule complicates the distribution of vowel allophones in two ways: Besides voicing of a consonant following a vowel it takes into account the manner of its articulation as well, and it also operates with morpheme boundaries. However, stress and number of syllables in a word do not probably interact with SVLR, and operate independently. We are not aware of an empirical study that would examine their effect on vowel duration in SSE. Then, SVLR interacts only with the first category in the first line of Table 5.

Concerning the differences between the influence of a general phonological rule concerning segmental context on vowels in RP, and the influence of SVLR on vowels in SSE, it is obvious that depending on the following consonant or its absence there are only two potential degrees

of vowel duration in SSE: either non-lengthened or lengthened by SVLR, e.g. *peace* < *pea/please*, unlike in RP English where three degrees of varying vowel duration are predicted: vowel duration before voiceless consonants, before voiced consonants and vowel duration in open syllables, e.g. *peace* < *please* < *pea*.

In SSE, voicing of consonants following vowels does not seem to influence vowel duration. A relationship between SVLR and lengthening of high vowels /i/ and /u/ before voiced consonants was researched by Hewlett, Matthews and Scobbie (1999). Although the study was focused primarily on children's speech, the conclusions are applicable to SSE in general. They found out that in SSE a general rule of lengthening vowels /i/ and /u/ before voiced consonants operates only in a small degree, so that vowels before voiced consonants that do not cause SVLR effect are lengthened very modestly, if at all, in comparison with vowels before voiced consonants that do cause SVLR effect. (Hewlett, Matthews and Scobbie 1999, 2160) If this finding is further corroborated, we can consider SVLR as a complete modification of a rule describing the influence of a following sound on vowel length in SSE.

Hypothetically, varying of vowel length is also expectable within the group of allophones affected by SVLR in SSE. They might be arranged according to a presence/absence of following morpheme boundary and according to a manner of articulation of following heteromorphemic consonant. The question is, which criterion is more relevant for vowel length in SSE. If it was a manner of articulation, then long allophones would be arranged from the least lengthened to the most lengthened as follows: those before heteromorphemic non-fricatives without /r/ → before tautomorphemic voiced fricatives and /r/ → before heteromorphemic fricatives and /r/. If the major criterion was a presence/absence of a following morpheme boundary, allophones would be arranged from the least lengthened to the most lengthened like this: those before tautomorphemic voiced

fricatives and /r/ → before heteromorphemic voiced non-fricatives without /r/ → before heteromorphemic fricatives and /r/.

The results of McClure's empirical study (1977, 12-13) suggest that the criterion of a presence/absence of a following morpheme boundary is likely to be more relevant than a manner of articulation of following sound. For better notion of the results of his study they are partially reproduced in Table 6 below. There are also results of measuring allophones not affected by SVLR, and allophones before word boundary where vowels are longest which also corresponds with a general rule valid in RP. But these results should not be considered absolutely definite. The measurements relate only to one speaker from Ayrshire, and represents the mean duration for two utterances of the word in isolation (McClure 1977, 10). Although they do not represent average duration of vowels in connected speech, they confirm the hypothetical scale of vowel duration depending on its segmental context in SSE at least in isolation.

Table 6. Partial results of McClure's study of vowel duration in a Scottish accent (1977). Measured in csec. + stands for morphological boundary, # stands for word boundary

	i	**e**	**a**	**ɔ**	**o**	**u**	**ae**	**ʌu**
_t	12	20	20.5	18.5	18	13.5	23	23.5
_s	14.5	20.5	24.5	22	-	15.5	24	23
_d	13	21.5	26	23.5	23	13	32	-
_z	25.5	29	31.5	30	27.5	28	40	31.5
_r	28.5	31	32	29	31	29	40.5	32.5
_+d	28	31.5	35	33	31.5	34	43	36
_+z	30	35	39.5	36	37	34.5	44	38.5
_#	31.5	36	39	41.5	39	37.5	44.5	40

Although the influence of stress on vowel length in SSE has not been sufficiently researched yet, McClure (1977) partially takes it into consideration. He claims that SVLR operates only on those open syllables which are stressed, but he does not mention the influence of stress in other SVLR contexts at all. Still, there is no reasonable research that would examine the interaction of stress and vowel duration.

4 Research proposal

4.1 Research questions

In this chapter I will outline a research project which will examine the role of stress in Standard Scottish English. The aim of the research project is to find out whether stress influences vowel duration in SSE and to test its interaction with other factors potentially influencing vowel duration, that means vowel quality and segmental context. We will find out whether the interaction between stress and vowel quality is significant, whether the interaction between stress and segmental context is significant, and also whether the interaction of all these factors is significant.

In the research project we will state the degree of lengthening caused by the particular factors, both generally and depending on the influence of the other factors, and we will find out which factor has the most significant effect on vowel duration in SSE. According to the sources discussed in Chapter 3.2 concerning Scottish vowel length rule, segmental context influences vowel duration in SSE significantly, while vowel quality discussed in Chapter 3.1 does not. The research will also test these theoretical preconditions.

4.2 Methodotlogy

4.2.1 Stimuli

The first step in designing this study is to choose vowels from SSE vowel inventory which will provide the most reliable results. Since all the sources in Chapter 3.3 agree on the high vowels /i/ and /u/ to be affected by SVLR, and /ɪ/ and/ʌ/ not affected, we can consider these four vowels to be suitable for our purpose.

Since the study aims to compare the influence of stress on vowel duration of these two pairs of vowels, it is necessary to put them in the most similar contexts for the results to be the most accurate. We should state possible contexts in which the examined vowels really can occur in practice to avoid difficulties with not having a sufficient amount of material to measure and compare. Considering possible contexts in this way, it is necessary to exclude vowels followed by no coda, because /ɪ/ and/ʌ/ do not occur in stressed open syllables. Then, only closed syllables are appropriate.

Since we are going to measure vowel duration both in SVLR context and non-SVLR context, we will examine vowels in syllables with two different types of coda which are characteristic for these contexts. For SVLR context we will test vowels followed by voiced fricative /z/, and for non-SVLR context we will test vowels followed by voiceless stop /t/.

The tested words will be selected according to number of syllables in a word, because it is also a factor influencing vowel duration. The most appropriate words for testing are disyllabic autosemantic words.

Words containing /i, u, ɪ, ʌ/ followed by /z/ and /t/ in stressed syllables were easy to find in autosemantic words, e.g. *pity, cutler, bootie, cheating*. However, we run into difficulties with words containing the tested vowels in unstressed positions. Since the English lexicon seems to lack disyllabic words with unstressed /ʌ/ followed by voiced fricative /z/, we had to create a non-existing word to fill the missing stimuli.

The complete list of the selected test words is presented in Table 7. As we said above, the position for unstressed /ʌ/ in SVLR context had to be filled with a non-existing word. The word is *peabuzz* /ˈpibʌz/ where *pea* bears a stress and the measured part *buzz* remains unstressed. Since it will be a completely unknown word to speakers, they will have to become familiar with it before measuring to pronounce it naturally, as well as the other tested unusual words and compounds, to avoid the unwanted shifting of stress or slowing down the tempo of speech while recording.

Table 7. A list of measured words, according to phonemes that they represent, and according to contexts for realizations of these phonemes. The underlined parts will be measured.

	/i/	/u/	/ɪ/	/ʌ/
Stressed, in SVLR context	t<u>ea</u>ser	b<u>oo</u>zer	d<u>i</u>zzy	b<u>u</u>zzer
Unstressed, in SVLR context	boot<u>ie</u>s	voodo<u>o</u>s	rac<u>e</u>s	peab<u>u</u>zz
Stressed, in non-SVLR context	p<u>ea</u>ty	b<u>oo</u>tie	p<u>i</u>ty	b<u>u</u>tton
Unstressed, in non-SVLR context	lunchme<u>a</u>t	gumb<u>oo</u>t	profi<u>t</u>	peanu<u>t</u>

Although we have managed to find real words with the rest of the tested vowels in unstressed positions, most of them are objectionable as well, because unstressed vowels in SVLR context were found only before morpheme boundaries followed by the plural suffix *-s,* and also within the plural suffix *-es*.

In the former case, vowels are lengthened by SVLR both due to the presence of a morpheme boundary and due to the following voiced fricative. Since the interaction of these two factors within SVLR has not been examined yet, we do not know whether they have cumulative effect causing double-lengthening or they do not. In the latter case, the tested vowel occurs within a frequent grammatical suffix which can cause eroded vowel lengthening. Nevertheless, real words were chosen for testing rather than non-existing words for the stimuli to represent the real state of SSE as much as possible.

In order to control the effect of sentence stress on the vowel duration

in the examined words, the selected words will be placed in a carrier sentence “Say X once again,” where X stands for the examined word.

For the research material to be reliable it is necessary to choose the appropriate speakers. They should be educated native speakers, both men and women, professionals, probably of middle or higher class, without any speech abnormalities, living in Scotland, speaking Standard Scottish English. There should be enough of them to provide sufficient amount of material for the measurement to represent the real state of language. The appropriate number of speakers for the present study will be stated as twenty. Each test word will be pronounced twice by each speaker to avoid unwanted or accidental variations.

4.2.2 Equipment and Processing data

The data will be recorded on computer using a free recording software Audacity ® 1.3.13-beta, using a microphone in a stable position, in a quiet room, and will be digitized at 11,025 Hz. The recorded data will be exported to WAV format and analyzed using a free software for linguistic analysis, PRAAT version 5.2.23. Duration of the vowels will be measured from a simultaneous display of a waveform and a spectrogram.

4.3 The analysis procedure

From 20 speakers we will obtain 640 tested words as the source data for the analysis, each test word pronounced twice by each speaker, that is 160 samples for each vowel phoneme, 40 samples for each of 16 possible positions. To measure the vowel duration correctly we will have to identify the beginning and the end of periodicity. We will consider both waveform amplitude and waveshape, together with spectrogram. We will measure

the vowels from the beginning of a pitch period to the last peak of a period. We will have to distinguish voicing of the vowel and voicing of the consonants. A positive voice onset time will not be included in the measured time.

For a statistical analysis of the measured data we will use a two-way and three-way repeated measures analysis of variance (ANOVA). The independent variables are Stress, Context, and Quality of vowel. The dependent variable is Duration. Each of these within-speaker factors has two levels. The levels of Stress are Stressed/Unstressed, the levels of Context are SVLR/NonSVLR, and the levels of Quality are Lax/Tense.

4.3.1 The Main Effects

First we will consider the main effect of each factor separately, ignoring the effects of all other factors, and we will state whether the main effect of a given factor is significant or not. If the probability that the variation between the levels of the examined factor may have occurred by chance is less than 0,01 ($p < 0{,}01$) we can say that the factor has a significant main effect. In practice, to determine e.g. the main effect of Stress we examine the differences in Duration between Unstressed and Stressed vowels.

We will also state a ratio of lengthening between the levels of a given factor, e.g. the ratio of stress-caused legthening, determining to what extent the given factor influences vowel duration in SSE. In further examination these ratios can be used as the dependent variables for analyzing whether the differences among the ratios are significant, so that we can find out which factor is the most relevant for vowel duration in SSE.

4.3.2 The interaction between the independent variables

After we have learned the main effect of all factors, we will also examine the interaction between any of them. The interaction is determined by a simple main effect, which is a difference between vowel durations across one level of the first factor in one level of the second factor and vowel durations across the other level of the first factor in the same level of the second factor.

Before we examine the three-way interaction we will learn two of three possible two-way interactions; Stress by Quality, and Stress by Context. To learn whether the interaction between two factors is significant we calculate the simple main effects of one examined factor in both levels of another factor, we state the difference between them, and we test by ANOVA whether the final difference is greater than expectable by chance ($p < 0{,}01$).

In practice, if we examine e.g. the interaction of Stress and Context, we will calculate the simple main effect of Stress in SVLR Context, the simple main effect of Stress in NonSVLR Context, we will calculate the difference between them and then we will use ANOVA to find out whether the interaction is significant.

Examining the interaction between Stress and Context, we will find out whether the effect of Stress changes depending on Context, and whether the effect of Context changes depending on Stress. By simple comparison we will discover e.g. that SVLR Context in Stressed positions leads to longer Duration than in Unstressed positions, or e.g. that for NonSVLR Context, Stress has no effect.

Regarding the interaction between Stress and Quality, we will find out whether the effect of Stress changes depending on Quality, and whether the effect of Quality changes depending on Stress. We will discover e.g. that Stress in Tense vowels does not lead to longer Duration than in Lax

vowels, or e.g. that for Unstressed vowels, Quality has no effect.

Finally, we will make the analysis of the three-way interaction among all the independent variables, that means Stress by Context by Quality. We will learn whether the interaction is significant by a three-way repeated measures ANOVA.

5 Conclusion

I have proposed a research study that would examine the influence of stress on vowel duration in Standard Scottish English and its interactions with vowel quality and with segmental context.

The weak point of the proposed research study lies in the choice of the appropriate stimuli. Since there is not easy to find the tested vowels in unstressed positions in the English lexicon, we had to make use of unusual words or even non-existing words. Therefore, the speakers have to be familiarized with the examined words in advance to pronounce them naturally.

The other possible way of dealing with the problem of word stress is to examine the differences in vowel duration on the level of sentence stress instead, using the shift of semantic focus of the utterance, e.g. *I didn't LOSE your keys, I HID them.* Vs. *I didn't lose your KEYS, I lost your PURSE.*

From experience with RP English we expect that the main effect of Stress on Duration of vowel in SSE will be significant. Scottish vowel length rule predicts that also the main effect of Context will be significant. Nevertheless, we predict that the main effect of vowel Quality will not be significant, because in SSE, vowel length is not phonemic. Although we do not expect that in one phonetic situation vowels with different qualities have the same duration, the main effect of vowel Quality should not be significant. Nevertheless, the interaction of Quality with the other factors can be significant even if its main effect is not.

Concerning the interaction of Stress and vowel Quality, we can expect either that it will not be significant, that means that the lengthening caused by Stress will be approximately the same in lax vowels as in tense vowels due to the absence of phonemic vowel length which would also correspond with Crystal and House's general results from 1988, or supposing

that lax vowels are not subjects to the lengthening caused by Context they are neither lengthened by Stress, tense vowels will be lengthened much more than lax vowels, which means that the interaction between Quality and Stress can be significant in fact.

We can neither presume exactly whether the interaction will be significant between Stress and segmental Context. Provided that both Stress and Context have the main effect on Duration, which means that they lengthen vowel duration in SSE, it is expectable that vowel duration resulting from their interaction will be longer than if they operated separately, so that the longest vowel durations are expected to be in stressed positions in contexts affected by SVLR. Nevertheless, that does not mean that the interaction between them will be significant.

The difference between the effect of segmental context on stressed vowels and on unstressed vowels is hard to presume as well. And the interaction of all three factors is complicated in such a degree that any presumptions would be causeless. The analysis of variance in vowel duration in Standard Scottish English is then the essential requirement for further discussions.

6 Summary

V této práci se zabývám samohláskovou délkou ve skotské angličtině. Skotská angličtina je jednou z národních forem angličtiny, kterou hovoří obyvatelé Skotska. V žádném případě ale nemůže být zaměňována se "skotštinou" (Scots), která je vnímána jako samostatný, specifický dialekt.

Jedním z rysů, které skotskou angličtinu odlišují od ostatních národních jazykových forem, je systém samohlásek a jejich realizace. Nejen že má skotská angličtina odlišný samohláskový inventář a odlišnou kvalitu samohláskových alofonů, ale především zde, na rozdíl od samohláskové délky v RP, není samohlásková délka pevně spojena s kvalitou samohlásky, a v literatuře je proto označována jako alofonická.

Vzhledem k tomu, že je skotská angličtina dále vnitřně rozčlenitelná na několik variant, jako je spisovná skotská angličtina (Standard Scottish English) a teritoriální varianty – dialekty, které se mezi sebou do jisté míry liší, zaměřuje se tato práce především na spisovnou variantu skotské angličtiny.

Nejprve je zde podán přehled dosavadních teoretických poznatků a výsledků zkoumání na toto téma a poté je předložen návrh výzkumu, který by zkoumal samohláskovou délku ve spisovné skotské angličtině v závislosti na faktorech, které ji ovlivňují.

6.1 Přehled dosavadních poznatků

Jak už bylo řečeno, inventář samohlásek ve skotské angličtině je jiný než v RP. Například některé diftongy jsou zde monoftongizované (/eɪ/ → /e/, /oʊ/ → /o/), některé fonémicky krátké samohlásky se zde nevyskytují vůbec (/ʊ/) a jiné se vyskytují pouze v některých variantách skotské angličtiny (/ɒ/, /ɑ/, /ɘ/).

Pokud pak máme určit délku těch samohlásek, které se ve skotské angličtině objevují, nemůžeme je jednoznačně rozdělit na krátké a dlouhé, jak je to možné v RP, jelikož délka některých, především těch, které jsou v RP fonémicky dlouhé, je prokazatelně závislá na jejich hláskovém okolí. Existuje sice pravidlo o délce skotských samohlásek (Aitkenovo pravidlo), které popisuje, v jakém hláskovém okolí jsou samohlásky foneticky delší, ale v současnosti neexistuje jednotný názor na to, které samohlásky tomuto pravidlu podléhají a které nikoli.

Podle Aitkenova pravidla jsou samohlásky delší před znělými frikativami, před /r/, před morfematickými švy a v otevřených slabikách, tedy před pauzami. Lze proto říci, že samohlásková délka je zde určována hláskovým okolím, přesněji řečeno tím, co samohlásku následuje. Nabízí se otázka, do jaké míry bude jiné okolí než to, na něž se Aitkenovo pravidlo vztahuje, ovlivňovat samohláskovou délku ve skotské angličtině. Dalo by se sice očekávat, že zde bude působit efekt dloužení před znělými hláskami, jako je tomu v RP, ale tento byl ve skotské angličtině vyvrácen Hewlettem, Matthewsem a Scobbiem (1999). Jediný prokázný způsob, jakým tedy hláskové okolí samohlásku ovlivňuje, je dloužení vlivem Aitkenova pravidla.

Hláskové okolí však není to jediné, co má na délku samohlásky vliv. Dá se očekávat, že podobně jako v RP bude samohlásková délka i ve skotské angličtině ovlivněna délkou slova, respektive počtem slabik ve slově, a především také přízvukem. Nicméně vliv těchto faktorů na samohláskovou délku ve skotské angličtině nebyl dosud dostatečně zkoumán a není nám znám žádný zdroj, který by tuto hypotézu vyvracel nebo potvrzoval.

Práce proto předkládá návrh výzkumu, který by se vlivem přízvuku na samohláskovou délku ve skotské angličtině zabýval a který by rovněž analyzoval jeho interakci s Aitkenovým pravidlem a s kvalitou samohlásek.

6.2 Návrh výzkumu

Navržený výzkum předkládá postup, jakým lze zjistit a analyzovat vliv přízvuku na samohláskovou délku ve spisovné skotské angličině. Podle teritoriálních, jazykových, sociálních a biologických kritérií bude vybráno 20 mluvčích, kteří budou číst vybraná slova obsahující zkoumané hlásky v určeném kontextu, zasazená do reálné výpovědi. Promluvy mluvčích budou nahrávány a digitalizovány a tento nahraný materiál bude poté sloužit jako korpus měřených dat.

Zkoumanými hláskami budou nenapjaté (lax) hlásky /ɪ, ʌ/ a napjaté (tense) hlásky /i, u/, a to z toho důvodu, že míra pravděpodobnosti, s jakou jsou či nejsou předmětem působení Aitkenova pravidla, je u nich v porovnání s ostatními hláskami inventáře spisovné skotské angličtiny nejvyšší. Proto na nich bude interakce přízvuku s ostatními faktory nejprůkaznější.

Ze slov obsahujících zkoumané hlásky budou poté tyto hlásky selektovány a bude měřena jejich délka v počítačovém programu Praat za pomoci tvaru křivky a spektrogramu. Naměřená data budou reprezentovat hodnoty závislé proměnné – Délky samohlásek, která bude určována nezávislými proměnnými, jimiž budou pro účely analýzy naměřených dat Kvalita samohlásky (napjatá/nenapjatá), Přízvuk (přízvučná/nepřízvučná) a Okolí (přítomnost/nepřítomnost okolí podmiňujícího dloužení vlivem Aitkenova pravidla). Metodou vhodnou pro analýzu získaných dat bude trojcestná analýza variance (ANOVA) s opakovanými měřeními.

Účelem navrženého výzkumu jsou zjištění, zda hlavní efekty každého z faktorů, o nichž předpokládáme, že ovlivňují samohláskovou délku ve spisovné skotské angličtině, jsou ve vztahu k ní průkazné, a dále jakým způsobem se tyto faktory mezi sebou ovlivňují.

Konkrétně je zde tedy navržen postup, kterým lze ověřit, zda je samohlásková Délka ve spisovné skotské angličtině závislá na Kvalitě samohlásky a na Okolí, a kterým lze rovněž zjistit, zda je ovlivněna také

Přízvukem. Návržený výzkum by měl dále zkoumat vzájemné interakce mezi těmito faktory a zjistit, zda jsou v jednotlivých případech průkazné.

V rámci zkoumání hlavních efektů by měly být rovněž stanoveny míry dloužení samohlásek vlivem jednotlivých faktorů, aby pak mohly být analyzovány za účelem zjištění, který z faktorů má na délku samohlásek ve spisovné skotské anglčtině nejsilnější vliv.

6.3 Závěr

Navrhla jsem tedy výzkum, který má zkoumat vliv přízvuku na samohláskovou délku ve spisovné skotské angličtině a jeho interakce se samohláskovým okolím a kvalitou samohlásek.

Slabinou navrženého výzkumu je problematická volba stimulů. V rámci výběru reálných slov, které by byly k výzkumu vhodné, bylo zjištěno, že se v anglickém lexikonu vyskytuje jen velmi málo slov obsahujících zkoumané hlásky v nepřízvučných pozicích. Pokud jsme taková slova našli, použili jsme je, i přestože byla pro výzkum v některých směrech riziková (viz Chapter 4.2.1), za tím účelem, aby navržený výzkum mapoval co nejlépe skutečný stav spisovné skotské angličtiny.

Pro ty pozice, které lze v reálném jazyce jen těžko nalézt, je potom nutné vytvořit slova umělá, která nám ale neposkytnou informace o reálném stavu jazyka. Takové slovo bylo v navrženém výzkumu použito jen jednou. Další možností, která se pro řešení problému se slovním přízvukem nabízí, je nahradit jej větným a zkoumat tak rozdíly na úrovni přízvuku větného. Tato možnost však v navrženém výzkumu využita nebyla.

Co se týká předpokládaných výsledků výzkumu, lze ze zkušeností s RP očekávat, že hlavní efekt Přízvuku na samohláskovou Délku bude průkazný, a ze zkušeností s Aitkenovým pravidlem lze rovněž očekávat i průkazný hlavní efekt segmentálního Kontextu. Hlavní efekt samotné Kvality

samohlásek lze předem odhadnout jako neprůkazný, neboť ve spisovné skotské angličtině se s fonémickou délkou samohlásek nesetkáváme.

I přes to, že průkazný hlavní efekt Kvality samohlásek na Délku samohlásek zde nepředpokládáme, její interakci s Přízvukem nelze vyloučit. Rozdíl mezi dloužením samohlásek /i, u/ (napjatými) a /ɪ, ʌ/ (nenapjatými) vlivem Přízvuku sice pravděpodobně průkazný nebude právě z důvodu absence fonémické samohláskové délky, ale vzhledem k očekávané průkazné interakci mezi Kvalitou samohlásek s Kontextem ve spisovné skotské angličtině, tedy vzhledem k platnosti Aitkenova pravidla, kterou by měl výzkum ověřit, je možné, že podobnou interakci zjistíme i ve vztahu Kvality samohlásek a Přízvuku.

Stejně tak nemůžeme jednoznačně odhadnout ani průkaznost interakce mezi Přízvukem a Kontextem. Je sice zřejmé, že díky tomu, že Přízvuk i Kontext mají průkazný hlavní efekt na Délku samohlásek ve spisovné skotské angličtině, což má výzkum ověřit, lze očekávat, že nejdelší budou samohlásky v přízvučných pozicích před /z/, ale tento fakt ještě nevypovídá nic o tom, zda bude interakce mezi Přízvukem a Kontexem průkazná. Rovněž nelze předem odhadnout ani to, zda bude Přízvuk ovliňovat dloužení vlivem Kontextu, tedy zda bude Aitkenovo pravidlo působit i na nepřízvučené hlásky.

Proto je nezbytné, aby byl proveden výzkum, který by ve spisovné skotské angličtině vliv přízvuku na samohláskovou délku a jeho interakci s ostatními ovlivňujícími faktory analyzoval, všechny položené otázky tak zodpověděl a vnesl do problematiky samohláskové délky nová fakta.

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