

PROBLEMS OF SENSORY PROSTHESIS

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This is an age in which a great deal is being done to help the handicapped. There is an improvement in artificial limbs for the maimed, in new sorts of spectacles, and in hearing aids. All this is returning to useful life a considerable part of those who would in other generations have been hopelessly handicapped. Even the two greatest handicaps from which humanity suffers—blindness and deafness—are the object of powerful and determined attacks with the object that where these defects cannot be removed or corrected by medical means, these victims may still be allowed to take, as nearly as possible, a normal part in life.

Notice that these two afflictions are sensory defects, that is, defects in the reception of impressions from the outer universe and from other human beings. From the standpoint of the outer universe, blindness is overwhelmingly the greater of the two losses. The sense of hearing, as brought out by such investigations as have been made by the Bell Telephone Company in their study of speech, and as further evidenced by the size of the speech areas in the brain, is a sense with vastly less variety than the sense of sight. On the other hand, normal communication between man and man goes by mouth and ear much more than by all other channels, and the social and emotional damage done by deafness is disproportionately great when one compares it with the social loss of the blind. The typical emotional picture of the deaf man is that of a reserved, self-contained, neurotic personality, whereas the typical picture of the blind man who has achieved any degree whatever of equilibrium is that of a euphorically confident and rather cocky personality.

In order to make any effort to replace the lost sense, either of the blind or of the deaf, it is necessary for us to make a rather accurate measure of what they have lost. It is then necessary for us to see if there are any relatively unused channels into the human nervous system which are capable of supplying the whole or any considerable part of what is lost. These are problems of physiology and communication engineering, and have a most important mathematical side.

To bring out this mathematical side adequately, I wish to refer to

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