Exploring English Phonetics is conceived as a meeting point of the diverse perspectives, approaches and interests of scholars working in the field of English Phonetics worldwide. The focus of the volume is on the topics in the domain of language varieties, mutual language influences, and also on issues pertaining to the research, study, and teaching of English to speakers from other language backgrounds. Authors raise a number of novel, motivating and noteworthy questions, relevant from the point of view of either phonetic research or phonetic training and EFL teaching. These questions cover a wide range of phonetic topics: the nature of vowels and consonants in several dominating varieties of English, the phenomena of connected speech and the nature of intonation, issues in the methodology of phonetic research, problems encountered by speakers of other languages striving to acquire English pronunciation, and attitudes to different native and non-native varieties of English. Despite such a broad variety of topics, the volume offers a unifying approach to the study of speech and puts forward intriguing results gained by original research. Whatever their focus and sample size, most chapters deal with the English spoken and learned by speakers of other languages, thus highlighting both the current status of English as the language of global communication, and the international orientation of this volume.

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Mattingly, I. G. 1992. Linguistic awareness and Orthographic Form. In *Orthography, phonology, morphology, and meaning*, edited by R. Frost and L. Katz, 11-26. Amsterdam: Elsevier Science Publishers B. V.

Seidenberg, M. S. 1992. Beyond orthographic depth in reading: equitable division of labour. In *Orthography, phonology, morphology, and meaning*, edited by R. Frost and L. Katz, 85-118. Amsterdam: Elsevier Science Publishers B. V.

Wenk, B. 1979: Articulation Setting and De-fossilization. *Interlanguage Sudies Bulletin* 4: 202-220.

Wieden, W. & W. Nemser. 1991. *The Pronunciation of English in Austria: A developmental and regional study*. Tuebingen: Narr.

Using Web Technologies in L2 Phonological Research: Methodological Issues and Implications

Anastazija Kirkova-Naskova and Dimitar Trajanov

Outline

This paper reports on the benefits and limitations of a web-based experiment designed for the purposes of a broader study investigating the English speech of Macedonian learners of English. The subjects of the study were first and second year students of English at Skopje University whose speech was recorded and then evaluated by trained phoneticians, native speakers of English, using a specially designed web application as a data gathering instrument. The results demonstrate the manifold benefits of the approach as well as the flexibility of its adaptation in applied linguistic research and L2 learning/teaching.

1. Introduction

The use of computer technology in applied linguistic research has become common practice. In the field of phonetics, phonology and second language phonological acquisition, computer assistance has shown advancement and yields remarkable results. Chun (2007) observes that various hardware devices and specialist software packages have been designed for the purposes of speech research in general—from acoustic research on segmentals and prosody to the creation of speech corpora (recording, archiving, tagging, transcribing) and the development of speech synthesis and speech recognition programs. Chun further notes the growing use of technology for phonological component manipulation in studies related to the perception and production of L2 speech, foreign accents, intelligibility, the comprehensibility and acceptability of spoken texts, L2 prosody, the development of listening and speaking competence,

and the use of technological tools and programs for L2 pronunciation instruction and learning.

Research practice with foreign accent ratings and segmental analysis studies has shown that the traditional methodology applied in conducting such experiments can be lengthy and wearisome for researchers and participants alike (Beddor and Gotfried 1995). For researchers, such methodology usually involves an extensive preparation stage for speech stimuli design. Participants, on the other hand, are typically expected to listen to repetitive recorded speech stimuli and to complete various identification/discrimination tasks, and sometimes to provide detailed phonetic analysis. In doing so, they may become impatient, bored or indifferent, thereby compromising the validity of the responses. To overcome these problems, a number of studies have incorporated computer-aided tasks and procedures (e.g., Escudero 2000). Such studies have typically been undertaken in highly controlled laboratory conditions, with expensive equipment and a large number of participants.

In addition to the expensive equipment and the length of the experiments involved, a potential shortcoming in phonetic studies that collect responses of segmental elements and global accent ratings is the specific listeners' profile required for the experiment and their availability at the time of the study. Although untrained listeners are perfectly capable of making appropriate evaluations of non-native speech (Brennan and Brennan 1981; Anderson-Hsieh and Koehler 1988; Derwing, Munro and Wiebe 1998), many studies have found that experienced listeners, namely those with phonetic-phonological expertise, detect foreign-accentedness more reliably (Flege 1984; Thomson 1991). In fact, Flege (2002) argues that, despite the possibilities of gathering quantitative measurements of foreign-accented speech, it is the qualitative judgments of native speakers which remain "the golden standard".

Only recently have the possibilities offered by the Internet begun to be explored. The Internet hosts a vast number of general linguistic questionnaires and surveys and quiz-based applications for practicing phonetic symbols and target sounds. To our knowledge, however, the only study to have employed a large-scale Internet survey for foreign accent evaluation by native speakers was that conducted by Rias van den Doel (2006). In this study, Van den Doel addresses the issues of the intelligibility and acceptability of Dutch pronunciation errors in sentences read by bilingual actors and evaluated by more than 500 native speakers of different Standard English varieties. The software used in the development of this survey is WWStim (Veenker 2003), a Perl CGI script for presenting web-based questionnaires and experiments by using predefined sequences of template-based HTML pages.

This paper presents the development and design of a web application created as a user programme to gather native speakers' responses to Macedonian-accented English speech. We begin by giving a brief overview of the aims of the study and the research context. We then turn to describing the application design and its implementation. In the final section of the paper a summary of the phonetic results is included, followed by a discussion of the advantages and some shortcomings of the approach as reported by the listeners and encountered by the researchers.

2. The study: Research context and choice of methodology

The pronunciation of English by Macedonian learners of English demonstrates systemic features that are predominately the result of interaction between the phonologies of these two very different languages. Siljanoski (1976) has made an attempt to compare the two systems employing contrastive analysis. His conclusions identify potential difficulties for Macedonian learners acquiring English pronunciation in the phonemic, allophonic and phonotactic domain (the prosodic level was not included in his study). Unfortunately, these conclusions have never been tested experimentally.

Another aspect that must be taken into consideration is the way native speakers perceive features of foreign accent in the pronunciation of non-native speakers. Munro and Derwing (1995, 1998, 1999, 2001), for instance, examine the relationship between foreign-accentedness, intelligibility and comprehensibility. Their findings reveal that heavily accented speech is indeed more difficult for native speakers to understand. However, even heavily accented speech is sometimes fully intelligible and comprehensible and does not hinder communication. Other factors which have been found to have the strongest impact on overall intelligibility and comprehensibility involve a combination of grammatical and pronunciation errors, with prosodic errors being perceived as potentially more detrimental than phonetic errors. It seems that the globalisation of the English language may have caused a shift in native speaker attitudes towards pronunciation deviating from the norm. Not all mispronunciations, then, are perceived by native speakers as being equally detrimental. Rather, the greatest intolerance on the part of native speakers is demonstrated with regard to pronunciation errors that impede communication and cause unintelligibility.

With this in mind, our study aimed to detect and describe those segmental sounds in Macedonian-accented English speech which native speakers of English most frequently perceive as deviating from their own standard variant of English. Our research additionally sought to ascertain whether native speakers of different English variants perceive the same segments as non-native speakers. During the preparation stage, it became evident that our research would require a specific target group of native speakers: English native speakers speaking different English varieties and with phonetic training. As no such high profile experts resided in Macedonia, we developed for the purposes of our study an experiment in which the English speech of Macedonian native speakers was evaluated by English native speakers with the use of a specially designed computer web application employed as a data gathering tool.

2.1. Participants

The participants who took part in the research undertaken for this study comprised: (1) Macedonian learners of English who provided speech samples of their English for evaluation; (2) a native speaker of English employed as a control speaker; and (3) native speakers of English recruited to serve as 'raters' in the evaluation process.

A total of 17 Macedonian native speakers were recorded. All were first and second year students (aged between 19 and 25) residing in Skopje and majoring in English Language and Literature at the University of Ss. Cyril & Methodius. Their level of English ranged from B2 (n=6) to C1 (n=11). None of the group had resided for any extended period in an English-speaking country.

One native speaker of British English was recruited to serve as the control speaker for the accent-rating section of the experiment. His speech was part of the experiment among the recordings of the Macedonian speakers to provide a standard by which to assess the reliability of the other native-speaker evaluators. The choice of only one native control speaker, and not more as is the practice with large-scale experimental research studies under laboratory conditions, was deliberate in view of the small scale of this study and the consequent risk—as reported in Angelovska and Hahn (2009)—of native speakers being rated as 'near-native', implying non-native, and thereby bringing into question the reliability of the native speakers as raters.

14 native speakers of English completed the experiment and rated the speech samples obtained from the Macedonian learners. Their age ranged from 28 to 71 years old (median 49). All had university degrees or postgraduate qualifications (PhD=5, MA=6, BA=3) and phonetic-phonological expertise. Some had prior experience as raters (n=10). Most were either active or retired university lecturers (n=8), while the remainder included English teachers (n=4), a translator (n=1) and a language consultant/book author (n=1). As reported in the questionnaire, they spoke the following English variants: Southern British English (n=6), General American English (n=6), Irish English (n=1) and Canadian English (n=1). Most of them had never interacted with speakers of Macedonian origin, though two raters reported brief exposure to Macedonian and Macedonian-accented English.

The raters were mostly recruited via the websites of LINGUISTLIST http://www.linguistlist.org/ and the IATEFL Pronunciation Special Interest Group PronSIG http://uk.groups.yahoo.com/group/iatefl_pronsig/, or were directly approached via e-mail and/or personal acquaintance.

2.2. Stimulus materials

The recordings obtained from the Macedonian speakers and the control speaker were recorded in a soundproof booth using a Sound Forge 8.0 computer programme and a 20-channel 4-BuS Mixing Console Behringer MX2004A.

The speakers were each given a 'free speech' task in which they were asked to select one of four possible topics to speak about for 1–2 minutes. They were instructed to speak at their normal pace and preferably not to use words or phrases that might reveal their Macedonian origin. The recordings were then edited to an average approximate duration of 17–29 seconds (Jesney 2004) and then tested for authenticity.

The topics included in the free speech task were intentionally designed to be personal and with an emotional overtone in the hope of getting speakers to re-experience the events they described and thus focus more on the content of their speech than on the form of their delivery (Dowd 1984). This approach encouraged the speakers to demonstrate a natural flow of speech and eliminated the possibility of their rehearsing set speeches (Munro and Derwing 1994). As a result, their speech resembled a narrative style of spoken discourse typical of informal settings (Oyama 1976; Major 1986; Thompson 1991). Other considerations in the choice of free speech as an eliciting technique (in preference, that is, to reading word lists, sentences or paragraphs) included the desire to avoid the possibility of pronunciation errors arising due to lack of word familiarity or even negative transfer of their L1 reading skills combined with orthographic interference (Munro 2008).

3. Web application

The web application employed in this study is an example of an Internet-based research method that works well with any Internet browser available, such as Internet Explorer 7+, Mozilla Firefox 2+, Opera or Google Chrome. Table 1 details its technical specifications:

Table 1. Technical specifications of Phonetic Web Application 1.0

Technology	Microsoft ASP.NET 3.5, Adobe Flash
Programming Language	C#
Development Platform	Microsoft Visual Studio 2008, Adobe Flash CS3
Operating System	Microsoft Windows Vista
Database	Microsoft SQL Server 2005

The application was developed as a user programme that would be able to display predefined sets of questions, to store data (i.e. keep track of the answers checked by each of its users) and to create an easily accessible database for further analysis. In addition, the following components were incorporated:

- the experiment administrator was able to create accounts for the users (public access was not allowed)
- answers were chosen from check box lists or radio buttons
- free text boxes were added so that the listeners could make comments on speech phenomena they had heard and noticed
- security measures were undertaken so that users could not manipulate their answers once they had been submitted (they were not allowed to use the back button). They were, however, allowed to opt for a break during the experiment.

The application was organized in separate webpages, as follows:

1) an introduction with instructions (Figure 1)
2) a user account window
3) a participation agreement
4) a questionnaire for personal background details
5) experiment questions (Q1–Q4) with audio files and comment boxes repeated for every speaker (Figure 2)
6) comment boxes for users in order to:
   a) insert their impressions of Macedonian-accented English
   b) evaluate the experiment format (Figure 3).

Figure 1: Experiment start page

The web page with the questions and audio files was the core of the experiment. Two types of data were collected: a) quantitative data on the frequency of phonetic segment variables and foreign accent rating—Q1: consonantal variables; Q2: vocalic variables; Q3: global foreign accent ratings on a 5-point scale (adapted from Bongaerts et al. 1997: 456); Q4: general variables for foreign accent evaluations)—and b) qualitative data from open-ended questions with comment boxes. The variables used in experiment questions 1 and 2 were selected on the basis of our teaching experience and the most frequent mispronunciations reported in the literature consulted (Weinberger 1998; Siljanoski 1976, 1993; Dimovska 1980). The variables in Question 4 presented a selection of factors tested in other studies (Munro and Derwing 1998; McDermott 1986).

Figure 2. Screenshot of the question web page (part)

package SPSS 16. The written comments were compared and generalisations inferred.
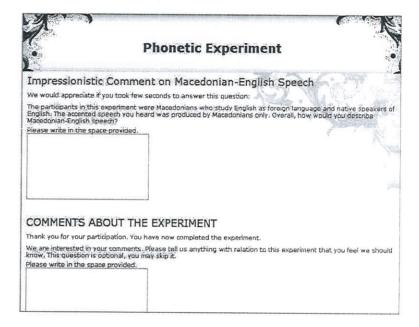
Figure 3. Impressions and Comments page

The administrator first created accounts for each rater and then sent a username and password via e-mail. The raters were expected to log into the system at http://e-tech.feit.ukim.edu.mk/phonetics/. They were then redirected to the next webpage to complete the experiment. The raters were asked to listen to each individual speaker's audio file and answer the questions related to each file as instructed. The procedure was repeated for every speaker. If a rater did not complete the whole experiment in one sitting, they could log in again and continue where they had stopped as the application kept track of the users' answers. The total duration of the experiment was 60–90 minutes (as reported by listeners who completed the pilot version of the experiment in one sitting).

The development of this application enabled the creation of a small-scale corpus of listeners' responses. This allowed for access to pre-stored data that could subsequently be grouped for faster analysis. On completion of the experiment, the data was extracted in a readable format using Microsoft Excel 2007. Additional statistical analysis for the calculation of the frequency of checked variables was conducted using the statistical

4. Results and discussion

As the main emphasis of this paper is on the experimental design of the study, the phonetic results will only be briefly explained.

The results analysis is divided into two parts. First, the findings related to the frequency distribution of consonantal and vocalic segments in the English speech of Macedonian learners evaluated as non-native by English native speakers were interpreted. Thus, the feedback from 12 native speakers—6 British native speakers (BNS) and 6 American native speakers (ANS)—was considered as two separate groups. These responses were then compared with the responses of the Canadian and Irish native speakers (given that one speaker cannot be regarded as a group). The second part of the analysis interprets the responses provided in the comment boxes from all 14 native speakers as one group.

The data for the consonantal variables is presented in Table 2 and for the vocalic variables in Table 3.

Table 2 shows that the highest frequency of perceived sound deviations is indicated for final obstruent devoicing by both groups of raters. A similar number of responses by both BNS and ANS is noted for the pronunciation of dental fricatives pronounced as dental plosives, with a higher percentage for /ð/>/d/ and lower for /θ/>/t/. The rest of the variables were less frequently checked by both groups of native speakers. Nevertheless, slight parallels do occur with: the English glottal fricative pronounced as Macedonian velar fricative /h/>/x/; velar plosives accompanying the pronunciation of the nasal velar /ŋ/>/ŋк, ŋg/; postalveolar /ɹ/ pronounced as an alveolar tap or trill; and bilabial approximants pronounced as labio-dental fricatives /w/> /v/. It seems that the American raters were more sensitive to the non-aspiration of voiceless plosives /p, t, k/ and the dentalization of English alveolars /t, d/. The British raters, on the other hand, noticed the insertion of /ɹ/ in every word position—as expected.

Table 2. Frequency distribution of consonantal variables

	N	final obstruent devoicing		non aspiration		dentalization		θ> t		ð>d	
		n	%	n	%	n	%	n	%	n	%
BNS	102	52	50,98	6	5,88	3	2,94	19	18,63	46	45,10
ANS	102	58	50,86	16	15,69	9	8,82	20	19,61	41	40,20
	N	w > v		ɹ >ɾ		h>x		ŋ>ŋg / ŋk		ɹ insertion	
		n	%	n	%	n	%	n	%	n	%
BNS	102	2	1,96	6	5,88	10	9,80	10	9,80	17	16,67
ANS	102	3	2,94	6	5,88	14	13,73	11	10,78	0	0

BNS	British native speakers	N	total number of possible responses
ANS	American native speakers	n	number of responses
		%	percentage of response count

The frequency results for the vocalic variables in Table 3 indicate a higher degree of tolerance among native speakers. It seems that both BNS and ANS predominantly perceive vowel shortening in the pronunciation of vowels by Macedonian speakers. The lower percentage of checked responses for the other vocalic variables leads to the conclusion that vocalic mispronunciations are quite acceptable. Differences between the groups were noted with changes in vowel quality, that is /æ/ and /ʌ/ pronounced as /e/ or /a/ respectively, which were observed more by ANS than BNS.

Table 3. Frequency distribution of vocalic variables

VOWEL FREQUENCY COUNT									
	N	vowel shortening		æ> e		ə >a		ʌ >a	
		n	%	n	%	n	%	n	%
BNS	102	47	46,08	4	3,92	3	2,94	6	5,88
ANS	102	41	40,20	16	15,69	1	0,98	13	12,75
	N	əʊ > oʊ		eɪ, aɪ, ɔɪ > ej, aj, oj		ɪə, eə, ʊə > ɪʌ, eʌ, ʊʌ			
		n	%	n	%	n	%		
BNS	102	8	7,85	6	5,88	5	4,90		
ANS	102	5	4,90	4	3,92	1	0,98		

BNS	British native speakers	N	total number of possible responses
ANS	American native speakers	n	number of responses
		%	percentage of response count

When a comparison is made between the summarised results from the British and American raters and the responses from the Canadian rater and the Irish rater, a certain degree of consistency is noted. These two raters also perceived consonant deviations as most striking, particularly with regard to final obstruent devoicing. Except for /æ/>/e/, which was marked by both raters, other vocalic adaptations were mainly accepted. The Irish rater also pointed out vowel shortening.

In the comment boxes, the raters were asked to note any specific examples of words in which they noticed segmental deviations in pronunciation. In addition to words exemplifying some of the listed variables, the raters also pointed out other phonetic phenomena not included in the list: vowel raising, vowel shortening, diphthong levelling, medial consonant voicing, lateral velarization, overcorrection, regional variant preference (American vs. British). Although not part of the study focus, frequent comments related to prosodic deviations and connected speech emerged spontaneously.

Based on the gathered data, we were able to pinpoint the pronunciation characteristics of a typical Macedonian learner of English (a representative of the study sample):

-    *Consonants* are clearly pronounced but completely devoiced in final position (obstruents). New consonantal sounds are substituted

with their closest Macedonian equivalent (ð/>/d/; /θ/>/t/; /w/>/v/), whereas similar sounds are adapted (place or manner of articulation, e.g. h/>/x/; /t, d/>/t̪ , d̪/; /ŋ/>/ŋk, ŋg/). /r/ is realised as a tap and pronounced in all positions; /l/ is velarised and pronounced rather hard; and voiceless aspirated plosives [pʰ, tʰ, kʰ] are either weakly aspirated or not at all.

- *Vowels* are systematically adapted to the Macedonian five-member vocalic system. Long vowels are poorly distinguished and shortened (/i:/> /i/; /ɑ:/> /a/,/ar/; /ɔ:/>/o/, /or/; /u:/>/u/, /ɜ:/>/ər/). All vowels are either raised or lowered (/æ/>/e/; /ʌ/>/a/; /ə/>/a/; /ɪ/>/i/; /ʊ/>/u/; /ɒ/>/o/). Diphthongs are monophthongised.

- Aspects related to *connected speech, stress, and intonation* include the pronunciation of both stressed and unstressed syllables with equal length, sporadic use of weak forms, recurrent use of short tone units and rising intonation, and frequent pauses in unexpected places.

The responses obtained from the comment box regarding the experiment format suggest that the experiment was properly administered given the satisfactory number of native listeners who responded to the project advertisement and their successful completion of the experiment. The raters highlighted the clarity of the instructions, the high quality of the recordings in the audio files and the well-defined and user-friendly experiment as a whole. Some of them complained of the length of the experiment; others observed the need for a pause button in the audio file icon and the inability to use phonemic symbols at times.

The use of the Internet as a medium also proved advantageous in making the application accessible from anywhere in the world. It addressed a wide audience, with respondents from the USA, Canada, the UK, Ireland, and New Zealand. As the procedure was pre-programmed and could be administered in various locations at the same time, there was no need for the researcher to supervise experiment completion directly. The users were allowed to conduct the experiment according to their own schedule. This proved to be time-saving as data was quickly and efficiently gathered, allowing the researchers to receive immediate results and having a database instantly created and regularly updated. On completion of the experiment, all data was easily extracted and managed (no need for manual data input). In future, the application can be easily adapted for the requirements of similar research studies due to its flexible software design.

From a methodological point of view, some limitations were experienced with regard to the choice of subjects, the choice of the speech elicitation technique and the subjectivity of the ratings. The Macedonian native speakers were a homogeneous subject group, thus rendering results more indicative than significant (some of the features which appeared, for instance, are typical of Skopje dialect). Although they produced authentic/spontaneous speech featuring typical mispronunciations (which was very constructive for the outcomes), the recordings revealed that not all expected phonetic/phonological structures emerged naturally—as pointed out by Munro (2008)—because there was no guarantee that every segmental variable on the list would be mentioned by all subjects at least once in their speech samples, which directly influenced the frequency of the raters' responses. In addition, considering our subjects' proficiency level, various grammatical errors were produced which were perceived by the raters and noted in the comment boxes. A *facilitated free speech* task should thus perhaps be adopted in future research. Such a task might involve a choice of several topics and a set of phrases with segments under investigation for the subject to include in his/her speech. However, to preserve speech spontaneity, care should be taken not to overburden the phrases with too many difficult elements and to disallow subjects excessive preparation time. As a final point, it should be mentioned that the accented speech produced by the Macedonian speakers was treated as a one-dimensional phenomenon, thus ratings for intelligibility and comprehensibility were not measured. Although a high level of inter-rater reliability was confirmed, a certain amount of subjectivity was expected, especially bearing in mind that the raters' first impressions could not be accounted for.

5. Conclusion

The methodology developed for our research is an example of how a modern approach can be applied when conducting phonetic experiments. There is room for its improvement and adaptation not only for research purposes but also in the area of language teaching, learning and assessment.

Such an approach, for instance, would be ideal for the promotion of research in less developed countries, as is the case with Macedonia, where people and resources are always limited and insufficient. Furthermore, it can be modified as part of learning management software where teacher-student interaction is preferred. Students can record themselves and upload their speech as an audio file. The teacher can mark their mispronunciations,

give immediate feedback, and monitor their progress. Alternatively, as part of their exams, students could be required to record themselves and upload the file for the teacher to assess their pronunciation according to a set of predefined phonetic items that are expected to be acquired throughout the academic year.

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References

Anderson-Hsieh, J. and K. Koehler. 1988. The effect of foreign accent and speaking rate on native speaker comprehension. *Language Learning* 38 (4): 561-613.

Angelovska, T. and A. Hahn. 2009. English with a "native-like" accent: An empirical study on native speakers' perceptions. In *Issues in Second Language Proficiency*, edited by A. Benati, 147-166. London: Continuum Publishing.

Beddor, P. S. and T. S. Gottfried. 1995. Methodological issues in cross-language speech perception research with adults. In *Speech Perception and Linguistic Experience: Theoretical and Methodological Issues in Cross-Language Speech Research,* edited by W. Strange, 207-232. Timonium, MD: York Press.

Bongaerts, T., C. van Summeren, B. Planken and E. Schils. 1997. Age and ultimate attainment in the pronunciation of a foreign language. *Studies in Second Language Acquisition* 19: 447-465.

Brennan, E. M. and J. S. Brennan. 1981. Accent scaling and language attitudes: Reactions to Mexican American English speech. *Language and Speech* 23 (3): 207-221.

Chun, D. M. 2007. Technological advances in researching and teaching phonology. In *Phonology in Context*, edited by M. C. Pennington, 274-299. Basingstoke: Palgrave Macmillan.

Collins, B. and I. M. Mees. 2006. *Practical Phonetics and Phonology: A Resource Book for Students*. London: Routledge.

Cruttenden, A. (ed.). 2001. *Gimson's Pronunciation of English*. 6th edition. London: Arnold.

Derwing, T. M., M. J. Munro and G. Wiebe. 1998. Evidence in favour of a broad framework for pronunciation instruction. *Language Learning* 48 (3): 393-410.

Dimovska, P. 1980. *An Outline of the Pronunciation of English*. Skopje: Ss. Cyril and Methodius University.

Dowd, J. 1984. *Phonological variation in L2 speech: The effects of emotional questions and field-dependence/field-independence on second language performance*. Unpublished doctoral dissertation, Teachers College, Columbia University.

Escudero, P. 2000. *Developmental patterns in adult L2 acquisition of new contrasts: The acoustic cue weighting in the perception of Scottish tense/lax vowels in Spanish speakers*. Unpublished M. Sc. thesis, University of Edinburgh.

Flege, J. E. 1984. The detection of French accent by American listeners. *Journal of the Acoustical Society of America* 76 (3): 692-707.

—. 1995. Second language speech learning: Theory, findings and problems. In *Speech Perception and Linguistic Experience: Theoretical and Methodological Issues in Cross-Language Speech Research,* edited by W. Strange, 233-277. Timonium, MD: York Press.

—. 2002. Factors affecting the pronunciation of a second language [.ppt, electronic version]. Presented at *Pronunciation Modelling and Lexicon Adaptation for Spoken Language Technology*, September 14-15, 2002, Estes Park, Colorado, USA. Available at http://jimflege.com/files/Colorado_2002.pdf .

—. 2003. Assessing constraints on second-language segmental production and perception. *Phonetics and Phonology in Language Comprehension and Production, Differences and Similarities*, edited by A. Meyer and N. Schiller, 319-355. Berlin: Mouton de Gruyter.

International Phonetic Association. 2005. *Handbook of the International Phonetic Association*. Cambridge: CUP.

Jesney, K. 2004. *The Use of Global Foreign Accent Rating in Studies of L2 Acquisition*. Calgary, AB: University of Calgary Language Research Centre Reports.

Kirkova-Naskova, A. 2009. *Markers of Foreign Accent in Macedonian-accented English*. Unpublished MA Thesis. Skopje: Faculty of Philology. [Original title: *Показатели на странски изговор во англомакедонскиот меѓујазик*].

Leather, J. 1999. Second-language speech research: An introduction. In *Phonological Issues in Language Learning*, edited by J. Leather, 1-58. Oxford: Basil Blackwell.

Magen, H. 1998. The perception of foreign-accented speech. *Journal of Phonetics* 26 (4): 381-400.

Major, R. C. 1986. Paragoge and degree of foreign accent in Brazilian English. *Second Language Research* 2: 53-71.

McDermott, W. L. C. 1986. *The Scalability of Degrees of Foreign Accent*. PhD Thesis. Ithaca, NY: Cornell University.

Munro, M. J. 2008. Foreign accent and speech intelligibility. In *Phonology and Second Language Acquisition*, edited by J. G. Hansen Edwards and M. L. Zampini, 193-218. Amsterdam: John Benjamins Publishing.

Munro, M. J. and T. M. Derwing. 1994. Evaluations of foreign accent in extemporaneous and read material. *Language Testing* 11: 254-266.

—. 1995. Processing time, accent, and comprehensibility in the perception of native and foreign-accented speech. *Language and Speech* 38 (3): 289-306.

—. 1998. The effects of speaking rate on listener evaluations of native and foreign-accented speech. *Language Learning* 48 (2): 159-182.

—. 1999. Foreign accent, comprehensibility and intelligibility in the speech of second language learners. In *Phonological Issues in Language Learning*, edited by J. Leather, 285-310. Oxford: Basil Blackwell.

—. 2001. Modelling perceptions of the accentedness and comprehensibility of L2 speech: The role of speaking rate. *Studies in Second Language Acquisition* 23: 451-468.

Oyama, S. 1976. A sensitive period for the acquisition of a nonnative phonological system. *Journal of Psycholinguistic Research* 5 (3): 261-283.

Siljanoski, V. 1976. *A Contrastive Analysis of English and Macedonian Phonological Systems*. PhD Thesis. Skopje: Faculty of Philology. [Original title: *Контрастивна анализа на фонолошките системи меѓу македонскиот и англискиот јазик*].

—. 1993. *Introduction to English Pronunciation*. Skopje: Ss Cyril and Methodius University. [Original title: *Увод во изговорот на англискиот јазик*].

Thompson, I. 1991. Foreign accents revisited: The English pronunciation of Russian immigrants. *Language Learning* 41 (2): 177-204.

Van den Doel, R. 2006. *How friendly are the natives? An Evaluation of Native-Speaker Judgments of Foreign-Accented British and American English*. Utrecht: LOT.

Weinberger, S. H. 1998. *The speech accent archive* [electronic database]. George Mason University. Available at http://accent.gmu.edu/index.php.

Veenker, T. J. G. 2003. *WWStim*. Utrecht University. Available at http://www.let.uu.nl/~Theo.Veenker/personal/projects/wwstim/doc/en.