DEVELOPING A READING MACHINE FOR THE BLIND

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The development of a reading machine for the blind implies the solution of problems on such diverse fields as linguistics, micro computing and ergonomics. Because of the state of the art in Computational Linguistics, however, the linguistic problems turn out to be the major draw back in this field of scientific endeavor. That is the reason why the paper for the greater part is devoted to the description of a new model for automated phonemization. This model is applied to Dutch. The model was developed for words only. Thus, the reading machine as it stands now is able to pronounce a series of words.

Therefore, the texts read into the computer are treated as a series of single words by the reading machine. The problems of prosody are not tackled uptill now. On the other hand, all problems concerning assimilation in the words have been solved. The computer program that performs this task is called FONGRAF. It was developed at the University of Utrecht. The computer program FONGRAF is able to perform a transcription of written text into the phonematic format according to the principles of phonematic transcription. The paper focusses on the design of the program and answers questions concerning the relation between the technical part (implementation) and the linguistic considerations behind the computer program.

It is argued that in the past computer programs performing this linguistic task were principally designed from the

implementation point of view. This has led to computer programs with a strong ad hoc kind of problem solving part in it. Therefore, these computer programs turn out to be not adaptable to new situations and unforeseen mistakes. In this paper it is argued that for the solution of linguistic problems of this kind a pattern matching computer program has to be developed. It should go without saying that a computer designed for linguistic purposes should be firmly based on the linguistic analysis of the task. As far as the search for regularities in the phonetic interpretation of written text is concerned we used the phonological theory as an important aid. The phonological description of the Dutch language was used as the most important source for the definition of the pattern matcher in the computer program FONGRAF. Many of the observed regularities regarding the Dutch phoneme distribution and phonological rules concerning the phonetic interpretation of the phonological forms of Dutch morphemes are particularly useful to our problem in that they state the surroundings which affect a particular phoneme. For instance the assimilation rule that a consonant becomes voiceless or voiced according to the "voice" of the following consonant. This kind of rules applies even in surroundings where the syllable boundaries are involved. This is the reason why we consider the application of hyphenation programs to be out of place as far as the solution of the phonematization problem for Dutch words is concerned. This also is the main reason why we developed a pattern matching computer program. A further advantage of the pattern matching program is that it is easy to implement "new" regularities. With the notion "new" regularities we refer to rules and regularities not described by normal phonology. Those regularities often are caused by the fact that a computer is too "literal". Native speakers will, e.g. not confuse any letter-sequence oir or isch as in hooirok and macaronischotel with the suffixes oir and isch. A computer, however, does not have this linguistic knowledge. Thus, one has to design means to implem-

ent this knowledge. This is done by the definition of patterns. In the paper we shortly refer to the solution of pronunciation ambiguity caused by semantic reasons. The computer program FONGRAF was tested with the help of a variety of corpuses consisting of natural language texts. The results of these tests are reported.