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# Online Training and Testing in Phonetics

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## 1 Introduction

University courses in general phonetics or the pronunciation or phonetics of specific languages often involve learning a considerable amount of factual knowledge: the labels for the speech organs, the different places of articulation, consonant and vowel definitions and other facts which require simple rote learning rather than theoretical understanding or phonetic/phonological analysis. While this information can be presented in a relatively short space of time, it often takes students quite long to actually commit to memory the details, which may seem overwhelming at first. The students therefore often fail to acquire this knowledge before the course moves on to new and equally demanding topics. This is a problem for the natural progression of the course – talking about assimilation processes which affect mainly alveolar consonants is more likely to succeed if students remember what and where the alveolar ridge is – and the time spent (or wasted) on simple mnemonic exercises could be better spent on discussions of interesting aspects of phonetics or phonology or details of pronunciation.

This paper proposes using computer-based training of this type of knowledge and describes a web-based program which can be used for practising most of these skills. Such an approach has both pedagogical and practical advantages even though there are also some obvious limitations. This paper describes a suggested use of the program for integrating training and final exam evaluation in a course in English pronunciation at the Copenhagen Business School with a yearly intake of 400 students. At present, only exercises on the pronunciation and phonetics of English have been developed, but there is no language or accent bias in the program itself. In fact, one of the advantages of the chosen implementation is that it is easily extensible.

## 2 Program design and implementation

The program is presented to the user as normal HTML web pages (standards compliant XHTML + some JavaScript routines), which means that it is cross-platform and cross-browser friendly. Input from users is handled through HTML forms, which may all be considered variations on multiple choice selections or text input. This means that all exercises involve either making one or more selections of possible answers to a multiple choice question (MCQ) or writing a text string. The answers are then parsed and evaluated by the test program (a CGI-script written in Perl), which submits a response along with the next exercise item (after allowing the user to correct any errors first). The possibilities offered by this technology have so far been used to create the following types of exercises.

### 2.1 Listening exercises

The simplest type of listening exercise instructs the user to listen to a sound file (by clicking a “play” button) and select the appropriate answer from a list of options. This is currently used to practise sound contrasts which are known to be difficult for our Danish (and many other) learners, such as the STRUT – LOT vowel distinction and the difference between medial and final fortis and lenis obstruents. This simple technique can also be employed to practise the location of stress in words or the location and type of intonation

nucleus in utterances. Another type of listening exercise involves listening to a sound file and writing a response in a text input box. Obviously, the main point of the listening exercises is to train the students' receptive skills – primarily their ability to distinguish important and difficult contrasts in the standard variety we use as a model, which is either Standard Southern British English or General American, but exercises on other varieties could also be developed.

## 2.2 Exercises on basic phonetic theory

These exercises are designed primarily to help students acquire some of the basic facts of phonetic description, using MC selections as the response type: in two exercises the user is shown a picture of the speech organs or the articulation of a particular consonant and is asked to identify the correct answer (speech organ or place) from a list. Other exercises involve providing articulatory labels for consonants (energy, place, manner) or vowels (tongue height, position, lip shape) from selection lists. The last type of exercise asks the user to identify a word or phrase which fits the description in a statement such as *Which of the following words does not contain a lenis fricative?* This type of exercise requires both an understanding of the phonetic facts (here the terms *lenis fricative*) and the ability to apply this knowledge to simple analyses. It is a very flexible type of exercise, in that it can be used about any part of phonetic/phonological description, and it is particularly suitable for testing purposes.

## 2.3 Transcription exercises

Reading and writing phonemic transcriptions often constitutes a relatively large part of courses in English phonetics (at least in Denmark), and one of the main reasons for the development of this program was to reduce the inordinate amount of time spent on teaching students the mere basics of transcription through weekly exercises. One of the major problems is helping students learn and memorise even relatively simple sound-to-symbol correspondences: that *like* is /laɪk/ and not \*/like/, and *main* is /meɪn/ and not \*/main/. This is a task which requires relatively little instruction but much practice, which makes it extremely suitable for computer-based training.

Several tools are already available online for practising (English) phonemic transcription, the most advanced probably being the Web Transcription Tool (WTT) located at <http://www.wtt.org.uk/> and described in Garcia Lecumberri et al. (2003). This is an excellent program which can provide automatic “intelligent” feedback on transcriptions, but it seems especially suited for larger size texts and for more advanced students. For beginners the number of errors produced in even a shorter text can seem quite distracting. The transcription exercises which have been implemented here are similar to the “Transcriber” tool (Maidment 1999) and aim at developing a basic understanding of phonetic symbols and will probably have to be supplemented with traditional exercises with teacher feedback or a more advanced tool such as WTT at later learning stages.

There are exercises for both reading and writing phonemic transcriptions of single words or (very short phrases), so users are presented either with a phonemic transcription for which they write the corresponding (orthographic) word in a text box, or with a written word which has to be transcribed phonemically. In both cases the response is input via normal keyboard strokes, and reading and writing phonetic symbols is accomplished by using the IPA-SAM phonetic fonts from <http://www.phon.ucl.ac.uk/home/wells/fonts.htm>, which has to be installed on the client machine.

Currently, the transcription exercises present a user-specified number of items randomly selected from a list of the 1000 most common English words. The lists include multiple and variant pronunciation, so that the transcription /sɔ:/ is evaluated as correct if the response is *soar*, *sore* or *saw*, the word *read* can be transcribed /red/ or /ri:d/ and *happy* can be /'hæpi/ or /'hæpi/. If the user's response is not correct the program will indicate where in the string of text/transcription the problem is located. However, this feature presents at least one fundamental problem: if a student suggests that /sɔ:/ is \*"sor", should the feedback point to the missing "e" in "sore" or the missing "a" in "soar"? At present the program simply compares with the first of a list of possible correct answers, which leads to unsatisfactory feedback in some cases, so this is a problem which will have to be addressed in the future.

### **3 Applicability and limitations of simple online exercises**

One of the main purposes of this paper is to suggest that even a relatively simple program with simple exercises can be very useful in phonetic training. While more elaborated programs with context-dependent, or "intelligent", feedback mechanisms might be better for some purposes, keeping it simple allows for minimal development costs and a high degree of flexibility. And the exercises still offer considerable pedagogical and practical benefits.

#### **3.1 Pedagogical advantages**

- Instant feedback. Many student errors derive from simple misunderstandings and confusions of symbols or labels. With instant feedback such errors can be corrected upon submission of one (erroneous) answer, before moving on to the next item in the exercise. This should result in a more gradual, yet faster, learning process.
- Students can (re)do exercises as much and as often as needed. The summary provided after each exercise allows students to monitor their current level of knowledge in specific areas, to revisit subjects as needed and then re-test at their own convenience.
- The exam is (partly) based on the exercises (see below) – this may be an important motivational factor. While most teachers probably like to use the intrinsic appeal and usefulness of phonetics as the primary motivation for studying the subject, students often have their focus firmly set on exam requirements. If the exam in part consists of answering exercise questions, these become a direct and integrated part of studying for the exam rather than an indirect means to an end. I am not suggesting that preparing students for the exam is in itself an important goal, though, and it may be useful to separate testing of factual knowledge, which can be done automatically, from testing students' ability to analyse and explain phonetic problems.

#### **3.2 Practical advantages**

- Less time is spent on simple, more or less mnemonic, exercises in the classroom. Ideally, this should free some time for discussions of more interesting topics, such as pronunciation variation within or across different language varieties or general phonetic or phonological processes.
- Students can monitor their own progress. Since the program keeps a log of all answers to exercises it is possible to allow students to examine their progress in different areas or overall. (This function has not yet been implemented.)
- Testing can be automated – both generation of tests and evaluation of scores.

- Additional bonus: student errors can be collected and studied more systematically.

### 3.3 Limitations

- Feedback is generally not accompanied by explanations or instructions/suggestions for improvement. This can be solved by developing more “intelligent” programs with context-dependent feedback. However, this would increase development costs and make it more difficult to add new exercises or functions.
- User input is in the form of MC selections or simple text strings only. Argument type responses cannot be evaluated automatically. This means that the students' ability to analyse and explain more complex features of pronunciation cannot be trained or tested using a (simple) program. In most courses the computer-based testing of factual knowledge would therefore have to be supplemented with an oral or written, essay type, examination.

### 3.4 Automatic testing/examination of phonetic skills

The automatic testing which has been planned but not yet (fully) implemented at the Copenhagen Business School will contain the following elements:

- All questions will be tagged with information about the type of exercise, topic(s) and subtopics(s) involved and the estimated level of difficulty.
- Based on this information a pseudo-random selection of items will be presented to the student. A unique selection is made for each student.
- Test scores can be calculated automatically, taking into consideration both chance probability and the level of difficulty of each question. Obviously, scores which are not significantly different from chance level cannot receive a passing grade, but apart from that, specific grades will have to be based on predefined levels obtained from comparisons with ratings made by human examiners. In other words, the algorithm needs to be calibrated during the testing stage.
- Test scores will automatically be stored in a database and sent by email to the relevant (predefined) officials (teacher, exam office). Also, a receipt in the form of an electronic version of all questions and the supplied answers will be made available to students for legal reasons in case of any uncertainty or dispute about the obtained test score.

## 4 Evaluation of exercises and suitability for automatic testing

The exercises will be integrated into the course in English pronunciation in the Autumn semester of 2005, with specially modified exercises to support the theoretical and practical contents of the course. The examination function will be introduced as a *mock exam* or exam exercise option, and the responses will be collected for comparisons with human rater evaluations. It is our plan to have a fully functional and automatic system implemented at the beginning of the academic year 2006.

A preliminary version of the exercises can be found here: <http://phonetics.dk/>

## References

Garcia Lecumberri, Maria Luisa, Maidment, John, Cooke, Martin, Ericsson & Giurgiu, Mircea (2003): A web-based transcription tool. *Proceedings of the 15th ICPHS*, Barcelona, 981-984.

Maidment, John (1999): Transcriber. <http://www.btinternet.com/~eptotd/vm/transcriber/transcri.htm>