



Latvian Language Institute
of the University of Latvia

International Scientific Conference

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

dedicated to the 100th anniversary of Dr. Alise Laua

ABSTRACTS

February 6–7, 2014

Location: Senate Hall

Latvian Academy of Sciences

Akademijas laukums 1, Riga

Organizing Committee:

Leading researcher *Dr. philol.* **Juris Grigorjevs**

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OPTIMALITY THEORY IN LATVIAN PHONOLOGY

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In April 1991 in a conference on phonology at the University of Arizona A. Prince and P. Smolensky presented a report “Optimality” (1991). It is the start of the new theory being given publicity. In the spring of 1993 linguists were already offered two major manuscripts expounding on this theory: A. Prince and P. Smolensky’s research into “Optimality Theory” (1993) and A. Prince and J. McCarthy’s publication of “Prosodic Morphology” (1993). Within a short period of time optimality theory becomes popular, it starts to be extensively used especially in phonology, though it is also used in morphology and syntax. Adherents of the new theory take into account significant aspects of the language – the universal, which all languages are endowed with, thus it is the unmarked part of the language, and the variation aspect, which is inherent to a few or even one language and presents the marked part of the language. Optimality theorists show the universal as a set of universal constraints existing in a language, and the markedness manifests itself in the breach or violation of these constraints, while the variation aspect arises from the order of importance according to which constraints of the particular language are ranked. The very name of optimality theory or OT suggests that it is based on the analysis wherein the faithfulness of the potential linguistic units to the existing constraints of the language is assessed and the optimal outcome is achieved. Optimality theory is used by a variety of subbranches of linguistics. In the report the use of this theory in phonetics and phonology will be illustrated with regressive assimilation in terms of voicing, which is widespread in the Latvian language, as well as some terms usable in the exposition of optimality theory in the Latvian language will be proposed. Examples will also be compared to those of a number of other languages.

REVIVAL OF ESTONIAN EPG STUDIES

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The few known articulation studies in Estonian including analysis of X-ray cinematography of steady vowels and dynamic electropalatography date back to the 1960–70s; no further research in articulatory phonetics has been practiced throughout the following four decades. In recent years several tools for articulatory research became available and the development of an articulatory-phonetic corpus of Estonian speech production was initiated.

Our data collection facilities include electropalatography (EPG), electroglottography (EGG), and electromagnetic articulography (EMA).

Electropalatography (EPG) is a method to study the timing and location of tongue contact with the hard palate during continuous speech. During the data capture a speaker has to wear an artificial palate with 62 silver contacts which register the tongue-palate contact during articulation.

Electroglottography (EGG) is a technique to register laryngeal movements during speech production. Two electrodes are positioned on both sides of the thyroid cartilage and a weak voltage is passed from one electrode to the other. The change in electrical impedance across the throat depends on the contact variations between the vocal folds.

Electromagnetic articulography (EMA) is a motion capture technique specifically designed for tracking speech related articulatory movements and articulatory kinematics. It enables real-time 3D data capture from several sensors glued onto the tongue, the lips, the front teeth and the jaw, along with synchronized audio.

The multi-modal corpus of Estonian speech production is collected using two recording set-ups: (1) EGG + EPG + audio, (2) EMA + audio. The text corpus compiled for data collection includes VCV and CVCV nonsense words, real words with frequent consonant clusters in word initial, medial, and final position, and short sentences. The corpus is recorded by two native Estonian subjects (one male, one female).

The corpus represents a language resource to be used for multiple research tasks in phonetics and speech technology.

DYNAMICS OF THE LATVIAN LONG VOWELS

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The system of the Latvian vowels includes short and long monophthongs, as well as diphthongs. Since diphthongs traditionally are viewed as a combination of two short monophthongs in one syllable, very little attention has been paid to the comparison of long vowels among themselves, i.e., long monophthongs and diphthongs.

In 2013 Latvian Council of Science awarded grant to the research project “The acoustic characteristics of the sound system of Standard Latvian by age groups (5–15, 16–39, 40–59, 60–80)” that allowed addressing this topic, as well as other topics insufficiently studied so far. In 2013 the target group of the research was speakers in the age between 16 and 39 years. For this report the data of two male speakers with the extreme sizes of their vowel planes (the smallest – M1, and the largest – M2) were chosen. For each vowel the duration was measured, as well as the formant frequencies were acquired taking measurements at 10 equally spaced points thus allowing the comparison of dynamics of vowels with different duration.

It has been observed, that long monophthongs tend to have larger duration (M1 – 0.399–0.466 s; M2 – 0.484–0.551 s) than diphthongs (M1 – 0.315–0.407 s; M2 – 0.305–0.382 s), but the length difference is speaker-dependable (the length ratio is on average from 1.09:1 to 1.18:1 for M1, and from 1.47:1 to 1.58:1 for M2). It is worth to notice, that for both speakers the mean value of the length ratio of short monophthongs to diphthongs has been equal – 1:1.64. Inspecting the vowel formant pattern of both informants it can be noticed that F1 and F2 have similar center frequencies. There is more variation in F3 and F4 frequencies. If there is a noticeable variation in F2 of diphthongs it is mostly observed in the transition phase from the first component to the second.

The conclusions drawn from this study suggest that the Latvian diphthongs do not exhibit three phase structure (steady state of the first component – transition – steady state of the second component) even in zero context. In most cases there is a comparatively short steady state phase of the first component (about $\frac{1}{4}$ of the diphthong's length) and long transition which in the best case ends with a structure corresponding to the expected quality of the second component, but no steady state phase. This suggests that the Latvian diphthongs are long gliding vowels instead of being combination of two short monophthongs.

SPECTRAL CHARACTERISTICS OF THE LITHUANIAN VOWELS: SOME PRELIMINARY RESULTS OF A NEW EXPERIMENTAL RESEARCH

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Until recently the acoustic characteristics of the sound systems of the contemporary Standard Baltic languages have not been investigated using the same methodology and the same software versions. According to different aims, mostly separate patterns of vowels, consonants or prosody of Latvian and Lithuanian have been examined.

The new research project *Acoustic characteristics of the sounds of the contemporary Baltic languages (experimental study)* financed since 2013 by the Research Council of Lithuania provides an opportunity to study the acoustic characteristics of the Lithuanian and the Latvian sound systems simultaneously using the same methods and equipment that allows a reliable comparison of phonetic inventories of both languages.

According to the new data – the spectra of vowels (formant patterns and their dynamics) – some preliminary results, as well as observations are going to be discussed in this report. An initial comparison of the Lithuanian and the corresponding Latvian sounds will also be provided.

QUALITATIVE AND QUANTITATIVE VOWEL REDUCTION AND DELETION IN THE SPOKEN LATVIAN

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

Unstressed vowel reduction – 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 the 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), but some linguists (J. Endzelīns, A. Ābele, in recent studies J. Grigorjevs) acknowledge that unstressed word-final syllable change their quality. Kr. Karins characterize (Karins 1995, Karins 1996) deletions of unstressed vowels.

Target vowels. There are six short vowels in Latvian – /a/, /e/, /i/, /u/, /æ/, /ɔ/, but neither /æ/ nor /ɔ/ occurs in circumstances where they could be deleted. Whenever other short vowels occur in a final unstressed open syllable, it becomes reduced and it may be variably deleted by the speakers of Latvian. For example, a word *māsa* ‘sister’ could be articulated as [ma:sā] or [ma:ss], and a word *skaisti* ‘beautifully’ can be uttered as [skaistī] or [skaɪst]. If the final unstressed syllable is closed (mainly if the coda is /s/), the short vowel (nucleus) is reduced as well, thereby a word *māsas* ‘sisters’ could be articulated as [ma:sās] or [ma:ss], and a word *skaistas* ‘beautiful (nom. pl. f.)’ can be pronounced as [skaistās] or [skaɪsts]. If the vowel is deleted in the open syllable, the final syllable becomes closed, and the number of syllables in the word decrease by one. When vowel deletion occurs in already closed syllable, it shortens the number of the syllables in a word and increases the number of consonants in the coda, but sonorant may become syllabic (Karins 1995). Moreover vowel deletion can lead to further changes i.e. voiced palatal fricative /j/ or voiced labiodental fricative /v/ may be vocalized: *māja* ‘house’ [ma:i], *skolotāja* ‘teacher’ [skuoluota:i]; *lauvas* ‘lions’ [lauʋs]

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

Vowel reduction is analyzed by using public discussions and interviews. The speech data from 14 speakers of standard Latvian (7 male and 7 female aged 16–65) is being analyzed. All recordings are sampled at 44 100 Hz (16-bit quantization). Data analysis is performed using the software *Wavesurfer 1.8.8p3* and *Praat 5.2.13*.

References:

- Kariņš, Krišjānis A. Vowel Deletion in Latvian : [ref. VII starptautiskajā baltistu kongresā 1995. gada 13.–15. jūnijā]. *VII starptautiskajā baltistu kongresa referātu tēzes*, 1995, 49.–50. lpp.
- Kariņš, Krišjānis A. Vowel Deletion in Latvian. *Language Variation and Change*. Ed. William Labov, Rena Torres Cacoulllos, Volume 7 / Issue 01 / March 1995, pp. 15–34.
- Laua, Alise. *Latviešu literārās valodas fonētika*. Rīga : Zvaigzne ABC, 1997. 158 lpp.
- Muižniece, Lalita. *Latviešu valodas praktiskā fonoloģija*. Rīga : Rasa ABC, 2002. 168 lpp.

LOCUS EQUATIONS FOR THE LATVIAN CONSONANTS

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The major goal of the present study is to examine whether locus equations can be considered as efficient descriptors of consonantal place of articulation across different manner classes in Standard Latvian. This research differs from the previous ones with the fact that a united software was used to record speakers for the first time as well as all syllables were produced by the same speakers.

There are twenty-six consonant phonemes in Standard Latvian: labial /p/, /b/, /f/, /v/, /m/, dental /t/, /d/, /s/, /z/, /tʃ/, /dʒ/, /n/, dental (Grigorjevs 2012, 275) or alveolar (Laua 1997, 63) /l/, alveolar /ʃ/, /ʒ/, /tʃ/, /dʒ/, /r/, palatal /c/, /ɟ/, /j/, /ɲ/, /ɕ/ and velar /k/, /g/, /x/.

Speech recordings from five native male speakers of Standard Latvian, aged 19–39, without any disorders or dialectal traces in their pronunciation, were used for the analysis.

Consonants were recorded in isolated closed CVC syllables, where C is one of the consonants and V – one of the twelve Latvian vowels, e.g. [pi(:)p], [pe(:)p], [pæ(:)p], [pɑ(:)p], [pɔ(:)p]; [pu(:)p]. For the results to be sufficiently credible, each informant repeated each syllable 3 times, thus 4680 items were analyzed in total.

The results suggest that velar and labial consonants can be separated from dental, alveolar and palatal consonants. However, by the slope value alone, it is possible to distinguish velar consonants from labial consonants; by the value of y-intercept palatals can be distinguished from coronal consonants with one exception – voiceless stop [c].

References:

- Grigorjevs, Juris. Acoustic characteristics of the Latvian sonorants. *Baltistica*, 47 (2). Vilnius: Vilniaus universitetas, 2012, pp. 267–292.
Laua, Alise. *Latviešu literārās valodas fonētika*. Rīga : Zvaigzne ABC, 1997. 158 lpp.

VOCALIZATION OF END CONSONANTS: EFFECT OF SPOKEN DIALECT ON SINGING DIALECT

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Results of measurements of vocalized syllable-end consonants are presented. Samples of the speech of eight speakers (three from Aukštaitija (northeast Lithuania) and five from Dzūkija (southern Lithuania)) and six singers (three from each of the regions) were analyzed. The methods of acoustical analysis (Praat-aided) and statistical analysis were applied. The analyzed parameters include time values of the consonants, their SPLs, F1 and F2 of their vocalized parts, and their pitch excursions from the preceding vowels. The collation of the results of consonant measurements led to the following inference: a distinct enunciation in the spoken dialect correlates with the vocalization of consonants in the singing; the difference in the values in speech transforms into the difference in the values of musical parameters, in exaggerated form. Dzūkai show higher values of the vocalization, in comparison with Aukštaičiai.

Hence, some traits of the singing dialect are neither ‘purely musical’ nor ‘purely vocal’, but rather speech-dependent.

The results raise some practical implications concerning the ethnomusicological studies and practical singing in the contemporary folk groups.

ESTONIAN QUANTITY DEGREES PRODUCED BY LATVIAN SUBJECTS

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Although Estonian and Latvian belong to different language groups, the prosodic systems in these languages have some common features – both languages use the duration cue for manifesting phonological contrasts, exploit tonal cues to distinguish lexical items, and have fixed initial word-stress. However, looking closer, several differences emerge.

Estonian features the three-way quantity contrast in a disyllabic foot referred to as short (Q1), long (Q2), and overlong (Q3) quantity degrees. The quantity oppositions can occur in vowels and diphthongs of the stressed syllable, and also in consonants and consonant clusters between the first and second syllable vowels. Phonetically, the quantity contrasts are manifested mainly by the duration of the first syllable vowel (and/or syllable-final consonant) and accompanied by characteristic tonal patterns. The vowel quantity contrast is possible only in the stressed syllable; vowels in second syllable are phonologically interpreted as "short" despite large variations in their duration.

Latvian has binary quantity contrast in vowels such that the short/long opposition can occur in any position of the word, and three-way contrast of lexical tones (pitch accents) – level, falling, and broken.

Numerous studies have shown that the native language (L1) affects the acquisition of a second language (L2), and depending on the role of phonetic features associated with phonological categories in L1 and L2, the acquisition of L2 categories can be more or less successful. In the case of L2 subjects with Latvian language background we can hypothesize that the Latvian binary quantity system obstructs and the three-way pitch contrast supports the acquisition of Estonian quantity degrees.

In the current study we explore the production of Estonian quantity contrasts by L2 subjects with Latvian language background (referred to as L2-LV) and compare it to the production of native Estonian subjects (referred as L1-EE). For the acoustic analysis we use a subset of the Estonian Foreign Accent Corpus involving the speech recordings from 16 L2-LV subjects and 10 L1-EE subjects. The analyzed speech material involves 27 read sentences comprising triplets of segmentally identical disyllabic target words in the quantities Q1 (CVCV), Q2 (CVVCV) and Q3 (CVV:CV). The target words were segmented, the durations of V1 and V2 were measured, and the duration ratio V1/V2 was calculated for each word.

The results show that L2-LV subjects produced successfully the Estonian Q1/Q2 contrast, but they failed to produce Q2/Q3 contrasts. The comparison of the two subject groups revealed significant differences in segment durations and F0-patterns in the production of Q2/Q3 contrasts.

WHAT SLIPS OF THE EAR REVEAL ABOUT SPEECH PERCEPTION

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In this presentation we aim to show that knowledge of phonological reductions is part of native speaker competence and that to apply this knowledge, it is necessary to assume a window larger, in some cases much larger, than the segment. We approach this from the angle of perception rather than production, but we assume a high degree of symmetry.

We do not advocate any particular model of speech perception, assuming that no single current model can explain everything. But, along with many psychologists, we think the human brain is quintessentially a pattern-recognition device and that spoken language is composed of a large number of simultaneous and overlapping patterns which are all recognised and used **selectively** by the brain. Where human beings are superior to computers is in the ability to use pattern matching with reference to a given situation. In speech perception, it is obvious that attention to patterns of all sizes is necessary: small patterns provide the traditional acoustic cues for distinguishing “peach” and “teach” and other words with minimal differences ... in other words, a phone-based approach is necessary in some cases. But our research suggests that one or more larger patterns is being used in addition to these, and we suggest that phonological patterns are among them. Correct perception is a result of getting the right perspective on a signal both in the smaller and larger patterns. Once we have matched the right pattern or patterns, we can interpret the “soundscape”. Our talk expands on this principle and offers examples.

WORD FREQUENCY, THE PHONE DISTRIBUTIONS AND THE LENGTH CONTRAST IN CONVERSATIONAL FINNISH SPEECH

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It is well known that the more frequent a word is in a language, the shorter and simpler it tends to be. Many phonetic reduction processes have been found to be connected with the frequency and probability of words. However, it is not yet known whether and how the phone distributions within words may reflect word frequency. It has been suggested in an earlier pilot study by Lennes (2005) that the segmental durations in more frequent Finnish words are generally diminished. This study aims to compare the phone distributions and the realization of the segmental length contrast within words of different frequencies in conversational Finnish speech. The analysis is based on the Finnish Dialogue Corpus (FinDialogue), consisting of ten informal dialogues recorded from 20 speakers (10 males). A frequency dictionary was built from all the words in the transcripts of the FinDialogue corpus, supplemented with a larger set of transcripts from the Helsinki Spoken Language Corpus. The frequency-ranked word forms were divided into ten bins so that each bin had approximately the same prior probability in the two corpora. Thus, bin 1 represented the rarest word forms, and bin 10 the most frequent words. In this study, the phone distributions are compared in the word-initial vs. the following syllables and between the ten word frequency bins. From the phonetically annotated FinDialogue corpus, the distributions of segmental durations within word-initial syllables are reported. It is shown that the phone inventory is gradually reduced from the rare words towards the frequent words. In addition, although the length distinction between short and long vowels and consonants is orthographically denoted in Finnish words of almost any frequency, the duration distinction between short and long segments tends to be gradually reduced and even completely neutralized when word frequency increases. In line with the H&H theory by Lindblom (1990), the current results suggest that the phonologies and lexicons of languages are not static systems but they participate in a continuous interplay with the phonetic variability in speech.

THE ACCENTS OF THE LONG VOWELS IN THE SOUTHERN AUKŠTAITIAN

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Some Lithuanian scholars in their works on dialectology argue that allegedly the Southern Aukštaitians (Southern Highlanders) cannot distinguish well or do not distinguish at all falling and rising accents in stressed syllables with \bar{u} (*u*), y (*i*), \acute{e} , *o*, *ie* and *uo*. Various arguments were sought to give proof to the appearance of this phenomenon: the levelling of the accents can be caused by the increased role of the stress, which is linked to increased dynamism, the tempo of speech, the disintegration of the accent system and other factors. However, the researchers who are of a different opinion have supplied counterarguments: phonologic opposition of the rising and falling accents has been retained in diphthongs and they are clearly distinguished in emphatic speech, quasi-homonyms and so on.

It is not so easy to determine by ear the accent in stressed syllables with \bar{u} (*u*), y (*i*), \acute{e} , *o*, *ie* and *uo*. There were attempts to solve the controversial issue almost a decade ago. Then acoustic and audio initial research into minimal word pairs, used in a certain context suggested that cases of the levelling of the accents exist. Not a single researched prosodic feature (the main tone, intensity, duration) did not demonstrate clear differences between syllables with the falling and rising accents. Conclusions arrived at during audio research were similar.

However, real usage demonstrates most clearly the essence of any language fact and reveals its features by which it can be identified. In this paper attention is paid to the realisation of the accents in spontaneous speech of Southern Aukštaitians. The features of the pronounced rising and falling accents in non-final syllables of words and other considerations about the prosodic phenomenon discussed are provided drawing on the results of new experimental research.

TONAL ALTERNATIONS IN SAMUE VERB PHRASES

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In tone languages, tone has distinctive functions both lexically and grammatically. Tone also functions independently of segments that bear tone; it has characteristics that segmental phonology does not, e.g. stability if the host segment is lost and mobility or the movement of tone from its point of origin [1]. Samue, an undocumented tone language of Burkina Faso, belongs to the Gur subgroup of the large Niger-Congo phylum [2]. In this paper tonal alternations are examined in Samue verb phrase.

Our results are based on the tone analysis conducted during the fieldwork period in a Samue speaking village in Burkina Faso. Results show that in Samue there are three level tones that are contrastive: High (H), Mid (M) and Low (L). The following minimal triplet of verbs in imperative mood illustrates the distinctiveness of tone: **síí**, (*be big*), **sīī**, (*be old*) and **sìì** (*be good*). Level tones form four tone melodies that are found in verb stem: H, M, L and MH.

Beside the lexical function, our results show the grammatical function of tone in the verb system. Aspect and tense are marked by suffixes and by tone, and as a consequence, tone opposition is partially neutralized. In verb phrase, some further tonal alternations are attested. The past tense particle **ntē** lowers H-toned verbs to Mid regressively, from right to left. Also the M-toned affirmative particle **nā** regressively raises L-verbs to Mid. This regressive M-tone spreading is a particularity of the Samue verb system. Most frequently in tone languages spreading is progressive concerning tone levels that are not close to each other [3, 4].

Key words: tone, Gur (Niger-Congo), verb systems

References:

- [1] Yip, Moira. 2002. *Tone*. Cambridge: Cambridge University Press.
- [2] Naden, Anthony J. 1989. *Gur*. In: Bendor-Samuel, J. (ed.), *The Niger-Congo Languages*. Lanham, MD: Universities Press of America, pp. 141–168.
- [3] Hyman, Larry M. & Russell G. Schuh. 1974. Universals of tone rules: Evidence from West Africa. *Linguistic Inquiry* 5,1, pp. 81–115.
- [4] Hyman, Larry M. 2007. Universals of tone rules: 30 years later. In: Riad, Tomas & Carlos Gussenhoven (eds.), *Tones and tunes: Studies in word and sentence prosody*. Berlin: Mouton de Gruyter, pp. 1–34.

CHILDREN LEARNING A DIFFICULT AND NON-NATIVE VOWEL

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In this study children's ability to learn a non-native vowel was examined with production tests. The child participants trained on a difficult vowel contrast with an intensive listen-and-repeat training and their productions were recorded and acoustically analysed. The trained vowel contrast was chosen so that it would result in learning difficulties according to second language learning models. The target word /tʌ:ti/ contained the vowel /ʌ/, which is phonologically irrelevant in Finnish and the nontarget word /ty:ti/ contained the Finnish vowel /y/. The stimuli used as model words were synthesised using a semi-synthetic method.

There were 13 subjects participating in the study, and the mean age was 9;1 (years;months); range 7;1–10;9. They were all Finnish speaking, healthy girls. All subjects participated on two consecutive days and performed the listen-and-repeat training as well as the recordings on both days. Altogether there were four trainings and four recording session. The four recording sessions consisted of 20 words per session and from those words the two lowest formants and the fundamental frequency were analysed. The formant values and their standard deviations were analysed statistically.

The results showed that the second formant values in the target word /tʌ:ti/ were significantly lower ($F(1,12)=6,869$, $p=0,022$) in the third recording session in comparison with the baseline. This indicates that the children learned to produce the target word after only three training sessions. The standard deviations of the nontarget word /ty:ti/ also changed significantly ($F(1,12)=5,935$, $p=0,031$) between the sessions one and four. Although, the formant values of the nontarget word did not change significantly. This suggests that children begin to modify the production of a native vowel to match with a given model. These results offer strong evidence on children's motor plasticity and suggest that children can rapidly acquire new models for articulation.

Keywords: Production training, children, second language learning

HOW DOES ARTICULATORY TRAINING AFFECT FOREIGN LANGUAGE LEARNING IN ELDERLY PEOPLE?

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Cognitive functions inevitably slow down during normal aging. It can be assumed that slowing also occurs in foreign language learning as linguistic processing is one of these deteriorating cognitive functions. Speech perception and production are both part of foreign language learning and can be studied with behavioural and psychophysiological methods. We wanted to see whether intensive short-term training can result in new speech sound learning and how linguistic activity affects learning in the elderly.

Our studies were based on articulatory training and we used behavioural production, identification (ID), goodness rating (GR), discrimination sensitivity (d'), and reaction time (RT) tests and recorded electroencephalography (EEG). The subjects were 61–74 year old Finns. Study 1 consisted of production tests and articulatory training on two consecutive days. The stimuli were semi-synthetic pseudowords /ty:ti/ and /tu:ti/. Study 2 utilized the same stimuli as Study 1 and it combined ID, GR, d', RT, EEG and production tests. One subject group in Study 2 consisted of advanced students of a foreign language, while other groups had no other language identities besides their mother tongue. The stimulus pairs were chosen so that they would result in maximal learning difficulties according to different Second language acquisition theories.

The subjects in Study 1 learned to produce the new speech sound. As data from Study 2 are not yet analysed, they will be reported with discussion and conclusions at the conference. Study 2 comparing learning effects in both groups will show how foreign language studying affects learning in elderly.

Keywords: Second language learning, aging, training

NON-TYPICAL HEARING – EDUCATION FOR ALL? THE IMPACT OF TECHNOLOGY

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It is well known that learning in noisy environments is challenging for students with limited hearing. During the last twenty years, cochlear implants have become a standard treatment for young deaf children. The outcome of the intervention is variable but many children develop typical or nearly typical oral language skills. This group of children is small but fewer children attend special schools for the deaf and hard of hearing, and a decreasing number of children learn sign language. Most students depending on technology for hearing are attending mainstream schools, and their communicative needs must be met in settings not primarily adapted for learners with limited hearing. Three factors important for securing good learning are discussed; communicative approach, the use of supportive technology and the adaptation of teaching activities. The need for adaptation of educational options is discussed.

PROTOTYPE FOR SIGN LANGUAGE ANNOTATION TOOL

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On a previous conference paper the project has announced a prototype of a sign language annotation tool for phoneticians (Ojala & Palo, 2012). The basic functions are analogous to Praat and other analysis software for analysing speech. Without such a programme the study of sign language phonetics is very slow. The current sign analysis tools are aimed for linguistic analyses and not for articulatory event analysis.

The prototype annotation tool is a fairly limited matlab script. The future, desired GUI would include features for e.g. Praat-like annotation tiers and time series analysis tools for articulator movement. This could be then used for investigating signs between individuals, coarticulatory phenomena in sign, sign acquisition, clinical sign phonetics and linguistics and building sign corpora with phonetic level precision among many others.

In this conference the project invites all fellow researchers to contribute in the further development stages of the prototype tool. We welcome all proposals for future dimensions for the application as well as participating in the programming itself.

Ojala, S. & Palo, P. (2012). Sign annotation tool for phoneticians. Proceedings of XXVII Fonetiikan Päivät 2012 – Phonetics Symposium 2012, pp. 41–45. Available at: <http://digi.lib.ttu.ee/i/?802>

CONTRASTIVE RESEARCH IN LATVIAN – ENGLISH PHONETICS AND PHONOLOGY

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Contrastive research of different aspects of language, including phonetic-phonological, lexical, grammatical, discursive and others, has developed along the lines of studies of both theoretical and applied character. The latter has proved to be of permanent interest for purposes of foreign language teaching; its aspect of error prevention and error analysis has developed into an independent branch.

The true founder of Contrastive Linguistics in Latvia is prof. Marta Vecozola (1903–1994) whose doctoral thesis “Comparison of the Vowel Phoneme Systems in Latvian and English” (1954) laid the foundation of contrastive approach to analysis of various aspects of Latvian – English Phonetics and Phonology. Her devoted long-term work in the field to a great extent was stimulated by her profession as a teacher of English at the University of Latvia. Under her guidance research was undertaken concerning both the segmental and suprasegmental levels of Latvian and English phonetic features resulting in several doctoral theses (M. Neilande “Analysis of Physical Properties of English – Latvian diphthongs” (1965), V. Broka “Contrastive Analysis of Intonation of Interrogative Sentences in English and Latvian” (1969), V. Gurtaja “Prosodic Characteristics of Voiceless Consonantism in Contemporary Latvian (in Contrast to English)” (1980), M. Brēde “Prosodic Characteristics of Sonorants in Latvian (in Contrast to English)” (1981)). The experimental part of the phoneticians’ investigation was accomplished mostly in laboratories of Experimental Phonetics of Moscow and Riga, and each of the above mentioned research analyses used contemporary methods of the day (photographic representation of articulation, x-ray, electrokymographic, spectrographic, oscillographic, intonographic, segmentation and auditive methods).

Among problems of phonology apart from the first contrastive research of the vowel systems of Latvian and English (M. Vecozola) linguists have turned to those connected with phonotactics: the distribution of speech sounds in English and Latvian, the structure of consonant clusters in different positions of the word with an accent on articulatory peculiarities of consonants in clusters of English for learners whose native language is Latvian. The scope of interest of contrastive studies includes also language features discussed in the fields of phonosemantics (V. Gurtaja, M. Brēde) and phonostylistics, particularly concerning the suprasegmental level, namely characteristics of intonational styles in Latvian and English (M. Brēde).

Research done decades ago has not lost its significance since the obtained results are regularly used in the process of teaching English Normative Phonetics and Phonology, English Theoretical Phonetics, Intonation of English Discourse, Phonosemantics and Phonostylistics.

PHONETICS OF PERSUASIVE SPEECH IN ENGLISH: NON-NATIVE SPEAKER PERSPECTIVE

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Persuasive speech in English and its acoustic-phonetic correlates is a relatively new and underexplored research avenue that is critical for students and professionals giving business pitches, academic presentations, or political speeches in English. Understanding the phonetic reality of persuasive speech is even more important for non-native English speakers whose native language might employ different phonetic cues to convey power. How is persuasiveness and power expressed phonetically in English, and how are such phonetic features produced by non-native speakers of English? From a perceptual perspective, if such phonetic features are accurately implemented in non-native speaker production, is speech perceived as more powerful by native and non-native speakers alike?

Phonetic evidence regarding what contributes to the “weight” and power of speech is scarce, mostly limited to prosodic aspects of speech such as pitch, intonation and speech rate. However, there are virtually no studies that would investigate the effect of sound level features on speech power. This talk outlines new experimental research that focuses on segmental aspects of persuasive speech, specifically, voiceless stop aspiration and continuant consonant prolongation, which are investigated both from an acoustic and a perceptual perspective. Increased voiceless stop aspiration and continuant prolongation add extra duration to stressed syllables, and, hypothetically, create perceptual prominence that contributes to speech being perceived as more assertive. Acoustic analysis of native and non-native production will first illuminate the use of these phonetic cues by the two speaker groups, followed by a perceptual study that will attempt to establish the effect it has on native and non-native listeners.