

AN AUTOMATIC PHONETIC TRANSCRIPTION MARKER AS A PHONETICS TEACHING TOOL

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ABSTRACT

This paper is a report on an experiment carried out with French students of English as a second language. It aims to test the validity of combining a multimedia tool with a constructivist approach to phonetics teaching at university level.

Keywords: automatic transcription marker, phonological competence, error analysis

1. INTRODUCTION

This paper presents some results of experiments carried out at university level in the phonetics class environment: for some years, we had been successfully testing a program designed to teach phonetic transcription to French students learning English as a second language [1]. However, this automatic transcription corrector remained a tool available to other students outside the class for training sessions, and it seemed tempting to integrate it into instructional sessions. Our aim was to assess the extent of its role in teaching and testing pronunciation in a foreign language.

2. MATERIAL AND PROCEDURE

2.1 Sample of students in the tests

The students tested were in their second year at university level, studying English as a second language, who had volunteered for this reinforcement course in a computer-assisted environment. The experiment was carried out on three different sub-groups, those who attended all classes, the regulars (hereafter denoted R), those who attended the majority of classes but not on a regular basis (hereafter denoted I for irregular) and the great majority of second-year students (241) who were taught phonetics theory and phonetic transcription in a classical pedagogical context. The R group, made up of 9 students, took part in all 9 tests; the I group (15 students) basically took part in tests 1, 5 and 9, the last two being

compulsory intermediate and final tests. All three groups took a final, general exam about one month after the end of the courses, consisting of a written phonetic transcription of a text and five theoretical questions. The 265 students tested formed a fairly homogeneous group, since they had similar educational backgrounds, with at least one year of post-secondary education; they had all been studying English phonetics during their first year at university. Passing the first year phonetics exam is the pre-requisite for taking the second-year course.

2.2 Description of the phonetic transcription program

2.2.1 *The automatic phonetic transcription marker*

The software described here is an open system, requiring teachers to choose themselves the texts they want the students to transcribe. The teacher's interaction with the program is very simple and consists of typing a text in ASCII format and then in transcribing it in IPA thanks to a phonetic keyboard, common to both teacher and student interfaces. The program is tolerant of variants (syllabic consonants, different degrees of stress, etc.) and capable of linking interdependent phonetic correlations, such as presence or absence of stress to full vs. reduced vowel quality.

2.2.2 *The student's interface*

On the student's screen, the program displays a text in ordinary spelling, available during the whole transcribing task if necessary, which has been segmented by the teacher according to its semantic, syntactic and intonative coherence. On their screens, the students can read one intonation group at a time as each word is submitted to the students for transcription. A representation of the keyboard is displayed on the screen at all times. The chosen symbol can be selected by clicking on the picture of the keyboard or by hitting keys on the real keyboard. Modifications are allowed until the return key is hit.

2.2.3 Correcting errors

Once provided, the student's transcription is compared to the teacher's version and annotated in red. After analysis of the most common errors made by students of English as a second language, we decided to indicate three types of errors (both in their pronunciation and in their transcriptions); an asterisk signals that a symbol is missing; added symbols are symbolised by a plus sign over them, and incorrect symbols are simply crossed in red. The students are given three tries after which the correct version appears and stays on the screen until the end.

2.2.4 The student's sheet of trials and errors

In order to keep track of the students' performances during the working sessions and to keep them informed of their progress, we have designed a filing module which stores the students' interaction with the computer, recording the overall time spent for each test, as well as the students' successive transcriptions and the number of errors per word per try. A final line at the bottom of the sheets recapitulates the number of correct words and errors per try. After each test, the students are handed back their individual sheets.

3. Teaching Procedure

Each class was held following the same protocol; the students read the orthographic script of a BBC extract on their computers, typed their phonetic transcriptions and were given individual transcripts showing the complete record of their transcriptions. A question-time period was then devoted to group discussion of the most common errors made by the students; in order to answer most questions on how to deal with stress at word-level, on how to pronounce vowels and consonants, the extract was then analysed on Praat [2] under teacher guidance. The aim of resorting to acoustic analysis was to bridge the gap between the graphic forms of the words and their oral rendering. The voice analysis software made it possible to access two cognitive levels, both perceptive and visual (spectrograms, oscillograms and pitch displays); by a direct question and answer procedure with the teacher and their peers, the students were gradually led to discover the

contexts in which phonological rules apply (stress-assignment, vowel transformations, etc.) and to build for themselves, test after test, a general view of the systematicity and regularity of the pronunciation of English. The students were asked to repeat after the model recording and corrected by the teacher so as to better their pronunciation. The final round up consisted in having students read the whole text from the original graphic script.

4. Tests

Nine graphic scripts were made from extracts from the BBC available on the web (bbc.co.uk). They were approximately 40 words long. The five first tests were taken from a BBC program entitled *Acoustic Shadows* (2005). They all dealt with the same topic, the program giving an overview of acoustics around the world, from Indian caves in California to acoustic chambers in cathedrals and opera houses. The last four tests dealt with the new regulations on British citizenship and the issues at stake in a multicultural society (also 2005, same website). The final phonetics exam which the whole 265 students took one month after the end of the course dealt with a completely different theme, namely with environmental issues. The lexical choices were different although the grammatical words were mostly identical. The transcriptions were made using pen and paper, followed by five theoretical questions corresponding to the general second year phonetics course which all students were supposed to attend.

3. RESULTS

Our aim was to check whether the integration of the phonetic transcription marker and its filing module in the phonetics class, in the conditions described above, proved to be a genuine learning aid for the students. We collected data from the students' result sheets and addressed the following questions.

3.1 Did students make any progress when given three tries?

Figure 1: Evolution of the percentage of correct answers in one test over three tries

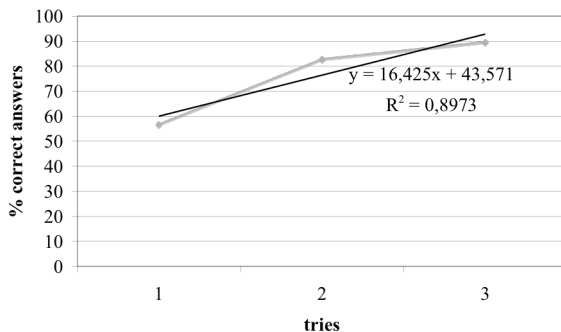


Figure 1 shows the results made by the first group of Regular students taking one and the same test; the average of correct words per try has been collected for all students and compared; the results show a significant improvement from one try to the next (the regression coefficient being different from 0; $R^2 = 0,9$).

3.2 Did students make any progress in task duration and correctness over the nine tests?

Figure 2: Evolution of the ratio of correct answers in time over nine tests

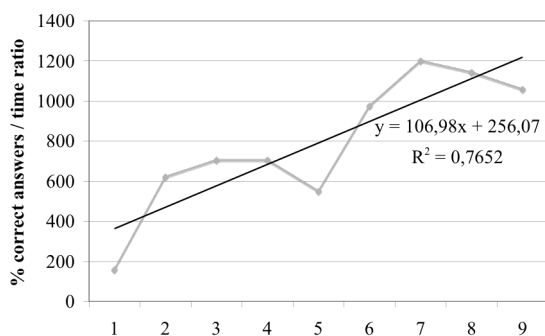


Figure 2 represents the evolution of the progress made by the Regular students in terms of time spent on the transcription task and average number of correct words per transcription. One can observe a significant evolution from the first test (below the regression line, which can be accounted for by the fact that the students had to get accustomed to the new keyboard) to the last (regression coefficient: $R^2 = 0,77$). Students were less successful in Tests 5 and 9, which were actually exam tests. Figure 2 shows that the

correlation between progress and time is higher and faster after Test 5.

3.3 Did regular students make more progress than those who attended classes on an irregular basis?

Figure 3: Evolution of the percentage of correct answers in three tests for the Regular and Irregular student groups

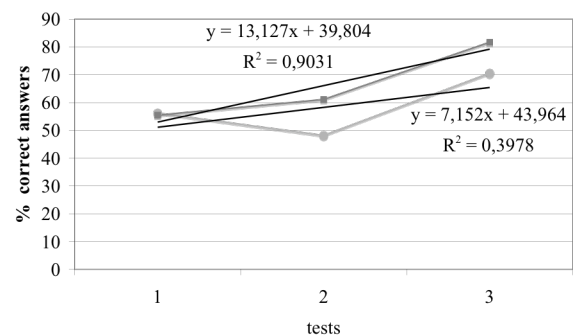
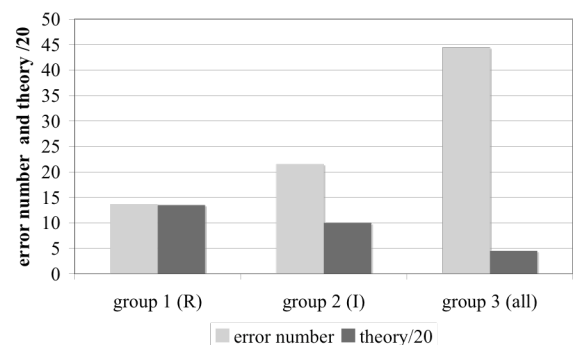


Figure 3 shows the parallel evolution in tests 1, 5 and 9 for the two groups of students; it is quite clear that although the performances were similar when they all started out, the progress of the R group in tests 5 and 9 is more significant (above the regression line) than for the other group. After test 5, both groups make greater and faster progress, but the I group never catch up. We can conclude to the greater impact of the transcription marker when used on a regular basis.

3.4 Did regular and irregular students make more progress than those who attended classes outside the computer assisted environment?

Figure 4: Comparison of the results of the Regular and Irregular groups as well as of the other second year students in the final test.



The average results of the three groups clearly show that the performance of the students who had been exposed to the computer assisted phonetics

learning had made fewer errors in the final exam taken by all 265 students one month after the end of the course. Their scores are also better in the theoretical questions (graded out of twenty). The Irregular group did not do as well as the Regulars but still scored half the number of errors of the other students and show higher grades in theory also.

4. DISCUSSION AND CONCLUSIONS

Use of the transcription marker brings two main advantages: considerable gain in marking time for the teacher and immediate feedback on error for the students. Since the transcription marker provides a reliable correcting guide by labelling their errors, students are led towards a target remedy. Directly involved in the task, they develop a gradual inductive and deductive stance based on error type. Involvement in the task is shifted from transcribing as a linear process to searching for personal errors involving a reflection on the system behind spoken English. If the correct form has not been found after three tries, it is provided and remains on the screen until the whole transcription is completed. Significant improvement between the three tries is due to this targeted correcting system: the *missing* sign feed-back enables the French learner to become aware of the general tendency of English to function as a stressed, rather than a syllabic language; the *added* symbol targets the pronunciation of graphic forms usually deleted or transformed in English, guiding the students in the systematic intricate relation between graphemes and phonemes; the *incorrect* symbol leads the students to acquire the more complex, context-determined English vocalic system. The association of two symbols (*missing* for stress and *incorrect* for vowels) leads to gradual linking between stress and vowel quality.

When student transcriptions are completed, a data collection programme reads their files, gives a synopsis of their choices and classifies their transcriptions according to their frequency of occurrence per try; the teacher can thus provide the adequate theoretical background, allowing for constant associative linking between theory and practice to take place [3]. The general evolution of student performance over all nine tests shows that students not only spend less time on the task but also improve the quality of their transcriptions; they obviously get used to using the IPA keyboard

very quickly (after two tests) and use the software as a genuinely operational tool to access L2. Progress is regular over the first four tests and although test 5 was carried out in the same conditions (in terms of time and lexical choices), the students' performances fall, showing how a stressful event such as an exam situation can impair intellectual performance. However, from the next test on, progress picks up more rapidly than before, up to the last exam test. This phenomenon can be explained by the gradual building up of a theoretical competence in dealing with oral English. This hypothesis is confirmed when comparing two sub-groups of students: if their evolution is quite similar, a regular training in the task seems to reinforce and stabilize performance. The acquisition of a procedural and phonological competence benefits greatly from regularity in time.

These initial results were compared with the results of those who had worked in the computer-assisted class and those who had had classic teaching sessions in a final exam taken by all students one month later. The performances showed that the former were far from penalised when they no longer worked with the ready-made keyboard or when left without computer guidance. To the transcription task we associated theoretical questions on stress placement and vowel quality; here again the results confirm our hypothesis that the transcription marker and associated filing system had worked in the building up of a phonological competence, and had clearly helped students in linking theory and language practise. Future work should lead us to take a closer look at the cognitive procedures at work in the construction of a phonological competence in L2.

5. REFERENCES

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