THE HISTORICAL DEVELOPMENT

OF

AUTOMATIC BRAILLE PRODUCTION IN GERMANY

by

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Automatic Braille production in Germany was initiated by a conversation between the blind teacher Erwin Mansholt from Hannover-Kirchrode and myself in 1962. In a subsequent conversation we formulated the rules to be used, and we agreed to demonstrate the principles of automatic Braille production to blind people by using Grade 1 translation only. In doing so we hoped to avoid the difficulties arising in the full scale problem. Grade 1 uses essentially a one-to-one translation, except for some frequent German combinations such as st, sch and ie, which are contracted. They must not be used if the letters of such a sequence belong to different etymological parts of a compound word.

Some of the problems that arise in Braille translation of Grade 2 are due to the fact that Braille uses a shorthand and this shorthand contains a number of contractions in order to save space. There are certain rules that govern the cases in which two different contractions collide with each other. There are certain rules of priority. These can be dealt with by introducing additional "pseudo contractions" that incorporate these rules of priority. Real problems arise, however, as was pointed out above, if contractions are composed of letters that belong to different etymological parts of a word.

During our work we learned very soon that there are two types of problems to be solved.

1) The Hardware Problems, because it is not enough just to write a computer program for the translation. In order to make practical applications it is necessary to pay particular attention to the input and output devices.

There are several possibilities to produce the input. It is easy to have a secretary put the inkprint text onto a medium acceptable to the computer: punched cards, punched tape or magnetic tape. This does not require knowledge of Braille at all. In addition it is to be expected that the community of computer users gets more and more interested in devices using inkprint texts as input as we see nowadays.

There was hardly any commercial development for Braille output and therefore hardly anything was available on the market at that time. First experiments to construct electric Braille writers for blind people and connect them as an output device had encountered problems with the carriage return (as I could see at the institute of Prof. Schouten in Eindhoven.) The first operational solution I saw at the American Printing House for the Blind in 1964.

2) Formulation of an Algorithm for the Translation – In the course of many years we learned by our cooperation what the true problem is. At first I believed that an approximate translation would be sufficient, not aware of the touchiness of the blind with respect to irregularities.

The Hardware Development

In the first years I concentrated on getting the necessary hardware to work successfully. I started gathering information by seeing the institute of Prof. Schouten in Eindhoven, then I met Leslie Clark of the American Foundation for the Blind and Mr. Virgil Zickel at the American Printing House for the Blind in 1963.

After my return to Germany in 1964 I applied for a grant to the Deutsche Forschungsgemeinschaft to purchase a punched card driven embossing machine of the American Printing House. The American Printing House was very cooperative and waited to get an inexpensive resold IBM card verifier. Thus we got our definite offer only in May 1965 and one month later made the definite ordering, based on a granted fund from the Deutsche Forschungsgemeinschaft.

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I participated also in a congress on "Reading Machines for the Blind" in 1966 to get more information on reading machines. My impression was that the efforts a blind person had to make to read one or a couple of words by the available reading machines were hardly adequate with respect to the information gathered.

In August 1966 the embossing machine was shipped by the American Printing House in two large boxes. However, one of these boxes was misguided and toured the world before it arrived in Münster, February 1967. It was heavily damaged and it was only by the help of the mechanic Horst Mecke and a helping hand from the workshop of the physics department of the University of Münster that we could repair the machine and get it going. It has been in operation since then.

Later on, several computer companies developed modifications to adapt their fast printers for Braille production. In 1971 we could purchase the equipment to adapt the IBM-printer 1403 of the University computation center to produce single Braille copies at the speed of the normal printer, i.e., approximately 19,000 Braille characters per minute.

We can say that at present we are sufficiently equipped with hardware to carry on our work successfully and produce samples for blind people to test our work. The interested readers should also be referred to the activities of the Sensory Aids Evaluation and Development Center at MIT (77 Massachusetts Ave., Mass. 02139, USA) for current work in the hardware field.

The Software Development

In 1962 we applied for a grant to the Duetsche Forschungsgemeinschaft which allowed us to have a student programmer with this project. During that year we made our first experiments of translating Grade 2 Braille on the IBM 650 of the University of Hamburg. The first program was produced by Roland Wais. He was soon superseded by Winfried Dost, who worked at this project until 1969. He was followed by Bernd Eickenscheidt who has been doing the programming and maintenance of the programs up to now. The experience with the first programs and the difficulties encountered led to the formulation of a proposal in cooperation with teachers of the Hamburg blind children's school, entitled "Hamburger Vorschläge zur Blindenschriftreform" in 1964, Mr. Dost and Mr. Seibt signing as authors. Simultaneously, in 1965 we could report on our work during the 25th congress of teachers from schools for the blind in Hamburg. I could urge the listeners to agree on some changes in the rules of the German Braille. The proposal was submitted to a commission for the reform of the German Braille rules and it was heavily discussed. This was the first time we found out how difficult it is to get an agreement on changes of the valid Braille rules.

The primary goal of this proposal can be formulated in the following way. The Braille system should be given such a form that on the one hand the old Braille print is still readable to a person educated in the new Braille system and on the other hand it can permit Braille production directly from inkprint by a computer.

In these more theoretical efforts we got unique practical support from the cooperation with one of the large German printing houses, although my own attempt of getting contacts with German printing houses and to get prefabricated input material had been unsuccessful. In 1967 the public relations representative of the printing house Gruner und Jahr contacted me and proposed to produce a Braille magazine with parts from two German inkprint weeklies "Die Zeit" and "Stern". It took about one year to arrange all the technical details. Then we obtained linotype tapes from the printing house and fed them into the IBM 360/50. The paper tape reader had been slightly modified by our own mechanic.

After the first successful experiments in 1968 we started with the regular production within the next year and the two-weekly newspaper for the blind has appeared ever since. It contains about 40 Braille pages corresponding to about 30 typewritten standard pages. Editors at the printing house select articles they feel appropriate. The project has been guided by Mr. Klenk, Gräfin Tauffkirchen and now Mr. Berthelsen.

The paper is distributed to the blind free of charge. Present circulation is approximately 5,000 copies and this means that we have about 5,000 critics and correctors for our experiment. We urge the reader to communicate to us about the problems in reading and to propose ways of improvement. In the meantime we have received more than a hundred letters and comments and an adhoc-commission of blind people from Hannover, Hamburg, Marburg, and members of our computation center get together to discuss these proposals and adjust the program. The group and approved. When new issues are distributed, the readers are asked for comments.

The newspaper also furnished working material for the discussion in the commission for the revision of the German Braille rules. In 1969 this commission made statements first in Bern and on October 7th and 8th in Vienna. It made a formal setup of changes to the German Grade 2 Braille rules. In summer 1972 these rules were fully incorporated in our program and they have been the subject of new comments and criticisms from our readers. Although this commission saw its work complete I firmly believe that new changes are due to come. A description of the working program is essentially contained in a publication in the "IBM-Nachrichten" No. 194, April 1969, pages 594 - 599 in German. The current version, written in PL/I is described in the paper by B. Eickenscheidt (these proceedings).

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In the recent years parallel to the described work other techniques were looked at to improve the translation by taking into account linquistic aspects. This was stimulated by the fact that we were transferred from the electronic data processing division of the Deutsche Forschungsgemeinschaft to the linguistics group. This transfer was connected with some delay in our funding and we gratefully acknowledge the support of IBM Germany to help out in our shortage of funds.

In spite of the operational approach we use currently, we look also into other methods that seem promising. Maybe it is possible to get a better approximation to the valid rules of Braille than we have at present. IBM Germany has a program designed by Dr. Hubner to split German words into syllables[1]; this program is used in operating the composer program for newspapers when hyphenations are necessary. Incorporating this program into our translation program promised the avoiding of illegal use of contractions across the boundaries of syllables. However, some contractions may be used across spots which were indicated by this program because only etymological boundaries are essential. So we are lying between two different poles: on one side we use too many contractions because we neglect the boundaries of syllables, on the other side not enough contractions because too many breaking points are encountered. It seems very difficult to work out a compromise and at present a systematic study of the German language with respect to this problem is under way.

To characterize the current state of the program I report from a letter that Dr. Freund, Marburg, has written to Mr. Eickenscheidt on March 12th, 1973. In this letter he communicates that Mr. Mittelsten Scheid has made a systematic count of errors in one of the last editions of our blind peoples' magazine. He detected 121 deviations on 40 pages which are distributed in the following way: 12 errors stem from misprints in the used input, 35 errors are wrongly used contractions. (That is one serious mistake per page.) The other 74 deviations stem from not using the contractions for some words and sequences of letters as "auf, zu" and similar things that hardly furnish any gain with respect to the shortening of the printed text. They also do not much improve its readability. Here I think are new starting points for a revision of the Grade 2 Braille for the German language. We are looking forward to see the results of our new linguistic approach to compare it with the efficiency of our working program.

References

1) IBM Hyphenation Program for the German Language Textprocessor EDIT 1130, Manual of Application, IBM-Form-E12-1048, p. 24

IBM Hyphenation Program for the English Language

a) improved hyphenation Manual of Application, IBM-1130-06.6.009

b) 1. application of printtext/370