COMPUTER AND INTERNET RESOURCES FOR PRONUNCIATION AND PHONETICS TEACHING

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Pronunciation teaching is once again coming into the foreground of ELT. Japan is, however, lagging far behind many countries in the development of pronunciation curricula and in the actual speech performance of the Japanese learners of English. The reasons for this can be found in the prevalence of communicative methodologies unfavorable for pronunciation teaching, in the lack of trained professionals, and in the large numbers of students in Japanese foreign language classes. This paper offers a way to promote foreign language pronunciation teaching in Japan and other countries by means of employing computer and internet facilities. The paper outlines the major directions of using modern speech technologies in pronunciation classes, like EVF (electronic visual feedback) training at segmental and prosodic levels; automated error detection, testing, grading and fluency assessment. The author discusses the applicability of some specific software packages (CSLU, SUGIspeech, Multispeech, Wavesurfer, etc.) for the needs of pronunciation teaching. Finally, the author talks about the globalization of pronunciation education via internet resources, such as computer corpora and speech and pronunciation training related web pages.

1. Introduction

Modern computer and internet resources are a powerful tool for developing foreign

language proficiency (Pennington, 1989). Many research papers show the advantages of

teaching segmentals and suprasegmentals with electronic visual feedback (EVF) (Anderson-

Hsieh, 1996; Akahane-Yamada et. al., 1998). In case of Japan, EVF is particularly

advantageous since it helps to tackle large numbers of students in a group by providing every

student with real time feedback to his/her pronunciation performance.

Unfortunately, despite the advantages of EVF, computer and internet resources are used

in Japan for the development of EL grammar, vocabulary, writing and reading skills, but not

so much for pronunciation skills. The problem lies partly in the low role of pronunciation in

Japanese ELT curricula caused by the great popularity of communicative methods in Japan

(Makarova, 2000), partly in university entrance exam requirements, and partly in the lack of

professionals trained in the field. Pronunciation teaching in Japan generally "remains

something of an embarrassment, is often just ignored or, at best, included only superficially"

(Acton, 1997: 21). Another part of the problem is connected with the traditional orientations

of speech technologies.

Originally spoken language technologies were geared towards helping people with

speech, language, visual, and hearing problems rather than towards foreign language learning.

Although the first attempts to apply electronic visual feedback for the needs of pronunciation

teaching go way back into the 60-s--70-s (Vardanian, 1964; de Bot, 1983), only very recently

educational applications of speech processing are becoming a noticeable part of contributions

at conferences on speech technologies. Yet, these results do not seem to get well transmitted from the laboratories and research groups to education, and language teachers frequently remain unaware of the speech technologies developments or their possible applications.

The purpose of this paper is to help teachers of foreign languages to find and implement computer and internet facilities for pronunciation teaching by pointing out available speech processing, error detection and pronunciation assessment software, computer corpora, phonetic fonts and other internet resources useful for professional development.

2. Speech processing software

One of the most serious problems preventing electronic visual feedback from wider applications is the shortage of easily available speech processing software. Reliable and well tested hard- and software products, like Kay Elemetrics Multi-speech, are so expensive that universities normally cannot afford buying them, or at the best, can only buy one copy, which can be used for research, but not for teaching purposes. Network licenses are not available, which means that a university would have to buy as many software packages or software/hardware devices as there are students in a class. The number of students in a Japanese university class ranging from 30 to 100 makes it impossible to employ such products for the needs of pronunciation teaching.

Even though some commercial speech processing software can be reasonably priced, and look generally well suited for the needs of pronunciation teaching, it can have some specific limitations. For example, SUGI Speech Analyzer works well for the analysis of short isolated

words and syllables, produces very clear spectrograms, and can therefore be successfully implemented for segmental training. On the other hand, the program does not have a very clear pitch trace, and does not handle sentences with the duration over a few seconds, which makes it poorly suited for the needs of intonation training.

Pronunciation teachers with very strong programming skills can try writing original software and implementing it in class. However, another option for teachers without such skills is to rely on free speech processing software available on the web.

The following software can be recommended since it can be used on Windows, is well tested, and is suitable for recording, playing, editing, viewing, printing, labeling and analyzing (pitch, spectrogram, etc) audio data.

WaveSurfer, a program developed at the Centre for Speech Technology (CTT) at KTH in Stockholm, Sweden. It can be downloaded from http://www.speech.kth.se/wavesurfer/

CSLU Speech Toolkit provided by the Centre for Spoken Language Understanding at Oregon Graduate Institute of Science and Technology is available from http://cslu.cse.ogi.edu/tools.htm

Praat has been developed by Paul Boersma and David Weenink at the Institute of Phonetic Sciences of the University of Amsterdam, the Netherlands. The program can be downloaded from http://www.fon.hum.uva.nl/praat/

More information about free and commercial software speech processing, synthesis and recognition software can be obtained from http://www.ims.uni-stuttgart.de/phonetik/joerg/worldwide/Things.html

3. Automatic error detection

In a foreign language classroom, errors are normally noticed and corrected by the teacher. However, nowadays, this process can be performed automatically by computers. For example, an automatic pronunciation error detection system was designed at the Department of Information Science of Kyoto university (Jo et al. 1998) for the learners of Japanese as a foreign language. The system detects vowel and consonant errors, and provides the learners with feedback showing them the type of error and ways of its elimination.

4. Automatic scoring and fluency assessment

Every teacher knows how hard it may be to assess the pronunciation quality of a student's speech. One of the problems with EVF is connected with the individual variability of phonetic characteristics of speech. Traditional EVF training sessions are based on the following procedure: the student listens to a model speech signal, looks at its visualized acoustic characteristics on the screen and tries to imitate it so that the student's speech signal would look similar to the model one. However, complete overlap is impossible due to individual differences, and the evaluation of the proximity of the imitation to the model is problematic. It is frequently done by the student him/herself or the teacher who rely on intuition rather than on any objective criteria. A computer system for automatic assessment of pronunciation quality has been tested for Spanish and French (Franco & Neumeyer, 1998). More information about it is available at http:www.speech.sri.com

Speech technologies provide possibilities of automatic assessment of such a seemingly subjective feature as 'language fluency' by taking account of objective criteria which include rate of speech, phonation/time ratio, average length of pause, filled pauses, etc. (Cucchiarini, Strik & Boves, 1998).

5. Computer corpora and electronic dictionaries

Computer corpora are already widely used for studying grammar (Leech, 2000). However, they have not been so far used for the needs of pronunciation teaching because until recently computer corpora dealt mostly with written rather than spoken texts. The situation is rapidly changing, and sound corpora are becoming more widely available. While still most speech corpora are made and stored in speech laboratories on UNIX or LINUX operating system, which non-professionals cannot handle, nowadays some speech corpora are available for Windows as well, and they are easy to install and run.

The International Corpus of English (ICE) is developed internationally and includes different local branches. It is coordinated by Professor Charles F. Meyer at the University of Massachusetts at Boston. The project is aimed at assembling and making widely available the data representing the development of English as a world language. It will include samples from Australia, Canada, East Africa (Kenya and Tanzania), Great Britain, Hong Kong, India, Ireland, New Zealand, the Philippines, Singapore, Sri Lanka, and the United States.

Every local research group contributing to the International Corpus is supposed to collect a local corpus of one million words of English divided into 2,000 word samples representing

various types of English: spontaneous conversations, speeches, broadcast discussions, learned

prose, private letters, newspaper reportage, and fiction. Three components of the International

Corpus of English (ICE) are now available: ICE-Great Britain, ICE-East Africa and ICE-New

Zealand.

Teachers who are interested in British pronunciation, can consider using the British

Component of the Corpus (ICE-GB). It is developed at the University College London. At the

moment the Corpus only provides fully parsed and annotated texts. However, very soon

Release 2 of ICE-GB will become available which includes the digitized speech recordings of

the spoken part of the corpus, aligned with the text. Release 2 makes it possible to hear the

original recordings while examining the corresponding grammatical analyses on the screen.

The corpora are aimed firstly at research rather than teaching purposes, but in

combination with a speech processing program, the corpora data can be used for pronunciation

training. Thanks to the speech samples from different parts of the world provided in the

Corpus, students of English can be exposed not only to one, but to many varieties of the World

Englishes, and can customize their pronunciation training according to their own individual

interests and requirements. Although yet practically unavailable, electronic pronunciation

dictionaries with sound files, like the EPD, will also provide assistance for language learners

in the forthcoming few years (Vaughan-Rees, 2000).

A particular advantage of computer corpora and electronic dictionaries with sound files

for pronunciation teaching is the ability to perform various kinds of searches using the parse

analysis. For example, while learning contractions, a student can do a search on 'would you,'

find many dozens of different usage of the contracted and full form, and practice pronouncing them. As P. Roach puts it, it is necessary to provide "much wider access to corpora of authentic material and let learners really get in among genuine data" (Vaughan-Rees, 2000).

More information about the corpus can be found at http://www.ucl.ac.uk/english-usage/ice-gb/index.htm

A sample of the ICE-GB can be downloaded from http://www.ucl.ac.uk/english-usage/ice-gb/sampler/download.htm

The East African Corpus is available from http://www.tu-chemnitz.de/phil/english/real/eafrica/index.htm

Information on ICE-New Zealand can be obtained from the web page http://www.vuw.ac.nz/lals/

6. Phonetic fonts

Not having a phonetic font can be an obstacle to pronunciation teaching. Some phonetic fonts like SIL, IPA and SAMPA are available from the web for Windows and Mac. The following phonetic fonts can be ordered or downloaded for free from the following web pages

IPA (International Phonetic Association) phonetic fonts: http://www2.arts.gla.ac.uk/IPA/ipafonts.html

SIL IPA. The Summer Institute of Linguistics (SIL) has its headquarters located in Dallas, Texas, at the International Linguistics Center. It is an organization aimed at studying world's lesser-known languages. Besides phonetic fonts for a large number of the world languages

including English much exciting information about minority languages can be found at SIL

webpage   http://www.sil.org/computing/fonts/Lang/silfonts.html

SAMPA (Speech Assessment Methods Phonetic Alphabet) is a machine-readable phonetic

alphabet. It was originally developed in 1987-89 by an international group of phoneticians and

is applied in many projects, like the BABEL. The advantage of the font is that one does not

need to do anything about installing it because it uses ordinary letters of a keyboard for

pronunciation transcription. SAMPROSA, a separate part of the phonetic alphabet is a system

of prosodic notation. http://www.phon.ucl.ac.uk/home/sampa/home.htm

For an example of a list of British place names transcribed in IPA and SAMPA fonts,

please, refer to the Appendix 1.

7.   Miscellaneous Web resources for pronunciation teachers

Although many guidelines on using the World Wide Web (WWW) appear now in Japan

for language teachers (e.g. McGuire, 1997; Newfields & McGuire, 1997), but to the best of

my knowledge, they never refer to pronunciation teaching. Since pronunciation t4eaching is

closely connected with rapidly developing speech technologies it is essential for the teachers

to have an access to easily available professional information sources.

Updating one's phonetic knowledge can be done now via numerous internet facilities.

For example, a teacher's knowledge can be upgraded by going to web pages with university

phonetics, phonology and speech processing courses which often contain reading lists.

Speech analysis exercises can be performed at

http://www.speech.kth.se/labsanalysis/

The webpage of International Speech Communication Association includes announcements of spoken and written linguistic resources, books, theses, etc. http://www.isca-speech.org/resources.html

International Phonetic Association provides various kinds of information on conferences, speech hard and software, fonts, etc. at its webpage http://www2.arts.gla.ac.uk/IPA/ipa.html

IATEFL Pronunciation Special Interest Group (Pronsig) can help to upgrade a teacher's knowledge of pronunciation teaching methodologies http://www.iatefl.org/PronSIG.htm

Discussion groups are useful to keep aware of hot subjects in phonetics and speech processing, many of them also have news pages, mailing lists, speech processing software and fonts links. An example of a discussion group webpage is http://www.ims.uni-stuttgart.de/phonetik/joerg/worldwide/Things.html

8. Conclusion

The Web enables pronunciation teachers to overcome geographic and administrative boundaries, develop professionally and chose the best products of modern speech technologies available in the global market for improving   students' speech performance.

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Appendix 1.

A list of British placenames in IPA and SAMPA transcriptions

SPELLING	IPA transcription	SAMPA transcription
1.Acle	´eɪkl	`eIkl
2. Birmingham International	´bɜ:mɪŋəm ɪntə´næʃ(ə)nl, $´bɜ:r	`b3:miN@m Int@`n{S(@)nl
3. Ardwick	´ɑ:dwɪk, $´ɑ:rd	`A:dwik
4. Axminster	´æksmɪnstə(r)	`{ksmInst@(r)
5. Baglan	´bæglən	`b{gl@n
6. Bare Lane	´beə(r) ´leɪn	`be@(r) `leIn
7. Belfast	(´)bel (´)fɑ:st, $´belfæst	(`)bel(`)fA:st
8. Bexhill	(´)beks(´)hɪl	(`)beks(`)hIl
9. Appledore	´æpldɔ: (r)	`{pldO:(r)
10. Burton upon Stather	´bɜ:t(ə)n ə´pɒn ´stæðə, $ ´bɜ:rt-, ə´pɑ:n	`b3:t(@)n      @`pQn `st{D@
11. Bishop's Stortford	´bɪʃəps ´stɔ: tfəd, $stɔ:rt	`bIS@ps `stO:tf@d
12. Blackburn	´blækbɜ:n, $´bɜ:rn	`bl{kb3:n
13. Bootle New Strand	´bu:tl ´n(j)u: ´strænd	`bu:tl `n(j)u: `str{nd
14. Bourn End	´bɔ:n ´end, $´bɔ:rn	`bO:n `end
15. Bournville	´bɔ:nvɪl, $´bɔ:rn	`bO:nvIl
16. Bridlington	´brɪdlɪŋtən	`brIdlINt@n
17. Burton Joyce	´bɜ:t(ə)n ´dʒɔɪs, $´bɜ:rt	`b3:t(@)n `dZOIs
18. Birmingham Moor Street	´bɜ:mɪŋəm ´mʊə(r) ´stri: t, (mɔ: (r)), $´bɜ:r	`b3:miN@m `mU@(r) `stri:t, (mO:(r))
19. Burton-on-Trent	´bɜ:t(ə)n ´ɒn ´trent, $ ´bɜ:rt-, ɑ:n, ɔ:n	`b3:t(@)n `Qn `trent
20. Down End	´daʊn ´end	`daUn `end