

THE OPTOPHONE: ITS BEGINNING AND DEVELOPMENT ^a

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This is Mary Jameson speaking from London about the optophone, its beginning and its development.

I first met with the optophone in 1917 when I was 18 years old I learned what was then the optophone code on an instrument built in the inventor's laboratory. This optophone had one selenium cell which received light reflected from the printed page being read. White paper emitted a full musical chord; the reading was done by the tones blotted out by the black print as the scanner passed along the line.

In a word, reading was effected by what one didn't hear. This was not easy and the frail construction of the instrument added to one's difficulties. The focusing arrangements would slip out of place if anyone walked heavily across the room. However, by August 1918, I could manage a speed of about a word a minute, sufficient to show that print reading was possible. Then, a most fortunate event occurred. Admiral Sir Reginald Deighton attended a demonstration given by me at King's College, London, and he introduced the optophone to Messrs. Barr and Stroud of Glasgow, who agreed to manufacture it. The optophone, when manufactured, showed a threefold advance: It was no longer frail to handle; the scanner was equipped with an excellent driving mechanism; and a second selenium cell, a balancer, had been added so that the printed letter signals came from the black print and not from the white paper.

The British optophone still uses the Barr and Stroud driving mechanism. It provides a rhythmic flow of signals which can be varied in speed by turning a screw. At the same time it can be held up by hand pressure if one needs to study a signal in detail. If only the selenium cells had been suited to their purpose as this drive was, the optophone would have been of immediate practical use.

The volume of sound given by these cells was uncomfortably low and they were apt to crackle after an hour or two of use. Yet the work on the balancer cell principle was not wasted, but was applied by St. Dunstan's

^a Transcribed from a taped recording presented at The Sixth Technical Conference on Reading Machines for the Blind. Several references to recorded sounds have been deleted from the text. A review of the conference precedes this paper.

when, twenty years later, in 1944, they took up the optophone and substituted two photo-electric for the two selenium cells.

The new cells gave really adequate volume of sound and after microphonic and focusing difficulties had been overcome, provided a useful instrument. Later, in the 1950's, Mr. W. K. Hill became interested in the optophone. His work on the focusing arrangements has markedly improved the definition of the output and made it easier to distinguish between shapes as similar as lower case "b" and "h" and "i" and "e."

There remained, and still remains, a serious drawback to the British optophone output; the signals are not heard against a silent background as they are in the case of the Battelle.

Having reached the 1960's, may I sum up the position as I see it. I think a driving mechanism with the attributes of the British system makes for ease and speed of reading. This should also be said for a silent background to the signals.

It is possible that further study will show that the British optophone gives better definition than the Battelle in the presentation of its signals.

Regarding tracking, one of the accompanying photographs (Fig. 1) taken by Mr. Hill shows the Battelle probe fitted into the British scanner so that it can be operated with the British drive. This allows a rhythmic flow along the printed line maintained at a speed desired by the reader. A turn of a screw increases or decreases this speed. Normally, I run the scanner a little faster than I can pick up every detail of each signal relying on hand pressure to slow up my reading if necessary.

Regarding definition, or the clear cut presentation of the signals, I find the British optophone somewhat superior in this respect to the Battelle, in spite of background noise.

Mr. Hill thinks the image reaching the print from the British optophone scanner is slightly narrower horizontally than that from the Battelle, and this has to do with the sharper output from the British optophone.

Coming now to the teaching of optophone reading, I prefer the letter-word to the word-letter approach, the correspondence between the shapes and sounds of the signals is such a powerful aid to the memory besides

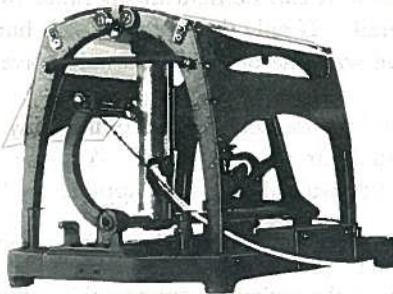


FIGURE 1

stimulating immediate interest. For example, having told the student that every vertical line produces a chord, he quickly grasps that lower case "m" having three vertical strokes has three chords; he will realize for himself that "n" must have two.

I have said I prefer the letter-word method, and that is true basically, but I would rather call it the "letter and word" method because I would gradually introduce words as the student progressed with the letters. I would start with two letter words, building up to words of about five letters. In this way I would construct a bridge between separate letters and instruction material such as the Battelle "word" method.

Also, with modern amplifying equipment I would not think instruction on tape recordings necessary, but would take the output direct from the optophone.

This system would permit varying reading material and speed of presentation according to the speed of the students and the interests of the experimenter.

In the past I have had to move from an alphabet sheet of separate letters to a child's primer having words of four, five, and even six letters, and I think the jump is too great.

I know that the word-letter method is used satisfactorily for teaching students to read with their eyes, but doesn't the situation differ from that of aural readers? The eye can take in at a glance a considerably greater range of characters than the ear, in fact the ear receives them one by one.

Being able to run the drive at a speed greater than that at which every detail can be picked up does help to speed the reading, however. Concerning the use of context, I cannot feel that this should be deliberately taught. It is often far easier to read the text than to guess at or think out what is likely to be ahead. Also, it seems to me that nothing should deflect us readers from performing what is still the basic task of helping the experts to discover the clearest possible code and the best manner of presenting it. Nevertheless, in practice one becomes familiar with the style and vocabulary being met with in the work being read and one can move quickly past names and other words which have become familiar.

I had hoped to include a sample demonstration of the Battelle output using the British scale, but it does not seem to suit the Battelle optophone, the frequencies needed for wavy letters such as "v" and "w" seem to be too close. Where these letters narrow to a point, a merging and roughening of the tones is caused. Mr. Hill has cured the trouble by spacing out the six tones.

Although this situation does not allow me to attempt a fair comparison between the Battelle and the British scales, I thought it might be useful to try comparing a six-tone with a nine-tone scale. For this, I recorded the words "winter" and "snow" from your instruction tape recording No. 15, then I recorded the same words direct from the Battelle I have here. As so

often happens in this kind of work, I met with a snag; the general quality of the instruction tape recording is much clearer than from the Battelle used by me.

In this short survey I have tried to do three things: To indicate the value of the British-type drive, to illustrate the advantage of the Battelle quiet background, and to suggest the direction which it seems to me that further research should take with the object of improving the clarity of the output, vertically speaking the best number and choice of tones, horizontally speaking for the clearest possible definition.

When I have recovered from the operation for which I enter the hospital on January 12, I hope to resume my studies. In the meantime, may I wish this Conference the success its importance deserves.