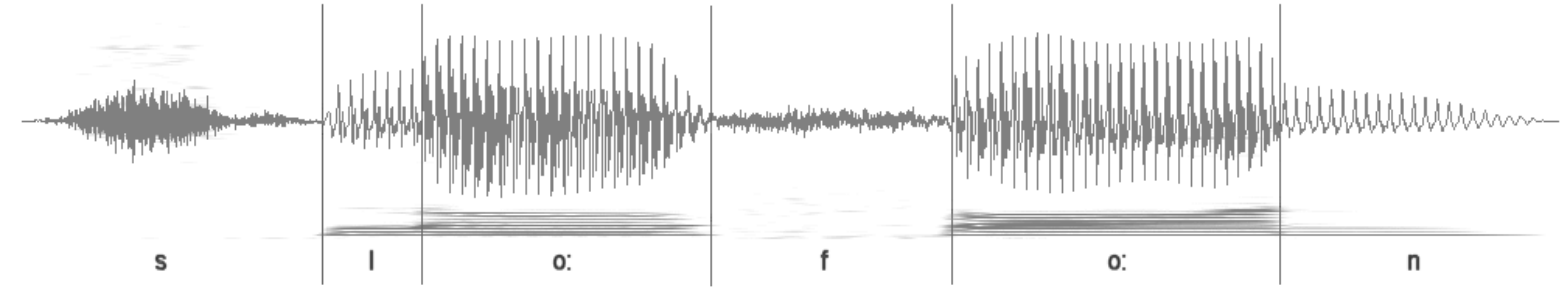

SloFon1

1. slovenska mednarodna fonetična konferenca
1st Slovene International Phonetic Conference

Ljubljana, Slovenija, 20.–22. april 2006
Ljubljana, Slovenia, 20–22 April 2006

Zbornik povzetkov
Book of Abstracts

Inštitut za slovenski jezik Frana Ramovša
Znanstvenoraziskovalni center Slovenske akademije znanosti in umetnosti

Fran Ramovš Institute of the Slovenian Language
Scientific Research Centre of the Slovenian Academy of Sciences and Arts

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Uredil Peter Jurgec.
Edited by Peter Jurgec.

Kazalo // Table of Contents

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Program // Programme

Četrtek, 20. april 2006 // Thursday, 20 April 2006

08.30–	Registracija // Registration
09.00–09.20	Uvodni nagovor // Welcoming remarks Janez Orešnik
09.20–09.30	Nagovor organizatorjev // Remarks by the organizers
09.30–10.00	Odmor za kavo // Coffee break
10.00–11.00	Vabljeno predavanje // Invited talk Moira Yip Sožitje med percepcijo in slovnico v fonologiji prevzetih besed The symbiosis between perception and grammar in loanword phonology
11.00–11.20	Odmor za kavo // Coffee break
11.20–13.00	*Fonologija I // Phonology I*
11.20–11.40	Franc Marušič *Af-koren-iks: Ali so nekontinuirani afiksi sploh možni? *Aff-stem-ix: Are there any discontinuous affixes?
11.40–12.00	Tatjana Marvin Interakcija med strukturo in izgovarjavo v angleških izpeljankah The interaction between structure and pronunciation in English affixation
12.00–12.20	Sašo Živanovič Vpliv obsega mentalnega slovarja na domeno fonološke teorije How does the size of the mental lexicon influence the range of phonological theory?
12.20–12.40	Alja Ferme Izglasni zvočniški sklopi Final sonorant clusters
12.40–13.00	Peter Jurgec O fonološkem statusu [ə] v slovenščini On the phonolgical status of schwa in Slovene
13.00–15.00	Odmor za kosilo // Lunch break
15.00–16.00	Vabljeno predavanje // Invited talk Jože Toporišič Slovensko knjižno glasovje in naglas, kakršna sta Standard Slovene sounds and accent (as they are)
16.00–16.20	Odmor za kavo // Coffee break
16.20–17.40	*Fonologija II / Phonology II*
16.20–16.40	
16.40–17.00	Teodor Petrič Glasoslovni razvoj slovenskega otroka – soglasniki in soglasniški sklopi Phonological development of a Slovenian child – Consonants and consonant clusters

17.00–17.20 Vlado Nartnik
K razmejitvi kontoidov in vokoidov v slovenskih slovnicah
On the delimitation of contoids and vocoids in the Slovenian grammars

17.20–17.40 Agata Šega
Nekatere glasovne značilnosti osnov za starejše latinizme oziroma romanizme v slovenščini
Some phonetic characteristics of bases for older latinisms or romanisms in Slovene

17.40–18.00 Odmor za kavo // Coffee break

18.00–19.00 Fonetika slovenščine I // Phonetics of Slovene I

18.00–18.20 Peri Bhaskararao, Nina Golob
Kaj je pomembno pri slovenskem naglasu? Akustična primerjava tonemskega in netonemskega naglasa
What matters in Slovene accent? An acoustic comparison of stress and pitch accents

18.20–18.40 Melita Zemljak Jontes
Zlivanje glasov v spontanem (narečnem) govoru
Sound fusion in spontaneous (dialectal) speech

18.40–19.00 Peter Jurgec, Karmen Kenda Jež
Akustična analiza leksikalnega tona v govoru Ukev
Acoustic analysis of lexical tone in the Slovene dialect of Ukve

20.00–? Sprejem pri županji ge. Danici Simšič // Reception (Ms. Danica Simšič, the mayoress of Ljubljana)

Petek, 21. april 2006 // Friday, 21 April 2006

09.30–10.30 Vabljeno predavanje // Invited talk
Bernd Möbius
Eksemplarična reprezentacija govora
Exemplar-based speech representation

10.30–11.00 Odmor za kavo // Coffee break

11.00–12.20 Jezikovne tehnologije I // Language technologies I

11.00–11.20 Tomaž Šef, Tea Tušar, Andrej Bratko, Matjaž Gams
Naglaševanje nepoznanih slovenskih besed: primerjava med človekom, človeškimi pravili in strojnim učenjem
Comparison between humans and machines on the task of accentuation of Slovene words

11.20–11.40 Jerneja Žganec Gros, Varja Cvetko - Orešnik, Primož Jakopin, Aleš Mihelič
Leksikon izgovarjav SI-PRON
The SI-PRON pronunciation lexicon

11.40–12.00 Matej Rojc, Darinka Verdonik
Uporaba fonetično-morfoloških slovarjev SIlex in LC-STAR pri grafemsko-fonemski pretvorbi tujih imen
Using SIlex and LC-STAR lexica for grapheme-to-phoneme conversion of foreign names

12.00–12.20 Andrej Žgank, Darinka Verdonik, Aleksandra Zögling Markuš, Zdravko Kačič
Razširitev slovenske govorne baze BNSI Broadcast News za izboljšano akustično modeliranje govora
Expanding the Slovenian BNSI Broadcast News speech database for improved acoustic modeling

12.20–14.00 Odmor za kosilo // Lunch break

14.00–15.20 *Splošna fonetika // General phonetics*

14.00–14.20 Ivo Škarić
Prostorska percepcija in sluh
Spatioception and hearing

14.20–14.40 Gordana Varošanec Škarić
Vibrato profesionalnih moških glasov
Vibrato in trained male voices

14.40–15.00 Ana Zwitter Vitez
Prozodične strategije v spontanem govoru: analiza in aplikacije
Prosodic strategies in spontaneous speech: analysis and applications

15.00–15.20 Branko Starc
Vokografija in njena uporaba v fonetiki
Vocographics and its application in phonetics

15.20–15.40 Odmor za kavo // Coffee break

15.40–17.00 *Jezikovne tehnologije II // Language technologies II*

15.40–16.00 Tomaž Rotovnik, Mirjam Sepesy Maučec, Darinka Verdonik
Problemi razpoznavanja spontanega govora ob primerih iz govornega korpusa Turdis
Discussing spontaneous speech recognition problems with examples from speech corpus Turdis-1

16.00–16.20 Simon Dobrišek, Boštjan Vesnicer, France Mihelič in Nikola Pavešić
Biometrični sistem za razpoznavanje govorcev
A biometric system for speaker recognition

16.20–16.40 Ekaterina Panova
Principi sestavljenja zvočne komponente v združevalni sintezi govora za sorodne jezike
Principles of compiling sound components in concatenative synthesis for closely related languages

16.40–17.00 Matej Rojc, Andrej Žgank, Tomaž Rotovnik, Bojan Kotnik
Prevajalni sistem govora v govor BABILON za jezikovni par slovenščina-nemščina
Speech-to-speech translation system BABILON for Slovenian-German language pair

17.00–17.20 Odmor za kavo // Coffee break

17.20–18.40 *Jezikovne tehnologije III // Language technologies III*

17.20–17.40 France Mihelič, Maša Novak, Simona Lustek, Grega Milharčič, Tadej Trebec
Statistična analiza formantnih frekvenc slovenskih samoglasnikov s standardnimi programskimi orodji
Statistical analysis of formant frequencies for Slovene vowels using standard software tools

17.40–18.00 Primož Jakopin
Samoglasniki in soglasniki v korpusu *Nova beseda*
Vowels and Consonants in the *Nova beseda* corpus

18.00–18.20 Tomaž Erjavec, Matija Ogrin
Fonetični znaki in elektronske izdaje
Phonetic characters in digital editions

18.20–18.40 Jana Zemljarič Miklavčič, Marko Stabej
Zapisati nezapisljivo: transkribiranje spontanega govora za govorni korpus
How to write down what cannot be written down (transcribing spontaneous speech for spoken corpus)

Sobota, 22. april 2006 // Saturday, 22 April 2006

9.30–11.10 *Kontrastivne raziskave // Contrastive studies*

9.30–9.50 Charalampos Karypidis, Antonia Colazo - Simon, Angelica V. Costagliola
Neenakomernost pri percepciji J2: dokazi iz artikulacijske sinteze kontinuuma /i/~/e/
Asymmetry in vowel perception in L2: evidence from articulatory synthesis of an /i/~/e/ continuum

9.50–10.10 Elenmari Pletikos, Jelena Vlašić, Jordan Bićanić
Uresničevanje leksikalnih naglasov v različnih intonacijskih glavah v hrvaščini
The realization of lexical accents within different focuses in Croatian

10.10–10.30 Rastislav Šuštaršič
Angleško-slovenska kontrastivna fonetika ter njene aplikacije pri poučevanju angleške fonetike
English-Slovene contrastive phonetics and its applications in teaching English phonetics

10.30–10.50 Damir Horga, Vesna Požgaj - Hadži, Marko Liker
Časovne spremenljivke hrvaščine in slovenščine ter njun tujejezični jezikovni stik
Temporal parameters of Croatian and Slovene in their linguistic contact as foreign languages

10.50–11.10 Hotimir Tivadar, Matea Hotujac
Artikulacijsko-akustični opis slovensko-hrvaškega jezikovnega sistema
Articulatory and acoustic description of the Slovene-Croatian language system

11.10–11.30 Odmor za kavo // Coffee break

11.30–12.30 *Fonetika in govorna rehabilitacija // Phonetics and speech rehabilitation*

11.30–11.50 Irena Hočevar Boltežar, Miha Žargi
Spremembe v oblikovanju samoglasnikov pri gluhih osebah po vsaditvi polževega vsadka
Changes in the articulation of the vowels in deaf subjects after cochlear implantation

11.50–12.10 Martina Ozbič
Razumljivost govora oseb z motnjo sluha: prispevek tranzientov, formantov ter glasovnih, govornih in izgovornih elementov
Intelligibility of talk of people with disturbance of hearing: Contribution of the transients, formants, voice, speech and articulation and articulation elements

12.10–12.30 Tanja Kocjančič, Stefan Werner
Akustična analiza diadokokineze v govoru oseb z nevrološko poškodbo
Acoustic analysis of diadochokinesis in neurologically impaired speech

12.30–14.00 Odmor za kosilo // Lunch break

14.00–15.40 *Fonetika slovenščine II // Phonetics of Slovene II*

14.00–14.20 Hotimir Tivadar
Sodobni knjižni jezik med pisnostjo in govorjenostjo (na primeru radia in televizije)
Contemporary standard Slovene between writing and speech (on the radio and television)

14.20–14.40 Damjan Huber
Vpliv nekaterih sociolingvističnih dejavnikov na (slušno) zaznavanje samoglasnikov slovenskega standarda pri dijakih pomurskih srednjih šol
Influence of some sociolinguistic factors to (speech) perception of standard Slovene vowels in the case of high school students in Pomurje

14.40–15.00 Nina Novak
Prvine spontanega govora v zapisniku
Elements of spontaneous speech in the minutes

15.00–15.20 Zdravko Zupančič
Premislek – manjkajoči člen med »verbum mentis« in »vis sermonis«
Reflection – A missing link between »Verbum Mentis« and »Vis Sermonis«

15.20–15.40 Zaključni pozdrav // Concluding remarks

Bernd Möbius
Univerza v Stuttgartu
Stuttgart, Nemčija

Eksemplarična reprezentacija govora

Ekseplarična teorija trdi, da notranji fonetični modeli nastanejo iz shranjenih reprezentacij velikega števila percipiranih akustičnih realizacij, eksemplarjev. To je dokaz, da se ti eksemplarji in njihove fonetične podrobnosti uporabljajo v govorni percepciji in pri tvorjenju, ne pa abstraktne reprezentacije.

V prvem delu bodo predstavljene osrednje predpostavke eksemplarične teorije v zvezi z govorno percepcijo in produkcijo. Kratko bo predstavljen model postopkov, ki so vodili k vzpostavitvi polno specificiranih reprezentacij govora v okviru eksemplarične teorije. Model predvideva, da je leksikalni dostop izločen iz mejnikov govornega signala na temelju fonetičnih značilnosti in preverjen prek notranje poti analiza-s-sintezo (Stevens 2005). Model predlaga, da eksemplarji govornih dogodkov niso dejanske realizacije, ampak reprezentacije, ki so narejene prek notranjega procesa analiza-s-sintezo (Dogil 2005). Ta proces se začne pri hipotetičnih leksikalnih vnosih in upošteva mejne in kontekstne informacije, rezultat pa so polno specificirani eksemplarji primerne jezikovne enote.

V drugem delu bomo časovno dimenzijo eksemplaričnih reprezentacij raziskali v več eksperimentih. Pokazali bomo, da so zlogi z visoko frekvenco pojavnosti kažejo značilno višje deleže koartikualcije kot nepogosti zlogi. Ta pogostnostni učinek je viden na časovni ravni, saj lahko trajanje redkih zlogov bolj predvidimo iz posameznih trajanj segmentov v primerjavi s pogostnimi zlogi. To priča o tem, da zlogi lahko služijo kot perceptivni in produkcijski cilji, če so dovolj pogostni za reprezentacije na podlagi reprezentacij.

Bernd Möbius
University of Stuttgart
Stuttgart, Germany

Exemplar-based speech representation

Exemplar Theory posits that internal phonemic models emerge from stored representations of large numbers of perceived acoustic realizations, or exemplars. There is evidence that these exemplars and their phonetic details, rather than more abstract representations, are used in perception and production to process speech.

In the first part of this talk, the central assumptions made by Exemplar Theory with respect to speech perception and production are reviewed. A computational model of the procedures that lead to the establishment of fully specified representations of speech in the framework of Exemplar Theory is sketched. The model assumes that the lexical access on the basis of phonetic features extracted at landmarks in the speech signal is verified by way of an internal analysis-by-synthesis path (Stevens, 2005). Crucially, the model proposes that exemplars of speech events are not concrete realizations but representations constructed through the internal analysis-by-synthesis process (Dogil, 2005). This process starts from hypothesized lexical entries, takes landmark and context information into account, and results in fully specified exemplars of the pertinent linguistic unit.

In the second part part of the talk, the temporal dimension of exemplar representations is investigated in a series of experiments. It is shown that syllables with a high frequency of occurrence exhibit a significantly higher degree of coarticulation than do low-frequency syllables. This frequency effect is demonstrated in the temporal domain, where the duration of rare syllables can be better predicted from the individual segment durations than the duration of high-frequency syllables. This is taken as evidence that syllables can serve as perception and production targets, if they are sufficiently frequent to build up exemplar-based representations.

Jože Toporišič
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Slovensko knjižno glasovje in naglas, kakršna sta

To glasoslovje se bralcem zadnjih nekaj desetletij predstavlja v mojih knjižnih delih, kot so: Slovenski jezik. Izgovor i intonacija s recitacijama na pločama, 1961, Slovenski knjižni jezik 1, 1965, Zakaj ne po slovensko, Slovene by Direct method, 1969, Slovenska slovnica, 1976, Načrt pravil za novi slovenski pravopis, 1981, Zakaj ne po slovensko – Lo sloveno con il metodo sintetico, 1982, Slovenski pravopis 1, Pravila, 1990, Slovenski pravopis, 2001; in skoraj vsa ta dela tudi v naslednjih izdajah.

Glasovni sestav SKJ obsega: 8 samoglasnikov (i, e, ɛ, a, ɔ, o, u + ə), 6 zvočnikov (m, j, m–n, r–l) oz. 8, če priznavamo še ń in ľ, in 15 nezvočnikov (p–b, t–d, s–z, š–ž, č–dž, k–g, in f, c, h); skupaj je to 8 + 6/(8) + 15 = 29/(31) fonemov. (Mehkih n in l v nadaljnjem ne upoštevam.)

5 samoglasnikov je lahko dolgih in kratkih naglašenih, e in o sta le dolga, polglasnik pa samo kratek. Vsi samoglasniki so lahko jakostno naglašeni, pa tudi nosilci tonemskega naglaševanja (omejitev je naglašena kračina v zadnjem ali edinem zlogu, razen na polglasniku pa so kračine v notranjosti besede menda samo cirkumfletirane). O tonemskem naglaševanju v slovenskem knjižnem jeziku prim. zlasti mojo razpravo Pojmovanje tonemskosti slovenskega jezika in razpravo Lik slovenskih tonemov v Galsovni in naglasni podobi slovenskega jezika, 1978, 225–229. Samoglasnika e in o ne moreta biti nenaglašena. Kračine, če so naglašene v notranjosti besede, so sklopnega nastanka (tjàkaj) ali pa t. i. oslabljenega naglasa (kàkšen, poljubn. nasproti kákšen, vprašalno). Poseben problem je obstojna zveza polglasnik + r, ki je naglasno izenačena z naglasom pri i,e, ɛ, a, o, ɔ, u, in sicer tudi, ko gre za nanaglašenost (tr̂d, tŕda, trdô – narečno na Mostecu tudi pr̥̄st pŕst, rus. pèrst perstà).

Ugovori moji teoriji so: število slovenskih fonemov, /v/ kot zvočnik (drsnik); narava obeh tonemov, kvantitetno nasprotje, tonemskost v govoru Ljubljane, nenaglašena e in o vendar tudi ozka, odpravljanje hiata med i + V, večnaglasnost slovenske knjižne besede, stavčna intonacija in pač še kaj, npr. zvočniški soglasniški sklopi ali moje slovenistično izrazje.

Jože Toporišič
Slovenian Academy of Sciences and Arts
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Standard Slovene sounds and accent (as they are)

This kind of phonology was presented in the last decades to the readers in the author's books, e.g.: Slovenski jezik. Izgovor i intonacija s recitacijama na pločama, 1961, Slovenski knjižni jezik 1, 1965, Zakaj ne po slovensko. Slovene by Direct Method, 1969, Slovenska slovnica, 1976, Načrt pravil za novi slovenski pravopis, 1981, Zakaj ne po slovensko – Lo sloveno con il metodo sintetico, 1982, Slovenski pravopis 1, Pravila, 1990, Slovenski pravopis, 2001; including the subsequent editions.

Standard Slovene sound system consists of 8 vowels (i, e, ɛ, a, ɔ, o, u + ə), 6 sonorants (m, j, m–n, r–l) or 8, if one acknowledges ń in ľ, and 15 obstruents (p–b, t–d, s–z, š–ž, č–dž, k–g, in f, c, h); the total of 8 + 6/(8) + 15 = 29/(31) phonemes. (Palatalized n and l are excluded from the following discussion.)

5 vowels can be both long or short, e and o only long, while schwa can only be short. All vowels can be pronounced with stress or pitch accent; the contrast is absent in the stressed short vowels, except for the schwa). For details regarding the pitch accent in standard Slovene see "Pojmovanje tonemskosti slovenskega jezika" and "Liki slovenskih tonemov" in *Glasovna in naglasna podoba slovenskega jezika*, 1978, p. 225–229. The vowels e and o cannot be unstressed. Word-internal short vowels are found in the compounds (*tjàkaj*) or under weak stress (*kàkšen* vs. *kákšen*). A special problem is the stable sequence schwa + r, which is leveled with i, e, ɛ, a, o, ɔ, u, as regards the stress patterns, even if unstressed (*tŕd*, *tŕda*, *trdô* – cf. Mostec dialect: also *pr̥̈st pŕst*, Russian: *pèrst persta*).

The objections to my theory are as follows: the number of phonemes in Slovene, /v/ as a sonorant (approximant), the nature of both tonemes, quantity contrast, pitch accent in Ljubljana, the unstressed e and o, hiatus resolution in i + V sequences, secondary stress in standard Slovene, sentence intonation, sonorant clusters, and terminology.

Moira Yip
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Sožitje med percepcijo in slovnico v fonologiji prevzetih besed

Ločimo lahko tri poglede na vlogo percepcije pri prilagajanju prevzetih besed. Prvi določa, da so odstopi v percepciji glavni razlog za prilagoditev. Bistvo pogleda je, da percepcijski pregled izpusti več ali manj kontrastov jezika dajalca (J2), ki jih ni tudi v jeziku prejemniku. Tako je lahko fonološki vnos v celoti brez posameznih segmentov. V skrajnem primeru vse prilagoditve potekajo samo na ravni percepcije (Peperkamp in Dupoux 2003). Nasprotni pogled pa pravi, da je percepcija pri poslušalcu jezika prejemnika relativno blizu tisti, ki je značilna za rojene govorce jezika dajalca. Fonološki vnos je torej kar rezultat jezika dajalca, večina prilagoditev pa je slovnično določena. Slovnica ima kvečjemu slab dostop do percipirane informacije (Gussenhoven in Jacobs 2000, LaCharité in Paradis 2003).

Tretji pogled, ki ga tu zagovarjamo, je srednja možnost. Percepcija vključuje nekatere reflekse večine tujih segmentov, hkrati pa se lahko razlikuje od percepcije rojenih govorcev jezika dajalca. Fonološki vnos je ta spremenjena percepcija. Slovnica vpliva na nadaljnje spremembe, ima pa lahko dostop do percepcije, posebej še do nekaterih bistvenih akustičnih in morda vizualnih značilnosti, čeprav o tem ne bomo povedali nič novega (Silverman 1992, Yip 1993, 2002, Steriade 2001, Shinohara 2004, Yip 2002, Kenstowicz 2003). Dokazi za vlogo slovnice so treh vrst. Najprej lahko pogledamo primer, kako različne skupnosti z istim jezikom prejemnikom (J1) uporabljajo različne strategije in tako kažejo, da se slovnice glede tega razhajajo. Drugič, omejitve pri zlogovni strukturi lahko povzročijo sovpad drsnika in samoglasnika, drsniki lahko postanejo samoglasniki ali obratno. Tretjič, slovnice imajo prioritete, katere vidike percepcije ohraniti in kako. Za kantonščino je pomembneje prilagoditi prominentne soglasnike in ton (refleks angleškega naglasa) kot pa prilagoditi prozodično strukturo, kar pa je še vedno pomembneje kot prilagoditi samoglasniško kvaliteto, šele potem pa trajanje samoglasnikov.

Podatki so večinoma iz angleščine v kantonščino prevzete besede, predstavitev pa bo organizirana na naslednji način. Na začetku bo kratka uvodna razprava o vlogi t. i. medjezikov pri prilagajanju prevzetih besed. Sledili bodo primeri, kjer lahko percepcija sama pojasni segmentne prilagoditve ali izpuste. Nato bodo predstavljeni primeri, kjer je odločilna slovnica. Osrednji del bo obravnava prilagajanja angleških [æ] in [ə] v kantonščini, pri čemer bo posebna pozornost posvečena akustičnim in perceptivnim dokazom za kar najboljše ujemanje samoglasnikov ter vlogi slovnice jezika prejemnika pri izbiranju med številnimi verjetnimi kandidati.

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The symbiosis between perception and grammar in loanword phonology

One can distinguish three views on the role of perception in loan adaptation. In the first view, misperception is the primary cause of adaptation. The idea is that the perceptual scan misses some or many of the L2 donor language distinctions that are missing in the host language. Thus the input to the phonology may lack some segments entirely. Taken to the extreme, all adaptation takes place in perception. (Peperkamp and Dupoux 2003). A contrasting view is that the host language hearer's percept is fairly close to that of a native speaker of the donor language. The input to the phonology is more or less the donor language output, and most adaptation is grammatically controlled. The grammar has little or no access to perceptual information. (Gussenhoven and Jacobs 2000; LaCharité and Paradis 2003).

A third view, and the one espoused in this paper, is intermediate between these two extremes. The percept includes some reflex of most of the non-native segments, but it may differ from the percept of a native speaker of the donor language. The input to the phonology is this transformed percept. The grammar then imposes further changes. This grammar may have access to perceptual information, particularly the relative salience of acoustic and perhaps visual cues, although I will have little to say about this here (Silverman 1992, Yip 1993, 2002, Steriade 2001, Shinohara 2004, Yip 2002, Kenstowicz 2003). The evidence for the role of the grammar comes from three sources. First, I look at a case in which different communities with the same L1 host language use different strategies, showing that their grammars are diverging in this one respect. Second, I show that syllable structure restrictions can cause glide-vowel coalescence, glides to become vowels, or the reverse. Third, I show that grammars set priorities as to which aspects of the percept to preserve, and how to preserve them. For Cantonese matching salient consonants and tone (the reflex of English stress) takes precedence over matching prosodic structure, and this in turn is more important than matching vowel quality, with matching vowel length the least important of all.

The data comes largely from English loans into Cantonese, and the talk is organized as follows. I begin in with a brief preliminary discussion of the role of interlanguages in loanword adaptation. Then I look at cases where perception alone can explain segment adaptation or deletion. Next I turn to cases where the grammar plays the central role. The main part of the paper is a case study of the adaptation of English [æ] and [ə] into Cantonese, looking in detail at acoustic and perceptual evidence for the best vowel match, then at the role played by the host language grammar in selecting from the field of plausible candidates.

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Kaj je pomembno pri slovenskem naglasu?
Akustična primerjava tonemskega in netonemskega naglasa

Slovenščina je eden izmed redkih jezikov, ki ima dva tipa naglaševanja v narečjih. Tradicionalno gledano naj bi tonemska narečja (npr. v Ljubljani) in netonemska narečja (npr. Celje) uporabljala druge akustične prozodične lastnosti za razlikovalnost. Ob upoštevanju ugotovitev v dosegljivi literaturi smo se ukvarjali z akustičnimi prametri pri naglaševanju obeh tipov. Štiri moški govorci (po dva za vsako vrsto naglaševanja) so prebrali nosilne stavke s 24 minimalnimi pari po naglasu in 19 minimalnimi pari po tonemu (vključno z minimalnimi pari iz Srebot Rejec 1988 in Toporišič 1978) v različnih položajih v stavku – na začetku, sredi ali na koncu stavka. Meritve trajanja, F0 in intenzitete relevantnih samoglasnikov kažejo več razlik med obema različicama jezika. Pokazalo se je: 1. da so naglašeni samoglasniki obeh različic precej daljši od nenaglašenih, 2. da ima netonemska slovenščina manj izrazit, ampak konstanten tonski potek (visoko-nizko), medtem ko ima tonemska slovenščina bolj izrazita, a nepredvidljiva poteka (visoko-nizko in nizko-visoko), 3. intenziteta je bolj regularna pri netonemski različici. Splošne ugotovitve kažejo, da je trajanje skupni kazalec naglašenih zlogov in da so značilne akustične razlike samo v naglasnih minimalnih parih, v tonemskih pa ne, ne glede na tonemskost/netonemskost govora. Slednje dokazuje, da ima tonemska slovenščina sicer značilen tonski potek, vendar so te razlike majhne in le težko pomensko razločevalne.

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What matters in Slovene accent?
An acoustic comparision of stress and pitch accents

Slovene is one of the few languages that is reported to have two different systems of accentuation across dialects. Conventionally, pitch accent dialects, such as the Ljubljana variety, and stress accent dialects, such as the Celje variety, are supposed to utilize different acoustic prosodic features to realize their distinctive function. Keeping in view the findings in the available literature on this topic, we investigated the acoustic parameters of the accent patterns of the two types. Four male speakers, two for each accent type, read carrier sentences that contained 24 stress-accent minimal pairs and 19 pitch-accent minimal pairs (including minimal pairs from Srebot-Rejec 1988 and Toporišič 1978) in different sentence positions – sentence-first, sentence-mid, and sentence-final. Measurements of duration, F0 and intensity of the concerned vowels show several differences between the two varieties of the language. Analysis of the data revealed the following: 1. In both the language varieties vowels of accented syllables are significantly longer than those in the unaccented syllables, 2. Stress accent variety has a less marked but constant type of pitch contour (high-low), whereas in pitch accent variety the pitch contour is more marked but with two unpredictable patterns (high-low and low-high), 3. Intensity shows regular patterns in stress-accent variety only. Our general findings indicate that duration is a common indicator of accented syllables, and furthermore, that while acoustic differences in stress-accent minimal pairs are significant, they are insignificant in pitch-accent minimal pairs, irrespective of the language variety. The latter suggests that although pitch-accent variety maintains its specific pitch contour variations, these variations carry a very week or nearly non-distinctive lexical function.

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Biometrični sistem za razpoznavanje govorcev

Analiza govora je eden od biometričnih načinov ugotavljanja in preverjanja istovetnosti oseb. Na področju biometrije predpostavljamo, da posameznika istovetijo njemu lastne fiziološke in vedenjske značilnosti. Zvočni govorni signal nosi informacijo tako o fizioloških kot tudi vedenjskih značilnostih govorca.

Njegove fiziološke značilnosti merimo posredno iz akustičnih značilnosti govora, ki so odvisne predvsem od ustroja posameznikovih govoril. Akustične značilnosti merimo z računalniško analizo frekvenčnega spektra kratkih izsekov zvočnega govornega signala. V spektru se namreč neposredno odražajo značilnosti, ki jih ljudje opisujemo z izrazi, kot so zvočnost, barva in globina glasu, ali pa nosljajoč, momljajoč govor ipd.

Vedenjske značilnosti posameznika ugotavljamo na osnovi prozodičnih in jezikovnih značilnosti njegovega govora. Meritve prozodičnih značilnosti izpeljemo iz meritev osnovnega tona in akustične moči govora. V teh meritvah se odražajo značilnosti, kot so poudarek, intonacija, ritem ipd. Jezikovne značilnosti ponavadi pridobimo kar z uporabo samodejnih razpoznavalnikov govora, ki akustični govorni signal pretvarjajo v nize jezikovnih enot. V razpoznanih enotah se odražajo značilnosti, kot so izgovorjava, dialekt, slog, dikcija in seveda tudi pomen izgovorjenega.

V našem laboratoriju imamo že dolgoletno tradicijo raziskav na področju razpoznavanja govorcev. Na predstavitvi podajamo poleg pregleda raziskovalnega področja tudi lastne raziskovalne izkušnje in rezultate, ki smo jih dosegli med pripravo na mednarodno ovrednotenje sistemov za samodejno razpoznavanje govorcev, ki poteka v organizaciji ameriškega nacionalnega inštituta za standarde in tehnologijo (NIST 2006).

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A biometric system for speaker recognition

Speech analysis is one of biometric modalities that is used for automatic identification and verification of persons. In the field of biometrics, it is assumed that every person is identified by his/her physiological and behavioural characteristics. The acoustic speech signal conveys information about both physiological and behavioural characteristics of a speaker.

Physiological characteristics can be measured indirectly via acoustic speech features that depend on an anatomical structure of speaker vocal apparatus. The acoustic speech features can be extracted by a short-term spectral analysis of an acoustic speech signal. The short-term speech spectrum reflects several acoustic cues; among them are the sonority, colour and depth of a voice, or mumbling and nasality in speech, etc.

Behavioural characteristics can be measured via prosodic and linguistic features of speech. Prosodic features are extracted from pitch and short-term loudness. These features reflect perceptual cues like stress, intonation, rhythm etc. For extractions of linguistic features automatic speech recognition systems can be used. Such systems transform speech signals into sequences of language units in which perceptual cues like pronunciation, dialect, idiolect, diction and semantics are reflected.

Our laboratory has a long tradition of research in the field of automatic speaker recognition. In our presentation, we give a brief survey of the research field and a report on the results and experiences gained during the preparations for the international evaluation of speaker recognition systems, conducted by the US National Institute of Standards and Technologies (NIST 2006).

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Fonetični znaki in elektronske izdaje

Prispevek obravnava problem kodiranja in prikaza fonetičnih znakov v elektronski obliki. Avtorja posvečata osrednjo pozornost trem relevantnim mednarodnim standardom in priporočilom: prvega predstavlja konzorcij za univerzalno kodiranje znakov Unikod (Unicode: http://www.unicode.org/), drugi standard je eXtended Markup Language (XML: http://www.w3.org/XML/), tretjega pa predstavljajo priporočila konzorcija Text Encoding Initiative TEI P5 (http://www.tei-c.org/P5/).

V tem kontekstu avtorja obravnavata shranjevanje (kodiranje) in dostopnost (prikaz) posebnih znakov, še zlasti znakov mednarodne fonetične pisave IPA in tem podobnih znamenj, denimo tistih, implementiranih v pisavi vnašalnega sistema ZRCola (http://zrcola.zrc-sazu.si). Prispevek predstavi razne možnosti za kodiranje znakov IPA, npr. SAMPA, Unikodov razpon mest za dodatne znake za nabor IPA in tistih za kombinirana diakritična znamenja, nenazadnje pa tudi Unikodovo področje za zasebno rabo (Private Use Area, PUA), ki je mdr. uporabljeno tudi v naboru pisave ZRCola. V prispevku so prikazani problemi in potrebni ukrepi pri uporabi področja za zasebno rabo, denimo dokumentiranje rabe PUA po priporočilih TEI P5. Avtorja podajata tudi scenarije priporočil TEI P5 za avtomatsko umestitev nadomestnih znakov in njihovo implementacijo v pretvorbah iz XML za prikaz v HTML. V povezavi s tem predlaga prispevek tudi možen dodatek k dokumentaciji znakovne tabele v področju zasebne rabe PUA pri pisavi ZRCola.

Referat temelji na izkušnjah, pridobljenih pri delu za projekt Elektronske znanstvenokritične izdaje slovenskega slovstva (http://nl.ijs.si/e-zrc/), še zlasti pa na tistih vprašanjih, ki jih avtorjema postavlja kodiranje fonetične transkripcije Brižinskih spomenikov v tipografiji ZRCola in posredovanje tega zapisa na medmrežju v izmenljivi in standardizirani obliki.

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Phonetic characters in digital editions

The talk addresses the issue of coding and displaying phonetic characters in digital form. We focus on three related international standards and recommendations: the universal character encoding Unicode (http://www.unicode.org/), the eXtended Markup Language, XML (http://www.w3.org/XML/), and the Text Encoding Initiative Guidelines TEI P5 (http://www.tei-c.org/P5/).

In this context we discuss the storage (coding) and accessibility (display) of special characters with emphasis on the International Phonetic Alphabet IPA and IPA-like symbols, esp. as implemented in the ZRCola font (http://zrcola.zrc-sazu.si). Presented are various options for encoding IPA symbols i.e. SAMPA, Unicode ranges for IPA Extensions and Combining diacritics, and the Unicode Private Use Area (PUA), which is, inter alia, used in ZRCola. The penalties of using PUA are discussed, as is the manner of documenting the PUA extensions in TEI P5. We also give options for fall-back scenarios that are available in TEI and how to implement them in the context of translations to HTML. In connection with this we suggest improvements to the documentation of the ZRCola PUA character set.

The presentation is based on our experience in the project Scholarly Digital Editions of Slovenian Literature (http://nl.ijs.si/e-zrc/), especially as regards our on-going work with encoding the phonetic transcription of the Freising Manuscripts in ZRCola and making it available on the Web in an interchangeable and standardised form.

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Izglasni zvočniški sklopi

Izglasni zvočniški sklopi v slovenskem jeziku so neredko obravnavani. (Izglasni položaj imenujem tako položaj na koncu besede kot pred raznozložnim soglasnikom. O sovpadu teh dveh položajev in razlogih zanj glej Kahn (1976), prim. tudi Toporišič (1959).) Toporišič (1959) jih razvršča v skupine, za katere določi, ali se v sklop vriva samoglasnik ali ne ter kakšna je njegova kvaliteta (polglasnik ali /i/). Kasneje v Srebot Rejec (1992) najdemo zavračanje pristopa naštevanja obstojnih in neobstojnih izglasij. Namesto njega avtorica na podlagi lestvice sonornosti vzpostavi pravilo, da v zvočniškem izglasju lahko nastopi le bolj sonoren zvočnik, ki mu sledi manj sonoren. V primeru obrnjenega zaporedja se med zvočnika vriva samoglasnik. Spremembe kvalitete vrivajočega se samoglasnika (polglasnik – /i/) pri izglasjih z /j/ avtorica ne pojasnjuje.

Za celjski govor opažam, da se v nasprotju z gornjimi trditvami v izglasju lahko pojavljajo vse kombinacije zvočnikov (izjema je /r/ kot drugi del sklopa), pri čemer takšno izglasje vselej nosi vrednost zloga (prim. Unuk 2003). Obravnava takšnih predteoretičnih opažanj poteka v okviru teorije vezalne fonologije (Kaye, Lowenstamm in Vergnaud 1990, Scheer 2004) Le-ta ne samo poveže opažanji o poljubnem kombiniranju zvočnikov in vrednosti zloga, ki ga takšno izglasje predstavlja, temveč tudi odpravi navidezne izjeme z /v/ (*barv* [baru]) in /j/ (*morij* [mori]) kot drugim delom zvočniškega izglasja. Teorija nam namreč pokaže, da gre pri teh tipih izglasja za popolnoma enak fonološki proces kot pri ostalih zvočnikih. O večini izjem, ki se tičejo zvočniških izglasij, torej v celjskem govoru ni mogoče govoriti.

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Final sonorant clusters

There are many analyses of Slovene final sonorant clusters. (In this presentation the term final stands for both, the word- nal position and the position preceding a heterosyllabic consonant. For collapsing the two contexts into one see Kahn (1976), cf. also Toporišič (1959).) Toporišič (1959) assigns them to di erent groups according to their behaviour; some cannot be broken by an intervening vowel and some can, among the latter the intervening vowel is a schwa or /i/. Srebot Rejec (1992) rejects the grouping method and proposes a rule for the existence of final sonorant clusters based on the sonority scale: the more sonorous sonorant is followed by the less sonorous one. In the case of the reverse sequence the vowel needs to appear between the two sonorants. Different qualities of the vowel (schwa vs. /i/) are not explained.

The Celje dialect on the other hand displays all possible combinations of sonorants in final position (the exception being clusters with /r/ as the second member). In addition, such clusters always have a value of a syllable (cf. Unuk 2003). The analysis of these observations is couched in the framework of Government Phonology (Kaye, Lowenstamm, and Vergnaud 1990, Scheer 2004). It not only combines the two seemingly unconnected facts (arbitrary combinations of sonorants in final clusters and their value of a syllable) but also shows that the alleged exceptions with /v/ (*barv* [baru]) and /j/ (*morij* [mori]) are nothing more than results of perfectly regular phonological processes affecting sonorants in final positions. The conclusion the theory provides is that most of the alleged exceptions concerning final sonorants clusters are non-existent in the Celje dialect.

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Spremembe v oblikovanju samoglasnikov pri gluhih osebah po vsaditvi polževega vsadka

Izhodišča. Zaradi odsotne slušne kontrole so pri gluhih osebah moteni vsi elementi motorične govorne produkcije: dihanje, fonacija in izreka. Za oceno izboljšanja kakovosti izreke samoglasnikov po vsaditvi polževega vsadka (PV) uporabljamo akustično analizo t. i. vogelnih samoglasnikov (/a/, /i/ in /u/), ki v diagramu, v katerem so prikazani samoglasniki glede na frekvence prvega (F1) in drugega formanta (F2), ležijo v skrajnih položajih in tvorijo samoglasniški trikotnik (ST).

Namen raziskave. Želeli smo ugotoviti spremembe v izreki pri gluhih odraslih in otrocih po vsaditvi PV, ko pridobijo slušno kontrolo svojega govora.

Metode. V raziskavo smo vključili 13 prelingvalno gluhih otrok (6 fantov, 7 deklet) in 12 postlingvalno gluhih odraslih (6 moških in 6 žensk). Pred vključitvijo PV in nato 6 do 12 mesecev po njej smo analizirali vzorce izoliranih vogelnih samoglasnikov s pomočjo Computerized Speech Lab (Kay Elemetrics, ZDA), določili frekvence F1 in F2 ter izračunali ST. Primerjali smo razlike v F1, F2 in ST pred vključitvijo PV in po njej.

Rezultati. Pri odraslih, ki so bili gluhi od 3 mesece do 25 let pred vsaditvijo PV, se F1 in F2 vogelnih samoglasnikov niso veliko spremenile po vsaditvi PV. Pri 13 prelingvalno gluhih otrocih se je po pridobitvi slušne kontrole govora s PV statistično značilno spremenila F1 za /u/ ($p = 0{,}034$) in s tem značilno povečala tudi ploščina ST ($p = 0{,}039$).

Zaključki. Rezultati naše raziskave so pokazali, da se pri otrocih po vključitvi PV poveča fonološka razlika med posameznimi glasovi in s tem razumljivost njihovega govora. Predvsem pri majhnih otrocih, pri katerih se govor in motorični vzorci izreke šele oblikujejo, pridobitev slušne kontrole hitro in značilno izboljša natančnost izreke. Pri odraslih, pri katerih so motorični vzorci že avtomatizirani in sposobnost njihove spremembe manjša, se kljub pridobljeni slušni kontroli kakovost izreke bistveno ne izboljša.

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Changes in the articulation of the vowels in deaf subjects after cochlear implantation

Backgrounds. In deaf subjects the regulation of all elements of motorical speech production (breathing, phonation and articulation) is disordered because of lack of auditory control. In order to assess the improvement of vowel articulation after the cochlear implantation (CI), the acoustic analysis of corner vowels (/a/, /i/, /u/) is used. The corner vowels form a vowel triangle (VT) when they are represented in a diagram with frequencies of the first (F1) and the second (F2) formant.

Purpose. The purpose of the study was to investigate the changes in the articulation in deaf adults and children after the CI which enables them auditory control of their speech.

Methods. Thirteen prelingually deafened children (6 boys, 7 girls) and 12 postlingually deafened adults (6 men, 6 women) were included in the study. The voice samples of the corner vowels were analyzed with a Computerized Speech Lab (Kay Elemetrics, USA) before and 6 to 12 months after the implantation. The frequencies of F1 and F2 were measured and the square dimension of the VT was calculated and compared before and after the implantation.

Results. No significant differences were detected in the formant frequencies, and the square dimension of the VT in the adults who were deaf 3 months to 25 years before the CI. In the prelingually deafened children a significant difference in the F1 frequency of /u/ ($p = 0.034$) and in the square dimension of the VT ($p = 0.039$) were detected after the CI.

Conclusions. The results of the present study show that the phonologic differences between different phonemes increase after CI in children. The intelligibility of their speech improves. After acquisition of auditory control the precision of the articulation is particularly improved in small children in whom the speech and articulation motorical patterns are still developing. In adults the quality of their articulation did not significantly improve after the CI. We suppose that their speech motorical patterns are already automated and their ability to change them after acquisition of hearing is smaller.

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Časovne spremenljivke hrvaščine in slovenščine ter njun tujejezični jezikovni stik

Pri učenju tujega jezika sta materni in tuji jezik v psiholingvističnem stiku, ta pa kaže sistem napak, ki kažejo na vpliv maternega na tuji jezik in govorne sposobnosti. Ta pojav je znan kot tuji naglas in se kaže na različnih ravneh jezika in govora – od fonetično-artikulacijskega do pragmatično-nejezikovnega. Ta referat obravnava nekatere časovne spremenljivke hrvaščine kot J2 slovenskih študentov in slovenščine kot J2 hrvaških študentov. Skupina 15 hrvaških in 15 slovenskih študentov je prebrala odlomek iz pripovedi (v trajanju od 125 do 180 s) v J1 in J2; posnetki so nastali v zvočno izoliranem prostoru. Označevanje in analiza je bila narejena v programu Praat. Analizirali smo: hitrost artikulacije, hitrost govorjenja, trajanje in distribucijo premorov ter segmentalne časovne značilnosti J1 in J2. Statistična analiza je pokazala značilne razlike v časovnih parametrih med obema skupinama in med maternimi in tujejezičnimi govorci hrvaščine in slovenščine.

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Temporal parameters of Croatian and Slovene in their linguistic contact as foreign languages

During the process of learning a foreign language the native and the foreign language are brought into a psycholinguistic contact which produces a system of errors revealing the influence of the native language on the foreign language and speaking skills. This phenomenon is known as a foreign accent manifest in different levels of language and speech; from the phonetic-articulatory to the pragmatic-nonverbal. This paper investigates some temporal parameters of Croatian as L2 as spoken by Slovene students and Slovene as L2 as spoken by Croatian students. A group of Croatian students (N=15) and a group of Slovene students (N=15) read the same narrative passage (duration spanning between 125s and 180s) in L1 and L2 which were recorded in a soundproof chamber. Annotation and analysis was done by the Praat software. The following variables were analysed: rate of articulation, rate of speaking, duration and distribution of pauses and segmental temporal characteristics in L1 and L2. Statistical analyses showed significant differences in temporal parameters between these two groups of speakers and between native and foreign speakers of Croatian and Slovene.

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Vpliv nekaterih sociolingvističnih dejavnikov na (slušno) zaznavanje samoglasnikov slovenskega standarda pri dijakih pomurskih srednjih šol

S perceptivnimi testi smo pri 96 dijakih četrtih letnikov štirih pomurskih srednjih šol (murskosoboška gimnazija: 31, murskosoboška ekonomska gimnazija: 25, ljutomerska gimnazija: 26, lendavska dvojezična gimnazija: 14) preverjali uspešnost zaznavanja samoglasnikov slovenskega standarda, ki so bili testirani v besedah brez konteksta oz. v minimalnem kontekstu (beseda ali kratka poved). Dobljene rezultate smo predstavili v luči nekaterih sociolingvističnih dejavnikov: **okolje** (primarni jezikovni kod Pomurcev se fonetično zelo razlikuje od slovenskega standarda, saj je to področje, ki je po različnih jezikovnih, zgodovinskih itn. kriterijih zelo oddaljeno od osrednje Slovenije, ki naj bi bila (pravorečno) merodajna; na prebivalce dvojezičnega območja okrog Lendave ima velik jezikovni vpliv tudi madžarščina), **prekmursko narečje** (velike razlike v razvrstitvi, kolikosti in kakovosti posameznih samoglasnikov; neobstoj širokih o-jevskih fonemov v prekmurskih narečnih samoglasniških sistemih itn.), **mediji** (anketiranci spremljajo predvsem lokalne radijske postaje in komercialna vseslovenska televizijska programa POP TV in Kanal A), **izobraževalni sistem** (ki ni najbolj naklonjen slušni fonetiki) itn.

Glede na posamezno šolo se rezultati med sabo razlikujejo. Rezultate smo primerjali tudi z raziskavo, izvedeno med študenti slavisti in slovenisti, kjer se je pokazalo, da študenti za razliko od dijakov skoraj stoodstotno prepoznavajo samoglasniško kakovost. Na primer dijaki lendavske dvojezične gimnazije slabše prepoznavajo o-jevske (64 %) in e-jevske (68 %) foneme od dijakov, ki se šolajo v Murski Soboti (o-jevski: 70 %, 66,5 %; e-jevski: 90 %, 88,5 %) in Ljutomeru (o-jevski: 75 %; e-jevski: 91 %), veliko bolje pa so se izkazali pri prepoznavanju fonema /a/ (65 % v Lendavi proti 62 % in 54,5 % v Murski Soboti ter 63 % v Ljutomeru), saj madžarščina pozna segmentno ločevanje a-jevskega fonema (dolgi in kratki a sta različna fonema), medtem ko slovenski standard pozna le nadsegmentno ločevanje a-jevskega fonema (dolgi in kratki a sta alofona istega fonema).

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Influence of some sociolinguistic factors to (speech) perception of standard Slovene vowels in the case of high school students in Pomurje

96 high school students from Pomurje region in their final year (Murska Sobota High School: 31 + 25, Ljutomer High School 26, Lendava Bilingual High School: 14) took the perception tests. The perception of standard Slovene vowels was tested in isolated words and in the context (short sentences). The results are presented in the context of the following sociolinguistic factors: **background** (the primary linguistic code of Prekmurje natives is distinct from standard Slovene, which is considered orthoepically relevant; extensive influence of Hungarian), **Prekmurje dialect** (differences in segmental and suprasegmental properties of the vowels), **media** (the influence of local radio stations and POP TV and Kanal A channels), and the **system of education** (unfavourable for auditory phonetics), etc.

The results vary from school to school, and are compared to the results of the undergraduate students of Slavic languages and Slovene studies; the latter perceive the vowel quality almost 100%. For example, high school students from Lendava identified back mid and front mid vowels far worse (64% and 68%, respectively) than in Murska Sobota (70%/66.5% and 90%/88.5%, respectively) or Ljutomer (75% and 91%). On the other hand, the situation is vice versa in /a/ (Lendava: 65%, Murska Sobota: 62%/54.5%, Ljutomer: 63%), as Hungarian has two a-like segments (a short and a long /a/), while standard Slovene has only different allophonic realizations of one /a/ phoneme.

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Samoglasniki in soglasniki v korpusu *Nova beseda*

Nova beseda je dinamični besedilni korpus slovenščine, ki ga je razvil in ga vzdržuje Laboratorij za korpus slovenskega jezika na Inštitutu za slovenski jezik Frana Ramovša. Prvotno je namenjen za leksikografske in leksikološke potrebe Inštituta, je pa prek spletnega konkordančnika in iskalnika besednih oblik tudi prosto dostopen v raziskovalne in izobraževalne namene. Trenutno korpus obsega 160 milijonov besed večinoma publicističnih, uradnih (prepisi sej Državnega zbora) in literarnih besedil.

V tem prispevku bodo predstavljena razmerja med samoglasniki in soglasniki v besedah treh podkorpusov: literature (12 milijonov besed), publicistike (Delo, 1998–2005, 115 milijonov besed) in javnega govora (1996–2004, 20 milijonov besed). V slovenski abecedi je 25 črk, slovenščina pa ima 8 samoglasnikov in 21 soglasnikov. Drugače kot v angleščini je razmerje med zapisom in izgovarjavo relativno predvidljivo; v mnogo primerih je razmerje 1 : 1. Preslikava iz črk v soglasnike oz. samoglasnike izhaja iz tega ujemanja; izjeme pa so bile obravnavane kot v Slovenskem pravopisu 2001.

	Literatura		Publicistika		Javni govor	
1.	CV	246017	CV	189028	CV	217164
2.	CVCV	81839	CVCV	59897	CVCV	70993
3.	CVC	67958	C	45917	CVC	53397
4.	CVCVC	50267	CVC	44753	CVCVCV	43010
5.	VC	47367	CVCVCV	39517	C	35710
6.	CVCVCV	40145	VC	35864	CVCVC	35630
7.	CVCCV	38536	CVCVC	32221	VC	34007
8.	CCVCV	33157	CVCCV	29588	CCVCV	32107
9.	C	33117	CCVCV	24128	CVCCV	26818
10.	CCVC	23462	CVCCVC	17964	CCV	18682

Zgornja tabela kaže 10 najbolj pogostih različnic soglasnik–samoglasnik, izpeljanih iz besednih oblik, s frekvenco (na milijon besed).

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Vowels and Consonants in the *Nova beseda* corpus

Nova beseda (*New Word* in Slovenian) is a monitor text corpus of Slovenian, developed and maintained at the Corpus Laboratory of the Fran Ramovš Institute of Slovenian language. It is primarily aimed at the lexicographic and lexicological needs of the Institute, but is, through a web concordancer and wordform search (http://bos.zrc-sazu.si), also freely accessible for research and education of Slovenian. At the time of writing the corpus consisted of 160 mil. running words of mainly newspaper text, formal speech (Slovenian National Assembly session transcripts) and fiction.

In the paper the vowel-consonant aspect of the words in three subcorpora: fiction (12 mil. words), newspaper text (DELO newspaper, 1998-2005, 116 mil. words) and formal speech (1996-2004, 20 mil. words) is discussed. There are 25 letters in the Slovenian alphabet, as well as 8 vowels and 21 consonants. As opposed to English the spelling-pronunciation correspondence is fairly straightforward; that is, in many cases there is a one-to-one correspondence. The letter-to-consonant/vowel transformation has been derived from this correspondence; the exceptions have been treated according to the rules, described in the Slovenian Orthographic Dictionary 2001.

	Fiction		Newspaper text		Formal speech	
1.	CV	246017	CV	189028	CV	217164
2.	CVCV	81839	CVCV	59897	CVCV	70993
3.	CVC	67958	C	45917	CVC	53397
4.	CVCVC	50267	CVC	44753	CVCVCV	43010
5.	VC	47367	CVCVCV	39517	C	35710
6.	CVCVCV	40145	VC	35864	CVCVC	35630
7.	CVCCV	38536	CVCVC	32221	VC	34007
8.	CCVCV	33157	CVCCV	29588	CCVCV	32107
9.	C	33117	CCVCV	24128	CVCCV	26818
10.	CCVC	23462	CVCCVC	17964	CCV	18682

The above table shows the top 10 vowel-consonant tokens, derived from wordforms, with frequencies per million words.

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O fonološkem statusu [ə] v slovenščini

Tradicionalni fonološki opisi (npr. Toporišič 2000, Priestly 1993) so vseskozi oklevali v zvezi s fonološkim statusom segmenta [ə] (oz. /ə/) v slovenščini. Poskušal bom zagovarjati tezo, da je samo epentetičen, kar je nasploh pogostno v jezikih, ki imajo en polglasniku podoben segment.

Uvodoma bodo povzete glavne distribucijske lastnosti [ə] v fonoloških opisih slovenščine (Toporišič 1978, 2000, SP 2001), izpostavljene pa bodo tudi tiste, ki jih ti ne omenjajo. Distribucijo [ə] bom ugotavljal najprej v odvisnosti od predhodnih in sledečih segmentov. Izpostavljeni bodo procesi odpravljanja v sodobni slovenščini (npr. v tipih *tema*, *megla*, *deska*), kakor tudi morfonološki procesi, ki pogojujejo njegov nastanek (npr. *film*; *žanr*). Pri izpeljevanju polglasnik pogostno zamenjuje sprednji srednji samoglasnik (npr. *jazbečar*, *deževati* proti *jazbec*, *dež*), redkejši je tudi pri prevzetih besedah.

Analiza bo potekala v okviru optimalnostne teorije (Prince in Smolensky 1993/2004, McCarthy in Prince 1993).

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On the phonological status of schwa in Slovene

The traditional phonological descriptions of standard Slovene (cf. Toporišič 2000, Priestly 1993) are reluctant to answer the problem of phonological status of [ə] (or /ə/). The present author will try to argue, that schwa is purely epenthetic in Slovene, the property commonly observed in languages with only one schwa-like segment.

In the introductory part of the talk, the main distributional properties of [ə] are described, as presented in the traditional sources (after Toporišič 1978, 2000, *Slovene Orthographic Code* 2001). New findings are mentioned as well. The predictability of [ə] with respect to the preceding and the following segment is analyzed. The schwa deletion (e.g. *tema*, *megla*) and the epenthetic phenomena (*film, žanr*) of standard Slovene are also discussed. Schwa is prone to different derived environment effects (*jazberčar* and *deževati* vs. *jazbec* [ə], *dež* [ə]), and is less frequent in recent loanwords.

The analysis is carried out in the frame of Optimality Theory (Prince and Smolensky 1993/2004, McCarthy and Prince 1993).

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Akustična analiza leksikalnega tona v govoru Ukev

Dosedanje fonetične analize osnovne frekvence v ziljskem narečju (Vodušek 1961, Neweklowsky 1973) v povezavi s fonološkimi opisi (Logar 1968, 1971, 1981, Lausseger 1989) in splošnimi raziskavami slovenske tonematike (Toporišič 1968, Srebot Rejec 1988) kažejo, da naj bi se leksikalni ton v omenjenem govoru realiziral predvsem kot opozicija LH (akut) in HL (cirkumfleks). Preliminarne raziskave govora sosednje Ovčje vasi (Jurgec, v tisku) so pokazale, da to v veliki meri drži.

Analiza ukovškega govora temelji na posnetkih vodenih intervjujev (približno 15 ur), opravljenih pri terenskem delu na raziskovalnih taborih, ki jih je v letih 2003–2005 v sodelovanju z raziskovalci iz Slovenije in Italije organiziralo Slovensko kulturno središče Planika iz Kanalske doline. Izločene so stavčno nezaznamovane besede, razvrščene glede na segmentne in nadsegmentne spremenljivke in (diahroni) izvor tonskih enot, ter polavtomatsko analizirane v programu Praat, upoštevani pa so bili osnovna frekvenca, jakost, trajanje in kakovost glasu. Pričakujemo, da bodo rezultati nadgradili dosedanja spoznanja o realizaciji tonemov v ziljskem narečju, še zlasti kar se tiče zadnjih treh količin, ki do sedaj sploh niso bile upoštevane.

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Acoustic analysis of lexical tone in the Slovene dialect of Ukve

Acoustic analyses of F0 in Zilja dialect (Vodušek 1961, Neweklowsky 1973) in connection to phonological descriptions (Logar 1968, 1971, 1981, Lausseger 1989) and general studies of Slovene tonemicity (Toporišič 1968, Srebot Rejec 1988) so far show that lexical tone is realized mainly as a LH (acute) or HL (circumflex) contrast. Preliminary studies of Ovčja vas dialect (Jurgec, in press) confirm that.

The present analysis of Ukve speech is based on the interviews (~15 hours of recordings), as a result of the field work carried out by the authors in the organization of Slovene and Italian researchers and Planika Cultural Centre in Kanal Valley. Neutral words and phrases as regards the sentence intonation, were classified according to the segmental and supra-segmental criteria, and diachronic origin of the tonal units. These were analyzed in Praat software programme, and F0, intensity, duration and periodicity were considered. The results are expected to broaden the understanding of phonetic realization of tones in Zilja dialect, especially regarding the latter three variables, which have never before been analyzed.

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Neenakomernost pri percepciji J2: dokazi iz artikulacijske sinteze kontinuuma /i/~/e/

Predlagano je bilo, da je spremembo v samoglasniški kvaliteti težje zaznati, če prvi izmed elementov zasede ekstremen položaj v akustičnem prostoru, obrobni samoglasniki pa radi perceptivno asimilirajo sosednje samoglasnike (Polka 2003). Z artikulacijskim modelom (Maeda 1990) smo pripravili kontinuum 10 samoglasnikov, ki se razteza od prototipičnega francoskega /i/ (najbolj ekstremen primer, št. 1) do prototipičnega srednje visokega francoskega /e/ (primer št. 10), pri dveh eksperimentih pa so sodelovali italijanski južnosalentski govorci (JSI) in španski govorci (ŠP). Pri prvem je sodelovalo 21 poslušalcev JSI in 30 ŠP in ti so morali identificirati deset primerov v dolžini 350 ms kot /i/ ali /e/. Rezultati kažejo jasen prehod med /i/ in /e/ z mejo med primeroma 4 in 5 za JSI in pri 5 za ŠP. Pri drugem eksperimentu (test AX) je sodelovalo 15 JSI in 30 ŠP poslušalcev, pari posnetkov, različni le za eno ali dve stopnji, pa so bili predvajani v obeh vrstnih redih. Učinek zaporedja je bil prisoten pri JSI, ne pa pri ŠP, kar priča o asimetriji, ki jo določa akustična spremenljivka [+ ekstremno], ki vpliva na spremenljivko [nizek F1] pri /i/ in je razširjena prek slušnega spomina (Karypidis idr., v pripravi). Literatura priča, da ima ŠP /i/ nižji F1 v 9 od 10 primerov (Quilis 1983), tako da bi ŠP poslušalci težko določili [+ ekstremno] za katerega koli od njih. Drugače pa velja za /i/, kjer je F1 višji v prvih štirih primerih (Grimaldi 2003), kar pa so edini člani zaporedja, ki lahko pojasnijo učinek zaporedja. Zanje so primeri 1–4 obrobni v spremenljivki F1.

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Asymmetry in vowel perception in L2: evidence from articulatory synthesis of an /i/~/e/ continuum

It has been proposed that a vowel change is harder to perceive when the first element in a pair occupies an extreme position in the acoustic space, since peripheral vowels tend to perceptually assimilate neighbouring vowels (Polka, 2003). Using an articulatory model (Maeda, 1990), we have prepared a 10-vowel continuum extending from a prototypical French /i/ (stimulus no. 1, the most extreme) to a prototypical mid-close French /e/ (stimulus no. 10) and have conducted two experiments with Southern Salentinian Italian (SSI) and Spanish (SP) listeners. In Experiment 1, 21 SSI and 30 SP listeners were requested to identify the ten 350-ms stimuli either as /i/ or /e/. Results reveal a clear quantal transition from /i/ to /e/, with the boundary being located between stimuli 4 and 5 for SSI and coinciding with stimulus 5 for SP. In Experiment 2 (AX test), 15 SSI and 30 SP listeners participated and elements in each pair - differing in one or two steps along the continuum - were presented in both orders. The order effect being attested only for SSI and not for SP listeners, we postulate that the phenomenon of asymmetry is triggered by a [+extreme] acoustic cue, which reinforces the [low F1] cue of /i/ and is propagated via the auditory memory (Karypidis et al., in preparation). Indeed, literature indicates that SP /i/ has a lower F1 than 9 of our 10 stimuli (Quilis, 1983), hence SP listeners hardly assigned the [+extreme] cue to any of them; SSI /i/, on the other hand, has a higher F1 than the first four stimuli (Grimaldi, 2003) – the only members of the continuum that account for the order effect - thus, for them, stimuli 1-4 are peripheral on the F1 dimension.

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Akustična analiza diadokokineze v govoru oseb z nevrološko poškodbo

Nevrološke poškodbe pogosto povzročijo motnje govora. Ena od pogosto uporabljenih nalog v protokolih za oceno govora je diadokokineza, ki je bila uspešno uporabljena v diferencialni diagnostiki dizartrij, lahko pa bi bila v pomoč tudi pri diagnosticiranju različnih nevroloških motenj. V raziskavi je bilo posnetih 14 oseb, ki so ponavljale zloge /pa/, /ta/ in /ka/ najprej z normalno hitrostjo govora, nato pa še kakor hitro lahko. Sedem oseb (3 ženske in 4 moški stari od 24 do 79 let) je imelo nevrološko poškodbo (4 možgansko kap, 2 multiplo sklerozo in 1 poškodbo glave). Ostali sodelujoči so bili po spolu in starosti usklajene kontrolne osebe brez znanih nevroloških in govornih motenj. Trajanje, amplituda in višina odzivov bodo merjeni s pomočjo programa Praat ter ocenjeni na podlagi protokola Speech Examination. Rezultati bodo omogočili objektivno primerjavo med osebami. Cilji raziskave so: (i) proučiti, ali lahko na podlagi diadokokineze razločimo govor oseb z nevrološko poškodbo in govor oseb brez nje, (ii) dobiti vpogled v izvedbo diadokokineze pri osebah brez nevroloških motenj in (iii) ugotoviti, ali osebe z nevrološko poškodbo dosegajo podobne rezultate na testu diadokokineze ter kakšne so razlike med različnimi nevrološkimi poškodbami.

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Acoustic analysis of diadochokinesis in neurologically impaired speech

Neurological impairments often cause speech impairments. One of the commonly used tasks in the speech evaluation procedures is diadochokinesis, which has been successfully used for differential diagnosis of the dysarthrias and can consequently help in diagnosing different neurological impairments as well. 14 participants were recorded while repeating syllables /pa/, /ta/, and /ka/ at normal and fast speech rate. Seven of them (3 females and 4 males ranging in age from 24 to 79) had neurological impairments (4 had cerebral vascular incident, 2 multiple sclerosis, 1 traumatic brain injury). The rest of the participants were gender and age matched controls without any known neurological or speech impairments. Duration, amplitude and pitch of the responses will be measured using Praat and evaluated following the procedures of Speech Examination protocol. The results will enable objective comparisons between the subjects. The aims of the study are (i) to examine if diadochokinesis task can be used to differentiate between the speech of neurologically intact subjects and of those with neurological impairment, (ii) to gain insight into the diadochokinesis performance of neurologically intact subjects, and (iii) to establish if subjects with similar neurological impairment exhibit similar outcome on the diadochokinesis task and what are the differences between different neurological impairments.

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*Af-koren-iks: Ali so nekontinuirani afiksi sploh možni?

Teorija prozodične morfologije v optimalnostni teoriji (McCarthy in Prince 1993) pojasni infiksacijo kot posledico rangiranja zaznamovalnostnih omejitev nad veznimi omejitvami, ki vežejo morfeme k besedam. Naprimer, tagaloška predpona *um*, (1), postane infiks, da zmanjša število zlogovnih izglasij (Prince in Smolensky 1993).

(1) **Tagaloščina** (Schachter in Otanes 1972)

a.	ibig	*um*-ibig	"ljubiti"
b.	kain	k-*um*-ain	"jesti"

Ker je rangiranje zaznamovalnostnih omejitev in veznih omejitev prosto, optimalnostna teorija predvidi obstoj še številnih drugih možnosti, zmanjševanja zaznamovanost s spreminjanjem pozicije morfema. Tako recimo predvidi obstoj situacije v (2). Afiks v (2a) se zaradi vezne omejitve RIGHTMOST pripoji na koncu besede kot običajen sufiks. V (2b) pa se afiksov soglasnik premakne na pozicijo pred koren, saj se s tem izognemo kršitvi omejitve NOCODA, s tem pa se afiks razbije na dva dela in tako ustvari enomorfemski cirkumfiks.

(2)

a) *na* + polo	NOCODA	RIGHTMOST
☞ po.lo.*na*		
*n*po.lo.*a*		*!
b) *na* + apak	**NOCODA**	**RIGHTMOST**
a.pak.*na*	*!	
☞ *n*a.pa.k*a*		*

Pregled literature o cirkumfiksaciji in afiksaciji splošno (Spencer 1991, Anderson 1992, itd.) sugerira, da morfološka alternacija opisana v (2) v jezikih sveta ne obstaja. Circumfiksi so vedno sestavljeni iz samostojnega prefiksa in samostojnega sufiksa. V tem članku predlagam modifikacijo teorije, ki naj bi pojasnila neobstoj in omejila generiranje enomorfemskih cirkumfiksov.

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*Aff-stem-ix: Are there any discontinuous affixes?

Prosodic Morphology in Optimality Theory (McCarthy & Prince 1993) accounts for infixation as an effect of ranking markedness constraints above constraints requiring affixes to be aligned with word edges. For example, the Tagalog affix *um* as in (1) is infixed in (1b) to minimize the occurrence of codas in a syllable (Prince & Smolensky 1993).

(1) **Tagalog** (Schachter & Otanes 1972)

a.	ibig	*um*-ibig	"love"
b.	kain	k-*um*-ain	"eat"

Free ranking of phonological markedness constraints with constraints on positioning of morphemes will generate a number of other logical possibilities for manipulating the position of a morpheme in order to decrease phonological markedness. Consider the hypothetical cases in (2). In (2a) the affix is suffixed to the stem, satisfying RIGHTMOST. But in (2b), the consonant of the affix is moved to the position before the stem, avoiding a violation of NOCODA by splitting the affix *na*, resulting in monomorphemic "circumfixation".

(2)

a) *na* + polo	NOCODA	RIGHTMOST	CONTIGUITY$_{MORPHEME}$
☞ po.lo.*na*			
*n*po.lo.*a*		*!	*
b) *na* + apak	NOCODA	RIGHTMOST	CONTIGUITY$_{MORPHEME}$
a.pak.*na*	*!		
☞ *n*a.pa.k*a*		*	*

A survey of literature on circumfixation and affixation in general (Bauer 1988, Spencer 1991, etc.) suggests that the affix~circumfix alternations predicted in (2) do not exist. The morphemes known as circumfixes are composed of a prefix and a suffix - two distinct morphemes obeying separate alignment markedness constraints. In this paper I propose a modification of the theory that will limit the occurrences of monomorphemic circumfixes.

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Interakcija med strukturo in izgovarjavo v angleških izpeljankah

Znano je, da se v angleščini zlogovanje tvorjenih besed razlikuje glede na pono (afiks), Chomsky in Halle 1968. V besedah kot *hinder*, *meter*, *burgle* je zadnji zvočnik korenov *hindr-*, *mitr-*, *burgl-* zložen v izglasju, kar sledi pravilu vstavljanja polglasnika, ki naredi končni zvočnik pred soglasnikom zložen. V sorodnih oblikah, kjer pa sledi pona s samoglasniškim vzglasjem, npr. *-ance* v *hindrance*, *-ic* v *metric*, *-ar* v *burglar*, pa ti zvočniki niso zložni, ampak postanejo nastopi sledečih zlogov. Vse pone, ki se začnejo na samoglasnik, nimajo enakega učinka. Deležniška pripona *-ing* povzroči vstavljanje polglasnika ne glede na svoje vzglasje, npr. *hinder* /hindər/: *hindrance* /hindrans/, ampak *hindering* /hindəriŋ/, */hindriŋ/. Chomsky in Halle (1968) imata to za inherentno lastnost pripone, torej se *-ance* v *hindrance* loči od *-ing* in *hindering* glede na to, ali sproži vstavljanje polglasnika ali ne. Z uporabo podrobnejše besedne skladnje bomo v referatu poskušali dokazati, da razlike v izgovarjavi zgornjih besed niso le diakritične značilnosti pon, kakor v Chomsky in Halle 1968, ampak so odvisne od mesta tvorjenja in skladenjske strukture besede.

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The Interaction between Structure and Pronunciation in English Affixation

It is a well-known fact that in English, syllabification of derived words differs according to the attaching affix, Chomsky and Halle (1968). In words such as *hinder*, *meter*, *burgle* the final sonorant of the roots *hindr-*, *mitr-*, *burgl-* is syllabic in word final position, following the rule of schwa insertion that makes a final sonorant preceded by a consonant syllabic. However, in related forms where these words are followed by a vowel-initial affix, such as *-ance* in *hindrance*, *-ic* in *metric*, *-ar* in *burglar*, the sonorants in question are not syllabic, but are syllabified as onsets of the following syllable. Not all affixes beginning in a vowel have the same effect on syllabification. The participle forming affix *-ing* triggers the schwa-insertion regardless of its vowel-initial status, e.g. (*hinder* /hindər/: *hindrance* /hindrans/, but *hindering* /hindəriŋ/, */hindriŋ/). Chomsky and Halle (1968) treat this property as inherent to the attaching affix; i.e. *-ance* in *hindrance* differs from *-ing* in *hindering* with respect to triggering the schwa-insertion rule. Using a finer-grained syntax of words, this paper derives the differences in pronunciation of the above-mentioned words as following not exclusively from a diacritic on the affix, as in Chomsky and Halle (1968), but also from the attachment position of the affix in the syntactic structure of the word.

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Statistična analiza formantnih frekvenc slovenskih samoglasnikov s standardnimi programskimi orodji

V prispevku bo predstavljen potek dela in dobljeni rezultati na področju določanja formantnih frekvenc slovenskih samoglasnikov. Analiza je zajela izgovor štirih govorcev, pri čemer je vsak govorec izgovoril deset različnih besed za vsak samoglasnik slovenskega govora. Pri zbiranju podatkov smo razlikovali med naglašenimi in nenaglašenimi samoglasniki. Za snemanje, označevanje in formantno analizo govora smo uporabili prostodostopni program Wavesurfer. Za statistično analizo, grafične prikaze porazdelitev meritev in preizkušanje hipotez o enakih srednjih vrednostih formantnih frekvenc pa smo uporabili program Excel. Predstavljeni rezultati se nanašajo na opis in komentar statističnih porazdelitev meritev, podajanje njihovih parametrov, zaključke na podlagi preverjanja statističnih hipotez o enakih srednjih vrednostih in primerjavo z dosedaj objavljenimi rezultati meritev formantnih frekvenc slovenskega govora.

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Statistical analysis of formant frequencies for Slovene vowels using standard software tools

We shall describe the procedures and the results on the field of Slovene vowel formant frequencies determination. The analysis embraces the speech material obtained from four speakers. Each speaker uttered 10 different words containing each of the Slovene vowels. We distinguish stressed and unstressed vowels. For the recording, the labeling, and the automatic formant frequencies determination the shareware program Wavesurfer is used. For the statistical analysis, the graphical representation of measurement distributions, and the statistical tests for equal mean values of formant frequencies the program Excel is used.

The results include the description and the comments on the statistical distribution of measurements, the presentation of their parameters, and the conclusions subject to the statistical tests for equal means. In addition, the comparison with previously published results about measurements of Slovene vowel formant frequencies is given.

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K razmejitvi kontoidov in vokoidov v slovenskih slovnicah

Vidne razlike poglavitnih slovnic slovenskega jezika iz druge polovice preteklega stoletja se kažejo med drugim v gledanju na zvočnike. Slovenska slovnica treh avtorjev iz leta 1956 navaja ob pripornikih *f*, *v*, *s*, *š*, *z*, *ž*, *h*, *j* zvočnike *l* (pa tudi *l'*), *r*, *m*, *n* (pa tudi *n'*), Slovenska slovnica Jožeta Toporišiča iz leta 2000 pa postavlja pred nezvočnike zvočnike *m*, *n*, *v*, *j*, *l*, *r*. Tako sta nezvočna pripornika *v* in *j* prve slovnice postala zvočnika druge slovnice. Navedena fonema sta res posebna v tem, da stoječa pred samoglasniki spominjata na šumne soglasnike, le da s predhodnimi samoglasniki spet oblikujeta dvoglasnike podobno kakor nenaglašena samoglasnika *i* in *u* v sestavah tipa *íti* → *nájti*, *úk* → *náuk*. In ker je nadalje značilna še izravnava ožjega in širšega *e* pred istozložnim *j* ter ožjega in širšega *o* pred istozložnim *v*, sta fonema *v* in *j* pravzaprav vokoida podobno kakor večina samoglasnikov. Gre za to, da se (šumni in zvočni) kontoidi in (jasni) vokoidi ob rastoči ubranosti delno različno vključujejo v zloge: nezložni kontoidi ter vokoida *v* in *j* kot soglasniki, zložni kontoid ə in nadaljnji vokoidi pa kot samoglasniki. Tako se zložni kontoid ə izkaže za samoglasnik, medtem ko sta nezložna vokoida *v* in *j* soglasnika. Za to govori tudi razhajanje zvočnikov proti sredini besede, ko se kontoid *ə* pred kontoidom *r* ohranja, medtem ko z vokoidom *v* izenačeni kontoid *ł* izzove tudi prehod kontoida *ə* v vokoid *o*:

vétər → vétərc
kôzəł → kozòłc

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On the delimitation of contoids and vocoids in the Slovenian grammars

The main grammars of Slovene from the second half of the past century differ in the way they look at sonorants. Slovenian grammar of three authors (1956) mentions the fricatives *f*, *v*, *s*, *š*, *z*, *ž*, *h*, *j* and sonorants *l* (also *l'*), *r*, *m*, *n* (also *n'*). Toporišič's grammar (2000) states the following sonorants: *m*, *n*, *v*, *j*, *l*, *r*. The former fricatives *v* and *j* become the latter sonorants. These two phonemes are special in one respect, namely that they are acoustically similar to other consonants in the position before vowels. On the other hand, they form diphthongs with the preceding vowels, like the vowels *i* in *u* in the derivations of the following type: *íti* → *nájti*, *úk* → *náuk*. At the same time, both front mid *e* before tautosyllabic *j* and back mid *o* before tautosyllabic *v* neutralize. This confirms the nature of *v* and *j* as vocoids. The sonorant contoids and clear vocoids in rising sonority partly differ in syllabification: the nonsyllabic contoids and vocoids *v* and *j* as consonants, the syllabic contoid *ə* and other vocoids as vowels. The syllabic contoid *ə* is actually a vowel, while the nonsyllabic vocoids *v* and *j* are consonants. This is in accordance with the differentiation of sonorants in the word-internal position, where the contoid *ə* before *r* is preserved, while the contoid *ł* neutralized with *v* causes *ə* to change to *o*:

vétər → vétərc
kôzəł → kozòłc

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Prvine spontanega govora v zapisniku

Zapisnik je uradni zapis o poteku sodnega postopka, ki ga med postopkom po nareku sodnika zapisuje zapisnikar. Oblika, zgradba in sestavine besedilne vrste so zakonsko predpisane, zaradi njene pravnomočnosti pa se pri zapisovanju teži k dobesednemu navajanju sodnikovih vprašanj in izjav drugih udeležencev sodnega postopka. Udeleženci so pri odgovarjanju zavezani k navajanju resničnih dejstev in opisov dogodkov, prepričljivost in jasnost njihovih izjav pa sta med drugimi dejavniki, ki vplivajo na potek postopka, odvisni tudi od sporazumevalnih in jezikovnih zmožnosti udeležencev ter sodnika, ki povzema njihove izjave in jih narekuje zapisnikarju.

Zaradi okoliščin in načina zapisovanja besedila se v zapisniku na vseh jezikoslovnih ravneh ohranjajo prvine spontanega govora, v prispevku pa bom največ pozornosti namenila tistim, ki se odražajo na skladenjski (mašila, kopičenja, spremenjen besedni red ipd.) in besedilotvorni ravni (ponovne pojavitve leksema, redko povezovanje s tretjeosebnim zaimkom, raba kazalnih zaimkov ta in tisti, zveze kazalnega zaimka in ponovne pojavitve leksema ipd.), saj ravno te najpogosteje otežujejo razumevanje besedila.

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Elements of spontaneous speech in the minutes

The minutes are the formal written record of the legal process, recorded as a dictation during the process by the clerk. The form, structure and the components of this textual type are regulated by the law, and as it has legal consequences it tends to directly cite judges questions and the statements of other participants in the legal process. The participants are bound to truthfulness, while convincingness and clarity of their statements also affect the process, and are dependent of the communicative skills of the involved subjects.

Because of the circumstances and the manner of transcribing the text, the properties of spontaneous speech tend to be conserved. In this talk, I try to emphasize those which emerge on the syntactic (e.g. inversed word order) and textual level (e.g. repetitions, use of pronouns *ta* and *tisti* etc.), which normally hinder the overall comprehension of the text.

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Razumljivost govora oseb z motnjo sluha: Prispevek tranzientov, formantov ter glasovnih, govornih in izgovornih elementov

Z zasnovano raziskavo smo skušali z multivariantnimi statističnimi postopki ugotoviti, katere spremenljivke akustične, govorne, glasovne, artikulacijske narave na segmentalnem in suprasegmentalnem nivoju najbolj prispevajo h govorni razumljivosti oseb z motnjo sluha.

Akustično in slušno smo analizirali izgovor predloženih besed 91 oseb z motnjo sluha, ki spadajo v kategorije od srednje naglušnosti do popolne gluhote, različnih starosti od 5 do 23 let, enakomerno porazdeljenih po spolu, iz treh glavnih slovenskih ustanov, namenjenih osebam z motnjo sluha. Poleg opisnih spremenljivk osebe in stopnje izgube sluha smo ocenjevali še govorno produkcijo s spremenljivkami formantov, pravilnost izgovora besede, govora (hitrost, razumljivost, tekočnost, zlogovna, črkovna fragmentacija, vnašanje glasov med foneme, vnašanje glasov na zlogovni meji, redukcija kontrasta, podaljševanje zlogov, uporaba prstne abecede, skandiran govor), glasu (povprečje F0, nazaliziranje, neustrezna prozodija, hripavost, zvenečnost glasu, jasnost formantov, *cul de sac*), tranzientov (ustreznost in oblika neustreznosti).

Poleg osnovnih statističnih analiz pogostosti, korelacij, statistično pomembnih razlik med podksupinami motnje sluha, smo z multivariantnimi analizami dobili slušne, govorne, tranzientne profile govorcev ter spremenljivke, ki diskriminirajo razumljiv govor od nerazumljivega oz. prediktorske spremenljivke. Ugotovili smo, da celoten nabor spremenljivk diskriminira stopnje razumljivosti in da lahko na osnovi števila izgovornih napak, stopnje zvenečnosti, tekočnosti govora ter vidnosti - jasnosti formantov napovemo stopnjo razumljivosti.

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Intelligibility of talk of people with disturbance of hearing: Contribution of the transients, formants, voice, speech and articulation and articulation elements

In this study we used multivariate statistical procedures to find which acoustic, speech, voice, articulation variables (segmental and suprasegmental elements) contribute to speaking intelligibility of deaf people most. We analyzed the speech production of 91 deaf people, that fit in the categories from middle hard of hearing to total deafness, of different ages from 5 to 23 years old. We evaluated and measured formants, articulation, speech (speed – speech rate, fluency, intelligibility, phoneme / syllabe segmentation, intersyllabic / interphoneme insertion, syllabic contrast reduction, prolonging syllabes, use of finger spelling, segmented hyperstressed speech), voice (laringeal tone F0, nasalisation, prosodic intonation, breathiness, clarity of voice, good formant production, voice »cul de sac«), transitions from vocal to consonant and from consonant to vocal).

We computated statistics (frequency, percents), latent space – factors of the speech, regression (predictors for intelligibility), discriminant functions of intelligibility.

It was seen that all variables included in the research contributed to the explanation of the degree of intelligibility of deaf people, the number of articulation – speech errors, clarity of voice, good formant production and speech fluency most.

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Principi sestavljenja zvočne komponente v združevalni sintezi govora za sorodne jezike

Referat predstavlja opis samoglasniških in soglasniških sistemov standardne slovenščine. Podrobno so pregledani značilnosti, ki karakterizirajo kombinatorno in pozicijsko variabilnost samoglasnikov in soglasnikov v slovenščini.

Takšno raziskovanje je potrebno pri ustvarjenju zvočne podatkovne baze za združevalno sintezo govora, kakor tudi za proučevanje značilnosti ustvarjenja podobnih podatkovnih baz na gradivu sorodnih jezikov. V tem primeru so kot sorodni jeziki predstavljeni srbščina in hrvaščina na eni strani in slovenščina na drugi strani. Najpomembnejše vprašanje pri primerjalni analizi teh jezikov je raziskovanje funkcij tonemske komponente za standardno izgovorjavo.

Pozneje bo predstavljena primerjava dobitih podatkov s fonetično bazo za združevalno sintezo govora na gradivu ruščine.

V okviru raziskav za ustvarjenje podatkovne baze na gradivu slovenščine bila je narejena akustična analiza soglasniškega sistema. Soglasniški fonemi so bili analizirani v naslednjih položajih:

1. pred samoglasnikom v odprtem zlogu CV
2. na meji dveh besed
3. v absolutnem izglasju

Rezultati akustične analize so predstavljeni v obliki sonagramov. Za pridobivanje raziskovalnega gradiva so bili posneti rojeni govorci slovenščine. Snemanje je bilo narejeno s pomočjo profesionalnega digitalnega diktafona. Posneto zvočno gradivo je bilo analizirano s programom Wave Assistant.

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Principles of Compiling Sound Components in Concatenative Synthesis for Closely Related

This paper presents a description of the vowel and consonant systems in Standard Slovene. Special features which characterize positional and combinatory variability of vowels and consonants in the Standard Slovene language are examined in detail.

The present study is necessary for creating a speech data base for concatenative speech synthesis as well as for research into the principles of creating such data bases to be used for closely related languages. Closely related languages in the present study include Serbian and Croatian on the one hand and Slovene on the other. The most important issue in comparative analysis of these languages is investigation of the functions of tone component in standard pronunciation.

Further research will concern the comparison of obtained results with the phonetic data of concatenative synthesis used for Russian text-to-speech system (TTS).

Within the framework of research aimed at creating a speech data base for Slovene, acoustic properties of its consonant system have been analysed. The consonant phonemes of Slovene have been studied in the following positions:

1. before vowels in open syllables CV
2. at the word boundary
3. in the absolute end of the word

The results of the acoustic analysis are presented in the form of sonograms. To obtain speech data for analysis, native speakers of Slovene were recorded with a portable Digital Audio Voice recorder. The recorded material was analysed using Wave Assistant sound analysis software.

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Glasoslovni razvoj slovenskega otroka – soglasniki in soglasniški sklopi

Osnovna tema prispevka je glasoslovni razvoj slovenskega predšolskega otroka. Izbrane zvočne posnetke opazovanega otroka je avtor akustično analiziral in ovrednotil s stališča novejših preferenčnih teorij (teorije naravnosti in optimalnosti), v posameznih primerih pa je izsledke primerjal z razpoložljivimi izsledki drugih raziskav o slovensko, nemško, angleško in nizozemsko govorečih otrocih. Izpostavljeno bo usvajanje soglasnikov in soglasniških sklopov, še posebej naslednja glasoslovna vprašanja: V literaturi o zgodnjem glasoslovnem razvoju (npr. Jakobson 1941) ponavadi najdemo domnevi, da so prve otroške besede (pretežno) sestavljene iz zlogov tipa CV (soglasnik, ki mu sledi samoglasnik) in da je soglasnik v takih prototipičnih zlogih zapornik. Značilen naj bi torej bil čim večji kontrast med začetnim robom in rimo zloga. Tudi usvajanje soglasniškov sklopov je veliki meri odvisno od sonornostne lestvice. Naravnejši (optimalnejši) in domnevno zgodnejši v jezikovnem razvoju so tisti začetni zlogovni robovi z večjo sonornostno razdaljo med soglasniki.

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Phonological Development of a Slovenian Child – Consonants and Consonant Clusters

The basic subject of the paper is the phonological development of a Slovenian preschool child. The selected audio material has been acoustically analyzed and evaluated in the framework of recent preferential theories (naturalness and optimality theory), in some cases the results of the analysis have been compared with available data and analyses of other investigations conducted on Slovenian, German, English and Dutch speaking children. The following questions concerning the acquisition of consonants and consonant clusters will be highlighted: In contributions on early phonological development (ie. Jakobson 1941) it is often claimed that the first words of children (predominantly) consist of CV-type syllables (a consonant followed by a vowel) and that the consonant in such prototypical syllables belongs to the class of stop consonants. This syllable shape should be predominant due to the maximization of the contrast between syllable onset and rhyme. The acquisition of consonant clusters depends to a considerable degree on the sonority scale of sound classes, too. Therefore it is assumed that those syllable onsets consisting of consonants with a greater sonority distance are more natural (more optimal) and earlier acquired than syllable onsets having smaller sonority distances.

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Uresničevanje leksikalnih naglasov v različnih intonacijskih glavah v hrvaščini

Intonacijo v hrvaščini, posebej še položaja v glavi, so do sedaj opisovali Nakić (1981), Škarić (1991) ter Ivas (1996), besedne naglase pa Gvozdanović (1980), Lehiste in Ivić (1986), Škarić (1991), Pletikos (2003) in drugi. Samo Smiljanić (2004) opisuje besedni naglas v široki in ozki glavi, ne opisuje pa vpliva šestih tipov glav na intonacijsko obliko besede. Pričujoča študija obravnava vprašanje, kako v hrvaškem jeziku uresničevanje treh različnih glav (padajoče, naraščajoče in ravne) vpliva na uresničevanje štirih besednih naglasov (dolgo padajočega (dp), dolgo rastočega (dn), kratko padajočega (kp) in kratko rastočega (kn)) s perceptivnega in akustičnega vidika. Za raziskovanje percepcije smo izbrali poslušalce (N = 13) zmožne dobrega prepoznavanja naglasov (z natančnostjo >96%). Besede s štirimi različnimi besednimi naglasi (mîna, màma, víno, vòda) so bile posnete v stavkih s padajočo, rastočo in ravno glavo na koncu intonacijske enote, potem pa ločene od intonacijske enote ter predložene poslušalcem kot samostojne besede. Poslušalci so ovrednotili naglase na lestvici od 1 do 5 glede na stopnjo tipičnosti, razločnosti in prepoznavnosti. Rezultati pokažejo, da so naglasi, uresničeni v padajoči glavi, ovrednoteni kot najbolj tipični ($\underline{x}$ = 4,2), v ravni kot manj tipični ($\underline{x}$ = 3,1), v naraščajoči pa kot najmanj tipični ($\underline{x}$ = 2,7). Gibanja tona v glavah pokažejo, da imajo v padajočih glavah vsi štirje naglasi padajočo krivuljo F0, ki je pa pri padajočih naglasih večjega razpona kot pri naraščajočih (dp = 64 Hz, kp = 68 Hz, dn = 44 Hz, kn = 28 Hz). V naraščajočih glavah imajo vsi besedni naglasi naraščajočo krivuljo (povprečnega razpona 95 Hz), medtem ko je v ravnih glavah v vseh naglasih prvi zlog naraščajoč (povprečno 71 Hz), drugi pa raven. Rezultati kažejo, da intonacija glave skoraj popolnoma preusmerja gibanje tona štirih značilnih besednih naglasov.

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The realization of lexical accents within different focuses in Croatian

Intonation in Croatian has been described by Nakić (1981), Škarić (1991) and Ivas (1996), and lexical accent by Gvozdanović (1980), Lehiste and Ivić (1986), Škarić (1991), Pletikos (2003) and others. Only Smiljanić (2004) describes lexical accent in broad and narrow focus, but she does not describe the influence of the six types of focuses (Škarić, 1991). This paper examines how the realizations of three different focuses (falling, rising and flat) influence the realizations of four lexical accents (long-falling (LF), long-rising (LR), short-falling (SF) and short-rising (SR)) both perceptually and acoustically. 13 listeners who recognized accents well (96% correct answers) were selected for this experiment. The words with four different lexical accents (mîna, mäma, víno, vòda) were recorded in sentences with falling, rising and flat focus at the end of the intonation phrase, and then isolated from the intonation phrase and presented as single words. The listeners assessed accents on the 1 to 5 scale estimating to what degree each accent realization is typical, clear and recognizable. The results show that the accents realized within the falling focus are estimated as the most typical ($\underline{x}$=4,2), within the flat focus as less typical ($\underline{x}$=3,1), and in the rising focus as the least typical ($\underline{x}$=2,7). The tone movement of the focuses demonstrates that the F0 curve of all four lexical accents is falling, and it has wider range among falling accents than among rising (LF=64 Hz, SF=68 Hz, LR=44Hz, SR=28Hz). Within the rising focuses all lexical accents have rising curve (average range of 95 Hz), while within the flat focuses all accents show a rising first syllable (the average of 71Hz), and rather flat second syllable. These results demonstrate that the focus intonation almost completely changes the tone movement of distinctive lexical accents.

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Uporaba fonetično-morfoloških slovarjev SIlex in LC-STAR pri grafemsko-fonemski pretvorbi tujih imen

Pri avtomatski sintezi govora je poseben problem ustrezno sintetiziranje tujih lastnih imen, kjer pravila grafemsko-fonemske pretvorbe odstopajo od pravil, ki veljajo v slovenskem jeziku. Pri sintezi je treba tuje besede detektirati in poiskati ustrezno fonetično transkripcijo.

Za detekcijo tujih imen smo izdelali obsežne fonetične slovarje lastnih imen v okviru slovarjev SIlex in LC-STAR. Od teh je modul lastnih imen v drugem novejši in kvalitetnejši, vsebuje 45.000 osebnih, zemljepisnih in lastnih imen iz slovenskega okolja, dostopne pa imamo tudi slovarje za ameriško angleščino, nemščino, italijanščino, španščino, katalonščino in kitajščino. Vnose iz slovarja LC-STAR smo zbrali v enoten seznam, ki smo ga predstavili s končnim avtomatom. Končni avtomat nam tako služi kot časovno in pomnilniško optimalen detektor lastnih imen v vhodnem besedilu.

Pri določanju ustrezne fonetične transkripcije tujih imen se odločimo za transkripcijo s fonemi slovenskega jezika. V ta namen potrebujemo razpredelnico preslikav fonemov tujih jezikov v slovenske. Razpredelnica je bila narejena s pomočjo Slovenskega pravopisa, za zdaj samo za angleški in nemški jezik. V pomoč je bila pri ročnem pregledovanju in popravljanju slovarjev, prav tako pa je uporabna pri grafemsko-fonemski pretvorbi za sintezo govora. Ustrezne tabele preslikav smo v sistemu sinteze slovenskega govora PLATTOS predstavili s končnim pretvornikom, kar omogoči časovno in pomnilniško optimalen postopek grafemsko-fonemske pretvorbe tujih imen.

Na kratko bodo predstavljeni viri SIlex in LC-STAR, ki vključujejo tuja lastna imena, razpredelnice za preslikavo tujih fonemov v slovenske in vključevanje teh virov v avtomatsko sintezo govora.

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Using SIlex and LC-STAR lexica for grapheme-to-phoneme conversion of foreign names

For automatic speech synthesis, foreign names are problematic since the grapheme-to-phoneme conversion rules are different than for Slovenian language. Therefore, when doing automatic speech synthesis, we have to detect foreign words and search for appropriate phonetic transcriptions.

In order to detect foreign names, we used large phonetic and morphologic lexica of proper names as parts of SIlex and LC-STAR lexica. The proper names module in LC-STAR is newer and more completed. It includes 45.000 person, place and organization names for Slovenian language, and the same for some largest world languages: American English, German, Italian, Spanish, Catalan and Mandarin. For speech synthesis system, we collected all the proper name entries from LC-STAR lexicon and presented them by using finite-state transducer, which gives time and space optimal detection of grapheme-to-phoneme conversion of foreign names.

In order to determine the appropriate phonetic transcriptions of foreign names, the set of Slovenian phonemes must be used. For this purpose, we need a table of phoneme mappings that defines corresponding mappings between foreign and Slovenian phonemes. The constructed table based on rules of Slovenian orthography and is for now made only for English-to-Slovenian and German-to-Slovenian phonemes. It was used as help for manual checking of phonetic transcriptions and it can be used also for automatic grapheme-to-phoneme conversion in automatic speech synthesis system. In the TTS system for Slovenian language PLATTOS, the table was presented with finite-state transducer which enables time and space optimal grapheme-to-phoneme mappings in case of foreign names.

In this presentation, the language resources SIlex and LC-STAR and especially the proper names modules will be presented in more details. Also the tables with defined phoneme mappings between foreign and Slovenian phonemes and their use in the TTS system PLATTOS will be given.

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Prevajalni sistem govora v govor BABILON za jezikovni par slovenščina-nemščina

Predstavljen bo dvosmerni prevajalnik govora v govor BABILON za jezikovni par slovenščina-nemščina. Sistem BABILON je zgrajen za domeno turističnih informacij, in sicer za hotelske rezervacije. Sestavljajo ga razpoznavalnik tekočega govora za slovenski in nemški jezik, prevajalni modul in večjezični sintetizator govora PLATTOS. Za njihov razvoj je bilo treba zagotoviti predvsem ustrezne jezikovne vire. Pri razvoju razpoznavalnika govora smo uporabili bazi PoliDat za slovenščino in SpeechDat(II) za nemščino. Za izvedbo sistema PLATTOS za nemški jezik smo morali zagotoviti ustrezne jezikovne vire, kot so: nemška akustična baza, viri za grafemsko-fonemsko pretvorbo in viri za oblikoslovno označevanje. Izhod razpoznavalnika tekočega govora za neodvisnega govorca je nedeterminističen (podobno kot je na primer pri prevajanju teksta v tekst). Izvedli smo obsežno analizo dobljenih hipotez iz razpoznavalnika tekočega govora in sestavili ustrezen seznam. K seznamu smo nato poiskali ustrezne prevode. Za dobljeni seznam smo zgradili končni pretvornik, ki je glavni del prevajalnika teksta v tekst. Dodatno smo pridružili k danemu pretvorniku še pretvornike, zgrajene v okviru projekta LC-STAR, predvsem za prevajanje izoliranih besed. Sistem teče na osebnem računalniku in deluje v realnem času. V prispevku bomo podrobneje predstavili zgradbo in delovanje sistema, rezultate vrednotenja uspešnosti, možnosti izboljšanja uspešnosti prevajanja ter možnosti razširitve sistema na druge jezikovne pare, predvsem na jezike, za katere so na voljo jezikovni viri projekta LC-STAR.

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Speech-to-speech translation system BABILON for Slovenian-German language pair

In this presentation, the bidirectional speech-to-speech translation system BABILON for Slovenian-German language pair is presented. The system BABILON is constructed for the domain of tourist information (hotel reservations). Main modules are: continuous speech recognition engine for Slovenian and German language, translation engine and multilingual TTS system engine PLATTOS. For each module, several language resources for both languages are needed. For speech recognition engine, the speech databases PoliDat for Slovenian language and SpeechDat(II) for German language, are used. For TTS system PLATTOS we use: speech synthesis databases, resources for grapheme-to-phoneme conversion, and part-of-speech tagging databases for both languages. The output of the continuous speech recognition engine is un-deterministic (similar as in the case of text-to-text translation). Careful analysis of speech recognition hypothesis was performed, and the corresponding list was constructed. The corresponding translations were assigned to each entry on the list. The final list is represented as finite-state transducer, and used by text-to-text translation module in the BABILON system. Additional transducers are added to the translation module, representing time-and-space efficient bilingual lexicons of tourist phrases, constructed in the scope of LC-STAR project. The system BABILON runs in real-time on PC computers. In this presentation the architecture, functionality, performance, future work on the system and the activities to develop the system also for other language pairs (defined in the scope of the LC-STAR project), will be presented in more details.

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Problemi razpoznavanja spontanega govora ob primerih iz govornega korpusa Turdis-1

Turdis-1 je korpus 30 spontanih telefonskih pogovorov v turizmu. Omogoča, da raziščemo značilnosti spontanega govora ter analiziramo probleme pri avtomatski razpoznavi govora, ki iz tega izhajajo, in morebitne rešitve. Iz korpusa ugotovimo, da so razlike med branim in spontanim govorom, pomembne za razpoznavanje, naslednje: v spontanem govoru se pojavljajo tihi ali glasovni premori, popravljanja, zatikanja, ponavljanja, premori, izjave so lahko prekinjene, besedni red je bolj svoboden, obliko-skladenjska neujemanja, zarekanja..., vokalna redukcija, artikulacija je lahko tiha, nerazumljiva, površna..., veliko je dodatnih šumov, segmente je težje določiti, govor lahko ima različen tempo, nekatere besede so lahko poudarjene, nekateri zlogi podaljšani...

Zaradi navedenega je uspešnost razpoznavanja spontanega govora z velikim slovarjem besed z obstoječimi razpoznavalniki, ki temeljijo na vrednotenju prikritih modelov Markova s pomočjo Viterbijevega algoritma, slabša od razpoznavanja vezanega govora. Uspešnost povečamo z akustičnim modeliranjem z govorno bazo z enako akustično karakteristiko, kot je uporabljena pri testiranju, z vključevanjem dodatnih modelov, ki modelirajo efekte, ki nastanejo pri spontanem govoru, in s povečanjem baze spontanega govora.

Metodologija, uporabljena pri gradnji jezikovnih modelov, temelji na statističnem pristopu. Za učenje statističnih jezikovnih modelov govorni korpus ni dovolj velik, zato v začetni fazi kot osnovni vir uporabimo mnogo večji korpus pisnih besedil. Tako zgrajen jezikovni model ima omejeno uporabno vrednost pri modeliranju govorjenega jezika, zato v nadaljevanju uporabimo govorni korpus za prirejanje ocen verjetnosti tistih besednih zvez, ki odražajo lastnosti spontanega govora in jih v pisnih besedilih ne zasledimo. Smiselno je obravnavati vsako lastnost spontanega govora posebej, kar je možno le, če je korpus ustrezno označen. V korpusu Turdis predlagamo enega od možnih načinov označevanja. V prispevku se posvetimo predvsem modeliranju netekočnosti v govoru, ki poruši relacije med besedami v lokalnem kontekstu n-grama jezikovnega modela.

Predstavljene bodo značilnosti spontanega govora v korpusu Turdis-1 in možnosti procesiranja teh značilnosti pri razpoznavi spontanega govora.

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Discussing spontaneous speech recognition problems with examples from speech corpus Turdis-1

Turdis-1 is corpus of 30 spontaneous telephone conversations in tourist domain. As such it enables a research of spontaneous speech characteristics, analysis of the problems that these characteristics cause in spontaneous speech recognition and possible solutions. According to Turdis-1 the differences between connected speech and spontaneous (conversational) speech that make speech recognition of spontaneous speech less efficient, are: silences, voiced pauses, prolonged syllables, emphasized words or phrases, repairing, repeating, stammering, cut-off utterances and cut-off words, free word order, silent, incomprehensible, careless... pronunciation, additional noises, segments of speech are harder to define etc.

Therefore large vocabulary continues speech recognition of spontaneous speech can not be so efficient as connected speech recognition, based on HMM and Viterbi algorithm. We improve the recognition with acoustic modeling of speech database with the same acoustic characteristics as is used for testing, with including additional models for effects of spontaneous speech, and with larger spontaneous speech database.

Methodology used for language models is based on statistical approach. The Turdis corpus is not big enough for training language models therefore at the beginning we use much larger corpus of written texts. Language model built this way shows limited prediction power when modeling spontaneous speech, therefore later we use the spontaneous speech corpus to adapt probability estimations for the word groups which are typical for spontaneous speech and which can not be found in written texts. Different spontaneous speech characteristics were studied separately, therefore the corpus has to be appropriately tagged. Corpus Turdis presents one of tagging possibilities. In this presentation we focus mainly on language modelling of disfluencies in speech.

Further characteristics of spontaneous speech in corpus Turdis-1 will be presented and possibilities for overcoming the problems they arise at spontaneous speech recognition.

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Vokografija in njena uporaba v fonetiki

Vokografija je transkripcija fonacije, ki se uporablja v govoru in petju. Fonacija se opisuje in snema s pomočjo posebnega zapisa, ki je drugače mogoč samo ustno in pisno. Da bi razumeli fonacijo s perspektive vokografije, je pomembno, da se subjektivno in objektivno, pa tudi virtualno in realno združijo. Na ta način je mogoče do določene stopnje opisati in vizualizirati fonacijo – to nevidno »materijo«. Vokografija deli fonacijo na fiziološke, fizikalne, zvočne in psihološke elemente in jih postavlja v različne kategorije. Vokalni znanosti, umetnosti in pedagogiji pa tudi interdisciplinarni komunikaciji ponuja nove možnosti. Prav tako se lahko kombinira s fonetično transkripcijo kot naprimer z mednarodno fonetično abecedo.

Z uporabo vokografije je mogoče:
- pokazati, kar je v fonaciji lahko avditivno, vizualno in fiziološko razlikovalno
- kombinirati funkcionalno subjektivne in objektivne faktorje fonacije
- brez težav posneti, prenesti in shraniti fonacijske podatke
- narediti protokol fonacijskega procesa in rezultatov
- prikazati vokalno tehniko in postavitev glasu

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Vocographics and its application in phonetics

Vocographics is a graphic transcription of phonation used in speech and singing. Phonation is described and recorded by means of specific graphic, otherwise possible only orally and in writing. To observe phonation from the vocographic point of view, subjective and objective, as well as virtual and real, need to become united. In this manner, it is possible to a certain degree to describe and visualize phonation- that invisible "material". Vocographics separates phonation into physiological, physical, sound, and psychological elements and puts them into different categories. It offers new possibilities to vocal science, arts, and pedagogy, as well as to interdisciplinary communication. It can also be combined with phonetic transcriptions, such as the International Phonetic Alphabet. By the use of vocographics it is possible:

– *to show what can be distinguished auditorily, visually and psychologically in phonation*
– *to combine functionally subjective and objective factors of phonation*
– *to record easily, transfer and file phonation data*
– *to make a protocol of phonation process and results*
– *to show vocal technique and voice posture*

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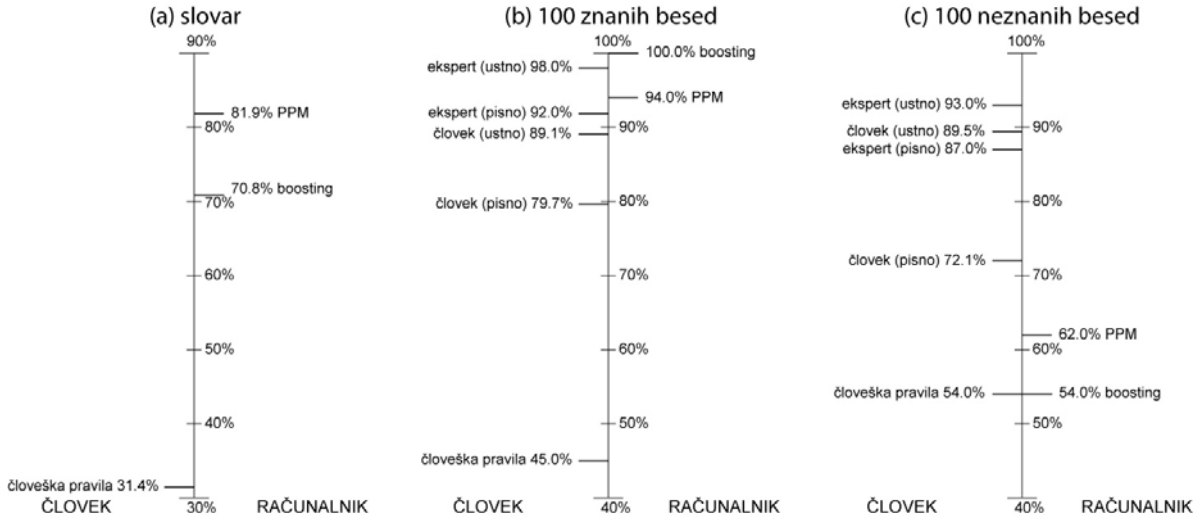
Naglaševanje nepoznanih slovenskih besed: primerjava med človekom, človeškimi pravili in strojnim učenjem

Avtomatsko naglaševanje nepoznanih slovenskih besed je eden od zahtevnejših problemov pri razvoju različnih govornih sistemov. Za razliko od nekaterih drugih jezikov je za slovenski jezik značilno prosto mesto naglasa. Poleg tega ima lahko posamezna beseda različno število naglasnih mest. Mesto naglasa je določeno za vsako besedo posebej in velja, da se ga naučimo hkrati z učenjem jezika. V tem delu prikazujemo rezultate raziskave o sposobnostih ljudi (prostovoljci, jezikoslovci, človeška pravila) in strojev (metode strojnega učenja, n-gramski Markovski modeli) glede naglaševanja njim nepoznanih besed. Analiziramo povezavo med človeškim znanjem in pravili ter rezultate človeških pravil primerjamo s strojno generiranimi pravili. Na takšen način skušamo priti do najboljše metode za avtomatsko naglaševanje nepoznanih slovenskih besed. Ugotavljamo, da ljudje besede izgovarjajo večinoma pravilno, čeprav jih pred tem niso še nikoli slišali ali prebrali. Po drugi strani pa človeška pravila za naglaševanje delujejo nezanesljivo in dajejo slabše rezultate od računalniško generiranih pravil. Ljudje se razmeroma dobro obnesejo pri naglaševanju besed, ko pa je potrebno to znanje formalizirati, so rezultati nezadovoljivi (Slika 1). Zato je za avtomatsko naglaševanje besed bolje uporabiti metode strojnega učenja.



Slika 1: Primerjava rezultatov človeka in računalnika na problemu naglaševanja: (a) besed iz slovarja (3-kratno prečno preverjanje), (b) 100 znanih besed in (c) 100 neznanih besed.

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Comparison between Humans and Machines on the Task of Accentuation of Slovene Words

The accentuation of unknown Slovene words represents a challenging task for automated solvers since in Slovenian, stress can be located on arbitrary syllables. Most words have only one stressed syllable, but there exist also words with no stress and words with more than one stress. Furthermore, different forms of the same word can be stressed differently. In this work, we inspect the performance of humans (human volunteers, human experts and expert-defined rules) and machines (machine learning methods and n-gram Markov models) on the task of stress assignment of Slovene words. We analyze the relation between human knowledge and their rules and compare the results of expert-defined rules and machines to find the best method for automatic accentuation of Slovene words. We find that humans tend to accentuate the words correctly, even when they have never heard or seen them before. On the other hand, expert-defined rules for accentuation perform quite poorly, achieving worse results than machines. This indicates that humans are good at accentuating, but very limited when their knowledge has to be formalized (Figure 1). Therefore, machine methods have to be employed for automatic accentuation of Slovene words.

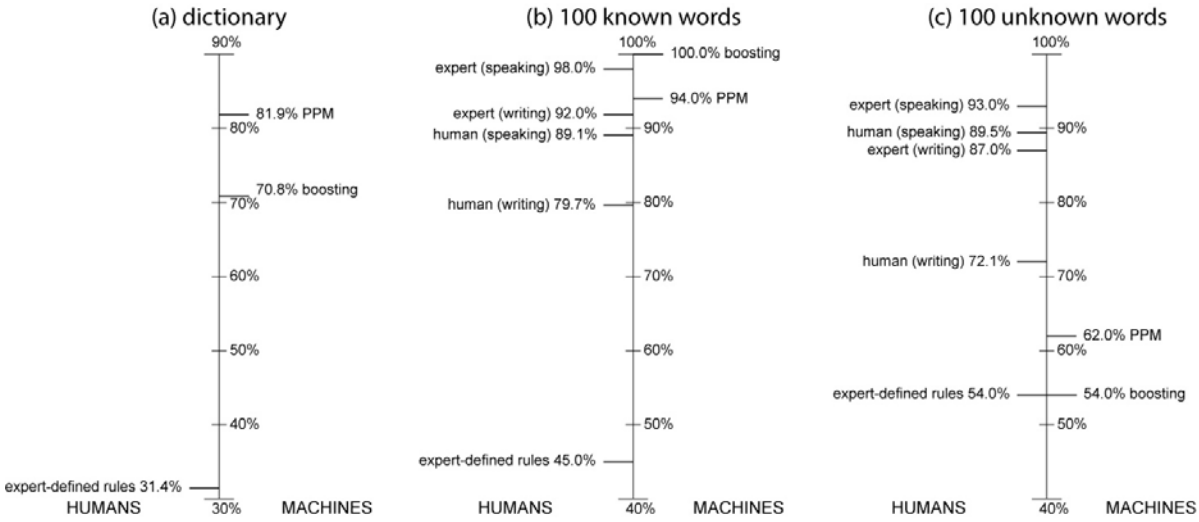

Figure 1: Comparison of accuracy achieved by humans and "machines" on the problem of determining stress type on vowels: (a) on words from the dictionary besed (3-fold cross validation), (b) on 100 known words and (c) on 100 unknown words.

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Nekatere glasovne značilnosti osnov za starejše latinizme oziroma romanizme v slovenščini

V prispevku skuša avtorica na osnovi besednega fonda kakih 150 starejših latinizmov in romanizmov v slovenščini odgovoriti zlasti na vprašanje, kaj nam te izposojenke, prevzete nekako do konca 11. stoletja, povedo o o glasovni vrednosti posameznih vulgarnolatinskih glasov v času prvih stikov s slovanskimi priseljenci. Na začetku opozarja na nekatere omejitve, ki jih je treba pri takih raziskavah upoštevati, nato pa ob primerjavi z rezultati predhodnih raziskav, ki so se opirale predvsem na toponomastično gradivo, ugotavlja nekatere glasovne značilnosti latinskih osnov za starejše latinizme in romanizme v slovenščini. Pri konzonantizmu je pomembna predvsem dvojnost substitucijskih rezultatov za protoromanske velarne zapornike pred palatalnim vokalom ali vokalom v hiatu in za medvokalne zapornike, ki lahko pričajo o sonorizaciji ali pa tudi ne. Glede vokalizma so zgovorni primeri, ki potrjujejo podaljšanje protoromanskega vokala v naglašenih predzadnjih zlogih, slabljenje nenaglašenih vokalov in sinkopo, vendar so to pojavi, ki jih zaznamo na področju celotne Romanije. Kot glasovno posebnost širšega področja prevzema, bi lahko označili le v alpskoslovanskih substitutih potrjeno izenačenje protoromanskega *o* in *u*. Na koncu prispevka avtorica predstavi še svoja razmišljanja problemih, ki so povezani s substitucijo protoromanskega odprtega *u* in *i* v zbranem gradivu.

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Some phonetic characteristics of bases for older latinisms or romanisms in Slovene

This paper primarily attempts, on the basis of 150 older Latinisms and Romanisms in Slovene, to find out what these borrowings, made some time before the end of the 11th century, tell us about the phonetic value of individual phonemes at the time of initial contacts with Slovenian emigrants. The paper starts out by drawing attention to a number of restrictions that must be taken into account; then, through a comparison with the results of previous research, which were limited to toponomastic material, it establishes several phonetic features of Latin bases for older Latinisms and Romanisms in Slovene. In consonantism, the duality of substitutional results for proto-Romance velar stops before a palatal vowel or vowel hiatus and for intra-vowel stops, which may or may not be evidence of sonorisation, tell us a great deal. With regard to vocalism, cases which confirm the extension of the proto-Romance vowel in stressed penultimate syllables and the attenuation of unstressed vowels and syncopes are also fruitful; however, it is possible to notice these phenomena across the entire Romance area. Only the levelling of the proto-Romance *o* and *u* in Alpine-Slavonic substitutes can be considered a phonetic feature special to the wider area of adoption. At the end of the paper the author presents her thoughts on issues connected with the substitution of the proto-Romance open *u* and *i* in the collected material.

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Prostorska percepcija in sluh

Sluh je eden od ločenih zaznavnih načinov, prostorska percepcija (oz. spaciocepcija) pa je percepcija prostora in je polisenzotična, ne samostojno čutilo. Sluh lahko sodeluje pri spaciocepciji in jo izkorišča, saj z iskanjem izvora govora zvok jasnejše zaznavamo (negativni vplivi hrupa in odmevov se zmanjšajo, torej t. i. učinek zabave s koktajli). Vendar pa je sluh neoviran tudi brez spaciocepcijskega elementa, npr. pri telefonskem pogovoru, prenosnem telefonu, radiu, televiziji in ostalih zvočnih oddajnikih in posnetkih. Za razliko od spaciocepcije sluh zaznava informacije o akustičnih značilnostih zvočnega izvira ne glede na to, kje v prostoru je (govor slišimo, ne da bi videli govorca, pesem ali orkester slišimo ne glede, kje igra).

Testirali smo otroke s polževim vsadkom med 6 in 7 leti. Pred vsaditvijo so bili otroci gluhi in alalični. Tri ali štiri leta po operaciji je njihov govor normalen in je skoraj na ravni govornih sposobnosti otrok brez vsadka iste starosti. Stereometrični test je pokazal, da ta skupina otrok ni mogla locirati izvora zvoka. Ti podatki kažejo, kako pomemben je sluh za razvoj govora, pri čemer spaciocepcija nima pomembne vloge. Zaradi optimizma pri rehabilitaciji so do nedavnega trdili, da je spaciocepcija del sluha, torej da so gluhi lahko slišali na podlagi spaciocepcije. Kar se je razvijalo iz tovrstnega prostorskega sluha, ni bilo nič drugega kot govor, značilen za gluhe. Da bi naredili pooperativno rehabilitacijo otrok s polževim vsadkom bolj uspešno, bi se morali zavedati njegove slušne kakovosti in njegove neudeležbe v spaciocepciji.

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Spatioception and hearing

Hearing is one of separatre sense modalities, while spatioception is the perception of space and is polysensory, not a separate sense. Hearing can also take part in spatioception and take advantage of it as well, because by locating the sound source, the sound is percieved more clearly (the negative influence of noise and reverberation is reduced – coctail patry effect). However, hearing is proper even without spatioceptive determining, like hearing over telephone, celular phone, radio, television and other sound trasmitters and recordings. In distinction from spatioception, hearing has the importance of recieving the information about acoustic characteristics of the sound source wherever it is located in space (speech is heard without locating the speaker, and song or orchestra is heard wherever it plays).

Children with cohlear implant, aged between 6 and 7 years, were tested. Before the implantation, children were deaf and alalic. Three to four years after the operation, their speech is normal and has almost reached the level of speech abilities of normally hearing children of same age. Stereometrical test has shown that this group of children couldn't locate the sound source at all. These facts show how important hearing is for speech development, in which auditory spatioception doesn't show a significant value. Because of rehabilitation optimism, it has been claimed, until recently, that hearing is involved in spatioception that much to make hearing a part of spatioception, i.e. it has been claimed that the deaf hear on the basis of spatioception. What was developing from that kind of spaticeptive hearing was nothing but the speech typical of the deaf. In order to make postoperative rehabilitation of children with cohlear implant more successful, one should be comletely aware of its auditory quality and its hardly any involvement in spatioception.

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Angleško-slovenska kontrastivna fonetika ter njene aplikacije pri poučevanju angleške fonetike

Prispevek najprej pregledno obravnava različne vidike angleško-slovenske kontrastivne fonetike, in sicer: razlike med samoglasniškim in soglasniškim sistemom obeh jezikov, prevzemanje angleških leksemov v slovenščino in njihovo fonološko adaptacijo, prilikovanje in izpad v obeh jezikih ter prozodične razlike (mesto jedra in tonski poteki stavčne intonacije). V drugem delu so podana opažanja v zvezi z vplivom medjezikovnih razlik na angleško izgovorjavo slovenskih študentov angleškega jezika ter nekatere aplikacije ugotovljenih medjezikovnih razlik pri poučevanju angleške fonetike. Pri tem avtor poleg tradicionalnih vidikov artikulatorne fonetike (zvenečnost, mesto in način izgovorjave soglasnikov) ter perceptivne fonetike (predvsem stopnja odprtosti, sprednjost oz. zadnjost in dolžina samoglasnikov) upošteva tudi možnosti akustične analize z uporabo različnih računalniških programov za analizo govora.

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English-Slovene Contrastive Phonetics and its Applications in Teaching English Phonetics

The paper first provides a survey of various aspects of English-Slovene contrastive phonetics, i.e.: differences between the vowel and consonant systems of the two languages, phonological adaptation of English loanwords in Slovene, assimilation and elision in English and Slovene, and differences concerning some of the prosodic features, in particular those concerning tonicity and tone in the sentence intonation of the two languages concerned.

The second part presents the author's observations on the influence of these differences on the English pronunciation of Slovene students of English, and some possble applications of these observations on the methodology of teaching English phonetics. In addition to the traditional features of articulatory phonetics (vocing, place and manner of articulation of consonants) and auditory phonetics (in particular the degree of opening, frontness/backness and duration of vowels), the author takes into account also the possibility of application of acoustic analysis by using various speech analysis computer programs.

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Sodobni knjižni jezik med pisnostjo in govorjenostjo (na primeru radia in televizije)

V slovenskem jezikoslovju je do konca 20. stoletja prevladovalo mnenje, da govorjeni knjižni jezik izhaja iz »pisave«, potrebno je upoštevati le nekaj osnovnih pravil za pravilni izgovor, kot sta zatrjevala Rigler in Toporišič ob nastanku takrat novega slovarja (1970). To je tudi vzrok za pomanjkanje pravorečnih priročnikov v preteklosti in sedanjosti. Če se vrnemo k začetkom slovenskega knjižnega jezika, pa ugotovimo, da je že Trubar ustvarjal sicer pisni knjižni jezik, vendar je imel v mislih čim širšo razumljivost knjižnega jezika med Slovenci. Torej je izhajal iz primarnega jezikovnega prenosnika – govorjenega jezika.

V 20. stoletju se je predvsem s Toporišičevimi monografijami utrdila tudi misel, da je živa osnova knjižnemu jeziku govor Ljubljane. Po letu 1990 pa so prav številne lokalne televizijske in radijske postaje ob siceršnji sprostitvi precej toge norme medijskega govora (manj branosti in govornega lektoriranja, več živega (s)poročanja) potrdile razlikovanje med javnim in zasebnim ter pozornost usmerile na dejanski (knjižni) govor.

V prispevku osvetljujemo še nekaj podobnih samoumevnih trditev (zakonov!?) o govorjenem jeziku, s primeri iz realnih besedil radia in televizije pa poskušamo pokazati novo smer v raziskovanju in kodificiranju ter razvijanju govorjenega knjižnega jezika. Značilnosti slovenskega medijskega govora na prelomu tisočletja obravnavamo s poudarkom na aktualnosti, poslušanosti/gledanosti in vplivu na poslušalca/gledalca/govorca.

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Contemporary standard Slovene between writing and speech (on the radio and television)

Until the end of the 20th century, there was a predominant opinion in the field of Slovene studies, that spoken standard Slovene is predictable from the written form. Only a few basic pronunciation rules had to applied, as claimed by Rigler and Toporišič when compiling a new dictionary (1970). This fact is the main reason for lack of othoepic reference books, in the past and today. Going back to the beginning of standard Slovene, one can claim that even Trubar had in mind the general comprehensibility of Slovene, not only the written form. Trubar's ideas of the standard language must have been based in the primary communication media, the spoken language.

In the 20th century, however, Toporišič's work established the idea, that the foundation of spoken standard Slovene is the speech of Ljubljana. After 1990 numerous TV and radio stations confirmed the division between private and public and underlined the importance of the actual (standard) speech, although the norms of speech in media became relaxed (i.e. less reading and lectorship, more live communication).

In the talk, we would like to stress some of the similar self-evident claims (laws?!) about spoken speech. Examples from actual radio and TV texts show a new way in research, codification and developments of spoken standard Slovene. Properties of Slovene media speech at the turn of the millennia are handled with emphasis on actuality, ratings and influence on the recipients or speakers.

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Artikulacijsko-akustični opis slovensko-hrvaškega jezikovnega sistema

Fran Ramovš je v svoji knjigi *Kratka zgodovina slovenskega jezika* knjižni jezik opredelil kot kulturni dialekt oz. «posodo», v kateri so spravljene vse narodove kulturne dobrine. Njegova ideja, da jezik lahko priča o medsebojnih odnosih dveh skupnosti v stiku, je upoštevana tudi v našem artikulacijsko-akustičnem opisu slovensko-hrvaškega jezikovnega sistema. Skupni življenjski prostor in sožitje sta vplivala na množico podobnih ali celo enakih jezikovnih pojavov v obeh jezikih: podobnost glaso(slo)vnega in oblikoslovnega sestava, način oblikovanja besed ipd. Dvanajst stoletij sta se slovenščina in hrvaščina (kajkavščina in čakavščina) razvijali kot skupna jezikovna enota, v marsičem različna in nasprotna jugovzhodnemu štokavskemu dialektu, ki je postajal od časa hrvaškega razsvetljenstva vse bolj dominanten na balkanskem ozemlju. Kasneje se je Slovenija obrnila na srednjo Evropo, Hrvaška pa se je bolj usmerila na Jadransko morje. Na prekinitev skupnega razvoja slovenskega in hrvaškega jezika je močno vplivala tudi panslavistična ideja Ljudevita Gaja in Vuka Karadžiča v 19. stoletju, da štokavščina postane jedro jezika vseh jugozahodnih Slovanov.

Z našim artikulacijsko-akustičnim opisom slovenščine in hrvaščine želimo z drugega zornega kota pogledati v slovensko-hrvaške jezikovne stike od njihovih začetkov do sodobnih jezikovnih sistemov.

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Articulatory and acoustic description of the Slovene-Croatian language system

In Fran Ramovš' *Kratka zgodovina slovenskega jezika* (*A short history of Slovene*) standard Slovene is defined as a cultural dialect, or as a treasury of nation's cultural goods. His idea that language can witness the relationship between the two communities in contact is acknowledged in the present arcitulatory and acoustic description of the Slovene-Croatian languages system. The common life space and the symbiosis influenced a number of similar or even the same linguistic phenomena in both languages: the similarity of sound/phonological and morphological structures, word formation etc. For twelve centuries, Slovene and Croatian (Kajkavian and Cakavian) have developed as a unified linguistic unit, distinct from South-Western Stokavian dialect, which became increasingly dominant in the Balkans. Later, Slovenia tied more closely to Central Europe, while Croatia has directed itself to the Adriatic Sea. The separation in the previously common development was influenced by the Panslavism of Ljudevit Gaj and Vuk Karađić in the 19th century, that Stokavian is the actual common language of the South-Western Slavs.

In the proposed articulatory and acoustic description of Slovene and Croatian we aim at an alternative point of view to Slovene-Croatian language contact from the beginnings to the contemporary languages.

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Vibrato profesionalnih moških glasov

Raziskali smo moduliranje osnovne frekvence treh opernih pevcev: znanega starejšega bas-baritonista (80 let) in dveh mlajših bas-baritonistov (23 in 21 let). Glasovi so bili posneti ob enakih pogojih v studiu Oddelka za fonetiko v Zagrebu. Na podlagi dolgih samoglasnikov med arijami, vokalizacijami, pesmimi in lestvicami je bil narejena ozkofiltrska spektrogramska analiza osnovne frekvence in slike periodičnih sprememb v f_0. Izračunani so bili še hitrost vibrata, srednje vrednosti f_0, standardni odklon f_0, obseg f_0, jitter (%), shimmer (dB) in HNR (dB). Da bi ugotovili t. i. visoki pevski formant, je bil narejen LTAS za vsak glas posebej pri petju in govorjenju. Izbrani ton je trajal dovolj dolgo, da je bilo mogoče izmeriti čas med dvema valovoma iz spektrograma. Ker vibrato variira med trajanjem tona, tj. da pred koncem nekoliko zraste, smo upoštevali srednji del po trajanju. Ugotovili smo, da je vibrato v mejah dobrega profesionalnega glasu (za starejše glasove 6 Hz: f_0 ravno čez 150 Hz, 5,1 Hz: f_0 165,88 in upad pribl. na raven med 4,28 in 4,65 Hz za nekatere tonske višine; za mlajše glasove 5 Hz: f_0 168,82 Hz, 198,29 Hz) z odstopanjem v odvisnosti od not in udarcev. Danes je vibrato med 5 in 6 Hz estetsko zaželen. Pevski vibrato je tudi kultiviral vokalni tremor, ki lahko obogati glas. Torej lahko rečemo, da je občudovanja vredno, kako estetsko ohranjen je starejši glas, čeprav je tremor postal opazno neperiodičen, ker ga je težje nadzorovati in ni lahko peti s točnim vibratom. Vibrato je lažje videti pri višjih harmonskih frekvencah, saj se razlike seštevajo. Po drugi strani pa nižje frekvence sovpadajo. Če primerjamo meritve vibrata na različnih notah, je jasno, da je dober vibrato bolj konstanten v sredini pevskih obsegov v odvisnosti od f_0 v primerjavi z zelo nizkimi ali viskomi f_0. Popolne konstantnosti nismo opazili pri nobenem od govorcev, različna razmerja so odvisna od glasilk, tonske višine in interpretacije, vrste pesmi. Dober kultivirani vibrato prispeva k vtisu glasovnega bogastva, ki je akustično dokazljivo s širšo spektralno obliko pevskih formantov in večjim številom harmonskih frekvenc na spektrogramu.

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Vibrato in trained male voices

Fundamental frequency modulation was investigated on 3 male trained opera voices: famous older bass-baritone (80 years old) and two younger bass-baritones (23 and 21 years old). Voices were recorded in same conditions in the studio of the Department of Phonetics. On the basis of prolonged vocals during the perfomance of arias, vocalizations, songs and scales, narrow sonogram pitch analyses and pictures of periodic pitch changes were made. Vibrato rate, f_0 middle values, f_0 standard deviation, f_0 range, jitter (%), shimmer (dB), HNR (dB) were also calculated. For the purpose of identifying so called high singing formant, LTAS was made for each singing voice on the basis of speech and singing. The sellected tone lasted long enough to measure the time beween two waves on the spectrogram picture. As the vibrato rate varies during the tone, i.e. near the end vibrato rate grows, the middle of the tone duration was taken into account. It has been found that vibrato rate is within the standard limits of good singing voice (for older voice 6 Hz:f_0 just over 150 Hz, 5,1 Hz:f_0 165,88 and descends approximatelly to rate between 4,28 and 4,65 HZ for some pitches; for younger voices 5 Hz: f_0 168,82Hz, 198,29 Hz) with variability depending on notes and beats. Nowadays, vibrato between 5 and 6 is aesthetically desirable. Singing vibrato is also cultivated treated vocal tremor, and specific aestetical tremor enriches the voice. Threfore, it is admirable how aesthetically preserved older voice is, although tremor has become noticeably unperiodic because it is harder to control it and it is not easy to sing with the exact vibrato. Vibrato can be more clearly seen in higher harmonics because the differences are summed up. On the other hand, low pitch harmonics merge together. When vibratos measured on different notes are compared, it is obvious that good vibrato is more constant in middle singing ranges of f_0 pitches than in very low or very high f_0. The complete constancy was not the case for every single singer, i.e. different rate depends on the vocal, pitch, interpretation – type of the song. Good cultivated vibrato contributes to the impression of voice richness that is acoustically evident in the wider spectral shape of singing formants and in greater number of harmonics in the sonogram.

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Zlivanje glasov v spontanem (narečnem) govoru

V vsakem vnaprej nepripravljenem, torej spontanem govoru lahko prihaja na zlogovni in besedni meji do zlitja glasov. S terminom zliti glas so v prispevku na eni strani označena zlivanja dveh ali več glasov, samoglasnikov ali soglasnikov (pri soglasnikih torej ne gre za zlitnike, ki so samostojni glasovi, sestavljeni iz zapornega in istovrstnega pripornega dela glasu) ter izgovarjave, ki ne sodijo neposredno v okvir samoglasniških ter soglasniških sistemov, a lahko povzročijo nepričakovana zlitja, saj jih v določenih primerih niti slušno niti vidno s pomočjo slike govornega signala ali sonogramske oz. spektrogramske slike ni mogoče ločiti od sosednjih samoglasnikov oz. soglasnikov. Do zlitij obeh vrst prihaja bodisi zaradi skupnega mesta izgovarjave sosednjih glasov bodisi, morda tudi zato, zaradi hitrosti izgovarjave sosednjih glasov.

Raziskava zajema na terenu zbrano gradivo spontanega narečnega govora Zabukovja nad Sevnico (7 informatorjev), in sicer statistično obdelavo pogostnosti zlitih glasov glede na celotno zbrano gradivo, meritve prozodične lastnosti trajanja in primerjavo teh vrednosti z vrednostmi nezlitih glasov v enakih položajih glede na vrsto in odprtost zloga ter njegovo zložnost. Posebej je obravnavana in predstavljena metodološka problematika obdelave tovrstnih zlitih glasov.

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Sound fusion in spontaneous (dialectal) speech

In every unprepared or spontaneous speech sound fusion effects on the syllable and word boundary are present. With the expression "fused sounds" two types of phenomena are described in this talk: the fusion of two or more sounds, vowels or consonants (except for affricates), or the pronunciation, which cannot be attributed to any vocalic or consonantal system, but can create unpredicted fused segments, which cannot be (auditorily or via spectrographic analysis) separated from the surrounding environment. These two fusions are conditioned by a common articulatory point of the segments, or the speed of articulation.

This study includes the spontaneous dialectal material of Zabukovje nad Sevnico local speech (N = 7), gained as a result of fieldwork. Consequent statistical analysis of the whole data was made, as well as the measurements of the duration and comparison to the not fused sounds in corresponding positions with respect to the syllable type. Separately, methodology of this kind of research is discussed.

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Zapisati nezapisljivo: transkribiranje spontanega govora za govorni korpus

Za slovenščino obstajajo različni standardi zapisovanja govora: predvsem v dialektologiji, nekaj poskusov je bilo v literarnih besedilih, predlog za fonetično transkribiranje govora pa je nastal tudi za potrebe jezikovnih tehnologij. Pri načrtovanju gradnje govornega korpusa za slovenščino kot dela referenčnega korpusa se je pokazala potreba po izdelavi načel za prilagojeno ortografsko transkribiranje spontanega govora. Potreben je standard, po katerem se zapis govorne verige do določene mere prilagodi pisni obliki besed v verigi oziroma načelom, ki veljajo za knjižno zapisovanje slovenščine. Taka rešitev je potrebna za učinkovitejšo izrabo korpusa, zlasti pri iskanju in statistični obdelavi. Kljub temu pa mora tovrstno zapisovanje ohraniti prozodične lastnosti govora in ostale tipične lastnosti, po katerih se govorjeni jezik razlikuje od pisnega. To je tehnološko izvedljivo z večplastno ureditvijo korpusa in s sinhronizacijo zvočnih posnetkov in transkripcij.

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How to write down what cannot be written down (transcribing spontaneous speech for spoken corpus)

There are several different standards for transcribing Slovene in existence: in the dialectology, severyl attempts have been made in literary fiction, a proposal for phonetic transcription of speech was made in the field of language technologies. When designing a speech corpus for Slovene as a part of a reference corpus, it has been established that certain guidelines for adapted orthographic transcription of spontaneous speech are needed. The transcription standard should be similar to the written form of the standard Slovene. Such a solution is needed for a better use of the corpus, especially when searching, and in statistical analyses. However, this kind of transcription should also preserve the prosodic properties of the speech and other typical properties, which distinguish spoken language from the written. This is a technologically possible solution, using a multi-layered structure of corpus and synchronization of the recordings and transcriptions.

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Premislek – manjkajoči člen med »verbum mentis« in »vis sermonis«

1. Pravica govorca do premisleka je sestavni del pravice do govora.
2. Premislek je varovalka pred uničevalno močjo izgovorjene besede.
3. Beseda o moči govorjenih besed in moči zapisanih besed.
4. Kakovost premisleka se skriva v »ravno pravšnjem časovnem okviru«.
5. Premislek je stvarnik ideje in arhitekt načrta govora.
6. Premislek je največkrat edina dopustna priprava na govorno dejanje.
7. Premislek je sorodnik »uvodnega dramatičnega molka«.
8. Premislek je eno izmed zdravil za strah pred govorjenjem in nastopanjem.
9. Izvirna naloga premisleka je sprejem odločitve »govoriti ali ne govoriti«.
10. Kaj se zgodi, če se premislek prelije v diskurz molka?
11. Ali je govor brez premisleka izvedljiv?
12. Premislek sledi zunanjemu izzivu za govor ali pa ga vpelje notranji vzgib.
13. Kakšen je učenjakov sindrom ali »moje misli ne pridejo do besede?«.
14. Kdaj je premislek povsem navadno kupovanje časa?
15. Kaj vse lahko naredimo s premislekom in venček nepremišljenih misli o premisleku.

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Reflection – A missing link between »Verbum Mentis« and »Vis Sermonis«

1. The speaker's right to reflect is an integral part of the right to speak.
2. Reflection is a safety fuse against a destructive power of uttered word.
3. A word about the power of spoken and written words.
4. The excellence of reflection is hidden in »just right timeframe«.
5. Reflection is a creator of idea and an architect of speech plan.
6. Reflection is commonly the only allowed preparation for speaking.
7. Reflection is a relative of »introductory dramatic silence«.
8. Reflection is one of the remedies for fear of speaking and performing in front of the public.
9. The original task of reflection is reaching a decision on whether »to speak or not to speak«.
10. What happens if the reflection turns into the discourse of silence?
11. Is speech without reflection feasible?
12. Reflection follows an external challenge to speak or is initiated by an internal drive.
13. What is the scientist’s syndrome or »my thoughts fail to be brought to light?«
14. When is a reflection a mere struggling for time?
15. What can be done with a reflection and a wreath of imprudent thoughts on reflection.

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Prozodične strategije v spontanem govoru: analiza in aplikacije

Spontana govorna izmenjava predstavlja izziv predvsem, ko si zastavimo vprašanje, zakaj določen govorec v določenem trenutku za določenega naslovnika tvori natančno izrek, kakršnega v danih okoliščinah tvori. Avtor govornega sporočila namreč zaradi nepovratnosti izrekanja sproti glede na odzive naslovnika uravnava svoje govorne intervencije, pri čemer uporablja različna strateška sredstva in z njimi strukturira posamezne govorne enote.

Zato se sodobno jezikoslovje pri analizi spontanega govora ne opira več zgolj na diskurzivne kriterije, veljavne za analizo pisnih besedil, ampak upošteva dodatne komunikacijske strategije, pri čemer igra pomembno vlogo prozodija. To bomo na korpusu treh spontanih govornih izmenjav v slovenščini poskušali pokazati z analizo govorne izmenjave po metodologiji, izdelani pod vodstvom M. A. Morel in L. Danon-Boileauja (1998). Ta predpostavlja, da govorec s spreminjanjem F0 ohranja naslovnikovo pozornost, z jakostjo vzpostavlja boj za besedo, s trajanjem posameznih govornih enot kaže stopnjo pripravljenosti svoje formulacije, s premori pa naslovniku omogoča miselno sintezo tistega, kar je že bilo izrečeno.

Proučevanje komunikacijske vloge posameznih prozodičnih kazalcev, njihovega prepletanja in njihove interakcije s skladnjo, semantiko ter mimiko in gestikulacijo nam tako lahko olajša delo na različnih področjih jezikoslovnega raziskovanja, npr. pri sintezi in avtomatičnem prepoznavanju govora, v forenzičnem jezikoslovju ipd.

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Prosodic strategies in spontaneous speech: analysis and applications

In contemporary linguistic researches, a spontaneous conversational exchange represents a challenge especially when treating the question why a certain speaker produces a certain utterance in a certain moment for a certain addressee. In fact, the author of the message is constantly adapting his speech interventions considering the reactions of the addressee, and as a result he uses different strategic resources structuring special speech units in order to achieve his communicative aim.

That is why speech linguistics no longer relies on the discourse criteria pertinent for written texts, but takes into consideration additional communicative strategies, among which an important part is played by prosody. The paper presents these facts on a corpus of three spontaneous conversational exchanges in slovene analysed by a methodology elaborated by M. A. Morel and L. Danon-Boileau (1998). The presented methodology supposes that 1) the variation of F0 is the result of the speaker's will to retain the adressee's attention, 2) the intensity shows the claim for one's turn, 3) the duration indicates the degree of elaboration of the speech unit and 4) the pauses facilitate the mental synthesis of what has been uttered.

Studying the communicative role of prosodic parameters, their interference and their interaction with syntax, semantics, mimics and gesticulation is a useful domain in linguistics researches, particularly in speech synthesis, automatic recognition of speech and in forensic linguistics.

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Leksikon izgovarjav SI-PRON

Naglasno mesto predstavlja zlog, na katerem ima beseda tonsko ali jakostno izrazitost. Glede na besedno obliko poznamo stalno mesto naglasa, kot npr. v francoščini na zadnjem zlogu, delno omejeno mesto naglasa, kot npr. v hrvaščini zadnji zlog ni nikoli naglašen, ter prosto mesto naglasa. Za slovenski jezik je značilno prosto mesto naglasa, saj se ta lahko pojavi na prvem, zadnjem, predzadnjem ali predpredzadnjem zlogu. Prav tako ima lahko posamezna beseda več mest naglasa. Mesto naglasa je določeno za vsako besedo posebej in se ga naučimo hkrati z učenjem jezika in besed.

Slovar izgovarjav, ki vsebuje fonetične prepise besed, vključno z oznakami za naglasno mesto, je nujno potreben jezikovni vir za razvoj jezikovno-tehnoloških izdelkov ter za jezikoslovno študije. Za slovenski jezik so bili zgrajeni številni slovarji izgovarjav [Derlić 1996, Gros 1999, Verdonik 2002, Šef 2002], noben izmed njih pa ne pokriva celotnega besedišča iz *Slovarja slovenskega knjižnega jezika* (SSKJ) [SSKJ 1997].

V prispevku predstavljamo postopek pridobivanja SI-PRON slovarja izgovarjav za slovenske besede, ki so zbrane v SSKJ. Seznam osnovnih besednih oblik smo razširili s številnimi pregibnimi oblikami. Skupaj z Onomastico [Derlić 1996] predstavlja SI-PRON dragocen jezikovni vir za izgradnjo govornih aplikacij. Vgrajen je bil v sintetizator govora za slovenski jezik, AlpSynth, prav tako je bil uporabljen za izgradnjo zvočnih podob SSKJ besed, ki so predstavljene na spletni predstavitvi slovarja SSKJ, na strani http://bos.zrc-sazu.si/sskj.html.

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The SI-PRON Pronunciation LEXICON

In Slovenian, lexical stress can be located on almost any syllable obeying hardly any rules. As a consequence, a pronunciation lexicon indicating lexical stress positions for as many Slovenian words as possible is crucial for the development of speech technology applications and linguistic studies. Such a lexicon can be used either in its full-blown form or as a training material for machine learning techniques aimed at automatically predicting word pronunciations.

Several attempts towards pronunciation lexicon construction for Slovenian have been reported so far [Derlić 1996, Gros 1999, Verdonik 2002, Šef 2002]. However, none of these has used the full lemma set as given in the *Dictionary of Standard Slovenian* (SSKJ) [SSKJ 1997].

We present the efforts involved in designing SI-PRON, a comprehensive machine-readable pronunciation lexicon for Slovenian. It has been built from two sources and contains all the lemmas from the SSKJ, the most frequent inflected word forms found in contemporary Slovenian texts, and a first pass of the inflected word forms derived from the SSKJ lemmas. The word list determination procedure, the generation and validation of phonetic transcriptions, and the lexicon format will be presented.

Along with Onomastica, SI-PRON presents a valuable language resource for linguistic studies and research and development of speech technologies for Slovenian. The lexicon is already being used by the AlpSynth text-to-speech synthesis system for Slovenian and for generating audio samples of the SSKJ word list.

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Razširitev slovenske govorne baze BNSI Broadcast News za izboljšano akustično modeliranje govora

Pri razvoju avtomatskega razpoznavanja govora imajo pomembno vlogo jezikovni viri, potrebni za učenje akustičnih in jezikovnih modelov. Slovenščina je zaradi visoke pregibnosti in relativno prostega besednega reda eden izmed kompleksnejših jezikov za razpoznavanje tekočega govora. Prvi slovenski jezikovni vir za razpoznavanje tekočega govora z neomejeno domeno je bila baza *BNSI Broadcast News*, ki je bila zasnovana konec leta 2002 na FERI v Mariboru v sodelovanju z RTV Slovenija. Govorni del baze BNSI je obsegal 36 ur zapisanega govornega materiala, namenjenega učenju akustičnih modelov. Ker je zaradi pregibnosti slovenskega jezika potreben čim večji slovar za doseganje dobre pokritosti testnega nabora, smo povečali obseg govornega materiala v bazi BNSI Broadcast News s 36 na 72 ur. Hkrati smo kot poseben dodatek k bazi BNSI zasnovali govorno bazo *SINOD* (*Slovenian Non-native Database*), ki je prva slovenska govorna baza, namenjena avtomatskemu razpoznavanju govora govorcev, katerih materni jezik ni slovenščina. Takšni govorci pri izgovorjavi slovenskih besed pogosto uporabljajo najbolj sorodne foneme iz svojega maternega jezika. Baza SINOD vsebuje posnetke v skupni dolžini 102 minut, kjer je ena govorka iz ZDA, druga pa iz Rusije. V razširjeno različico baze BNSI smo dodali tudi druge oddaje dnevnoinformativnega programa (intervjuji, omizja). Tako smo povečali delež spontanega govora, ki je zaradi svojih lastnosti še posebej zahteven za avtomatsko razpoznavanje govora. Skupaj obsega razširjena različica baze BNSI govorne posnetke 81 televizijskih oddaj. Lastnosti razširjene baze BNSI bomo podrobneje predstavili v prispevku.

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Expanding the Slovenian BNSI Broadcast News speech database for improved acoustic modeling

Language resources have an important impact on acoustic and language modeling for automatic speech recognition (ASR). Slovenian is due to highly inflectional nature and relatively free word order a complex language for large vocabulary continuous speech recognition (LVCSR). The first Slovenian language resource for LVCSR in unrestricted domain was the *BNSI Broadcast News* database. The BNSI project was started in the year 2002, as cooperation between FERI, Maribor and RTV Slovenija. The original BNSI speech corpus consists of 36 hours of transcribed speech material for developing acoustic models. The complexity of Slovenian language from ASR's point of view was the main motivation to expand the BNSI Broadcast News speech corpus from 36 to 72 hours. At the same time, the *SINOD (Slovenian Non-native Database)* speech database was built. The SINOD speech database is the first Slovenian non-native speech database, which will be used for ASR's acoustic modeling. It was created as supplement to the BNSI database. The SINOD database consists of two TV interviews in total length of 102 minutes. One of the non-native speakers was from the US, the other one from Russia. The expanded BNSI version also contains interviews and talkshows. Such type of broadcasts was added to the expanded BNSI version to increase the amount of spontanuous speech for improved acoustic modeling. Altogether, there are 81 broadcasts in the expanded BNSI Broadcast News database.

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Vpliv obsega mentalnega slovarja na domeno fonološke teorije

Tvorbeniki pojmujemo mentalni slovar kot skladišče vsega usvojenega (tj. neuniverzalnega) znanja jezika. Še vedno je kdaj zastopano stališče, da je velikost mentalnega slovarja radikalno omejena (prim. Halle 1997: 130). Temu stališču oporekam, saj menim, da zanj ni na voljo empiričnih argumentov. Pač pa obstajajo argumenti v prid nasprotnemu stališču, recimo večjezičnost in vseživljenjsko učenje novih besed.

Po drugi strani menim, da se načelo, ki pravi, da so morfološko sorodne besede fonološko izpeljane ena iz druge, uporablja premalo oprezno. Preprost protiprimer univerzalni veljavnosti tega načela so že nepravilne oblike besed, potreba po previdni določitvi domene aplikacije načela pa bo ilustrirana na primeru (navidezne) palatalizacije kot aktivnega fonološkega procesa v slovenščini (prim. Toporišič 2000). Če v fonološko teorijo vključimo pravila, ki so zmožna izpeljati vse morfološko sorodne besede iz skupnega izhodišča, dobimo teorijo, ki zmore formalizirati *kakršnokoli* izpeljavo (prim. Kaye 1995). Takšna teorija je neovrgljiva ter zato neempirična in neznanstvena. Nasprotno velja za fonološko teorijo, ki bo svojo domeno omejila na produktivne morfološke procese in naplavine diahronije prepustila mentalnemu slovarju, čigar povečana obremenitev je seveda mogoča le, če opustimo zgoraj navedeno dogmo o radikalni omejenosti.

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How does the size of the mental lexicon influence the range of phonological theory?

In generative grammar the mental lexicon is taken to be a repository of all acquired (i.e. non-universal) knowledge of language. The view that the size of the mental lexicon is radically limited is still found in the literature (cf. Halle, 1997, 130). I object to this view, since there seem to be no empirical arguments to support it. Counter-arguments are not hard to find, however, the prime examples being multilingualism and the fact that we learn new words every day.

I also believe that the principle saying that phonological forms of morphologically related words are derived from a common source is used too indiscriminately. A simple counterexample against its universal validity is irregular forms of words. Furthermore, palatalization as an (allegedly) active phenomenon of Slovene phonology will serve as an example that caution must be exercised when delimiting the domain of its application. If phonological theory includes rules that are able to derive all morphologically related words from a common lexical source, the resulting theory is able to formalize any derivation (cf. Kaye, 1995). Such a theory is unfalsifiable and therefore non-empirical and unscientific. Exactly the opposite can be said for a phonological theory that limits its domain of application to productive morphological processes and stores all diachronic diversity in the mental lexicon. Such move sets an additional load to the mental lexicon and can therefore be made only if the radical-limitedness dogma discussed above is abandoned.


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