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One Approach to Computer Assisted Letter Design

H. W. Mergler and P. M. Vargo

ITSYLF is an interactive synthesizer of letterforms, which can be used in the design and study of alphabets. It is a computer assisted, operator oriented programming system which allows a typographic designer to enter numeric values through a keyboard and manipulate the characteristics of the letterforms quickly and easily. The alphabet was divided into classes, based on geometric properties of the letters. A set of parameters was derived that allows the construction and manipulation of the letter shapes based on mathematical models of the letters. A set of programs was generated that produces a drawing of the letter which corresponds to the current parameter values. Examples of the effects on the letter shapes of various sets of parameter values are presented for E, A, D, C as well as examples of computer generated serifs and three sets of consistent letterforms that could be used as the basis for several new alphabets.

"Electronics will soon force its claims upon letterforms, and let us hope they will liberate us from the dust of the past." [1]

The art of designing letters is a very old one; the ancestors of modern capital letters may be traced back to the Trajan Column of the Roman Empire.[2] There is no question as to the high degree of skill that must be possessed by letter designers to resolve the myriad problems of letter height, width, the weights of the thick and thin strokes, and serif design. If one investigates an alphabet, it should readily become apparent that there is a tremendous amount of structure and regularity in a fine typeface. The amount of structure might lead one to think about a computer-based system that could exploit it for design purposes.

The most significant use of letters is to convey information by means of the printed word. In the past, at least since the advent of metal type,

1. Hermann Zapf, "The Many Faces of Zapf," *Lithopinion*, III, no. 2 (1968), 59.
2. Fred W. Goudy, *Capitals from the Trajan Column at Rome* (New York: Oxford University Press, 1936).

letterform design has reflected characteristics of the metal; the need to shape the letters in metal or to produce them on a hot-metal composing machine, for example, have been limiting factors. This has led to a class of contemporary letterforms which are suited to letterpress printing. However, for the past 20 years typography and printing have been undergoing significant changes in both technique and philosophy.[3] These changes include such advances as computer controlled hot-metal typesetting, hyphenation and justification programs, page composition, and computer controlled photoelectric typesetting using cathode ray tubes to expose film.[4] While there has been some attempt to develop typefaces which reflect the technology and capabilities of the modern digital computer—such as the American Standards OCR Font [5] or Wim Crouwel's experimental design for an alphabet particularly suited to the requirements of cathode ray tube typesetting [6]—these efforts have not had a significant impact on book, magazine, or newspaper printing. Today, much effort is being devoted to altering typefaces designed for hot-metal composition to make them suitable for computer controlled photocomposition. Perhaps one could draw a parallel between these efforts and Gutenberg's attempt to produce printed matter that looked like handwritten manuscripts. Within a few decades letterforms evolved which reflected the characteristics and properties of the new medium: movable metal type. Little effort is being made to utilize the characteristics of modern data display equipment to design letterforms which reflect the current capabilities and tools of the printing industry.

ITSYLF, an Interactive Synthesizer of Letterforms, is a typographically oriented man-machine system. It represents an attempt to use the data manipulation capabilities of modern computers to support the efforts of the typographic designer. ITSYLF results from a synthesis of two different trends in an effort to develop a system that will allow a typographic designer to quickly and easily manipulate the letterforms based on his

3. Kelber and Schlesinger, *Union Printers and Controlled Automation* (New York: Free Press, 1967).
4. "Latest Word in Printing Spells New Electronics Market," *Electronics,* XL (May 29, 1967), 137.
5. *U.S.A. Standard Character Set for Optical Character Recognition* (New York: U.S.A. Standards Institute, 1967).
6. Wim Crouwel, *New Alphabet: an Introduction for a Programmed Typography* (Hilversum, Holland: Steendrukkerij de Jong & Co., 1967), booklet.

concepts of them. At the same time, ITSYLF relieves him of some of the graphical bookkeeping—such as drawing lines and maintaining appropriate widths and heights—which is essential to designing letters that are to be compatible with one another.

The two trends referred to above are the expanding use of computer controlled photocomposition in the printing industry and the development of computer graphics and computer assisted design in engineering. ITSYLF will enable a designer to rapidly synthesize new and different letterforms for design purposes or to approximate known hot-metal faces to investigate their characteristics. It can also be used to study the effects a change of parameters would have on a new set of letterforms, either on one letter or on a complete alphabet. ITSYLF has a further advantage beyond the ease with which letterforms may be manipulated in that the letters are generated using a digital medium, a core memory, which is ideally suited for use with modern CRT display and photocomposition systems as opposed to a continuous paper and pencil medium which must then be converted to a digital representation.

ITSYLF has been restricted to the generation of 24 roman capital letters. (The Q and J have not been considered for reasons to be elucidated later.) It consists of 24 sans-serif letter generating routines, a monitor system, and various serif generating and letter drawing routines. The letter generating routines are extremely flexible and, based on parameters entered by either the operator or the automatic executive system, can produce letters having many different characteristics. When running in a manual mode, the operator may generate individual letters which are completely dissimilar to one another. When running under control of the automatic executive system, parameters for all 23 other letters are calculated based on values input by the operator for the letter E. (The E has been chosen as a key letter as it is one of the commonest letters in the English language.) A consistent set of letters is then automatically synthesized and drawn. The requirement of consistency is of extreme importance, for, as observed by Fred Goudy, "The making of a type design is quite easy... one has only to think of a letter and draw about the thought.... The great difficulty lies in thinking of 25 other letters to go with it in complete harmony." [7]

7. *Design of Types* (Adirondack Club of Printing House Craftsmen, 1941).

This leads one to a definition of the activity that ITSYLF, along with a typographic designer, engage in. This is digital letter design, which is defined to be the synthesis of characters, either singly or as members of a set, all of which are consistent with one another. This is somewhat different from the definition proposed by M. V. Mathews for digital type design: "Digital type design consists in determining the coordinates of the vectors which form the image of the letter." [8] Mathews was primarily concerned in his definition with the replication of hot-metal faces on cathode ray tubes as opposed to the synthesis of digital letterforms.

There has been much research into the characteristics of letters and alphabets in the past but very little of it has been oriented toward letter synthesis. There has been work done in the areas of legibility,[9] readability,[10] and letter-spacing [11] but the work associated with letter design has been of a highly qualitative nature and, at most, provides a conceptual framework in which to think. To construct a letter generating system, it has been necessary to postulate the existence of a set of parameters that will realistically describe the letter shapes. Then it was necessary to investigate the geometric characteristics of each letter and extract this set of parameters which could be used to specify and describe the letter. The data that were used in deciding on significant parameters and in developing the relationships between the letters came from 18- to 24-point letters photographically enlarged 32 times. It would, of course, have been very desirable to use original drawings of the letters but these were impossible to obtain. The four fonts used were Bodoni Bold, Times Roman, Futura Medium, and Vogue Light. These four fonts were chosen because they are representative of a large number of different fonts and fairly good enlargements could be made.

ITSYLF produces for the designer a picture of the synthesized letter or letters which are drawn on a Cal-Comp plotter either 4-times or 32-times actual size. The 4-times size was a result of available plotter resolution

8. M. V. Mathews, *et al.*, "Three Fonts of Computer-drawn Letters," *The Journal of Typographic Research,* 1 (October, 1967), 345–356.
9. *Legibility of Alphanumeric Characters and Other Symbols* (Washington, D.C.: U.S. Department of Commerce, 1964).
10. *Ibid.*
11. D. Kindersley, *An Essay in Optical Letter Spacing* (London: Wynken deWorde Society, 1966), booklet.

and the necessary size of the sampling interval to achieve adequate reproduction of known fonts. The 32-times size output has the same resolution as the 4-times size, but each of the incremental plotting magnitudes is multiplied by 8. This mode is useful for comparing synthesized letters directly with the photographed originals.

It should be noted that no attempt has been made to investigate the character spacing problem. All characters are arbitrarily centered on the character generation matrix. This is not to imply that the spacing problem is trivial or unimportant. It is neither. The decision has been so made precisely because the spacing problem is quite involved and should be considered as a problem in its own right. This is so even though the parameter values for the letters and the space between them are definitely interrelated. It is the authors' opinion, in fact, that a computer-based spacing algorithm based on the optical spacing system developed by David Kindersley [12] is not only feasible but, coupled with a letter synthesizing scheme such as ITSYLF, would result in a powerful typographic design tool.

System Structure and Characteristics

ITSYLF depends on a very basic assumption about the typographic design process. It assumes that the significant function a letter designer carries out is the making of choices—often based on unknown criteria—concerning the desirability of certain letterform shapes, heights, widths, stroke weights, and serif characteristics—to name a few. This leads to the implication that the drawing of character shapes is necessary to see the results of the design effort, but it is not inherently a part of creative letter design. ITSYLF takes in parameter values that embody the essential characteristics of a letter and does the necessary bookkeeping work to generate and draw the resulting letterform. The programming system does all the quantitative work necessary to generate and draw characters of appropriate heights, widths, and with the necessary stroke thicknesses while leaving the operator free to think about how he wishes to manipulate the letter parameters. ITSYLF runs on what is classified as a small computer system. Available hardware includes 8,000 words of memory, a magnetic tape drive for bulk storage, a Teletype for

12. *Ibid.*

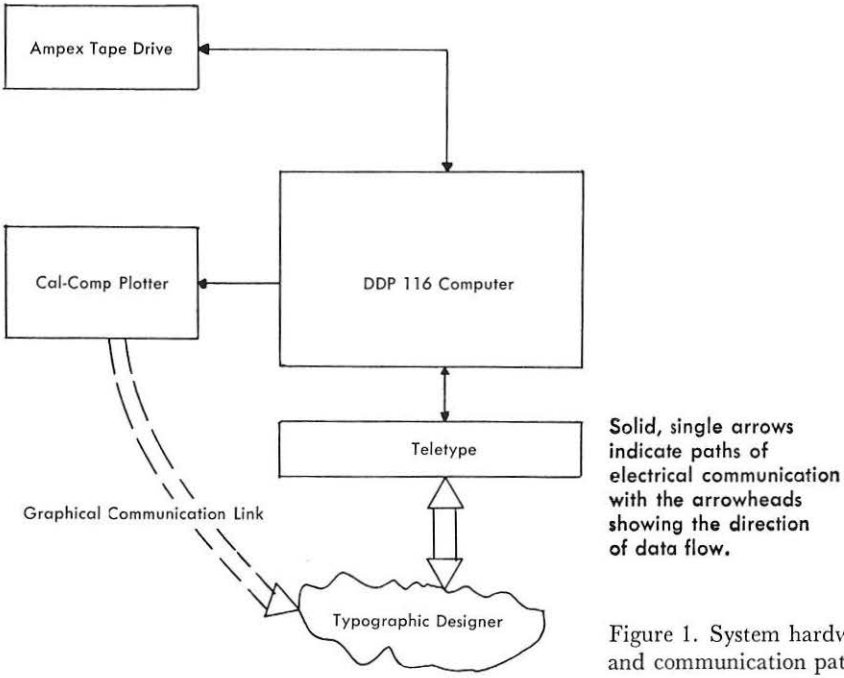


Figure 1. System hardware and communication paths.

communication to and from the programming system, and a Cal-Comp plotter for graphical output. ITSYLF consists of 24 sans-serif letter generating routines plus assorted control and serif producing programs. (The Q and J seem so similar to the O and I that at this stage they are excluded.) The operator communicates with the systems programs by means of the Teletype. The system is operator oriented and one is able to call various routines for execution, define parameter values, or determine the states of the system simply by entering the appropriate names and values through the Teletype keyboard. Once the name of a program has been entered, the system positions the tape on which all programs are stored, reads the program into memory, and starts it automatically. There is automatic checking of the inputs to be sure that they are correct and may be understood by the system. If errors are found, diagnostic messages are typed out on the Teletype, and the system waits for a correct input to be entered by the operator.

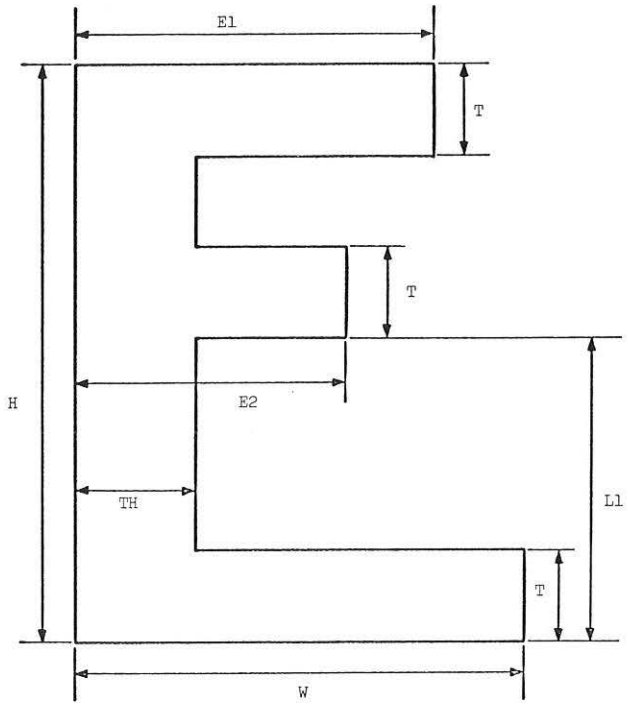
Figure 1 is a block diagram of the system hardware and the significant communication paths. As can be seen, there is a visual, graphical

communication link between the plotter output and the designer. The other communication paths are serial, symbol oriented, and are used to transmit formal messages between the components of the running system or between the operator and the system. The graphical link is the path by which the system loop is closed through the operator, and it is on the basis of this graphical feedback data that the designer determines if he is satisfied with the shape of the generated letter. If not, it may quickly be changed by entering a different parameter set for the letter or just changing the offending parameter value. The letter may then be redrawn with this new set of parameters. Characters are represented in the computer's memory by a two-dimensional binary matrix. Initially the matrix, which is 208 x 208 bits, is set to all zeros. The letter generating routines set each bit on the edge or interior of the character being generated to a 1. This basic character shape is then automatically coded to produce a set of instructions which are used to drive the plotter. The matrix size is dictated in part by the available number of words of core memory and partly by the need to generate characters with as small a sample interval as possible. The character generation routines select appropriate rows and columns, and the letters are generated a row at a time.

Letter Generation

Suppose that an operator wishes to design a letter, E, based on some criteria. For example, he may wish to design a letter with equal width strokes or with condensed or expanded characteristics. To do so, it is only necessary that he introduce into the system appropriate values for the parameters of the letter E,which are defined in Figure 2. These are values for the height, width, weight of the thick and thin strokes, length of the top and center horizontal, and the height of the center horizontal from the foot of the letter. Once the necessary values are entered, ITSYLF will produce the corresponding graphical version of the letter. Figure 3 illustrates four different sans-serif versions of the E. (Note that these are drawn four-times actual size.)

If it should happen that the operator does not like the version of the letter that a given set of parameters produces, it is only necessary that he alter the parameters in the direction that seems desirable and have the letter drawn again. Figure 4 illustrates the letter E with all parameters



Letter parameters entered by operator are, E1, E2, H, L1, T, Th, W.

Figure 2. Parameter definitions, letter E.

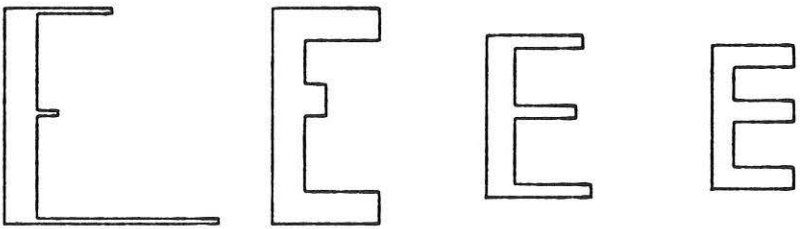


Figure 3. Four sans-serif versions of the letter E.

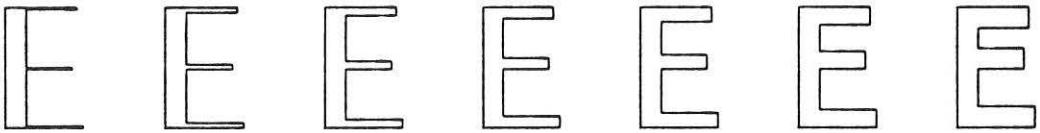


Figure 4. Variation in changes of form of letter E as value of T is increased in increments of four units starting with a value of two units for the left-most E.

fixed except for the weight of the thin stroke (T). It is interesting to note the extreme changes in form that the figure demonstrates even though only one parameter is being manipulated. The total time necessary to generate and draw these versions of the E was under four minutes. The generation itself is almost instantaneous but drawing the letter and moving the magnetic tape to get the necessary programs are rather slow.

Before it was possible to produce a set of letter generating routines, it was necessary to produce a mathematical model for each of the letters. To this end, the alphabet has been divided into classes based on significant geometric properties as follows:

Class 1 letters—E, F, H, I, L, T. These are the most elementary letterforms composed only of horizontal and vertical straight lines.

Class 2 letters—A, K, M, N, V, W, X, Y, Z. This class is composed of letters which have straight lines that are not necessarily horizontal or vertical.

Class 3 letters—B, D, O, P, R, U. These are the most elementary curvilinear letterforms and are composed of both straight and curved strokes.

Class 4 letters—C, G, S. The C, G, S require generation procedures that are much more involved than Class 3 procedures though they are composed of the same variety of strokes.

Class 5 letters—J, Q. The J and Q are classified together because while both have the basic Class 1 and Class 3 forms of the I and O, they also have very free-form tails that significantly alter their appearance.

The models of the letterforms that were used evolved out of an investigation of the geometrical characteristics of the letters of the four type fonts mentioned previously plus some comments concerning the characteristics of the letterforms and their historical background.[13-16] The models are quite flexible and will let the designer investigate a great number of parameter combinations. These models also have the advantage of being easily changed as more becomes known about the letters.

13. E. Weiss, *Design of Lettering* (Pencil Points Press, 1932), p. 9.
14. B. Warde, *Type Faces Old and New* (London: The Bibliographical Society, 1935), p. 138.
15. M. Bigelow, *Alphabets and Design* (San Diego, 1965), p. 41.
16. W. A. Dwiggins, *WAD to RR: a Letter about Designing Type.*

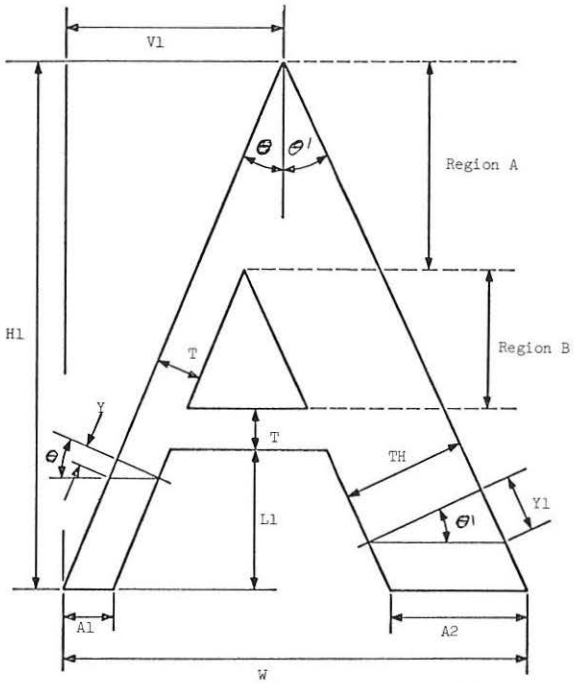
The E (discussed previously) is typical of Class 1 letters and is composed of one vertical and three horizontal strokes. It is generated in the computer's memory sequentially. First the vertical is produced followed by the three horizontals. As an example of the Class 2 letterforms, consider the letter A and its parameter definitions in Figure 5. The A is composed of two slanting strokes and one horizontal stroke. As can be seen from Figure 5, all parameter definitions are linear as opposed to being angular. This is because it is the author's opinion that the effects of altering linear parameters of a two-dimensional shape are much more intuitively obvious than altering an equivalent angular parameter. In the case of the E, there seems to be only one adequate set of parameters. In the case of the A, however, some question might be raised as to the necessity of parameter V1. Based on results from the four measured type fonts, V1 seems to have a value near W/2, but enough variation exists that it seemed desirable to make V1 independent of W. If V1 gets very far from W/2, however, a skewed and rather strange looking letter results. Figure 6 illustrates the effects of radically altering the parameter values of the A. Figure 7 demonstrates for the A the effects of altering the weight of the thin stroke (T) while holding all other parameters constant. Note from Figure 5: the width of the two slanting strokes, T and TH, is the perpendicular width. One of the functions of the letter generating routine for the letter A is to calculate the appropriate horizontal width. This is done by calculating the necessary tangent values based on values of H and V1 and then using Pythagoras' Theorem. The A is generated in one pass rather than a portion at a time as the E is. This is because the actual positioning on any row of the matrix is a function of the distance one is from the foot of the letter.

As an example of a Class 3 letter, consider the D and it's parameter definitions in Figure 8. In order to generate the Class 3 letters, it is necessary to combine straight strokes, whose mathematical model is that of the straight line,

$$Y = MX + B$$

with curved strokes to produce the lobes for B, D, P, R, U and the circular O. The mathematical curve that is used for this function is the superellipse.[17] The superellipse has an equation of the form:

17. "The Superellipse," *Scientific American,* CCXIII (September, 1965), 222.



Letter parameters entered by operator are H1, L1, T, Th, V1, W.
Calculated parameters are, A1, A2, Tan Θ, and Tan Θ ¹.

Figure 5. Parameter definitions, letter A.

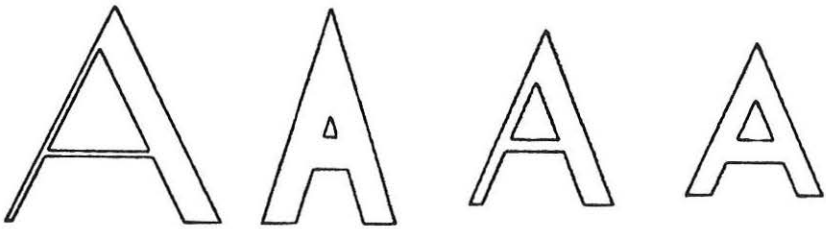
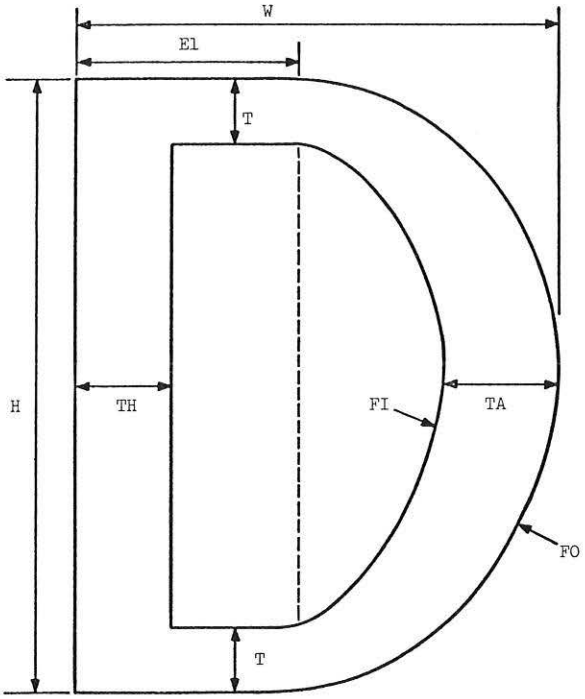


Figure 6. Four sans-serif versions of the letter A.

Figure 7. Variation in changes of form of letter A as value of T is increased in increments of four units starting with a value of two units for the left-most A.



Letter parameters entered by operator are E1, H, T, TA, TH, FO, and FI.
Calculated parameters are a, b, a1, b1.

Figure 8. Parameter definitions, letter D.

$$(X/A)^F + (Y/B)^F = 1$$

For a given A and B, varying F between 2 and 3 produces curves as in Figure 9. As F increases, the curves tend to take on a more square appearance. This curve was chosen because it seemed to approximate quite well the lobes of the letters of the four measured fonts. In the case of the letter D, the squareness coefficient of the interior curve may be adjusted independently of that for the external curve. This has been done to account for a "thinning" phenomena which has been observed on the measured fonts. This phenomena occurs as the exterior curve of the lobe has a value of F less than the interior curve. As a result, one encounters the phenomena displayed in Figure 10 where the interior curve is more square than the exterior curve and the letter appears "thinner" in some portions than one might initially expect. For all Class 3 and Class 4

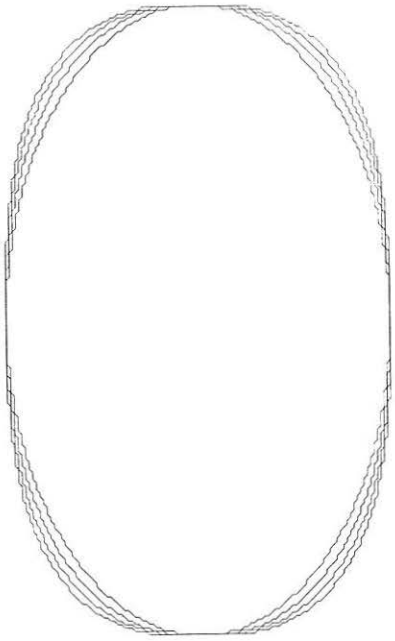


Figure 9.
Superellipses illustrating the effects of increasing F from 2 to 2-3/4 in increments of 1/4 (interior curve has F = 2).

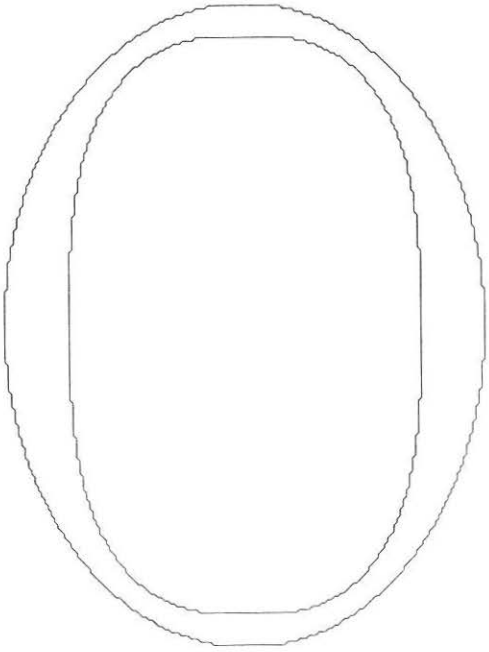
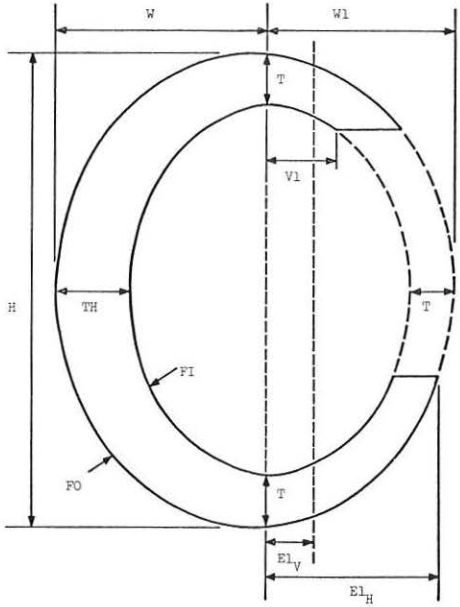


Figure 10.
Letter 0 illustrating "thinning" effect due to interior squareness parameter being greater than external value.



Letter parameters entered by operator are H, T, TH, V1, W, W1, FO, FI, $E1_H$ (value of E1 that might be used if horizontal edges are desired) or $E1_V$ (value of E1 that might be used if vertical edges are desired).

Figure 13. Parameter definitions, letter C.

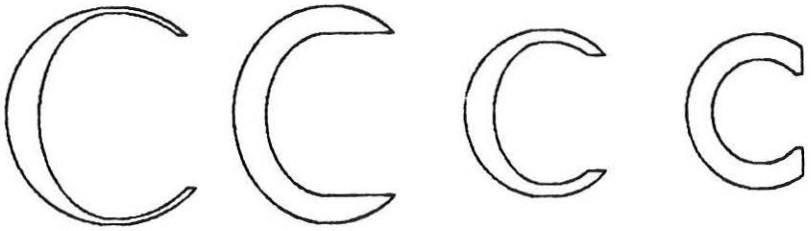


Figure 14. Four sans-serif versions of the letter C.

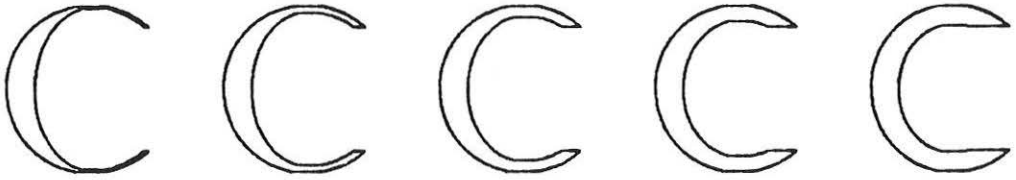


Figure 15. Variation in form of letter C as value of T is increased in increments of four units starting with a value of two units for the left-most C.

As an example of the ability of ITSYLF to approximate a known type font, 18-point Times Roman, consider Figures 16-19. In each case, the filled in letter is a 32-times size enlargement of the printed original. The outline form is an electronically generated, sans-serif version of the letter to the same scale. (They have been reduced in size for printing purposes.) A comparision is rather difficult to make because of the influence the serifs have on the face, but the basic letterforms are quite close with the exception of the C which is not so good.

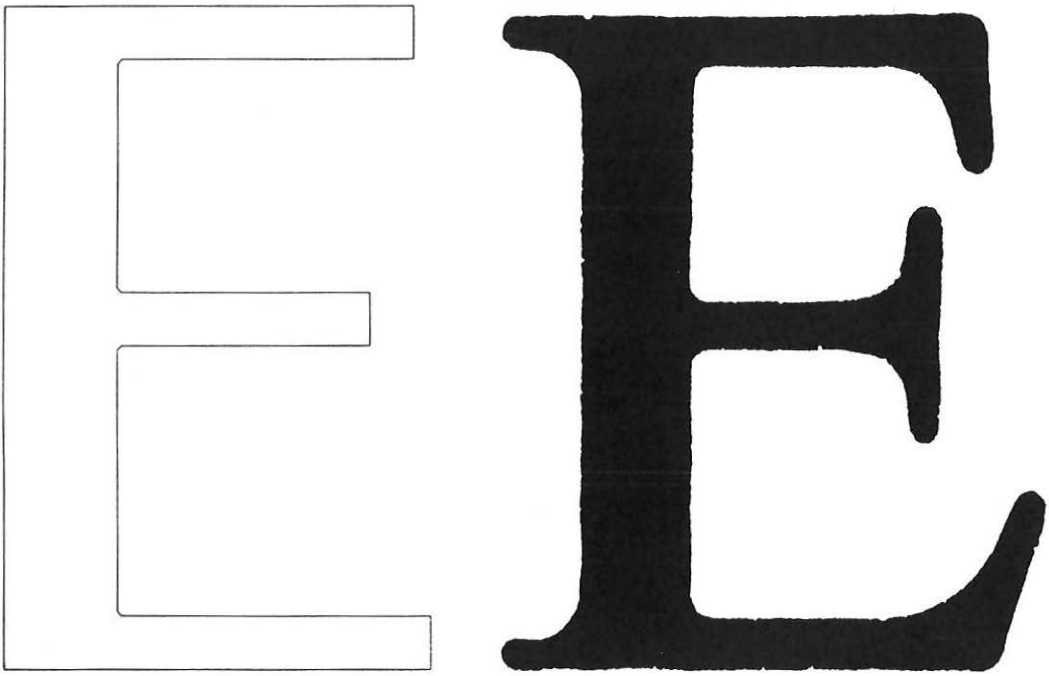


Figure 16. An example of the ability of ITSYLF to approximate a known type font, 18-point Times Roman.

Figures 17-19. Examples of the ability of ITSYLF to approximate a known type font, 18-point Times Roman.

Serif Generation

ITSYLF presently generates two different types of serifs. As illustrated in Figure 20, one is associated with vertical or slanting strokes, the other is associated with horizontal strokes. Parameter values for the height and width of serifs may be entered through the Teletype as with any other parameters. In case more than a square serif is desired, provision has been included to specify two radii, R1 and R2. When these parameters are nonzero, a fillet of appropriate radius is generated once the basic block serif has been formed. At the present time, fillets are only associated with horizontal or vertical strokes and not with slanting ones. This is because of the difficulties of fitting a curve to two nonperpendicular lines. One avenue of possible interest would be to fit a catenary (the equation of a chain suspended only at its ends) at the intersections of the slanting and horizontal strokes. Figure 21 illustrates the effects of serifs on the E, A, D. No serifs are generated for the letter C.

The Automatic Executive System

The purpose of the automatic executive system is to enable a designer to generate 24 consistent letters based on the parameters of one letter. In this case, the letter E has been chosen. The necessary consistency relations have been produced by taking average values of ratios of all significant letter parameters with respect to corresponding parameters for the letter E. The four measured fonts were used to produce the ratios from which average values were drawn. Some of the less significant parameters were not derived from the E as it did not seem necessary. These are usually assigned arbitrarily to zero. Once the parameters for the letter E and a complete set of serif parameters are entered, the automatic executive system may be started. It will generate the 23 other letters and draw two versions of each one. One version will have serifs, the other will not. Three sets of letterforms that were generated this way are illustrated in Figures 22–24. In case some of the suggested letters are not suitable to the designer, that particular letter program may then be called, and the parameters for that letter manipulated to produce the desired shape. To fully benefit from the potential of this program, much more study of the characters is necessary.

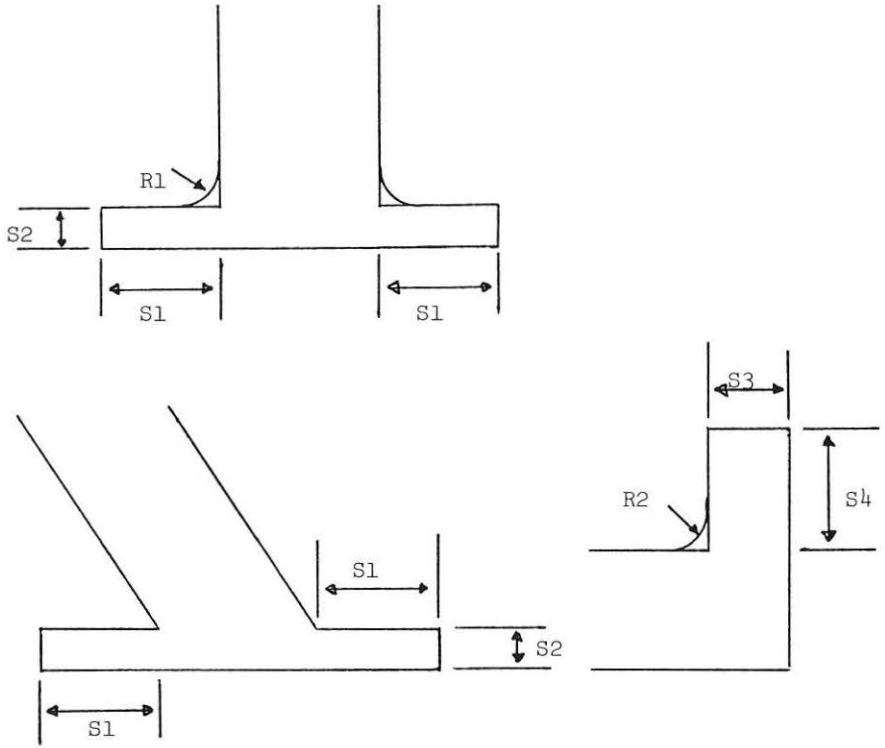


Figure 20. Serif parameter definitions.

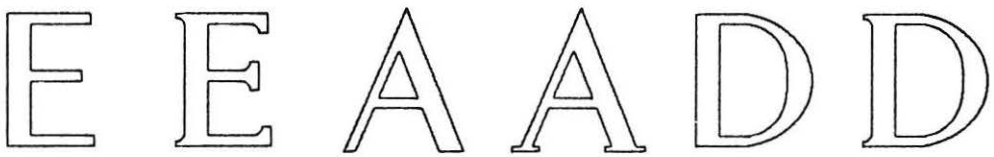
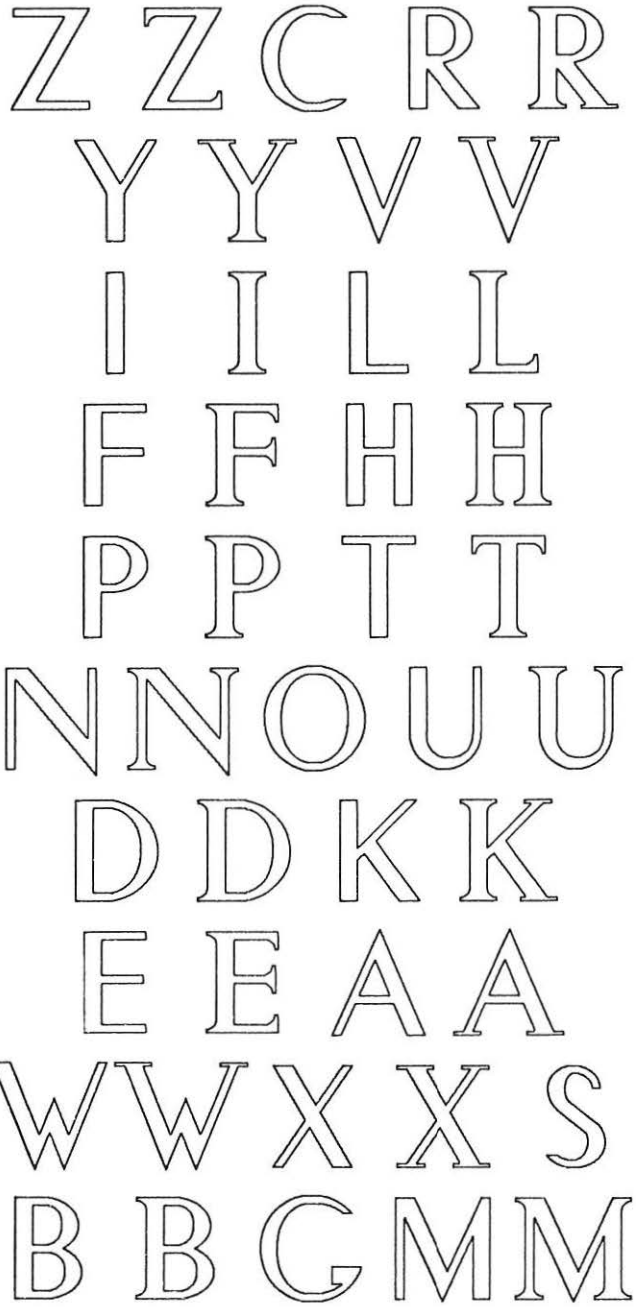


Figure 21. Effects of serifs on E, A, and D.

Following pages:
Figures 22–24. Letterforms generated by Automatic Executive System.


Z Z C R R
Y Y V V
I I L L
F F H H
P P T T
N N O U U
D D K K
E E A A
W W X X S
B B C M M


Z Z C R R
Y Y V V
I I L L
F F H H
P P T T
N N O U U
D D K K
E E A A
W W X X S
B B G M M


Z Z C R R
Y Y V V
I I L L
F F H H
P P T T
N N O U U
D D K K
E E A A
W W X X S
B B G M M

Conclusions

It seems reasonable to conclude, based on the performance of the system, that the postulated set of parameters does exist and may be utilized in conjunction with a set of mathematical models to design aesthetically pleasing characters. ITSYLF, however, represents just a first attempt at computer assisted letter design, and more research will be necessary before a finished system results. Among other problems still to be investigated are the general serif design problem, the general spacing and legibility problem, and further investigations into the properties of the letters to develop more adequate models. Another problem that can now be investigated is the effect on basic alphabets of isolating and modifying specific letterform elements. Additional investigations of known alphabet styles could lead to more than one set of ratios to be used with the Automatic Executive System. The particular set chosen might depend on the ratio of the width of the thick to thin strokes. Depending on exactly what this ratio is, the Automatic Executive System would generate letters of various widths for the same basic width of the E.

ITSYLF suffers from the fact that it is almost too large for the present hardware configuration and, as a result, long waits occur while the tape drive is positioned to read-in the desired program. What is needed is a disk storage system which would allow high-speed loading of the desired programs. Similarily, a graphical display would produce almost instantaneous pictures of the desired letters and eliminate waiting for the plotter to finish drawing them.

The Typography of El Lissitzky

L. Leering-van Moorsel

Around 1920 there was ferment in all of the arts. Lissitzky (1890–1941) developed his art during this period and was influenced by such men as Malevich (Suprematism) and Tatlin (Constructivism). His typographic innovations are individualistic and cannot be classified with any single "movement." Lissitzky's work and ideas on typography—of a pre-eminently pictorial quality—are summarized and illustrated.

A. General

By the early 1920's a major change manifested itself in typography as, for that matter, it did in the other arts. This change was the upshot of developments that had been fomenting ever since 1800. They were aimed at emancipating the arts from the established, time-worn "form language" which had lost its functional impact in a changing society amidst a changing world.

The change, setting in around 1920, was preluded by several nineteenth-century trends toward a renewal of the arts. Of these, the Arts and Crafts Movement of William Morris and the Jugendstil must be named as having been of significant consequence for developments in the field of typography. Morris sought to achieve renovation by employing special letter types; the Jugendstil contributed asymmetrical composition. This alertness to the use of new materials was reflected in typography by a renewed interest in composing material.

The ensuing development in the plastic arts was also important to the situation around 1920, the time in which Lissitzky originated his typography. From Cézanne's art emerged Cubism which, with Mondrian (the Stijl Movement) and Malevich (Suprematism), led to the abstract conception of pictorial art. Dadaism, which sprung up during World War I, flayed a society that had gone bourgeois. The dadaists were bent on using the new techniques of collage and montage, which were to affect typography.

These changes occurring in the world of art were paralleled by social changes of which the most striking were those taking place in Russia in the years between 1900 and 1920. As far back as 1900, the Russian art world was the scene of lively activities: witness the magazine *The World of Art,* which closely mirrored the new trends originating in Western art, and the existence of two major private art collections boasting more works by Picasso, Matisse, and other such masters than any Western collection at the time. But it was not only the developments in the Western world that fired art life in Russia, it was also what was happening at home. Around 1910 Kandinsky arrived at abstract art; Larionov and Goncharova initiated Rayonnism, while Tatlin prepared the ground for Constructivism. In 1915 Malevich ushered his Suprematism on stage.

Then, in 1917, Russia was rocked by the great Revolution; it swept everything before it. No wonder that it was hailed by the new art movements: they, too, envisioned a new society and, in fact, played a meaningful and functional part in it.

Lissitzky (1890–1941) belongs to the generation of, among others, van Doesburg and Moholy Nagy, i.e., the generation that welcomed the novel technical possibilities as a vital element of their art. On this score, they broke away from their spiritual ancestors, Malevich and Mondrian, whose work was chiefly committed to painting.

Lissitzky received part of his education in the Western world, viz., at Darmstadt. In this German town, from 1909 through 1914, he studied architecture and was graduated, with distinction, as an engineer. In those days, Darmstadt was a significant art center where such architects as Behrens, Olbrich, Hoffmann, and Loos were influential. Aside from architecture, Lissitzky was introduced to typography. At that time it showed the unmistakable hallmark of the Jugendstil, which was to influence Lissitzky's typography.

At the outbreak of World War I, Lissitzky returned to Russia where he started out as an employee of various architectural firms. But his was not to be a straight architect's career; his broad interest spurred him to embark on a wide variety of activities. His *oeuvre*—as shown in the 1965–66 exhibition organized by the Van Abbemuseum at Eindhoven, Holland, as well as in the book about him published at Dresden in 1967—includes works in fields ranging from painting, graphic art, architecture, and exhibition halls to typography; photography and even

motion pictures. His education as an architect, though, comes out in his every undertaking: in all his works we meet with a tectonic spatial order of things.

In the years 1917–1919, he illustrated Jewish books. A born Jew, he contributed in this way to a movement advocating a revival of Jewish national culture. In this context, Lissitzky encountered Chagall, considered leader of this movement, and who, in those days, had a telling influence on him. Through Chagall's intervention, Lissitzky was appointed a teacher of architecture and graphic arts at the academy of Witebsk, founded by Chagall. In 1919 Malevich was also asked to join the teaching staff of the academy.

The encounter with Malevich was of critical significance for Lissitzky, who was so impressed by his ideas that his work underwent a radical change. He no longer pursued Jewish national goals, but focused on the creation of a universal, generally understood form language. It is this work, created since 1919, that is of interest to us.

In essence, suprematic painting can be characterized as follows: by carrying Cubism and Futurism to their ultimate consequences, Malevich arrived at abstract painting. In a white field he set geometric color planes which, grouped or single, seem to float in an indefinite space; at the same time being, however, subject to a tension prevailing in that space. They are parts of an infinite space, the cosmos, with which Malevich equated space.

Lissitzky did his first abstract paintings in 1919. Malevich's influence is unmistakable. There are, however, also differences which indicate the very nature of Lissitzky's art. Whereas Malevich's canvases have a purely pictorial quality, Lissitzky adopts a constructive painting process. In Malevich's paintings we sense the ubiquitous presence of his compasses and ruler. Many of his geometric forms acquire volume: they become beams, cubes, and like elements. Lissitzky constructs, builds: his space is defined, limited. To him, the elements were signs *of* space, whereas to Malevich they were signs *in* space.

Lissitzky termed his painting "Proun"—a contraction of "pro" and "un." "Pro" is the Russian preposition "before," and "un" is an abbreviation of "Unowis" which again is a telescoped version of Russian words meaning "establishment of new art forms." He paraphrased the term as follows: "Proun is the station where painting changes for its next destination: architecture" (*Kunstismen,* 1925, p. XII); and

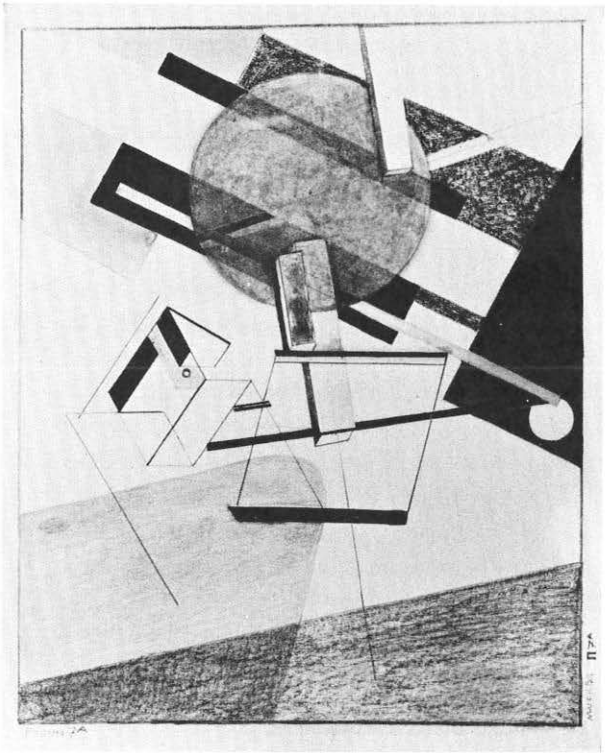


Figure 1. *Proun 7A;* about 1920; drawing, sealing-wax, gouache, collage; 7⅛ x 5½ inches (18 x 14.1 cm); coll. Kunstmuseum, Basel.

"Proun starts out on the plane, progresses to spatial modeling and from there to building the objects of our world" (*De Stijl,* 1922, no. 6, p. 85). This accounts for the fact that his pictures impart a sense of concreteness to the viewer. It also points up Lissitzky's intent to realize this quality by creating "objects." On this score, he moved one more step away from Malevich who, consciously, kept aloof from any semblance and form of concreteness in art.

Lissitzky's approach is allied with the constructivist movement headed by Tatlin. Tatlin and his adherents rejected the easel painting type of art as being a-functional in our present-day society: instead, they created a machine art. It was their avowed ideal to be able, as artist-engineers, to respond directly to specific social needs. They championed a "productive" art, harbinger of industrial design. Tatlin,

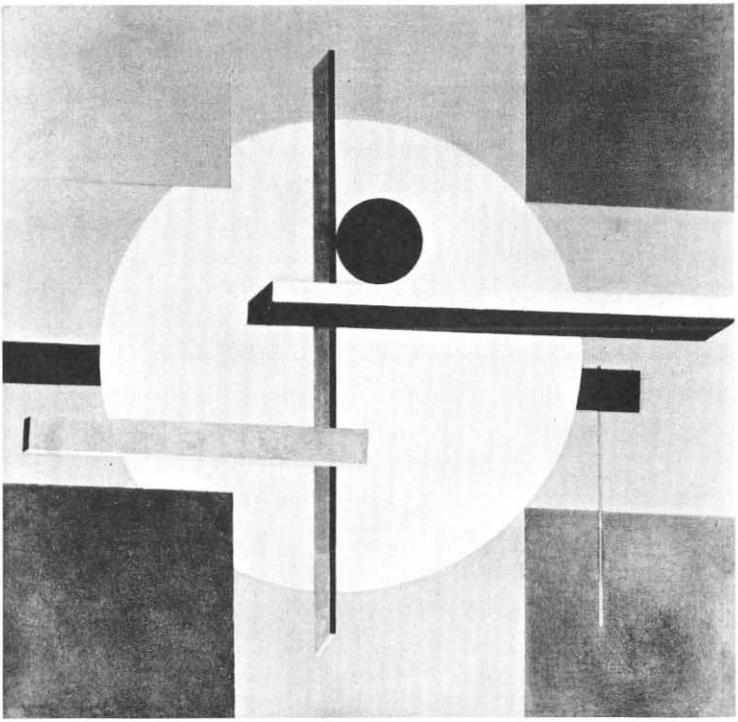


Figure 2. *Proun R.V.N. 2;* 1923; tempera and silvercolor on canvas; 39 x 39 inches (99 x 99 cm); coll. Städtische Galerie im Landesmuseum, Hannover.

as the most extreme exponent of this movement, translated his ideas into practice and sought employment in a metal plant.

Malevich could not endorse this stance; in his thinking, art was a spiritual endeavor designed to shape man's vision of the world. To work as an artist-engineer would imply that the artist comes down to the level of a craftsman. In 1921 the two philosophies were pitched against each other in public. Tatlin, riding the wave of sentiments in the face of the prevailing poor economic conditions, carried the day.

Lissitzky, conversely, convinced of the artist's functional task in daily life, was sympathetic toward Tatlin's vision. Yet he could not identify with it up to the hilt: his interpretation of the word "object" implied that it not merely covered "articles of daily use" but also a painting, a house, architecture, a poem, etc. In this perspective, he oriented his

activities toward society and wanted his art to act as an incentive. In fact, Lissitzky appears to have reconciled the Malevich-Tatlin controversy.

A notable example of his mediating posture is the *Figurinenmappe* (1923), a lithograhic design for the opera *Sieg über die Sonne*. The scaffolding (Schaumaschinerie) with the mechanical puppets approximates Tatlin's machine art, but the form in which the designs are executed clearly testifies to an affiliation with Malevich. The accompanying text also bespeaks the dualism of Lissitzky's attitude. He writes that he only intended to make the design; the realization he wanted to leave to others.

In 1921 Lissitzky went to Berlin. In the years 1920–1930 he sojourned repeatedly in Western countries. In Berlin, at that time an avant-garde center, he met, among others, Schwitters, Hausmann, Richter, van Doesburg, Moholy Nagy, Arp, Mies van der Rohe, and van Eesteren. He came to know these artists intimately, wrote articles for van Doesburg's magazine *De Stijl* and for Schwitters' publication *Merz;* for the Nasci issue of this magazine, he did the typographic design. Jointly with Arp, he published, in 1924, the *Kunstismen.*

Through Lissitzky Russian trends found their way into Western Europe. There is, however, also a certain amount of cross-fertilization. When, for instance, in 1922 Lissitzky's painting went through a process of growing simplicity and clarity and, as from 1924, van Doesburg developed Elementarism, the effect of the close contacts between the artists is unquestionable.

It is certain that Lissitzky's repeated stays in Western countries greatly added to his growth as an artist: here he was able to develop without any extraneous curb, at a time when in Russia the modernly oriented artist was faced with mounting difficulties such as stifling state controls. After the first feverish flush of renewal in the early years following the 1917 revolution, the urge toward avant-garde art faded into the background. The new trend had failed to reach out to the average citizen and arouse his interest, and the adverse economic situation called for a refocussing of interests. Following his final return to Russia in 1930, Lissitzky was so frustrated by the dictates of the state regarding art, that the quality of his work dropped. An inveterate communist, Lissitzky must have felt it as a personal tragedy that the society which, to his mind, held the keys to the future, did not subscribe to his artistic creed.

B. Typography

It is plausible, that by the end of 1923, Lissitzky did his last painting. In his later canvases, the original complexity—generated by a concentration of a host of overlapping elements, all varying in direction—gradually disappears. The component elements assume greater independence and the spatial tension is more equably played over the entire surface. As a result, the plastic forms gain in clarity and simplicity. Similar aspects are apparent in his typographic work; here the dynamic element—a pre-eminently pictorial quality—plays an essential part. Lissitzky's basic philosophy underlying his typographic work purports that the typographic image should achieve for the reader what for the listener is conveyed by voice and gesture. He wrote some extremely penetrating and lucid essays on typography ("Typographische Tatsachen," 1925; "Unser Buch," 1927). In eight brief paragraphs (from *Merz 4,* 1923) he summarized the requirements of good typography:

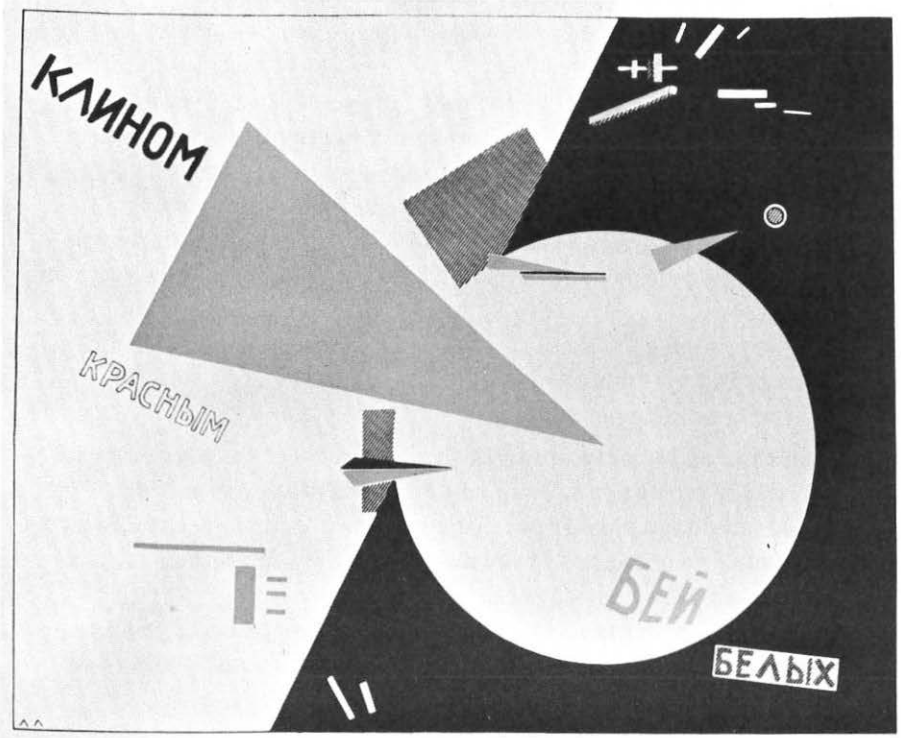
1. Printed words are seen and not heard.
2. Concepts are communicated by conventional words and shaped in the letters of the alphabet.
3. Concepts should be expressed with the greatest economy—optically not phonetically.
4. The layout of the text on the page, governed by the laws of typographical mechanics, must reflect the rhythm of the content.
5. Plates must be used in the organization of the page according to the new visual theory: the supernaturalistic reality of the perfected eye.
6. The continuous sequence of pages—the cinematographical book.
7. The new book demands new writers; inkwell and quill have become obsolete.
8. The printed page is not conditioned by space and time. The printed page and the endless number of books must be overcome.
   The ELECTRO-LIBRARY.

In these eight paragraphs, couched in clear terms, Lissitzky set out the function of typography. In some of the paragraphs we read also confidence in the possibilities of the machine. At an early date, Lissitzky formulated here the task of the new typography. With these ideas, alongside his work, he has set the new course.

His early typographic work includes the illustrations of Jewish books, among which *Chad Gadya* (Fig. 3) *Ingl, Zingl, Chwat* (both from

Figure 3. *Chad Gadya;* 1919; litho; 9½ x 11 inches (24 x 28 cm); coll. E. Estoric, London.

Figure 4. Poster, *Beat the Whites with the Red Wedge;* 1919.

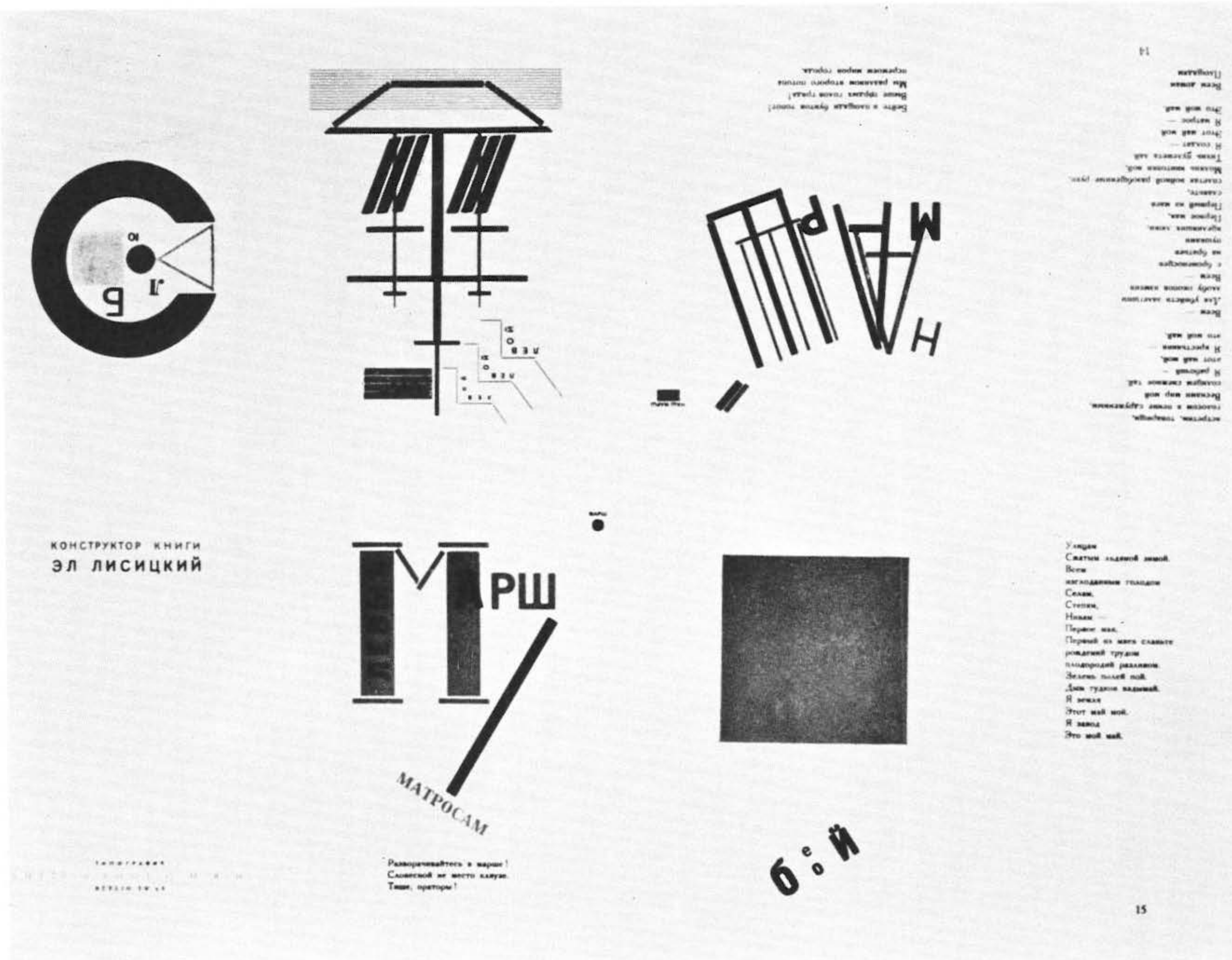


1919) clearly bespeak Chagall's influence. In these books Lissitzky, obviously in the wake of the Jugendstil, aimed at achieving the integration of text and illustrations.

Later, after 1919, he originated a typography on the lines of "Proun." His opening work of this period was a poster (1919), *Beat the Whites with the Red Wedge* (Fig. 4). Both this work and the picture-book *The Story of Two Squares* (invented and designed in 1920, printed in 1922) are, in terms of form, strongly influenced by Malevich's suprematic paintings. Aside from the striking affinity there is, however, also a marked difference: whereas Malevich utilized the vocabulary of an abstract form language, Lissitzky used the same abstract plastic means to the end of expressing something concrete (as in the "Proun" paintings the composing parts, designed to order space, have a concrete function). In the poster the red wedge smashes through the white circle causing the fragments to fly around. Something similar we observe in *The Story of Two Squares.* As in the poster, the minimal text is a functional part of the composition. In this context Lissitzky writes: "The key fact is here that the layout of word and picture is achieved with the same technical means, i.e., phototype, photography. . . . Consequently, we are confronted with a form of book in which the presentation is of prime importance and the letter takes second place" ("Unser Buch," *Gutenberger Jahrbuch;* Mainz, 1926–27).

In this picture-book Lissitzky experimented already with a variety of typefaces and sizes. This procedure would prove to impart such a marked playfulness to the optic-functional design of his later work. For instance, a large letter may serve as a plane for small letters, or two words may be joined together through a combination of larger and smaller letters. Such playful typography triggers the reader's activity.

A highlight of Lissitzky's typographic *oeuvre* and a landmark in the development of the new typography was his design for Mayakovsky's anthology of verse: *Dlja Golossa* (for reading out loud), 1923 (Fig. 5). The typographic compositions that accompany the text are done with a variety of composing material which Lissitzky distributed freely over the type area in two colors, red and black. With the booklet went a practical tabulator listing the distinctive marks of the various poems. Against the background of his conception of the optical impact of typography, the very arrangement of this collection of poems—with this title—must have been a real challenge to him. Here his typography has



КОНСТРУКТОР КНИГИ
ЭЛ ЛИСИЦКИЙ

МАРШ
МАТРОСАМ

Разворачивайтесь в марше!
Словесной не место кляузе.
Тише, ораторы!

Улицам
Сжатым льдяной зимой.
Всем
изголодавшимся голодом
Селам,
Степям,
Нивам —
Первое мая.
Первый из маев славьте
рождаемый трудом
плодородий разливом.
Зелень полей пой.
Дым гудков вздымай.
Я земля
Этот май мой.
Я завод
Это мой май.

бой

grown to assume a very personal style, in which he has freed himself from the suprematic imagery of his previous works. The letter is treated as an element of composition and is oftentimes built of disconnected parts: broader and narrower lines that appear as independent elements in the typographic picture. He also does not shy away from applying different typefaces on one page and superimposing letters varying in position and size. The varied use of red and black makes for liveliness and clarity. In this connection Lissitzky, in "Unser Buch," quotes Marinetti: "I am opposed to what is commonly termed: the harmony of the type area. When necessary, we'll apply three or four different colors and twenty different typefaces on one page. Through italics, for instance, we'll indicate a sequence of equal, quick emotions; bold print will express exclamations, etc., etc. In this manner, a new pictorially typographic presentation of the printed sheet is achieved."

Futurism emancipated typography from the classic type area—often, however, to the detriment of legibility. Without sacrificing any of the dynamic vigor of Futurism, Lissitzky has given typography a solid undergirding by not only spelling out its function, but also by laying down a well-ordered form language and working method.

Mayakovsky's collection of poems directly affected Theo van Doesburg's typographic design of Schwitters' fairy-tale *Die Scheuche* (the scarecrow), 1925 (see K. Steinitz, *K. Schwitters,* 1963, p. 79). Blending in with the text, the illustrating figures that are playing over the type area, consist of letters. This procedure again inspired Lissitzky when making his *Four Rules of Arithmetic* (Fig. 6) in 1928.

Aside from these comparatively free compositions, Lissitzky also did commercially obligated typographic work, such as covers for magazines, etc. In these designs, his constructive side was more pronounced. Here, also, the dynamic composition has a meaningful function; see, for example, the banded diagonal of the cover for the magazine *Wjeschtsch* (1922) (Fig. 7).

Figure 5. *Dlja Golossa* (for reading out loud); 1923; proof; 15 x 24⅝ inches (38 x 63 cm); coll. Van Abbemuseum, Eindhoven.

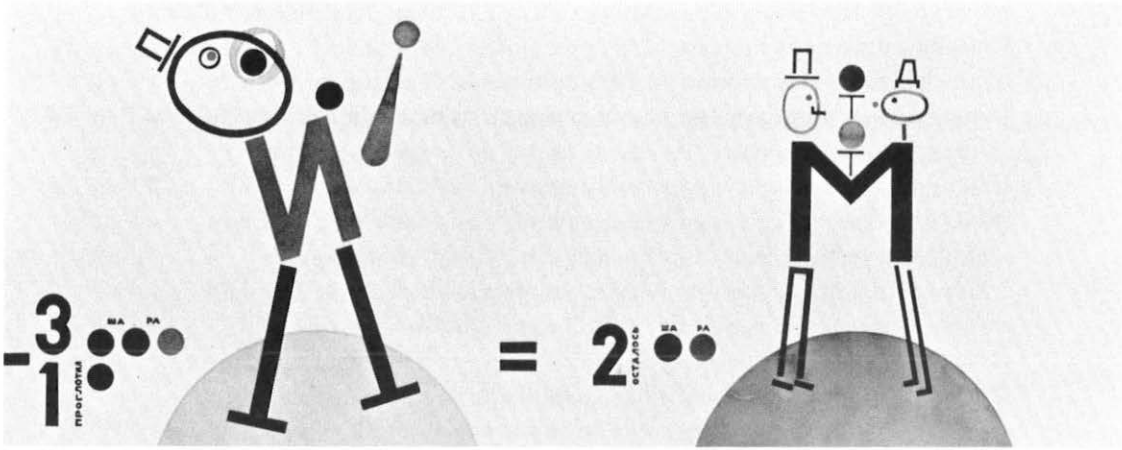


Figure 6. Design for *Four Rules of Arithmetic;* 1928; drawing, gouache; 9¼ x 24⅝ inches (23.5 x 62.5 cm); coll. E. Winter, London.

Figure 7. Cover design for the magazine *Wjeschtsch-Gegenstand-Objet,* number 1, 1922; 12⅓ x 9½ inches (31.3 x 23.6 cm); coll. Van Abbemuseum, Eindhoven.

Also in 1922 Lissitzky did a series of five designs each for the cover of the magazine *Broom* (Figs. 8–12). In these the trend toward greater clarity is very much in evidence. The first design is still fully consonant with the pictorial conception in the way the letters are composed, both individually and as a whole. The two hyperboles are even strictly outside the pale of typographic objectives—they are reminiscent of the use of hyperboles in his paintings. The next designs are tuned to the idea of plural legibility: whether the magazine is held straight, upside down, or viewed from the side the title always remains legible. In the last design of the series Lissitzky achieves a maximum of clarity. This series shows that the page is treated as a whole (like the canvas) and that the dynamic aspect appears in an increasingly controlled form until an equilibrium is reached.

Figure 8. Cover design for the magazine *Broom;* 1922; drawing; 10 x 7⅝ inches (25.3 x 19.4 cm); coll. Van Abbemuseum, Eindhoven.

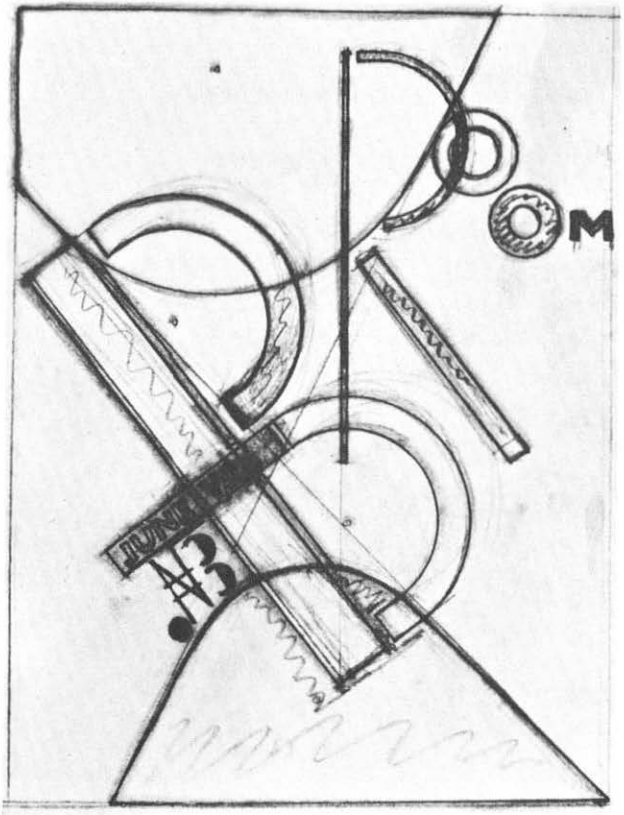


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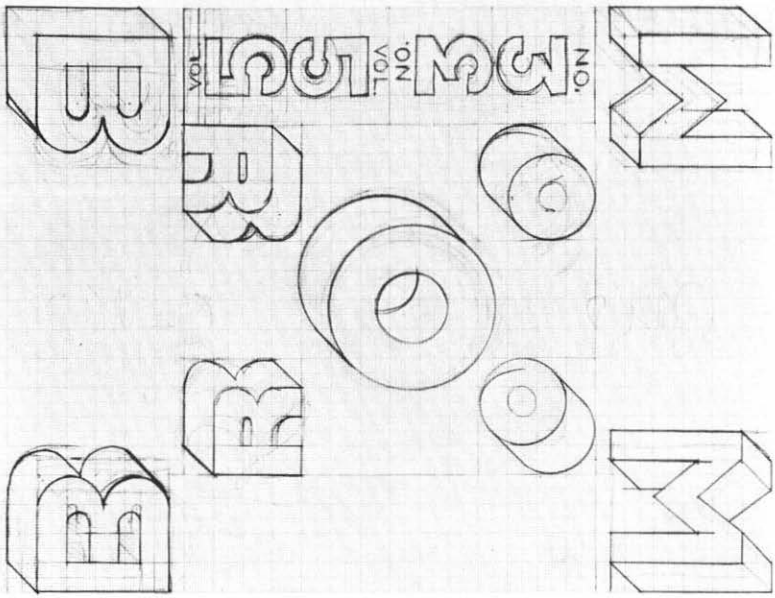
Figure 9. Cover design for the magazine *Broom;* 1922; water color; 8⅔ x 13⅞ inches (22 x 35.3 cm); coll. Van Abbemuseum, Eindhoven.

Figure 10. Cover design for the magazine *Broom;* 1922; drawing; 10⅝ x 7⅞ inches (27 x 20 cm); coll. Van Abbemuseum, Eindhoven.



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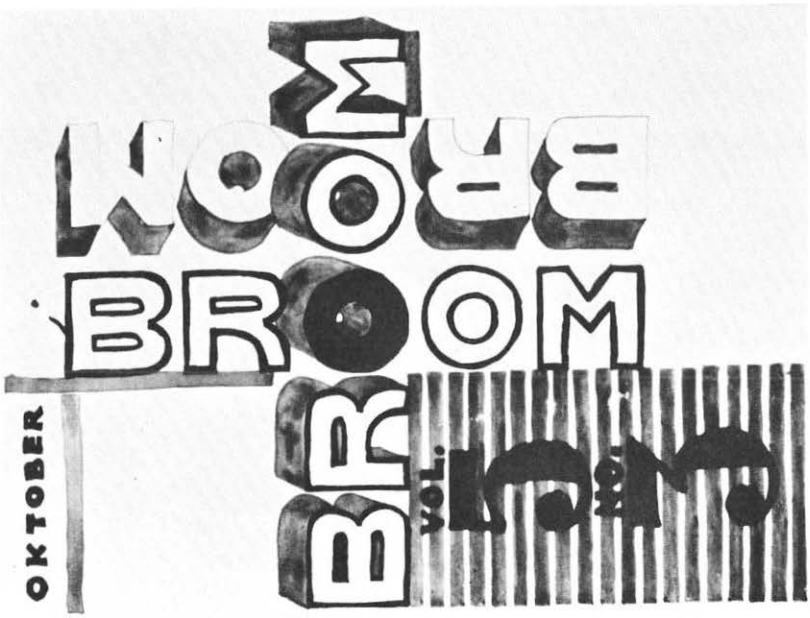

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Figure 11. Cover design for the magazine *Broom;* 1922; ink, water color; 10⅞ x 8⅛ inches (27.6 x 20.7 cm); coll. Van Abbemuseum, Eindhoven.

Figure 12. Cover design for the magazine *Broom;* 1922; ink, water color; 10⅞ x 8⅛ inches (27.6 x 20.7 cm); coll. Van Abbemuseum, Eindhoven.

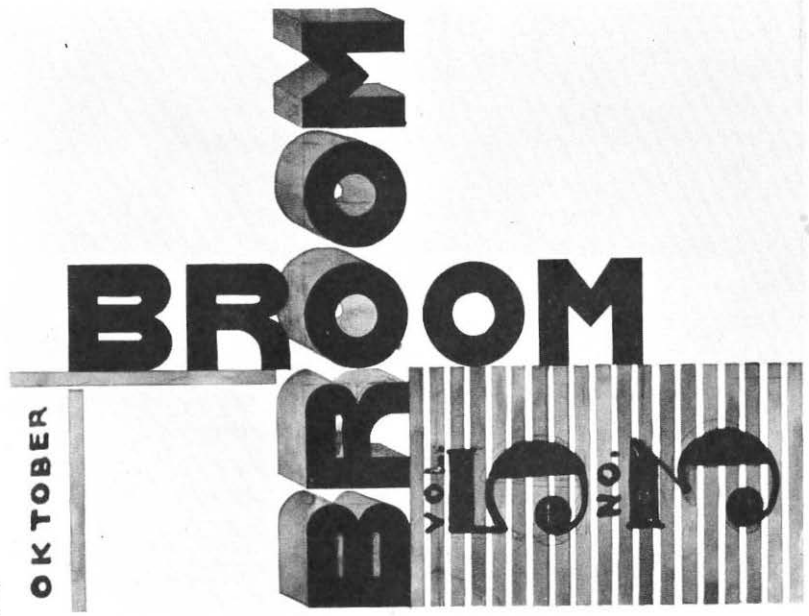

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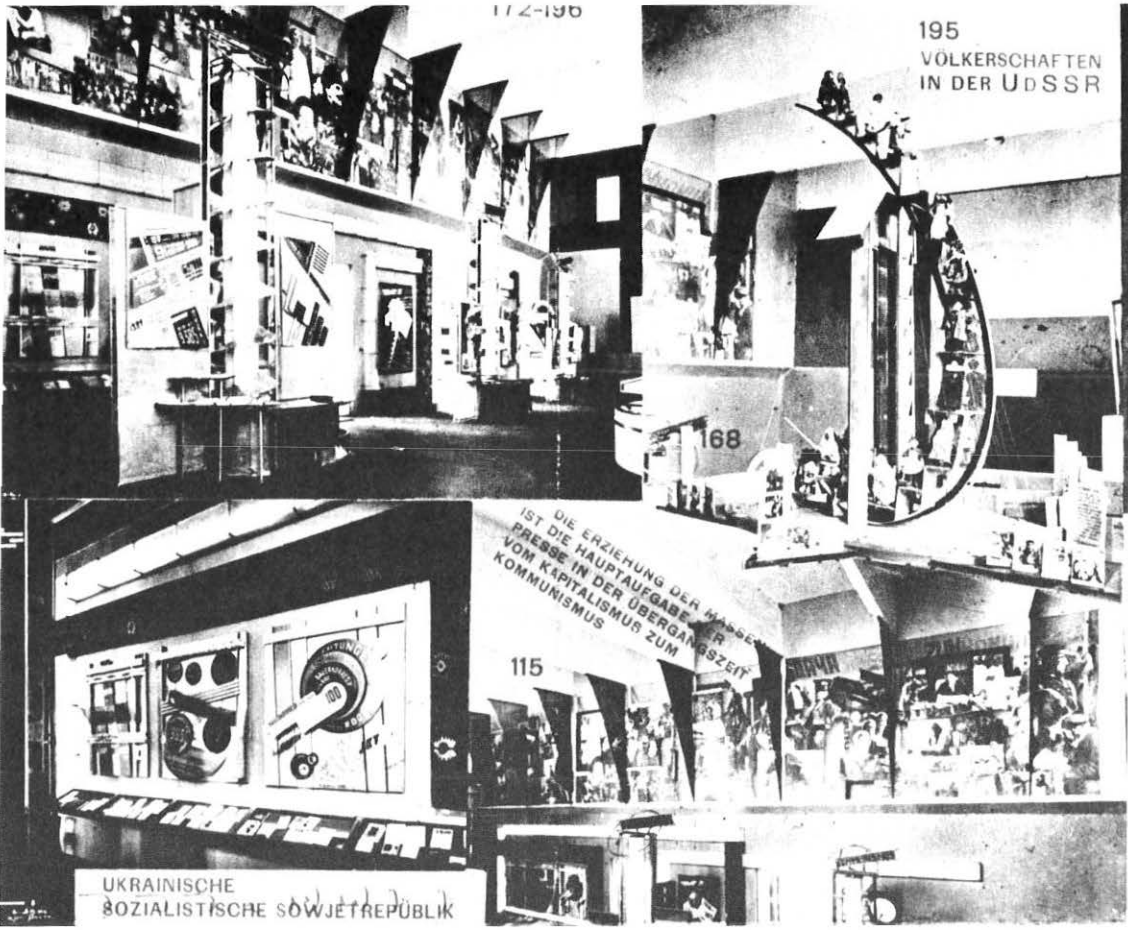
Figure 13.
Part of the exhibition
in the Russian Pavillion at
the International Press Exhibition,
Cologne, 1928; photograph.

Yet another category is concerned with the application of photography (including photogram and photomontage) in typography. Early examples are the Pelican designs of 1924.

Until well into the 1930's, photography was to play a growingly important part in Lissitzky's book designs. It was often applied in the form of photomontage; e.g., in *USSR Builds Socialism* (1932).

Lissitzky also used photomontage for typographic purposes in his so-called demonstrationrooms and exhibition halls. He was given the



official government assignment of designing the Russian pavillion at the International Press Exhibition at Cologne in 1928. For this he designed a frieze of photomontage measuring 24 by 3.5 meters (Fig. 13). It bespeaks his artistic inventiveness and imagination in that he managed to create a lively spatial atmosphere with the uninspiring means of monotonous propaganda material. The catalogue of the Russian contribution, also designed by Lissitzky, includes a series of photographs illustrating—in a typographic motion picture—the contents of the Soviet pavillion.

As indicated above, Lissitzky does not stand alone as a typographic innovator. There are many artists in the 1920's who, with him, have given typography a new look. As opposed to the typographic work of most of his contemporaries, however, Lissitzky's typography cannot be aligned with any specific movement. He cannot be bracketed with the Russian constructivists with their static, rather ponderous, typographic design nor with the Bauhaus style of typography which, under the leadership of Moholy Nagy, developed its own "underlined" features. There is a certain affinity with the Dutchman Piet Zwart in whose designs the diagonal plays a dominant part. Zwart, however, employs the diagonal so consistently as a recurrent element that its dynamic quality is obscured. Furthermore, their relationship appears from their application of photography in their typographic work.

Aside from these relationships, Lissitzky's typographic *oeuvre* evidences a strongly individual character. His versatility, which is apparent in his many activities, is also manifest in his varied and imaginative work in the limited field of typography. This liveliness and variety, anchored though in a strongly integrated conception, have shielded his work from getting bogged down in artistic dogmatism. These aspects of his art have helped to develop the outstanding quality of his typographic work.

For the preparation of this article I am profoundly obligated to Pieter Brattinga and Piet Zwart who have graciously supplied me with a wealth of material. The article has been translated from the Dutch manuscript by J. J. van der Maas, The Hague.

Esthetic Values in Computerized Photocomposition

John W. Seybold

Can the computer achieve the same quality composition as a skilled typesetter? The author identifies some factors which contribute to successful esthetic solutions and discusses the compromises that must be considered; for example, in hyphenation and justification. "Feedback" of information and ideas from typographer to computer programmer is encouraged.

Can the computer ever achieve the same results, in terms of quality composition, as the skilled craftsman? If not, how good can such composition be? Will we have to sacrifice quality in the interest of speed and economy? These are the questions I shall attempt to consider in this article.

What the machine operator does

The linecasting machine operator—who can study the "fit" of his lines as he watches the matrices fall into the assembly elevator—if he is dedicated to the creation of high-quality composition, will keep a number of concerns in the back of his mind. It will not be sufficient for him to bring a group of words into the range of spaceband justification. He will seek to secure an even flow of composition, and he will not permit adjacent lines to vary in their interword spacing characteristics—if he can avoid it—by anything like the full range of spaceband expansion potential. He will not alternate tight and loose lines, and he will pay attention not only to the accuracy of his word division (hyphenation) but also to its frequency. He will avoid three hyphens in a row. He will try to divide words so that their meaning is not obscured and their root sense is not offended. Where paragraphs end, he will try to get around the awkwardness of the single word or portion thereof sitting on a line by itself. If the final sentence in the paragraph approaches the end of the line, he will try to fill out the remaining space lest it detract from the even march of words down the right-hand margin.

Such an operator, even if he keeps one eye out for what lies ahead and checks constantly on what he has already cast, will frequently find it necessary to discard lines and go back to try another solution, starting over with a different set of assumptions, perhaps at the beginning of a paragraph or at least several lines back, in order to get a running start and work his way out of the condition he has created. And when he has done his best, his product will be scrutinized by the critical proofreader and the more critical customer, so that the final result will be as pleasing as possible. Often the customer will contribute editorial change —adding or taking away—to assure an even more delectable typographic result.

General principles applied

Our linecasting operator thus applies a set of *general principles,* some of which he may never have heard enunciated but which he feels intuitively to be "right." But he deals with recalcitrant elements—words and pieces of words that do not lend themselves to any tidy system of apportionment into lines, paragraphs, and pages. One line will have a lot of little words and all kinds of space to *spread* a tiny bit. The succeeding assembly of syllables plagues diligent operators, causing anguished consternation, especially when confronting intransigeant elements like "through," "stretched," "strained," "thought," "sloughed," or "straight." Rule out letterspacing, call for a narrow measure in a large point size, and you set a task for which there may never be a good solution—only one that is least bad.

Computer optimizes choices

But whatever that solution is, it is theoretically possible for a computer program to arrive at that disposition which is optimal. In fact, it may be stated that a good *program* should be able to produce more consistent results, and more consistently *good* results, than even the best manual operator.

Such programs do not yet exist, although in many or perhaps most situations their weaknesses will not be exposed. They do not exist because those who have created them have lacked the insight adequate to define the task; and perhaps, too, because a satisfactory solution might require a "bigger" program and a larger computer system than might seem justifiable under existing economic constraints.

Conceptual limitations

We suspect, however, that conceptual limitations have been the major obstacle. In the case of our own company we are now engaged in our fifth major system redesign in five years, each being predicated upon broader and more ambitious objectives. We are now overcoming problems of whose existence we were not even cognizant several years ago.

It is the purpose of this paper to identify some of the factors which will contribute to successful esthetic solutions, and to indicate some of the trade-offs which will have to be considered. For every gain there is a cost, not only in economic terms but perhaps in esthetic ones as well. The good systems designer is one who can foresee the largest number of consequences which will flow from the introduction of any given variable and who can predict the incidence of occurrence so that he will get the best trade-off in the light of his particular universe of (partially unknown) data.

To make this point more cogent, consider a small concrete example. One of the "design specifications" for our "hyphenation and justification" program was that the last word in a paragraph could not be split. We wanted to avoid the situation in which an "ing." stood on a line by itself. This meant that if the program encountered the condition in which only one word remained in the paragraph, and the whole word would not fit on the preceding line, that word was not submitted to the hyphenation routine. The word was carried over in its entirety, and the preceding line was justified at whatever cost.

As a consequence, in narrow measure material we often encountered excessive interword spacing in the last full line of the paragraph. It appeared that this condition occurred quite frequently, especially in short paragraphs of lists and definitions. We therefore created an option. We could specify for the individual job, depending upon the measure (line length), whether to permit the last word to be divided or not. In those cases in which we elect to split the last word in a paragraph, we have concluded that a syllabic "widow" is a lesser evil than excessive interword spacing.

It might be noted that other solutions would have been possible. One would have been to "set a switch" in the program so that, automatically, when narrow measure material is encountered, the word-splitting feature comes into play. A second would have been to provide that the

last word in the paragraph would be split only when the resulting interword spacing in the preceding line (whatever its measure) exceeded certain (broader) tolerances. (But bear in mind that a fractional word widow on a narrow measure is much more acceptable than it would be on a very wide one!) But the best solution of all would be to instruct the program to back up, throw away the lines it had just "set" (computed) and try again—or again and again—until it worked its way out of that condition entirely. Such a solution would be slower, more costly in terms of computer time, and would represent a larger set of computer instructions and perhaps a larger "core" in which to retain these instructions, with the consequent increase in overhead costs.

Only one example

If the condition we have just described were our only problem, there could be no doubt about our solution. But it is illustrative of many hundreds of tough choices the systems designer makes—or ignores if he does not realize the implications of his systems design. Each such alternative must be recognized. Tentative solutions must be explored. The cost of these solutions in *throughput speed* and *core* must be assessed. The ultimate decision will take into account the extent to which a failure to meet the specific problem will impair the marketability of the product. If the market is known and its customers' predilections are predictable, then the easiest solution would be to design the program especially for that market. The poor esthetic product is a consequence of using a program for a market for which it was not intended. It happens today that most of the so-called "book composition" programs are nothing more than adaptations (if indeed any adaptation has been made at all) of newspaper composition programs. It should be readily apparent that the demands of newspapers (fast throughput, narrow measure, permissible *intra*-word spacing [letterspacing] and the like) are of a different order than for the fine book market. While adaptations may be more or less successful, the product will not begin to compare with that which could be produced from a *general purpose* systems design which takes into account every conceivable refinement of the typesetting art, but which allows for the optional exercise of certain of these features, depending upon the constraints for the task in question.

The relationship between hyphenation and justification

"Justification" is performed by the computer program by a process of addition. A line width is determined of, say, 500 units. Each character that is accepted into the line has a width value. Perhaps an upper-case S has a value of 15 units in a particular typeface. This sum is added to the total of accumulated values within the line, or, conversely and more probably, subtracted from the unit value width of the line. When a word is completed and a word space is reached, a minimum value, perhaps five units, will be deducted, but a separate tally will be kept of the number of spaces in a line.

Let us suppose that the last word processed brings the counter to 480 units—that is, leaves a remainder of 20 units—and the next complete word in the text stream would increase the count to more than 500, reducing the surplus to a minus quantity. If there are five interword spaces in that line, it is evident that if each space is allowed to assume the value of nine units rather than five, the necessary precise total of 500 will be successfully achieved. Since the problems of good justification are greater for narrow measures than for wide, and since the design of some typefaces is more conducive to loose setting than others, the first option in the construction of a justification program is to allow for the input, *uniquely for each job and perhaps for each typeface,* of special parameters or instructions which define the minimum and maximum values of an interword space. If the expansion of these spaces will fill up the line there will be no attempt to hyphenate. But if the expansion potential is not sufficient then an effort will be made to fit a portion of the next word into the line, if that word is found to be capable of being divided. At this point a subroutine is invoked to test the word to ascertain whether it should be submitted to the hyphenation "logic."

Esthetic judgment in hyphenation [1]

What is the smallest word that should be divided? *Suggested assumption:* only those words consisting of five or more letters. Hence an inflexible

1. We shall not discuss the problems of hyphenation itself. When words are tested by the hyphenation routine, satisfactory answers—including not only acceptable but even preferred points of hyphenation—can be secured. The usual constraints have to do with the size and speed of good programs, and their consequent costs in production.

rule might be adopted which would preclude the splitting of "a-way" or "Ma-ry."

Implication: if this is an invariable rule, there will nevertheless be circumstances in which the division of a hyphenable four-letter word could be preferred to an excess of interword space. A manual operator would use his judgment. The normal computer program could not. However, in a more elaborate program another "check" might be included to provide that if the computed interword space exceeded a defined tolerance, *then* four-letter words, *or certain four-letter words only,* should be scrutinized and divided. *Query:* would this feature be truly helpful? Our systems designer might conclude that only once in six million lines (or some such wild guess) would the hyphenation of certain four-letter words be essential to the sort of solution the customer would require. And he might determine that, given those odds, manual resetting of those lines, and hand stripping, would be the easiest, cheapest, and best way out.

Esthetic judgment: how many letters of a word should be "left behind," and how many carried over? *Suggested solution:* leave not less than two; carry not less than three. *Implication:* five-letter (or more) words that break after the first letter ("a-head," "a-breast") or after, say, the third letter ("hap-py") are discarded. Justification (and excessive interword spacing) occurs at the expense of hyphenation.

Esthetic judgment: how frequently should hyphenation occur? Bear in mind that the more frequently (successful) hyphenation takes place, the better and more even the interword spacing. But is it harder to read lines with excessive interword spacing or lines with too frequent hyphenation? *Suggested solution:* a tally on the frequency of hyphenation. If the two preceding lines end with hyphens do not submit the next line to the hyphenation routine.

Query: But suppose the third line, if hyphenated, produces a better result, in terms of interword spacing, than the second line, which has already been hyphenated and accepted? *Solution:* a program which does not approach the problem on a line-for-line basis, but reaches tentative solutions only, scans the entire "area of consideration," juggles the results to optimize them, and then "releases" the lines in question.

At the present time, so far as we know, no one has written a computer program which checks for successive hyphenations. Existing programs solve their problems on a line-to-line basis. Usually, then, poorly justified

lines and too-frequently hyphenated lines (as well as bad hyphenation) are corrected by manual keyboarding and stripping.

Manual intervention typical

In point of fact, most existing computer typesetting programs do not present the facility for making corrections (to eliminate keyboard or input errors) prior to typesetting, and thus manual intervention is a most common occurrence. In this respect, "computer-aided typesetting" is a more meaningful term than "computer typesetting." But when keyboard errors have to be corrected subsequent to typesetting, most of the advantages of the computer are sacrificed. We must take it for granted, therefore, that the entire process is not meaningful unless error-free copy goes through the hyphenation and justification program, for otherwise the "h and j" solutions would, in many cases, have to be discarded.

"Clean" input is now possible in a variety of ways, but such input is created without advance knowledge of how lines will break. If manual intervention is limited to the correction either of computer-generated errors or of solutions which are less than perfect, a substantial forward step has been made, but the process cannot be considered an acceptable and economical alternative to conventional typesetting until the program can achieve optimal (or virtually optimal) solutions in more than, perhaps, 95% of the cases, and achieve them in such a way that to correct the other 5% does not require a manual reset of much of the job.

Film versus metal composition

Perhaps we should have pointed out earlier that our entire discussion presupposes film composition, as opposed to hot metal.[2] What computers can do for linecasting on hot metal composition devices is only a small portion of what they can contribute in the film composition arena. Film devices are faster, more flexible in terms of the mixing of fonts and sizes, and superb in their ability to adapt to different measures, formats, and white space allocations. Most of the restrictions enforced by

2. We should like to consider the pros and cons of film composition from the standpoint of type design and character fit, and especially the quality of the image generated by CRT (cathode ray tube) devices, but that is the subject of another article.

economy during the reign of hot metal may now be thrown out the window. But film composition devices do these new things poorly when they are responding directly to human instructions. Film composition comes into its own only when it is computer-created. This means that it proffers an efficient product only when the material being composed is not only error-free, and properly justified and hyphenated, but is processed to conform to the proper format. A computer approach cannot be successfully applied merely to the creation of *galleys* of type composition in those situations in which page makeup in film is more cumbersome than in hot metal. Hence in all current discussions of the possibilities and limitations of computerized composition, attention focuses directly and explicitly upon the possibility of devising pagination solutions.

Problems of pagination

If justification and hyphenation seem complex, the making up of a book into pages is many times more so. The rules, for example, are even less clearly defined. The solutions are infinitely more varied. There is wider scope for esthetic judgment. There are more recalcitrant elements for the programs to cope with.

Chapter openings vary: right-hand pages only, right or left pages; a new chapter begins on the same page under certain circumstances. Chapter "sinkage," the treatment of running heads and folios, the manipulation of footnotes, the positioning of illustrations and tables, the requirements for "balance" between columns and facing pages, the extent to which succeeding pairs of pages may depart from standard —all of these and many more diverse elements must be identified, and general rules, with all of the foreseeable exceptions, must be formulated and programmed.

But even though the variables are much greater, the rules and standards are such that optimal solutions can be devised. These solutions are not difficult to realize for a limited class of work, because the variables can be foreseen and the tolerances can be specified. But the more "general purpose" the systems conception, the more intricate the options, the more varied the parameters to which the program must accommodate.

Here the demands upon the computer configuration are at their

Figure 1. Facing pages, balanced by computer program, avoiding widows, avoiding a new paragraph at the bottom of a page, with footnotes moved to correct position and running heads and folios allocated by program.

> Speak the language of the parents and forget the pedagogy. Be honest but kind. Some words create emotional reactions that can severely impair communication. For example, Johnny is stubborn, insolent, sloppy, and a liar. It is better to say that Johnny insists on having his own way, is sometimes outspoken, has a tendency to stretch the truth, and could do neater work.
> 2. Kinds of information to give and not to give. What is or is not to be communicated through the oral conference varies from school system to school system; therefore, the principal and classroom teacher will need to know what things are appropriate in their system.
> 3. Adherence to the professional code of ethics. Some parents will take *shots* at Johnny's last year teacher. Don't buy it! You will want to be sure your attitude reflects positive support of that teacher and of other teachers and other schools. Remember, Johnny will have another teacher next year, and it may be your turn.

In conclusion, the individual oral conference, if it is to be effective, requires considerable planning and effort on the part of the principal and teacher. The effort is justified when we see that elementary school children are benefited. Successful parent-teacher conferences are a means to the realization of this end."[4]

Question 22: Is the process of grading generally regarded as a punitive process by students and faculty?

Yes. While the reasons given in defense of the typical grading system are of the highest, the facts are usually quite different. When they are asked about the purposes of grading, teachers often respond as did Eugene L. Gaier:

> . . . to challenge and motivate the student; to inform the student and his parents of the quality of his work and his progress; to provide information for classification—to group, promote, retain, or certify completion of a given work program—hoping thereby to protect society from incompetency; to provide information for assessing the school, the curriculum, and the teacher's competencies; plus a host of others—all stated with academic solemnity.[5]

But further on in the article, the point is made that the process of grading is still generally viewed by both students and faculty essentially as a punitive process rather than as a learning guide. If the conclusions are correct, and I am inclined to think that they are, the implications are disturbing. These conclusions clearly reveal why students tend to shift their emphasis away from learning toward the earning of grades; they also reveal the limited value of grades as a guide for the student of how to effect improvement.

[4] Johnson, *op. cit.*, pp. 48-50.
[5] Eugene L. Gaier, "The Grade Society," *The National Elementary Principal*, Vol. XLV, No. 6 (May, 1966), pp. 42-47.

Question 23: Are there moral considerations to the grading system?

Yes. Any system of evaluation and grading that precludes the possibility of success for some children is immoral. Notice that I said, "precludes the possibility of success for some children." Of the 124 separate abilities identified by Guilford, only about eight are consistently prized by teachers; these have to do with factors such as memory, verbal intelligence, and the like. Thus, even one important factor of creativity, i.e., of divergent rather than convergent thinking, has been widely overlooked until recent years. The spectrum of opportunities for success must be widened if morality is to have any bearing on the evaluation system.

Question 24: What is meant by the phrase "Evaluation as Feedback and Guide"?

The title of the 1967 Yearbook of the Association for Supervision and Curriculum Development is *Evaluation as Feedback and Guide*. The entire book deals with the vital concept, borrowed from industry, that evaluation should provide information to the pupil and his parents that will help to control the pupil's future behavior in ways beneficial to him. The authors rather severely indict the traditional grading system as follows:

> . . . it is equally to be condemned for the narrowness of its focus, because in its gross exaggeration of the more mechanical, easier-to-measure features of education, it virtaully blots the broader, more fundamental objectives out of sight. The end result is not simply bad evaluation; it is distorted teaching and learning.
> We believe that much of the trouble goes back to the marking-grading system and the kinds of records which it produces.[6]

I recommend this book to teachers and parents who are seriously concerned with improving the evaluation program of their schools and who, in the process, want to improve the nature of communication between faculty and parents.

Question 25: If the teacher should avoid using words such as "lazy," "bad," "careless," "sloppy," "irresponsible," and the like in talking with parents about children, what should she do?

Name-calling that reflects a judgmental attitude usually results in defensiveness in parents and reduced communication. Usually, a teacher who uses "loaded" words with a parent is unaware that she is doing so; she really wants to communicate but may not know how. One of the best examples of a contrast between "what was" and "what might have been" has been described by Rothney as follows:

> A few years ago, when the writer's children were in elementary school, he usually sent his wife alone (as was the custom) to represent the family at the

[6] Fred T. Wilhelms, Editor, *Evaluation as Feedback and Guide*, Yearbook of the Association for Supervision and Curriculum Development, Washington, D.C., 1967, p. 15.

greatest. If facing pages of text are to be balanced, and incomplete lines at the tops of pages or columns ("widows") are to be avoided, then the computer must have sufficient capacity to include within its "area of consideration" all of the relevant material. If sufficient text information must reside in "core" to permit a meaningful and useful analysis, "core" must be large and the required computer configuration expensive, unless alternative ingenious approaches to the balancing of pages can be devised.

Yet of all of the factors which may yet stand in the way of the achievement of the assignment, the major ones (in our judgment) do not relate to economics or to computer size, but to the lack of problem definition and lack of human ingenuity. For our part, at Rocappi, we feel that we have come a long way because we have been able to identify many of these problems, to categorize them, and to assess the "trade-offs" that are implied. We have devised answers, including pagination, which are capable of reaching a 95% result, on a wide variety of text problems, without manual intervention.

We may, therefore, state categorically that given unlimited resources in terms of programming talent and computer configurations, a product can be achieved which meets the most critical esthetic standards and which, in all probability, will be more consistently satisfactory than that which will be produced by craftsmen working within the limitations of the job assignment's time frame.

We are not there yet, but we are getting there. And what we most require is the sympathetic and imaginative interest of those whose calling it is to establish the yardsticks which measure the product and help to distinguish good from bad. They must learn, as we have had to learn, to move from the particular to the general. Instead of saying that "in this case I don't like this solution because . . . ," they must be able to re-phrase their criticism so that we can draw from it the following: "when these conditions occur, and these alternatives exist, this is the path you should follow." Given this degree of assistance the ultimate result will be not a deterioration of quality, in a mass production era, but greater style, vivacity, variety, and beauty than we have achieved in the practical world of book composition by the application of conventional methods.

The Changes in Letterforms Due to Technical Developments

Hermann Zapf

A brief historical survey traces the major technological influences on typography, beginning when Gutenberg transferred the handwritten letters of the medieval scribes into typographic forms, down through the development of machine composition, both in hot metal and photocomposition. Today new problems arise in connection with automated optical reading machines. Not only must the technical requirements of computerized composition be mastered, but we also have to consider the demand for new alphabet designs as an expression of our time, departing from historicizing elements of past styles.

Apart from historical changes in style, technical developments have changed our alphabet since the invention of typecasting. Today there may be the special problems of reading machines; tomorrow, perhaps, electrostatic printing methods or developments in laser-beam techniques. Gutenberg's most important task was to place the freely handwritten letter on a rectangular piece of metal. Besides a few artistic exceptions in relation to italics and script faces, this principle remained a basis of all type design for letter casting for more than 500 years. It is only the development of photocomposition in our days which is in a position to bring back, once more, the whole scale of handwritten variations of earlier calligraphs. Today, some of these photocomposition machines can ignore the technical limitations of the past and produce, by means of special optical arrangements and photographic tricks, modern solutions not thought of before.

The invention of the adjustable typecasting instrument by Gutenberg made it necessary to bring the handwritten image into a system which permitted a solution for the technical art of typecasting as well as the typographic design of the page of a book. Gutenberg and his successors tried to imitate the handwritten forms of the scribes by means of variety of ligatures. To produce the 42-line Bible of 1455, Gutenberg required

approximately 290 characters, abbreviations, and ligatures; Fust and Schoeffer also used several hundred characters for the Psalter of 1457.

All the same, the technique of book printing had followed its own ways since its invention. Contrary to the handwritten books, where the lines were not justified, in the production of the 42-line Bible the lines had already been composed into fully justified columns. This was only possible with the help of a complicated system of ligatures and abbreviations. Gutenberg and his contempories would have saved themselves much effort had they done without those. One can imagine what complication of the typecasting process and letter distribution this meant considering a total volume of 1280 pages with more than 3 million characters; this effort contradicts, indeed, all economic considerations of Gutenberg. The early production is, as can be seen, by no means a mechanic imitation of the medieval handwriting. I am no more of the opinion that Gutenberg intended to copy the handwriting process. He intended an improvement.

Many artists of the Renaissance occupied themselves with the letters of the alphabet, and some tried to put them into the order of a system of geometrical design. These constructed alphabets existed first in Italy. In 1463 Felice Feliciano designed such an alphabet (Fig. 1), two years before the first book was printed in a roman type style at Subiaco near Rome. In the sixteenth century it was mainly Dürer who tried to construct letters with "compass and ruler" (Fig. 2).

Another effort to create an ideal constructed alphabet should be observed, since it points towards electronic solutions for a digitally stored alphabet for photocomposition machines, in which the single elements of letters are built up from dots of lights. By edict of Louis XIV of France the Academie Royale des Sciences was ordered in 1692 to develop, under the chairmanship of Jaugeon, a new typeface for the Imprimerie Royale. The outline of these letters was fixed mathematically in a network of 2304 squares. The files of the Jaugeon Commission are available today at the Bibliothèque Nationale (Fig. 3). On close examination of the letterforms, however, it is observed that they are transferred rather inexactly from the drawn originals to the copper plates for the printing process. Granjeans, too, did not exactly follow the originals when producing the face, called the Romain du Roi, which

Figure 1. Alphabet of Feliciano, ca. 1463. The capital letters are illustrated in the small Codex of the Vatican Library. Original height 82 mm.

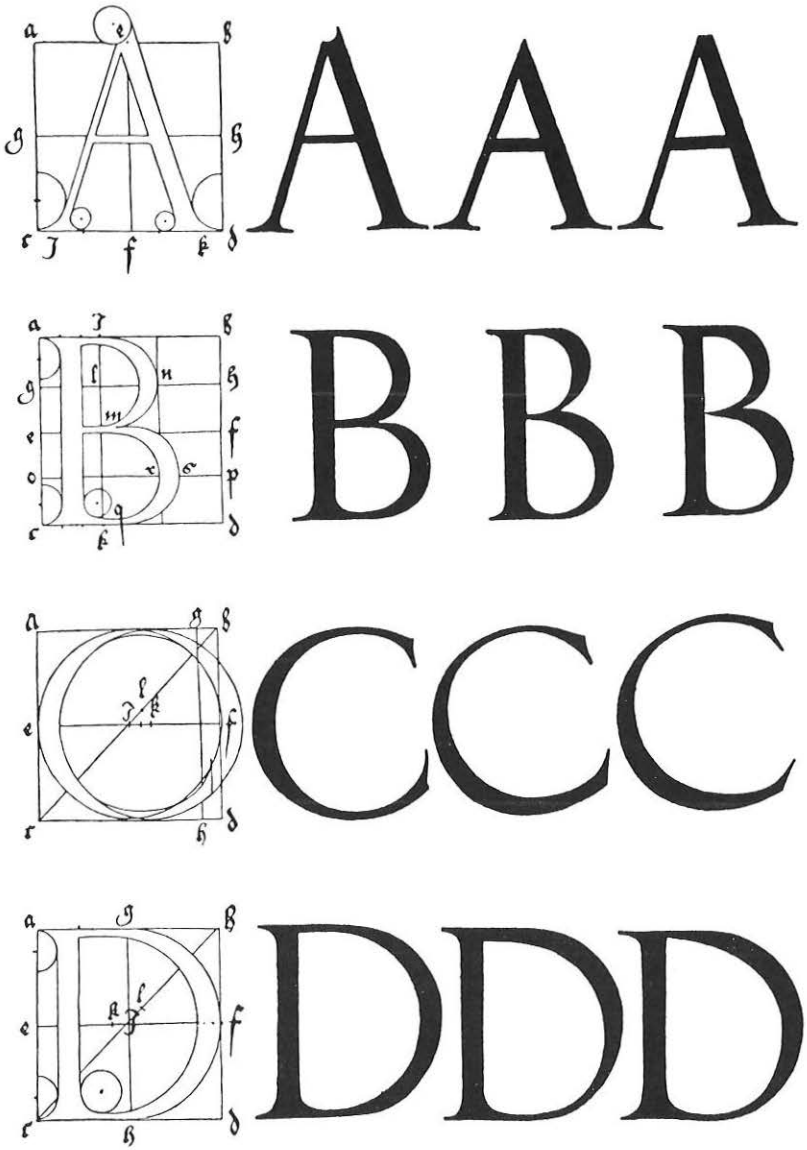
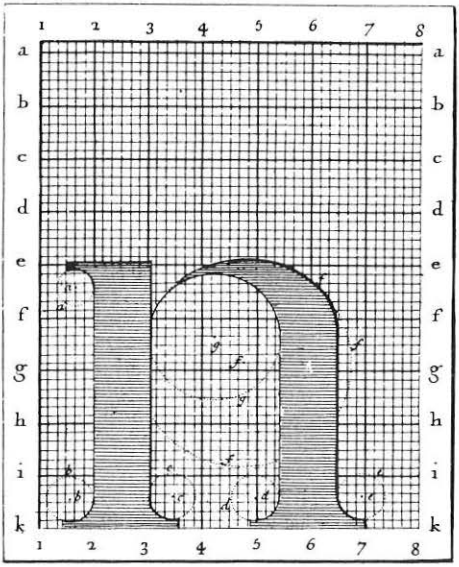
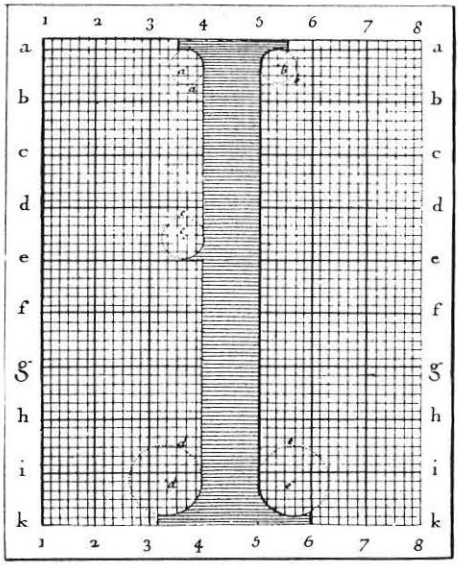


Figure 2. Some letters constructed by Albrecht Dürer, 1525.





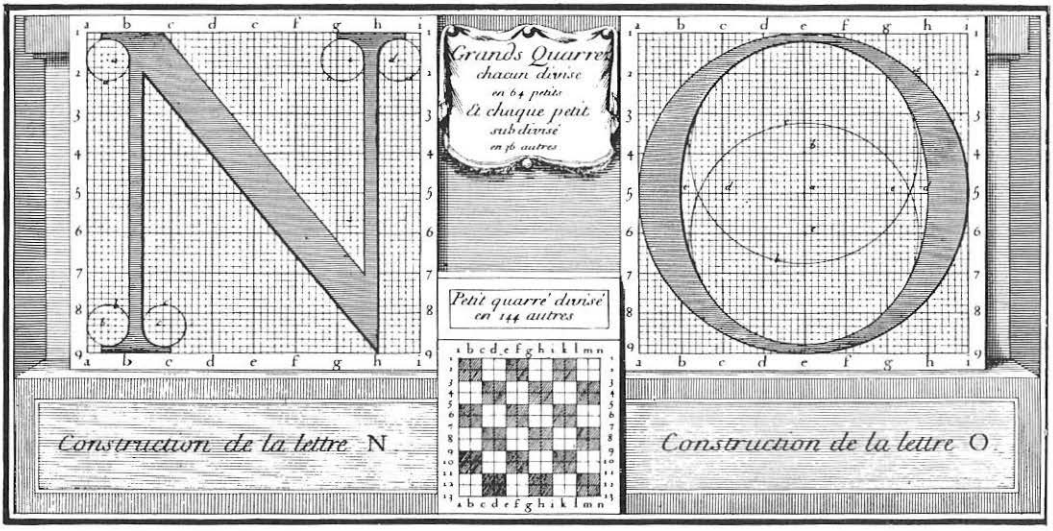


Figure 3. Examples from the alphabet developed by the Jaugeon Commission, 1692. The outline of the letters were fixed mathematically in a network of 2304 squares. Note the lower-case letter l with a minute horizontal flick or "trait" to the left for identification against the capital I and figure 1.

was used in 1702 for the first time. However, he had no possible method for the reduction onto the punch other than free drawing by hand. The form of the lower-case letter l is interesting; perhaps based on French examples of the sixteenth century, or to distinguish it from the capital letter I, it was given at the height of its x-line a minute horizontal flick or "trait" to the left. The Romain du Roi Louis XIV was the first typeface protected from imitation—by Royal Decree.

The change from the comparatively rough woodcut to the finer copper engraving required a change in letterforms. During the sixteenth and seventeenth centuries the serifs became finer shaped, the forms generally more elegant and cultivated. A further technical advance was brought about during the eighteenth century through "smoothed" paper. Baskerville was the first one to use it. The hand press continued to be used, however, into the nineteenth century, even if not exclusively with dampened paper.

In the seventeenth century accounting machines were invented, the first by Pascal in 1642, and a later one by Leibniz in 1673. They command special interest today as forerunners of modern data processing devices. Also, the binary system, the basis of electronic computers, was described by Leibniz at this early date.

The first automatic drawing machine was constructed by Jaquez Droz and Leschot in 1771 (Fig. 4). They programmed—to use an expression of our day—their three famous "wonder toys" with several programs. "The scribe" could write several texts with his hand and had a letter capacity of 40 characters, upper- and lower-case: a mechanical written alphabet. The movements for drawing a single letter on paper were controlled by cams. A simple, sans-serif type might have been reproduced comparatively easily, but it is surprising that it was possible to reproduce even handwritten forms. Only the repetition of details of the lower case e, r, etc., allows us to recognize the mechanical production of such a "handwritten" text. It must be considered that in this case a reproduction is not affected by means of the pantograph principle, but the hand moves in a natural manner, puts the pen into the ink, and the head follows the movement of the hand.

The next step was a program controlled by punched cards, which was first used with the mechanical loom of Jacquard in 1801 (Fig. 5). His knowledge of printing gave him the possibility to print his patterns.

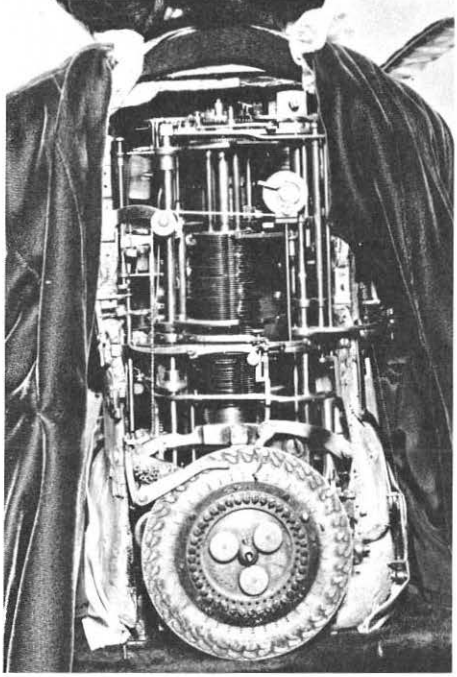


Figure 4. The inside and some lines of the Droz-Leschot automatic drawing machine, 1771.

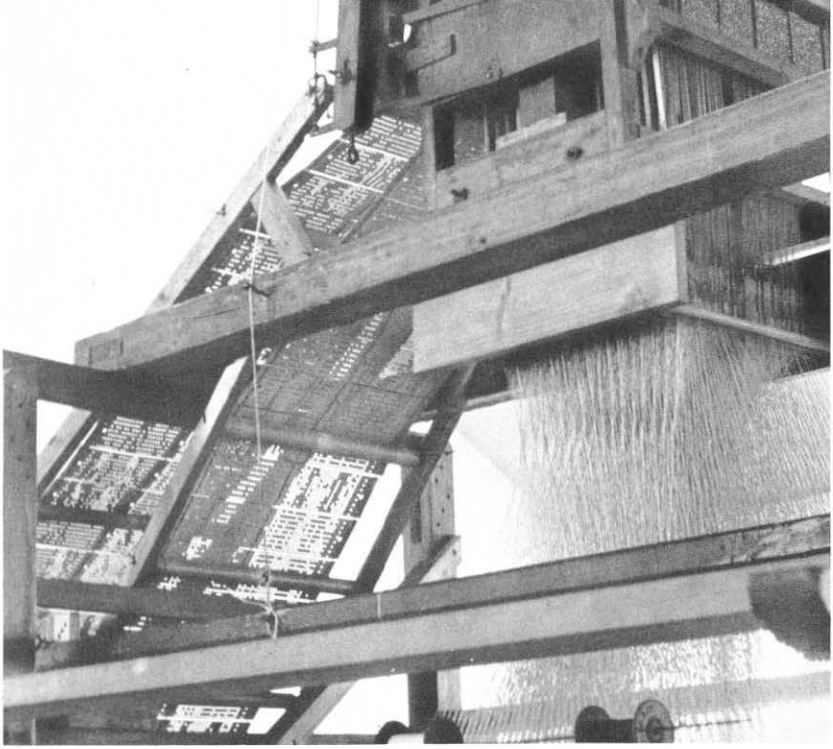


Figure 5. The Jacquard loom, first use of punched cards to control a printing pattern.

A few years later, in 1837, the Morse alphabet was invented; sequences of dots and dashes already used the principle of a binary coded alphabet. The Braille alphabet for the blind (1828) is also an abstract alphabet in which the characters are represented by combinations of dots, which combinations are in no way similar to the original shape of the letters. The punched paper tape of our days is not different in principle.

The punch cutters had worked their capabilities to a fine art in the course of the centuries. Perhaps this development was quickened by the invention of lithography in 1789, which very soon became a dangerous competitor of the book printing art, typography.

The English "script" typefaces, engraved in steel, could, from a technical point of view, be no further improved as far as their artistic conception went—although they were basically non-typographic. Also, the decorative alphabets of the nineteenth century command our appreciation as far as their technical achievements are concerned, though they are very often of rather doubtful artistic quality.

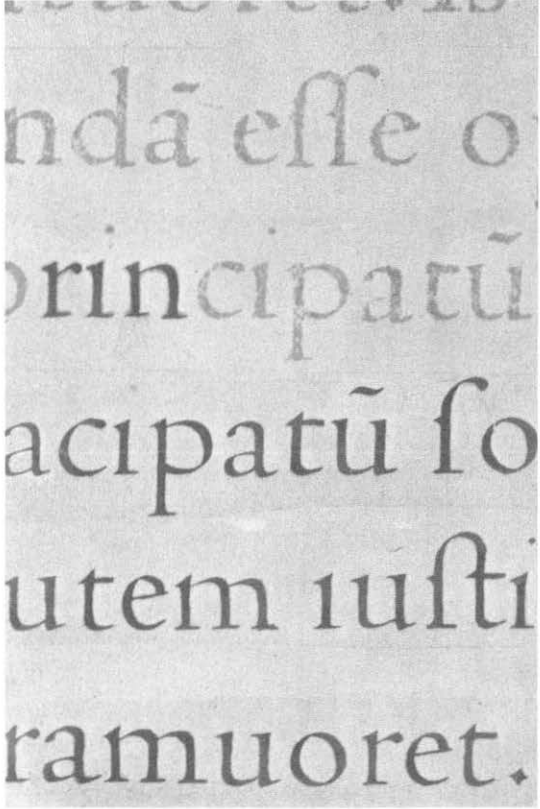


Figure 6.
Bruce Rogers' use of a broad pen to write over Jenson's original roman letters for the design of Rogers' Centaur typeface.

Photography followed the invention of lithography. It was, very soon after, to exert an indirect influence on letterforms. Emery Walker, in 1889, enlarged several roman letters from a Jenson edition of 1476 for William Morris. Morris overdrew the letterforms and thus shaped the Golden Type for his Kelmscott Press. The exaggerated thickness of the serifs might thus be explained since Morris photographically enlarged letterforms printed on dampened paper. The working method of Bruce Rogers for his Centaur (1914) is interesting in comparison. He used (as did Cobden-Sanderson) the same historical originals, i.e., Jenson. However, unlike Morris he did not retouch the characters with a brush but wrote with a broad pen (Fig. 6). Thus, he went the opposite way from Jenson, who used a written original and formed a letter. Rogers wrote the letter, or drew it with a broad pen, and thus brought it back to a pen-correct shape. It may be left open to debate whether or not this is the correct approach.

Essential changes in the basic forms of our alphabet are not possible. Readability and the letter as a character image, subconsciously known to us, must be maintained. However, several attempts have been made to equalize upper- and lower-case letters, to simplify the alphabet. Others have tried to reach better coinciding of the spoken and written form by means of special signs, in other words to develop a phonetic alphabet. Cassandre's Peignot typeface of 1931 was really pioneering work in equalizing the differentiating forms of upper- and lower-case letters; it was ahead of its time (Fig. 7). For the future, though, there will be many further possibilities to simplify our alphabet in parts. Against this, new developments of characters (however well considered) will have little chance to succeed in reaching general recognition. G. B. Shaw's testamentary wishes for a proposed British alphabet were honored by 450 proposals in 1958. None of them fully satisfied the public trustees. Finally a compromise led to a so-called "Shaw-Alphabet" in which Shaw's *Androcles and the Lion* was published by Penguin Books in 1962 (Fig. 8).

Since it has been possible to express Hungarian in a roman type, or the Turkish language in Latin letters, as was done in accordance with the Turkish alphabet reform by Kemal Atatürk in 1928, it should be possible to solve also other speech and writing problems with the roman characters known to us. Figure 9 is a page set in Futura designed by Deberny and Peignot for Vietnamese. A few additional special signs and special accents were sufficient for the representation of this Asiatic language. Technical problems and economic reasons make it more and more important not to complicate typesetting any further but, on the contrary, to attempt simplification.

The work of the type designer has not become easier. Not only has the scope to develop new alphabets narrowed, but technical aspects have limited it further. Automatic reading machines bring new difficulties and raise the question whether the traditional Latin alphabet can in the future also satisfy our artistic considerations.

I do not want to go into detail on the various purely technical alphabets of the past years. Mention should be made, however, of the best-known technical typeface, CMC-7. Although this so-called magnetic type has many advantages which should not be disregarded (it can be read by the eye and by a machine), it remains unsatisfactory with

Figure 7. Canandre's Peignot typeface, 1931.

Evening. The end of three converging roads to Rome. Three triumphal arches span them where they debouch on a square at the gate of the city. Looking north through the arches one can see the campagna threaded by the three long dusty tracks. On the east and west sides of the square are long stone benches. An old beggar sits on the east side, his bowl at his feet.

Through the eastern arch a squad of Roman soldiers tramps along escorting a batch of Christian prisoners of both sexes and all ages, among them one Lavinia, a good-looking resolute young woman, apparently of higher social standing than her fellow-prisoners. A centurion, carrying his vinewood cudgel, trudges alongside the squad, on its right, in command of it. All are tired and dusty; but the soldiers are dogged and indifferent, the Christians lighthearted and determined to treat their hardships as a joke and encourage one another.

A bugle is heard far behind on the road, where the rest of the cohort is following.

CENTURION [*stopping*] Halt! Orders from the Captain. [*They halt and wait*]. Now then, you Christians, none of your larks. The captain's coming. Mind you behave yourselves. No singing. Look respectful. Look serious, if youre capable of it. See that big building over there! Thats the Coliseum. Thats where youll be thrown to the lions or set to fight the gladiators presently. Think of that; and itll help you to behave properly before

[*Evening. The end of three converging roads to Rome. Three triumphal arches span them where they debouch on a square at the gate of the city. Looking north through the arches one can see the campagna threaded by the three long dusty tracks. On the east and west sides of the square are long stone benches. An old beggar sits on the east side, his bowl at his feet.*

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Figure 8. The so-called Shaw Alphabet. A compromise result of a competition with more than 450 proposals in 1958. Shown here as first used in *Androcles and the Lion,* published by Penguin Books, 1962.

Cho lưu hành thứ chữ nầy, chúng tôi tin chắc sẽ giúp ích rất nhiều cho nghề in chữ **Việt-Nam.**

Chúng tôi đã nhận thấy ở **Âu-Châu** kết quả của thứ chữ nầy rất tốt đẹp, vì lối chữ đã rõ ràng lại có vẻ mỹ thuật nếu khéo sắp cả ba kiểu chữ với nhau.

Figure 9. Vietnamese as an example of using roman letters for foreign languages. The basic Futura alphabet with a few additional signs and special accents can express this Asiatic language. Developed by Deberny and Peignot, Paris.

respect to its form. Since CMC-7 is mainly processed by special magnetic type readers for the checking business in banks, it is of lesser importance to our considerations; it is not concerned with the processing of large quantities of text for books or periodicals. The alphabets of high-speed printers of the first computer generation (UNIVAC 1956, etc.) are unsuitable, too, as far as our typographic requirements are concerned.

It was the design of OCR-B which brought the first step not only toward the unification of different computer systems but also toward an artistic solution. OCR-B is a typeface designed by Adrian Frutiger and technicians on behalf of ECMA in 1963; Frutiger himself has described its development in a previous issue of *The Journal of Typographic Research* (April 1967, pp. 137–146). OCR-B has proved that it is possible to combine technical and artistic requirements. These letterforms, appearing a little strange at first sight, will have to be considered in future developments of type forms.

To the technical requirements in the development of new type forms must be added changes in our reading habits. Until a few years ago, our eye was the only medium which traced the letters. It also was the only judge of good or bad legibility. The artistic aspect was predominant. The eye would discern the less perfect letter design of an alphabet, but, all the same, would finally recognize the meaning of a word or sentence. To distinguish between ß and B, or I and 1, or *h* and *h* (Garamond Italic) did not require much effort.

Our eye follows, when reading, the upper edge of the middle length (X-line). Attempts to increase this upper "reading line" to improve readability must be taken into consideration when designing readable letterforms in the future, especially typefaces for newspapers and periodicals. Times for quiet reading have become rare. The large amount of printed text which we have to work through daily compels us to read hastily, a fact that is not always considered. Many of our newspapers and periodicals present hindrances to fluent reading. There is, for example, often a lack of distinction between information, news, and supplementary commentary.

Beside the human eye there is, today, the electronic eye of the reading machines. For these machines, letters are not a problem of form but a problem of distinction, if we wish to keep the amount of reading

mistakes low in order to justify the use of these very expensive machines. Our eye is in a position—from experience and consideration of the context—to grasp even doubtful forms; we merely recognize them as non-artistic or difficult to read. A reading machine, on the other hand, would simply indicate a wrong or non-readable letter in such cases, or the machine would have to be equipped with additional storage means to compensate for such indistinct, doubtful characters in the text.

Many problems of form have to be taken into consideration for an optical as well as an electronically readable letterform, especially since equipment has already been developed which can read handwritten text as well as typewritten characters. There is not only the question of a letter distinction between i, and l and !, between u and n (in handwriting), between the number 0 and the letter o, or in American handwriting between  and  which are normally used for F and T.

Many sources for mistakes are mainly due to letters cast or set on too narrow a space. Two examples are rn and cl. Such critical letters are, as far as legibility goes, not only important in the small type used for book and newspaper printing, measuring only a few millimeters, but also for the signing in towns and on highways. The letters must not be placed too close to each other in order to safeguard quick recognition even under bad lighting or weather conditions. As far as numbers go, the differentiation between 3 and 8 (for instance in telephone directories or in companies' letterheads and bank account numbers) often presents certain difficulties even to the normal eye. The increasing importance of numbers (to think only of the postal zip code numbers for towns) should not be underrated, especially since they are the only characters which can actually be "read" by all people of this earth, regardless of language.

Turning to another aspect of modern typography, new problems arise in connection with the development of photocomposition. The manual typographic alphabet, dating from Gutenberg, was supplemented in the nineteenth century, through the invention of linecasting machines, by the mechanically produced typographic alphabet. Of the approximately 1600 patent applications filed in the nineteenth century for mechanical linecasting systems, only Mergenthaler's Linotype (1886) and Lanston's Monotype (1887) were actually used on a large scale. Both systems had a direct influence on the design of letterforms. In the case of Linotype, italic and bold faces had to be

adapted to the brass width of their standard equivalents. In case of the Monotype system—a system based on 18 width units—it was necessary to place all letters onto 12 different units, since the first 6 units were too narrow for letters or signs. Meanwhile, the systematic alphabet, based on width units, has become normal practice. For photocomposition machines, either existing alphabets which had been adapted to the special requirements by redrawing were used, or new letterforms designed which were really adjusted to the problems of this type of composition. Since it is generally necessary to produce several point sizes from one negative there are, especially in the case of high-degree optical reductions, differences in width and size disproportionate to the original letterforms. In a photographic alphabet the serifs of a 6-point letter are exactly half the size of a 12-point letter (if a 12-point negative is used). On the other hand, the serifs become too strong if a 10-point letter is used for the production of a 16-point letter. In a typeface used in linecasting the scale of point sizes could be adapted up or down; i.e., a 6-point letter was not, in all details, the arithmetic half of a 12-point letter.

Photocomposition machines working with cathode ray tubes and designed for extremely high speeds use the principle of the scanning spot similar to the methods used in television receivers. The Digiset machine uses an electronic memory to store the characters of the alphabet, a method that no longer uses a photographic negative of a character to electronically reproduce an analogue of it. This is a digitally produced alphabet and its resolution is determined by a line raster. By electronically influencing the deflection of the cathode ray it is even possible to produce an italic, a condensed, or an expanded reproduction of a character from the stored information of the standard character. Not all typefaces are suited to this method, and this fact should be taken into consideration when designing such faces, in order to achieve a somewhat satisfactory result.

The resolution of a character into a line raster—as done with the LINOTRON 1010, Digiset, or LINOTRON 505—requires some new reflections also, when designing the faces. Serifs become rounded at their ends and must be kept more pointed in design. Similar optical distortions must be considered in the case of sans-serif letterforms, especially for semi-bold alphabets; these, however, are of a purely technical nature similar to the problems facing the engraver when engraving punches.

Which tasks will be faced in the future? With the world population expanding at an extraordinary rate, printed reference books and periodicals will become more and more important. The population growth is estimated at approximately 6 billion people in the year 2000 (nearly double today's population)!

As far as we are concerned, the automated production of books will simply become a necessity, whether we like it or not.

In 1640, at the time of Galileo, approximately 600 million people lived on this earth; at the time of William Morris, in 1850, there were 1200 million; today the population has grown to approximately 3 billion people, of which more than 700 million are illiterates. This number represents more than one fifth of the world's population. Only 44% of 965 million children are going to school today to learn reading and writing. The only answer to the coming expansion of education is the automation of our book production.

In this area many tasks still remain to be solved by the typographers. According to the information of the World Association of Bible Societies, the Bible (or parts of it) had been translated—and printed—into 1280 languages or dialects by the end of 1966. These 1280 languages or dialects are spoken by approximately 96% of the world population. The remaining 4%, representing approximately 120 million people, use hundreds of additional languages, partially or completely unexplored. Even considering that a large part of these languages can, for various reasons, not be expressed with the basic signs of the Latin alphabet, there remain many interesting problems to be solved.

Russian efforts for a combined printing type which is supposed to make the Latin alphabet and the Cyrillic Azbuka suitable for more than a hundred languages and dialects in the Soviet Union are reported to be almost completed. A similar situation exists in some parts of Africa. Since Latin letters are familiar to a part of the population of these countries due to the use of the French or English language, an attempt should be made to use the Latin alphabet as a base to solve the special African language problems. I am thinking in this respect of Adrian Frutiger's Davanagari and new experiments in the Arab area, the Simplified Arabic and the non-kerned Alahram Arabic for newspaper printing.

Automation of typesetting of large amounts of text will be the task of the future technicians; to design readable and formally good letterforms for the coming technical developments is the task of the typographer. We should express our respect to the great achievements of the past by aiming towards a result expressing the spirit of the present, honest and just to our days, as is done in the areas of architecture and the fine arts. There should be no copying of the past centuries; we want to work towards a real expression of our time: letterforms as an integral part of the industrial forms of the twentieth century. We do not want to go back into the past, especially not to the forms of the nineteenth century, an easy neo-historicism which would permit us, thanks to our modern techniques, to copy and cheaply use the style elements of the past. Letterforms are no longer a question of style, they express our modern way of thinking—a way of thinking which is essentially different from the thoughts of the nineteenth century in respect to social, political, and artistic ideas.

This article is based on a speech by Hermann Zapf at the Tenth Congress of the Association Typographique Internationale held at UNESCO *in Paris, November 1967.*

Context Clues as an Aid to the Reader

Robert Emans

Context clues have been referred to as the most important single aid to word perception. The author proposes a simplified schema to organize context clues according to three categories for perception of printed words—*meaning clues, language clues,* and *organization clues*—and within each of the categories, describes a number of types of context clues and gives examples.

Reading authorities frequently recognize that context clues are an important aid to the reader in the perception of words (Cordts, 1965; Gray, 1960). Combined with other word perception clues they represent an indispensable tool for readers at all levels of reading ability. Young children often use context to help identify words they have previously known, but for the moment have forgotten. Similarly, young children use context as a check on words they have tentatively identified through the use of structural and phonic analysis. Mature readers use context clues for the above purpose and also to anticipate words for the rapid recognition of words in sequence, since it is a faster technique than sounding out a word and more reliable than merely recognizing a word by sight. All readers must use the context for the correct identification of such words as *read, lead, wind,* and *bank.*

Although the study of context clues is not specifically concerned with letterform research, readers of *The Journal of Typographic Research* should be made aware, at least, of one of our connecting links with the extensive reading research resources in the world. We are all concerned, basically, with perception and comprehension of our visible language.

To use context clues the reader must bring to the printed page prior experiences, oral language, and a knowledge that reading demands the achievement of meaning. Using his background, the reader limits his possible choice of words to relatively few which fit the meaning

of the passages. Thus, he does not need to be concerned with all the other thousands of words in the language. By combining context clues with other clues, the reader can very often correctly perceive an otherwise unrecognized word.

Artley (1943), McCullough (1943), and Ames (1966) did comprehensive studies on categorizations of context clues. They and others found their categorizations to be complex and technical. These classifications did not lend themselves well to interpretation and instruction of students.

This author proposes a simplified, yet comprehensive, schema to organize context clues according to three categories for perception of printed words. One category of clues uses the sense gleaned from the surrounding words and is referred to in this article as *meaning clues.* A second category involves the use of syntax, and is called *language clues.* How sentences and paragraphs are organized, or *organization clues,* represents a third set of clues. Such categories are not all inclusive and a reader may use a combination of these. However, a knowledge of such a schema for classifying clues and the types of clues comprising each category can be an aid to writers preparing manuscripts as well as readers. This article will go into a further discussion of this classification schema. Each type of clue will be explained briefly and examples given. In each example the italicized word may be recognized using the type of clue presented.

Meaning Clues

1. Definitions: An author may define a word for the readers. For example: The *median,* or midpoint score, was 10.5.

2. Descriptions: The reader uses the context that describes an unknown word to recognize it. For example: In the dirty, crowded *slum* of major cities, few children have an opportunity to grow as other children do.

3. Examples: Examples of an unknown word may help the reader to recognize it. For example: The *feline* family includes cats, tigers, and lions.

4. Synonyms: A more familiar word than the unknown word may be supplied. For example: The next-door *neighbor* was helpful.

5. Antonyms: The meaning of one word which gives an opposite

meaning may help in recognizing the other word. For example: While she was sociable, he was more *reserved.*

6. Comparison and contrast: Sometimes a word may be identified because it is evident in a comparison or contrast. For example: Do not run on the stairs, but *walk.*

7. Tone, mood, setting: A reflection of the situation may give a clue to an unknown word. For example: Nothing suited him. Dinner was late, the coffee was too hot, the meal was too cold. Father was in a *captious* mood.

Language Clues

1. Familiar expressions and idioms: Such a clue requires a knowledge of familiar language patterns. For example: To err is human; to forgive, *divine.*

2. Phrases or clauses: A phrase modifying an unknown word may help in identifying its meaning. For example: John *determinedly* tried again and again.

3. Referral signals: A modifier such as these, that, or first may refer the reader to what had been stated previously. For example: Children like candy, pies, and cakes. These *sweets* are preferred by boys and girls alike.

4. Parts of speech: A word sometimes may be identified because it is associated with another word of a different part of speech. For example: The fish *swam* silently in the brook. The children played in the *green* grass.

Organizational Clues

1. Series of words: A word may be recognized because the other words in series are known to the reader. For example: The enemy hit the Allies with bombs, guns, and *rockets.*

2. Main idea to details: In paragraphs in which a main idea is supported by evidence, the recognition of this organization may help the reader to identify an unknown word. For example: The Air Force's new plane has many advances. It has wings that sweep back in flight, new weapons, and advanced *radar.*

3. Questions to answers: A word may be identified in paragraphs in which the writer asks a question and then answers it if the reader

recognizes the use of such an organization. For example: Which approach is best? There is no clear-cut *proof* that any one method is better than another.

4. Cause and effect: Recognizing sentences that use a cause and effect thought relationship may help in word perception. For example: By hard work, students may receive higher grade-point *averages*.

The context clues discussed above include only those types of clues which the reader can glean from the printed word. There are other types of context clues which a reader may use in perceiving words. These clues may come from accompanying material (pictures, graphs, footnotes), punctuation (quotation marks, exclamation marks), and typographic treatment (italics, headline schedule, layout).

Authors, especially those writing matter of a technical nature for lay readers, would probably do well to make a concerted effort to include context clues for various words in their writing. They should attempt to give adequate clues to words which may be unfamiliar to their reading audience. The number of words which are likely to be unfamiliar to the reader would probably be small, although the exact ratio of unknown words to known words will probably depend upon the intelligence, maturity, and experience of the audience. Attempts should be made to reflect the language patterns of the reader whenever possible, use a concept level appropriate to the reader, and have the likely unknown words distributed throughout the text and not concentrated in any one point. An obvious connection should exist between the context clue and the unknown word, and the clue should be as close as possible to the unknown word. Clues should be distributed so that some come before the unknown word and some after. A variety of clues should be used from the meaning bearing, language bearing, and organizational clues categories.

Teachers could help students develop skill in the use of context clues so they are used easily and automatically. Students could be taught that words always make sense in context, that the context may be used to help recognize and get the meaning of unfamiliar words, and that other clues besides context clues may be necessary when more than one word may fit the meaning.

In addition, students may be given specific exercises. Pictures may be used at the beginning to develop the idea of using meaning as a way of perceiving words. At higher levels exercises in which words or,

which is probably better, parts of words may be given context clue study should probably be combined with the study of other word perception skills.

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Acknowledgments. This article is based on a speech, The Role of Word Attack Techniques: Context Clues, presented at the International Reading Association Conference in Boston last spring.

Research in Progress

Carl Flarsheim and Warren Infield

Junior students in the Design Department at the Tyler School of Art of Temple University were assigned a three-dimensional design problem. The problem dealt with a free investigation into the possible uses of an object language. By common consent the problem was not limited in any way, at the outset. As the individual investigations developed, the students were to set their own limitations. Through discussions during the developmental stages, the research group came to the early realization that manipulations based upon rudimentary set theory, in contrast to a purely spatial approach, gave greater flexibility in developing solutions.

It was generally found that environmental changes had a vital impact upon the metaphors established within the student's language construct. We also found that we were incapable, within the time limitation set by curriculum requirements, of establishing conclusive communication by means of such a language. In many cases it became necessary to reach prior agreements among the members of the group when individual students attempted to establish independent metaphors for specific objects.

Probably the most promising result derived from this phase of what will be a continuing investigation, was the general realization that the object cue gives greater conceptual flexibility when placed into a changing environment than the verbal cue. In other words, once common agreement had been established, the articulation of such a language was found not to be as beset by the same type of error as results from semantic entanglements inherent in verbal communication. In addition, the object language communicated much more intensely whether it was used by itself or in conjunction with verbal language.

Finally, it was found that environmental changes such as sound (other than verbal), temperature, space relationships between sets and their universe (as used in set theory) influenced the language to the point where actual changes occurred in its "sentences."

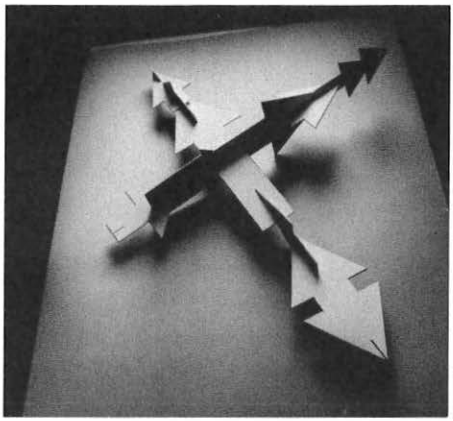
The exploration will be continued to obtain a larger sampling which we hope will lead to more conclusive results. Two of the solutions follow, together with the students' own statements describing their findings.

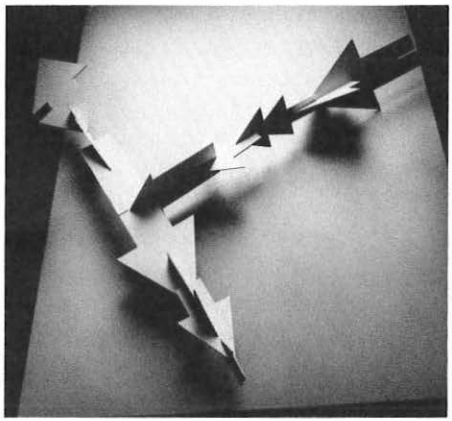
Problem: Create a three-dimensional language.

The arrow, as a single shape by itself, can be used to show direction. In this case the direction of the entire unit creates the mood, emotion, or just the general atmosphere of the statement. In the spoken language the tone of voice would determine this same factor.

The individual module represents the grammatical structure of the statement. By varying size and shape, a noun, verb, infinitive, preposition, etc., become distinguishable from one another. The direction of each arrow within the entire structure determines the function of that part of speech. The arrow, which represents the verb, when pointing in the same direction as the other arrows, means transitive ; when pointing in an opposite direction, intransitive. The same applies to a noun when used as the object of the sentence or of a prepositional phrase.

A combination of entire units, either juxtaposed or interlocked at various angles creates a series of statements which may rely on one another or convey completely opposite thoughts.





Although the arrows are representative of the spoken language, the structure as a visual entity in itself by the use of various shapes, sizes, and directions—and not relying on the relationships between the visual and the spoken language—will enable the reader to obtain the message. In putting the known language into a visual concept, the single word unit is no longer needed, and the "medium becomes the message."

Alan Levine

An Energized Concept (A Three-dimensional Language) In Two Dimension

I.

Objects speak. They have their own time and space and sequence in our existence. We conceive them not only as words but as ideas that relate to us and our environment. A word has a certain meaning or varied meanings to us when we can relate it to our experiences. Likewise an object can have relativity when we give it relationships. To give metaphor is to give functional mental value.

Time as a concept speaks to us. It speaks spatially, visually, and mentally. Suppose we assume that time is energy, and energy is the accepted source of all matter. Man is a timed entity. Man's acts of creation are energized extensions of himself. Thought is activated energy: mental energy.

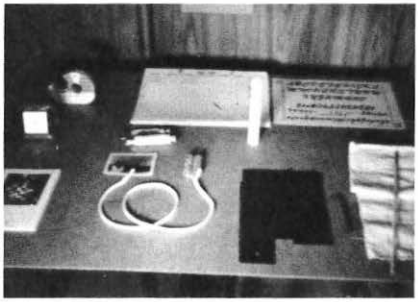
Time is relative—mental conception is relative. A candle is a candle, is a source of heat, is a light, is an ignition, is a decorative ornament, is molded wax with a wick, is a spiritual representation. Nothing exists as an absolute. Energy is not static, time is not static, objects as energy are not static ; they too are relative. Objects speak in time, for time, around time, through time, and as time.

Objects speak in spatial relationships, their sequence is relative, their order of being is relative.

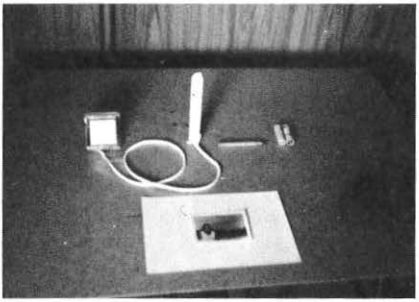
Man can speak consciously through objects. We do speak unconsciously and subconsciously through objects. We can relate need, desire, greed, wealth, health, mood, attitude, and other human conditions. We relate these conditions through objects. They speak relatively, they are not absolute ; what is spoken visually or mentally conceived is not absolute, not without continual change.

Everything that I might say to you in words, verbally, can not be said through objects. Objects are more absolute than spoken words. Written words are more absolute than spoken words. Objects are more absolute than written words.

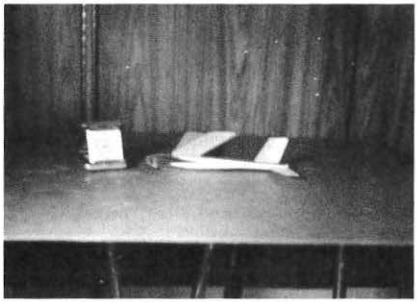
1. Conditioning



2. Set



3. Subset



4. Cliche

5. Statement

6. Progression

What I write here is relative to what you interpret; relative to what you believe I am saying in words. You can only assume that I believe in believing. A cross can represent belief if you believe in it. A cross is not a religion, but it can represent religion. A cross is an object that speaks. As an object it is not absolute. What it speaks is relative.

II. *Sitting*

Time: the wind carried a paper across the street from one side to the other, swiftly. Lightning carried fear to the old woman's brain. The electricity source carried the current through the lamp and was transformed into light. I blew out the candle ; it exists as an ornament, a source of light. I carry it up the stairs to light my way.

It is necessary to read more than the words. Read, too, the concepts; make the parallels and relate the objects.

Matter is concreted energy. To conceive it we activate energy and create an image or make an object. We energize in essence, however, not in specifics at the time of conception. In order to perceive an object, we must re-activate the energy of the matter in our brains: to find metaphor.

LAUNA VIRN CIYN BOKRE T FWRIOV JX. Here the tools of perception are present but we can make no metaphor. As a statement it speaks. Our reference point is acknowledged but where does one go from there? Arbitrary representation: "Life exists now, before and tomorrow." I have given it metaphor. It is not absolute, it is relative, relative to me at this time.

Think black. Now think green. How did you think? Did you determine space, time, mood, depth of perception? Close your eyes and think red. Blink twice and think *of* white. What occurs as your mind is energizing this transition? Do you "see" a subjective red and an objective white? Is the area of color perception infinite in its mental state, or is it a band of color only as wide as the distance from one eye to the other?

What is a game, a g a m e.

My concept of a three dimensional language is the energizing of objects, relative to everything, and within a spatial sequence or configuration.

Energy: the g a m e.

Adrienne C. McCoy

Commentary: Linguistics, "Writing," and Typography

Ernest Hoch

Linguistics can certainly contribute towards cleaning up the imprecise and confusing uses of the word "writing"; the recent paper by John Mountford in *The Journal of Typographic Research* (" 'Writing' and 'Alphabet'," II [July 1968], 221–232) is a welcome contribution towards that end. It does, however, call for comment mainly under two aspects.

First, I believe John Mountford interprets "typography" too narrowly. The impression arises (to quote but a few examples) from "Typography is crucially concerned with the transmission, in the modern world, of language in the form of writing" (page 221) and "Typography is a discipline inescapably concerned with writing–1, incidentally or not at all with writing–3. When necessary, ambiguity can be avoided by firmly using 'handwriting' and resisting the word 'writing' when writing–3 is meant" (page 224); "Typographers, rightly, have their own use for the word 'alphabet' as a technical term in typography" (page 227) and ". . . the family of European writing-systems based on the Roman alphabet: each of these contains other symbols in addition to the alphabetic ones (the letters), viz., numbers or figures, marks of punctuation, and symbols such as the asterisk . . ." (page 230).

There can be few typographers today who think of the Roman alphabet in terms restricted to "the set of 26 letters"—even leaving aside the awareness that we use at least two if not three distinct Roman alphabets together, each originating in different periods of the past.

The background of rapid development in the field of communication is reflected in rapid change of the concept "typography" itself, and in the intermingled use of the word with different, conflicting meanings.

But in this instance of "polysemy," most meanings correspond to different phases of development. At one end of the history-related spectrum, "typography" is still used as a synonym for letterpress. At the other, it stands for the purposeful manipulation of alphanumeric and other conventionalized symbols in order to communicate a message visually to given recipients. What is transmitted need not necessarily be language in the sense of the prose characteristic for the language concerned. The very success of the act of transmission may demand a modified prose, an algorithmic or some other non-prose form of representation. That, in our day, is the concern of typography. *Mutatis mutandis,* it *is* concerned with writing–3. The essence of typography, a brilliant teacher remarked, "can be taught with your toe in the sand." [1]

The second main comment refers to the complete lack of taking technical distinctions into account. Linguistics, divorced from technical reality, loses some of the ability to "sort out meanings." This results in statements such as "Handwriting and print are two manifestations of writing–1; typewriting is a third. There are others . . ." which leaves the problem quite unnecessarily in mid-air.

The criterion for "print" is the existence of—for want of a better term—an "image carrier" that allows large numbers of near-identical images to be produced from it. Whether that carrier is a photographic film or TTS tape, a letterpress form or offset plate, a gravure cylinder, a stencil or signals on magnetic tape, is important for further classification; but *all* forms of print are qualitatively different from writing in that one basic respect. Examination of the carrier allows us to forecast the content of the image to be printed.

"Writing," whether handwriting or typewriting, is qualitatively different in that no amount of examining the typewriter, brush, pen, pencil, or finger will reveal anything whatsoever about the content of what is to be written.

Handwriting and print, it turns out, are qualitatively different manifestations of writing–1; typewriting is *not* an equal third

1. P. Burnhill, Head of Design Department, Stafford College of Art and Design, at the First National Conference of the Working Party for Typographical Teaching, England.

manifestation: handwriting and typewriting are sub-categories.[2] This qualitative difference throws light on yet another distinction which appears to be beyond the grasp of too many teaching establishments (that between "printing" and "printmaking") and the educational damage resulting.

Handwriting or typewriting can, of course, be used to produce, directly or by intermediate steps, an image carrier for printing. So can a single print from an existing image carrier. So can, for that matter, drawing, engraving, etc.

There is no more need for the linguistic approach to be a-historical than to be a-technical. Study of the range of meanings of the word "drawing" can help to clarify the concepts associated with the word "writing." It appears undesirable to exclude such study when analyzing writing–1, writing–3, and writing–4. Not only can the linguistic approach, by the inclusion of "drawing," fully encompass writing-systems which are pictographic (and which were treated somewhat cavalierly in the *Journal*), but also within the European framework itself, analysis of the development drawing → writing → printing leads to further clarification of "writing."

A rigid artificial dividing line between highly conventionalized drawing as a "basic skill of normal linguistic communication" and writing–3 is less useful to understanding than the recognition of such drawing as the language-skill involved in production and its pairing with reading in reception. The drawings of small children; the drawings of artists depicting scenes from everyday life or phantasy; the drawings representing, say, an identical event from the New Testament at different times or in different parts of the world; the drawings that form the elements of a pictographic writing-system: among the numerous criteria according to which they can be classified, a crucial one is that of the *degree of conventionalization*. At some point the increase in conventionalization, the decrease of latitude allowed within the

2. An analogy exists between the guitar and the harpsichord on the one hand, and a gramophone record or tape recording of a guitar or harpsichord concerto on the other. The fact that on keyboard instruments depression of each key will always give (nearly) the same note does not tell us anything about the piece to be played; a record or tape, once identified, does.

framework of convention, results in the new quality of "normal linguistic communication."

Under that aspect, too, typewriting falls into its proper place—linguistically, historically, and educationally: the acquisition of writing–2 as a language-skill is the learning of highly conventionalized symbols. The latitude allowed within the framework of convention is of necessity greater for handwriting than for typewriting, as the latter uses prefabricated image carriers for individual symbols (though not an image carrier for the entire message to be transmitted).

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Book Reviews

1. Stephen Bann (Ed.). *Concrete Poetry.* An international anthology. London: London Magazine Editions No. 13, 1967. 19g pages. 30s.

2. Eugene Wildman (ed.). *The Chicago Review Anthology of Concretism.* Chicago: Swallow Press, 1967. 157 pages. $2.00.

3. Emmett William (Ed.). *An Anthology of Concrete Poetry.* New York: Something Else Press, 1967. × + 342 pages. $10.00 (cloth), $3.00 (paper).

There have been many attempts to define concrete poetry. None succeed. The search for definition can, in any case, lead to "over-definition," an all too familiar procrustian process in which the *definata* are concentrated or expanded to fit the definition. The *definata* are then ignored in favor of the definition. The label becomes a handle. This is a common vice among would-be gourmets who read the label rather than taste the wine and among protagonists of "art for the sake of criticism."

That concrete poetry should have defied(!) definition is hardly surprising when we come to examine a representative sample, such as any of the works under review, and there find an intimate mixture of: acrostics, anagrams, emblematic verse, onomatopoeia, palindromes, paronomasia, scissors verse, and other types of word play. These types of verse are well-known; e.g., C. C. Bombaugh's *Oddities and Curiosities of Literature* [1] and G. R. Hocke's *Manierismus in der Literatur, Sprach-Alchimie und esoterische Kombinationskunst.*[2] One does wonder why so few writers of and on concrete poetry have used the terminology used above and in these two books.

The majority of concrete poetry falls into these categories, which have been associated with poetastery rather than poetry or, to be less extreme,

1. (New York: Dover Publications, 1874 & 1961).
2. (Hamburg: Rowolt, 1959).

with verse rather than poetry, so that we have a case of that widespread phenomenon whereby a pastime becomes elevated into art; e.g., the progress of jazz from fun to ethnomusicology, college from a genteel Victorian pastime to an avantguard Cubo-Dada medium, and the recent cults of comics sci-fi and pop music among the more than statistically literate. This process has been characterized by Victor Shklovsky and other "formalists" as a "canonization of the cadet branch . . . whereby Dostoevsky took the detective story and made it into an artistic dogma. . . ." Max Lerner characterized the process as a "renewal of culture by rebarbarization." Shklovsky's formulation is the more useful of the two because not every rebarbarization is a renewal of culture; it is only some cadet branches which get canonized. There is a great difference between renewal of art and mere pastime of pop. With concrete poetry most of it uses the forms of "curiosities and oddities," some of it for valuable communication but some of it is just odd and curious—stop. A distinction between the two will help us to steer a difficult course between the highly partisan views *pro et contra* concrete poetry ; between those who reject the whole movement because of the manifest mediocrity it includes and those who embrace the whole because of the good. It is not easy to avoid being so onesided. Our judgment is only trained by appreciating the masterpieces of the past, so that we are at sea when faced with the complexity of a contemporary movement without the accustomed chart of carefully weeded anthologies and the usual compass in the form of a body of critical literature far outweighing the corpus of the literature it criticizes.

Shklovsky said, "The history of art is not a succession of masterpieces." The missing links between masterpieces may be popular and unart forms—such as peasant art, playing cards, the pulp press, and advertising. In the case of concrete poetry the missing link may be poetasters rather than poets, and this missing link appears between the covers of anthologies with titles such as *Verse and Worse, A Whimsey Anthology, The Complete (?) Nonsense of Edward Lear; (-/More/Yet More) Comic and Curious Verse;* etc. If we ignore or do not know such works, we will be prone to find a canonized cadet branch as more "original" than it is or else to reject it as barbarous. But if we keep a sense of proportion, we will be able to see the thing for what it is, or may become, and not to take it for what it is not.

Neither of the first two of the books under review are in any sense as critical or selective as this, but this is not to denigrate them because the tendency is still too young (at least under the name concrete) for it to be

easy to make a "critical" anthology. Both these books are preaching to the already converted by works, and to the still unconverted by exhortation. It is also pleasant to see so many people being so kind to each other in print, even if the reason is that they are all members of a small, highly international and leaderless circle. But it does have the result that most of the literature on concrete poetry consists of eulogies. The recent article in the *Times Literary Supplement* and the ensuing correspondence is a refreshing exception.[3] Of course, eventually someone will take it on himself to debunk the myth, to prick the bubble, and to tell us we have been fooled—for some mean little personal reason. But let us not be so naive as to be ready to hop onto the anti-bandwagon. Concrete poetry, before and after the use of the term concrete, is far more than a flash-in-the-pan gimmick.

At book level, concrete poetry has used alternative forms of the book, such as the pull-out (Pre-Columbian codices, Lisitsky, and numerous advertising brochures and children's books) and the flip-book (Max Born's *Restless Universe* [4] and the *Michelin X Flipbook*). Both these devices let the reader see more than two pages at once. In the case of the pull-out it is possible to see half the book at one glance; the window book allows us to see right through to one page. The assignment of text to a given page is quasi-accidental, and the turning of a page is a decisive and dichotomous event, like the opening and closing of doors, &c, & c. For this reason, the pagination of books tends to interfere with the semantic total structure of the book. To misquote, one can't see the book for the pages. Concrete poetry may yet down the reactionary attitude which relegates to advertising and children's books valuable forms such as pull-outs, detailed thumb indices, mechanical (pop-up) or optical 3D (the later, so far, has only been used for covers and postcards), squeak books, combination books with divided pages (heads on the top section, trunks in the middle, and legs on the bottom which enable one to make Kangerphantosceros, Rhinophanteroo, Elekangerosceros, &c.), books with tactile appeal, &c. These forms have great unexplored possibilities for textbooks of all subjects as well as art.

At page level, concrete poetry can be seen as the first really thorough attempt outside advertising at designing print *ab initio* and not as some latter-day manuscript with margins justified left and right, even line

3. "Concrete Poetry," *The Times Literary Supplement*, No. 3,444 (February 29, 1968), pp. 193–195; (March 14 and March 21, 1968, numbers for correspondence).
4. (London: Institute of Contemporary Arts, 1965).

spacing, and the rest of inherited "typographical" good manners, but rather as something which can take advantage of the freedom afforded by modern setting and printing techniques in which the position, size, style of each work—or even each letter—can be meaningful. Advertising has already blazed a trail in this respect by using every device in the history of script and picture for its own financial ends. Literature and informative writing have hardly started to follow this opening for their far more important ends.

These inherited typographical good manners—if they are applied to the use of contemporary cold-type, leadless techniques—exhibit MacLuhan's "horseless carriage effect" by applying the canons of the medieval MS. not only to letterpress but to cold-type. Traditional letterpress disposes words on the page in a way which is essentially meaningless, with the exception of paragraph indention. Such printing is read by a monotonous, jerky, scanning motion of the eye. This process of silent reading is so rapid that in the case of the not merely statistically literate many sublime words of literature are only spoken about rather than read because we naturally find them indigestible at speeds of 200–1000 wpm. Joyce's *Finnegan's Wake* is a case in point.

This is one grave disadvantage of silent reading which is, of course, very useful for scanning newspapers, journals, and reference books. Should we then take to reading aloud, following the text with our fingers? This would be retrograde, though useful for *Finnegan's Wake*. The rational answer to the eye which tries to look at flowers while galloping on horseback is either to slow the eye down by playing a recording of an understanding reading of the text or by redesigning the format and layout of the book to enhance the meaning, slow down the eye, and also make skimming more rapid by using a thumb index or a pull-out format. The trouble with our present books is that, in cybernetic terms, they are too efficiently coded.

Concrete poetry has typographic implications which are a culmination of: (1) Sterne's *Tristam Shandy* with its graphic summary of the plot, blank pages to show nothing happened, black pages to show what the dead man saw, and a marbled page to illustrate confusion. (Shklovsky greatly admired *Tristam Shandy,* which is, perhaps, the first concrete novel—though *Gargantua et Pantagruel* also has some claim for this title); (2) James Joyce's and Samuel Beckett's use of unpunctuated, uncapitalized sentences to represent the speech of a flat, fast talker and to force the reader to concentrate if he really wants to read the book; (3) Mayakovsky's use of echelon line breaking, which visually represents the periods of an oration or of a poet reciting in a football stadium or concert hall at the

top of his voice. The aim is to make writing what it was in the words of the Koran and of Freud, "Writing is the voice of one who is distant." Writing is synaethesia; it is the connection of the senses of hearing and of sight and the evocation of the one by the other.

Unpunctuated sentences, avoiding upper-case letters, stepped lines, and concrete poetry may seem gimmicky because they are sometimes used capriciously rather than functionally. But they are not just gimmicks to be discarded like broken toys or yesterday's fashion. Concrete is a vital step towards articulate communication in terms of sight and sound; a vital step in investing our present, fairly rapid but superficial, communication by typewriter and letterpress with an acoustic dimension, a personal voice like a personal handwriting. We pay so little attention to reading and writing that it almost seems a joke to many people that reading and writing were once sacred acts preceded by ablutions and prayers. Our shallow letterpress communication is becoming a facile pidgeonholing-recognition rather than articulate perception and thought. We recognize rather than hear and see; we hear what we expect to hear and exclude the rest. We do not "use our eyes" or "use our heads."

An Anthology of Concrete Poetry, edited by Emmett Williams, is the most comprehensive of the three anthologies reviewed here; it gives poems in the widest selection of media: calligraphy, typewriting, letterpress, photographic, and displays on an indoor and outdoor architectural scale. The poems come from a dozen or so countries. A wide range of typographic styles are illustrated. It is pleasant to see a cut-up by Brion Gysin with whom Gregory Corso and William Burroughs worked. This is one of the few cases in which writers well-known in "conventional" (= abstract) writing have done concrete work. Burroughs has written cut-up novels. The West German/British edition has a black passepartout spine like a German schoolbook and is bound in matt silver paper which has a horrible feel. The U.S. edition is more ordinary but neutral in its binding. This anthology has no table of contents and the pages are un-numbered between pages x and 330 which is mystifying, since there are occasional page references in the notes to the poems. There is a short introduction and biographical notes at the end of the book. The standard of the contents varies greatly, but this is a reflection of the state of concrete poetry which is well represented by this book.

Concrete Poetry, an International Anthology, edited by Stephen Bann, gives poems by three groups of authors: German, Brazilian, and Anglo-Saxon. All the poems are in letterpress or typewriting; the use of color (orange) on a few pages does not make up for the lack of other media.

Generally the typography is much less varied in this volume than in the Williams anthology. It is interesting to compare the presentations of poems which both books have in common. The table of contents is no such thing, merely being a list of the authors represented. The book has a ten-page introduction, and gives a few biographical details at the beginnings of the three sections. The book has a dust wrapper of greaseproof paper which slips off when the book is picked up. This would be immaterial if the wrapper were a throw-away. The fact that it has a poem on the back and a blurb on the front would indicate that it is not. This anthology is half the size and half the price of the Williams anthology ; it has a third as many poets represented and a quarter as many countries.

The Chicago Review Anthology of Concretism, edited by Eugene Wildman, presents poems from ten countries by forty poets and in a concrete way by using black pages between sections in a way reminiscent of silent films (with their titles like "Meanwhile, back at the . . .") and presents some poems with film techniques, e.g., Bory pp. 130–41. There are no potted biographies and the book represents calligraphy, typewriting, and letterpress. Within the anthology's limitation of size and price, the standard of the poems is higher than that of either of the other two anthologies. The pagination is intermittent and begins at the table of contents rather than at the first sheet after the endpaper. This prevalent custom seems a cheap trick to inflate slightly the apparent number of pages in a book. The Williams and Bann anthologies both fall foul of this. To summarize, all three anthologies are more like catalogues of an unheld exhibition than anthologies. The Chicago anthology is most like a book (and a concrete one at that) and has the highest standard. If one were to buy one anthology, one should get the Chicago one. The Williams anthology—due to its size and an inclusion of architectural poems—is perhaps more representative of concrete both good and indifferent.

For those who require detailed documentation, *Between Poetry and Painting* [5] (including the masterly telegraphese "Chronology" by Dom Sylvester Houedard) is recommended. The Chronology is a history of concrete poetry before and after the term concrete. The title of this publication is misleading because it implies that concrete poetry is a visual poetry. This is to ignore sound poetry and does not include the majority of concrete poetry which, if it is between any two things, is between poetry and typography rather than between poetry and painting.

Between Poetry and Painting is also valuable because it gives pre-concrete

5. (London: Institute of Contemporary Arts, 1965).

concrete poetry, some of which is top flight poetry although less adventurous in form than contemporary work having a more significant content. This is to be expected because one can hardly expect three anthologies of poems containing works by 70, 20, and 40 poets, alive at the time, to contain more than a handful of works of the calibre of some of the best works of Apollinaire, Pierre Albert-Birot, Van Doesburg, Lewis Carroll, and Mallarmé whose lives span a century.

Bluntly speaking, concrete poetry could become far more concrete by transcending typewriter and letterpress, and it has room to become far more poetic. No doubt more poets with more to say will be attracted to concrete poetry when it has developed into the vacuum our muscle-bound typography has left due to its heritage of letterpress—provided, of course, that the centrifugal force of our wheel of fashion in art (driven as it is by a consumer-like thirst for novelty) has not tossed concrete poetry into the rubbish heap of history.

Peter Mayer

Peter Mayer (34a Lanhill Road, London W9, England) is a poet, a scholar in classical Chinese, and a Chinese calligrapher. His concrete poems have appeared in several periodicals, and his articles on letterforms and visual semantics have appeared in such publications as *Typographica*.

John Russell Taylor. *The Art Nouveau Book in Britain*. Cambridge, Mass.: M.I.T. Press, 1966, 175 pp. $12.95.

The title of John Russell Taylor's monograph, *The Art Nouveau Book in Britain,* is unusual since it very accurately describes its contents, a rare occurrence today. Taylor deals with two closely related subjects, book illustration and book design. It is clearly the latter which particularly interests him, but since Aubrey Beardsley had to be included—though he was an illustrator who seems to have had little to do with the over-all design of the publications in which his works appeared—it was necessary, at least in part, to divorce illustration from design in its entirety. Illustration —or, more properly, decoration—does play a role in most of the material which Taylor covers, but certainly that is a result of its nature, not the author's bias.

Art historians have for some years been aware of the germinal importance of English book decoration in the development of the first phase of twentieth-century design, the movement popularity called the art nouveau style. But Taylor's is the first work to focus upon this material. The major figures of the movement are widely known, but in his investigation of the minor masters Taylor was mapping new territory, and he has succeeded both in pointing out all of the significant landmarks and also in indicating quite accurately their relative importance. Later travelers may quibble with him about details and insist that, after all, Jessie King is not so interesting an artist as he had led us to believe, or that Lucien Pissarro, as a book designer if not as a painter and print maker, was very much a part of the English tradition; but fundamentally, Taylor's opinions will, I think, prove to be sound. Perhaps of even greater importance is his stylistic analysis of English art nouveau books. He demonstrates quite conclusively that the curvilinear and rectilinear aspects of the style coexist in time from the beginning and are not successive, as has widely been presumed by critics who have concentrated their attention on the continental manifestations of the style. On the basis of this insight alone, Taylor's work should be widely influential.

He runs into problems, however, when he attempts to place English art nouveau books within a broader historical context. There are small errors of fact which are easily corrected. It was Lalique's jewelry, not his glass, in which "the sinuous lines run free." His glass, which he began to make only about 1910, was more tightly designed. The "cool domestic Wren" does not exist. For all practical purposes, nothing is known of his style in domestic buildings. There are also errors of stylistic interpretation which are more difficult to correct without lengthy argument. For example, his contention that "Continental art nouveau is a reaction against form itself . . ." is certainly debatable. To contest its validity, one need only mention the name Gaudi, but proof of its error would require a complete historical survey of the movement. This is but one example of several such generalizations which are much too broad and ill defined to be sustained.

For readers especially interested in Taylor's subject, a few additions and corrections to the core of his text may be of interest. On page 84 he states that each of Rickett's books was conceived freshly in terms of its literary materials. Though generally correct, an exception was the Vale Press Shakespeare in which the volumes were uniform in size, binding, and type, with borders of three designs for the tragedies, comedies, and histories. In his discussion of the books of Lucien Pissarro, pages 121–122, Taylor implies that color was an important factor in all of his productions,

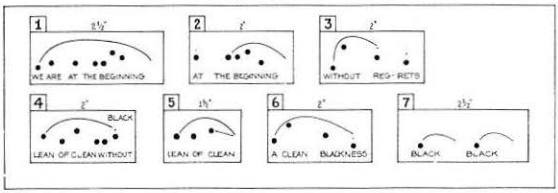
while, in fact, some were entirely in black and white, others in black and white with red marginal titles and chapter headings, quite in the fashion of Vale Press books. On page 144 Taylor presumes that the illustrations of Ricketts' *De Cupidinis et Psyches Amoribus* were made at the time of publication, 1901, but in his *The Vale Press Bibliography* Ricketts states that the illustrations for this volume had been on hand for a considerable time. One of Taylor's few significant omissions is a mention of the picture books for adults illustrated by William Nicholson and published by William Heinemann in the 90's. They included *An Almanac of Twelve Sports* with texts by Rudyard Kipling, *An Alphabet,* and *London Types* with verses By W. E. Henley.

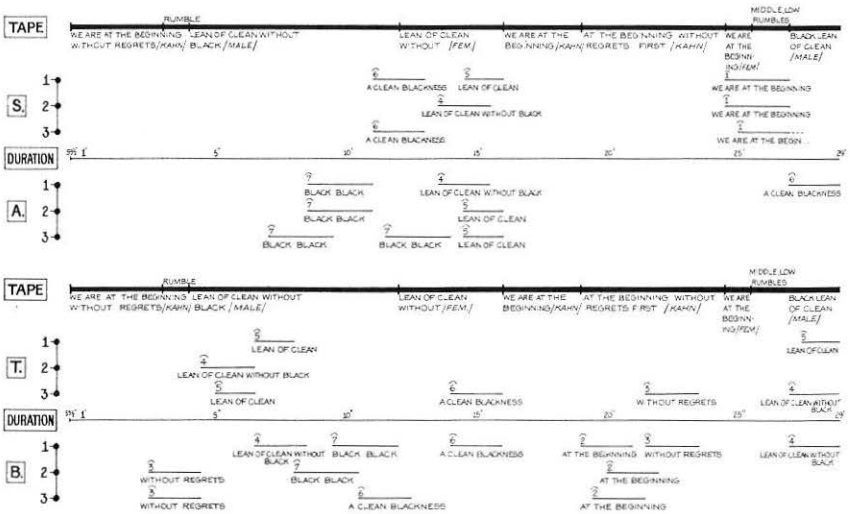
Henry Hawley

Henry Hawley (Cleveland Museum of Art, Cleveland, Ohio 44106) is associate curator of decorative arts, in charge of post-Renaissance decorative arts of Europe and America (1600 to the present). He has lectured on the art nouveau style, a subject of particular interest to him. Privately, he collects books in that style.

Publication available

M. François Richaudeau has prepared an advance publication of *Le Processus de Lecture* (the reading process) and will be pleased to forward copies without charge to readers requesting them from: M. François Richaudeau, 114 Champs Elysées, Paris, France.

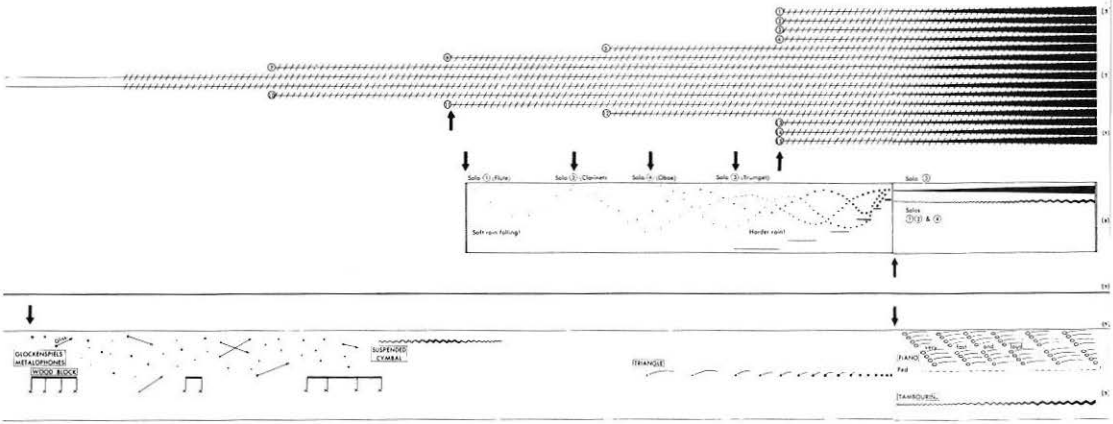


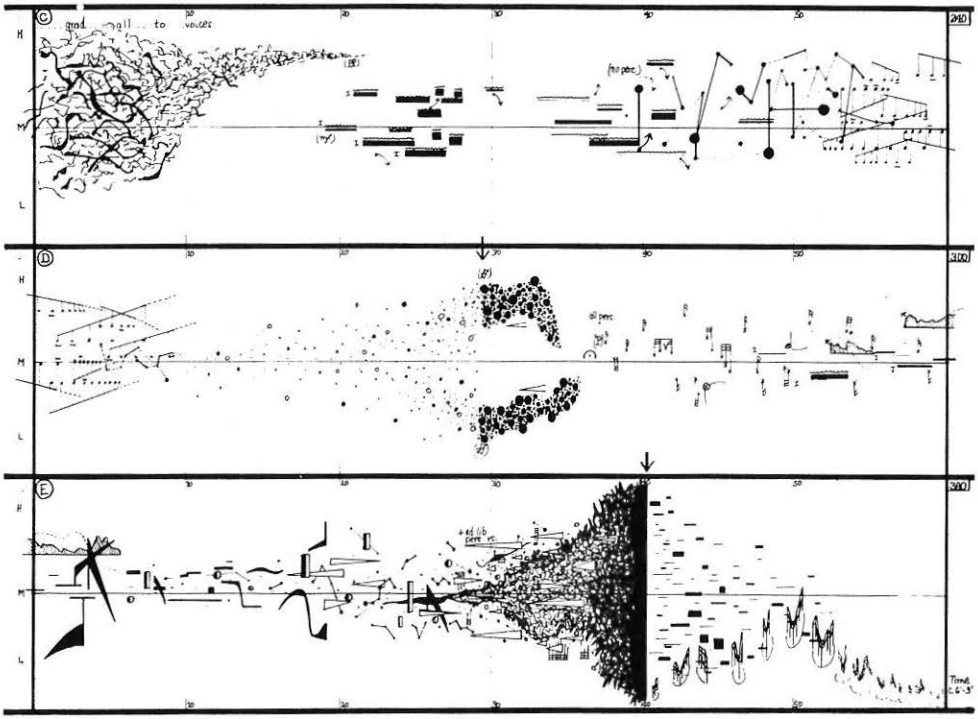


Istvan Anhalt

Cento on Eldon Grier's "An Ecstacy" (Cantata Urbana), © *1968*

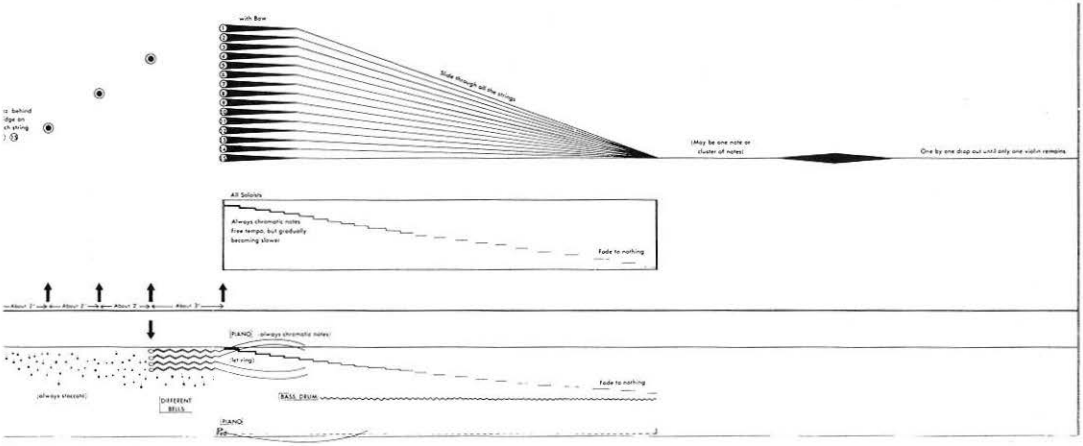
for twelve voices and magnetic tape

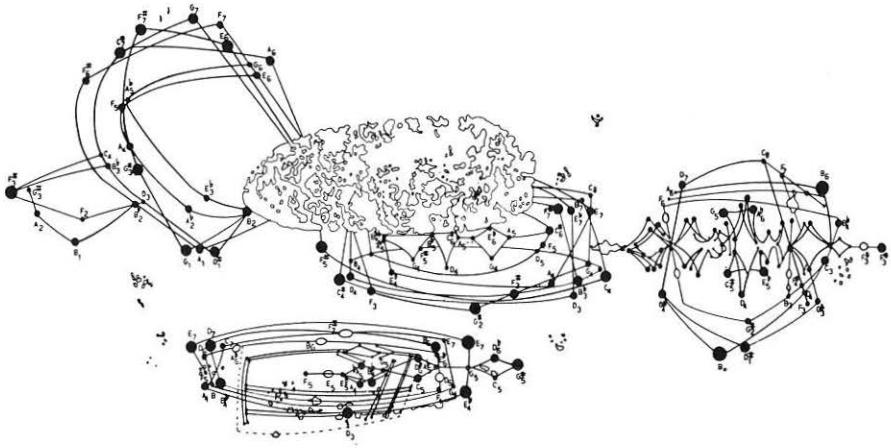




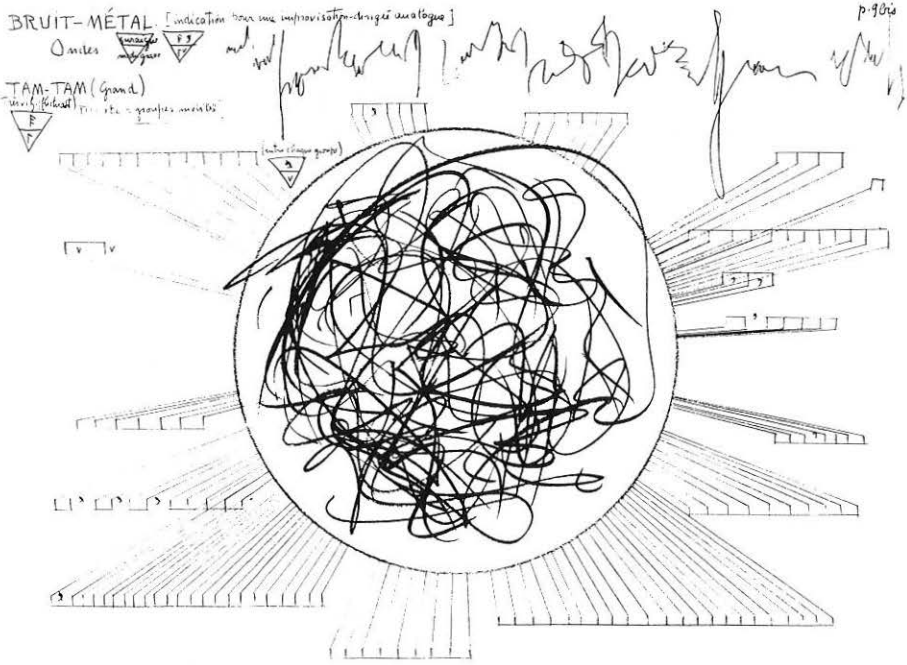
Sidney Hodkinson
Armistice, © *1967*
a truce for dancers and musicians *(*Pages C, D, and E*)*

R. Murray Schafer *Statement in Blue,* © *1966* for youth orchestra *(*excerpt*)*





George Cacioppo
Cassiopeia (Pianopiece #3), © 1968



Gilles Tremblay
Kekoba, © 1968
for three solo voices, percussion and Ondes Martenot

Correspondence

The editors welcome comments on articles, reviews, and letters that have appeared in the Journal. Communications should be addressed to the Editor, c/o The Cleveland Museum of Art, Cleveland, Ohio 44106.

To the Editor:

I thank Mr. Jeremy Foster for his very considerate remarks about terminology and the main purpose of *The Journal of Typographic Research* ("Commentary: Psychological Research into Legibility," II [July 1968], 279–282). Surely, if designers and researchers are to exchange views, opinions, and findings, a standardized terminology is much to be commended, to say the least. It may well be due to the very scope of legibility research that the need for a common vocabulary has only now become urgent. It is obviously one of the many purposes which this *Journal* wishes to serve. And it seems that researchers are really the people best equipped to suggest working terms and definitions.

So far it all appears fairly simple and self-evident. But it is not as simple as that in fact, for it will soon become evident that it is not enough just to agree on any number of words and definitions. We must also face the fact, the inescapable fact, that any word must be allowed to have different meanings in different contexts. This point cannot be elaborated here, but it has been treated in a paper prepared by Dr. Dirk Wendt for the XIth Congress of the Association Typographique Internationale.

Fernand Baudin
Gonlez par Grez-Doiceau, Belgium

To the Editor:
It is good to have people like Hans Schmoller warn us about the dangers of letting the new technologies become our master—as he has in his letter to the editor (January 1968, p. 103). It would be much more appropriate to offer such warnings where they are really needed; viz., to the developers of "the electronic giants," whose experts are only now beginning to realize the effectiveness and possibilities of their machines.

A simple photocomposer for display faces has demonstrated how magnificently designers have made technology their servant (see January

1968, p. 41, fig. 22) ; or, if you will, how technology has become master over their doubtful taste. Within the technical limitations of the electronic machines, the designer has adequate tolerances to do his work properly. To the amateur this is not always evident. He has limited access to the subject and is sometimes overly impressed by new achievements. It would be ridiculous to expect the machine to match the designer's ideas (whose taste—as shown in the figure mentioned above—may not be any better than the machine!) The best way certainly is where aesthetic judgment and technology meet halfway, which is the case of the IBM Selectric Composer version of Univers.

André Gürtler
Basel, Switzerland

To the Editor:

. . . I have one major criticism: the atrocious design utilized on the cover. When I received the first issue I thought it might somehow have run through the press more than once. Subsequent numbers brought home the awful fact that the design (which term I use for want of a suitable word) was intentional, and that it was not merely an experiment, but the permanent symbol of the *Journal.*

Mr. Stauffacher's eye-wrenching smear does injustice to the calibre of the *Journal's* content. It is undeniably modern, but fails to represent either modern or experimental typography. As Goudy and other great designers have defined it, typography is but a vehicle for conveying ideas from the page (or the screen, etc.) to the mind. Above all, good typography must be based on legibility. There is also something to be said for typography as an art form, whether assembled from otherwise static characters or created, as in calligraphy. The *Journal's* cover is unique; it is easily identifiable; it is arresting; but it is hardly legible and its worth as art is questionable. As an amateur printer, I discard sheets that look like the *Journal's* cover when I've adjusted makeready and registration!

Typographic research must, of necessity, investigate the past as well as the future. The cover of the *Journal* offers an ideal medium for illustrating the transition of typography from calligraphy to computers. I guess I wouldn't object so violently to the present design if it made some sense (e.g., the flow of type evolution, such as ABCDEFGHIKLMNOPRSTUWXYZ but design for the sake of design is antithetic to the principles of typography, however defined.

I can only hope that, following the pattern of some professional journals, you will change the cover design with each volume, giving "equal time" to both extremes and the middle ground of type design.

To close in a more positive vein, . . . I'm even pleased—in spite of myself—with the ragged right margins!

Frank Spear, Editor
Michigan-Ohio Regional Educational Laboratory
Detroit, Michigan

A reply from Jack Stauffacher

I fully appreciate the comments and concern about the basic concept of the design of this important Journal. Possibly, my intention was in fact trying to include this spirit Frank Spear has written about.

I claim no need for legibility within the alphabetic lines of the cover design. All this was merely the outcome of exactly what is inferred in his letter: the shift of the letters of the alphabet on the press, bringing together a new juxtaposition of the 26 letters. I don't say this is "legibility" in the reading textual sense, but rather I have taken the letters and extended their vitality and contrast. That is all. The "reading" of these shapes begins and ends there—meaning and content are explicit in their formation and configuration. I would agree on every account about the tradition of typography as a quality of legibility and concern with the reading line. But here, obviously, we are not concerned with this problem in the overall graphic image on the cover. I do not agree that everything ends at that traditional statement, but rather we must try to shift our view and re-see other possibilities. We have two reasonable claims: first, to bring forth a visual order out of a seemingly disordered material; and secondly, to simplify and free the typographic language from stale and useless devices. It was in this spirit that the cover was done—actually, the design was "created" directly from the proof press, leaving the materials at hand to help in the process of "design."

To the Editor:

What a shame to find the title of your journal on the cover changed from small type to large!

I much preferred the original design. Within seconds after seeing the first issue, I knew what to look for forever after. The magnificent abstraction of letters run together is your trademark.

The *Journal* is addressed to a graphically oriented audience. Therefore, I would have thought that the prejudice which says that a title must never be small could have been avoided.

David Ford, Senior Designer
Harvard University Press
Cambridge, Massachusetts

Editor's note: The present cover design by Jack Stauffacher is not (nor was it planned as) a permanent symbol of the *Journal.* Indeed, we have planned to redesign the *Journal* (completely, not just the cover) from time to time —although not on any fixed timetable. We have had our troubles meeting post office regulations governing designs suitable for covers of second-class permit material. It was not design prejudice (as Mr. Ford suggests) that caused the switch to a larger title on the cover of the January 1968 number; it was a post office decision!

To the Editor:
I see you are taking to reprinting articles from other periodicals. It might be useful if you could simply give a list of such articles, reports, etc., that you think might interest readers and might otherwise escape their notice. This is something that is always worth doing where a new, interdisciplinary field is concerned, as there is often relevant material in specialist publications that a specialist in some other branch of activity won't have heard of.

John Willett, London

Editor's note: Mr. Willett raises two points—the *Journal's* use of reprinted material, and the need for a list of related articles appearing in other publications.

We wish we could agree that all that need be done to encourage the reading of pertinent research reports in related areas would be to *list* references of such material. Rather—at least in the beginning—we feel that what is needed is a little forced feeding! For example, how many readers would have been interested enough in an article on concrete poetry to secure a copy of *The Lugano Review?* Interest in any new discipline needs a long time "in press." Part of this process must be encouragement by the *Journal* through republication of appropriate

materials from other publications—with an emphasis on the more obscure journals as well as on the less obviously related subject matter.

The *Journal* has been trying for several years to establish an abstract service for our research area. There are hopeful signs now that we might be able to get something started in cooperation with the communication schools in this country, although foundation funding may be necessary to establish any kind of a comprehensive survey. Such a service is not only "worth doing," as Mr. Willett points out, but is vital to progress within any interdisciplinary area. What it will take is the devoted interest of an individual or small group of individuals from several related research areas.

To the Editor:

I received my April, 1968, number this week and eagerly began flipping through it, in backwards fashion as is my habit with fresh magazines (perhaps you'll someday do a study on backward readers).

I was interested to read of Pieter Brattinga's appointment as editor for experimental design, but I am afraid his "experiments" have already gotten out-of-hand: as I continued my backward flipping, I found every other spread blank and devoid of printing. Should I dip it in water so the message will come out, or should I simply request a replacement copy?

Despite the need of this letter, I am delighted with the magazine, its content, design, and production. Keep up the good work!

Howard E. Paine, Chief, Editorial Layout
National Geographic Society, Washington, D.C.

Editor's note: The editor's office is adjacent to the Oriental Department in the Cleveland Museum of Art. We have thought it appropriate, therefore, to revive a custom of ancient Chinese authors and publishers; viz., deliberate insertion of errors so that on discovering them the reader can enjoy—however briefly—a feeling of superiority. Many of our readers have sensed this program of publishing therapy and have refrained from comment in appreciative silence; others—such as Mr. Paine—have kindly called our attention to various editorial and production errors, defective copies, and general distribution snags. While we acknowledge the occasional error, the *Journal* deeply regrets the receipt by a subscriber of a damaged or defective copy—and, especially, complete failure of delivery. You will be doing the *Journal* a favor if you will inform us of any such inconvenience.

Résumé des Articles

Traduction: Fernand Baudin

Présentation d'un système pour dessiner électroniquement des caractères *par H. W. Mergler et P. M. Vargo*

ITSYLF est un système propre à faire la synthèse des lettres de l'alphabet, soit pour l'étude soit pour l'exécution. Il est actionné par ordinateur et programmé par le dessinateur qui frappe des valeurs numériques sur un clavier et peut intervenir rapidement et facilement dans l'élaboration des formes caractéristiques. L'alphabet a été divisé en éléments basés sur les propriétés géométriques des lettres. Une série de paramètres a été élaborée permettant la construction et la correction des formes des lettres d'après des modèles mathématiques. Une série de programmes permet de dessiner la lettre qui correspond aux valeurs des paramètres. Des exemples illustrent: les effets produits par différents paramètres sur les formes des lettres E, A, D, C; des formes d'empattements dessinées par ordinateur; et trois séries de caractères qui pourraient servir de base pour d'autres séries de caractères.

La typographie de El Lissitzky *par L. Leering-van Moorsel*

Vers 1920 tous les arts étaient en fermentation. Lissitzky (1890–1941) arriva à maturité vers ce temps-là sous l'influence notamment de Malevitch (suprématisme) et de Tatlin (constructivisme). Ses innovations en typographie sont strictement personnelles et ne sauraient être inscrites dans aucun "mouvement." Ses travaux et ses idées en cette matière - qui sont d'inspiration essentiellement plastiques - sont illustrés et résumés.

Les valeurs esthétiques en photocomposition électronique *par John W. Seybold*

L'ordinateur peut-il fournir une qualité de composition comparable à celle que donne un opérateur exercé? L'auteur détermine d'abord quels sont les éléments qui contribuent à la qualité esthétique des compositions. Il examine ensuite les compromis qu'il faut accepter, par exemple pour les coupures et pour la justification. Il invite les maquettistes et les programmateurs à échanger leurs vues et leurs informations de spécialistes.

L'influence des techniques sur la forme des lettres par *Hermann Zapf*

Un bref historique retrace les principales influences d'ordre technique qui ont infléchi le cours de la typographie depuis que Gutenberg a traduit en termes typographiques les écritures des scribes médiévaux jusqu'à la composition mécanique en plomb et en films. A présent de nouvelles difficultés surgissent dans

le domaine des machines lectrices. Il ne suffira pas de résoudre les problèmes de la composition électronique. Il faudra aussi répondre à la nécessité de traduire dans le dessin de la lettre la sensibilité de notre temps, et se détourner de tout historicisme.

Le sens des mots selon les contextes *par Robert Emans*

Le contexte a été souvent signalé comme l'aide la plus importante à l'intelligence des mots. L'auteur propose un schéma simplifié tendant à ranger sous trois rubriques l'aide fournie par divers contextes : quant au sens, quant à la langue, quant à la construction des phrases. Pour chaque catégorie, il donne des exemples et des commentaires.

Kurzfassung der Beiträge

Übersetzung: Dirk Wendt

Ein Ansatz zum Schriftentwurf mithilfe eines Computers *von H. W. Mergeler und P. M. Vargo*

ITSYLF ist ein vielseitiger Erzeuger von Buchstabenformen, der beim Entwurf und bei der Untersuchung von Alphabeten benutzt werden kann. Es ist ein an einen Computer angeschlossenes, vom Benutzer gesteuertes Programmsystem, das es dem entwerfenden Typographen gestattet, numerische Werte mittels einer Tastatur einzugeben und dadurch die Merkmale der Buchstabenform schnell und leicht zu manipulieren. Das Alphabet wurde nach den geometrischen Eigenheiten der Buchstaben in Klassen eingeteilt. Es wurde eine Reihe von Parametern abgeleitet, welche die Konstruktion und Manipulation der Buchstabenformen aufgrund mathematischer Modelle gestatten. Eine Reihe von Programmen wurde aufgestellt, die eine Zeichnung des Buchstaben gemäss den jeweiligen Parameterwerten erzeugen. Beispiele der Wirkung verschiedener Parameter-Sätze auf die Formen der Buchstaben E, A, D, und C und drei Sätze festgelegter Buchstabenformen werden gezeigt, die als Grundlage für verschiedene neue Alphabete dienen könnten.

Die Typographie von El Lissitzky *von L. Leering-van Moorsel*

Um 1920 herum war eine Gärungsperiode für alle Kunstgebiete. Lissitzky (1890–1941) entwickelte seine Kunst in dieser Zeit und nahm Einflüsse von Leuten wie Malewitsch (Suprematismus) und Tatlin (Konstruktivismus) auf. Seine typographischen Neuerungen sind individuell und können nicht einer einzelnen "Richtung" zugeordnet werden. Lissitzky's Werk und Ideen zur Typographie - von hervorragender bildnerischer Qualität - werden zusammengefasst und illustriert.

Aesthetische Gesichtspunkte beim Computer-gesteuerten Photosatz
von John W. Seybold

Kann ein Computer die gleiche Qualität des Satzes erreichen wie ein erfahrener Setzer ? Der Verfasser stellt einige Faktoren heraus, die zu aesthetisch befriedigenden Lösungen führen, und diskutiert die Kompromisse, die gemacht werden müssen, zum Beispiel bei Worttrennung und Zeilenausschliessen. Es wird ein Austausch von Information und Ideen zwischen Typographen und Programmierern angeregt.

Die Veränderungen der Schriftformen durch die technischen Entwicklungen
von Hermann Zapf

In einem kurzen historischen Überblick werden die wichtigsten Einflüsse der Technik auf die Typographie aufgezeigt, von Gutenbergs Übertragung der handgeschriebenen Buchstaben mittelalterlicher Schreiber auf typographische Formen bis zur Entwicklung von Bleiund Photosetzmaschinen. Dazu kommen heute die besonderen Lesbarkeitsprobleme und Schwierigkeiten der schnellen Unterscheidung beim automatischen Lesen. Nicht nur den technischen Notwendigkeiten automatischer Satzherstellung und der Elektronik haben sich neue Schriftformen anzupassen, sondern darüber hinaus sollen sie auch ein Ausdruck unserer Zeit sein, ohne historisierende Elemente vergangener Stilepochen.

Kontext-Erkennungshilfen für den Leser *von Robert Emans*

Hinweise aus dem Text-Zusammenhang sind als wichtigste isolierbare Hilfe bei der Wort-Erkennung angeführt worden. Der Verfasser schlägt ein vereinfachtes System vor, um die Kontext-Hinweise bei der Wahrnehmung gedruckter Worte in drei Kategorien einzuteilen : Hinweise von der Bedeutung, von der Sprache und von der Organisation her. Er beschreibt eine Reihe typischer Kontext-Hinweise und gibt Beispiele für jede Kategorie.

This number of the *Journal* has been composed in Baskerville types by Dayton Typographic Service, Dayton; printed by Great Lakes Lithograph Company, Cleveland; on Softwhite Mohawk Superfine Text, 80 lb., high finish, with white Mohawk Superfine Cover, basis 80. The *Journal* was designed by Jack Stauffacher of the Greenwood Press, San Francisco.

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A limited number of back issues of The Journal of Typographic Research *are available at $2.50 each. Copies may be ordered directly from the* Journal, *c/o The Press of Case Western Reserve University, Cleveland, Ohio, USA 44106. Payment should accompany your order.*

Pages 1–104, January number
Pages 105–200, April number
Pages 201–296, July number
Pages 297–408, October number

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P. M. Vargo is assistant professor of electrical engineering at the University of Oklahoma (Norman, Oklahoma). He was previously a member of the Digital Systems Laboratory, Case Western Reserve University. Dr. Vargo is interested in man-machine computer systems, the uses of computers in printing, and in graphic displays.

Mrs. Louise Leering-van Moorsel (Veldm. Montgomerylaan 515, Eindhoven, Holland) studied the history of art at the Leiden University, and for her doctoral dissertation made a study of the architecture of J.J.P. Oud and its connections with De Stijl and the Bauhaus. She lectures on the modern collection of the Van Abbemuseum in Eindhoven (her husband is director) and writes introductions for the museum's catalogues.

John W. Seybold is president of Rocappi, Inc. (an acronym for Research on Computer Applications in the Printing and Publishing Industry), Springfield, Pa. 19064. A pioneer in the field of software development for typesetting and related data processing, Mr. Seybold is a former college professor (economics), industrial relations expert, and trade association executive. He has a Master's Degree from the University of Pennsylvania and is the author of *The Philadelphia Printing Industry—A Case Study* and numerous articles on economic and technical aspects of the printing industry. He is also an active arbitrator.

Hermann Zapf, type designer and typographer (Bernhard Mannfeld Weg 24, Frankfurt am Main, Germany) is the designer of more than 50 typefaces. He has been instructor for lettering at Werkkunstschule Offenbach; professor for graphic design at Carnegie Mellon University, Pittsburgh; and has lectured widely on graphic design and advanced typography. His books include *Pen and Graver, About Alphabets, Typographic Variations, Manuale Typographicum* (1954 and 1968). The educational film, *The Art of Hermann Zapf* (available by Hallmark, Kansas City, Missouri), show techniques and examples of his work.

Robert Emans is associate professor in the College of Education, Ohio State University (Columbus, Ohio 43210). He received his advanced degrees from the University of Chicago and has taught in Wisconsin, Chicago, and at Temple University. Dr. Emans' interests have included research in phonics, children's reading interests, underachieving children, individual reading, as well as the investigation of context clues.