

## THE VISOTONER: A PERSONAL READING MACHINE FOR THE BLIND

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While the Chicago area was being inundated by the great snow storm of January 1967, I had one of the most rewarding experiences of my life. It all started three years ago when I began to learn to use the Veterans Administration's Battelle Optophone (1). Later I used the first Mauch Visotoner optophone. At first I could check my own touch typing and later I could read typed correspondence. A greater feeling of independence arose when I was able to use the reading machine in conjunction with other skills to complete business transactions independently. For example, I now read many utility bills myself and make braille notes, type checks and envelopes, read my typing, and check the legibility and function of the pen. (The reading of handwriting is not now feasible.) I can mail the check confidently and later read the bank statement and canceled checks and compare them with my original braille notes. I find that the reading machine adds to the value of braille, typing, and language skills. As my skill improved, the list of reading tasks increased but attempting to read the dictionary had always resulted in a hopeless "blur."

Then, just as the great snow began to fall, the newly redesigned Visotoner arrived from the manufacturer, Mauch Laboratories, Inc., Dayton, Ohio (2). The Visotoner was developed under a research contract with the Prosthetic and Sensory Aids Service of the Veterans Administration. Since I had used other optophones, I was asked to try the new machine.

So I sat down with a stack of mail and the new Visotoner. Most of the return addresses were amazingly legible. While reading the table of contents in a magazine, I was so impressed with the "fidelity" with which this machine "sees" the print that I decided to read a whole article. I felt compelled to reach for the dictionary and sure enough, it came alive. To be sure, there were times when deciphering unfamiliar diacritical marks used in dictionaries became necessary, but now I can use the dictionary when the need arises.

Our faithful volunteer sighted reader could not make it through the snow that week but since then her services have not been needed regularly because

I have been able to meet my urgent reading needs. For the first time, I felt I had acquired a bit of synthetic eyesight.

### **HOW DOES THE MACHINE "SEE" THE PRINT?**

The Visotoner contains a vertical column of nine photocells, an optical system, and the electronic circuits to generate a different audible tone for each photocell while it is "seeing black."

We cannot say that the machine reads—rather, it presents the letter shapes as tone patterns. As it is moved along a line of print, the nine-tone output is usually heard in an earphone. Each letter or other symbol has its characteristic tone pattern. If the two lowest tones are heard, it means that the letter extends below the line. Each of the five middle tones responds to its assigned band of print encompassing the so-called "x" height of the letters. If the two highest tones sound, it means there is print extending above the "x" height. For example, reading a hyphen results in a steady tone. The letter "I" consists largely of a chord and the letter "V" makes a "wavy" sound.

The user must learn to interpret these tonal patterns as letters and words on the printed page. This involves a rather lengthy learning process similar to the experience of a sighted child learning to read ink-print. The 200-hour course of training developed at Battelle Memorial Institute, Columbus, Ohio, uses text in ordinary print and some tape recordings.

The Visotoner has a variable-magnification optical system which permits the user to select the proper magnification for reading letters printed in 7 to 36 point type. A lamp brightness control is also used. The machine with its battery and earphone can be carried in its leather case the size of a hardcover textbook. During training and when reading for long periods, it is advisable to use the machine with its tracking board which Mauch Laboratories has named the Colineator. All equipment mentioned, plus a battery charger and spare battery, fits into a small, specially designed attaché case.

### **PROGRESS REPORT**

Currently, my work in the Central Rehabilitation Section for Visually Impaired and Blinded Veterans, Veterans Administration Hospital, Hines, Illinois 60141, includes testing, demonstrating, and teaching the use of reading machines. The work has only begun, for now production models must be perfected and techniques for teaching the skill need refining. Much also needs to be learned about the usefulness of the equipment and the kinds of people who can, and want to, learn the skill.

Though experimental, the Visotoner is emerging from the laboratory and classroom. After teaching the skill to several blind persons, we now can report preliminary results. The main requisite for success is that a candidate be keenly motivated to meet independently those reading needs for which

high reading speeds are not usually important. Because use of context is important for efficient learning of the skill, previously acquired reading skill at the eighth-grade level using braille or print is very desirable.

The ability to learn to identify the tone patterns of letters and short words is essential. Apparently, some individuals lack this ability but little is known yet about its relationship to the use of the reading machine. Normal hearing is desirable but persons with subnormal stable hearing may also be able to use the machine.

We have found that students, after about 30 or 40 hours of practice, can learn to check material they have just typed. Additional practice is needed for reading typed correspondence, bank statements, labels, encyclopedias, etc. Besides reading skill, advanced uses require concept and knowledge of printed format; i.e., what to look for and where to look. One example of an advanced use is a housewife reading package directions and perhaps brailleing them for easier, future reference.

Besides checking one's typing, other elementary uses include reading some meters and the large hand of a stop watch and detecting the presence and direction of many kinds of lights. Currency may be identified not by the numerals, but by the gross features, such as the columns on a \$5 bill. The "sound of money" is pleasant indeed, and now "money can talk" to a vending stand operator.

With the Visotoner, blind typists may check their typing and correct any errors. I have taught the skill to Margaret Butow of the Hadley School for the Blind, 700 Elm Street, Winnetka, Illinois. She reads her typing and correspondence. The Hadley School is working on a short course to introduce the code of the Visotoner via tape recordings. The purpose is to determine a potential candidate's interest, ability to learn the skill, and likelihood to profit from the longer course of training. The Hadley course may be available by mid-1968.<sup>a</sup>

We feel that a blind person should first avail himself of the training given at rehabilitation centers or by home services. Then he may consider a machine like the Visotoner as a supplement to the basic skills.

I read with the Visotoner at speeds of from five to thirty words per minute, depending on the type of print, the paper, and the need for accurate reading. With this newly designed equipment, slightly higher rates of speed may be possible.

### OTHER READING MACHINES

Under a research contract with the Veterans Administration, Mauch Laboratories is developing several reading machines for the blind. One of them uses eight tactile stimulators which are felt as vibrations by four

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<sup>a</sup> Progress on the Hadley course is reported in the "Highlights of Other VA Research Programs" section of this issue.

fingertips of one hand. It is a sort of tactile optophone and is called the Visotactor.

We need small reading machines like those discussed for their low eventual cost (several hundred dollars including accessories) and for their high degree of versatility. For instance, they can be used to read italicized print, numerals and other symbols, and foreign languages.

Mauch Laboratories has built a prototype model of another machine it calls the Recognition Machine (2). The production model will be the size of an office typewriter. It now spells words audibly or it could be made with a braille output. A blind person, Miss Bonnie Reinicke, of Dayton, Ohio, now reads with the machine. It identifies upper- and lower-case letters in several common type fonts, so it permits more rapid reading at speeds of 90 or more words per minute. However, a Visotactor, similar to the one previously discussed, must be used as a part of the Recognition Machine to locate the print and size it up and keep exactly on the line. Only then will the Recognition Machine spell words. The small machine must also be used to read numerals and other symbols which the Recognition Machine cannot identify. The smaller reading machine will be detachable from the larger but faster recognition equipment for portable use in remote locations. In the event that several machines are fully developed, it may be possible to select the type of outputs used according to individual ability and preference.

#### **WHAT ABOUT THE IMMEDIATE FUTURE?**

The Visotoner and Visotactor are nearing the production stage. Because of small quantity production, the unit cost is currently too high for investment by individuals. Agencies may consider buying machines and training teachers and users. Reading machines would then be available to those trainees who had invested their time and effort in learning the skill.

The following is quoted from a July 1, 1967, Veterans Administration Information Sheet, only the cost figure being changed, a reduction from a \$2,500 unit cost to the figure shown.

“Current plans for future development of the Visotoner and Visotactor systems . . . call for the production for expanded clinical trials of about 30 second-generation Visotoners and about 10 Visotactors Model B with associated Colineators, battery chargers and carrying cases. The unit cost in manufacturing runs of the order of 40–60 complete device packages is estimated at \$1,850 at the present time. . . . There is a possibility that responsible agencies other than the development sponsor, the Veterans Administration, may wish to order one or more of these still-experimental devices for local trial purposes from the manufacturer, to be produced concurrently with the forthcoming Veterans Administration production run. . . .

"Those interested may request information from: Eugene F. Murphy, Ph. D., Chief, Research and Development Division, Prosthetic and Sensory Aids Service, 252 Seventh Avenue, New York, New York 10001."

I gratefully acknowledge the assistance of fellow team members on the staffs of the organizations referred to in this article.

Technology often makes old ideas feasible. Jet propulsion and magnetic recording were curiosities of the 19th century. Fifty years ago, Mary Jameson (3) of Great Britain demonstrated the first optophone at a speed of one word per minute. Today, she is still aiding in the evaluation of new equipment. Her example of foresight and dedication is still inspiring us.

### REFERENCES

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