Meetings

Reading Machines for the Blind

Equipment used to help the blind to "read" an ordinary printed page was discussed at the sixth technical conference on reading machines for the blind, held in Washington, D.C., 27–28 January 1966.

Reports ranged from the simple transducer probe with a single light-sensitive cell and audible or tactile output to "direct translation," "intermediate," and "character recognition" reading machines. Outputs for both the auditory and tactile senses were considered.

Brief mention was made of the frequently reinvented optical probe which, with a photosensitive cell, converts information on light and dark to some audible or tactile signal. Such units generally cannot be used to "read" print although they may serve a number of useful purposes, including sensing of lights on a computer panel, for a person with no sensitivity to light.

The research of Mary Jameson (London, England), a pioneer with 48 years' experience with the optophone, was reported. Early optophones, as well as the present-day, six-tone British instrument, were described. A braille instructor from Hines Veterans Administration (VA) Hospital and a skillful user of the recently developed VA-Battelle nine-tone optophone, told of the potential utility of the optophone. As the term "optophone" suggests, through optical scanning and electronics the device transforms the letter images from a page to tones for the ear. More specifically, the transformation is from the ink patterns on a page in the y and x dimensions to sounds for the ear in the frequency and time dimensions. The user must learn to interpret these tonal patterns as letters, labels, denominations of paper money, and so forth.

Devices that produce raised replicas of graphic materials were described. Other instruments produce the effects of such embossed copy, but by means of arrays of selectively vibrating piezoelectric, bimorph stimulators sensed by the fingers.

"Intermediate" reading machines, intended as compromises somewhere between the simpler direct translation types such as the optophone and the more complex recognition devices, were also discussed. Partial recognition of letters can be accomplished with this kind of machine. For example, letters with descenders (portions projecting below the line of type, as with "g," "j," and "p") are distinguished from those having ascenders or those with neither form of projection. An audible output, coded to embody this partial knowledge of letter features, is generally proposed for use with such machines.

Recognition-reading machines were discussed, emphasis being put on the VA-sponsored research work at Mauch Laboratories (Dayton, Ohio), where the development of a personal reading machine for the blind is in progress. The laboratory model of this machine is already able to recognize the alphabetic characters from several type fonts. At this stage in the development only small deviations from perfect tracking of the probe or slight misalignments of letters on the page can be accommodated by the system. After recognition of letters, the "word synthesizer" section of the machine produces a spoken version of the text. This is in a serial rendering of letter-sounds called "spelled-speech," a special, audible, alphabet-like pronunciation system developed at Metfessel Laboratories (Los Angeles, California) to foster coalescence of the letter-sounds into word-like groups.

The possible contributions from the business machine and computer industries to recognition-reading machines for the blind were summarized.

Audible outputs for reading machines were considered at some length. Following a presentation on "spelled-speech" by Metfessel Laboratories, representatives of Haskins Laboratories (New York, New York) discussed their work aimed at production of more nearly speechlike outputs from more complex machines. They told of current plans to develop "re-formed" speech, a type of flowing speech compiled from stored word-pronunciations of several thousands of individual words manipulated in pitch contour and duration to suit contextual requirements in a sentence. Recent commercial devices, storing up to hundreds of recorded words and capable of "speaking" them back in any chosen sequence, but with only one fixed reference pronunciation, were noted by a speaker from Cognitronics Corporation.

Gaining independent access to the material on a printed page continues to be a difficult problem for the blind. Some discussions were also held on methods which sidestep or bypass the problem and provide alternative, though often less satisfying, solutions. The managing director of the Sensory Aids Evaluation and Development Center (Cambridge, Massachusetts) spoke on machine translation to braille of "Teletypesetter" and "Monotype" perforated paper tapes. These tapes, by-products of printing processes, contain information appearing also in some printed version but are highly amenable to the "machine reading" required in an automatic reading system for the blind. By using this advantageously stored and recoverable information and translating it to the braille system, one might conveniently circumvent the more difficult optical character recognition problem.

Another general class of alternative solutions, mentioned at these meetings at least since the second conference, held in April 1955, generally involves possible use of the telephone lines to convey a facsimile of a printed page from the location of the blind user to a central office. The text might then be read back over the phone to the user. Engineers from Cognitronics Corporation demonstrated publicly for the first time two variants of such a system. In the first, typed numeric data were scanned by the apparatus at the conference in Washington; video information was sent by the telephone lines to the plant at Briarcliff Manor, New York; automatic character recognition was accomplished there, and the numerals were "spoken" back over the phone in human-voice recorded numerals by "Speechmaker," an automatic speech-generation machine developed at Cognitronics. In the second, alphanumeric material scanned in Washington was

read back over the telephone by a sighted reader from a CRT display at Briarcliff Manor.

While no neurophysiologists or sensory information processing specialists spoke at the conference, brief reference was made to the possibility of a nearly all-encompassing ultimate solution to the reading problems of the blind—development of substitute organs to replace defective parts of the visual system, and then conveying the visual information directly to appropriate parts of the central nervous system. Some participants considered this approach very difficult and expensive, but not completely impossible.

The conference was organized by the Veterans Administration.

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Forthcoming Events

May

3–5. **Industrial Waste**, 21st conf., Purdue Univ., Lafayette, Ind. (D. E. Bloodgood, School of Civil Engineering, Purdue Univ., Lafayette 47907)

3–6. American Chemical Soc., Div. of **Rubber Chemistry**, San Francisco, Calif. (G. N. Vacca, Bell Telephone Laboratories, Murray Hill, N.J.)

3–8. Mechanism of Action of **Fungicides and Antibiotics**, intern. symp., Biological Soc. of the GDR, Reinhardsbrunn, East Germany. (H. Lyr, Inst. für Forstwissenschaften, Alfred-Möllerstr., 13 Eberswalde die Berlin)

4. Society for **Analytical Chemistry**, mtg., Bristol, England. (The Society, 14 Belgrave Sq., London, England)

4–6. **Genetics** Soc. of Canada, 11th annual mtg., Banff, Alberta. (C. O. Person, Dept. of Genetics, Univ. of Alberta, Edmonton, Canada)

4–6. Society for Experimental **Stress Analysis**, spring mtg., Detroit, Mich. (B. E. Rossi, 21 Bridge Sq., Westport, Conn. 06882)

4–7. **Virginia Acad.** of Science, Madison College, Harrisonburg. (R. C. Berry, Virginia Acad. of Science, P.O. Box 8203, Richmond 23226)

4–8. **Laboratory Medicine**, 12th congr., Bad Kissengen, West Germany. (W. Albath, Katharinengasse 3, 87 Würzburg, Germany)

4–11. **Instability Phenomena in Galaxies**, symp., Armenian SSR. (A. N. Hakopian, Acad. of Sciences of the Armenian SSR, Erevan)

5–6. **Human Factors in Electronics**, 7th symp., Minneapolis, Minn. (C. A. Baker, Honeywell, Inc., 2700 Ridgeway Rd., Minneapolis)

5–6. **Rabies**, natl. symp., Atlanta, Ga. (J. R. Ray, American Veterinary Medical Assoc., Chicago, Ill.)

5–6. **Strontium Metabolism**, intern. symp., Annan, Scotland. (J. H. Martin, United Kingdom Atomic Energy Agency, Chapelcross Works, Annan, Dumfriesshire, Scotland)

5–7. Society for American **Archaeology**, 31st annual mtg., Univ. of Nevada, Reno. (D. D. Fowler, Dept. of Anthropology, Univ. of Nevada, Reno 89507)

5–7. New Jersey Soc. of **Professional Engineers**, 42nd annual conf. and exhibition, Atlantic City. (K. G. Stanley, The Society, 495 West State St., Trenton, N.J. 08618)

5–7. Midwestern **Psychological** Assoc., Chicago, Ill. (F. A. Mote, Psychology Dept., Univ. of Wisconsin, Madison)

5–8. **Protides of the Biological Fluids**, 14th annual colloquium, Bruges, Belgium. (P.O. Box 71, Bruges)

6–7. Institute on **Lake Superior Geology/Mineralogical** Soc. of America/Soc. of **Economic Geologists**, mtg., Michigan Technological Univ., Saulte Ste. Marie. (A. K. Snelgrove, Michigan Technological Univ., Houghton 49931)

6–7. **North Carolina Acad.** of Science, Catawba College, Salisbury. (J. A. Yarbrough, Meredith College, Raleigh, N.C.)

6–7. **North Dakota Acad.** of Science, North Dakota State Univ., Fargo. (B. G. Gustafson, Univ. of North Dakota, Grand Forks)

6–8. Society for Applied **Anthropology**, 25th annual mtg., Milwaukee, Wis. (The Society, Rand Hall, Cornell Univ., Ithaca, N.Y.)

6–8. **Wisconsin Acad.** of Sciences, Arts, and Letters, Lawrence Univ., Appleton, Wis. (D. J. Behling, 720 Wisconsin Ave., Milwaukee 53202)

6–9. American **Psychoanalytic** Assoc., Atlantic City, N.J. (H. Fischer, 1 E. 57th St., New York, N.Y.)

7–8. Academy of **Psychoanalysis**, Atlantic City, N.J. (A. H. Rifkin, 125 E. 65 St., New York 10021)

7–12. American **Ceramic** Soc., 68th annual mtg., Washington, D.C. (The Society, 4055 N. High St., Columbus, Ohio 43214)

8–10. Society of the **Plastics Industry**, Canadian section, 24th annual mtg., Montreal, P.Q. (The Society, 250 Park Ave., New York 10017)

8–11. **Administrative Management** Soc., 47th intern. conf., Boston, Mass. (W. H. Latham, Willow Grove, Pa. 19090)

8–12. Association of American State **Geologists**, annual mtg., Univ. of Indiana, Bloomington. (W. C. Hayes, Missouri Geological Survey, P.O. Box 250, Rolla 65401)

8–12. **Organic Sulphur Compounds**, symp., Univ. of Groningen, Groningen, Netherlands. (M. J. Janssen, Dept. of Organic Chemistry, Univ. of Groningen, Groningen)

8–15. **Stereochemistry**, conf., Bürgenstock, Switzerland. (D. Arigoni, Dept. of Organic Chemistry, Univ. of Zurich, Zurich, Switzerland)

9–10. **Circuit Theory**, 9th midwestern symp., Oklahoma State Univ., Stillwater. (D. R. Wilson, School of Electrical Engineering, Oklahoma State Univ., Stillwater 74045)