

Recent Developments in Communication Aids
for the Visually Disabled

J M Gill

Brunel Institute for Bioengineering

There are over 123,000 registered blind in Britain, but various estimates suggest that there are about another 80,000 whose vision is such that they could be registered. The registered blind population is largely one afflicted with seriously defective vision rather than blindness in the full sense of the term.

The main technological development for those with residual vision has been television magnifiers (Fig. 1); there are about 30 models commercially available. These devices usually provide variable magnification, enhanced contrast and image reversal (white letters on a black background), but they have disadvantages such as cost (from £650 to £3000) and weight of the machines (typically 25 Kg). Despite these disadvantages they have proved to be very useful aids for those whose needs have not been met by conventional optical aids.

(insert Figure 1 here)

For those with no useful vision, aids for access to written information have either audio or tactual output. Probably the most useful technical aid is the cassette tape recorder. The main disadvantages of which are the user's inability to vary the speed, and the lack of a good indexing system. The variable speed problem will be partially solved with the increasing availability of inexpensive 'compressed speech' modules. These devices correct the pitch changes which result from increasing the speed. Blind professionals have the need for faster speeds, but many elderly blind people find the existing recordings too fast. The indexing problem is not so easily solved. What is required is an inexpensive system so that the blind user can input a number or keyword, and the machine will then automatically find the information; such systems exist but they

are prohibitively expensive.

A variety of devices with speech output are now commercially available. The speech can be spelled, compiled or synthetic. Spelled speech is when the output is character by character; the advantage is the very low cost but the quality is unacceptable for any application involving prolonged listening. With compiled speech the machine has a limited vocabulary of whole words, and then spells out words not in the vocabulary. A vocabulary of 8000 words and their plurals copes with over 90% of most texts. Synthetic speech is where the machine approximates a human speaker. The output quality is dependent on the computer program; high quality synthetic speech systems are still very expensive. A reading machine with optical character recognition and synthetic speech output costs in the region of £20,000; costed over five years, it would be cheaper to employ a sighted reader. However the cost of such machines should decrease significantly over the next few years.

One of the disadvantages of braille is the considerable bulk which is typically twenty times that of the print version. Grade 2 braille uses 190 contractions and abbreviations which result in about 25% saving in space. There is an acute shortage of people skilled in transcribing text to contracted braille. A number of computer-based systems have been developed to translate text to contracted braille, so that a typist with no knowledge of braille can produce documents in both ink-print and contracted braille from a single typing operation (Fig. 2).

(insert Figure 2 here)

Computer-based systems are significantly cheaper than manual transcription for information which already exists in digital form. For instance two major banks use an automated system to produce statements of account in braille. Since the system is totally automated it also minimises the risk of an error in the braille version.

A recent development is that information can be directly input from the British Telecom Prestel viewdata system. This is

particularly important for those who are both deaf and blind since they do not have ready access to the news and weather forecast.

Braille has not been superceded by other forms of non-visual media despite numerous predictions to the contrary; braille is still supreme in its use for reference and technical material. Another important aspect is that a blind person can write braille without having to invest in expensive equipment. A number of systems have been developed for storing braille digitally on cassette or floppy disc (Fig. 3). The braille is output on a transitory display such as an array of pins which can be raised to represent the braille characters. The decreasing cost of microprocessors has permitted the introduction of sophisticated searching and editing facilities; however these devices still cost from £3000 to £5000.

(insert Figure 3 here)

As yet the blind have not significantly benefited from the introduction of 'information technology'. The type of aid which will become cheaper in the foreseeable future is BASIS (Braille And Speech Information System). This system permits input in contracted braille with output in print. It can also check the spelling of words, automatically number and position footnotes, and give the blind user the ability to instruct the device to "start a new print page if there are less than four lines left on the present page".

A number of devices have been developed for directly converting printed characters to some form of tactual output. Most of these devices do not recognise the characters but present a tactual display which has to be recognised by the human reader. The most widely used device is the Optacon which gives a ten-times enlarged tactual image of the letter being scanned. The advantage of this device is that it can be used on any printed or typewritten material. The disadvantages are the considerable training and practice required to reach speeds of 50 words per minute, and the cost of about £2000.

As mentioned earlier most of the registered blind have residual vision, but it is only very recently that modern technology has been used to produce reading material for this group. The most notable development has been the application of laser printers for the fast production of large or 'clear' print. A laser printer is capable, with special computer programs, to produce good quality print of any size at speeds up to four pages per second. These printers are very expensive so it is only economically viable to use an existing printer which has spare capacity. This work was pioneered by Lloyds Bank since they had a need to produce large print statements of account for their visually handicapped customers.

In conclusion, it must be emphasised that the majority of useful aids are simple and inexpensive. It is only when simple aids or techniques do not meet the user's needs, that sophisticated aids are required. All sophisticated aids go wrong occasionally, and therefore it is essential to check on the maintenance arrangements before purchasing an aid.

Figures

Figure 1 Television magnifier (courtesy J Heathcoat & Co)

Figure 2 Braille and Ink-print Text-processing System (courtesy
RB Aids for the Blind)

Figure 3 VersaBraille (courtesy Telesensory Systems)

(photographs by M Gould)