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On the whole, the roman ligatures appear to be superior to the sans-serif counterpart. The roman alphabet, with its serifs and thick and thin weight distribution, supplies more cues to the identity of the individual letters than the more simplified sans-serif characters. An example of this can be seen if we compare the roman ar ligature with the sans serif. The roman ligature has a very distinctive ball on the stem of the r as well as a serif at the bottom to establish recognition. The sans-serif ar ligature has only the stem of the r which has few distinctive characteristics.

The Technical Process

The ligatures were drawn 5½ inches high and were photographically reduced to a standard 60-point type height or approximately ½ inch. The ligatures were then juxtaposed with printed individual letters to make paragraphs, and then reduced to a normal text height of 10–11 points.

Ultimate use of this system of ligatures would require a computer and a photocomposition machine. The programming would have to be determined in conjunction with professional computer personnel.

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Type Design for the Computer Age

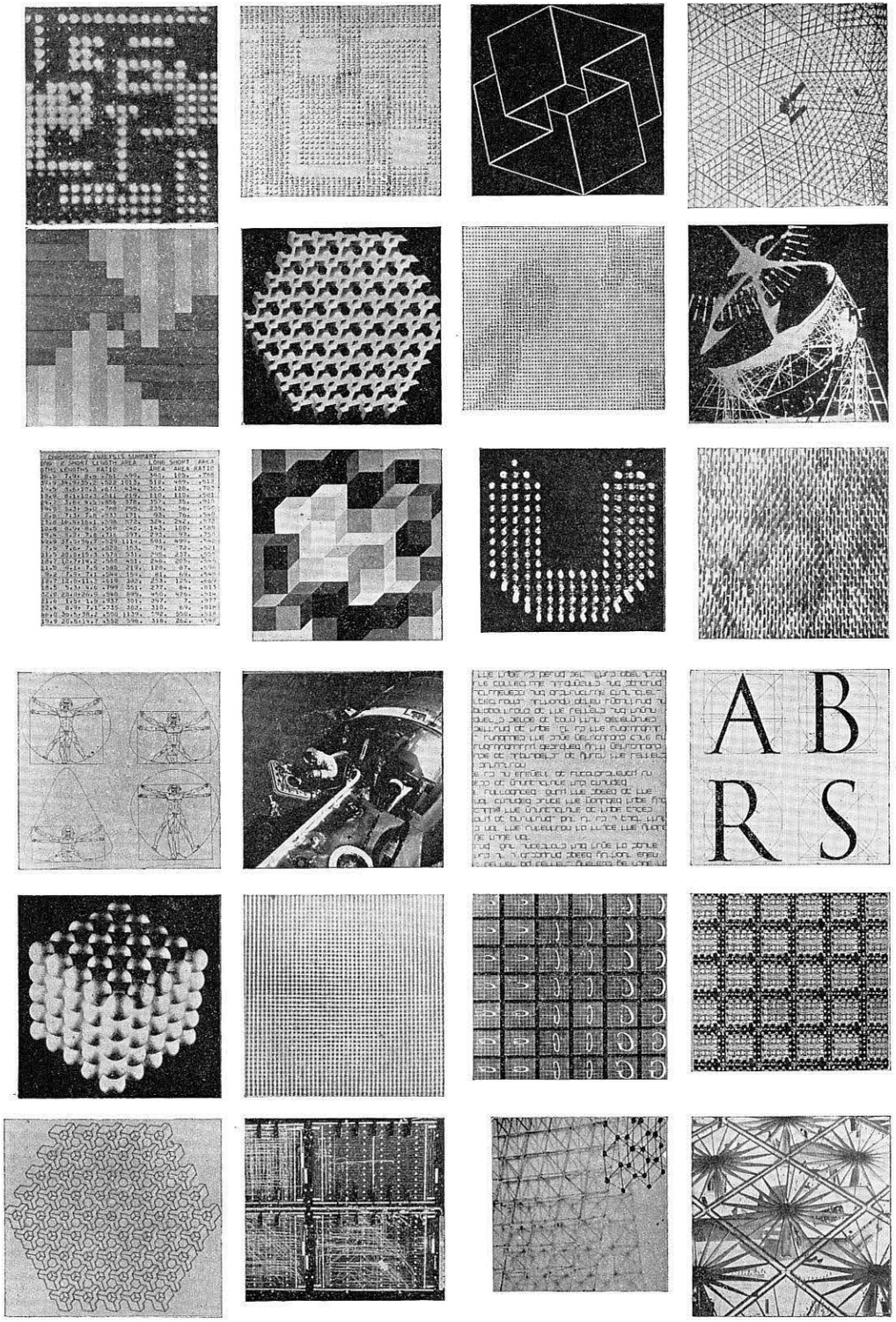
Wim Crouwel

Although typography has always reflected the cultural pattern of its period, today's typefaces and typographic design are a reflection of the past, not of contemporary society. We must think in terms of our electronic media and contemporary forms of expression. A suggested approach for designing today's typography—based on a cell or unit system—is discussed and illustrated.

Leonardo da Vinci may not have been an important type designer; he was, in any case, one of the first who tried to bring letter-types into the framework of a construction. Many after him have repeatedly tried, with more or less success, to analyze the highly individual signs that letters are into a number of basic forms. In da Vinci's case it was clearly the constructor who felt the need to reduce things to simple principles; more-over, his constructions were inspired by his being a sensitive artist.

This attempt—to reproduce constructionally what the human hand created with care and devotion—never had many actual consequences for the evolution of type. Clearly, man's productivity could easily meet the existing demands, and the individual who looked a bit further stayed alone; economically there was no need.

Now, however, we have reached a period—the second half of the twentieth century—in which economic necessity has created machines capable of reproducing characters at a speed of several 1000 per second. In 1969 Leonardo da Vinci would have been able to contribute much to the development of the typesetting machine and especially to the evolution of types for it. We can assume that da Vinci, who reflected the trend of his time with extreme sensitivity, would have evolved a highly appropriate type, a type that would not be anachronistic to the space craft in which the first men landed on the moon.



For the moment I shall ignore the fact that computers and CRT setting systems came into existence as a result of military needs. And I only mentioned Leonardo da Vinci (who also designed horrible war-machines) to indicate that typographical development has always been closely related to a period—its techniques, its economics, its art, and its culture.
As there were the Phoenicians with imprinted clay tablets,
the Romans with their inscriptions in marble,
the men of the Middle Ages with illustrated parchment,
the men of the Renaissance with soft lead type,
and the Classicist with type engraved in steel;
each period with the type conforming to its need and reflecting a total cultural pattern.

We do not conform to this tendency today; our type is generally anachronistic, out of touch with our particular time. Today, for example, we should soon be able to project letters into space with the help of laser beams. We have for too long seen the typographical character as a form in itself. We have for too long practised the writing down of these beautiful characters: in school, in our handwriting; in art school, in calligraphy and letter-drawing. We have been so intent upon copying something from the past that we have forgotten to think of our own time. We are so dazzled by the beauty of the characters with which we have to do every day that we cannot bring ourselves to regard them objectively. Writing by hand is fortunately a vanishing skill. In the future it will serve only for making rapid abstract notes, which will be of no value except to the writer, and undecipherable except by him. For true communicative purposes its role is finished.

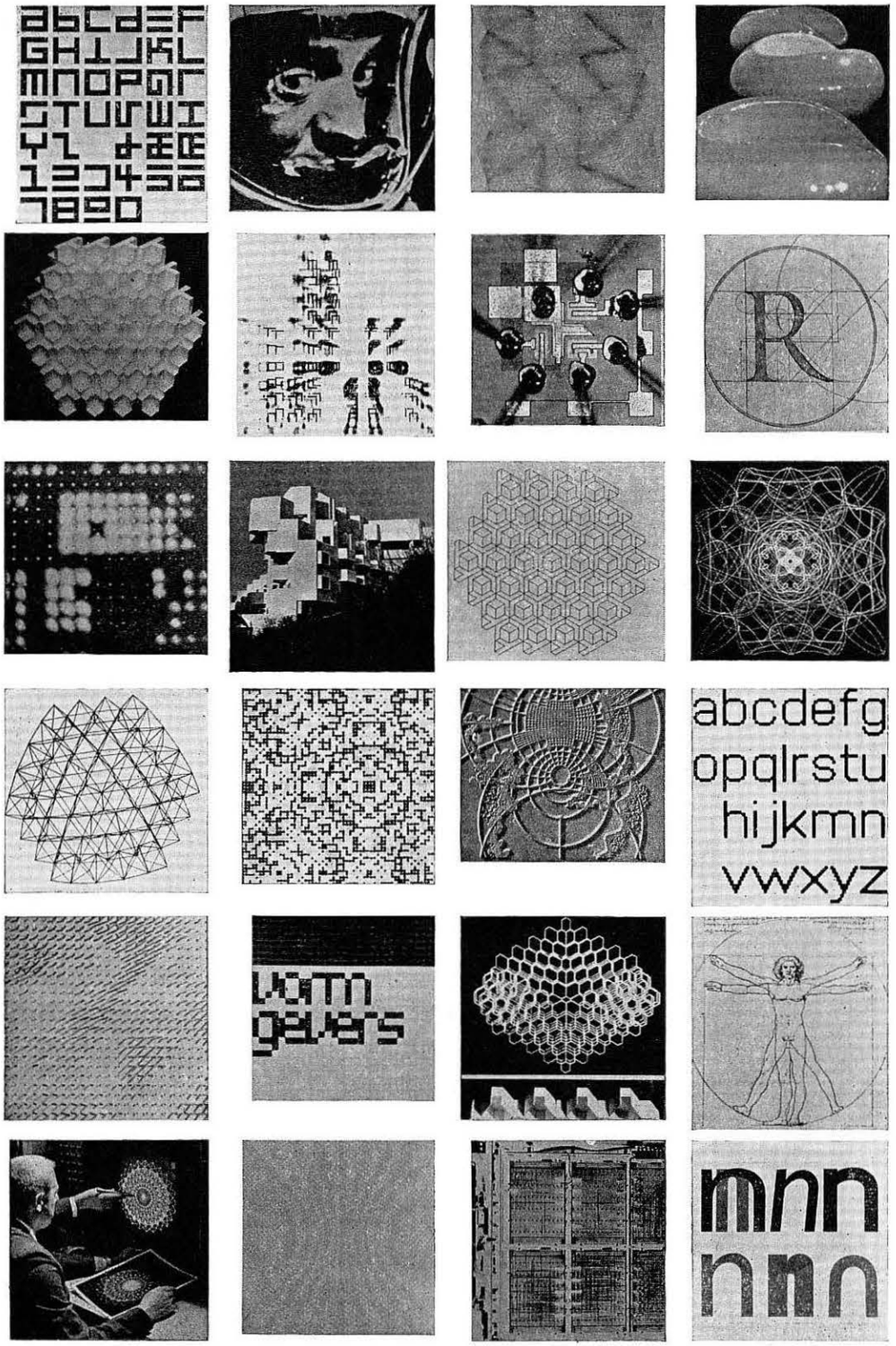
The letter-type for our time will, therefore, certainly not be based on the written or drawn examples of the past. The type which will now come into existence will be determined by the contemporary man who is familiar with the computer and knows how to live with it. Likewise, this type will be determined by the art of the present time, with its rapidly changing character in which aesthetic values are given a totally different interpretation. The type will be determined by the contemporary cultural pattern of which we have as yet only a partial view, but which each of us senses, and in which we participate; a period with a tremendous urge for renewal.

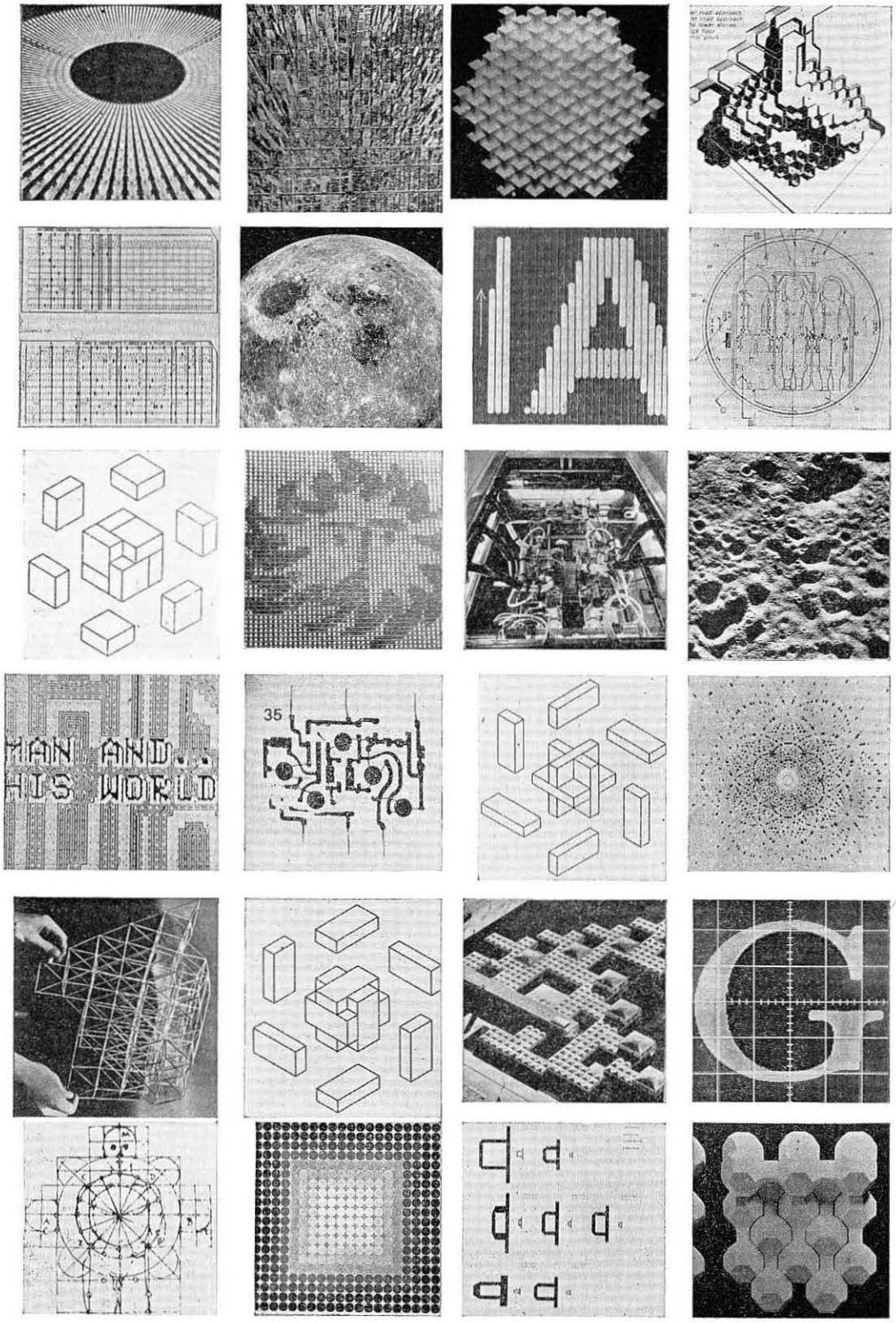
Our computers work according to the very simple system of yes or no, 1 or 2. The memory of a computer is an assembly of cells, charged positively or negatively. This assembly of cells, so similar to the composition of organisms and to the structure of our entire society, could be a new starting point for the development of new characters. I do not know whether this ought to be letters or pictograms; in principle I speak of communication symbols. Symbols in every form can be constructed with these cells and even spatial symbols are possible. The computer does not have a merely two-dimensional "output," but a three-dimensional possibility. The cells may be strung together in certain patterns; this pattern construction determines the form of the symbol.

In our present arsenal of forms one finds many corresponding expressions—the clearest in contemporary architecture—all based on the principle of many small units, together shaping the form. For example: the honey-comb, certain architectural studies by Conrad Wachsmann, the geodesic domes of Buckminster Fuller, and Habitat at the Montreal Expo. No matter which computer-aided system one applies, the cell principle seems to me a correct starting point, just as was the papyrus stamp, the goose quill, or the engraver's tool.

Although the cell form is important for the arrangement of patterns, I use the expression "dots" as an example for convenience sake. If we compose a classical letterform with these dots, you will notice that there is something happening. The letter cannot be dotted, cannot be screened; that is incompatible with its appearance. In principle nothing is changed when one takes 400 dots to the cm. instead of 20. Apparently everything is in order, but the screening has been done. It remains a concealed affront! It is against the classical letterform.

One can compare this to another example. In the nineteenth century when cast iron was discovered, we were proud of the fact that we could imitate everything in cast iron, indistinguishable to the naked eye from the original article. By means of this, beautiful wood carvings and sculpture were copied for architectural purposes. We soon saw that this was the wrong approach. In the same way we will doubtless stop the reproduction of Bodoni and Garamond on the supersonic machines. *It is an error!*





The assembly of cells which is so marvellously adapted to the computer principle, will have to lead to a specific sign language. Taking into account the uniformity of the cells, an equilateral form is perhaps the most desirable for these signs—an enlarged cellform, as it were. It is also desirable in view of a variable typography. Every conceivable combination in all directions can then be achieved. I would like to adopt some sort of vocabulary agreement to facilitate understanding.

Together the cells form the signs, I would call these *nuclei*; together these nuclei form words or concepts, I would call these *units*; these units form the *communication*. A communication is an assembly of units, and a unit is an assembly of nuclei. Giving form to a communication is therefore typography. Typography, according to this system of nuclei, will be very clearly defined. The construction of this typography could be much freer, could even be developed in the third dimension; while, on the other hand, the form would appear far more systematic and harmonious than in traditional typography. It will probably lead to equilateral two- or three-dimensional sizes if we assume that the cellform determines the form of the nucleus, the nuclear forms determine the forms of the units, and the forms of the units determine the form of the communication. The increase or decrease in size of a specific type sign, a specific nucleus, means that a greater or smaller number of cells is involved.

A result of this is that a freely-drawn curved line changes its shape in principle with every increase or decrease in size. Again I say "in principle" because with 400 cells per centimeter, this could not be observed by the naked eye. The fact remains, however, that there is an unacceptable change of the sign in every size, while the meaning remains unchanged. This would mean that all straight lines of 90° or 45° could serve as the basis for the construction of the nuclei. These directions do not change and are the most regular in the cell construction. Straight lines with other angles—such as 60° or 30°—could possibly also be considered.

A lettertype was designed two years ago as a basis for discussion along these lines in which a correspondence between reproductions of types and of illustrations was effected. After all, illustrations have for many years been reproduced by means of the multiplication of dots, even though in this case different dot sizes are used. An

illustration could just as well be reproduced by same-sized dots, only a far greater density than has been possible so far, is needed. It is a matter of the refinement of printing techniques. It would be ideal when illustrations and type could be handled in the same way. The typographer would then have innumerable possibilities at his disposal, and complete integration of illustration and text could be realized.

For the "total" typography, which then becomes possible and which might even assume spatial dimensions, simple grids would have to be constructed. These grids may be compared to the structure in architecture, in which housing units can be placed as required. A grid is the invisible network of lines into which signs and illustrations are placed as required. And since the computer is able to carry out spatial calculation, this typography could also achieve an extra dimension, which very soon would also be completely visible from all sides in space. Just as holography is already showing.

The laser beam in typography. I wonder if we could then still maintain the term typography.

This article is based on a speech by Wim Crouwel at the Eleventh Congress of the Association Typographique Internationale held at Prague, Czechoslovakia, June, 1969.