Access to Information by the Blind

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One of the most serious deprivations of blindness is the lack of privacy. Most blind people have to rely on sighted friends and acquaintances to read their correspondence. However recent developments indicate that within the forseeable future many more blind people could have increased independent access to written information.

There are about 120,000 registered blind in Britain and 79% of them are over 60 years old. In order to qualify for registration as blind a person must be unable to read, at a distance of three feet, an optical test card which people with normal vision can read at sixty feet. If the field of remaining vision is restricted, then a distance of three to six feet will qualify. It is obvious that this definition leaves a significant margin of useful vision in many cases.

Those with no useful vision have the choice of braille, tape or reading machines for access to written material.

The advent of the relatively inexpensive cassette tape-recorder has been a boon to many blind people. The great advantage of the tape recorder is that the text can be recorded by someone who needs only to be able to read aloud fluently and clearly. However there are a number of disadvantages compared to braille. It is easier and quicker to find one's place on sheets of braille than on tape. With tape the blind 'reader' must assimilate the information at the speed of the sighted reader and cannot 'skim' very easily. Moreover, he

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must accept the subjective element imposed on the material by a sighted reader.

Some of these problems may be alleviated by technical developments such as 'compressed speech' which enables a voice on a recording to be speeded up in playback mode without unduly distorting the frequency content. Unfortunately no satisfactory system of indexing has yet been devised.

Since the beginning of the century considerable effort has been devoted to the development of machines which will 'read' written characters and give output in an audio or tactual form. Either these machines recognise the individual characters and output in braille or synthesized speech, or the complex recognition process if left to the blind user. One example of the latter is the Optacon (figure) which presents the user with a ten times enlarged tactile display of a single character, using vibrating piezo-electric crystal, and the user then has the complex task of recognising the patterns of stimuli which represent each character. The expense, low reading speeds and long training required may be acceptable in specific employment situations but these devices are not yet a viable alternative to braille or tape for large quantities of material. It is the lack of understanding of the design of non-visual displays which is seriously hindering progress on these devices.

The user has a much simpler task with devices which use optical character recognition but these devices are neither cheap nor do they recognise the large range of typefaces found in everyday use.

Braille is based on a cell which has six dot positions (figure) spaced 2.5 mm apart, with adjacent cells spaced

4 mm apart. The cell size together with the height of embossing (.5 mm) and thick paper necessary will explain why the bible takes up 72 braille volumes.

In an effort to reduce this bulk, a great number of contractions have been introduced which are governed by a number of complex rules, some depending on syllable boundaries, pronunciation or meaning. For instance the contraction for the word 'one' may be used when all the three letters it represents are pronounced as a single syllable as in 'stones' but not 'anemone'. Another example is that 'st.' is contracted differently depending on whether it is an abbreviation for 'saint' or 'street'. Braille is a language not a code.

These contractions and abbreviations result in the reduction of about 26% in the number of cells required compared with the number of alpha-numeric characters in a passage, but necessitate highly skilled transcribers for the translation to braille. The acute shortage of these skilled transcribers has provided one very significant motivation for the development of computer programs to translate text to a good approximation to contracted braille.

The computer-based systems typically involve:

(i) A typist, with no knowledge of computing or braille, inputs the text on punched cards, paper tape or directly on a visual display unit.

(ii) A line-printer listing of the text is produced in order to proof-read for typing errors.

(iii) The typing errors are corrected on a visual display unit.

(iv) The text is translated to contracted braille using a complex table-driven program which typically

operates at 5000 words per minute.

(v) The braille is output on an on-line paper embosser when few copies are required or on zinc plates used in a conventional braille press when many copies are required.

This type of sytem can be used for quickly producing single copies of agendas and minutes of meetings, local telephone dialling codes, recipes, knitting patterns, instructions for domestic appliances, as well as for producing both fiction and non-fiction books.

The most expensive parts of this production process are the input and proof-reading of the text, and so methods for eliminating these stages are being investigated. In some situations it is possible to obtain the data in digital form; for instance Lloyds, Lewis's and Midland banks use an automated system for producing braille bank statements directly from their digital magnetic tapes.

Another potentially valuable source of digital information is the tapes used by printers who have computer-based composing systems. These tapes have the advantage that the input errors have been corrected and there are flags to indicate running headings, page numbers and footnotes. Some of these also have the advantage that they use different codes for apostrophe and single inverted comma which are frequently represented the same in print but are different in braille. These tapes will require additional format controls for producing the tables in braille; diagrams have to be produced tactually by a separate system.

For any blind person with a scientific or technical background, keeping up-to-date with his subject raises