

graph and Venn diagram symbols might easily be combined by programs to create totally new graphic texts.

Only a few years ago the author of a book on chemistry could still boast of having succeeded in writing his text without illustrations. Today the creation, through neglect, of such barriers to understanding and imagination would be no cause for pride. In the future audio-visual world an equality between text and image in information transmission will be a matter of course not only out of economic compulsion, but also in response to the current realms of thought and problem solving.

People are prepared for a new dimension of visible language by illustrated magazines, film, and television. Even in comic books one can find complex activities of visual communication which are by no means as simple as some theorists maintain. In a dozen frames of a cartoon series, occurrences are expressed whose narrative description might require a whole chapter of a novel. Even youngsters have little difficulty in understanding this form of information which often contains relatively complex action patterns, conflict situations, social interdependencies, etc. The use of quite general, easily understandable visual symbol languages should not be confined to comics.

Language, thought, and action are connected in a complex feedback system. Therefore, the step toward a more visual visible language will have an influence on thinking and acting. One may hope that this development in the direction of visual thinking will lead to a more beneficial, augmented clarity of thought and to a better understanding of the abstract connections of the modern, technical world.

#### Notes

1 The most important element shown in Figure 1, a diagram of information channels from the sense organs through data processing stations in the brain, is that of the input capacity of consciousness. As determined by different measurements, its value lies approximately between 8 and 25 bits per second. A probable value adopted by H. Frank is 16 bits per second. Note that this input capacity accounts for the sum of the information flowing through all sensory channels as well as the information being brought from memory. Usually if one concentrates on an auditory process, the information flowing through the eye is restricted, or if one tries to quote material from memory less information is at one's disposal from the external world.

It is very difficult to state how much information consciousness is able to accept; there exist only estimates. For instance, one may rely on the so-called duration of present time, about 10 seconds (H. Frank, 1959). It is possible, for example, to remember the text of linguistic expressions or of a musical phrase if it does not date back more than 10 seconds. Also extremely instructive is the fact that one is able to count unobserved strokes of a clock after it has been removed, but only for approximately 10 seconds. Taking into account these and similar considerations, one may estimate the following value for the storage capacity of consciousness: if within 10 seconds 16 bits enter, then 160 bits are accepted. If more information enters, part of the storage capacity must be given up or extinguished. The sum of 160 bits is not precise but is sufficiently accurate to allow one to draw qualitative conclusions having importance for investigations of cognitive processes as well as the structure of human language.

#### To the Sincere Reader

Nelson Howe

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