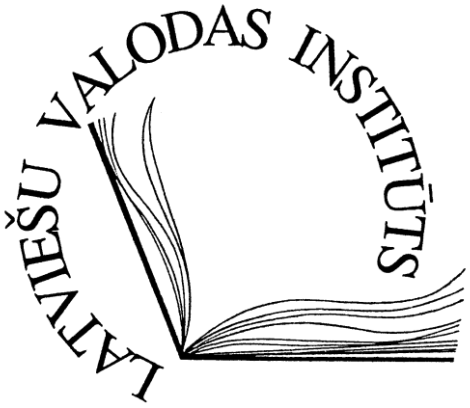

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of the University of Latvia

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CONTEMPORARY RESEARCH IN PHONETICS AND PHONOLOGY: METHODS, ASPECTS AND PROBLEMS

ABSTRACTS

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CONTENTS

PHONEMES, CONTEXT, ALTERNATIONS: BACK TO BASICS AND BACK AGAIN

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The proposed paper deals with the question how perfect the identification of phonemes is. For that reasons we turn our attention back to basic terms, taken for granted and not reviewed any more: phoneme, archiphoneme, alternation and (allo)phone. The matter needs a new reanalysis since all above used terms are today simply taken for granted and not considered as working terms only serving the higher principle: proper phonemic analysis.

The analysis of phonemic data reveals both **phones** and **strings** (syntagmata) they are present in. This analysis is done using a preliminary **segmentation** of data on strings of (proto)phones and a **substitution** test to verify both strings and phones. Another step in the analysis is to identify phonemes beyond the set of phones, i. e. **distributional** analysis of phones in a given context and all (syntagmatic) alternations we can describe. This leads to final description of phonemes and patterns strings are bound to.

But in some context this analysis of some phones could not be finished with a final identification of a given phoneme, since the context allows only limited number of phones to be present in a context.

Example will be demonstrated on the alternation of voice in given Indo-European languages. As known, this alternation is between voiced (D) and voiceless stops (T). In most context we can surely identify input phoneme, for example in Czech string of phones [hrat] ‘castle’ is the last phone [t] an allophone of the phoneme /d/ in the position at the end of the word, because the string is a nominative of the morpheme *hrad* and in other cases we meet [d]: [hradu], [hradem], etc. Same situation we face in Sanskrit, with the nominative [pāt] ‘foot’, with other cases [pādam], [padaḥ], etc. Contexts like those are contexts with a known alternation and hence with a known qualities of phonemes present in them, since phonemes could appear in other contexts, too.

On contrary, in some contexts given phones do not alternate, or in other words in those context given phone has no alternation with other phone, hence it is not possible to attach given phone to a given phoneme: cf. Czech *dbalý* [db-] ‘careful’, Lithuanian *duktė* [-kt-] ‘daughter’ or Sanskrit *kṣatra-* [-ks-] ‘power’, Greek *osteon* [-st-] ‘bone’, Latin *stella* [-st-] ‘star’. In those contexts, we cannot determine the quality of voice of a phoneme in the left position of a given cluster, since phonemes in that position synchronically do not alternate. The voiced/voiceless quality of a given phone is without question, but that quality is bound to the quality of a following phone/phoneme. Phonemes in the left position then could be stated as dental/alveolar stops, even as stops taking part on the opposition of voice, but nothing more. Hence some phonemes in some context could be qualified and classified only according to the classes it belongs, but not in concrete values of given classes, or in other words, in some contexts we cannot distinguish the phonemic value of a given phoneme; we can only identify a class of phonemes to which a given phoneme belongs. It seems we have to take for granted that in some contexts are phonemes “fuzzy” and accept it somehow theoretically.

PHONETIC TRANSCRIPTION IN THE CORPUS OF SPONTANEOUS RUSSIAN[*]

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A Corpus of Spontaneous Russian that is being elaborated in St. Petersburg State University (*http://narusco.ru/search/trn-search.php*) includes around ten hours of radio interviews, talk and reality show recordings transcribed orthographically. As it is aimed to be used for spoken word recognition modelling, an acoustic-phonetic transcription is required as well. The algorithm of phonetic transcription that is going to be discussed in the presentation has already been applied to 115 minutes of the material.

Firstly, all recordings were manually divided into interpausal fragments (even very short pauses and glottal stops being taken into consideration). Then, a group of trained phoneticians transcribed every interpausal fragment by listening to short asemantic one-syllable long pieces and simultaneously analyzing spectrograms and waveform displays. The set of symbols used for the transcription (*http://narusco.ru/transkrip.htm*) consists of Roman alphabet characters with a minimal use of upper case and is partly similar to the X-SAMPA system (*http://www.phon.ucl.ac.uk/home/sampa/ipasam-x.pdf*).

In the presentation, I am going to discuss some problems we came across while performing the transcription and to show how we coped with them. Some of the problems seem to be language-specific (such as the detection of a stressed syllable), whereas the others can occur while transcribing any spontaneous text. The latter include, for example, variation in the experts' description of one and the same sound/syllable or the transcription of voiceless vowels, some of them being so short that it is impossible to define their quality.

Despite these problems, we suppose the algorithm described to be more adequate for spontaneous speech description than an automatic transcription, which anyway requires a revision of the results performed by an automatic transcriber and may turn out to be even more time consuming and less accurate.

The segmentation into interpausal fragments showed that around 30 % of all semantic-syntactic units in the texts analyzed are broken by pauses. Some examples of this phenomenon as well as its possible application for spontaneous speech recognition modelling will be provided in the presentation.

The combination of the orthographic and phonetic descriptions allowed us to generate automatically a frequency word list where every orthographic form is provided with all its realizations in the recordings analyzed along with the frequency of each realization. This word list is now being used for studying word reduction in spontaneous Russian.

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FUNCTION WORD PROMINENCE IN PUBLICISTIC STYLE OF INTONATION

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Language variation, being characteristic of all language levels, fully pertains to the stylistic level. Style can be interpreted as a motivated choice of linguistic means. It is distinctive linguistic expression used for some purpose and to some effect (Verdonk 2002, 3–5). Phonostylistic variations depend on the aim and the form of communication and the speaker's attitude. Stylistic variation manifests itself not only on the segmental but also on the suprasegmental level of speech including intonation, stress, tempo, rhythm and voice timbre. All languages involve some intonational variation in style, class and sex. In all languages, there are varying styles of intonation appropriate to different situations (Cruttenden 1997, 128).

The purpose of the publicistic style of intonation apart from passing over the intended message is affecting the audience emotionally (Sokolova et al. 1991, 185). Features of publicistic style are evident in political speeches, debates, press conferences, etc. Usually speeches are thoroughly prepared and read out. However, depending on the particular genre they may obtain different degrees of spontaneity.

Individual lexical items take different meanings when different intonations are imposed. It is natural that the 'content' use of expressions (as opposed to the 'function' use) is cued by accent (Bolinger 1989). The speaker's choices besides the overall pitch contours include the division of the utterance into tone units and the realization of prominence since the selection represents what the speaker considers prominent or non-prominent matter. In connected speech, it is usually content words that are highlighted in contrast to function words. On the other hand, there are cases when function words are made prominent.

The paper will look closer at the treatment of function words in publicistic style in Latvian. To obtain the necessary information excerpts of several Latvian public speakers' speeches and parts of discussion broadcast programmes were selected for auditory analysis. The excerpts were transcribed indicating phrase/sentence stress of every utterance focusing attention on function words that are stressed, particular point of interest being whether they may indicate a shift of meaning in comparison with an ordinary usage of this category of words. Among them, there are conjunctions, prepositions, relative pronouns and particles.

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CONVEYING EMOTIONS IN SPEECH FOR THE HEARING AND DUAL-SENSORY IMPAIRED

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Emotions in a conversation are conveyed not only through a person's voice, but also in facial expressions or behavioral markers. But how are the emotions perceived if you cannot hear or see very well? As the state-of-the-art of hearing aid technology still struggles with speech encoding in a neutral tone as well as speech in noise (Limb & Roy 2014), it is understandable that emotional content in speech might result in distorted, even in unintelligible source signal. For the hard-of-hearing people, the facial expressions and the behavioral expressions of emotions are beneficial for emotion recognition in a face-to-face conversation.

If there is additional visual impairment, the recognition of emotional content becomes even more difficult as one cannot even rely on the visual markers of emotions, such as facial expressions. Emotion-related facial expressions are usually minute and without contrasts making them difficult for the visually impaired person to perceive (*www.lea-test.fi* — contrast and visual impairment). It might be that the conversation partner takes that into account by using verbalizations of emotions or emotional behavior, such as "I am sad, because..." or "I am smiling...". This requires special understanding for the dual-sensory impairment. These emotional markers are very easily missed because of the limitations of both visual and acoustical cues in conversation (Waaramaa & Leisiö 2013). That is the reason why these verbal markers of emotions might need repetition and furthermore, when the emotion is more intense, it might be difficult to rely solely on verbalizations and to maintain one's articulation on a neutral basis, as this is more straightforwardly and reliably conveyed by the hearing aids and cochlear implants. In such instances, other ways of expressing and relaying of emotional content of discussion are needed.

This alternative and augmentative way of enhancing emotional expressions is relayed by specialized touch based emotional message markers called haptices (e. g. Lahtinen & Palmer 2008). These are based on facial expressions and behavioural signs of emotions transferred into touch based messages, which can further be modified according to the intensity of the emotional content of the spoken utterance. These haptices can be used either directly onto the body of the other person within a conversation, or when a dual sensory impaired person uses interpreting services the interpreter can provide emotional haptices based on the conversation content as a part of so-called environmental description. Environmental description is also used by visually impaired people as well as other disability groups.

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AN ANALYSIS OF THE DIFFERENCES IN THE PRONUNCIATION OF THE BACK OPEN OR NEAR-OPEN VOWEL AMONG INDIVIDUAL PERSIAN SPEAKERS

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This study aims at trying to understand why a possible misconception may arise in the case of students of Persian and others in connection with the vocalism of modern Persian, and in doing so advance the development of a better clarification of this and other problems, mentioned in passing, for future descriptions. This would appear necessary if the teaching of Persian is to be freed from what this author considers to be some misleading descriptions and terminology. But not only language instruction; technical applications must also beware of these difficulties, and of course research itself. The main problem discussed here concerns the quality of that back vowel which, in this article will be represented by the IPA /ɒ/ as generally presented in the standard language, for the sake of convenience, even if this does not necessarily seem to be the appropriate symbol. The variables which were analyzed in order to determine articulation strategies adopted by individual speakers were position of the vowel in the vowel chart, length of the vowel, and degree of roundedness. The parameters analyzed were formants 1–4, vowel length and intensity.

The results are based on the recordings of nine informants from a wide area in the western areas of Iran four of which informants were from Tehran, the others from the provinces, and representing different age groups and occupations, male and female. The informants read the same material in speech style, each pronouncing approximately 200 vowel phonemes for analysis. The approach was qualitative rather than quantitative in the sense that comparison was made between speakers, rather than as a summary of the statistics of the averages of vowel parameters, in order to detect those aspects that contributed to a particular quality of pronunciation of the vowel under discussion for individual speakers.

The main finding was that it is mistaken to assume that /ɒ/ is regularly more closed or even, as some charts suggest, more open than /æ/ although otherwise the same or that it is a longer version of /æ/, and that any other articulation which disregards either of these two distinguishing conditions would lead to incorrect pronunciation. The speaker informants differentiated /ɒ/ from the neighboring phonemes /æ/ and /o/ in several different ways, changing the quality of the vowel and thus its representation in the IPA as might be expected, but this phoneme was never under any circumstances more open than /æ/. Respecting the repercussions that terminology might have for students and researchers of Persian, it must be said that the traditional division of Persian vowels into “short” and “long” is, in the view of this author, misleading, since, despite whatever relevance it may have historically, it does not fit into diachronic descriptions because whether or not /ɒ/ is longer than/æ/ is a matter of preference for the individual speaker and not a question of following language rules. For example, a speaker can pronounce /ɒ/ distinctly without displaying any difference in length compared to /æ/, as many speakers do. The study shows that this also applies to other vowels. Variation in roundedness also seems to play a part in the differentiation of /ɒ/ as the results of this examination show.

EXISTING, DISAPPEARING AND FORGOTTEN VOWEL CHANGE IN ENDINGS

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In the High Latvian dialects' deep Latgalian subdialects, wider pronunciation of short narrow vowel *e* in endings (that can reach up to a vowel pronunciation) has been spotted (Endzelīns, Rudzīte, Briediņa, Markus, etc.).

Nowadays, speakers of deep Latgalian subdialects are less and less using the above-mentioned change; however, one can still hear it in deep Latgalian subdialects in North-East Vidzeme.

Unfortunately, this phenomenon is not even mentioned in the "Phonetics" edition of "The Atlas of the Latvian dialects" (Sarkanis 2013), which has been created according to the "Material collection Programme for the Atlas of Latvian Language Dialectology" (Šmite 1954).

In order to ensure the quality of the vowel in endings, acoustical studies of the dialect materials have been carried out. The results of these studies assure that due to the changes mentioned vowel *e* in endings is reaching up to vowel *a* pronunciation or even fully corresponds to it in comparison with the vowel acoustic measurements carried out in the Latvian standard language (Grigorjevs).

THE FINAL POSTTONIC VOWEL REALIZATION AS A FUNCTION OF PROSODIC ORGANIZATION OF THE UTTERANCE IN MODERN STANDARD RUSSIAN

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The vowels of unstressed final open syllables are characterized by significant variability in Modern Russian. It is supposed that within a phrase these vowels undergo radical reduction and surface as [ə], but before a pause they can surface as sounds similar to the more prominent vowel [a] (Avanesov 1949, 113–114; Knyazev & Pozharitskaya 2012, 245). Thus, the rhythmical structure of a phonological word is conditioned not only by the place of stress in an isolated word but also by other various factors. For instance, one of the strong factors responsible for vowel implementations in the final posttonic syllable within a phrase is the presence/absence of the stress on the first syllable in the following word (Grammatchikova & Knyazev 2014; Knyazev 2007). It can be assumed that the rhythmical structure of a phonological word may also depend on the prosodic organization of the utterance, particularly on the pitch accents realization.

This paper reports some results of an experimental study on the vowel length in the final unstressed syllable as a function of the presence/absence of the phrasal accent on the word following the experimental one. Ten informants from Moscow, Belgorod, Sochi, Kaliningrad, Chelyabinsk and Tambov took part in the experiment. The sentences, formulated as experimental material, comprised 35 pairs of within-phrase word combinations. All these pairs were divided into three groups: (1) the first word has the phrasal accent; (2) the second word has the phrasal accent; (3) both words have the phrasal accents. The length of the final posttonic vowel in the first word of each combination in each group was measured. The second word in each pair has the first stressed syllable.

Aggregate data are presented in Table 1 and Figure 1. These data permit the formulation of some preliminary conclusions that in all regional variants of Modern Standard Russian the final unstressed vowel in the word followed by the phonological word with the phrasal accent is longer as compared with the word without the phrasal accent followed by the word with the pitch accent. When the both words have phrasal accents, the final vowel is the longest. This can be conditioned by the fact that there is a phrase boundary between two accented words and the final vowels implementations are closer to those as before a pause.

Table 1.

The average length of posttonic vowels for all regional variants as a function of the presence/absence of the phrasal accent on the following word

№	Region	1 group (ms)	2 group (ms)	3 group (ms)
1	Moscow	30,5	49,5	-
2	Moscow	42,5	49,7	45,7
3	Moscow	32	35,2	38,6
4	Moscow	42,5	47,9	48,3
5	Belgorod	35,3	56,4	59,9
6	Sochi	48	55,3	54,8
7	Sochi	44,3	57,6	70
8	Kaliningrad	51,5	57,8	54
9	Chelyabinsk	49,2	50,8	67,5
10	Tambov	33,5	38,6	42,9
Average		**40,9**	**50**	**53,5**

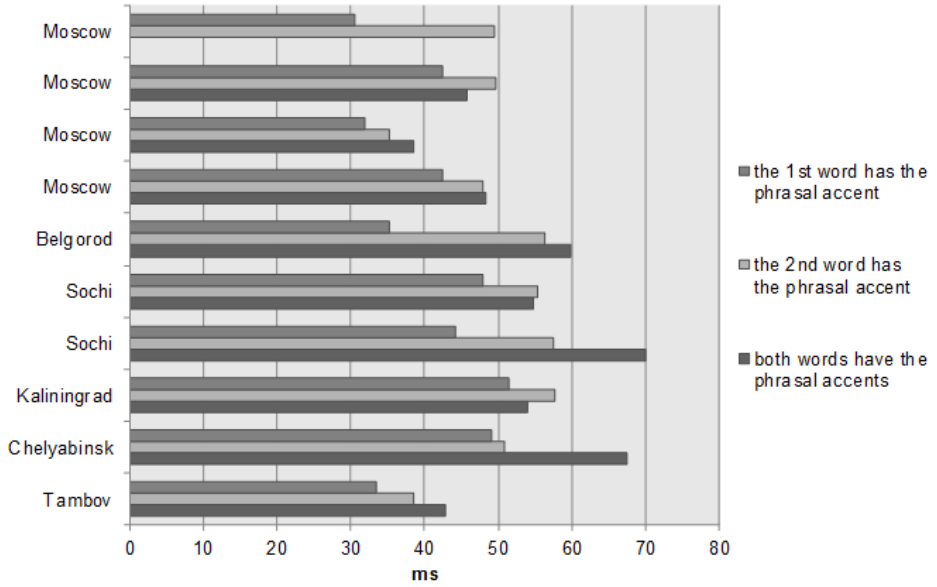

Figure 1. **The average length of posttonic vowels for all regional variants as a function of the presence/absence of the phrasal accent on the following word**

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PHONOLOGICAL WORD IN CZECH AND ITS PHONOTACTIC ANALYSIS

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It is generally assumed that the phonological word, a unit posited in the prosodic hierarchy, is coextensive with the accent unit in Czech, but we will show that these two units should be kept apart in this language. Some phonological properties such as the syllabicity of liquids and the occurrence of the glottal stop suggest that a unit smaller than an accent group must be posited. In Czech, the glottal stop occurs at the beginning of vowel-initial grammatical words or at the boundary of a prefix and a vowel-initial word base. It is a non-distinctive sound because its absence does not change the meaning, but its function is obviously to mark boundaries. The glottal stop will be interpreted as a boundary signal of phonological words. Hence, the non-syllabic prepositions *z* 'from', *s* 'with', *k* 'to', *v* 'in' in the right-hand examples under (1) correspond to two phonological words.

(1)	**One phonological word**	**Two phonological words**
	sok [sok] 'rival'	*z ok* [sʔok] 'from eyes'
	suchem [suxɛm] 'dryness.INSTR.SG'	*s uchem* [sʔuxɛm] 'with the ear'
	kosám [kosaːm] 'scythe.DAT.PL'	*k osám* [kʔosaːm] 'toward the axes'
	faktech [faktɛx] 'fact.LOC.PL'	*v aktech* [fʔaktɛx] 'in acta'

The prepositions are related to the verbal prefixes *v-* and *z-*, and the glottal stop also occurs after them before a vowel-initial word base (see (2)). These grammatical words are also interpreted as corresponding to two phonological words.

(2) *vústit* [fʔuːscɪt] 'to empty into'
zaktivovat [sʔaktɪvovat] 'to activate'

The prefix *z-* can also be appended to the verb *rdousit* 'to strangle'. Here the initial liquid is not syllabic because liquids are syllabic only between two consonants (cf. *vlk* 'wolf') or after a consonant at the end of a word (cf. *vítr* 'wind'). However, in the word *zrdousit* (*z* + *rdousit*) the liquid is not syllabic despite being between two consonants. This is also interpreted as a boundary signal of phonological words.

It will be thus shown that despite the usual claims that phonological words are not smaller than syllables (cf. e. g. Hall 1999), in Czech they may consist of a single consonant. However, they also correspond to one syllable (cf. *půlarch* [puːlʔarx] 'half a sheet') or to groups of more syllables (cf. *velkoobchod* [vɛlkoʔopxot] 'wholesale'). Or they coincide with grammatical words (see the left-hand examples under (1)).

Once set up, their structure can be described. In the second part, we will provide a phonotactic analysis of phonological words in Czech on the basis of a phonological lexical corpus of more than 45,000 items. It will be shown that Czech prefers phonological words beginning with a single consonant and ending in a vowel and containing one medial consonant group. Most commonly, Czech phonological words consist of 3–5 syllables and 9–11 phonemes. Other phonotactic properties will be mentioned, all backed up by statistical data.

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DISTANT PALATALIZATION ASSIMILATION OF VELARS IN MODERN STANDARD RUSSIAN

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Russian is a consonantal language where realization of vowels depends on consonantal context. Thus, any back vowel undergoes fronting before and after palatalized consonant and any front vowel becomes a back one after velarized consonant. However, vowels could act in different way upon dorsal consonants. Russian has three pairs of velars — [k]/[k^{j}], [g]/[g^{j}], [x]/[x^{j}] — that differ not by means of secondary articulation but rather by place of articulation. Their phonological status is still point of discussion. Some peculiarities of their phonetic behavior distinguish them from other pairs of soft and hard consonants in Russian.

Y. A. Bryzgunova (Bryzgunova 2003) noted the possibility of palatalization of velars before back vowel phoneme in Modern Standard Russian, for example in the words like *сотрудни[к']ами* (*sotrudni*[k^{j}]*ami*) ‘employee.INSTR.PL’. There are two different opinions of their appearance’s reasons. On the one hand, it is attributed to the dialect expansion (Bryzgunova 2003). On the other hand, it seems that the palatalization of velars in this phonetic position is the result of vowel's distant regressive fronting and the following coarticulation of the hard velars to front vowel (Knyazev 2010). However, the real reasons of this process are still unclear.

The major goal of this paper is the analysis of factors which may cause the palatalization of hard velars followed by back unrounded vowel phoneme. The hypothesis was that the sought factors are the following ones:

- The position of velars before a back unrounded vowel in unstressed (not the first pretonic) syllable;
- The presence of the front unrounded vowel in the next syllable.

To check the hypothesis the experiment was carried out. Seventeen different words positioned in a text were studied; each of them met the conditions listed above. All the words were not under the phrase accent. The text was read by twenty five native speakers of Modern Standard Russian and then the formant frequencies of back vowels in the words under investigation were calculated using Praat software, since the F2 frequency depends on palatalization of the adjacent consonants.

The obtained results show that in addition to the abovementioned factors palatalization of velars is conditioned by some other factors: (1) the quality of preceding vowel (back or front) and (2) the presence of the soft homorganic consonant in the preceding syllable.

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VARIATION IN CASUAL SPEECH: REALIZATIONS OF FREQUENT WORD FORMS IN SPONTANEOUS RUSSIAN*

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Sound omissions and changes were shown to be typical for spontaneous monologues and dialogues (Bondarko et al. 1988; Bogdanova 2010; Schachtenhaufen 2012; etc.). As reduced word forms turn out to be quite frequent in casual speech, it is interesting to understand how native speakers manage to recognize such realizations in everyday communication. In order to answer this question, we studied eighteen Russian word forms of high frequency (*s'eichas* [sʲitɕæ+s] 'now', *kogda* [kɐgda+] 'when', *tol'ko* [to+lʲkə] 'only', *govor'it* [gəvɐrʲi+t] '(he/she) says', etc.).

All realizations of these word forms were extracted from the records of talk and reality shows and radio interviews of an overall duration of 4 hours and 50 minutes. The realizations were analyzed both aurally and instrumentally and provided with acoustic-phonetic transcription.

The number of different realizations ranges from two for *sovs'em* [sɐfsʲe+m] 'entirely; at all' to 33 for *jesl'i* [je+slʲi] 'if', being around nine on average. The majority of the word forms tend to be used in their unreduced (canonical) realization more often than to be reduced. Reduced realizations can be divided into three groups: typical realizations of high frequency that should probably be stored in the mental lexicon of a listener along with the canonical realization of a word form (for example, [ɛ:æs] for *s'eichas* [sʲitɕæ+s] 'now'); realizations with low degree of reduction (omission or change of not more than two sounds) that can be easily reconstructed to the canonical realization (for example, [kɐda+] for *kogda* [kɐgda+] 'when'); sporadic highly reduced realizations (for example, [təti+] for *togda* [tɐgda+] 'then', [tsɛ] for *t'eb'e* [tʲib'e+] 'you.DAT.SG', etc.). In the presentation, we will, inter alia, put forward some hypothesis on how the latter are processed by a listener. The combination of phonetic cues and contextual factors is supposed to be required for successful recognition of highly reduced realizations in casual speech.

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THE EFFECTS OF PASSIVE AUDITORY TRAINING ON THE FORMATION OF A NEW L2 SOUND CATEGORY AND A PERCEPTUAL MAGNET EFFECT IN SCHOOL-AGED CHILDREN: PRELIMINARY RESULTS FROM AN MMN-STUDY

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According to the Native Language Magnet Model (NLM), problems in the perception and production of a second language (L2) are caused by the perceptual magnet effect, which causes the L2 sounds to assimilate to first language (L1) prototypes and the surrounding categories. However, the formation of the perceptual magnet effect has not yet been experimentally tested, although its existence has been proven in previous studies. In this study, school-aged (7–11 years) monolingual Finnish children participate in passive auditory training and mismatch negativity (MMN) measurements on two consecutive days. The purpose of the training is to see whether it is possible to create a new L2 sound prototype and category through intensive auditory exposure, and whether a perceptual magnet effect — traditionally associated with L1 perception — will emerge around the trained prototype.

The training block consists of 34 synthesized stimuli representing the vowel /u/ from the closed round vowel continuum, where the Swedish vowel /u/ represents a non-native sound category for Finnish speaking children. The stimuli are presented 1864 times in a pseudorandomized order, so that the best exemplar of the /u/ category (i. e. the new prototype) has the highest probability and the amount of repetitions of the surrounding stimuli decrease according to the relative distance from the prototype. The training block is designed to simulate natural exposure to new sounds in real life, where a category is formed around the exemplars with the highest frequency of occurrence of a particular sound. The effects of the training will be monitored with MMN-measurements and identification experiments.

The hypothesis is that children will learn to perceive the L2 sound at least on a behavioral level due to their plasticity as learners. However, whether it is possible to create a perceptual magnet effect around the trained prototype with this type and amount of training remains to be seen. If the subjects show a perceptual magnet effect for the trained prototype it would be preliminary proof of how sound categories and their internal hierarchies are formed in the brain. The presentation will showcase the preliminary findings of this current study, but as the study is still in progress, there are no results to report here in this abstract.

GERMAN ROUNDED VOWELS PERCEIVED AND PRODUCED BY BULGARIAN CHILDREN

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The aim of this paper is to present the results of my recently defended doctoral thesis which conducts an extensive study of the strategies for perceptual acquisition of speech sounds in the L2 that are not present in the L1 phoneme set, and of the relationship between perceptual and productive mechanisms in this process. The subject of the study is the perception and production of the German vowels by 7–9-year-old Bulgarian children, on the one hand because the studies of the specifics in the acquisition of the German language in Bulgarian learners have focused so far on learners above the age of 13, and on the other hand because at that particular age these children have already been exposed to the L2 since the age of 4, so that the development of the categorical perception in the L2 and the impact of the L1 phonological system on the acquisition of the L2 phonological structures can be traced.

The methodological approach applied in the dissertation includes a comparison between the articulatory and the acoustic characteristics of the German and the Bulgarian vowels considering the determination of the potential difficulties in the discrimination of the German vowels. Two theoretical models of L2 perception build the theoretical frame of the study and three experiments provide the empirical basis for the examination and verification of the hypotheses and the postulates of those two models. The results of the experiments support the working assumptions and can be used to develop a new system for the teaching of German phonetics to these age groups.

ROMANIAN VS. CZECH: A CONTRASTIVE ANALYSIS OF THE PHONETIC INVENTORY

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It has become common to consider Romanian "a difficult language" (within the Romance family) and also Czech another "difficult language" (within the Slavic family). There are, of course, various angles of analysis, but the first step is the phonetic inventory. Why do foreigners find Romanian difficult? It is indeed difficult or it is just an impression. And why is Czech?

The author attempts to identify the essential points when the student learns a language close to the structure of his/her mother tongue (e. g. an Italian learning Romanian or a Russian learning Czech) or when he/she learns a language with a different structure (any cross situation of the above or any other similar).

A better understanding of the phonetic structure means a faster acquisition of a language, essential in a multicultural and multilinguistic structure like the European Union or any other similar situation.

ARTICULATORY CLASSIFICATION OF LITHUANIAN AND LATVIAN CONSONANTS: VARIATIONS AND NUANCES

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The recent experimental comparative research of Lithuanian and Latvian sounds[*] made it necessary to create a common synchronous classification of Lithuanian and Latvian consonants. Affinity of two surviving Baltic languages implies a preconceived provision of similar sound systems. Both Baltic languages have many similarities, for example, phonological opposition of long and short vowels, a large number of diphthongs, and pitch accent system. However, there are differences that may affect distinct phonemic inventories; for example, the Latvian language is characterized by fixed stress and large subsystem of palatal consonants while Lithuanian language has free stress and secondary (*i*-type) palatalization. Opposition of palatalized and non-palatalized consonants and developed system of pitch accents existing in one language, such as Lithuanian, is regarded as a typological rarity.

The aim of this report is to propose a common classification of Lithuanian and Latvian consonants taking into account articulation characteristics, and to create a base of further comparative research of sounds of the contemporary Standard Baltic languages. There are 26 consonant phonemes in the Latvian language and 45 consonant phonemes in the Lithuanian language. In terms of articulation, Lithuanian and Latvian consonants are classified according to four criteria: (1) the place of articulation; (2) the method of articulation; (3) the activities of the vocal cords; (4) palatalization.

On the one hand, the common classification of the consonants of the contemporary Standard Baltic languages allows describing individual consonants more accurately. For example, in the common classification Lithuanian consonant /j/ like Latvian consonants /ɟ/, /c/, /ɟ/, /ɲ/, /ʎ/ is characterized as palatal (there is no separate subgroup of the palatal consonants in the Lithuanian language). On the other hand, attribution of /v/, /l/ is problematic as these consonants are attributed to different subgroups according to the different place of articulation (or due to tradition?). For example, in Lithuanian /l/ is considered as a dental consonant, while in Latvian — as an alveolar one; Lithuanian /lʲ/ is considered as an alveolar consonant, while Latvian /ʎ/ is a palatal one; in Lithuanian /v/ is considered as a fricative sonorant, and in Latvian — as a fricative consonant.

In this report, for the first time a common classification of the consonants of the contemporary Standard Baltic languages based on the latest research including articulation, auditory and locus equations studies is presented.

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LATVIAN *v* AND *j* — FRICATIVES OR APPROXIMANTS?

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The Latvian consonants *v* and *j* are traditionally described as voiced constrictives. They are considered being obstruents, although some linguists suggest viewing *v* as obstruent, i. e. [+consonantal], but *j* — as sonorant, i. e. [–consonantal]. This is caused by different pronunciation found for these consonants, their diachronic aspects and phonological vocalization in the position after a vowel in the syllable coda (Markus 2002, Pakerys 1995, Kazlauskas 2000). In the latest edition of the Latvian Grammar (LVG 2013), these consonants are classified as voiced fricatives based on their pure, idealized pronunciation. Nevertheless, in real speech samples different realizations of this idealized pronunciation ranging from fricative to vowel can be found. The current pilot study is an attempt to find the most frequently used variants of these phonemes and to classify them on the basis of their acoustic characteristics.

The characteristics chosen for this study are relative intensity and relative duration of the formant transitions of context vowels. If the relative intensity of *v* and *j* is compared with the relative intensity of laterals and vowels in the corresponding positions, it has been observed that the intensity of *v* and *j* is lower. If the relative durations of formant transitions are compared, the following pattern has been observed: the transitions are the shortest in case of laterals, medium in case of *v* and *j*, and the longest between the diphthong components.

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AFFRICATED PALATALIZED DENTAL PLOSIVES IN RUSSIAN: PHONOLOGICAL STATUS AND PERCEPTUAL CUES AS A TRIGGER OF SOUND CHANGES

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Modern Standard Russian has phonological contrast between palatalized and plain (or, to be more precise, velarized) consonants. One of the most prominent changes attributed recently to this part of its phonetic system is the dramatic affricatization of palatalized dental stops that are now pronounced in most phonetic contexts as affricates [t͡sʲ], [d͡zʲ]. This paper presents two related problems: (1) what factor triggers the phonetic changes in question, and (2) if there are any phonetic factors that could help decide whether these consonants should be treated as stops or as affricates phonologically.

Spectrographic study of Russian shows that the main perceptual cue for differentiation of non-palatalized stops is the second formant's transition of preceding and following vowels with its movement in a region of 500–1000 Hz for labials, 1500–1800 Hz for dentals and no transition for velars, while the palatalized stops have second formant's locus in a region of 2000–2200 Hz. Our perceptual experiments show that native speakers of Russian easily distinguish between plain stops only by the second formant's transition of vowels before or after the consonant in question when no information about the quality of burst or its duration is available, while the palatalized ones in the same situation are all recognized as soft labials. This brings us to hypothesize that such a fast spread of palatalized dental stops' affricatization in Modern Standard Russian is triggered by the need to more effectively distinguish palatalized plosives in situations that do not provide the primary acoustic cue for their differentiation to the listener. It is worth noticing than in Northern Russian dialect voiceless non-palatalized dental affricate is neutralized with a palatalized postalveolar one in a soft dental [t͡sʲ] no such affricatization of palatalized dental stops is attested (but speakers of Modern Standard Russian always perceive dialectal [t͡sʲ] as [tʲ]).

Since palatalized dental stops are pronounced in most phonetic contexts as affricates, the question may arise whether they should be treated phonologically as affricates or as plain stops. On the basis of our experimental data we vote for the latter: in the position before homorganic sonorants (nasal and lateral) palatalized dental stops are not affricated (and often unreleased), while the fricative part of dental affricates in the same position was still preserved in pronunciation of all the subjects studied.

BROKEN TONE IN SOUTH ESTONIAN DIALECTS IN LATVIA

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Broken tone or *stød* is not characteristic of the Finnic languages. However, it appears in the Finnic varieties once spoken in the territory of Latvia. Broken tone is well documented in Livonian (see Tuisk 2014); there are also traces of it in old data of the Krevin dialect of Votic (Winkler 2000).

Recently, some examples of broken tone were described in Leivu South Estonian (Teras 2010). In this paper, we also give examples of broken tone from recordings of Lutsi South Estonian. This is especially significant, as broken tone had not been previously detected in Lutsi. Leivu and Lutsi are dialects of South Estonian, which were spoken in eastern Latvia for several centuries and whose speakers were isolated from each other and from other South Estonian speaking communities, while being in heavy contact with speakers of Latvian and other nearby languages. It is noteworthy that in Leivu and Lutsi broken tone occurs in addition to a glottal stop, which is characteristic in general for South Estonian.

Our experimental data have been taken from sound recordings of Leivu and Lutsi made in the 1960s and 1970s. Acoustic analysis of these data shows that broken tone appears mainly in these South Estonian dialects as a trace of historical *h* between vowels of the 1st and 2nd syllables. Synchronically, it is a quality of long vowels found primarily in stressed syllables. The most stable correlate of broken tone is an abrupt weakening of intensity along with an increase of F0. Our paper will in particular describe examples of broken tone in Leivu and Lutsi more thoroughly.

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AN INFLUENCE OF DEFECTS IN SYNTHESIZED SPEECH ON ITS NATURALNESS

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The paper deals with different types of auditory defects in synthesized speech. We attempted to estimate what errors are most common in modern speech synthesis of high quality (the experiment was conducted for the Russian language) and which ones cause the most serious problems in its perception, forcing listeners to evaluate it as a less natural.

The brief description of previous work is given: we show that data are either not very detailed or almost contradictory. The differences may be caused by the fact that the experiments were conducted with different generations of synthesizers.

In order to evaluate the quality and naturalness of synthesized speech we selected two modern Russian speech synthesizers. The following categories of possible errors were chosen: (1) wrong stress; (2) incorrect pronunciation (replacement/loss/adding extra sound); (3) wrong pause (no/extra, too short/long); (4) bad tempo/rhythm; (5) incorrect intonation; (6) breaking of fluency: discontinuity, leaps, knocks etc.; (7) overall voice quality; (8) other. The phonetically representative text was used, which includes a narrative and dialogue parts, which allowed better assess the adequacy of speech intonation was used as test material. Eleven subjects (aged from 18 to 40, all native Russian speakers) were asked to rate naturalness of each sentence on a five-point scale and select the categories of presented errors. Brief results of the experiment are given.

Both samples received approximately the same average rating of naturalness: 3.9 and 4.1, but the frequency of different types of errors for them varies. It is possible to distinguish the following patterns regarding the effect of different types of errors on the overall speech naturalness. Phrases in which the majority of the subjects noted errors in word stress, have not received mean scores greater than 3.5; breaking of fluency — not more than 3.9; incorrect pronunciation — not more than 4.0; incorrect intonation — not more than 4.4 (but at the same time the only mistake in intonation could reduce average rating to 3.2). The most frequent for both tested systems were mistakes and defects in intonation, but it should be noted that this group is clearly not uniform: some intonation errors considerably reduced sentence naturalness; while others practically not affected it. This is likely due to the fact that inaccuracies in intonation can be of two types: the wrong choice of phrase intonation type (e. g., narrative intonation instead of a question), or defects connected with unnatural movement of the pitch. Apparently, these defects should be evaluated separately. Other types of errors were considerably more infrequent.

We can conclude that the errors in the intonation of synthesized speech is a major problem of the modern Russian language synthesizers that can be associated with unit selection algorithm for speech synthesis used in modern systems, when sounds not exactly matching desirable physical characteristics can be chosen. It should also be noted that synthesizers vary in linguistic and acoustic processing quality, and errors connected with wrong word stress and incorrect transcription have the most effect on synthesized speech naturalness.

QUALITATIVE AND QUANTITATIVE VOWEL REDUCTION AND DELETION IN WORD-FINAL UNSTRESSED CLOSED SYLLABLES IN SPOKEN LATVIAN

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The aim of this study is to investigate the reduction of short vowels in word-final unstressed closed syllables found in Latvian.

Unstressed vowel reduction can be any of various changes in the acoustic quality or quantity of vowels: they can demonstrate reduced duration and loudness, weakened voicing, complete devoicing and they may be completely deleted.

Spoken Latvian is characterized by the reduction of unstressed vowels. Although so far it was believed that there is mainly quantitative vowel reduction in Latvian (Laua 1997, 72; Liepa 1957, Muižniece 2002, 73), some linguists (Jānis Endzelīns, Anna Ābele, recent studies by Juris Grigorjevs) acknowledge that unstressed word-final syllable change their quality. Krišjānis Kariņš (Kariņš 1995a; 1995b) characterizes deletions of unstressed vowels.

There are six short vowels in Latvian — /ɑ/, /e/, /i/, /u/, /æ/, /ɔ/ — but neither /æ/ nor /ɔ/ occur in circumstances where they could be deleted. Whenever other short vowels occur in a final unstressed closed syllable (mainly if the coda is /s/), the short vowel (nucleus) is reduced, thereby the word *māsas* ‘sisters’ could be articulated as [mɑːsă̆s] or [mɑːss], and the word *skaistas* ‘beautiful.NOM.PL.F’ can be pronounced as [skɑi̯stă̆s] or [skɑi̯sts]. When vowel deletion occurs in already closed syllable, it shorten̆s the number o͡f the syllables in a word and increases the number of consonants in the coda, but sonorant may become syllabic (Kariņš 1995a). Moreover, vowel deletion can lead to further changes, i. e. voiced palatal fricative /ʝ/ or voiced labiodental fricative /v/ may be vocalized: *mājas* ‘houses’ [mɑːi̯̯s], *skolotājas* ‘teachers’ [skuo̯luo̯tɑːi̯̯s], *lauvas* ‘lions’ [lɑu̯u̯s].

Factors indu͡cing the reduction are a͡s follows: syllable status (closed/open), distance from the main stress of the word, preceding/following circumstances. The degree of reduction also depends on the manner of speaking (casual/careful speech; private/public) and particular speaker.

Vowel reduction is analyzed using public discussions and interviews. The speech data from 14 speakers of Standard Latvian (7 males and 7 females aged 16–65) is being analyzed. All recordings are sampled at 44100 Hz (16-bit quantization). Data analysis is performed using the software Wavesurfer 1.8.8p3 and Praat 5.2.13.

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CORPUS STUDY OF EXTERNAL REDUCTION: EVIDENCE FROM SPONTANEOUS RUSSIAN

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The modification of acoustic information in spontaneous speech is observed in different languages (Zemskaya 2006; Ernestus 2000; Johnson 2004). Yet mechanisms underlying the processes of speech reduction are not evident. To study regularities of speech realization its detailed description is required. While developing a corpus of Russian spontaneous texts as a part of the Corpus of Standard Literary Russian (*http://www.narusco.ru/*) we applied a method of continuous labelling of speech. The records of radio interviews and TV talk-shows in Russian (115 minutes and 15106 items) were provided with an orthographic and a phonetic transcription. The transcription was made manually; for the phonetic transcription, spectrogram and waveform displays were used along with auditory cues. In the presentation, the method will be described in detail; its advantages and disadvantages will be discussed.

The method revealed some phonetic phenomena in casual Russian that were hardly known before. Word-external reductions that can modify two words simultaneously and result in a sound contraction at word boundary is one of them.

All two words (W1 and W2) combinations with no pause between the words were taken from the part of the Subcorpus of Russian spontaneous texts (65 minutes, or 8786 items overall). 6936 examples of word junctions found in the material were divided into 6 groups: (1) final sound deletion of W1; (2) initial sound deletion of W2; (3) final part (more than one sound) deletion of W1; (4) final sound deletion of W1 and initial sound deletion of W2; (5) external sound contraction: *должны_опираться* [doʒne+p'ɛra+t̂s] instead of [doʒnɨ+ap'ɛra+t̂sa] (‘must.PL base.INF.MED’); (6) word contraction: *страшное_действительно* [stra+ʃn s'i+tna] instead of [stra+ʃnɨ d’ɛjstv'i+t’ɛl’na] (‘ugly.NOM.SG.N actually’). According to the results, 13 % of all word junctions undergo quantitative external reduction in the texts analyzed. Simultaneous reduction of two words occurred in 6 % only.

Groups (5) and (6) implicate overlapping of two words. The term “sound contraction” is used for an interaction of only two external sounds when one new sound is pronounced instead of two; while by “word contraction” we mean an interpenetration of two words including more than two sounds. In further research, only external sound contractions were examined on more representative material: 115 minutes of spontaneous speech and 46 minutes of read aloud texts. The results showed contractions to be an inherent feature of Russian speech: it occurred in 3 % in spontaneous and in 8 % in read aloud texts.

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THE ACOUSTIC CHARACTERISTICS OF LIVONIAN *STØD*

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The Livonian tonal system shares similar characteristics with Latvian but also Danish. Livonian is the only Finnic language that differentiates two tones in stressed stem-initial syllables. The plain tone is characterized as level or rising and the broken tone or *stød* as rising-falling.

Previous descriptions reveal a certain degree of agreement among researchers who have studied Livonian *stød*. The acoustic-phonetic studies have pointed out that the fundamental frequency peak occurs late in the stressed syllable in words without *stød* and much earlier in the syllable in words with *stød*. In addition to the characteristic tone contour, *stød* is realized as a change in the phonation pattern — irregular vibrations of the vocal folds, i. e. laryngealization or glottalization. The location of the laryngealization in a syllable rhyme can appear in the beginning, middle or at the end of the first syllable. There are also descriptions of an abrupt drop of F0 when the laryngealization begins.

It has been shown that *stød* tends to shorten long vowels and diphthongs. The general contour of intensity has been found to be different in words with and without *stød*. A decrease of intensity during the laryngealization has been also described. It has been shown that in spontaneous speech the most characteristic tends to be earlier intensity peak in words with *stød*, while in words without *stød* the peak is later.

The current paper focuses on the phonetic realization of the Livonian *stød*. An investigation of the temporal and tonal characteristics of words with and without *stød* consisting of a long first syllable and a short second syllable in spontaneous speech was carried out. The changes in pitch alignment and durational patterns in disyllabic words was analyzed and the role of intensity was studied. The paper deals primarily with the following questions: (1) How stable are the main phonetic characteristics of *stød* in spontaneous Livonian? (2) What is the role of intensity in characterizing Livonian *stød*? Considering previous studies, it is hypothesized that there is a variation in tonal characteristics and intensity between words with and without *stød*, but temporal features are more neutralized in spontaneous speech. It is also assumed that not only the acoustic characteristics of the first syllable but also the second syllable should be much more considered.

The preliminary analysis reveals a difference in acoustic characteristics in words without *stød* and with *stød*. The S1 duration is more neutralized in both groups. In tonal characteristics two patterns are evident. In words with *stød*, the pitch peak in the stressed syllable is earlier than in words without *stød*. The intensity in S1 is similar in both groups, but there is a difference in the interaction between S1 and S2.

THE METHOD OF CONTRASTIVE ANALYSIS AS A KEY TO EFFECTIVE FOREIGN PRONUNCIATION ACQUISITION

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Learning foreign languages is becoming a universal phenomenon in the global world of today. Bilingualism is forcing out monolingualism, which has been prevalent on previous social development stages, and is thus turning into a social norm. Under the circumstances, effective foreign language teaching (including creating new pedagogical concepts and science-based teaching techniques) in the area of foreign pronunciation is gaining in importance dramatically.

It is generally acknowledged that L2 language courses aimed at speakers of a single L1 language are much more effective that those intended for everyone wishing to learn the L2, regardless of their L1. This is largely so because the former take into account typical negative transfer mistakes that L1 native speakers tend to make when speaking L2. The problem is, however, that only the grossest accent features are normally considered while many others remain ignored. The reason lies in the fact that L2 courses for L1 speakers are traditionally based on existing teaching practice whereas careful scientific consideration may often lack.

I suggest that teaching efficiency in phonetics can be raised by means of contrastive analysis (CA). The method of CA emerged in linguistics in the 1960–1970s; it enables to forecast all (or the majority of) phonetic negative transfer zones in L2 speech of L1 native speakers, and vice versa. On the basis of CA results, course books aimed at various levels of detail can be created. E. g., taking into account all forecasted negative transfer zones allows to create a phonetic manual for those wishing to speak L2 practically without a trace of an audible foreign accent. If a far less ambitious task of teaching just basic principles of L2 pronunciation is set, only the grossest negative transfer mistakes can be included with the course book. CA can be used for creating traditional phonetic manuals as well as for providing linguistic support for phonetic CALL-systems.

One of the most sought-after foreign languages in Russia is German, which has a long-term tradition. Although there exists an abundance of theoretical and practical books of German phonetics for Russians, I failed to find just one single work on the subject that would introduce consistent and full CA of German and Russian sound systems. In order to fill in the gap, I carried out CA of Russian and German consonant systems. For each allophone of each phoneme I determined the most likely negative transfer replacement and found a number of common lexis examples. Further on, I am planning to implement an experimental verification of the obtained negative transfer forecast. After verification, it will be able to use the analysis results for creating phonetic courses for Russians learning German, and vice versa.

In my report, I will explain the research procedure in detail, show results of the CA I made and present possible ways of using them for creating course books on phonetics of a new type.