Sensory aids for the blind. I, Reading machines

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I. Reading Machines

– J.C. Swail –

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This is intended to be the first in a series of short articles on various subjects relating to research on sensory aids for the blind. It is primarily intended to assist blind students and their advisors to assess the changes that technology may bring to the future employment picture of the blind. This particular article is based on a more detailed review of advances in communications given by the author at the 1969 Assembly of the World Council for the Welfare of the Blind, and on additional research information which has become available since.

The Optophone has been with us for over fifty years, but it has not gained much acceptance by the blind owing to its very low reading speed and the necessity for a long training period to learn its extremely complex audio output code. Currently, the Hadley School for the Blind, Winnetka, Illinois, is offering a correspondence course on a modern version of this device, the Visotoner, to determine just how much general acceptance the device might receive. The Canadian National Institute for the Blind and other organizations are about to test a more sophisticated device of the same general nature. This is the Lexiphone, developed at the University of British Columbia by Dr. Michael Beddoes. The Optophone has offered reading speeds of about 25 words per minute, whereas the Lexiphone should make speeds of 50 words per minute possible, in both cases to highly trained users. It is probable that either or both of these devices may prove to be useful to blind persons who require only the reading of occasional letters and the like. There is a wide range of tactile reading aids currently in the laboratories, but none seems to offer any higher speeds than the auditory machines just mentioned.

With the increasing number of blind university students, and thus professional workers, coupled with the information explosion, a much faster reading machine will be essential. To date, the human reader has been the only practical solution for the reading of material available in inkprint. For this purpose, a computer translation seems to offer the only practical alternative. As most of the components of such a system are being sought for commercial purposes, it seems reasonable to assume that a practical high-speed reading service for the blind will be available during this decade.

In essence, the computer reading machine will probably take the following form.

An optical scanner. This device will be located on the user's desk, and the book or document to be read will be placed in it. It will then transform the inkprint into a code which may be transmitted by telephone line to a computing center for processing.

Character recognizer. This equipment will be located in the computing center and will accept the code from the scanner and transform it into a code acceptable by the computer.

The computer proper, including the required storage facilities and program for print translation. The computer will be time-shared with many other users and will be programmed to translate the coded print symbols into either contracted Braille or simulated speech.

An output and storage device. This will be located on the reader's desk and will either be a Braille writer or a tape recorder, depending on whether Braille or speech is chosen as output. The output will be driven by signals fed from the computing center over the same telephone lines which are used to take the coded print to the center.

Note – Contracted Braille will probably not follow all the rules of the present grade 2 system; if a few of the rules of grade 2 are relaxed, the computer program will be much less expensive. Simulated speech, although recognizable as English speech, will probably not be perfect as to pronunciation. It may be too expensive to allow, say, for the various pronunciations of -OUGH in words such as THOUGH, ENOUGH, THROUGH. With these restrictions, high-speed translation of print should be available with little extra learning on the part of the blind user. He will have to cope with more errors than he would expect in published Braille, as print usually contains more errors than are normally permitted in Braille. As long as the error does not occur in an unfamiliar word this should be of little consequence.

Despite the fact that computer time is expensive, the cost of a time-shared service is dropping and should soon not exceed the cost of a paid human reader. It has the advantage of being always available, and the price should not be prohibitive. For a number of reasons this type of service will not replace the human reader in the talking book service, or the editor in Braille publishing. These services have to meet higher standards than are possible with the system just described, but it should free many blind students and professionals from the need for extra assistance. Most of the required components of the computer system have been designed and tested. We are still awaiting reliable character recognizers and speech synthesizers, but both of these are being urgently sought by industry for commercial uses and seem close at hand.

Although there are a number of intermediate-speed reading machines under development which could be portable, and could result in reading speeds equivalent to that of Braille reading, unless there is a considerable technical breakthrough in a number of areas, it is unlikely that any of these will actually become available.

In conclusion, although keeping up with the deluge of published material is becoming increasingly difficult for any student or professional worker, sighted or blind, high-speed computer translation will help to put the blind person in a more competitive position.