Procedures for the Comprehension and Acquisition of Foreign Languages

Ferenc ROVNY, *UD Foreign Language Centre & Panorama LS Publishing;*
Gabor Janos PALI, *UD CSc. student; rovnyf@flc.unideb.hu, pg0003@delfin.unideb.hu*

Keywords: *CALL, Foreign Language Learning, Listening Comprehension, Contrastive-Comparative Linguistics, Pronunciation Standard, Stress, Intonation; Speech Processing algorithms: PSOLA, SHRPD, DIN45631*

Out of the computational efforts to help foreign language learning especially the results hitherto achieved in the field of Listening Comprehension (LC) and Speech Acquisition have not treated the issue in its complexity. E.g. the English language significantly differs from the Hungarian in its phoneme set, stress and intonation. In English, words go through marked quantitative and qualitative transitions owing to speech rhythm. The main difference between the two languages is that the Hungarian has a *„syllabic"* character while the English has a *„stress-timing"* one. That is why LC and correct English speech constitute serious trouble for Hungarian learners of English. *The problem cannot be treated in a proper objective way within the usual framework of language learning and teaching.* So we have come to the conclusion that we should try to develop a special kind of software for the enhancement of the acquisition of foreign languages (especially that of the English). The software is being developed in *MatLab* environment at present and for the sake of user-friendliness a Graphical User Interface is also added to it.

The major components and steps of the task are as follows: 1. It is to be defined what can be considered an *adequate foreign language pattern.* 2. It is also to be decided that the software should handle *stored samples only* and/or *any optional authentic foreign language speech samples.* 3. The next step is the *digitalisation of speech patterns* and carrying out the necessary filtering and post-processing. 4. The *stress and intonation curves* belonging to the stored sentence patterns are to be prepared and drawn in an unambiguous form. This way the learner can have a *visual image* of how the given sentence is to be produced according to the rules of English speech. 5. The learner will be able to *slow down* (or even *speed up* if he/she wishes so) the heard speech pattern in a pre-defined range and that can help him/her in the comprehension of the pattern. 6. *Practising:* the learner can reproduce the patterns, meanwhile the reproduced patterns are being stored. The stressed parts of both the heard and reproduced speech patterns are *visually marked,* at the same time the intonation curve and the speed also appear in the function of time. 7. *Evaluation and marking:* the authentic pattern and its reproduction by the learner are *visually compared.* (At present, phonemic level comparison is not planned. We concentrate on stress and intonation as they are the two main pillars of LC and the differentiation of meaning.)

The optional slowing down of samples is implemented by the ***PSOLA*** *(Pitch Synchronous Overlap and Add)* algorithm. The algorithm requires pitch detection, i. e. the estimation of fundamental frequency. The method chosen to do this is the ***SHR PD*** *(Subharmonic to Harmonic Ratio Pitch Detection)* algorithm. The *distortionless slowing down* of the sample is also important. The ***DIN45631/ISO532B*** standard defines the stress function. The intonation function given by the PDA must be combined with the computation of *short-time energy* or *loudness.* The comparison is implemented by the method of *computation of Mahalanobis distance.* The result of the computation serves as the basis of the evaluation.