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Pictographs, Ideograms, and Alphabets in the Work of Paul Klee

James Smith Pierce

Paul Klee (1879-1940), the Swiss artist who taught at the German Bauhaus, used ancient and modern pictographs and alphabets in many of his paintings and drawings. The discreet characters of the various systems of writing were well adapted to Klee's unusual additive technique by which he retained the expressive purity of the formal elements. In the 1910's and 1920's, Klee used roman letters to construct abstract formal patterns, but in the 1930's he reanimated the conventional symbols of the alphabet, turning them into active representational figures suggestive of their pictographic origins. His most revolutionary achievement was the invention of bold ideograms, combining different pictographic schemata in a set of double images which enrich a basic idea through chains of associated ideas, thus altering the notion of a picture as representing a scene fixed in time and space.

Paul Klee's interest in ancient systems of writing is obvious from his work and has frequently been commented upon, especially in discussions of the schematic drawings and paintings of the 1930's.[1] At a time when such bold images were not as fashionable as they are at present, some attributed this development to the scleroderma that slowly sapped his strength and finally, in 1940, stopped his heart. However, one can point to parallel developments in the work of his contemporaries—Miro, Picasso, and Matisse—and, curiously, in the very history of image making itself, as writing emerged from simple picture-making. Close attention to Klee's developing interest in pictographs, ideograms, and alphabets provides positive reasons for the phenomenon of the late works and reveals their direct relevance to his own peculiar method of working and the changing artistic goals which have dramatically altered traditional notions of what a picture should do.

Klee had shown an interest in pictographs as early as 1903 when he copied in his journal four beggars' signs from a pam-

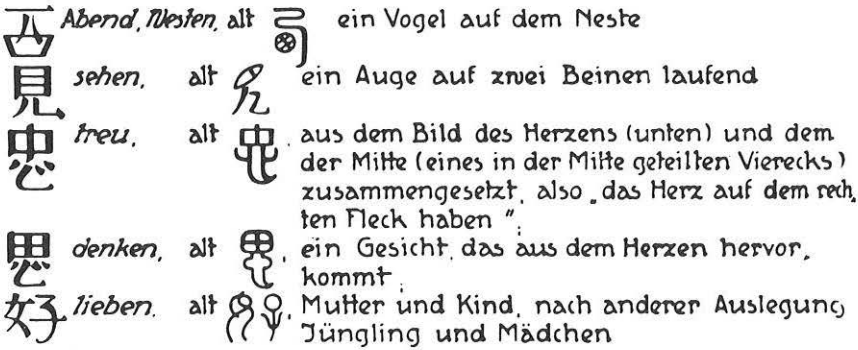


Figure 1. Comparison of ancient and modern Chinese characters from Karl Weule, *Vom Kerbstock zum Alphabet.*

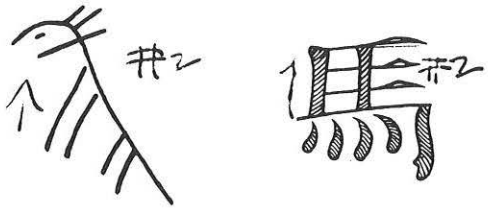


Figure 2. Ancient and modern Japanese characters used by Sergei Eisenstein to illustrate an article in *Cahiers d'Art* (1930).

phlet on Swiss folklore,[2] and Jürg Spiller has noted that Klee had in his library a popular introduction to the origins of writing, Karl Weule's *Vom Kerbstock zum Alphabet* (Stuttgart, 1915).[3] Here Klee would have seen the transformation of natural signs into conventional symbols, graphically demonstrated in tables comparing Chinese characters with their original clearly identifiable shapes (Fig. 1). He would also have appreciated the comparison of the old and the modern Japanese pictographs for "horse" (Fig. 2) illustrating the same process of abstraction in an article by Sergei Eisenstein in an early issue of *Cahiers d'Art,*[4] the avant-garde magazine which frequently reproduced Klee's work and which, according to his son Felix, he collected.

Klee tried his hand at creating his own pictographs, transforming simple schematic figures into signs of varying degrees of abstraction. *More and More Signs* (1932; Fig. 3) is a churning mass of figures in the process of dissolution. Some, like the prominent

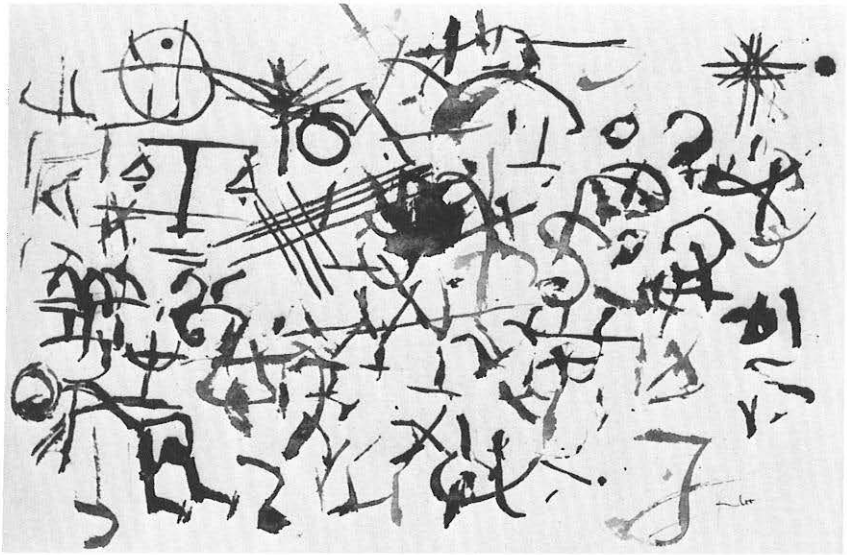
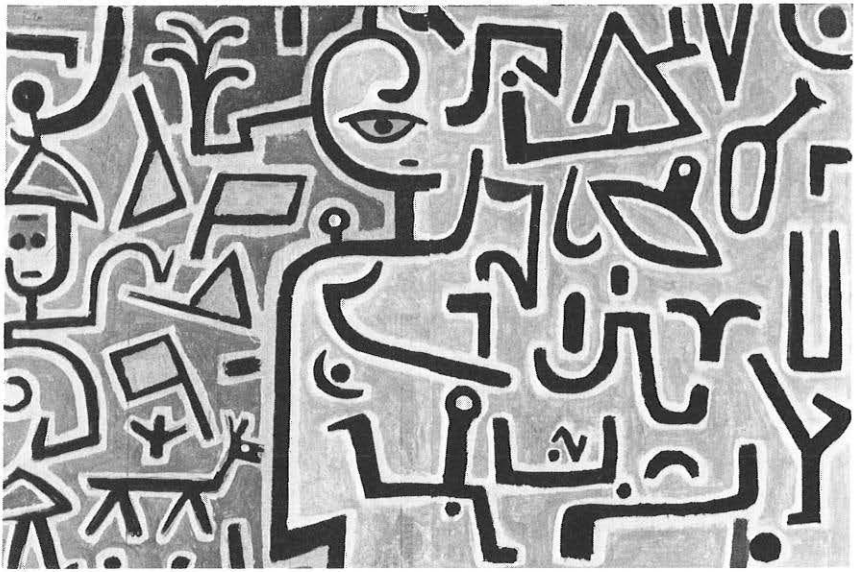


Figure 3. Klee: More and More Signs (Zeichen verdichten sich). Brush drawing. 1932/Qu 1. Klee-Stiftung, Bern.

Figure 4. Klee: Intention (Vorhaben). Paste colors on newsprint over burlap. 1938/J 6. Klee-Stiftung, Bern.



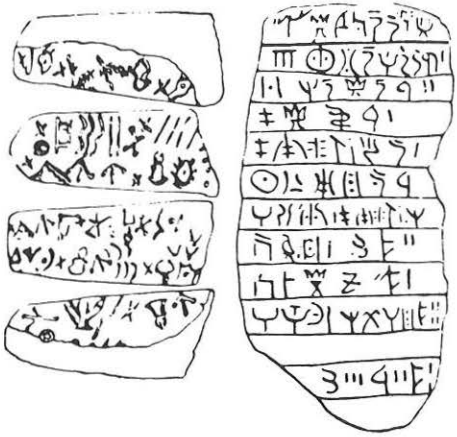


Figure 5. Examples of Minoan pictographs and linear script from Karl Weule, *Vom Kerbstock zum Alphabet.*

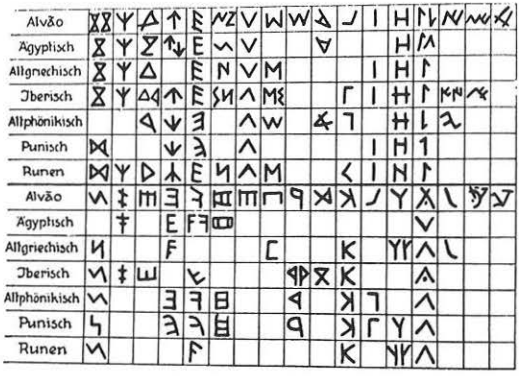


Figure 6. Comparative table of ancient scripts from Karl Weule, *Vom Kerbstock zum Alphabet.*

heads and the falling figure in the lower left corner, are distinguishable as natural signs sharing some recognizable aspect of the referent, but others are as far removed from any recognizable object as the letters of the alphabet which also appear in the profusion of "hen scratches." A more systematic transformation of signs into symbols is found in *Intention* (1938; Fig. 4). To the left of the central figure are easily recognizable schemata on a dark green field: the girl, the animal, the tree. Within the glowering figure itself, against a glowing red background, are more abstract signs, but the representational origin of some is still obvious, especially in the running and kicking figures toward the bottom. In this painting, which Klee called *Vorhaben* (noun: "intention"; verb: "to have in mind"), he was able, by using figures of varying degrees of abstraction, to contrast the abstract

Figure 7.
Klee:
Document
(Urkunde).
Oil and plaster
on gauze.
1933/Z 3.
Angela Rosengart
Collection,
Lucerne.

character of thought (suggested by the symbolic figures within the glowering man) with the reality of the world without, signified by the more fully realized figures in the green field.

Many of the recurrent symbols in Klee's pictures of the 1930's, such as the flag-shapes (𐤃 , 𐤒) and the plant form (𐤉) in *Intention,* were used in the ancient Mediterranean scripts which are ancestors of the modern roman alphabet. A number of these symbols were reproduced by Weule (Figs. 5 and 6). Klee used these and similar symbols in paintings which appear to be undecipherable fragments of antiquity. Such paintings as *Document* (1933; Fig. 7) might appropriately be called "forgeries"; one can hardly call them "pictures." These caprices lie at the very border between art and writing; without even speaking metaphorically, it can be said that these paintings were written.

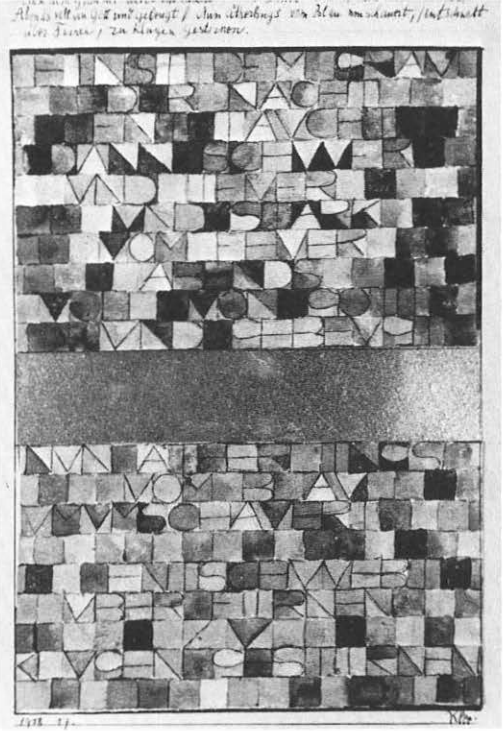


Figure 8.
Klee:
"Once emerged
from the gray
of night . . ."
("Einst dem Grau
der Nacht
enttaucht . . .").
Watercolor.
1918/17.
Klee-Stiftung,
Bern.

Figure 9.
Klee:
Inscription
in the Clouds
(Inschrift
in Wolken).
Ink-pencil.
1919/209.
Klee-Stiftung,
Bern.

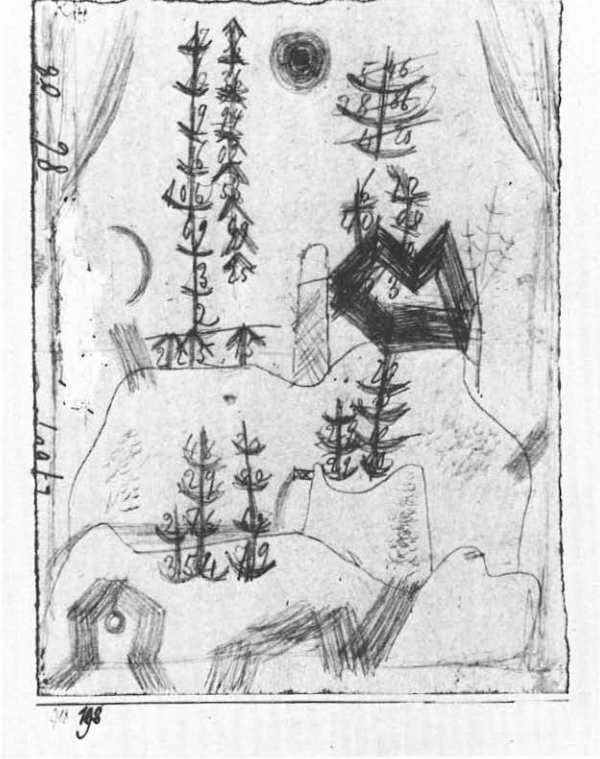


Figure 10.
Klee:
Number-Trees
(Zahlenbäume).
Pencil.
1918/198.
Klee-Stiftung,
Bern.

Klee had included writing as an important part of his pictures at an early date. In 1901 he wrote rather defensively that in his portraits he added "words on the brow and around the corners of the mouth" but that his "human faces are truer than the real ones."[5] In the series of illuminated poems made during the war (Fig. 8), the words are more than accessories; the letters serve as the framework of the whole composition. By 1918, letters and numbers were liberated from any conventional symbolic meaning in such drawings as *Inscription in the Clouds* (1919; Fig. 9) and the sheet of figures whimsically transformed into *Number-Trees* (1918; Fig. 10). Through such arrangements of numbers and letters Klee was working toward the art of pure form, described in his *Creative Credo,* in which "abstract formal elements are put together like numbers and letters to make concrete beings or abstract things; in the end a formal cosmos is achieved, so much like the Creation that a mere breath suffices to transform religion into act."[6]

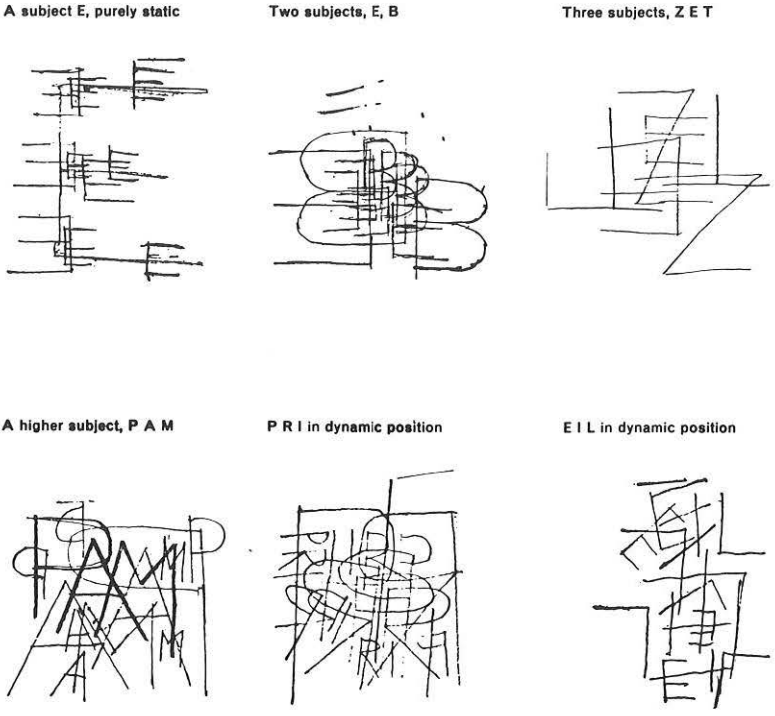


Figure 11. Klee: Compositional exercises with capital letters. Pedagogical notes for the Bauhaus, 1922. Klee-Stiftung, Bern.

In the alphabet, Klee had found a ready-made system of discrete units which could be combined and recombined in endless variations. The combinations of letters which Klee made in 1922 (Fig. 11) are almost fugal in their formal purity. They have meaning only within their particular "formal cosmos." The letters of the alphabet long ago lost any semblance of their pictographic origins. Simply by looking at the letter A, for example, one would never suspect that it is supposed to be descended from the Egyptian hieroglyph for "eagle." From the representational point of view, the letters of the roman alphabet are entirely neutral, and as such, they are ideally suited as building blocks for formal constructions.

In the 1930's, however, Klee reanimated the long-dead letters of the alphabet, turning them back into recognizable objects. By juxtaposing T-shapes with pine tree schemata in *Place of Concord*

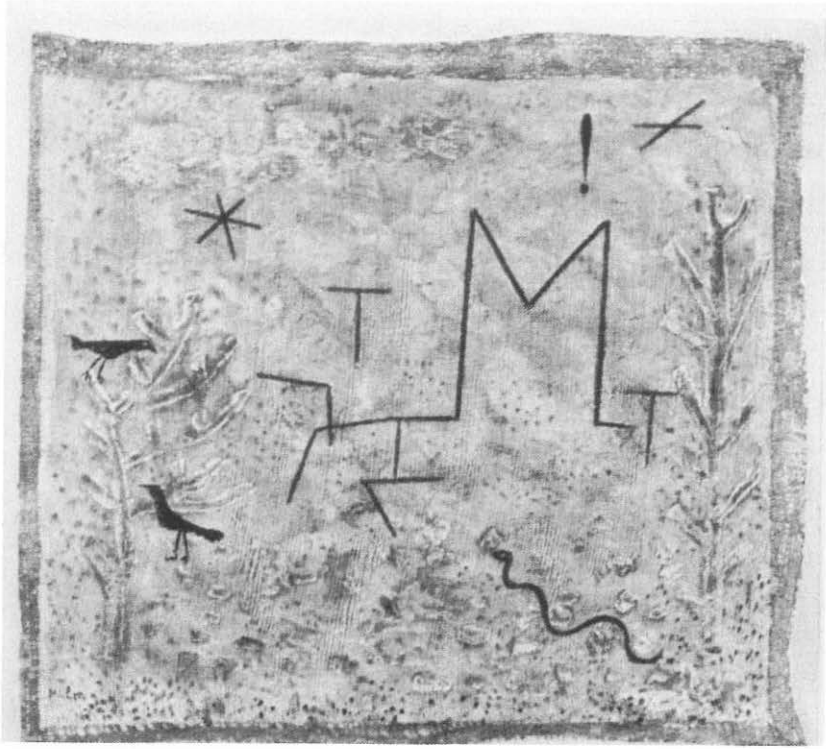


Figure 12. Klee: Garden Gate M (Gartentor M). Oil and gouache on muslin. 1932/M 15. Richard Doetsch-Benziger Collection, Basel.

(1932), he transformed the T into a plant-sign without altering its original shape in any way. In *Garden Gate M* (1932; Fig. 12) the T is joined by the M of the title to form the entrance to a paradise garden, complete with a schematic serpent and birds of hieroglyphic simplicity.[7]

In 1938 Klee began to alter the shape of the letters so that they suggested representational images by themselves without any landscape setting. In the *Studies of Active Figures* (1938; Fig. 13) letters of the alphabet have been reactivated by extensions suggesting the arms and legs of scampering figures. *Signs on the Rocks* (1938; Fig. 14) recalls the mysterious petroglyphs that serve as reminders of a primitive past in isolated regions throughout the world. We seem to watch the very creation of the alphabet as schematic figures, reduced to simple and barely recognizable forms, merge by degrees into conventional symbols. At the

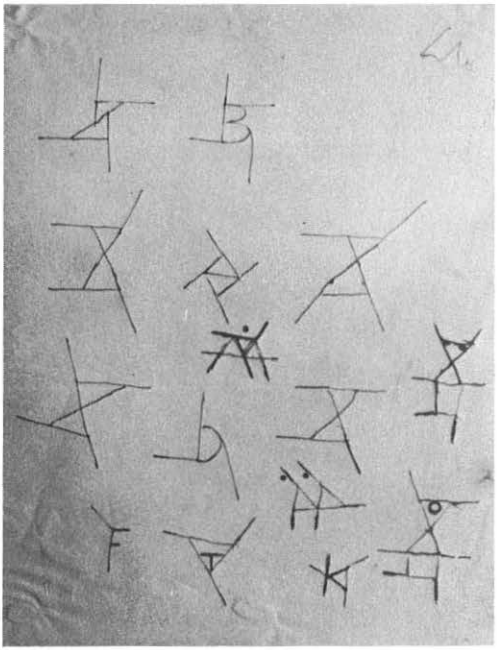


Figure 13.
Klee:
Studies of
Active Figures
(Studienblatt
mit bewegten
Figuren).
1938/L 16.
Klee-Stiftung,
Bern.

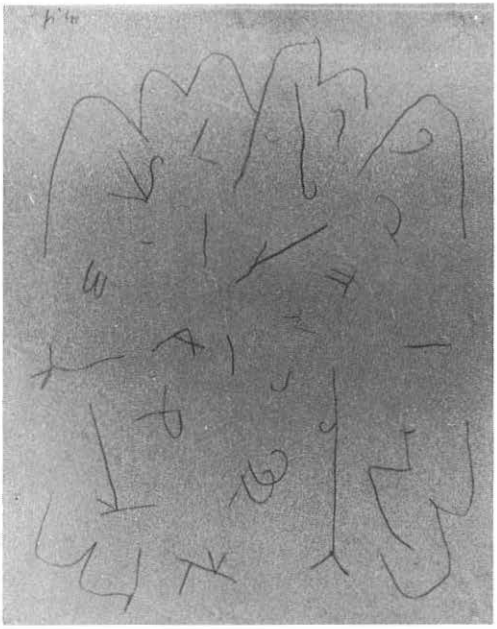


Figure 14.
Klee:
Signs on
the Rocks
(Zeichen
auf Felsen).
1938/R 11
Klee-Stiftung,
Bern.

lower left, the shapes of a bird and a long-eared beast are resolved in the letter K. The letters P and A emerge from the abbreviated forms of walking figures. The most systematic of all these alphabetic transformations is the drawing *Children and Abstractions* (1938; Robert Rothschild Collection, N. Y.) in which the schematic figures of children are transformed by regular stages into the letters Y, T, and X.

Klee also reanimated the Kufic alphabet. The long, snaky characters and the profusion of diacritical marks lent themselves even more readily to reconversion into pictographic images than the roman alphabet. For anyone who does not read Arabic, a Kufic text seems alive with little animals, people, and ships. It takes little imagination to see, in the specimen of modern Kufic characters reproduced in Figure 15, a snake wearing a hat (lower left), an ancient trireme (next to the "snake"), and, at the extreme right, a child with a curly lock on his brow. Klee, for whom "each formation, each combination," had "its own particular constructive expression, each figure its face—its features,"[8] must have seen such faces looking out at him everywhere during his trips to Tunisia and Egypt.

The figures in *Group W* (1930; Fig. 16), drawn about a year after the Egyptian trip, must have been suggested by the overlapping, interlaced characters of the ornamental inscriptions Klee would have seen in Cairo (Fig. 17).[9] The "Kufic" pictures of 1938 (Figs. 18 and 19), in keeping with Klee's bold late linear style, are derived from the more commonplace script without overlappings. Klee made good use of the dots, dashes, and curlicues which serve as diacritical marks, transforming them into schematic animals, plants, and facial features.[10]

Other works of 1938 and 1939 appear to have been directly inspired by ancient pictographs. Reminiscences of the hieroglyphics encountered on the Egyptian trip and pictographs reproduced in Klee's copy of Weule's book may have prompted the assemblages of disjointed human anatomy that abound in these years. The chunky shapes, particularly the disembodied heads and arms characteristic of the series (Fig. 20), are remarkably similar to the Hittite inscription reproduced by Weule (Fig. 21). The disembodied frontal eye used in such works as *Fragmenta Veneris* (1938/x 1)[11] is often found in Egyptian inscriptions.

Figure 15.
Modern Kufic writing.
From David Diringer,
The Alphabet: A Key to the History of Mankind.).

Figure 17.
Epigraphic frieze from Madrasa Hasan Sadaka, Cairo. (From Hautecoeur and Wiet, *Les mosquées du Caire.*)

Figure 16. Klee: Group W. 1930. Location unknown. (From Paul Klee: *Über die moderne Kunst,* Verlag Benteli Bern-Bümpliz, 1945.)

Figure 18. Klee: Interim near Easter (Zwischenzeit gegen Ostern). Oil on burlap. 1938/v 2. Staatliche Kunstsammlungen des Landes Nordrhein-Westfalen, Düsseldorf.

Figure 19. Klee: Insula Dulcamara. Oil. 1938/C 1. Klee-Stiftung, Bern.

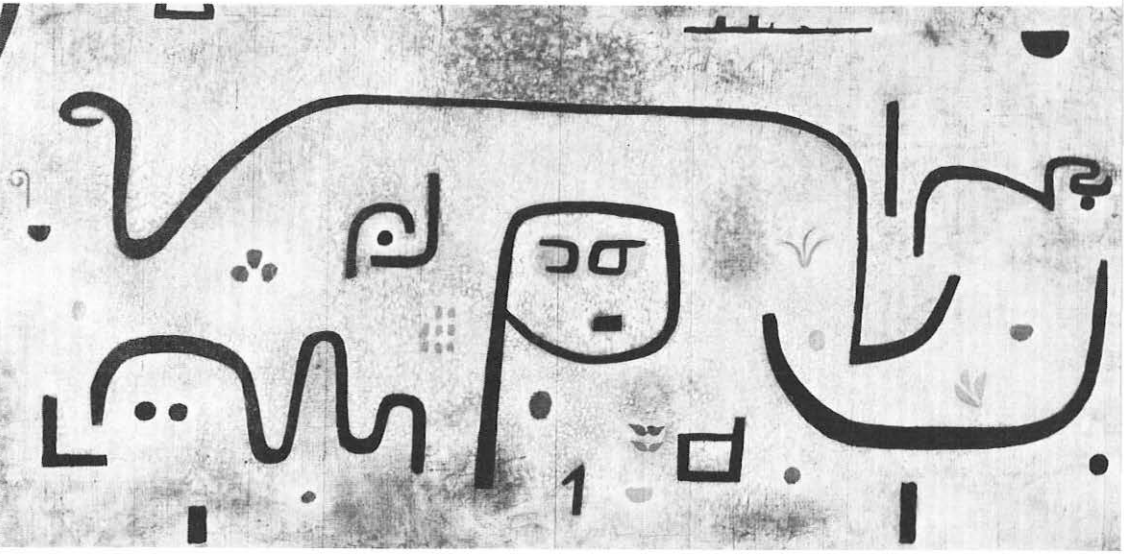


Figure 20. Klee: Outburst of Fear III (Angstausbruch III). Watercolor. 1939/M 4. Klee-Stiftung, Bern.

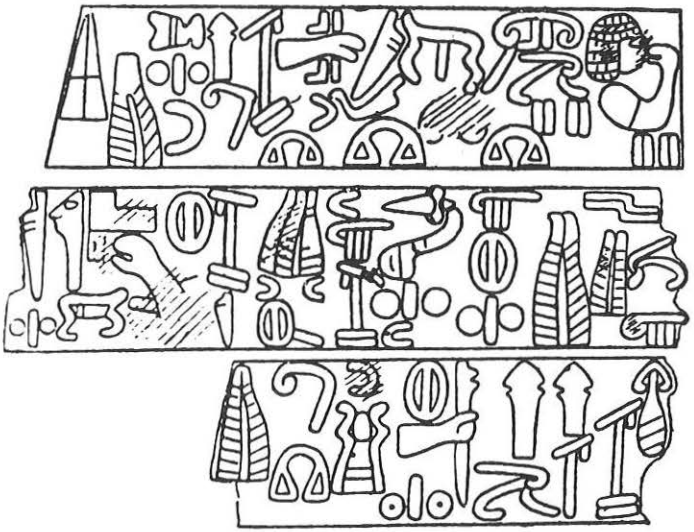


Figure 21. Hittite inscription from Karl Weule, *Vom Kerbstock zum Alphabet.*

More important than these superficial formal similarities is the method of communication by the addition of discrete units, which is fundamental to both the late works of Klee and ancient picture writing. Klee let a picture form itself, piece by piece, without a preconceived plan. In the alphabet he found a set of units ideally suited to his method, but the letters, while they might provide an aura of meaning and sometimes might be used for their special connotations, were essentially abstract and, when used alone, lent themselves more to formal play than memorable imagery. In the ancient pictographic systems, however, Klee found units which were not only suited for part by part construction but, unlike the letters of the alphabet, were also natural signs, charged with universal meaning. Furthermore, their meaning, as he would have read in Weule's book, could be altered by the addition of other independent units.

In the section of his book dealing with Chinese characters, Weule reproduces the old Chinese ideogram for "to see" (Fig. 1), an eye on two legs. From the combination of two independent schemata—the eye that sees ( ) and the diagonal legs that move ( )—a new concept is presented through a visual metaphor describing the act of seeing. Klee used the very same elements in his

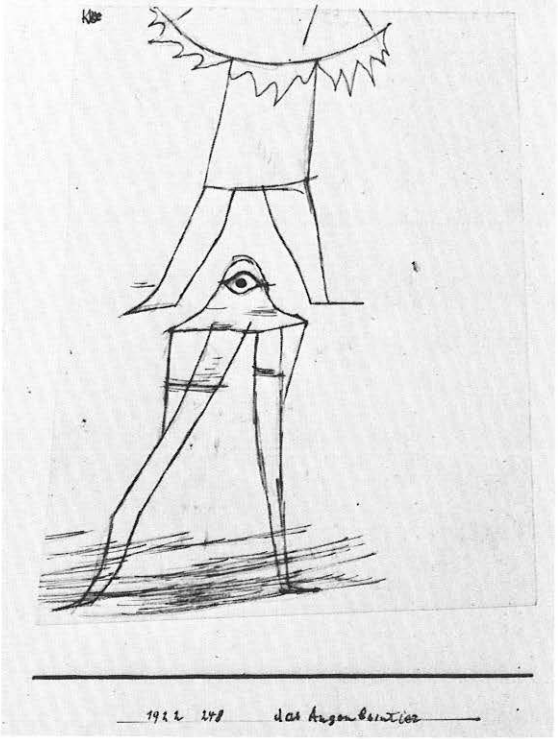


Figure 22.
Klee:
The Eye-Leg Animal
(Das Augenbeintier).
Pencil. 1922/248.
Klee-Stiftung,
Bern.

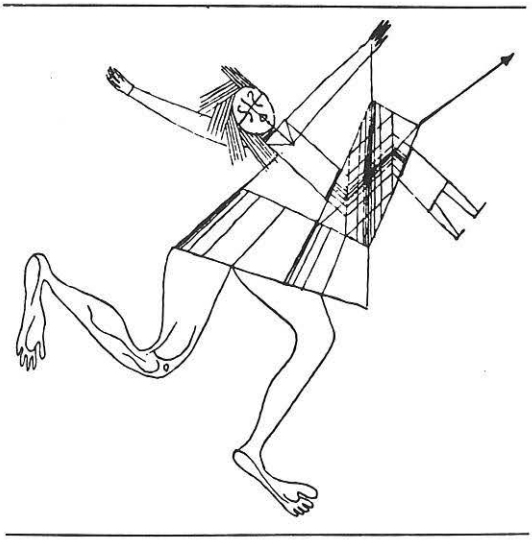


Figure 23.
Klee:
Untitled drawing.
1928?
Location unknown.
(From Will Grohmann,
Paul Klee, Éditions
Cahiers d'Art, 1929.)

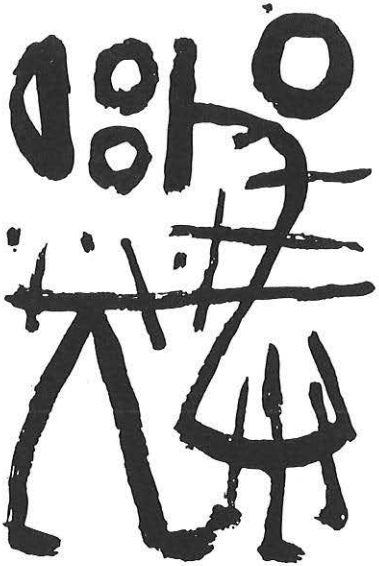


Figure 24.
Klee:
Assault and Battery
(Tätlichkeiten).
Paste with black
pigment on paper.
1940/F 20.

Eye-Leg Animal (1922; Fig. 22) and the same method in a drawing of the late 1920's (Fig. 23), in which a pair of running legs is linked with the image of a gesticulating woman to form an ideogram standing for abduction in general, rather than any particular rape, such as the rape of Europa or Persephone. These were subjects which the classically-educated Klee probably wished to evoke without illustrating any specific myth.

In his last years, Klee became absorbed in the creation of such ideographic pictures. Ideographs (or ideograms) are images that convey concepts in visible form. They are poetic inventions, not simply schematic reductions of visible objects. The drawing *Assault and Battery* (Fig. 24), made the year of Klee's death, is not a representation of a particular fight between two individuals but is a universal image of rage. As in the old Chinese ideogram for "love" reproduced by Weule (Fig. 1)—the tender union of the separate pictographs for mother and child—two figures are juxtaposed to suggest a general emotion, but the expression is one of hatred rather than love. These figures—a man and a woman composed of powerful diagonals and exploding fragments—are confronted rather than joined. They are going at each other "hammer and tongs."

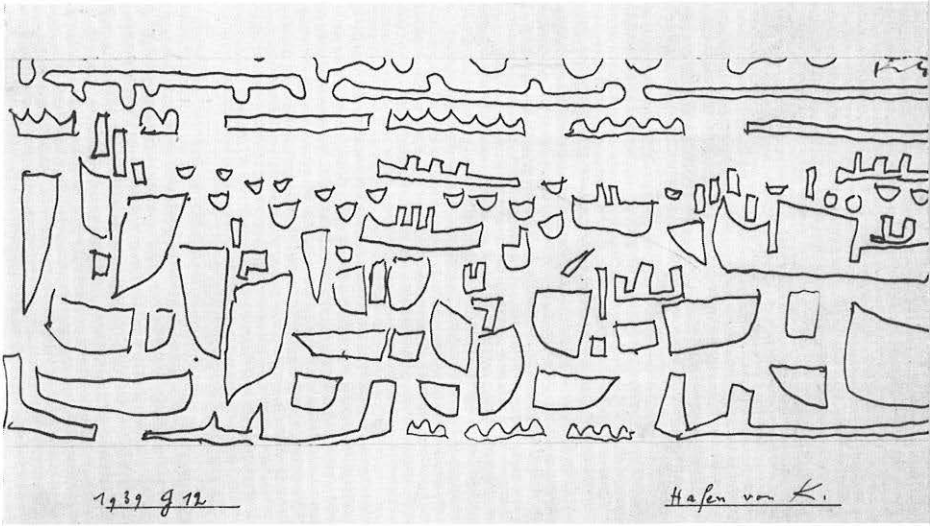


Figure 25. Klee: Harbor at K (Hafen von K). Pen. 1939/G 12. Klee-Stiftung, Bern.

Such ideographic drawings should be distinguished from both simple picture writing and those drawings representing a specific scene, however schematic. *Harbor at K* (1939; Fig. 25) is so abbreviated that signs resembling the Egyptian determinatives for "water" ( ) and "foreign land" ( ) are found, but it is still the representation of a particular harbor, at K. *Poem in Picture Writing* (1939; Fig. 26) is more completely pictographic. Spatial continuity is done away with altogether. The *Poem* also seems to involve a boat, but the boat is not shown in a seascape. It appears in the company of a number of separate little signs that suggest objects without defining them. This was undoubtedly one of the special charms which the pictographs of antiquity held for Klee. As certain pictographs became more widely accepted, they became more and more abstract; representational detail became less important than speed of execution. Klee used such semi-abstract signs, not for this prosaic purpose, but because of their poetic and almost magical powers of evocation, suggesting many things but defining none.

Klee was intrigued by the similarly equivocal character of the early schematic drawings of children. Although the evolution of

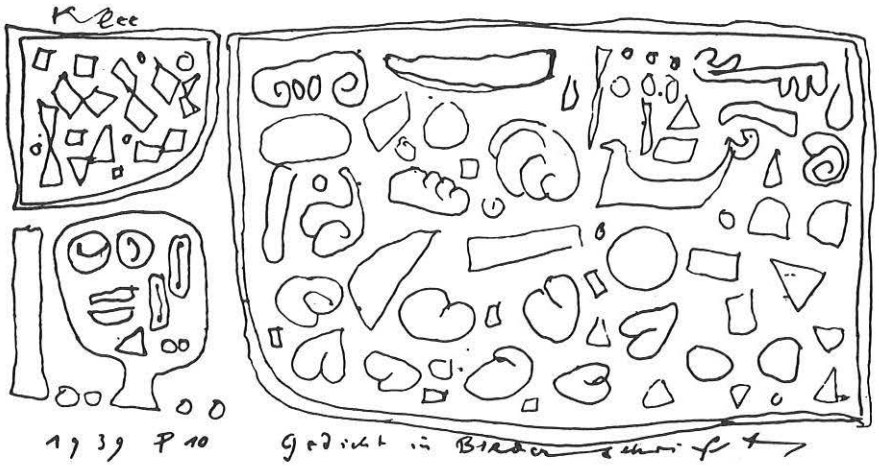


Figure 26. Klee: Poem in Picture Writing (Gedicht in Bilderschrift). Pen. 1939/P 10. Felix Klee Collection, Bern.

the pictographic forms of writing toward brevity and simplicity generally reverses the development of children's schemata toward more complex figures, there is a point at which the schematic figures of young children are very much akin to the abbreviated forms of pictographs. The child-like pictures of the 1910's and 1920's were inspired by the more elaborate drawings of older children. The laconic works of the 1930's reveal an interest in the more schematic drawings of younger children which is in keeping with Klee's absorption with pictographs and ideograms.

Children, in their earliest efforts at representation, use a single simple schema to represent many different things: a schema used to depict a tree trunk and branches may also be used to represent the relation of arm and hand, or a sun schema may be used for a lightbulb or an eye. Klee found these formal analogies pleasing in their own right and would often let a picture emerge from a chain of such formal associations, analogous to the stream of consciousness technique of contemporary literature. These visual associations might arouse kindred forms of feeling. The zigzag of lightning described in the "little journey into the land of greater insight" from the *Creative Credo* stirs up startling emotional as-

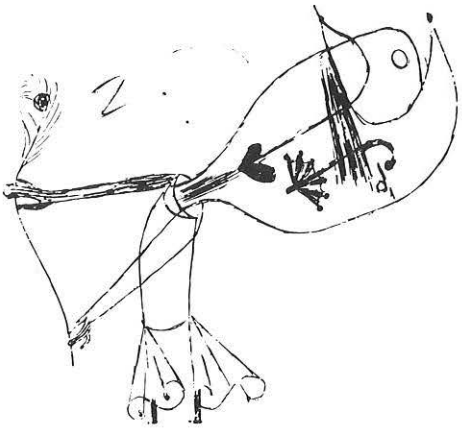


Figure 27. Klee: Dance of the Mourning Child (Tanz des trauernden Kindes). Pen. 1921/186. Klee-Stiftung, Bern.

sociations: "The lightning shaped like the fever curve. Of a sick child . . . long ago."[12] The zigzag of the lightning and the zigzag of the fever curve arouse similar emotions of sudden fear. The intrinsically exciting nature of the zigzag, made by abrupt shifts in direction, adds even greater force to the association. The *Creative Credo* is full of suggestions for the presentation of objects, actions, emotions, and ideas by such simple discrete formal motifs—in other words: pictographs and ideograms.

In the late works, Klee makes use of the ambiguous nature of simple schemata which are similar to those of children, but he arranges them in ideograms which are far more meaningful than the schematic drawings of any child. They are marvels of brevity exploiting formal and emotional analogies by reducing objects to the simplest common shapes. In the 1920's, for example, Klee often used the heart sign as both heart and lips in such drawings as the *Dance of the Mourning Child* (1921; Fig. 27), an ideogram of sorrow composed of otherwise discrete and formally unrelated signs: the heart-lips, the umbrella, and the rain of tears. In the late *Love Song by the New Moon* (1939; Fig. 28), however, the heart sign is repeated in various transformations throughout the entire composition. By reducing forms to variations of a common shape, he creates a forceful ideogram of erotic love. Buttocks and breasts become the very symbol of love.

Figure 28. Klee: Love Song by the New Moon (Liebeslied bei Neumond). Oil and watercolor on burlap. 1939/Y 2. Klee-Stiftung, Bern.

Figure 29. Klee: Untitled and uncataloged brush drawing, usually called "Glance" (Blick). 1940. Klee-Stiftung, Bern.

Paradoxically, Klee was able to develop such evocative double images and visual metaphors by reducing his means to the simplest two-dimensional mode. As Mies van der Rohe would have it: less is more. Only a few brushstrokes were used to make the very late drawing reproduced in Figure 29, but the lines are so fused that one schema seems to grow from another. A fawn becomes a child. A bush becomes a waterbird, and a bough with a pendent fruit becomes an omniscient eye. In this ideogram of creation, the face of the Creator is formed by the very elements of his Creation. The parts are so similar and so closely interrelated that a single line may represent many things. It is impossible to tell whether some lines are animal, vegetable, or mineral; they may be all three. Is the A-shape at the upper left a letter of the alphabet, a running figure, a tree, or a hillside? Every schema has more than one meaning in this two-dimensional realm where forms can shift and one thing becomes another. Klee brought movement to a static art; everything is quite literally in flux. Since only one aspect of each double image can be comprehended at a single

moment, it is quite possible to see several different pictures in this single configuration of lines. The fawn, the bird, and the fruit tree will dissolve if the lines forming them are seen as a face; and the face will dissolve, in turn, when the little spook is discovered in the lower right corner. Surely at the end of his life Klee penetrated to "that secret cavern," of which he spoke, "where the primal law is hidden; where the central organ of all temporal and spatial movement . . . the brain or the heart of creation . . . makes everything happen . . . in the bosom of nature, in the primordial source of creation, where the secret key to everything is kept."[13]

Klee was concerned with becoming rather than being, with the universal forces that form nature and man, rather than with the outward form of any particular moment. Natural growth and movement were the essence of his method and the ultimate content of his work. It is proof of Klee's greatness as an artist and a man that he recorded his feelings of his own death with the same detachment and in the same universal terms as all other natural forces. The final ideograms of death are the natural conclusion to his work.

Death is met face to face in *Death and Fire* (1940; Fig. 30), but his image fluctuates before the eyes. The features of Death are formed with the three letters of his name in German. One thing dissolves into another but all are joined in Death: his shoulders and arms are the River Styx, his hand the horizon beneath the setting sun. And toward the horizon, glowing with fire, walks the soul of the dead.

Even the Egyptians never created such a forceful ideogram of Death and certainly nothing comparable can be found in the history of Western art since the Renaissance. The Cubists and Futurists, although they represented objects as if seen from a variety of viewpoints or as seen in successive stages of movement, still presented a scene, a picture of a specific place or event. But Klee, guided by the schematic art of children and man's first efforts at writing, created richly evocative ideograms, visual metaphors unbound by time or place, which through the simplest natural signs gave visible form to things only felt before. For Klee, "Art does not reproduce the visible but makes visible."[14]

Figure 30. Klee: Death and Fire (Tod und Feuer). Oil and paste color on burlap. 1940/G 12. Klee-Stiftung, Bern.

[1]See, for example, the basic surveys by Will Grohmann, *Paul Klee* (New York, 1954); G. di San Lazzaro, *Klee: a Study of His Life and Work* (New York, 1957); Carola Giedion-Welcker, *Paul Klee* (New York, 1952); Werner Haftmann, *The Mind and Work of Paul Klee* (London, 1954).
[2]*Tagebücher von Paul Klee,* ed. Felix Klee (Köln, 1957), p. 148, n. 496.
[3]*Paul Klee: das bildnerische Denken,* ed. Jürg Spiller (Basel, 1956), p. 516. This compilation of Klee's theoretical and pedagogical writings was published in English in 1961 by George Wittenborn as *Paul Klee: the Thinking Eye.* The pagination is uniform with the German edition.
[4]"Le Principe Cinématographique et la Civilization Japonaise," *Cahiers d'Art,* V (1930), 31f.
[5]*Tagebücher,* p. 52, n. 136.
[6]Spiller, p. 79.
[7]The exclamation mark above the garden gate M retains its conventional symbolic meaning. It had been one of Klee's favorite symbols since 1918. By adding only two marks, the most forceful two lines anyone can make, he could supercharge any image with sudden emotion. The exclamation mark has such universal and immediate impact that in Switzerland it now stands without words as the road signal for "caution, danger ahead." In this way, the land of Paul Klee's birth honors him with memorials more numerous than those for any national hero except William Tell.
[8]Paul Klee, *On Modern Art,* trans. Paul Findlay (London, 1948), p. 43.
[9]The W-shapes in the inscription in Figure 17 are the final letters of "Allah" read from right to left.
[10]Klee was not the first to make use of such transformations; Kufic script is so "lively" that Arabic scribes themselves had occasionally pressed the characters into such representational patterns as the ark of Noah.
[11]Reproduced in Spiller, p. 452.
[12]Spiller, p. 77. The sick child was certainly Klee's son Felix and the fever curve the daily record he kept during Felix's long illness in 1909 (see *Tagebücher,* p. 413).
[13]Felix Klee, *Paul Klee: His Life and Work in Documents* (New York, 1962), p. 177.
[14]Spiller, p. 76.

Calendoli Composer, 1893 (#81).

A Chronological List of Type-setting Machines and Ancillary Equipment, 1822-1925

Richard E. Huss

The history of the development (1822-1925) of the mechanical control of printers' type is outlined in this chronological list of type-setting machines. Early emphasis is on the single-type devices which manipulated individual pieces of type; gradually matrix machines were perfected. Also included are machines used to supplement the typesetting process: typecasters, direct printers, transfer or impression devices, and material makers.

The history of mechanical manipulation of printers' types is less than one-third as long as the history of typography itself, but it is every bit as fascinating. Many of the machines are worthy of individual studies, but for the purpose of this chronological list, details and descriptions have been reduced to a minimum.

Over the period of approximately 100 years about 200 machines are known to have been conceived. Many were abandoned at the work bench, as the models failed to fulfill the expectations of enthusiastic inventors; many machines were changed completely and new approaches made. Experimentation went on for years, one of the longest periods being on the Alden Typesetter (#29)—from about 1838 to 1902. To date, the most important work on the subject has been L. A. Legros and J. C. Grant, *Typographical Printing-Surfaces,* published in 1916. The book has some unfortunate gaps and did not cover many of the machines in this chronology. This list has been abstracted from a more comprehensive treatment of the subject in a book now in process, *The Development of Printers' Mechanical Typesetting Methods—1822-1925.*

All through the nineteenth century and well into the twentieth experimenters had been assiduously tackling the problem of setting and/or casting and composing type by mechanical means.

Some of these inventors were printers, but a surprising number of them were not. The 130 individuals included in this list represent fourteen different countries—about two-thirds are Americans, with the British second in number with 17.

The most prolific decade of experimentation was the 1890's. During this period the Linotype and the Monotype were perfected; and, although they work on very different principles, they have replaced and survived all other mechanical typesetters proposed. (The Intertype falls in the Linotype classification; the Ludlow does not control its matrices mechanically.)

Illustrations, of course, are invaluable to such a history, but for this list only a few representative examples can be included. However, illustrations for more than two-thirds of the machines described are in the writer's collection and will be included in the larger work mentioned above.

Ascribing exact invention dates to the machines is extremely difficult. The years given in various research materials may indicate either actual date of invention or of patent. In some cases the year of patent may be ten years later than the year of invention.

The reader should keep in mind a basic distinction between the two main systems for mechanically setting printers' type: (1) single-type machines—to manipulate individual pieces of printers' type by mechanical means, and (2) matrix machines—to manipulate matrices from which type is cast.

In addition to machines used strictly for setting type, four other general categories of machines have been included because of their direct relationship to the typesetting process: (1) type-casters—separate machines to cast individual pieces of type either to supply the single-type machines or as a separate "foundry"; (2) direct printers—connected to typesetting or fixed-type equipment for direct impression of types; (3) transfer or impression devices—indirect use of the type image (for transfer to lithographic stone) or of the type impression in soft material (as a stereotype for casting plates or type); and (4) material makers—mechanical production of slugs, rules, and borders. A few machines which seem to fit none of the established categories are listed as "unclassified."

Every effort has been made to make this list as comprehensive

as it possibly can be. However, new information on these machines—indeed, machines not included here—may be known to readers or will come to light in the future. Readers are encouraged to send corrections to the author, c/o Graphic Crafts, Inc., 1027 Willow Street Pike, Lancaster, Penna. 17602 USA.

The Chronological List

Order of Information. (1) serial number; (2) year; (3) name of machine; (4) name of inventor; (5) country of origin, not necessarily the nationality of inventor; (6) category; (7) power used, where known; (8) function, briefly outlined; (9) commercial use, where known. Most machines had keyboards; those without are noted. After 1900 where the power source is not mentioned, electricity was the driving force. Earlier hot-metal machines used gas to heat the metal. "Computer" and "calculator" refer to mechanical, not latter-day electronic, devices.

1. 1822. CHURCH TYPESETTER. Dr. William Church; English; single-type; powered by clockworks and weights; types fell by gravity into assembler; hand justification; types stored in upright channels; wooden construction; limited use. Church was American settled in Birmingham, England.

2. 1822. CHURCH TYPE CASTER. Dr. William Church; English; type caster, multi-cell; to accompany Church Typesetter (#1); powered by hand wheel and weight; matrix bar, plunger filled all cells at one stroke; mold bar shifted to cut off tangs; type delivered to typesetter or into storage tubes; limited use.

3. 1839. KIEGL COMPOSER. Joseph Peter Kiegl; Hungarian; typesetter, single-type; distributor; no details, looked like pianoforte; no use.

4. 1840. CLAY AND ROSENBORG COMPOSER. John Clay and Frederick Rosenborg; English; single-type; crank or steam power; vertical type channels; types pushed from channels onto traveling chain; hand justification at machine by second operator; some use. Another inventor suggested running by perforated tape.

pushed out by steel plungers; manual justification; distribution by "stick" operating on pistol principle into channels of distributing table (3 devices); 45 years use.

21. 1857. Houston's Typesetter and Distributor. W. H. Houston; American; single-type; steam driven; type pushed into raceway by followers; manual justification; distributor independent but in same machine, automatic; use unknown.

22. 1859. Gilmer Typesetting and Distributing Device. John B. Gilmer; American; single-type; manual; no keyboard; type drawn direct from "case" by special composing stick; manual justification; distribution direct into "case" through bottom of stick; use unknown.

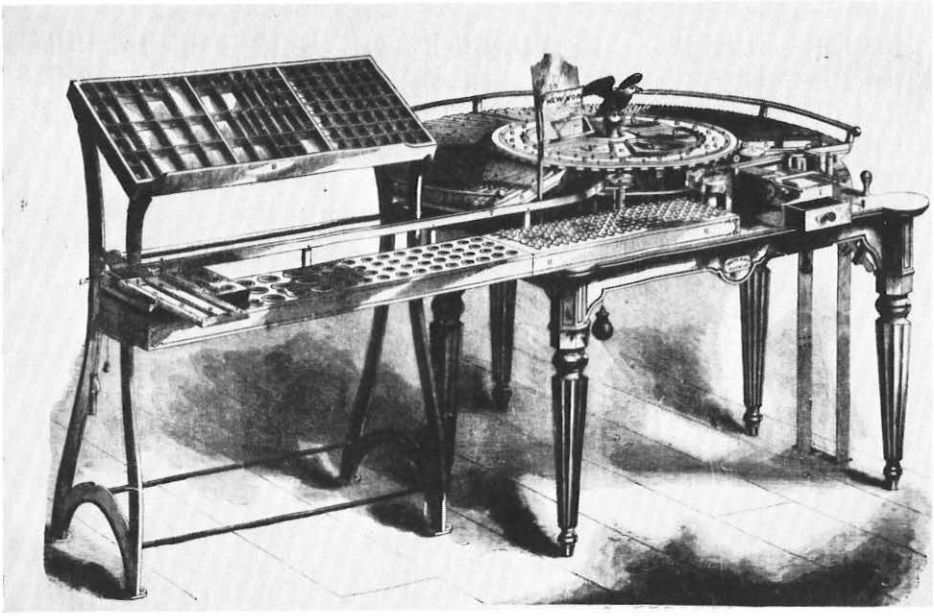
23. 1860. Felt Composing, Justifying and Distributing Machine. C. W. Felt; American; single-type; steam; separate keyboard; punched tape controlled machine; type stored in spiral line on drum; justification automatic; distribution automatic, by same tape in reverse (if no corrections had been made in original setup) ; no use.

24. 1862. Brown's Patent Typesetter. Orren L. Brown; American; single-type; no keyboard; types released by small lever and tongue at bottom of type channels, dropped into "stick" held in operator's hand; manual justification; separate distributor; distribution by special nicks by rotary motion; limited use.

25. 1862. Fraser Typesetter and Distributor. Alexander Fraser; English; single-type; gravity; manual justification; distribution by keyboard in separate machine, reverse of typesetter; 40 years use.

26. 1862. Ray Typesetting System. D. B. Ray; American; single-type; manual, no keyboard; type in tubes arranged in circle; fed into composing stick; details scant.

27. 1864. De Mey Typographer. D. A. De Mey; American; nonclassified; impression for electrotyping; foot pedal; indexed wheel controlled type wheel which made impressions in gutta-percha; impression table moved horizontally and laterally; matrix thus composed to be used as mold for electrotype plates; use unknown.



Alden Typesetter and Distributor, 1866 model (#29).

28. 1864. FLAMM COMPOSERS. Pierre Flamm; American; non-classified; impression for stereotype, and direct printer for lithography; supposed to be first impression machine which made matrices for stereotyping; details scarce.

29. 1866. ALDEN TYPESETTER AND DISTRIBUTOR, #2. Henry W. Alden, W. Mackay; American; single-type; improved after Alden's death; composition same as original (#19); manual justification; distribution mechanical, types returned to storage channels by rotating wheel; 60 years intermittent use.

30. 1866. BAER TYPESETTING MACHINE. Charles Baer; American; single-type; revolving type-receiving channel, radiating type cases; lip at mouth of cases, cams on forked mouth of revolving channel; spring hooks and pushers operated by keys; adjustable galley with sliding-rake; no use.

31. 1867. COREY AND HARPER TYPESETTING MACHINE. A. Corey and J. M. Harper; American; single-type; loose wheel, bearing on types pushed from reservoir; guiding plate to turn type; pushing

bar to adjust row of type in line; type in vertical row, on side, pushed up from below, with block to elevate each type; box with detachable type receiver; spring plate for controlling keys; no use.

32. 1867. KNIAGHININSKI AUTOMATIC COMPOSER. Petr Pavlovich Kniaghininski; Russian; single-type; electro-magnetic coils; tape operated, types picked from inclined grooves, deposited in collector, jaws of composing stick removed type from collector; manual justification; distribution automatic; no use.

33. 1867. MACKIE COMPOSING MACHINE. Alexander Mackie; English; single-type; steam; type picked from small boxes on circular table, controlled by perforated tape; hand justification; no distribution; limited use in Mackie's own newspaper shops. First application of perforated tape on commercial basis.

34. 1868. FOSTER TYPESETTING MACHINE. F. G. Foster; American; single-type; removable vertical plate, with recesses and grooves, covered with glass; type boxes, fingers acting in grooves; spring pressed type forward to guide with curved groove leading to composing stick; setting rule, stick and galley; manual justification; no distribution; no use.

35. 1869. KASTENBEIN COMPOSER AND DISTRIBUTOR. Charles Kastenbein; French; single-type; foot treadle or steam power; gravity, from vertical channels; types pushed into raceway; manual justification; distributor hand-fed, sorted and stacked types in channels; about 30 years use.

36. 1870. KLEES LEAD CASTER. K. M. Klees; American; material maker, strip (?); no details.

37. 1871. HOOKER ELECTRICAL TYPESETTER. John Hooker; English; single-type; no keyboard, but "setting board" arranged like type case; operator touched letter compartments with copper rod, closed electrical contact, which pushed type from sloping troughs; gravity, to long assembly lines; manual justification; distribution in separate machine, no details; about 30 years use.

38. 1871. PLUNKET COMPOSER. T. J. (or G.) Plunket; American; single-type; type channels arranged in circle; magnetic de-

vice rotated, electromagnets picked type from channels, deposited in lines; *iron* types; manual justification; no distribution; no use.

39. 1871. WINDER SYSTEM. R. Winder; English; non-classified; typesetter; manual; no keyboard; type stored in tubes; source material sketchy and conflicting; use unknown.

40. 1872. WESTCOTT DIRECT CASTING MACHINE. Charles Westcott; American; matrix, single-type caster and composer; dies mounted on levers, each stroke of key locked matrix to mold and cast single letter; composition followed casting in machine; no distribution.

41. 1873. FILMER LEAD CASTER. W. Filmer; American; material maker; details lacking, except patent notice.

42. 1873. PAIGE COMPOSITOR. James W. Paige; American; single-type; justifier, distributor; electricity; gravity, delivered perfect composition; justification and distribution automatic, notched type; type stored in upright channels; no use. Only two models built in over 20 years.

43. 1874. GOODALE LEAD CASTER. J. Goodale; American; material maker. Details on early lead casters very scant.

44. 1875. BURR TYPESETTER. S. W. Green and H. A. Burr; American; single-type; steam; gravity; types in vertical channels; manual justification; no distribution; later improved and called Empire (#49).

45. 1876. STONE LEAD CASTER, AND LEAD SHAVER. H. J. Stone; American; material maker, strip; two machines, one for leads and rules, other for shaving them to uniform size; no other details.

46. 1877. FARNHAM TYPESETTER. J. M. Farnham; American; single-type; gravity; type laid side upon side; no other details; no use.

47. 1878. WICKS ROTARY TYPE CASTER. Fredrick Wicks; English; type caster, multi-cell; electricity; cast types at 60,000 per hour; 100 molds in wheel 20″ in diameter; wheel revolved in front of nozzle, cast whole fonts at each revolution; metal temper-

ature 700°; delivered types on rotating chain; two operators required; 25 years use.

48. 1879. Wicks Composer. Frederick Wicks; English; single-type; steam; gravity delivery; two rows of keys, could deliver "chords" or parts of words at same time; types in inclined channels, pushed out by plunger; no springs or cams in machine; delivered into raceway, manual justification; used new types from Wicks Rotary Typecaster (#47); non-distribution; 25 years use.

49. 1880. Empire Composer and Distributor. Frank McClintock; American; the Burr (#44), greatly improved; single-type; gravity; manual, except for small motor-driven cam which kept a clear space for falling types; three banks of keys, three sections in magazine; automatic justification; distribution in separate machine by special nicks in type; 25 years use.

50. 1880. Fleming Lead Caster. J. Fleming; American; material maker; another attempt at machine-cast leads; no details.

51. 1880. Thorne Typesetter. Joseph Thorne; American; descendant of Tacheotype (#10); single-type; steam or electricity; gravity; two type cylinders on same axis; top cylinder was distributor, revolved; lower cylinder stationary, stored type; keys released types onto spinning disc at bottom of type cylinder, carried to "type way" and assembler in long lines; manual justification; distribution automatic by special nicks in type; very popular, 30 years use; later improved and known as Simplex One-Man Typesetter (#109) and as Unitype (#113).

52. 1883. McMillan Typesetter and Distributor. John L. McMillan; American; single-type; electricity; gravity; type removed by a "grab" which engaged nicks in type; justification automatic; distribution automatic in separate machine; several styles built for different kinds of composition; 20 years use.

53. 1883. Rotary Matrix Machine. J. O. Clephane; American; impression, stereotype; manual; type wheel, projecting characters; indented papier-mâché, letter by letter; pasted to backing, stereotype plate cast; no use.

54. 1884. Mergenthaler Band Machine #1. Ottmar Mergenthaler; American; impression, stereotype; vertical patrix bars, each with full alphabet and spaces, side-by-side; dropped to position determined by keyboard; impressed images in papier-mâché strips; strips lined up to form page matrix; stereotype plate cast; no use.

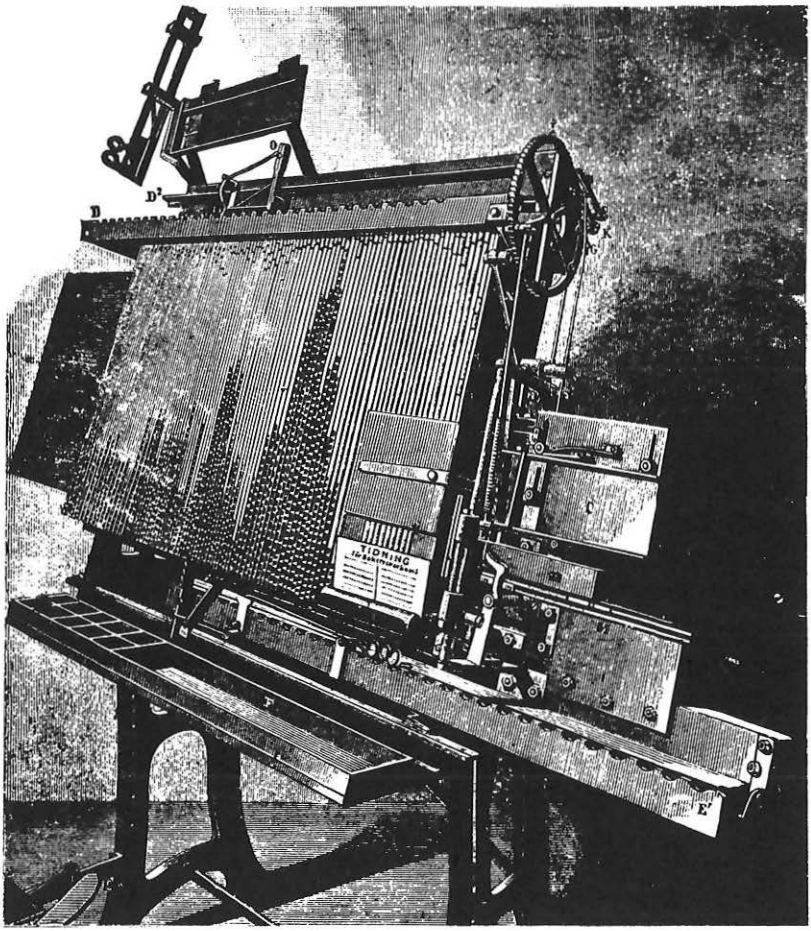
55. 1885. Lorenzo Dow Composing Machine. Lorenzo Dow; American; single-type; whole mechanism set on small table, cylindrical magazine overhead held types in troughs; types lowered by small boxes traveling on wires, or fell by gravity (?); details unclear; manual justification; no distribution; no use.

56. 1885. Lagerman Composer, Justifier and Distributor. Alexander Lagerman; Swedish; single-type; no keyboard; set of three-finger rings moved from channel to channel across serrated bar at bottom of magazine, pincers picked type and deposited in traveling "stick"; justification automatic; distribution by second operator at top of magazine, same arrangement as setting apparatus, in reverse; type dropped into long vertical grooves; two-man machine; use unknown.

57. 1885. Lyman Lead Caster. N. R. Lyman; American; material maker; continuous strip.

58. 1885. Mergenthaler Band Machine #2. Ottmar Mergenthaler; American; matrix, slug caster; steam or electricity; first "Lin-o-type"; construction similar to Band Machine #1 (#54); female (recessed) matrix bars, several characters on each bar, side-by-side, dropped to alignment, same as in #1 machine; hot-metal pot and mold locked against mats, cast slug; no use.

59. 1885. Mergenthaler First Circulating Matrix Machine. Ottmar Mergenthaler; American; matrix, slug caster; experimental model, transition between #2 Band machine (#58) and "Blower" Linotype (#60); vertical magazine, overhead distributor; wrought-iron frame, U-channel; matrices assembled by keyboard, sent to casting mechanism, returned to magazine via distributor; established principle of Blower.



Lagerman Composer, Justifier and Distributor, 1885 (#56).

60. 1885. MERGENTHALER "BLOWER" LINOTYPE. Ottmar Mergenthaler; American; matrix, slug caster; steam or electricity; circulating matrices, stored in upright sheet metal tubes; keys released mats into delivery channel, blast of air forced mats to assembler; justification by double wedges (space bands), line clamped in casting head, locked against mold in rotating disc; distribution via chain atop magazine, combination shoulders on mats and lips in distribution channel; wide usage, about five years; replaced by Square Base Linotype (#67).

61. 1886. LAGERMAN TYPOTHETER. Alexander Lagerman; Swedish; single-type; small electric motor; types dropped by hand into hopper, sorted and stacked, delivered as unjustified lines; manual justification; no distributor; type taken from ordinary type case; some use.

62. 1886. WENTSCHER CASTING AND TYPESETTING MACHINE. Ernst Wentscher; German; matrix, caster-composer; similar to Johnson Type Caster and Johnson Composer (#105-106); types cast, and inserted in composer, which had keyboard, gravity feed; temporary spaces, justification by replacement of temporaries; no use; patents bought by Johnson.

63. 1887. LANSTON MONOTYPE (Impression). Tolbert Lanston; American; matrix, impression; keyboard punched paper ribbon, justification established at keyboard; two tapes punched, one for movement of metal blanks in composer, cutting blanks to size; second tape controlled matrix die-case; die-case shifted each letter over metal blank and *embossed* letter, delivered letter-by-letter to galley, lines automatically justified; no distribution; no use.

64. 1887. UNIVERSAL TYPESETTER. Alexander Lagerman; English; single-type; same as Typotheter (#61), with improvements.

65. 1888. LAGERMAN JUSTIFIER. Alexander Lagerman; Swedish; single-type; justifier; hand crank; removed temporary spaces and inserted proper spaces or combinations for exact justification; lines moved up from unjustified bank to justified bank; took over from Typotheter (#61).

66. 1888. RISLEY AND LAKE COMPOSER. Isaac Risley, V. F. Lake; American; transfer, lithography; steam; printed on roll of paper by action of "type sleeve" as types were inked by small rollers, special paper for transfer to stone; letter-spacing proportional and justification automatic; type sleeve rotated and moved up and down; no use.

67. 1889. SQUARE BASE LINOTYPE. Ottmar Mergenthaler; American; matrix, slug caster; electricity; new style matrix carried in inclined magazine, released by verge escapement; 90 keys, 90 magazine channels; justification by sliding wedges (space bands); cast-

ing in revolving mold disc; mats carried to magazine by second elevator; distributed by screws and combination teeth in mats; slugs delivered into stacker; wide use.

68. 1890. CHADWICK TYPESETTER. J. W. Chadwick; English; single-type; last improvement on Lagerman Typotheter (#61); installed on board in type stand; manual; had warning bell, and dial indicating number of spaces to be thrown into hopper; manual justification; no distribution; limited use.

69. 1890. KLETZKER'S IMPRESSION MACHINE. A. J. Kletzker and J. G. Goesel; American; impression, stereotype; small electric motor; letter punches in oscillating head, driven into flong for making stereotype matrices; impression table shifted two directions; no use.

70. 1890. LANSTON MONOTYPE (Hot Metal). Tolbert Lanston; American; matrix, single-type caster, composer; principle of punched tape and unit setting established in first impression machine for all Monotypes; this model *cast* types as dictated by keyboarded tape; die-case about four-inches square, held 225 matrices; compressed air moved die-case to position matrices over mold; type cast and delivered to galley letter-by-letter; justification automatic; no distribution; not final design.

71. 1890. ROGERS TYPOGRAPH. John R. Rogers; American; matrix, slug caster; electricity; matrices were long brass rods, strung on wires in elliptical frame; upon release by keyboard, matrices slid down wires to assembly and casting position; after cast operator tipped frame back, mats slid back to home position; justification by revolving wedges; wide commercial use, popular in Canada and Europe, especially Germany until WW II; revived in Germany about 1964, with improvements.

72. 1890. ST. JOHN TYPOBAR. R. H. St. John; American; impression, type-bar; electricity; circulating hardened-steel matrices; keyboard released mats from magazine to assembler, soft cold-metal blanks mounted on steel bases presented to line of mats; justification by wedges; mats *embossed* line on blanks, then line passed through trimming knives; mats returned to magazine au-

tomatically; metal blanks stored in composer; after use, type-bars were run through another machine which stripped type metal from bases; bases were re-used; no cams; run by rotary devices; no use.

73. 1890. SIMPLEX LINOTYPE. Ottmar Mergenthaler; American; matrix, line-slug caster; third stage of Linotype development, first true production model; electricity; inclined magazine, circulating matrices; released by verge escapement; gravity to assembler; rotating mold disc, casting and trimming devices; justification by double wedge (space band); distribution by combination teeth in matrices and grooved distributor bar; elevated to top of magazine; basis for all subsequent models; universal use.

74. 1891. MATRIX MAKING MACHINE. H. Lee and E. LeBrun; American; impression, slug caster; electricity; two banks of keys; types made impressions in metal blanks, slugs cast from this matrix, delivered to galley and matrix discarded; types restored to magazine; no use.

75. 1891. MCGRATH TYPE-COMPOSER. P. H. McGrath; American; single-type; no details on composer, but special computing and casting device made wedge spaces; justification by advancing wedges from thin to thick and cutting off excess.

76. 1892. MATRIX TYPOGRAPH. T. T. Heath; American; impression, stereotype; pretyped copy on unit system, justified at keyboard; operator of impression machine followed this copy; 140 male punches in die-case, impressed letters in soft matrix material page by page; die-cases interchangeable, different faces or sizes of type; stereotype plates cast from matrix; no use.

77. 1892. MONOLINE. Wilbur Scudder; American; matrix, slug caster; electricity; matrix bars in small magazine, advanced to assembler and cast slug, moved back into magazine; justification by wedge spacer; 15 years use. Not made or sold in U.S.A. because of infringements of certain Mergenthaler patents.

78. 1892. SEARS TYPO-MATRIX. Charles Sears; American; impression, slug caster; keyboard, separate caster; punches driven into

wooden elements, which were run through caster, made "Lin-o-type" slugs; justification by differential feed on keyboard; no use.

79. 1892. TACHYTYPE. Frank A. Johnson; American; non-classified; inventor experimented with three principles: Monotype, Linotype, and impression (stereotype); 16 different patent listings, but no specific details, except on impression method: keyboard punched tape, caster impressed letters in soft-metal matrix, cast slug lines; no use.

80. 1892. TRIANGLE MONOTYPE. Tolbert Lanston; American; matrix, caster and setter; electricity; same tape principle, unit system as cold-metal machine (#63); type cast as die-case moved to and fro over mold; two tapes used to operate machine; no use.

81. 1893. CALENDOLI COMPOSER. V. Calendoli; French; single-type, type-bar; electromagnets; keyboard of 575 keys; types short, with deep keyhole slot in bottom, slid down inclined conduits to assembler; moved onto type metal bars, no justification; no distribution, type-bars melted down after use; types stored in upright channels; three machines in system: type caster, base caster, composer; limited use.

82. 1893. DOW COMPOSING MACHINE. Alexander Dow; American; single-type; typesetter and justifier; electricity; automatically composed and justified; separate distribution by combination nicks; set eight different sizes of type by changing sizes in upright channels; used types from Wicks Rotary Type Caster (#47); about 10 years use.

83. 1893. GOODSON GRAPHOTYPE. George A. Goodson; American; matrix, single-type caster and setter (Monotype principle); keyboard perforated ribbon, which controlled caster; die-plate moved to and fro over mold; justification automatic; cast hollow type, melted down after use; about 15 years use.

84. 1893. HILL'S DEVICE. A. A. Hill; American; single-type; manual; strapped to compositor's waist; type dropped into it by both hands; manual justification; no use.

85. 1893. KEMP'S TYPE-BAR MACHINE. William Kemp, Jr.; American; single-type, type-bar; caster and setter; short types cast

in wheel with tenon, assembled on bars; details scant; use unknown.

86. 1894. Converse Typesetter #1. Frank B. Converse; American; single-type; setter and justifier; electricity; gravity; 92 channels in four groups, upright magazine at right angle to keyboard; justification, temporary steel wedges determined proper spaces which were replaced by metal spaces; no distribution; no use.

87. 1894. Cox Type and Logotype Machine. Paul F. Cox; American; single-type, logotype; electricity; types, logotypes in two magazines at right angles, released onto traveling belts at right angles; assembled at common point; manual justification; no use.

88. 1894. Cox Composer, Space Discarder, Distributor. Paul F. Cox; American; single-type; electricity; three machines: composer—type pushed from magazine onto traveling belt, soft-metal piece cut from reel, crimped and inserted as space; justification by compression; space discarder—sorted types and spaces, threw out spaces, stacked type; distributor—similar to Thorne (#51), type put in top of cylinder which revolved, sorted types by nicks and distributed into radiating channels; channels with type put into composer; limited use.

89. 1894. Fowler Type Caster and Setter. Joseph C. Fowler; American; matrix, single-type caster-composer; cast at each stroke of key, stored type in magazine; composition from magazine; justification by compressible spaces; use unknown.

90. 1895. Angle-End Monotype. Tolbert Lanston; American; matrix, caster-composer; electricity; perforated tape and casting principles same as earlier Monotypes; galley and delivery mechanism on angle at end of machine; one tape used; no use.

91. 1895. Composite Type Bar. Lucien A. Brott; American; matrix, type-bar; caster and composer; electricity; composite mold, all letters cast at each stroke of plunger, deposited in magazine; composition usual manner, types ¾″ high; justification automatic; line moved to secondary casting unit and welded to solid base; limited use.

92. 1895. Fowler Impression Composer. Joseph C. Fowler; American; impression, slug caster; electricity; steel patrices (dies) impressed lines in lead blanks to make matrices, slugs cast; compressible steel spaces; no use.

93. 1895. Pulsometer. S. H. and P. E. Hodgkin; English; single-type; electricity; 116 horizontal channels in tiers; type pushed forward, gravity drop to assembler; manual justification; distribution by keyboard in separate machine, selection by set-width of types passing through bridges; limited use.

94. 1896. Berri Typecaster. William Berri; American; matrix, single-type caster and composer; details scarce; lines of matrices assembled with mold dividers between each matrix, forming plurality of mold cells; line cast as single types; justification by wedge; no use.

95. 1897. Berri Casting Justifier. William Berri; American; single-type; justifier; electricity; machine separate from Typecaster (#94); measured unjustified line of type, calculated width of spaces, set mold and cast all spaces at same time, stored them in receptacle; type lines passed beneath this magazine, spaces inserted step-by-step, temporary spaces removed; no use.

96. 1896. Burg Composer. Hubert Burg; German; single-type; types gathered in channel, pushed to assembler; justification automatic; distributor handled several sizes; details scant.

97. 1896. Des Jardins Justifier. B. M. Des Jardins; American; single-type; brass temporary spaces, computer calculated and inserted justifying spaces; designed for Thorne Typesetter (#51); use unknown.

98. 1896. The Stenotype. The Stenotype Company; English; direct printer (?); typesetter, set line, made impression, distributed; no connection with American Stenotype of 1911; details scant.

99. 1897. Bellows Electric Compositor. Benjamin F. Bellows; American; matrix, slug caster; electricity, electro-magnetic; assembled brass matrices, cast solid slugs; 128 keys; gravity; temporary hollow spacers, replaced by solid brass justifying spaces; mats

circulated, distributed by combination holes in mats; two machine models, could cast 5- to 36-point sizes; no use.

100. 1897. Botz Machines. Charles J. Botz; American; scant details, except working principles; non-classified; several machines: type-bar, impression machine, keyboardless setter.

101. 1897. Bowron Justifier. C. W. Bowron; American; single-type; justification by false hollow spaces, replaced by proper spaces; controlled by steel balls which fell when space key was struck; no use.

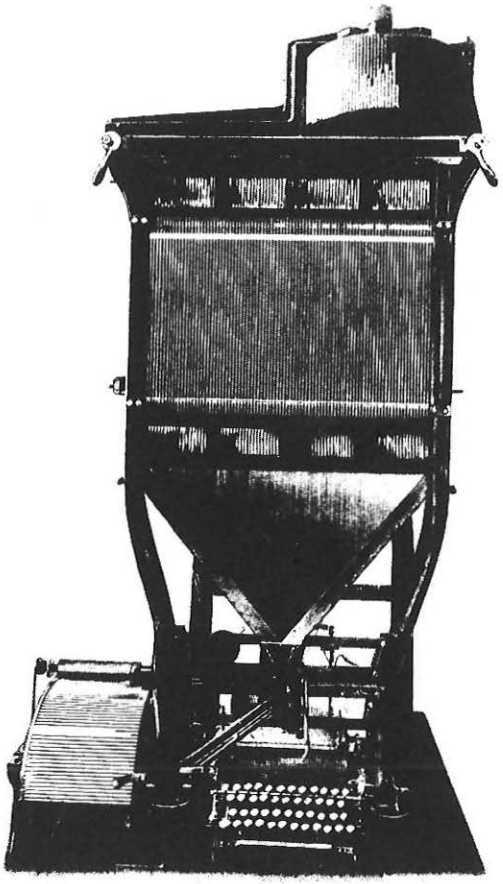
102. 1897. Electrotypograph. C. Méray-Horváth, C. Rozár; Hungarian; matrix, single-type caster and composer; electricity; separate keyboard for punched tape; tape controlled caster, justified lines delivered; die-case, each matrix having three faces; distribution by remelting; Teletypograph (#103) part of this system; perforated tapes relayed by telegraph to distant shop or city.

103. 1897. Teletypograph. C. Méray-Horváth, C. Rozár; Hungarian; non-classified; part of Electrotypograph system (#102); telegraphic system of perforating tapes, relaying copy or messages to distant keyboard-perforator; similar to modern Teletypesetter (TTS); tapes re-punched and ran through caster; scant details; limited use.

104. 1897. Four Tower Monotype. Tolbert Lanston; American; matrix, single-type caster, composer; electricity; principles same as other Lanston machines, except machine was much longer, had four paper tape towers, cast four different jobs, or four setups of same matter; no use.

105. 1897. Johnson Type Caster. Frank A. Johnson; American; type caster, multi-cell; single-type caster, but cast full alphabet in rotation each revolution of machine; types stored in tubes, ready for Composing Machine (#106); limited use.

106. 1897. Johnson Composing Machine. Frank A. Johnson; American; single-type; electricity; gravity; temporary spaces, replaced by proper spaces cut from metal strips and inserted; type supplied by separate caster (#105); limited use.



Stringertype, 1913 model (#121).

spacer; types delivered in composed lines, as in Monotype; mats raised to top of magazine and distributed, as Linotype; 36 years use.

122. 1900. Webster Lead Caster. C. C. Webster; American; material maker, strip; cast in continuous strip; could cut to short lengths; no subsequent shaving; compressed air (tank with hand pump) aided casting; use unknown.

123. 1901. Automatic Type Machine. F. H. Brown, J. E. Hanrahan, G. A. Boyden; American; also called Compositype;

type caster, single-type; cast one kind at time; own matrices, or electrotyped matrices from founder's types; orifice of mold same for all sizes, 6- to 36-point, a serious drawback; limited use.

124. 1901. Brown Bar-O-Type. Herbert Brown; American; matrix, slug caster; bar form of matrix, 10 characters per bar, suspended by hooks, upright magazine; keys released, aligned matrix bars, space tubes inserted between words, line measured, spaces calculated, solid brass spaces delivered through tubes, tubes withdrawn; mats raised to magazine by hooks; distribution by combination nicks; two machines built, no use.

125. 1901. Duplitype. W. H. B. Miller; American; type caster, single-type; foundry type impressed into blotting paper produced matrix; matrix fastened in bottom of box-mold, metal poured in; all manual labor.

126. 1901. Linotype Junior. P. T. Dodge; American; matrix, slug caster; matrices were long flat brass rods, one letter to each, with hook at top; keyboard released mats, slid down wires to assembly and casting mechanism, then returned to home on wires; derived from Rogers Typograph (#71); about 5 years use.

127. 1901. Logotype Casting and Composing Machine. Ottmar Mergenthaler, Emil Lawrenz; American; matrix, logotype caster; circulating matrices; keyboard of 42 keys released mats into assembler, with temporary "separator"; last word had "correcting" space; justification by wedge in casting mechanism; one word and space, or part of long word advanced to mold at a time, mold adjusted itself and cast logotype, delivered lines of logotypes; mats sorted into eight groups, distributed into eight magazine segments; no use.

128. 1901. Polytype. Fritz P. Lucke; German; matrix, slug caster; curved matrix with several characters on outer edge, inner edge had teeth for control in machine and distribution; wedge spacers; composed matrices delivered to supporting cylinder; two molds in large wheel; after cast, distribution by grooved roller; no use.

129. 1901. Storm Electric Linotype. Alfred W. Storm; American; matrix, slug caster; matrices on ends of "spider" arms, like

wheel spokes, electrical contacts moved mats to casting position; metal pot and mold at top of machine; nozzle engaged line of mats, cast slug; gas heated; self-contained water cooling system; no use.

130. 1901. VAN HOYWEGHEN COMPOSER. Henri Celeste Van Hoyweghen; Belgian: non-classified; no mechanical description, called composing machine to eliminate all assembling and stone work, spacing, distribution; to permit change of characters, compose ovals, obliques, vignettes, frames, borders; use unknown.

131. 1902. CASTOTYPE. JOSEPH C. Fowler, Sr. and Jr.; American; matrix, single-type caster and composer; bar-type matrices, various letters of same width on same bars; matrix lowered, registered with its mold, single type cast, assembled; lines over-set, soft metal quads between words; lines compressed to measure, sent through trimming knives to remove protrusions from spaces; distribution by remelting; limited use.

132. 1902. CONVERSE'S NEW TYPESETTER. Frank B. Converse; American; single-type; similar to No. 1 (#86) with improvements and changes; gravity; 90 keys, types fell into assembling "stick"; when filled, replaced by another stick; composition continuous; justification automatic; two vertical magazines, one roman, one italic; could handle seven different type bodies; use unknown.

133. 1902. DYOTYPE. J. Pinel; French; matrix, single-type caster and setter; separate keyboard punched paper tape; tape controlled caster; matrices in wheel, six rows to wheel, two wheels to machine = 576 characters; wheels rotated and moved in direction of axis, contacted mold, cast type; selecting needles pushed through holes in tape; justification automatic, effected at keyboard; distribution by remelting; limited use.

134. 1902. PLANOGRAPH. Charles T. Moore; American; transfer, lithographic; perforated tape fed through printer which printed on chemicalized paper, justification by computation as for Monotype; transfer to metal plate or stone for printing; use unknown.

135. 1902. Sears Direct Printer. Charles Sears; American; non-classified; composition for relief plate; differential keyboard, typed on chemically prepared paper; transfer to metal plate; plate etched to *raise* characters (relief) for printing direct; use unknown.

136. 1903. Dougall Linotype. J. R. Dougall; Canadian; matrix, slug caster; simplified form of Linotype; circulating matrices; casting mechanism, crucible, mold arm (not disc), knife block, cams turned at right angle to front (keyboard); assembled lines of mats turned 90° for casting, turned back for usual distribution; one magazine; also known as Style-B Linotype; limited use.

137. 1903. Lithotype. W. S. Timmis; American; transfer, lithographic; keyboard punched paper tape, electromagnets in keyboard; tape passed through printer, "type sleeve" rotated and moved axially, hammer struck transfer paper to type sleeve; finished matter run through transfer press onto metal plate; limited use.

138. 1904. Brooks Casting and Setting Machine. B. A. Brooks; American; matrix, single-type caster and setter; matrix and mold for each letter; new letter cast and deposited in channel as each was removed in composition; justification by computation, spaces cast and inserted in line; use unknown.

139. 1904. Dow Type Selector. Alexander Dow; American; non-classified; mechanized type case; types stored in large sloping case with channels, nicks all one way, face outward; types ejected onto shelves at two levels, replaced as each letter was picked off; identifying strip for each shelf, showing characters immediately above; use unknown.

140. 1905. Pearson Composing Machine. John R. and Gustave R. Pearson; American; matrix, single-type caster and composer; one-operation machine; single-type cast at each stroke of key; six rectangular matrix bars, characters on each surface, rotatable; each to its own mold; justification by computation, spaces cast and sent to galley with types, inserted by hand; limited use.

141. 1905. Rototype Composer. Franz Schimmel; German; matrix, slug caster; polyhedral matrices, circulating, having 10 faces, assembled by keyboard of 100 keys; lines sent via carrier in rotating wheel to casting segment; compressible spacers; mats distributed after cast; second and third lines composed while first in process; slug delivered to front; limited use.

142. 1906. Baker Typesetter and Distributor. A. G. Baker; American; single-type; manual throughout; 90 keys; 90 type channels in upright magazine; gravity; type pushed out by plunger, fell into assembler, hand justification; distribution automatic at top of machine; operated in conjunction with keyboard; distributor moved to and fro, selection of wards returned type to channels; any style or size of type; use unknown.

143. 1906. Ludlow Typograph (Matrix Bar). Washington I. Ludlow; American; sliding matrix-bar; slug caster; flat table-top, series of tapered matrix bars 24″ long, thin end to thick end; bars slid either direction to align letters to form words; metal pot and mold under table, moved to position to cast slug, receded; slug delivered at front of machine; cast 8-, 10-, 12-point sizes; no use.

144. 1906. Universal Type Caster. Philip Nuernberger, George Rettig; American; typecaster, single-type; cast types for machine or case; 6- to 36-point, different mold for each size; recessed break at foot of type, tang broken off in recess, no further dressing necessary; also known as Nuernberger-Rettig Type Caster; about 10 years use.

145. 1907. Goodson Graphotype, One-Man Machine. W. Nicholas and W. Ackermann; American; matrix, single-type caster and composer; remodeled Graphotype (#83); perforated tape eliminated, keyboard built-in; mechanical controllers adjusted for spaces automatically, which were cast with types for automatic justification; die-plate shifted to and fro by electro-magnetic elements; lines delivered complete to galley. Machine adaptable to casting type sorts to 36-point; limited use.

146. 1907. Hanigan Type Bar. A. W. Hanigan; American; single-type (type-bar); system in Monotype classification; type

cast full height, with dove-tail recess in body; justification by wedges, no spaces cast; curved type-metal segment wedged into recess, flattened against body forming a type bar; use unknown.

147. 1907. KLETZKER & GOESEL TYPE-BAR MACHINE. A. J. Kletzker, J. G. Goesel; American; impression, cold embossing; type-bar; few details available; matrices assembled and embossed characters in relief on edge of type-metal blanks, forming a slug; no use.

148. 1907. STRINGER LINE JUSTIFYING MACHINE. H. J. S. Gilbert-Stringer; English; single-type; justification by milling; for Wicks Composer (#160) or others; two kinds of em quads (one high, one low) played into lines at composer; line overset; computer set wedges for proper spaces; small jaws pulled high quads from line, passed them over fast milling cutter, returned to line of type, delivered to galley; use unknown.

149. 1908. BHISOTYPE. S. A. Bhisey; English; type caster, multi-cell; full alphabet cast at each stroke of plunger; type delivered on chains direct to composer, or stored in channels; one caster capable of supplying eight typesetters for day; several models for different type sizes; about 15 years use.

150. 1908. THOMPSON TYPE CASTER. John S. Thompson; American; typecaster, single-type; cast all "sorts" needed in composing room, or new fonts, 12- to 48-point; used own matrices, or with adapter in mold, cast from other line casting matrices; universal usage.

151. 1909. GRANTYPE. J. C. Grant; English; matrix, single-type caster and composer; basic Linotype construction, but assembling and casting mechanisms adapted to single types; matrices circulated; lines turned at 90° for casting and returned for distribution; matrices acted as part of mold, lines cast with open spaces between letters to form "comb" with solid base or tang; tang broken off, line closed up and delivered; limited use.

152. 1909. GRANT-LEGROS-MAW LINE JUSTIFIER. J. C. Grant, L. A. Legros, T. F. Maw; English; single-type; mechanically similar to Stringer Line Justifier (#148); lines over-set, justifying spaces

computed; special long quads set into line, extending below foot of type, pulled from line, passed over fast milling cutter, bottom extension cut off, returned to line, delivered to galley; to be connected to any typesetting machine; use unknown.

153. 1909. Hoofnagle Justifier. W. T. Hoofnagle; American; single-type; few details; from composer type received in word-holders, justifying spaces are cast and inserted between words; no use.

154. 1909. Ludlow Typograph. William A. Reade; American; hand-set matrices, slug caster; outgrowth of Ludlow Typograph (#143); brass matrices, any desired size, or mixture, hand set in steel "stick" from case; slug cast in machine, mats immediately hand distributed; slug (over 12-point) had overhang, built up with leads; universal use.

155. 1909. Rototype. Franz Schimmel; German; matrix, single-type caster and setter; derived from Rototype Composer (#141); 123 keys; matrices decagonal, 12 to a roller, moved rotationally and axially; one letter cast each stroke of key; slow; mold opened and ejected type, no mechanical justification, but cast spaces provided; distribution by remelting; no use but still available in 1924 (!).

156. 1909. Unitype-Bar Machine. Rolls P. Link; English; matrix, type-bars; types cast as short heads; assembler sprung channel open in base, inserted type and released lips of base which gripped type heads; distribution by stripping heads from bases; use unknown.

157. 1910. Pantotype. René Dacheux; Belgian; single-type; one-man machine; set, justified, distributed; few details; compressible spaces from soft-metal tubing; distribution by nicked type; use unknown.

158. 1910. Rapid Type Caster. L. A. Legros and J. C. Grant; English; type caster, single-type; for case or composer; mold similar to Monotype; cast one letter at a time, 10,000 per hour; water-cooled mold, hot nozzle kept in contact, nozzle heated by circulating molten metal; limited use.

159. 1910. VICTORLINE. German Linotype Co.; German; matrix, line slug caster; similar to Linotype (#73); 103 keys, mats circulated; magazine change by swinging and tilting; water-cooled mold disc; details scant; limited use.

160. 1910. WICKS COMPOSER AND JUSTIFIER. Frederick Wicks; English; single-type; same basic construction as 1879 machine (#48); improvements; Stringer Line Justifying Machine (#148) added; limited use.

161. 1911. AMALGATYPE. E. B. Barber; American; matrix, typebar; details scant; machine cast single types with expanding spacers; secondary casting welded types into solid line; weight 550 pounds; distribution by remelting; no use.

162. 1911. HUMMEL COMPOSER. J. J. Hummel; American; single-type; details scant; plurality of type fonts, series of magazines; no use.

163. 1912. LESKOW COMPOSER. E. Leskow; English; single-type; type in stationary radial channels; composing channel rotated; details scant; use unknown.

164. 1912. LINOGRAPH. Hans Petersen; American; matrix, line slug caster; circulating matrices; Linotype principle, many refinements, simplifications; vertical magazines, one elevator, short matrix travel, low-quad slugs; 1921 model three magazines, 1923 model twelve magazines; less than five feet high; widespread use until 1944.

165. 1912. ROWOTYPE. Ogden Rowotype Company; American; matrix, line slug caster; typewriter keyboard, could be removed and used as office typewriter; matrices on long arms, concentric rows at top of machine; fell by gravity to assembling and casting point; slug cast in vertical position; electrical escapements; justification by pairs of wedges; no use.

166. 1912. THOMPSON TYPESETTER AND JUSTIFIER. John S. Thompson; American; single-type; details scant; used temporary spacers and cast proper spaces, inserted between words; no use.

167. 1913. INTERTYPE. International Typesetting Machine Company (later Intertype Company); American; matrix, line slug caster; Linotype principles; circulating matrices, 90-keys; refinements and simplifications from Linotype; quick magazine changes; machine adaptable to alterations to change model; universal use.

168. 1916. HANSEN FACSIMILE TYPESETTER. H. P. Hansen; American; single-type; typesetter for duplicating purposes; small electric motor; gravity; types moved directly into type drum; printing performed; type drum inserted in automatic distributor at top of machine; special type with grooves; limited use.

169. 1916. ORIENTYPE. S. Sheba; Hawaiian; single-type; Chinese language; resembled small Brooklyn Bridge; gravity; sliding seat for operator; types in brass tubes with combination notches, released by springs, traveled on belt to assembler; types classified into 100 units; use unknown.

170. 1917. ELROD LEAD CASTER. Benjamin S. Elrod; American; material maker, strip; crucible, continuous-flow mold; frictional puller draws material from mold in continuous strip; cuts to lengths to 25 inches; 1- to 36-point leads, slugs, rules; universal use.

171. 1922. ROBERTSON PHOTO-COMPOSING MACHINE. John Robertson; English; non-classified; basic Linotype principle; circulating photo-mats; camera, film-controlling device replaced casting mechanism; matrices reflective, larger than standard sizes; too early for times; no use.

172. 1923. MONOTYPE MATERIAL MAKER. Lester Walden, M. C. Indahl; American; material maker, strip; crucible, metal injected into mold by force-pump, pushed out by steel blade; interchangeable molds; strips any length, stacked on table; casts 2- to 36-point material, rules and borders; universal use.

173. 1925. MONOTYPE GIANT CASTER. M. C. Indahl; American; type caster, single-type; uses own matrices; casts up to 72-point types, and strip furniture to 72-point; castings on larger sizes hollow or recessed; universal use.

Studies of the Efficiency of Drug Labelling

M. Hailstone and J. J. Foster

Two experiments on the effectiveness of drug-labelling are reported. The first compared typewritten with hand-written labels, and the second compared printed drug-labels varying in type size, form of type, and layout (centered or ranged left). A discrimination-test procedure was employed, the subjects having to select specified labels from a display. The results of the experiments showed (1) that typewritten labels were discriminated more readily than handwritten ones, (2) that labels printed with 10-point type were discriminated more speedily than labels printed with 6-point type, (3) that for labels printed with 6-point type, upper-case letterform was more easily discriminated than lower-case letterform, (4) the layout of the label design had no effect on discrimination.

Over the past few years there has been an increase in the number of people admitted to British hospitals suffering from accidental poisoning. In some cases, this has been due to out-patients making errors when taking medicines prescribed for them; either they have selected the wrong medicine, or they have taken the wrong quantity of the proper medicine (RSPA, 1966).

It has been suggested (Poulton, 1964) that clearer inscriptions would ease the task (a) of selecting the correct preparation, and (b) of reading the directions for use. There has been little evidence produced to support this suggestion. Indeed, there has been remarkably little scientific investigation of the problem of error in drug administration, either in the domestic environment or in hospitals.

Poulton (1964) experimented on a selection of labels which differed in lettering size, color of lettering, and color of the whole label. His results indicated (p. 218) "that inscriptions can be discriminated from each other more quickly either when they are printed in lettering larger than has generally been the practice, or

when the key differences are printed in contrasting colors. A combination of larger lettering in contrasting colors makes for the quickest discrimination. No added advantage is to be gained by printing the complete labels in contrasting colors." The lettering sizes varied in x-height from 1.6 mm. to 2.4 mm. in a series of experiments using labels which indicated different doses of a standard drug, and from 1.9 mm. to 5.9 mm. in experiments using labels bearing the names of different drugs. We suggest that since the number of drugs exceeds the number of discriminable colors (Eriksen and Hake, 1955; Hanes and Rhoades, 1959), a color for each drug is not feasible; however, a system of color-coding which distinguishes a few important groups of drugs could be devised. Alternatively, color-coding could be used to indicate strengths of certain preparations. (This technique is used with insulin preparations, for instance.)

The present experiments compare the discriminability of drug labels of various designs, and form part of a continuing research program being undertaken in the School of Advanced Studies of the Manchester College of Art and Design. The eventual aim of such a project is the production of a system of drug labelling which will minimize the chances of errors in drug administration.

EXPERIMENT I

The labels on drugs obtained from a pharmacist for domestic use tend to be handwritten. It is possible that some errors in administration are due to the difficulty of discriminating these labels. Our initial experiment, therefore, was designed to compare the discriminability of handwritten labels with that of typewritten ones. Bell (1939) reports that typewriting is read more quickly than handwriting when the speed of reading prose is the subject of study, but not when single letters or nonsense syllables are being perceived. Our problem, that of discriminating one out of a set of possible messages, was not considered by Bell.

Method and Procedure

The general method of assessing discriminability was the measurement of time taken to select a specific instruction from a display of different instructions.

Twenty-four students acted as subjects in the experiment. There were two groups of 100 labels, each label being 2 x 1 inches. Ten instructions commonly used on drugs administered by the patient himself were selected. These were:

One tablet three times a day
Two tablets three times a day
One tablet every four hours
Two tablets at once, then one tablet three times a day
One tablet three times a day after food
One tablespoon three times a day after food
One teaspoon three times a day after food
One teaspoon three times a day
One tablespoon three times a day
One tablet two times a day

Each instruction was typewritten onto ten labels, and also handwritten onto ten other labels. Ten people wrote each of the instructions onto a separate label, so that the handwriting of the labels varied. In this way, we hoped, the experimental display would be similar to that which an individual faces when he goes to his bathroom cupboard, for we would expect that most people —having accumulated drugs over a period of time and possibly from different pharmacists—have drugs with labels which have different handwriting on them. A single typewriter face was used for the typewritten instructions, partly for practical reasons and partly because we suspect that there is little difference in the legibility of the common typewriter faces. This assumption is supported by the experience of research comparing the legibility of printing typefaces (Pyke, 1926; Paterson and Tinker, 1932; Tinker, 1963; Poulton, 1965).

We, therefore, had two groups of 100 labels. One group consisted of the ten instructions typewritten ten times; the other group consisted of the ten instructions handwritten ten times. Each group of labels was mounted on a 29½ x 19¼-inch neutral grey board, with a half-inch space between each row and column of labels. The labels were arranged on each board in two 10 x 10 Latin squares, so that no instruction occurred more than once in any one row or any one column.

The 24 subjects were tested singly. Each subject wrote down an

instruction. One of the boards bearing the labels was then exposed, and he selected the ten labels on that board which had the same instruction as he had just written down. Selection was shown by placing a brass ring on the chosen label. Each subject went through this procedure four times, twice on each board. On the board bearing the typewritten instructions he selected the instructions: "One tablet every four hours" and "One teaspoon three times a day." On the board bearing the handwritten instructions he selected: "One tablet three times a day" and "One tablespoon three times a day." The order of presentation was decided from random number tables.

The data recorded was the time between the moment the board was exposed and the moment the last (tenth) ring was placed on the final label.

The subjects were instructed to correct any errors they might have made. If uncorrected errors remained, the row containing the wrongly selected label was indicated; and the time taken to select and correct the error by relocating the ring was recorded and added to the time taken on that trial.

Before the experimental trials, each subject had a practice trial on which he searched for symbols. He was asked to search the boards by a systematic technique of scanning each row, and the practice trial was used to give him the opportunity of using this system. The intention of this procedure was to prevent the subjects changing their searching strategy between trials, since this might have contaminated the results.

Results

The mean time taken to select a typewritten instruction from the display was 43.54 seconds; for the handwritten instructions, the mean time taken was 63.47 seconds. A t-test of the difference between these means indicated that the difference is significant beyond the .01 level. The selection of the handwritten instructions took 45.8% longer than the selection of the typewritten instructions.

The mean number of uncorrected errors made by each subject was 0.42 with the typewritten instructions, and 0.83 with the handwritten ones. The difference between these means is not significant at the .05 level.

Conclusions

The results of this experiment have demonstrated that typewritten instructions are more speedily discriminated than handwritten ones, with no loss in accuracy. We would, therefore, recommend that drug labels which are going from the pharmacy into the home should be typed rather than handwritten.

EXPERIMENT II

The second of our experiments compared the discriminability of printed drug labels of various typographic designs. The following three design features were studied: (a) type size, (b) upper-case and lower-case letters, and (c) ranged left and centered arrangements.

A considerable amount of research has been published which has investigated the legibility of type of various sizes. Paterson and Tinker (1940) compared the speed of reading type of a number of sizes, set in the optimal line length, and with the optimal amount of leading; and found that 9-, 10-, 11-, and 12-point Granjon were equally legible under these conditions. Glanville, Kreezer, and Dallenbach (1946) found that 6-point type was less easily perceived than 12-point type; they used the tachistoscopic method of investigating perceptibility. Other studies are included in Burt (1959) and Zachrisson (1965).

Tinker and Paterson (1932) report that upper-case letters can be read at a greater distance than lower-case. A further study by the same authors (1946) indicated that lower-case letters can be read significantly faster than upper-case. Breland and Breland (1944) found that lower-case letters are more speedily perceived than upper-case.

We have not, in our study of the literature, found the perceptibility of copy which is ranged left compared with that of centered copy. The only relevant research is that concerned with the justification of the right-hand margin of printed material (Hultgren, 1954; Powers, 1962; Fabrizio, Kaplan, and Teal, 1967), and Zachrisson's (1965) comparison of left and right, even and uneven, margins. All these studies have failed to show that justification increases legibility.

None of the experiments mentioned have used selection of one

message from a display as the test of perceptibility. Since we are concerned with this problem, we have performed experiments using this procedure before accepting the validity of the results of other experiments for a selection situation.

Method and Procedure

A similar method to that used in Experiment I was again employed, except that printed labels bearing the name of drugs were used.

Eight groups of 100 labels were formed, there being eight different label designs. The designs differed according to: (a) type size (6-point *or* 10-point), (b) letterform (upper-case *or* lower-case with initial letter only in upper-case), and (c) layout (ranged left *or* centered). Details of each particular design group are shown in Table I.

TABLE 1. *Label design, drug names to be selected, and mean selection time*

Design of Label			*Names to be Selected*	*Mean Selection Time in Seconds*
Type Size in Points	*Ranged Left or Centered*	*Upper- or Lower-case*		
6	R/L	UC	Hydroxyzine & Phentolamine	24.5
6	C	UC	Ultandrell & Zactane	
6	R/L	LC	Zarontin & Eurermil	26.2
6	C	LC	Bradasol & Ultandrell	
10	R/L	UC	Rastinon & Palaprin	22.45
10	C	UC	Coscopin & Prednisone	
10	R/L	LC	Palaprin & Bialamicol	22.78
10	C	LC	Dequadin & Biliodyl	

Note: Since the data showed that the layout (ranged left or centered) had no significant effect on selection time, the scores for both these layouts were combined.

The specific hypotheses which were being tested were:

1. Ten-point type is discriminated more quickly than 6-point type.
2. Lower-case lettering with upper-case initial letters is perceived more quickly than upper-case lettering, when type point size is held constant.

3. Ranged-left layout gives a more easily perceived presentation of the printed information than centered layout.

Because this experiment concerns the discriminability of printed labels and because nurses are the ones who have to discriminate printed labels at the critical time before administration of a drug to a patient, it was decided to use nurses as subjects. A total of 33 nurses took part.

The labels were printed in Gill Sans, Medium and Bold. Bold type was used for the name of the drug. The other information relating to the strength and quantity of the drug was printed in Medium type. This information remained constant on each label. Gill Sans has been found to be a more legible typeface than some other sans-serif faces (Poulton, 1965). Sans-serif faces are not demonstrably less legible than serifed faces, according to a number of criteria of legibility (Poulton, 1965; Zachrisson, 1965).

In each group of 100 labels of the same design, ten drug names were used, each occurring on ten labels of each 100. Drug names were selected randomly from the British Pharmacopoeia list of approved names. The labels printed in 10-point type were 1⅜ x 1⅛ inches and were arranged on a neutral grey board 23 x 19¾ inches. The labels printed in 6-point type were 1 x ¾ inches and were also arranged on a neutral grey board 23 x 19¾ inches.

The size of the label was made proportional to the size of the type (10:6). The size of the board was kept constant, leaving more space between labels on the board bearing 6-point labels than on the board bearing 10-point labels. The board size was maintained for both label sizes so that the total area to be scanned would be the same under both conditions. Each group of 100 labels of the same design was mounted in a 10 x 10 Latin square; each name appeared only once in each row and column.

The 33 nurses were tested singly. She (or he) wrote down the name of a drug and then selected (from the board of labels presented) those labels bearing the name she had just written. Selection was shown by placing a ring over the chosen label. The time between exposure of the board and selection of the final label was recorded. Each subject had two trials on each board, using a different name on each occasion. Since each subject had two trials on each board, there was a total of 16 trials for each subject. The

order of presentation for each subject was decided from random-number tables. The names to be selected on each board were the only ones having their respective initial letter, so that perception of the correct name was not confused by other names with the same initial. The particular names to be selected from each display are shown in Table I.

Each subject was given a practice trial—searching for symbols—and was asked to scan the display systematically, by looking along the rows of labels beginning at the left-hand side of each row.

Results

The mean selection time for each label design is shown in Table I. The over-all mean score for labels with 10-point type was 22.61 seconds, and for those with 6-point type was 25.24 seconds. The difference between these means is significant beyond the .01 level ($t = 6.43$).

The over-all mean score for upper-case labels was 23.48 seconds, and for lower-case labels was 24.49 seconds. The difference between these means is significant beyond the .05 level. In order to classify the meaning of this result, the relative discriminability of the two letterforms for each type size were compared. The mean score for upper-case 6-point labels was 24.5 seconds and for lower-case 6-point was 26.2 seconds. The difference between these means is significant beyond the .01 level ($t = 3.41$). The difference between the mean score for upper-case 10-point labels (22.45 seconds) and for lower-case 10-point type (22.78 seconds) is not significant at the .05 level.

Conclusions

The results of this experiment show that labels printed in 10-point type are more easily discriminated than labels printed in 6-point type. Upper-case is not superior to lower-case for 10-point type, but is for 6-point type. This result is in line with the findings of previous researchers who have examined the legibility of type of different sizes. The use of upper-case in 6-point type increases the visual size to a very noticeable extent. Since a similar increase in visual size does not influence the discriminability of 10-point type, it would appear that using upper-case 6-point type

has the result of bringing the visual size above the lower boundary of easy discrimination. Research has tended to show that between 8- or 9-point and between 12- or 14-point, type is equally legible. When the size falls below or rises above these limits, legibility diminishes (Paterson and Tinker, 1940). This past work has used normal lower-case print, with upper-case for beginning sentences, names, etc. Nevertheless, 6-point upper-case is less legible than 10-point upper-case or 10-point lower-case, as Table I shows.

With respect to our third hypothesis, the two layouts we compared had no effect on discriminability.

On the basis of these results, we recommend the use of 10-point type for drug labels. With type of this size, whether upper- or lower-case is used does not appear to affect ease of discrimination. Ranging left or centering does not apparently affect legibility; we do not make any recommendations concerning layout. If 6-point type has to be used, it should be all-capital printing, since with type of this size upper-case is more easily perceived than lower-case.

None of the subjects in this experiment made any errors in selection. This may well be the result of nursing training. The student subjects used in our first experiment were less accurate in their selection.

Summary

Two experiments are described, both concerned with the general problem of the design of drug labels. The first experiment compared handwritten instructional labels with typewritten ones, and led us to conclude that pharmacists should use typewritten labels. The second experiment, which compared different label designs for containers of drugs used in hospitals, showed that 10-point type is preferable to 6-point type, since labels printed in 10-point type could be discriminated more speedily than those printed in 6-point type. Ranging left or centering the copy on the label had no measurable effect on discriminability. For 6-point type, upper-case was more easily discriminated than lower-case, but this was not demonstrated for 10-point type.

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Typography with the IBM Selectric Composer

Adrian Frutiger

The place of the IBM Selectric Composer in the evolution of bookmaking processes is outlined: it provides a return to directness and simplicity, combined with the speed of mechanization. Some restrictions and problems which the new machine poses for the type designer are described. The article was originally presented as a lecture at Gallery 303 in New York City last fall. It has been composed on the IBM Selectric Composer in the Univers face which the author adapted to the machine.

Reproducing Our Letterforms

To explain the place that the IBM Selectric Composer has assumed in our trade, I have drawn up the plan shown in Figure 1.

(1) In the Middle Ages a calligrapher prepares by pen one copy of a book: this is the most direct progress from the idea to the graphic "imprisonment." The author can make his book by himself.

(2) The need for a greater diffusion of ideas encourages book workers in the Middle Ages to invent wood-engraving and printing on a press: the result is faster duplication of copies but the necessity of cooperation of two specialists, the engraver and the printer. Already the author can no longer make his book by himself.

(3) The process becomes more complicated: founding of movable letters, composing, paging, printing require the cooperative skills of several trades.

(4) Mechanical composition further multiplies the bookmaking processes, including punching tape, founding, paging, and printing.

(5) At last, photocomposition becomes really the faster way to compose: we speak in terms of a million letters per second. But the process is most complex and involves many more specialists--

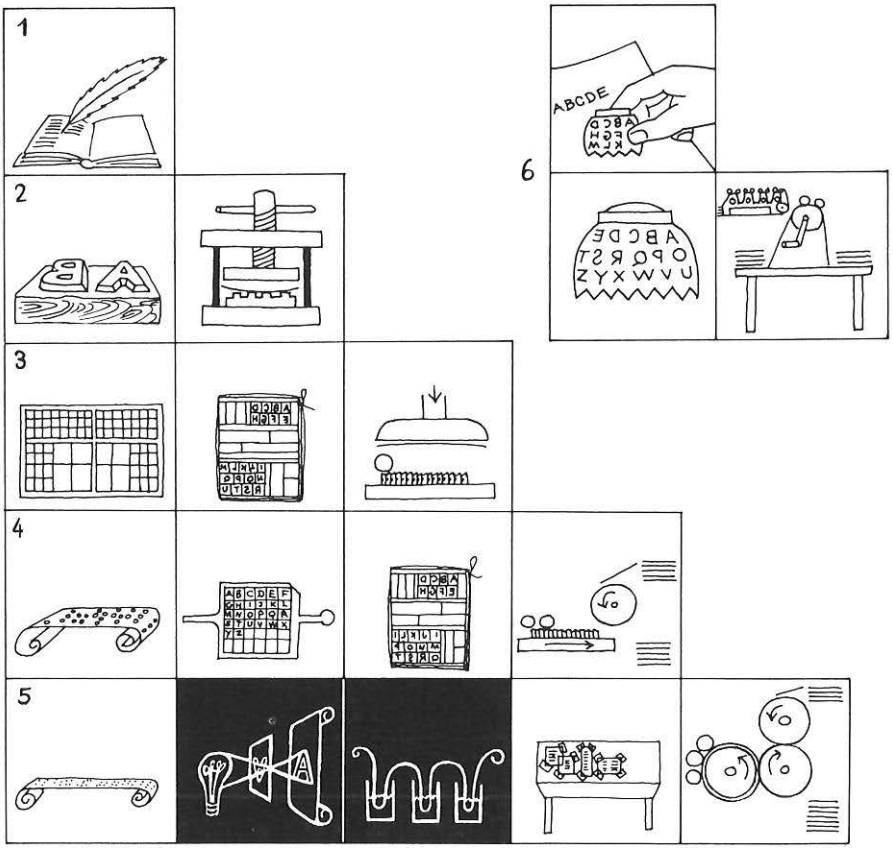

Figure 1. Methods used to reproduce our letterforms.

typographers, photographers, chemists, etc. Moreover, an important part of the work takes place without any direct view of composition: the compositor is engaged in a purely theoretical process; he does not see the letters he is composing; he sends codes and the photograph is made in darkness. We can observe that the more time is reduced the more complicated the operations become.

(6) The Selectric Composer takes a new place in this evolution. With it the author can, should he wish to, write his book by himself again, without any specialist's help. We can speak of a modern calligrapher: the rolling Selectric head which bears the alphabet is almost like an extension of the individual hand, replacing the pen and also the art of writing. Composing becomes extremely simple and direct.

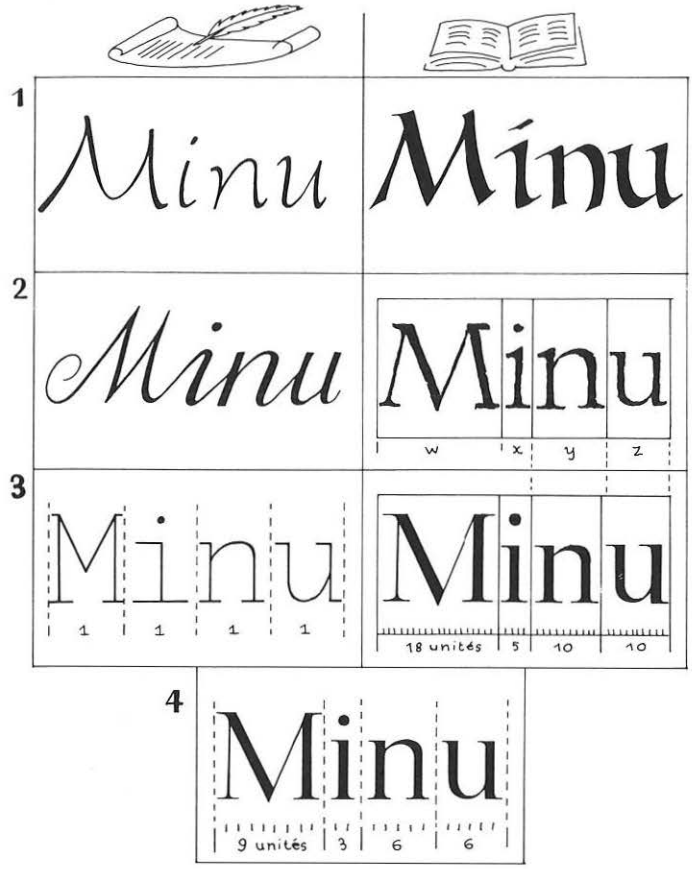

Figure 2. Personal and impersonal letterforms.

Personal and Impersonal Graphics

This return to simplicity attracts me and makes me believe in the future of this way of composing. But what is the typographic quality of this composition? In Figure 2 we discern two major kinds of graphics: to the left, handwriting, the personal, direct, immediate expression of my ideas; and to the right, impersonal, indirect, distant graphics, printing characters.

(1) At the top we see two examples of script: to the left, the free script of a burgher; to the right, the script of a medieval calligrapher.

(2) The following line shows to the left the evolution of script as a succession of characters tied together. To the right we see the first

form of a graphics founded, composed, and printed. The appearance of the two graphics is more and more differentiated. On the lead block are relief characters. All blocks have the same height, but their widths vary with every letter. For every letter the type-founder fixes a new width. This is still true today.

(3) The following line shows, to the left, what more and more replaces handwriting: the typewriter. Until a few years ago, such typewriters were of severely restricted use, owing to the very poor aesthetics of typing, which conceives of all letters in terms of the same width. To the right is the mechanical composing system. Letter widths are restricted, most manufacturers taking eighteen units as the basis for the widest letter. On this number of units all the letters have to be designed. Niceties are no longer allowed: the example shows that the n and the u in line 2 are of different widths, but here a difference of one unit is unacceptable and the two letters must be designed on the same width. This does not prevent the quality of our mechanical composers from being very good.

The place of the Selectric Composer is between the two groups: it is still a typewriter, but it is also a composer. The number of units is reduced by one half, to nine.

Restrictions on Letterforms

What is the influence of that restriction in the number of units on the letterforms?

If we take forty classical alphabets, add the relative widths, and divide by forty, we obtain an average width for every letter (Fig. 3).

The graphic representation of these widths (Fig. 4), arranged in an ascending order, gives that scale: at the top, the lower-case i, the narrowest one; at the bottom, the capital W, the widest one.

Applying the nine available units on this schema (Fig. 5), we note that only a minimum distortion is necessary to enclose the various letters in these width groups. Yet a real difficulty exists. Problems are raised not by the fact that there are only nine units at our disposal but by the fact that every letter has always, and in all faces, to be on the same relative width.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	TOTAL : 40 = MOYENNE
	ALPHABETS	LUMITYPE - PHOTON																																							MONOTYPE	
	BASKER. ROM.	BASKER. ITAL.	BODONI ROM.	BODONI ITAL.	BODONI SEMIB	BODONI BOLD	GARAMOND ROM.	CASLON ROM.	CASLON ITAL.	CASLON BOLD	JANSON ROM.	JANSON ITAL.	JANSON BOLD	MERIDIEN ROM.	MERIDIEN ITAL.	MERIDIEN SEMIB	MERIDIEN BOLD	UNIVERS 47	UNIVERS 57	UNIVERS 63	UNIVERS 45	UNIVERS 55	BEMBO ROM. 270	BEMBO ITAL. 270	BEMBO BOLD 428	CENTAUR RO. 252	CENTAUR IT. 252	ROCKWELL RO. 371	ROCKWELL B. 391	GILL ROM. 262	GILL ITAL. 262	GILL BOLD 275	PERPETUA R. 239	PERPETUA I. 239	CLARENDON R. 12	TIMES ROM. 321	TIMES ITAL. 321	TIMES BOLD 334	
a	8,5	8	8	9	8,5	8,5	7,5	8	8	8,5	7,5	8	8	8,5	8,5	8	8,5	9,5	8,5	9	8,5	8	8,5	8,5	9	8	9	7	7	9	10	8	8	10	7	8	9	9	9	9	336,50	8,41
b	10	7,5	9	8,5	9,5	9,5	8	9,5	7,5	8	9,5	7,5	9	9	7,5	10	11	9	9	8,5	9	9	9	9,5	10	8	11	9	7	11	11	10	8	9	11	9	8	9	10	9	9	365,00	9,12
c	7,5	6	7,5	7	7,5	8	6,5	7,5	6	7,5	7	7,5	7,5	8	7,5	8	8,5	8,5	8	8,5	8	8	8,5	8,5	8	6	9	7	5	9	11	11	10	8	9	8	9	10	9	8	8	301,50	7,53
d	10	9	9	9,5	9,5	9,5	8	9,5	8	10	9	8	9,5	9,5	9,5	10	11	9	9	9	9,5	9	9	9,5	10	8	11	9	7	11	11	10	10	11	9	8	9	10	9	9	9	372,00	9,30
e	8	6,5	8	7,5	8	8,5	6,5	8	6	8	7,5	6	8	8	8	8	9,5	8,5	8,5	8,5	9	8,5	8,5	9	8	7	9	7	5	10	10	9	9	10	8	6	8	8	8	8	8	315,00	7,87
f	5,5	5	5	5,5	5,5	5,5	5	5,5	5,5	5,5	6	5	4,5	5,5	5	5,5	6,5	5,5	6	6	6	4,5	5	5,5	6	5	6	5	5	5	6	5	5	5	6	5	6	6	6	6	6	218,00	5,45
g	9	7,5	8,5	8,5	9	9,5	8	6	9	7	9,5	8,5	7,5	8,5	8,5	8,5	9,5	9	9	9	9,5	9	9	9,5	10	8	11	8	6	11	11	9	9	10	11	9	9	9	9	9	9	350,50	8,76
h	10	8	9	9	9,5	9,5	8	10	8	10	9	8,5	9,5	10	8,5	11	12	9	9	9	9,5	9	9	9,5	10	9	11	9	7	10	11	10	10	11	9	8	10	10	9	9	9	375,50	9,38
i	5	4,5	4,5	5	5	5	4	4,5	5	5	4,5	4,5	5	5	5	5	5	4	5	6	4	4,5	4	4,5	5	5	6	5	5	5	6	5	5	6	5	5	5	5	5	5	195,00	4,87
j	5	4,5	4,5	4,5	5	5,5	4	4,5	5	5	4	4,5	4,5	4,5	4,5	5	6	4	4,5	4,5	4	4	4	4,5	5	5	6	5	5	5	6	5	5	6	5	5	5	5	5	5	5	198,00	4,95
k	7	7,5	8,5	8,5	8,5	9,5	8	7,5	9	7,5	8,5	7	9	9,5	8	10	11	8	8,5	9	7,5	8	9	10	9	8	11	9	6	10	11	10	10	11	9	7	10	10	10	10	360,50	9,01
l	5	4,5	4,5	5	5	5	4	4,5	5	4,5	5	4,5	5	4	5	6	4	4,5	4	4,5	4,5	4	4	4,5	5	5	6	5	5	5	6	5	5	6	5	5	5	5	5	5	194,00	4,85
m	15	12	14	13	14	14	11	14	11,5	14	14	14	14	14	15	13	16	14	14	15	14	14	14	15	16	13	18	14	11	15	18	15	15	18	14	11	15	15	14	14	569,50	14,23
n	10	8,5	9	9	9,5	9,5	8	7,5	9,5	8,5	10	9	9	9,5	10	8,5	11	9	9	9	9,5	9	9	9,5	10	9	11	9	8	10	11	10	10	11	9	8	10	10	9	9	377,00	9,42
o	10	7	8,5	8	9	9,5	8	6,5	9,5	6,5	10	9	7	9,5	9	7	9,5	10,5	9	9	9,5	9	9	9,5	10	8	11	8	6	10	10	10	10	11	9	7	9	10	9	9	356,00	8,90
p	10,5	8,5	9	9	9,5	9,5	8	6,5	9,5	7,5	10	9	8	9,5	9,5	9,5	10	11	9	9	9,5	9	9	9,5	10	9	11	9	7	11	11	10	10	11	9	8	9	10	9	9	370,00	9,25
q	10	7,5	9	8,5	9,5	9,5	8	7	9,5	8	9,5	9	9	9	9,5	9,5	10,5	9	9,5	9	9,5	9	9	9,5	10,5	8	11	9	6	11	11	10	10	11	9	8	9	10	9	9	365,00	9,12
r	7	6	7	7	7,5	8	5,5	6,5	7	6	7	6	7	7,5	6,5	7	8	6,5	6	6,5	6,5	5,5	5,5	6	7	6	8	6	6	8	8	8	8	9	7	6	7	7	7	7	7	271,00	6,77
s	6,5	5,5	7	7	7,5	7,5	5,5	6,5	6,5	5,5	7	6	5	6,5	6,5	6,5	7	7,5	8	8	8	7,5	7,5	8	6	6	7,6	6	5	8	9	7	7	8	6	5	7	7	7	7	7	268,00	6,70
t	5,5	5	5,5	6	6,5	6,5	5	6,5	5,5	5	5,5	5	6	5,5	6,5	5,5	7	5,5	6	6	6	5	5,5	6	6	5	7	6	5	5	6	7	7	8	6	5	6	7	6	7	6	231,50	5,78
u	10	9	9	9	9,5	9,5	7,5	9,5	8	10	9	9	9	9,5	9,5	8,5	10	11	9	9	9,5	9	9	9,5	10	9	11	9	8	10	11	10	10	11	9	8	10	10	9	9	9	374,00	9,35
v	9	8,5	8	8	8	9	8	8,5	8	8,5	8	8	8	8	8	9	9	10,5	7,5	8	8,5	7	8	8,5	10	9	11	8	7	10	11	9	9	10	8	7	9	9	8	8	8	339,50	8,48
w	12	11,5	11,5	12,5	12	13	12	12,5	11,5	12,5	12,5	13	12	12,5	14	11	14	16	12,5	13,5	14	12	13	14	15	13	16	12	11	14	15	14	14	15	13	10	13	13	12	12	513,50	12,83
x	9	8	8	10	8,5	9	7,5	8,5	8,5	9	7,5	8	7,5	8	9	8	9,5	10	6,5	7,5	8,5	7	7,5	8,5	10	9	11	8	9	10	10	10	11	9	7	9	9	10	10	10	361,50	8,78
y	8	6,5	8	9	8,5	8,5	8	6	8,5	6,5	9	8,5	7	8,5	8,5	7,5	9	10	7,5	8	8,5	7	8	8,5	10	9	11	8	7	10	11	9	9	10	8	7	9	9	9	9	9	340,00	8,20
z	6,5	6	7	7,5	8	8	6,5	8	8,5	8	8	7	7,5	7,5	7	6,5	7,5	8	6	6,5	7,5	6,5	7	7,5	8	10	10	8	8	8	9	8	8	10	7	7	8	8	8	8	307,50	7,68

Figure 3. The average width within 40 classical alphabets for each of the 26 letters.

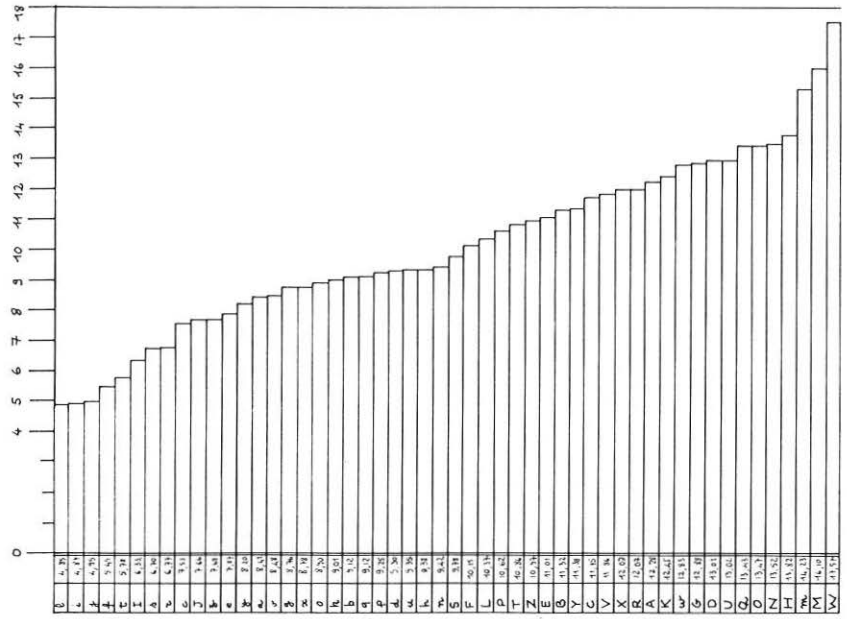

Figure 4. The graphic representation of the average widths of letters shown in Figure 3.

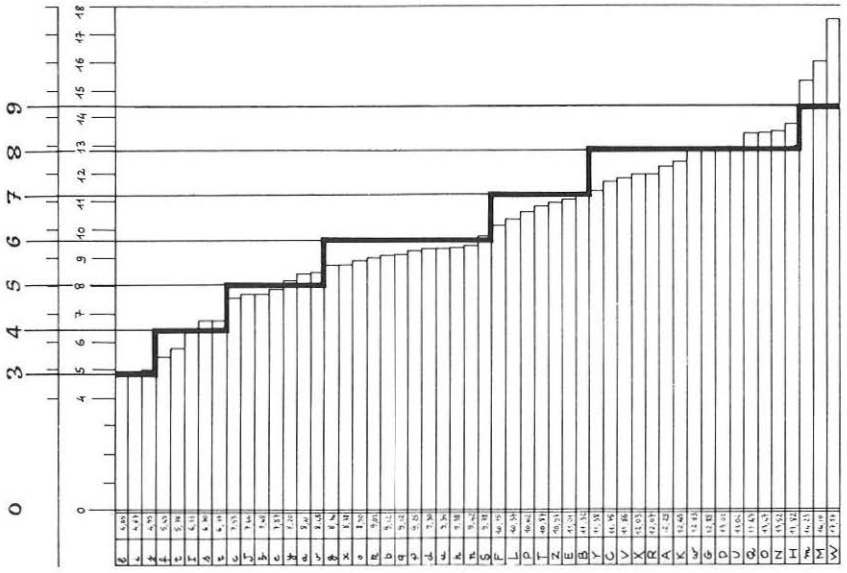

Figure 5. Application of a nine-unit scale to Figure 4.

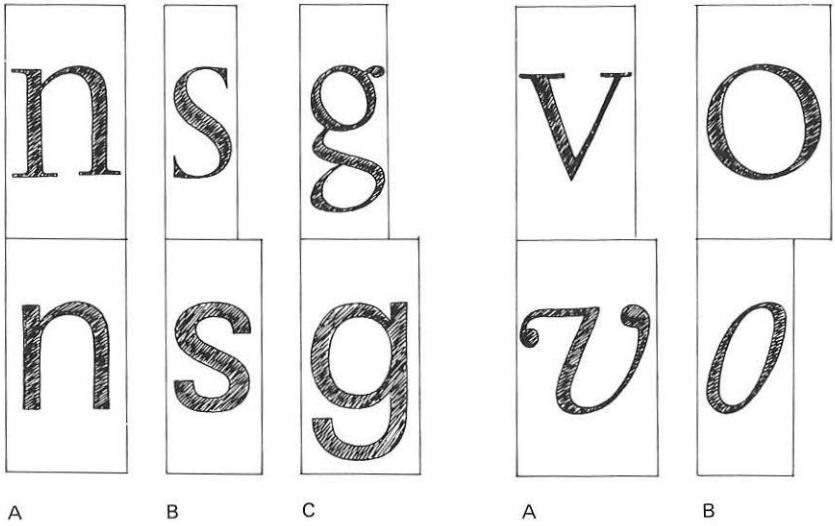

Figure 6. Comparison of old-style and sans-serif letter widths: n, s, and g.

Figure 7. Comparison of old-style and sans-serif letter widths: v and o.

For example, if we easily manage to design the lower-case s of an old style on its defined width, in a sans serif we have much more concern (Fig. 6), for closed endings give to this letter a much more significant volume. The lower-case g shows the same difficulties.

If we take an old-style roman with its italic (Fig. 7), we see that, for example, lower-case italic *v* is in that even larger than roman; on the other hand, the italic *o* is narrower than the roman.

Problems for the Designer

For the designer other problems are raised by the new technique of the Selectric Composer--Figure 8.

A few years ago, when we had to adapt the letters to the photocomposition system, the elements of reduced surfaces had to be increased proportionally, since light going through a small hole is not proportional to light going through a large one. Diagram 1A shows the theoretical drawing of an i; 1B, the distortion produced by photography with a very short flash; 1C, the necessary adaptation of the drawing for a photocomposition system.

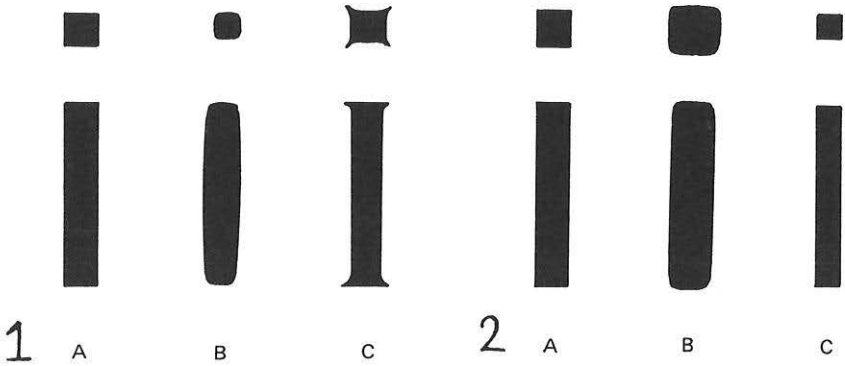

Figure 8. Distortion and adaptation of letterforms for (1) photocomposition and (2) the Selectric Composer.

With the typewriter system, the opposite happens: small-surface characters tend to imprint the paper more heavily--i.e., to increase in weight--while large letters like M or W may print lightly or imperfectly. The Selectric Composer can vary the force of its impression for three classes of signs (with small, medium, and large surfaces), but the designer has to take into account differences of surface *within* every one of these classes. For instance i, which in the same class as many other lower-case letters, has to be designed proportionally lighter. Diagram 2A shows the theoretical design of i; 2B, the result of a typed i without modification; 2C, the necessary adaptation for a typed face.

It is obvious that we can't have everything: an ingeniously simple machine sold at such a low price does not give the same performance as a machine costing five times as much. What must be the aesthete's position in view of these restrictions? I accept them. Technology needs us designers, and, in my opinion, if we don't cooperate willingly with the engineers, we will run the risk of being bypassed by technology. I, for one, am proud to live in these fascinating times and to know that they stand in need of the contributions of designers and scholars, who still know how to see with our human eyes.

Concrete Poetry

Mike Weaver

The origins of the Concrete movement in poetry are briefly traced, with early manifestoes included as appendices. Three perceptual approaches, classified as *optic, kinetic,* and *phonetic,* are distinguished by means of twenty-one illustrations. The emphasis falls on the development of a new fixed form consonant with our age.

In December, 1959, Georges Mathieu delivered a lecture in São Paulo in which he attacked the "professor-impostors" of the Bauhaus and suggested that their Argentinian disciples be confined in Stuttgart or in Ulm with the "intellectuals" of the *Journal do Brasil.* Max Bill's visit to Brazil (he lectured in Rio and São Paulo in 1953) was regarded by Mathieu as an omen of "pseudo-morphosis": "And that grieves me because Brazil is neither Switzerland nor Germany. Concretism or neo-concretism constitutes the strangest anomaly of Brazil."[1]

Max Bense is actually named by Mathieu; Tomas Maldonado is attacked by implication; but Max Bill is recognized as the most important single figure in the concrete movement. Having edited Kandinsky's and Klee's writings, his own form a direct link with Van Doesburg's magazine, *Art Concret* (1930).[2] In 1944 Bill organized the first international exhibition of concrete art in Basle. As a student in Berne, Eugen Gomringer wrote positively about the exhibition. Gomringer was Bill's secretary at the Hochschule für Gestaltung at Ulm from the spring of 1954 until Bill left in 1957. Gomringer stayed with Bill until 1958; his first manifesto on concrete poetry had appeared in 1954.[3]

Three years after Bill's visit (in December, 1956) there was a

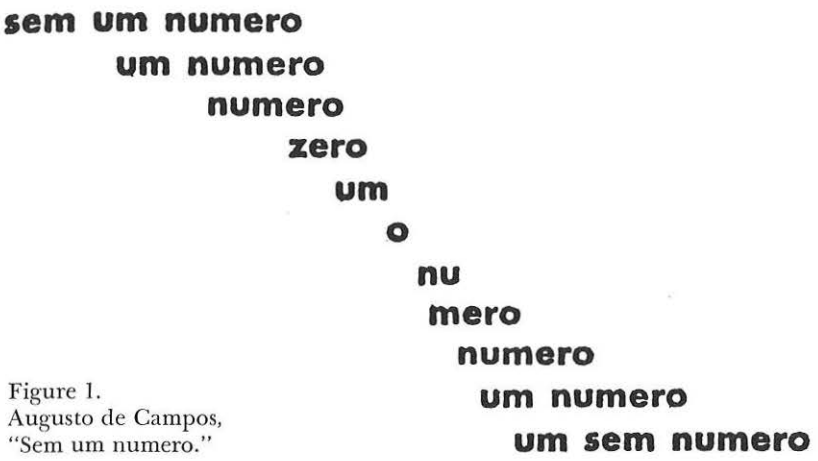

Figure 1.
Augusto de Campos,
"Sem um numero."

National Exhibition of Concrete Art in São Paulo. Within another two years the Noigandres group presented its Pilot Plan for Concrete Poetry (Appendix A). In tracing a literary tradition for itself, it mentioned as forerunners certain expressionist writers quite outside the constructivist tradition in art. Furthermore, in emphasizing the visual aspect of concrete poetry the Pilot Plan neglected its phonetic aspect.

The act of perception itself is the first preoccupation of concrete poetry. The *optic* or visual poet offers the poem as a constellation in space; the *kinetic* poet offers it as a visual succession; the *phonetic* poet offers it as an auditory succession. These categories represent an abstraction of tendencies; in practice the concrete poet has adopted all these approaches, either singly or in combination. In concrete poetry the experimental emphasis falls on the micro-aesthetic of perception rather than on the macro-aesthetic of attitude. Energy is directed towards solving problems of scale, movement, sequential relations, time, stamina, and, above all, the identification of forms. Concrete poetry is an aesthetic movement in poetry, only indirectly concerned with moral, social, and psychological values. This is not to say that concrete art and poetry are not fully committed to the improvement of the environment,[4] but only the Brazilians and Czechs have shown any inclination for social or political engagement. The main emphasis has fallen on formal values. Augusto de Campos' poem "Sem um

numero" (Fig. 1) combines the strictest concrete practice with commitment to the peasants in the Brazilian interior, who are both without number (identification) and numberless. Their life, and the form of the poem, is a zero; inwardly and outwardly.

All that is asked of the perceiver (the former "reader") is that he should possess unimpaired sensory organs and an undamaged brain; a capacity for fantasy, or self-stimulation of the notoriously "literary" kind, is not required. To participate in the concrete poem means no more (no less) than paying active attention in perceiving. Theo Van Doesburg wrote, "In matters of art, comprehension is always impossible; as soon as it is comprehended, art ceases to be art. Poetry cannot be comprehended—it is prehensile."[5]

Grasping with the senses, perceptually, means *being grasped* by the aesthetic object, directly. Grasping with the mind, psychologically, means *being grasped* by some information (historical, theological, or social) prior to the aesthetic communication. The best concrete poems maintain a subtle balance between form-perception and memory-perception; the materials of poetry consist (apart from neologisms) of prior information stored by the memory. These terms may, if necessary, be reduced to "form" and "message," but the emphasis in concrete poetry on perception, rather than attitude, abjures anything as apparently reducible as message. Its concern is to say the unsayable through form alone.

The identification of form in concrete poetry varies according to the predominant tendency of the perceptual requirements. In *optic* poems the distinction between form and ground is made in response to a surface (page, poster, glass or ceramic surface) which is perceived as a whole, instantaneously. In *kinetic* poems the dimensions of the visual figure are extended to produce a temporal configuration only possible by virtue of the sense of succession. In *phonetic* poems the figure (sound) rises off the ground (silence) producing a configuration of filled time against emptied time. But in all concrete poems, to use Koffka's formulation, "intermetric intervals belong quite as much to the whole experience as do the intrametric intervals."[6]

The configuration of emptiness—the negative of a positive form—can represent the most significant formal element in a work.

Figure 2.
Ladislav Novak, "Eva."

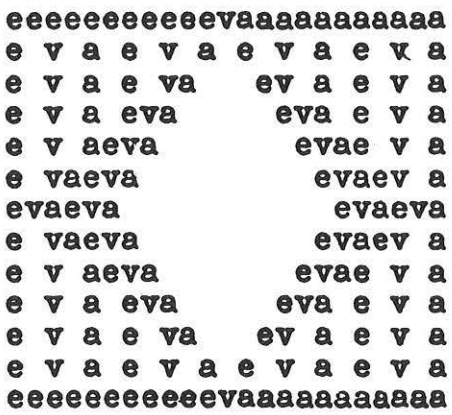

Figure 3. Pierre Garnier, "Grains de Pollen."

GRAINS DE POLLEN

SOLEIL

SOLEIL

SOLEIL

SOLEIL

SOLEIL

SOLEIL

SOLEIL

SOLEIL

SOLEIL

This is especially true of optic painting where the foreground (or form) depends upon intermetric intervals for its appearance. Optic poems are seldom productive of such marked perceptual effects as optic paintings. Ladislav Novák's "Eva" (Fig. 2) is an exception. Here the vibration of the print about the *glory,* the diamond-shaped white space symbolizing the vulva (the First Mother) and heavenly light (the Virgin), complements the associative force of the verbal material. But usually, as might be expected from a verbal medium, effects of instability are more mental than physical. In Pierre Garnier's "Grains de Pollen" (Fig. 3) the sun only exists by what it strikes; the activity of the motes, indicated by the title but not present in the poem, defines the sun's presence, not its beam which the emptied space of the page might have represented in a calligrammic poem. Optic poems exploit, in this way, the mind's capacity for reversal of the image. "The creative reader," said Van Doesburg, "always adds a projection to the given text. The uncreative, passive reader, on the other hand, takes one away; it is lost, as with a photographic negative (as against reality)."[7] In the case of Garnier's poem, the negative *is* reality; its positive is banality.

Van Doesburg's "fourth dimension," the reader's capacity for projection, is perfectly complemented in the concrete poem by a structural method which results in a wholly constructed work, a projection itself. The intervals may be arrived at either by calculation or by intuition, or by both. Calculation places the emphasis on the exact disposition of material according to a structural principle; intuition relies on the fusing power of the individual sensibility. It is not hard to find poets strictly outside the concrete movement speaking of the tension between inter- and intrametric intervals: "Rhythm is the trot of the intonations that one hears; there is rhythm that one sees and that one does not hear: rays of an inner grouping towards a constellation of order. Rhythm was, till now, the beating of a dehydrated heart, a measly, muffled, wooden bell."[8] Tzara's ambiguous use of a visual analogy to describe a predominantly auditory experience underlines the equivocal relation between ear and eye that concrete poets exploit. It is, moreover, an instance of the widespread tendency to spatialize temporal experience which kinetic and phonetic poems normally resist.

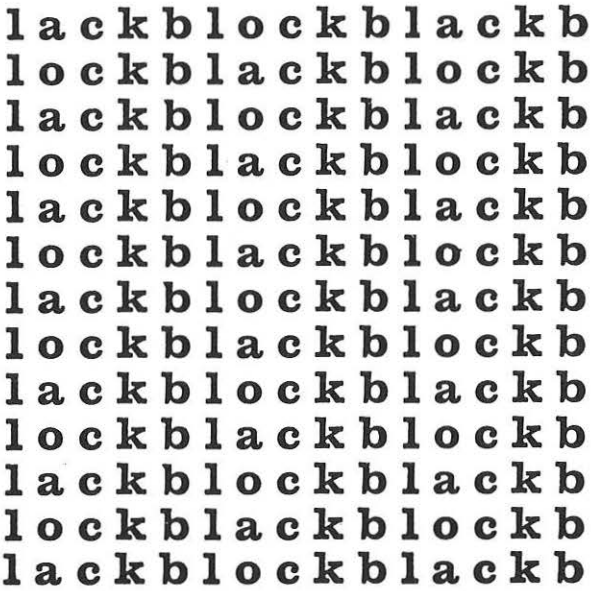

Figure 4.
Ian Hamilton Finlay,
"Homage to Malevich."

Garnier's poem is intuitively structured, a witty construction in the mind transferred to paper; Ian Hamilton Finlay's "Homage to Malevich" (Fig. 4) is structured methodically. Two constants *(lock, lack)* are modified by a variable *(b)* to form another pair of constants *(block, black)*. Graphically, the orientation of the poem is vertical; the lines *(l, k)* running from top to bottom, fended apart by the circles *(o, c)*. Linguistically, its orientation is horizontal, working from left to right; the asymmetric graphic elements *(b, k)* slightly reinforcing the reading convention. Semantically, the interaction of the graphic and linguistic elements expresses in this special way the dependence of form upon the distinction between *black* (figure) against *block* (ground), *lock* (constancy) against *lack* (instability). The subject of the poem is the search for formal invention, but this content is so tightly bound up with the poem's own form that the explanations of gestalt are only a hieratic gloss on a hieroglyph which speaks for itself, once and for all.

Finlay's basic tenet that "the mind will always try to make words out of letters—to create movement"[9] suggests the single

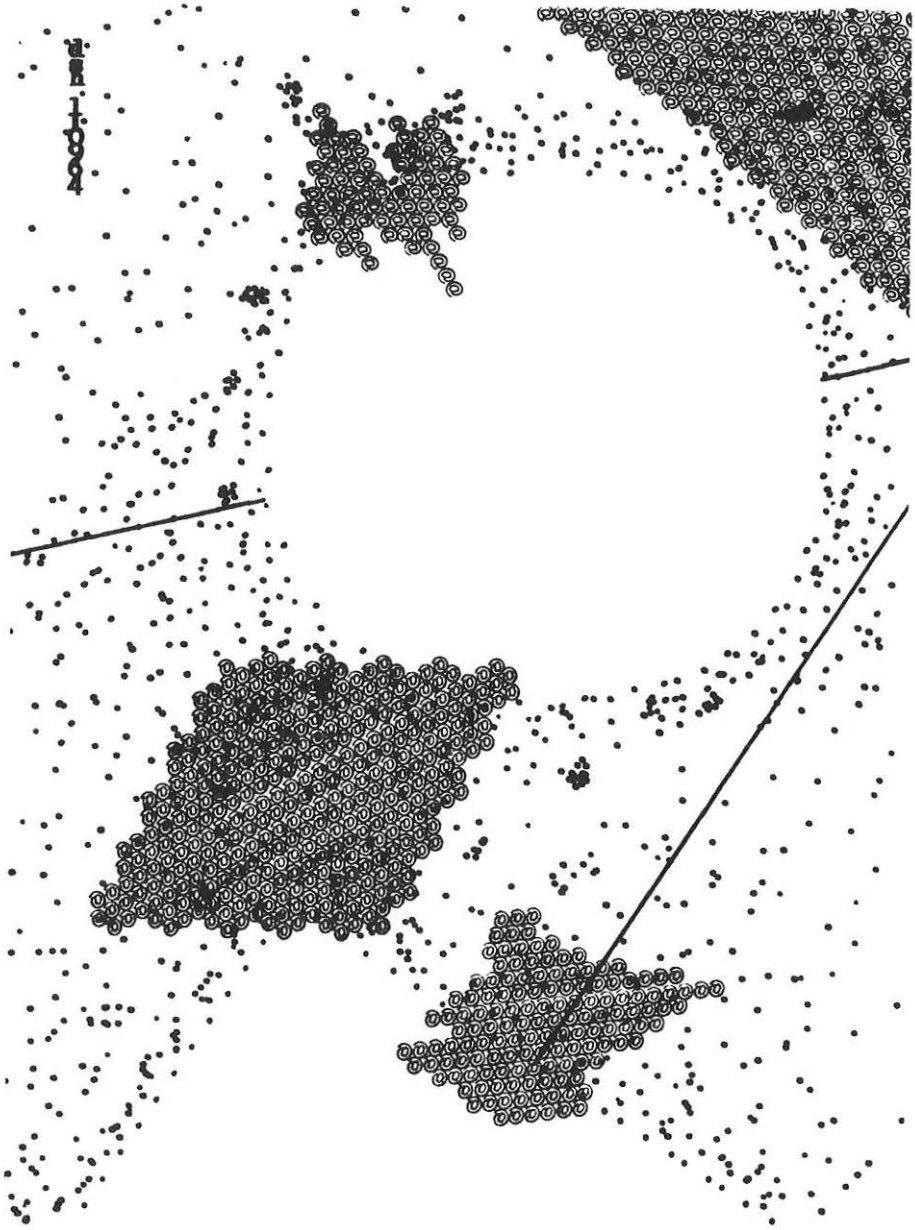

Figure 5. Dom Sylvester Houédard.

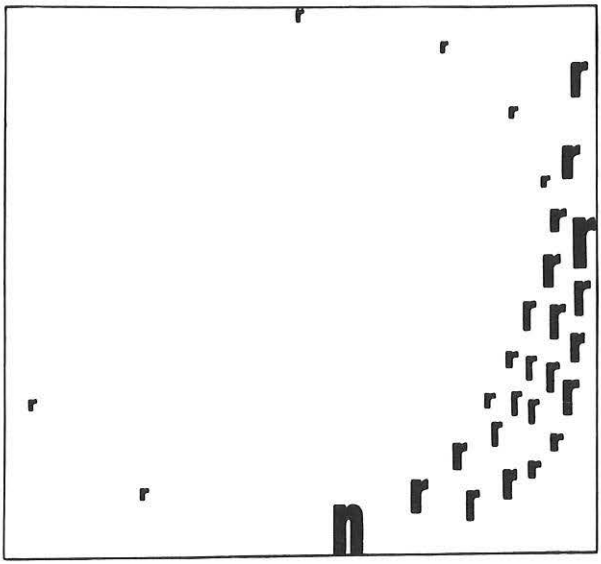

Figure 6. Gerhard Rühm.

Figure 7. Gerhard Rühm.

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word as the smallest unit of material in concrete poetry. It is certainly a most useful unit, stimulating a phonetic as well as a graphic reaction. The letter has an attraction for gifted graphic artists like Dom Sylvester Houédard who also uses the commercial repertoire of the typewriter (Fig. 5). Gerhard Rühm's poem (Fig. 6) exploits the visual constant in the letters *n* and *r*. They both appear stable enough in isolation, but their disposition here raises in the reader the uneasy doubt as to whether the *r*'s are not in fact amputated *n*'s; alternatively, the predicament of *r* is that only once (the ambiguity of the relation is most apparent where the largest *r* meets the edge of the poem) does it attain the sure two-footedness of *n*.

But the most useful unit for all kinds of concrete poetry is the one generally employed in the teaching of reading; the spelling-sound relation. In the optic poem the sense of simultaneity and multidirectionality—a spatial order—inhibits a successive, phonetic response to the verbal units. Nevertheless, where phonetic elements are distinguishable, they evoke a response at the motor level even when undetectable at the conscious level. So "Eva" (Fig. 2) has a powerful phonetic force, especially in the somewhat ornamental frieze at the top and bottom of the poem. Rühm's "Du" (Fig. 7) while literally unutterable, nevertheless carries a suppressed phonetic charge.

Finlay's "To the Painter, Juan Gris" (Fig. 8) is an elliptical figure on a rectangular ground, a stylized representation of the apple; but its function is to serve the linguistic implications of the spoken *happy/apple,* where the *p* divides the syllables. The relation between the stylized apple and the syllabic break demands semantic confirmation, so the joyful *pip* (the *i* in serene blue against the dull gold of the other letters in the original) takes us literally to the core of the happiness of apple.

The facts of Finlay's poem are experiential, not objective; a spelling-sound relation is worked intuitively to achieve an expressive form. Ronaldo Azeredo's "Ruasol" (Fig. 9) uses two words in the same grammatical class and of the same number, according to a constructional method, which achieves two objective facts or analyzable contributions within the experience. Purely graphically, the *l*'s step in a precisely measured fashion, from top-right

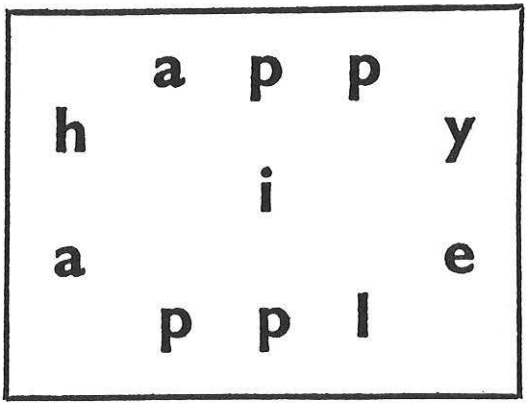


Figure 8.
Ian Hamilton Finlay,
"To the painter, Juan Gris."

to bottom-left, suggestive of the sun's progress; when no more are visible, the street falls into the plurality of darkness.

In these poems Finlay and Azeredo have used two different ways of avoiding the mere reproduction of nature's linguistic appearances. Since 1916, Vincent Huidobro had been reiterating that "Man has never been nearer Nature than now when he no longer seeks to imitate her appearances, but to do as she does by imitating her profoundly constructive laws."[10] Charles Biederman is perhaps the finest modern exponent of such a view.[11] Gillo Dorfles has also spoken recently (and in the context of kinetic art) of "not making art scientific or aestheticising science," but putting forward the view that "an analogous formative principle is frequently (not always) at the root of the most diverse human interests."[12]

This formative principle or structural process abstracted from nature is useful to the concrete artist, not as a system to be applied to no matter what materials, but as a method, to be drawn upon according to the inherent demands of carefully chosen materials. For the verbal work of art—the poem—is as far removed from linguistic mathematics as it is from casual speech. Bill's method is to find a geometric structure within which the imagination may free itself in accordance with the demands of the materials, but he concedes that concrete art may find its expression in various ways; constructive art is just one of them. Arp, for

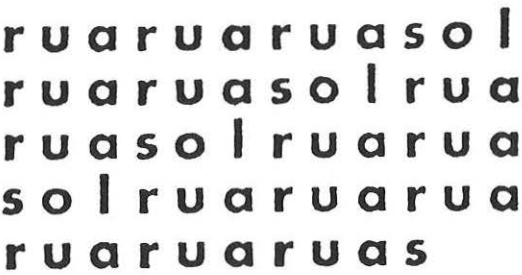


Figure 9. Ronaldo Azeredo, "Ruasol."

instance, claimed that "Certain 'surrealist objects' are equally concrete works. Deprived of all descriptive content they seem to me to be important in the evolution of concrete art, for they know how to bring to this art, by way of allusion, the psychic emotion which makes it live."[13]

The surrealist-constructivist polarity of the later Dada movement made it possible for Paul Dermée to write—in the same number of *L'Esprit Nouveau* as the De Stijl literary manifesto was reprinted—of his aim "to make the lyric flux pour itself out into the consciousness of the reader."[14] But this expressive, rather than concrete, notion of communication denies Van Doesburg's theories of projection and construction: "The reader is always, to a greater or lesser extent, the subject of the poem. The poet is always the cool constructor, who arranges the material with the utmost economy."[15] If the range is from cool (concrete) to warm (expressive) in psychological terms, it may be said that the stable introvert seeks concretion; the less stable, expression. But both share a quite practical concern. Expansive or manic types, on the other hand, find the whole range (which avoids harsh extremes) rigid, and lacking in feeling; sociable types reject its orderliness and precision. Mathieu's attack must be seen in this light.

The desire for a comprehensive view of concrete antecedents has regrettably blurred the fact that typographic exactitude—machine precision—is the Western medium for printed poetry,

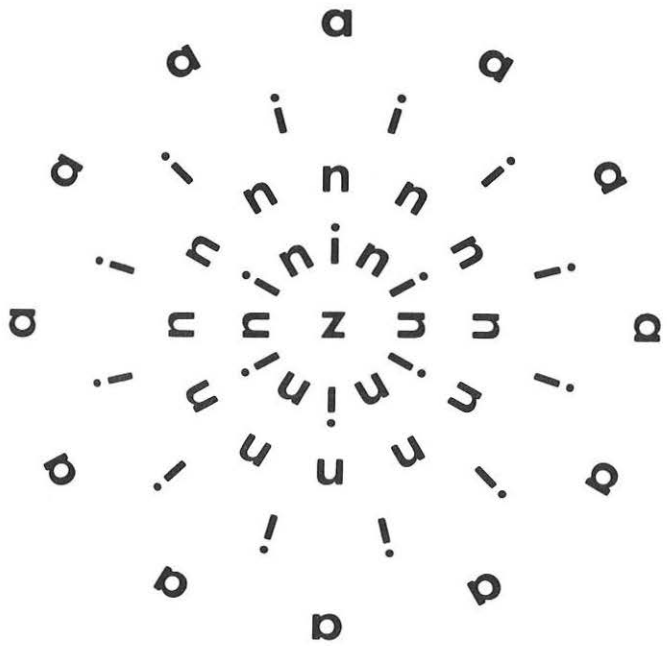


Figure 10. Mary Ellen Solt, "Zinnia." Version by Hansjörg Mayer.

not calligraphy. Expressive poets like Louis Zukofsky consider this a disadvantage: "It is questionable . . . whether the letters of the alphabet can be felt as the Chinese feel their written characters."[16] Poundians in North as well as South America value calligraphic and hieroglyphic writing for its individuality and spontaneity. Concrete poets, however, avoid handwriting for machine forms, believing that functional precision has its own secrets to reveal. The two settings of Mary Ellen Solt's "Zinnia," one by John Dearstyne and one by Hansjörg Mayer (Fig. 10), reflect the differing dimensions of feeling which Western typographers can bring to a beautifully simple, mimetic theme.

Azeredo's poem (Fig. 9) and Seiichi Niikuni's "Children's Castle" (Fig. 11) represent two different attitudes towards printed means. The Japanese poem is a freely expressive work; one in which, according to Niikuni's own general description of his visual poems, "a *motif* is developed, using Chinese characters,

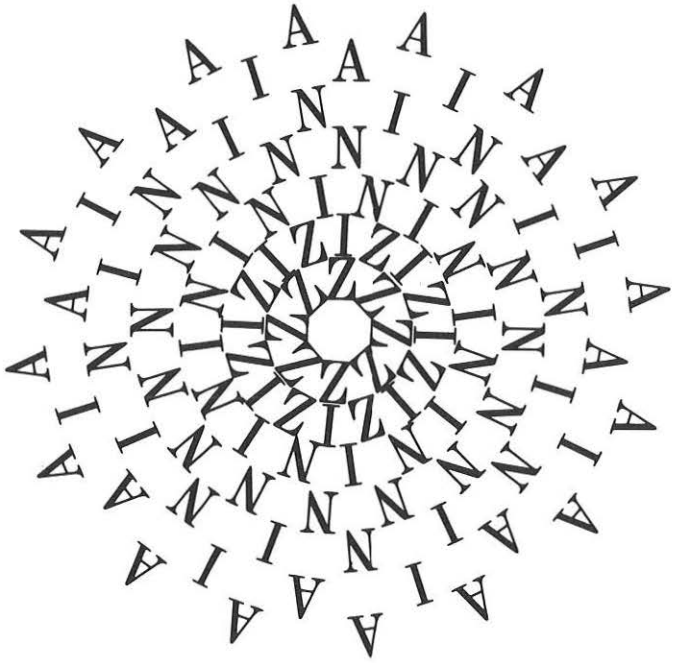
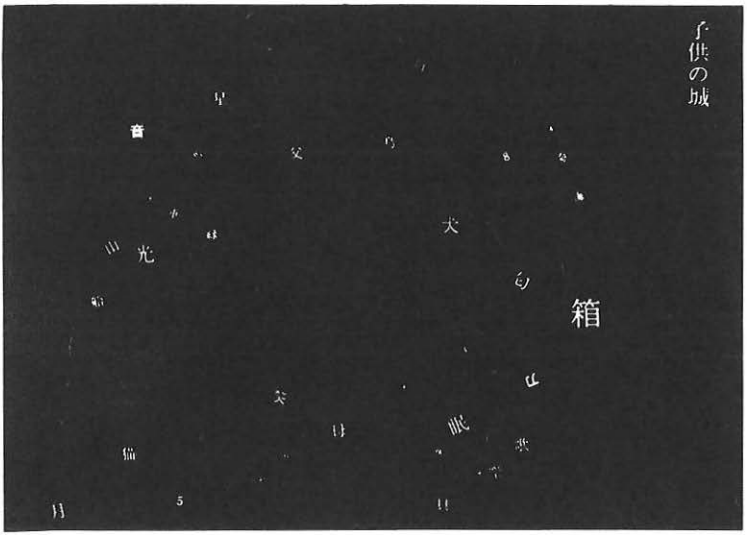


Figure 10. Mary Ellen Solt, "Zinnia." Version by John Dearstyne.

Figure 11. Seiichi Niikuni, "Children's Castle."



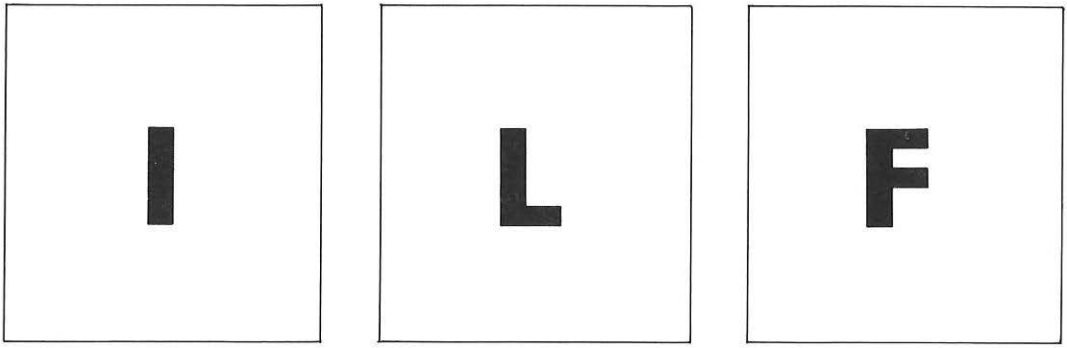
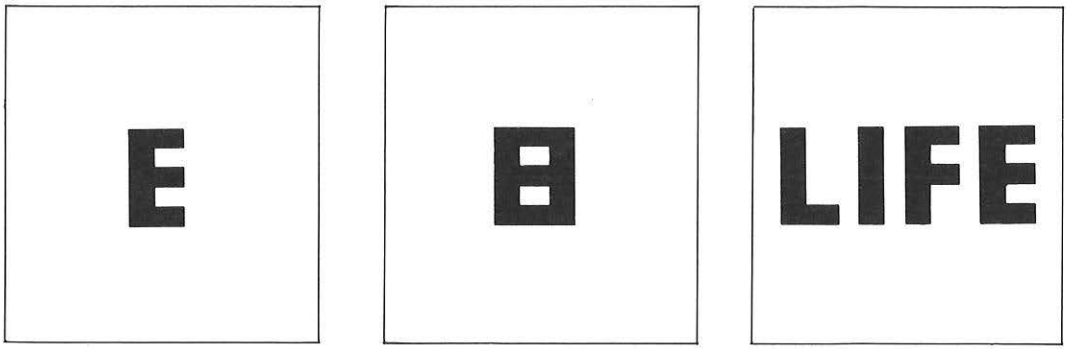


Figure 12. Décio Pignatari, "Life."

as a unit of an extremely *symbolic* nature."[17] He places himself in a poetic tradition of Western expressionism (he refers to Cummings and Eliot, translating "objective correlative" by the Japanese word for "symbolic"), and uses printed forms of calligraphy in different sizes in an expressive way. Katué Kitasono has, on occasion, employed uniform shapes in a serial manner, but the Japanese medium seems, on the whole, more suited to expression rather than concretion. Fusion is achieved by the power of suggestion rather than by the juxtaposition of weighed material.

Décio Pignatari's "Life" (Fig. 12 represents a spatialized version of this kinetic poem, whose psycho-physical effect cannot be illustrated without recourse to the turning pages of the original) is based on a vertical typographic constant which extends itself horizontally until the play of horizontal against vertical encloses itself in a sign which is a squared form of the Chinese sign for "sun." In this way, a metaphor is made in purely plastic terms according to the inherent possibilities of the type. The poem is an interesting exercise on the relations between machine type and written characters.

The successive nature of kinetic poems introduces perceptual problems into concrete poetry. In representational poetry using the naturalistic syntax of speech or discursive writing, the temporal "object" is the grammatical sequence. Even so, the representational poet uses it mainly as a pretext, since the poem is more important to him than the "object." The concrete poet, however, abandons it altogether in order to achieve expressiveness entirely



WAIT FOR ME

. . . *give a man his*
I said to her,

manliness; provide
what you want I

creature comfort
want only

for him and herself;
more so. You

preserve essential
think marriage is

hypocrisies —
everything?

in short, make a
O well,

home for herself.
I said.

Figure 13. Robert Creeley, "Wait For Me."

A

. . . blue boat
a brown sail

LITTLE POEM

a brown boat
a green sail

TO PUT

a green boat
a black sail

YOUR EYES

a black boat
a blue sail

TO SLEEP

a . . .

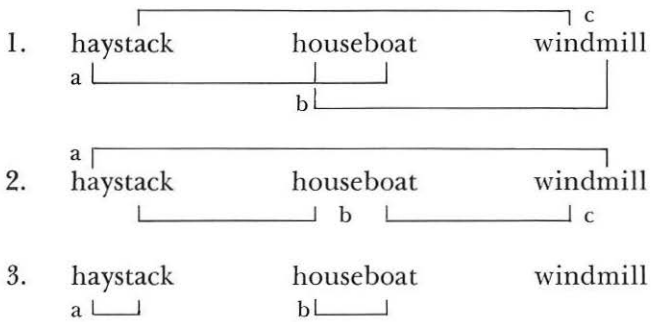
LITTLE . . .

Figure 14. Ian Hamilton Finlay.

by poetic means. The use of poetic means—without support from familiar spoken or written forms—produces an exclusively artistic "subject."

In the kinetic poem, serial method replaces discursive grammar. Robert Creeley's "Wait for Me" (Fig. 13), and Finlay's "A" (Fig. 14) indicate the kind of evolution which is possible from a wholly representational poem to one employing a partly-constructive method. Both poems employ the technique of simultaneity; but, whereas Creeley intertwines two spoken lines (italics representing the first, or inner, voice), Finlay uses speech as his model only in the capitalized sentence. In his co-mingling of the voices, Creeley achieves some meaningful juxtapositions (such as "*hypocrisies*—everything?") Finlay's spoken line merely acts as a commentary on the serial effect of counting boats. The representational poem is reflective; the near-concrete poem is partly reflexive.

Finlay's "Canal stripe series 3" (spatialized as a single constellation in Fig. 15) is wholly reflexive. Its three sequences exploit compound words for their separable morphemic values. *Cathedral* acts as a semantic as well as a serial constant, exerting a sense of relative permanence over the shifting nature of man's secular structures (haystack, etc.). The combinations of variables can be simply analyzed:



In the third sequence *windmill* is dropped; reason bows to intuition as the reader's pace quickens before the familiar combinations, and the schema completes the poem: *haystack cathedral houseboat windmill.*

Figure 15. Ian Hamilton Finlay, "Canal stripe series 3."

Figure 16.
Eugen Gomringer,
"5 mal 1 konstellation."

Gomringer's "5 mal 1 konstellation," as the title suggests, retains the exact typographical disposition of its schema (Fig. 16) through five methodical variations of its pattern:
1. Left to right vertically—*baum; mann FRAU kind;* etc.
2. Left to right horizontally—*baum MANNhund berg wolke;* etc.
3. Lattice (diamonds) + triangle—*HUND frau vogel land; wolke land HAUS wind; land vogel wind see* (*land* common to all); the unused words form the triangle *baum mann berg KIND.*
4. Diagonal slant—*baum; mann; hund frau; BERG kind;* etc.
5. The original schema, placed last.

This then is the structure of the poem; its form is not reducible either to analysis or explanation. Once the poem is in progress, its temporal form admits us to a world prior to the knowledge of which reason speaks. This is Van Doesburg's fourth dimension of projection. It is hinted at in the "sixth" constellation, which is composed of the relations set up in double-sized type (capitalized above) which, in the first four sequences are as follows: *BAUM FRAU WIND; MANN LAND VOGEL; HUND HAUS KIND; BERG WOLKE SEE.* What this total configuration "means"

comes not so much from association (that woman is rooted tree-like in the wind, etc.) as from reflex (that houses "mean" dogs and children, etc.). This inter-metrical set of relations requires typographic accentuation in order to be perceptible.

Whether a visual rhythm can result in a kinaesthetic effect—that is, affect the potential perceiver of visual rhythm at the motor level—seems very doubtful. According to Paul Fraisse, "we perceive change better with our sense of touch and hearing than with sight, the latter being better adapted for spatial discrimination than for the apprehension of the temporal modification of stimuli."[19] In a simple series—one word to a page, like Finlay's (Fig. 15)—the elements are phoneticized by some readers; in Gomringer's (Fig. 16), a complex series with several words to the page, the visual aspect inhibits a spoken response. But both poems are without the support of a representational syntax, a concrete syntax being composed of a series of independent or related items usually of the same grammatical class. This involves a learning process of quite a special order, since material which is serially structured is not already organized into probable forms like material which is naturalistically structured. The presence of pattern, however, does encourage a systematic approach to the serial poem, and furthers learning by this means.

Experiments by Fraisse have shown that logical representations —such as counting, upon which the analyses above are based; mental representations, such as the spatialization of a temporal order (Fig. 12); and auditory representations, such as the transcription of visual patterns into sound patterns—are necessary for the perception of visual rhythm.[20] The kinetic poem is therefore subject to assimilation by various processes of transcription, and intellection of the structure may be mistaken for perception of the form. Kinetic art also suffers in this way.[21]

By contrast with the purely local reflex actions produced by kinetic poems, phonetic poems result in a completely general reflex action. Fraisse cites one of his earlier experiments which showed that adults find great difficulty in following even a simple visual cadence, whereas children follow a metronome, beating at the same rate, perfectly spontaneously. But if phonetic poems are easily perceived and rapidly learnt, they are, nevertheless, limited

by duration. If a sequence is short enough (this applies also to the traditional lyric) recency and primacy complement each other, but longer sequences cannot interact without some spatial representation. The simple answer to the problem is to compensate for poor perception of succession by complex phrasal enrichment of each instant. Creeley's poem (Fig. 13) does this within a representational syntax. But simultaneous techniques have, of course, been used experimentally outside the immediate context of concrete and American poetry. Henri-Martin Barzun's "Voix, Rythmes, et Chants Simultanés—Esthétique de la Poésie Dramatique"[22] led him into controversy with Apollinaire on the visual and auditory claims to the term "simultaneity." The use of several voices in addition to the gramophone did not prevent Barzun's work from being a succession. Apollinaire put forward as a contrast his calligrams, "in which simultaneity existed in the mind, even in the letter, since it is impossible to read them without immediately conceiving the simultaneity of what they express. . . ."[23]

Pound considered Barzun's work briefly in *The New Age*. Barzun, he said, offered a mode of synthesis which was not to be despised. But he believed that art involved selection: "If you insist in being apperception and all sorts of apperception at once, you are in danger of paralysing thought; of bringing all your other faculties to a stand-still."[24] If Pound was still concerned primarily with thought, Van Doesburg was speaking of "the recovery of the poetic membranes of our ears, which are weakened to such a point that long phono-gymnastic exercises are necessary."[25]

Out of Barzun's polyphonic innovation come modern phonetic poets like Pétronio, Chopin, Heidsieck, and the Garniers. It is essentially a French tradition. But there was, and is, an alternative approach; that of a predominantly German-speaking tradition in which Hausmann and Schwitters are the innovators, and Ernst Jandl their modern successor.

Barzun's tradition does not take much account either of the constructive method implicit in Schwitters' manifesto "Konsequente Dichtkunst"[26] or of Van Doesburg's claim that his verses "are strictly bound to laws of tempo, relationship, and contrasting

S K I b a a n
S K Y l i n e
STIP STIP

stijgt

BLI nkt
BLI kt
BLIK
BLIK

G L IJ b a a n
G L IJ vlucht

GLEIS

G L I nstert
G L I mt
G L I st
G L I pt

de w i n g
de w o n g
de w i m p e r

strijkt

s t r e k t z i c h d e h o r i z o n
HORIZON

woeng

G R O N D

Figure 17.
Paul de Vree,
"Vertigo Gli."

effects of sound, whereas every troublesome, pathetic secondary gesture has been avoided."[27] French phonic poetry, however, is the nearest to come to a definition of concrete as *musique concrète;* a misnomer in terms of the concrete-expressive polarity, for it uses the human voice-range without regard for a clear linguistic element, modifying it electronically, and making new acoustic effects by means of cutting, speeding, slowing, and multiple re-recording. In other words, it applies electronic techniques to non-electronic material in a highly rhetorical way.

Performative electronic techniques are used by the Flemish poet, Paul de Vree, who works with the composer Jan Bruyndonckx. "Vertigo Gli" (Fig. 17 shows the text before sono-

lepn
nepl
lepn
nepl
lepn
nepl
o lepn
o nepl
nnnnnnnn
lopn
paa
lopn
paa
o nepl
o lepn
plllllll
lepn
plllllll
lepn
plllllll
nepl
lepn
plllllll
lopn
paa
noo
paa
noo
papaa
noo
nonoo
nononoo
nonononoo
paa
pl
paa
pl
pl pl
ononn
onononn
ononononn
lepn
eoooo
lepn
eoooo
nepl
ananann
nepl
anananann

eoooo
eoooo
lepn
eoooo
lepn
lepn
eoooo
eoooo
eooooooo
nnnnnnnnnnnnn
plllllllllll
pl
na
naaa
naaaaaaa
naaaaaaaaaaaa
naaaaaaaaaaaa
naaaaaaaaaaaa
pooleon
pooleon
poleeeon
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nanananana
naaaaaaaaaaaa
poleoooon
naaaaaaaaaaaa
pooleon
pooleon
poleeeon
poleeeon
poleeeon
poleoooon
poleoooon
oooooon
oooooon
oooooon
lllllllllllllllllllllllllllllllll

Figure 18. Ernst Jandl, "Ode auf N."

rization) is based on the phonic and associative relation in *ski, bli,* and *gli;* the consonantal changes suggesting sky, looking, and sliding. Life is conceived as an air-trip; the plane takes off *(stijgt)* at birth to land again *(strijkt,* strikes sail) at death when the body meets the earth *(GROND).* The life between is an illusion, a dream, an erotic adventure. In the dazzling brightness of the upper air, the lover's glances *(BLIK, BLIK)* are heady, inducing giddiness. Flying into orbit *(GLIJbaan),* their bodies (and the plane's) glitter, glimmer, glide, and slide through space, transfigured as shining faience *(GLEIS).* The analogy plane-body is extended freely in wing/arm *(de wing),* engine-noise/cheek (*de wong* represents an onomatopoeic liberty with *de wang*), and whirring propeller/eye-lash *(de wimper).*[28] By means of continuous loops of the three basic syllables, Bruyndonckx has brought to the performance full realization of their overlapping associations. A wholly performative or rhetorical effect, however, is incorporated in the falling tone and lengthening of *HORIZON,* which suggests a headlong dive towards the earth, although this is averted in the quiet landing of *GROND.* Intuitive method produces a fine expressive phonetic poem.

Concrete phonetic poems, on the other hand, approach the definition of music as the followers of Webern understand it, except that they do not employ electronic techniques. Their purely constructive method is serial, and their means are purely phonetic. Ernst Jandl's "Ode auf N" (Fig. 18) uses both syllable and letter *(lep-n)* according to a method of counter-composition *(lepn/nepl)*—which is the basis of a purely phonetic ode on the letter *n*—but in the course of the succession, distorted versions of the word *Napoleon* emerge. This is never pronounced as the man's name is pronounced (the "meaning" of the poem is not localized at one particular point in time) but offers an auditory analogy for Finlay's comment about the eye's natural attempt to make words out of letters: the ear tries to make words out of syllables. The disgust in the rising intensity of *naaa,* held at the level *naaaaaaaaaaaa* to produce a sense of crisis and impending solution, is artistically—rather than linguistically—released in *pooleon.* In this way, a constructive use of non-sense syllables achieves an effect which, while beyond the limits of common sense, is not *nonsense.*[29]

eile mit feile
eile mit feile
eile mit feile
durch den fald

durch die füste
durch die füste
durch die füste
bläst der find

falfischbauch
falfischbauch

eile mit feile
eile mit feile
auf den fellen
feiter meere

auf den fellen
feiter meere
eile mit feile
auf den fellen

falfischbauch
falfischbauch

eile mit feile
auf den fellen
feiter meere
feiter meere

falfischbauch
falfischbauch
fen ferd ich fiedersehn
falfischbauch
falfischbauch
fen ferd ich fiedersehn
fen ferd ich fiedersehn
falfischbauch
fen ferd ich fiedersehn
falfischbauch
falfischbauch

ach die heimat
ach die heimat
fen ferd ich fiedersehn
ist so feit

Figure 19. Ernest Jandl, "Étude in f."

But if such a method can give rise to verbal proportions, it can also transform established proportions into new ones by consonantal disfigurement and vocalic mutation. Humorous associative effects can then be combined with purely perceptual effects to produce a more traditional kind of nonsense verse using a conventional syntax. Jandl's "Étude in f" (Fig. 19) quickly establishes a variable stress-pattern based on time-lengths of equal duration, and maintains it as far as *fen ferd ich fiedersehn*. This longer duration stimulates a faster reading-rate than that of the established (and by now preferred) duration. This increase in tempo leads, in turn, to the *apparent shortening* of the objectively-given length of *falfischbauch*. Subjective shortening is an experiential, rather than an objective, fact; in this case its effect is literally to *quicken* the meaning of the *falfischbauch* predica-

ment, and force the sentimental cry *ach die heimat* from the parodist's lips. To this extent, the perception of temporal displacement is analogous to the perception of inter-metrical figure.

The De Stijl literary manifesto proclaimed that "the duality of form and content can no longer be maintained, so for the modern writer, form will have a directly spiritual meaning; it will not describe events; it will not *de*scribe at all, but *es*cribe" (Appendix B). The only hint in that manifesto as to how this would be achieved was in phonetic terms: "It is necessary that the word be reconstituted as much according to sound as idea." If there are many poets outside a constructivist tradition who would approve of this, few have adopted constructive techniques of contrast-analogy, deviation, dislocation, and repetition in series—in the way that concrete poets have.

Concrete poetry represents polemically the search for a new metric pattern. Committed to an aesthetic favoring material-construction rather than self-expression, it seeks a meter which will produce measure. If quantities can be structured in new ways, according to a "meter" consistent with the scientific spirit of an epoch, the sensibility of the individual poet will make qualities of them. In this way he will arrive at a "measure" consistent with himself and with his time.

Some of the Brazilians see the future of concrete poetry in the arbitrary signs of semiotic poetry (see Luiz Ângelo Pinto, Fig. 20); others among them represent the referent directly by means of photographs and "ready-mades."[30] But Eugen Gomringer's latest work proposes the restitution of the phrase as a unit: "It's my future after ten years' constellations. But it's a normal development I think. 'Informations' is No. 1 of 3 or 4 poems which altogether will show at once my new way to find out and find in life's network."[31]

The search for the closest possible rapport between poetry and constructive art involved an austerity of means and material which Gomringer seems no longer prepared to bear. The word, which is pared down to its bare lexical meaning, is as close as it can get to the univocal (or unequivocal) value of a unit in a non-verbal medium. In enriching the instant by means of the phrase within a freely serial syntax, Gomringer's "Informations" (Fig. 21)

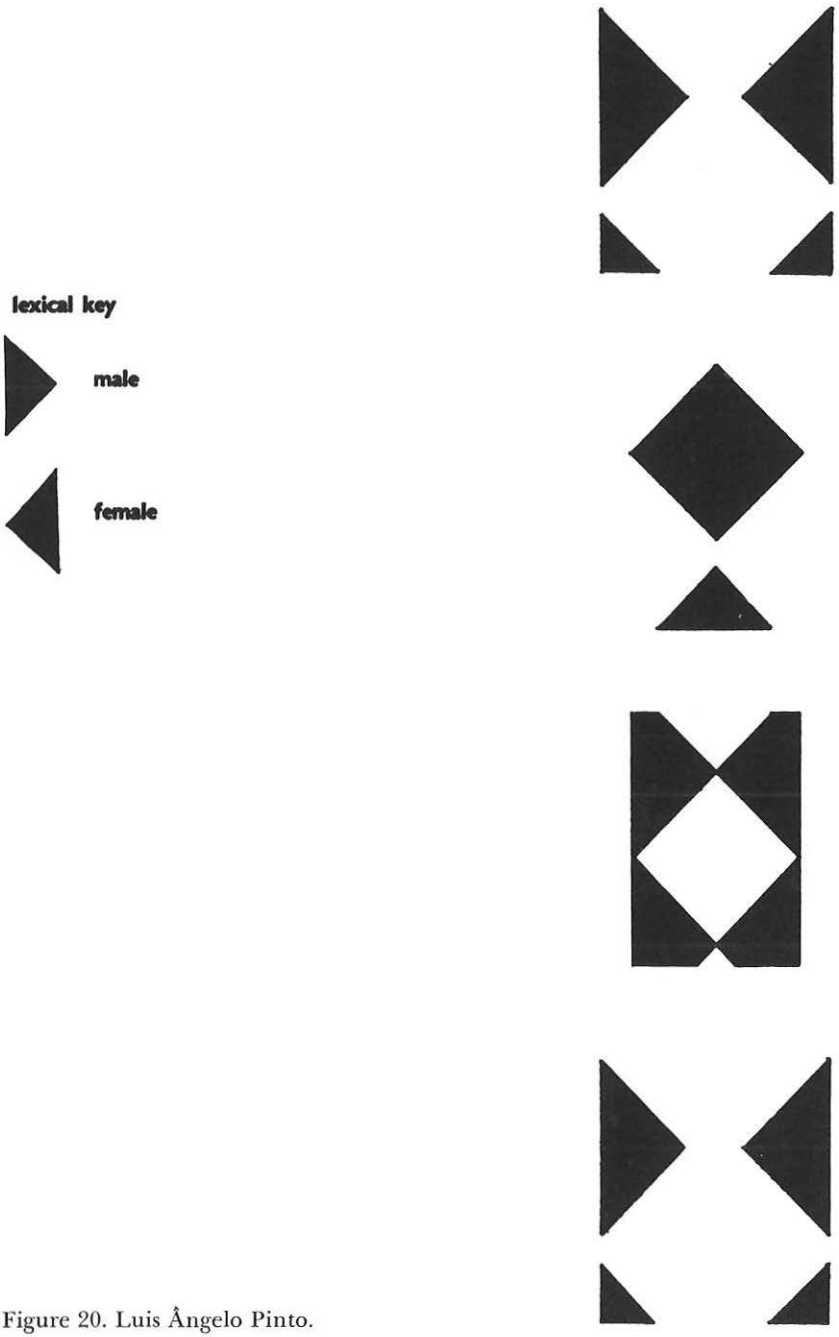

Figure 20. Luis Ângelo Pinto.

1
reflex for a time
was it you

yet the lemon-blossom
yet the early-evening line
yet the waves' beat against the house

was it you
reflex for a time

no games of chance
no tragedy of the south
no future in words

just the unintention of all things crossed
just reflex for a time
just the early-evening line

2
light filtered through filaments
changes in the mimosa bough
young swallow on the bough, a swing
soundless pattern of the tortoise's walk
twiggy wood rhythmically brought near
daggery point snapped off
glory of the leathery glistening leaf
the dumb girl from magadino
the mountain's early-evening line
noon it was

3
light filtered through millions of filaments
was it you

young swallow on the bough, a swing
was it you

soundless pattern of the tortoise's walk
was it you

daggery point snapped off
was it you

Figure 21.
Eugen Gomringer,
"Informations"
(trans. M.W.).

4
no games of chance
yet the lemon-blossom

no tragedy of the south
yet the early-evening line

no future in words
yet the waves' beat against the house

5
twiggy wood rhythmically brought near
reflex for a time

noon it was
reflex for a time

6
the dumb girl from magadino
yet changes in the mimosa bough

7
just the unintention of all things crossed

admits a limited amount of flow within an otherwise discontinuous structure. The generous associative force of noun and verb phrases is checked by the metric, which is supported by conjunctions. These grammatical representations combine with the phrasal imagery to concede a "subject matter" beyond the artistic "subject" of the poem. So the poem may be said to have a "theme," *The unintention of all things crossed.* In a complex "network" of reactions, images of East and West cross in conflict; Zen "reflex" crosses with Catholic "words." Perceptual and linguistic proportions modify each other aesthetically and discursively to produce verbal forms or "informations."

As concrete poetry enters its second decade, it is Gomringer, the innovator of the movement, who initiates its most important recent developments—an expansion of material, the return from a

supranational language to a native one requiring translation, and a freer rein for sensibility. Now that the new metric is established, certain freedoms are possible, even desirable, which were not so before. Its strength as art allows concrete poetry to admit the discursiveness of literature without serious loss, and occasionally with felicitous gain. No concessions to the rôle of sensibility as Mathieu conceives it need be made beyond that. Poems have a way of showing themselves as made by men, and by particular men, come what may.

[1]G. Mathieu, *Au delà du Tachisme* (Paris, 1963), p. 217.
[2]See, for example, "Konkrete Kunst," *Werk,* XXV (Aug. 1938), 250-254.
[3]"Vom vers zur konstellation: zweck und form einer neuen dichtung," *Augenblick,* 2 (1954); translated into English in *Image* [Nov. 1964], pp. 12-13.
[4]See Robert Sowers, *The Lost Art: A Survey of One Thousand Years of Stained Glass* (London, 1954), p. 67: "The never-never land between the decorative and the symbolic has now become the battlefield on which the artist must cry for a *place,* literally, in our environment—where art can gain that meaning it only has when celebrating vital human activities." Visual poems such as Finlay's projects for glass are a response to such a situation.
[5]"Over het nieuwe vers en het aaneegeknoopte touw," by I. K. Bonset [Van Doesburg], *De Stijl,* 3rd Year (1919-20), pp. 70-72; p. 71.
[6]*Psychological Bulletin,* XIX (Oct. 1922), 553.
[7]"Symptomen eener reconstructie der dichtkunst in Holland" by I. K. Bonset [Van Doesburg], *De Stijl,* 6th Year (1923-24), pp. 44-50; p. 48.
[8]*Anthologie Dada,* note 14 "Sur la Poésie" (Zürich, Feb. 1919); by Tzara, the editor.
[9]Letter to the present writer, June 14, 1964.
[10]"La Création Pure," *L'Esprit Nouveau,* 7 (1920), p. 773.
[11]C. Biederman, *Letters on the New Art* (Red Wing, Minn., 1951), p. 87: ". . . we can define the Structural Process as that which we abstract from nature pertaining to how things are constructed, which knowledge is translated into the requirements of the art inventions of man. HERE THE CORRESPONDENCE BETWEEN ART AND NATURE IS IN STRUCTURE ONLY, THEY ARE SIMILAR IN 'STRUCTURE' BUT NOT IN 'FORM'."
[12]See *L'Instabilité,* issued by the Groupe de Recherche d'Art Visuel (Paris, 1963) [n.p.].
[13]*Réalités Nouvelles,* 1 (1947), p. 10; or H. Arp, *Unsern täglichen Traum* (Zürich, 1955), pp. 80-81. Cf. "Poetry is a means of communicating a certain quantity of humanity—of the vitality one possesses." Tzara, *Merz* (Juli 1923), 40.
[14]*L'Esprit Nouveau,* 1 [1920], p. 37.
[15]See note 7; p. 47.

[16]Reprinted from *An 'Objectivists' Anthology* (1932) in *Kulchur,* 2, 7 (Autumn 1962), p. 81.
[17]Seiichi Niikuni, *Zero-on* (Tokyo, 1963), p. 44.
[18]See *konkrete poesie* 3 [pp. 11-12].
[19]P. Fraisse, *The Psychology of Time,* trans. J. Leith (London, 1964), p. 97.
[20]See P. Fraisse, "Rythmes auditifs et rythmes visuels," *Année Psychologique,* 49 (1948b), pp. 21-42.
[21]See Jean Mitry, *Esthétique et psychologie du cinéma* (Paris, 1963), I, 329-346. Prof. Mitry's strictures on abstract film or cineplastic art apply equally to kinetic art. Kinetic poetry, which continues to use signs for objects, and only abandons objects for ideas, avoids the implication of Mitry's contention that "visual rhythm is deprived of the capacity for emotion and meaning from the moment when the forms which make up its rhythm are deprived of objective meaning and initial emotional power" (p. 341). The limits of the verbal medium are also its strength; it cannot fail to produce associative representations.
[22]*Poème et Drame,* 4 (mai 1913). The best account of Barzun's work is in Pär Bergman, *"Modernolatria" et "Simultaneità"* (Uppsala, 1962), pp. 291-306.
[23]Apollinaire, *Les Soirées de Paris,* 25 (15 juin 1914), p. 323.
[24]*The New Age,* XIII (16 Oct. 1913), 728. Pound continued ". . . there is no use blinding oneself to the fact that the next great work may be written in this manner. It is not an impossibility, and M. Barzun is not altogether an imbecile." Nevertheless, he did eventually call Barzun a "lunatic" in private *(The Letters of Ezra Pound,* ed. D. D. Paige [New York, 1950], p. 134).
[25]Quoted by H. L. C. Jaffé, *De Stijl, 1917-1931* (London [1956]), p. 186.
[26]Reprinted from *G,* 3 (1924), in Hans Richter, *DADA—Kunst und Antikunst* (Köln, 1964), pp. 150-152: "Abstract poetry detaches—and this is a great service—the word from its associations and weighs word against word, special idea against idea, in terms of sound" (p. 151).
[27]See note 25; Jaffé, *ibid.*
[28]This last point is admittedly fanciful, but M. de Vree did encourage me in a letter to see the poem "in a polyvalent way, as suggestion" (February 15, 1965).
[29]Cf. Hans Arp, *Unsern täglichen Traum . . .* (Zürich, 1955), p. 50: "Dada is for non-sense (Ohne-Sinn) in art, which does not mean nonsense (Unsinn). Dada is without meaning (ohne Sinn) like nature."
[30]See *Invencão,* Ano 3, 4 (Decembro 1964); Pinto and Pignatari, "Nova linguagem, nova poesia," pp. 79-91 (with English translation); A. de Campos, "popcretos—breve exposição sôbre uma explosição de expoemas," pp. 105-106 (with French translation).
[31]Letter to the present writer, June 5, 1965.

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APPENDIX A
(translated by the signatories, as printed in *Noigandres* 4 [1958])

pilot plan for concrete poetry

concrete poetry: product of a critical evolution of forms. assuming that the historical cycle of verse (as formal-rhythmical unit) is closed, concrete poetry begins by being aware of graphic space as structural agent. qualified space: space-time structure instead of mere linear-temporistical development. hence the importance of ideogram concept, either in its general sense of spatial or visual syntax, or in its specific sense (fenollosa/ pound) of method of composition based on direct—analogical, not logical-discursive—juxtaposition of elements. "il faut que notre intelligence s'habitue à comprendre synthético-idéographiquement au lieu de analytico-discursivement" (apollinaire). eisenstein: ideogram and montage.

forerunners: mallarmé (un coup de dés, 1897): the first qualitative jumps: "subdivisions prismatiques de l'idée"; space ("blancs") and typographical devices as substantive elements of composition. pound (the cantos): ideogramic method. joyce (ulysses and finnegans wake): word-ideogram; organic interpenetration of time and space. cummings: atomization of words, physiognomical typography; expressionistic emphasis on space. apollinaire (calligrammes): the vision, rather than the praxis. futurism, dadaism: contributions to the life of the problem. in brazil: oswald de andrade (1890-1954): "in pills, minutes of poetry". joão cabral de melo neto (born 1920—the engineer and the psychology of composition plus anti-ode): direct speech, economy and functional architecture of verse.

concrete poetry: tension of things-words in space-time. dynamic structure: multiplicity of concomitant movements. so in music—by definition, a time art—space intervenes (webern and his followers: boulez and stockhausen; concrete and electronic music); in visual arts—spatial, by definition—time intervenes (mondrian and his boogie-woogie series; max bill; albers and perceptive ambivalence; concrete art in general).

ideogram: appeal to nonverbal communication. concrete poem is an object in and by itself, not an interpreter of exterior objects and/or more or less subjective feelings. its material: word (sound, visual form, semantical charge). its problem: a problem of functions-relations of this material. factors of proximity and similitude, gestalt psychology. rhythm: relational force. concrete poem, by using the phonetical system (digits) and analogical syntax, creates a specific linguistical area—"verbivocovisual"—which shares the advantages of nonverbal communication, without giving up word's virtualities. with the concrete poem occurs the phenomenon of

metacommunication: coincidence and simultaneity of verbal and nonverbal communication; only—it must be noted—it deals with a communication of forms, of a structure-content, not with the usual message communication.

concrete poetry aims at the least common multiple of language. hence its tendency to nounising and verbification. "the concrete wherewithal of speech" (sapir). hence its affinities with the so-called isolating languages (chinese): "the less outward grammar the chinese language possesses, the more inner grammar inheres in it" (humboldt via cassirer). chinese offers an example of pure relational syntax, based exclusively on word order (see fenollosa, sapir and cassirer).

the conflict form-subject looking for identification, we call isomorphism. parallel to form-subject isomorphism, there is a space-time isomorphism, which creates movement. in a first moment of concrete poetry pragmatics, isomorphism tends to physiognomy, that is a movement imitation natural appearance (motion); organic form and phenomenology of composition prevail. in a more advanced stage, isomorphism tends to resolve itself into pure structural movement (movement properly said); at this phase, geometric form and mathematics of composition (sensible rationalism) prevail.

renouncing the struggle for "absolute", concrete poetry remains in the magnetic field of perennial relativeness. chronomicrometering of hazard. control, cybernetics. the poem as a mechanism regulating itself: feed-back. faster communication (problems of functionality and structure implied) endows the poem with a positive value and guides its own making.

concrete poetry: total responsibility before language. thorough realism. against a poetry of expression, subjective and hedonistic. to create precise problems and to solve them in terms of sensible language. a general art of the word. the poem-product: useful object.

augusto de campos
décio pignatari
haroldo de campos

APPENDIX B
(translated by the present writer from *De Stijl,* 3rd year, 1919-20, pp. 49-54)

Manifesto II of *De Stijl* 1920: Literature

The organism of contemporary literature feeds on the sentimentality
of an enfeebled generation

THE WORD IS DEAD
hackneyed naturalism and verbal film dramas
which book-manufacturers supply
by the yard and by the pound
show nothing of the bold new moves of our day

THE WORD IS IMPOTENT
asthmatic and sentimental poetry
the "me" and "it"
which is still in common use everywhere
and most of all in Holland
is influenced by an individualism fearful of space
the dregs of an exhausted era
and fills us with disgust

The psychology of our romantic literature
rests on nothing but subjective imagination
psychological analysis
and clumsy rhetoric
have KILLED THE MEANING OF THE WORD

those phrases carefully set down one after another and one below another

that dry FRONTAL phraseology
by which the old realists presented their experiences
limited to themselves alone
and completely impotent and incapable of expressing the common
experience of our day.
To the extent that the old conception of life
bases books on
LENGTH DURATION
they are
VOLUMINOUS
the new conception of life resides in
DEPTH and INTENSITY
and so we want poetry

to construct in a literary way the multiple situations
about us and in us
the word must be reconstructed
to follow the SOUND as well as the IDEA

if in the old poetry
by the dominance of relative and subjective feelings
the intrinsic meaning of the word is destroyed
we want by all possible means
syntax
prosody
typography
arithmetic
orthography
to give new meaning to the word and new force to expression

the duality between prose and poetry can no longer be maintained
the duality between form and content can no longer be maintained.
Thus for the modern writer form will have a directly spiritual meaning
it will not describe events
it will not *de*scribe at all
but ESCRIBE
it will recreate in the word the common meaning of events
a constructive unity of form and content

we count on the moral and aesthetic support of those who are
collaborating for the spiritual renovation of the word

Leiden, Holland, April 1920. theo van doesburg/piet mondriaan/anthony kok.

VISION 67: Survival and Growth

October 19, 20, and 21, 1967.
Loeb Student Center, New York University, New York City.
Sponsored by The International Center for the Communication Arts and Sciences in cooperation with The School of Continuing Education of New York University.
This second biennial world congress on communications in a changing world is organized in three basic sections: (1) *Man and Machine*—the continuing dialogue between humanism and technology; (2) *Communications and Survival*—essential standards for a better understanding of people and ideas; and (3) *Communications and Growth*—new functions for the arts and sciences of communication in a technologically and socially transformed world. Internationally-known leaders from art, business, government, philosophy, technology, and science will participate.
Registration fee: $100 ($85 for members of the International Center for the Typographic Arts). Attendance is limited.
Information: Vision 67, 305 East 46th Street, New York City 10017.
Accommodations: Mrs. E. Manoville, 1 Fifth Avenue, New York City 10003.

Research on Readability and Congeniality of Print

Two research projects on psychological aspects of typographic variables have been started at the Psychological Institute at the University of Hamburg: one on congeniality and another one (supported by Grant No. Ho 242/3 and Ho 242/5 by the Deutsche Forschungsgemeinschaft) on readability.

In the congeniality project, 35 different typefaces have been judged by means of semantic differentials (Osgood-Hofstaetter). The type faces were presented to the subjects *(S)* in form of simple alphabets. The *S*s' judgments were averaged over *S*s for each typeface, and each scale of the semantic differential, and then correlated between typefaces over scales (Q-technique of correlational analysis), and factor analyzed. Included in the analysis were 28 verbal concepts (male, female, love, dictator, hero, war, etc.) which were judged on the same semantic differential, in order to be able to identify the printing types by means of these verbal concepts in the semantic space.

In the readability project, the influences of serifs, inclination, and boldness of printing types on speed of reading—and their interactions —are to be investigated. For this purpose, a part of the Tinker Speed of Reading Test has been translated, and adapted for German *S*s; three forms of 50 items each, two of which are parallelized, the third one serving as preliminary drill. One form was printed in sixteen different typefaces, systematically varying serifs (two levels), inclination (two levels), and boldness (four levels).

The parallel form has been printed in a standard type (Optima). The reading tests are to be given under time limit (3 minutes); scores will be the number of words read within the given time. Data will be processed by means of a 2 x 2 x 4 analysis of covariance with the score on the form printed in the standard type as a covariate.

Pilot studies showed standard deviations of about 16-21% of mean reading speed for student *S*s, and about 32% of the mean reading speed for less educated *S*s (Army population) which can be reduced to 10%, resp. 21%, by means of the covariate.

Dirk Wendt
Psychologisches Institut der Universität Hamburg

The 1967 Chicago Book Clinic Exhibition

On May 2, the Chicago Book Clinic opened its eighteenth annual book show. A review of the show could follow the usual pattern of calling attention to what is new and outstanding and what is ordinary and static. Factual information could be stated concerning the success or failure of the designer, the typographer, and the illustrator; production notes could be compiled about the type, paper, binding cloth, and reproduction techniques employed in each book. All this, however, has been accomplished in a review by Peter Keig published in the May number of *Book Production Industry*. What then remains to be done that would be appropriate for publication in *The Journal of Typographic Research?*

Perhaps very little; but it might be possible to use the current C.B.C. show as a reference point to gauge progress after eighteen years of bookmaking. As a premise we might restate the typographic needs of the serious reader, and try as best we can to determine whether or not progress is in fact observable.

Since *The Journal of Typographic Research* is in its infancy, it should not be amiss to print the oft-quoted aim of the Doves Press by its founder, T. J. Cobden-Sanderson: "The whole duty of typography is to communicate to the imagination, without loss by the way, the thought or image intended to be communicated by the author." While Cobden-Sanderson's dictum can penetrate deep into typographical practices, the Doves Press books themselves (for which a single font of roman type based upon that of Nicholas Jenson, 1470, was used) only restate the primary typographic solutions of the fifteenth century.

The typography of the book today is a relative matter. Some books are still as simple in design as a fifteenth-century one and can be treated as such. Others are complex beyond all belief and bear little or no relation to Nicholas Jenson's *Eusebius* or the Doves Press Bible. The complexity of typography is not an immediate happening; it has developed over the centuries as a result of the diversity of material presented and the necessity for multi-level emphasis throughout the book. The development of type sizes, accurate point system of mensuration, vast variations of type styles and modifications of basic styles,

printing surfaces, sensitive design knowledge and good taste in visual relationships, technical skills and machines capable of handling these elements, and the adjunct of illustrative reproduction in several well-known media have all contributed to the development. Modern counterparts of all the preceding elements are inherent in the books we design today.

Typographic design should lead the reader through a book in accordance with the nature of its content. This may mean fast and grasping pace, slow deliberate movement, or downright concentration page by page with reflection and re-reading:

1) If the content is straight narrative, the reader's progress should be direct and swift from the opening chapter to the last word. The typographic guideposts along the way will be held to a minimum with little more than a basic book typeface of normal reader size (8-10 point) properly leaded and set to a measure accommodated to a page size which can be easily held in the hands.

2) If information is the object, the typography should keep the reader in control of the material at all points with a minimum of design virtuosity.

3) If the material is complex and difficult to comprehend, the whole impact of typographic elements can be brought to bear. The typographer's skill in the manipulation of well-known type display relationships can reduce any complexity to understandable units or even segments of the whole subject.

When applying the foregoing to the exhibition, the dilemma is that typographic progress is either lost in the design consciousness of most books or they follow a well-known standard so closely that there is nothing to talk about. Anonymity prevails on so many levels of visual interest that book after book could pass before the eyes of a typographic expert without evoking a reaction—good or bad. Reaching a plateau such as I have described is probably an attainment of progress intended. There was a time when books from noted presses, or "press books" as they were known, stood out clearly from the trade issues in an exhibition. This is no longer true. Whatever the edge between these categories, it is barely noticeable in the eighteenth exhibition of the Chicago Book Clinic Club.

Perhaps we have to look to specific elements for something to talk about. There was a time when the statement "You can't tell a book by its cover" was true—not any more. Today the cover is the jacket and one can tell a great deal about a book from its jacket. Jackets have evolved in a relatively short time from a nonentity dust wrap-

per to a compelling visual representation of the entire book. The jacket is also a selling tool of the first magnitude without giving up one speck of its original function. During the same period edition book covers have advanced but little and are probably less strong as a case for protecting the book's "innards." This break with traditional standards is not serious since edition books are usually read once and set aside, or never read at all. The public library copies of edition books, of course, are rebound as needed—usually the rebound job is better than the original binding.

What are some of the conclusions regarding this exhibition of 66 books selected from a total of 320 submitted? First, I feel positive that, as a whole, the 66 books in this exhibition look better and work better as books than those in the first C.B.C. exhibition eighteen years ago. Secondly, it is quite possible that some one book in the first exhibition was a better book than the best one in this show. Progress, then, is group or mass progress. I also feel that the very best book in all categories of subject matter could have been conceived, set in type, imposed in relation to illustration or decoration and all other elements of the book, printed and bound at any time since the invention of movable type at the middle of the fifteenth century. Just as the lightest light is next to the darkest dark, the most obvious progress in book design has been immediately after a thoroughly degenerated period of printing design. Without the degeneration of their time William Morris and Cobden-Sanderson would have had no torch to hold as revivers of the art of printing.

R. Hunter Middleton

R. Hunter Middleton (Ludlow Typograph Company, 2032 Clybourn, Chicago, Ill. 60614) since 1923 has devoted his professional career entirely to the typeface program of Ludlow Typograph Company, having been responsible for the designing of some 80 typeface series. He is one of the founders of The Society of Typographic Arts and 27 Chicago Designers, active member of The Caxton Club, Association Typographique Internationale (Paris), The International Center for the Typographic Arts (New York), International Design Conference (Aspen), and author of two books: *Chicago Letterfounding, 1937; Making Printers' Typefaces, 1938,* as well as numerous articles for graphic arts journals. In 1944 he established a private press, Cherryburn, to print from original Thomas Bewick wood engravings.

Book Review

R. C. Alston, *A Bibliography of the English Language from the Invention of Printing to the Year 1800,* Volume VIII: *Treatises on Short-Hand.* Printed for the author by E. J. Arnold & Son Limited, Leeds, England; 1966. xiii + 152 pp. £5. 10s.

R. C. Alston, a philologist of Leeds University, ruefully acknowledges that "the peculiar nature of early books on shorthand" rendered his self-imposed editing task "unenviable and exasperating." He is not the first to experience such a feeling: it is assuredly one reason why so few bibliographers have been attracted to this field while fewer still have brought their labors to fruition. So far as the English language is concerned no serious attempt was made to record the literature of "the lithe and noble art" until Julius Ensign Rockwell produced his *Teaching, Practice, and Literature of Shorthand* (Circulars of Information of the Bureau of Education No. 2—1884. Washington, 1884). A supplement was added and a second and enlarged edition published in 1885. Rockwell pursued his researches until his death, in 1926, deprived us of a far more comprehensive and accurate record; but his manuscript collections, now in the Library of the University of London, constitute a rich quarry for future bibliographers.

Rockwell's pioneer work provided the basis for John Westby-Gibson's *Bibliography of Shorthand* (London, 1887), hurriedly prepared to ensure its publication in time to coincide with the first International Shorthand Congress held in London in that year. Access to the British Museum and a few private collections enabled the compiler to add a number of items to those garnered by Rockwell, but lack of time and care led him into errors which much reduced its usefulness. An impartial critic has written that Westby-Gibson seldom relinquished his grasp of Rockwell's hand in rough places without stumbling. Although the justice of this verdict is undeniable, Westby-Gibson nowhere acknowledged his debt to his predecessor.

In 1935 the New York Public Library printed an admirable catalogue of its important shorthand collections. Since this was perforce confined to the library's own holdings, it is of course not a bibliography but is much more than a mere list of titles. The compilers are to be congratulated in particular for heeding the warning given by

Pollard and Greg that "any attempt to treat books of all periods in the same way will be found to be impracticable." Thus books printed before 1837 are given much fuller treatment than those which proliferated after that date. Nearly nine-tenths of this catalogue's 548 pages (plus an index of nearly 100 pages) deal with English-language material.

Alston's volume—a short title catalogue or inventory rather than a bibliography in the strict sense of the term—is one of a series with a General Preface in Volume I which lays down certain general principles. Some of these he has clearly found it difficult to observe in dealing with a subject admittedly calling for special treatment, and two "inviolable principles"—attention to bibliographical detail and a personal scrutiny of every item—are diluted by the qualification in Volume VIII: "I have attempted to verify each item either by personal inspection or by correspondence." The scope of this bibliography, unlike that of the volumes of Rockwell and Westby-Gibson, is restricted not only to the period ending in 1800 but understandably by the exclusion of books printed in shorthand, such as Shelton's and Rich's *Psalms in Meter* and *New Testament,* Addy's *Bible,* and Mason's *Short-Hand Exemplify'd.* On the other hand, its value is enhanced by an indication in nearly every case of one or more libraries where the book may be found. This characteristic should be especially useful to those who wish to pursue their studies by consulting the books themselves. Wisely, the editor disclaims any attempt to make these locations, or his references to "secondary material," exhaustive. Unhappily, however, many of the locations given are misleading while others are inexplicably lacking. As many as 27 of them (Nos. 9, 12, 30, 38, 45, 55, 56, 77, 78, *85, 86, 88, 90, 91, 100, 103, 104, 121, 124, 125, 128, 148, 152, 157, 159, 162 and 172), all noted as being in "Crawford," appear to be ghosts; the copies of these books which were formerly in the library of the Earl of Crawford at Haigh Hall, Wigan, being now in the libraries of London University and Sir Isaac Pitman & Sons, Ltd. Almost the whole of Lord Crawford's early stenographiana were sold at Sothebys on July 6, 1948 (see *Times Literary Supplement,* July 17, 1948, p. 408).

Some of the "general works" listed under "Bibliographical References" (p. x) have long been superseded, *e.g.,* Levy's *History of Shorthand Writing,* 1862. Surprising omissions, however, are Olof Melin's *Stenografiens Historia,* 2 vols., Stockholm, 1927-29; C. Johnen's *Allgemeine Geschichte der Kurzschrift,* 4th ed., Berlin, 1940; H. Butler's

The Story of British Shorthand, London, 1951 (containing the most complete list of British shorthand authors to date), and the proceedings of the various international shorthand congresses.

Weston's *Stenography Compleated,* 1727 (No. 185), was preceded by his *Directions for Writing Shorthand,* 1724, mentioned by Alston as having been issued separately. The latter was presumably Weston's first publication and the one referred to by John Byrom in his *Journal,* July 24, 1725. A copy now in the Guildhall Library, London, was formerly in the British Museum, having been discarded apparently as a duplicate. All bibliographers have overlooked the fact that there were two variant issues of the 1727 *Stenography Compleated.* The engraved title-page of the first issue claimed that the system was "the most easy, exact, lineal, speedy and legible method extant." Recognizing later the superior lineality of his rival Byrom's method (then unpublished), Weston discreetly dropped the word "lineal" from the title of the second 1727 issue and all later editions of his book.

Various dates from 1700 to 1765 have been assigned to Clayton's undated modification of Weston (No. 192). As Byrom had a copy in 1725 (Byrom's *Journal,* April 27 and 29), the date 1730? given tentatively here is probably not very wide of the mark.

The first edition of Gurney's *Brachygraphy,* 1750 (No. *213), for which no location is given, is (or was recently) in Chetham's Library, Manchester; a photostat copy is in the Library of London University. Bordley's *Shorthand Alphabets,* 1791, mentioned in the note to No. 288, is in the National Library of Scotland (Warden Collection).

Henry Petre's "A Booke of Brachygraphie" (No. *21) is known only from an entry in the Stationers' Register (November 24, 1621). Alston ignores four other early shorthand treatises entered in the Register: William Labourer's *The Art of Short English Writing* (March 15, 1620/21), Thomas Whiting's *Brachygraphia or Short Writing* (February 27, 1632/33), and Richard Maud's *Semen Brachigraphia, or the Academy of Short Writing* (October 27, 1634). None of these is known to be extant. Edward Willoughby's "book of stenography," entered on June 8, 1621, may not have been published as the entry was afterwards canceled. Other noteworthy omissions are Thomas Cross's *The Art of Charactre or Short-writing,* 1645 (Bibliothèque Nationale, Paris: see *Notes and Queries,* CLVII, September 28, 1929, pp. 220-22); *The Methodist; or a New Method of Reading, Writing and Printing All Languages in Shorthand, 1741* (anon.) and *Stenography; or, the Art of Short Hand Perfected,* by W.M.S. (1797). The two latter are in the

Library of the University of London, the last named being probably the first edition of an anonymous book with the same title, "sold by Callow, . . published for the editor by Lackington, Allen & Co., . . . new edition, 1802," and later editions (Westby-Gibson, 1887, pp. 211-212). "The elements of a short hand," a paper read by Samuel Jeake at a meeting of the Royal Society on May 26, 1748, and printed in its *Philosophical Transactions,* Vol. X, Part IV, pp. 1380-83, is not listed by Alston, perhaps on the ground that although issued separately it is not a book. It is of some interest as the system has an alphabet of only eight simple strokes and provoked a comment from Byrom in the next (June) issue of the *Transactions.* Two items which might have been included in the useful lists of editions published after 1800 are the third edition, Liverpool, 1803, of No. 315 (Richardson's *New System),* in the National Library of Scotland; and an unrecorded edition, Hallowell, 1826, of No. 286 (Taylor's *Essay),* in the Library of the Maine Historical Society, Portland, Me. William Harding's version (p. 55) was first published in 1823, as Rockwell and Westby-Gibson noted.

The misspelling of Bathsua Reynolds for Bathsua Reginald (No. 17), repeated at the foot of Plate IV, may have been due to the pressure of a publication dateline from which this bibliography, like its predecessor, appears to have suffered. Although this particular error might have been avoided by a check with Westby-Gibson (who misspells Bathsua's first name, p. 188), a too confident reliance on him is responsible for other blunders. The basic criterion laid down by Westby-Gibson himself that "the value of a bibliography is in direct ratio to its accuracy" is implicitly accepted by Alston when he writes that "accuracy is obviously of cardinal importance." It is the standard by which any bibliographer must expect to be judged.

One of the most valuable features of this book is the excellent series of 92 facsimiles (the last seven misnumbered) of title-pages, shorthand alphabets, and abbreviating rules. The selection has been made judiciously on the whole and compensates to some extent for the absence of any guidance in the body of the work to the relative merits of the treatises listed. This might have helped the student to assess the progress of shorthand invention from the crude complexities of Bright's 1588 *Characterie* to the refreshing simplicity of Taylor's 1786 *Essay* (recognized at once as a major step forward and promptly adapted to other languages) and Bordley's revolutionary *Cadmus Britannicus* of the following year which pointed the way to an entirely

new conception of an abbreviated writing based on an analysis of the longhand alphabet, as opposed to the geometric symbols of earlier systems.

Although England forestalled other nations by half a century in the publication of textbooks on stenography, we are still without an adequate bibliography of English-language shorthand. René Havette's excellent *Bibliographie de la Sténographie Française* (Paris, 1908) and the New York Public Library catalogue already mentioned have shown what can be done. Although Alston's work will doubtless be of service to those for whom it is intended, there is room for a fuller and more careful survey that will meet the needs not only of philologists and phoneticians but of educationists in general and perhaps even those ingenious contrivers of shorthand systems who continue the search for a speedy and efficient means of communication to replace our laggard and laborious longhand.

William J. Carlton

William J. Carlton (37 The Avenue, Andover, Hants., England) retired in 1946 from the International Labor Office, Geneva, where he had worked since 1921, as registrar and later as librarian. Earlier he had held editorial posts in London with Amalgamated Press, Press Illustrating Co., and National Trade Press. He was a member of the advisory board and associate editor for the "Pilgrim" edition of *The Letters of Charles Dickens,* Vol. I, 1965. His publications include: *Dr. Timothy Bright, "Father of Modern Shorthand,"* 1911; *Charles Dickens, Shorthand Writer,* 1926; *Descriptive Catalogue of the Library of Samuel Pepys—Part IV, Shorthand Treatises,* 1940; numerous articles on shorthand and Dickensian topics in *The Dickensian, Dickens Studies, Harmsworth Encyclopaedia, Notes and Queries, Review of English Studies, Times Literary Supplement,* and other periodicals.

Association Typographique Internationale Tenth Congress

Paris; November 6 through 10, 1967.
Theme: Letters and Signs in a Pictorial Age.
Under the auspices of UNESCO, the Congress will bring together European scholars, scientists, and practitioners to lecture and to discuss new alphabets, types, and signs in extending culture. A special meeting will consider recent legibility and reading research.
NOTE: Enrollment deadline was July 31. It is hoped a comprehensive report on the Congress will appear in a future number of this Journal. For information, address A.Typ.I., 18 rue Ferrus, Paris 14, France.

Résumé des Articles

Traduction: FERNAND BAUDIN

Les pictogrammes, les idéogrammes et les alphabets dans l'oeuvre de Paul Klee—JAMES PIERCE

Paul Klee (1879-1940), l'artiste suisse qui enseigna au Bauhaus, en Allemagne, utilisa des pictogrammes et des alphabets tant anciens que modernes dans bon nombre de ses peintures et de ses dessins. Chacun des caractères qu'il empruntaitaux divers modes d'écritures était admirablement transposé grâce à l'insolite technique qui lui permettait de préserver toute leur pureté expressive aux éléments formels qu'il combinait. Dans lee années 1910 et 1920 Klee fit usage des caractères de l'alphabet romain dans ses compositions; tandis que dans les années 1930 il insuffla une vie nouvelle dans les symboles convenus de l'alphabet, les transformant en vives représentations qui rappelaient leurs origines pictographiques. Sa réussite la plus révolutionnaire fut l'invention de vigoreux idéogrammes ou les divers schémas pictographiques d'une série d'images doubles enrichissaient l'idée initiale de toute une chaîne d'association. Il ébranlait ainsi la notion même d'image en tant que représentation d'une scène située dans l'espace et dans le temps.

Liste chronologique des machines et accessoires pour la composition mécanique, 1822-1925—RICHARD HUSS

Cette liste chronologique retrace toute l'histoire de la composition mécanique des caractères typographiques. Aux débuts les recherches portaient sur la composition mécanique de caractères mobiles; la composition à l'aide de matrices est un dévelopement ultérieur. La liste renseigne aussi les accessoires indispensables de la composition de caractères: fondeuses, imprimeuses, dispositifs de report ou de transfert, et machines auxiliaires.

Etudes sur des étiquettes pharmaceutiques—M. HAILSTONE and J. J. FOSTER

Il s'agit d'un rapport sur deux expériences qui ont été faites concernant l'éfficacité des étiquettes pharmaceutiques. La première comparait des étiquettes manuscrites avec desétiquettes dactylographiques. La seconde comparait des étiquettes typographiques différant par le caractère, le corps et la mise en page (centrée ou alignée à gauche). La méthode consistait à faire choisir certaines étiquettes présentées dans un étalage. Les résultats ont prouvé (1) que les étiquettes typographiques étaient plus distinctes que les manuscrites, (2) que les étiquettes composées en c. 10 étaient plus distinctes que celles en c. 6, (3) qu'en c. 6 les capitales étaient plus distinctes que celles en bas de casse, (4) que la mise en page n'influençait pas le choix.

La composition sur I.B.M. Selectric Composer—ADRIAN FRUTIGER

L'I.B.M. Selectric Composer est situé dans l'évolution de la production des livrés imprimés: il annonce un retour à la simplicité, à la sobriété en même temps qu'il apporte une plus grande vitesse mécanique. Les restrictions et les

problèmes qu'il impose au dessinateur de caractères sont définis. Cet article reproduit le texte d'une conférence qui fut donnée à New-York, l'automne dernier, à la Gallery 303. Il est composé sur l'I.B.M. Selectric Composer dans une version de l'Univers adapté par l'auteur à l'usage de cette machine.

Poésie concrète—MIKE WEAVER

Les origines de ce mouvement sont brièvement retracées. Les premiers manifestes sont reproduits en annexes. Vingt et une illustrations permettent de distinguer trois conceptions: optique, kinétique, phonétique. L'accent est mis sur l'apparition d'une formule récente, plus conforme à l'esprit de notre temps.

Kurzfassung der Beiträge

Übersetzung: DIRK WENDT

Bildsymbole, Begriffszeichen und Alphabete im Schaffen Paul Klee's—JAMES PIERCE

Paul Klee (1979-1940), der Schweizer Künstler, der am Deutschen Bauhaus lehrte, benutzte alte und moderne Bildsymbole und Alphabete in vielen seiner Gemälde und Zeichnungen. Die einzelnen Zeichen der verschiedenen Schriftsysteme paßten gut zu Klee's ungewöhnlicher additiver Technik, in der er die Reinheit des Ausdrucks der formalen Elemente bewahrte. In der Zeit von 1910 bis in die zwanziger Jahre benutzte Klee Antiqua-Buchstaben zum Aufbau abstrakter formaler Muster, aber in den dreißiger Jahren erweckte er die konventionellen Symbole des Alphabets zu neuem Leben, indem er sie zu aktiven Symbolfiguren machte, die an ihren bildsymbolischen Ursprung erinnerten. Sein revolutionärster Schritt war die Einführung hervortretender Begriffszeichen, in denen er verschiedene bildsymbolische Schemen in einem Satz von Doppel-Bildern kombinierte, welche die Grundidee durch Ketten von assoziierten Ideen bereichern und so den Begriff eines Bildes als Repräsentation einer in Raum und Zeit festgelegten Szene veränderten.

Ein chronologisches Verzeichnis von Setzmaschinen und Zusatzgeräten 1822-1925—RICHARD HUSS

Die Geschichte der Entwicklung (1822-1925) der mechanischen Beherrschung des Schriftsatzes wird in diesem chronologischen Verzeichnis von Setzmaschinen dargelegt. In der Frühzeit lag der Schwerpunkt auf Ein-Buchstaben-Geräten, die einzelne Lettern manipulierten; allmählich wurden die Matrizen-Maschinen vervollkommnet. Mitberücksichtigt sind Maschinen, die zur Ergänzung des Setzvorganges benutzt werden: Gießmaschinen, Direktdrucker, Übertragungs-und Prägevorrichtungen und Materialhersteller.

Untersuchungen zur Zweckmäßigkeit von Arzneimittel-Aufschriften—M. HAILSTONE and J. J. FOSTER

Zwei Experimente zur Zweckmäßigkeit von Arzneimittel-Aufschriften werden berichtet. Das erste vergleicht maschinengeschriebene mit handgeschriebenen Aufschriften, und das zweite verglich gedruckte Etikette, die in Schriftgröße, Typenform und Layout (auf Mitte oder linksbündig) variierten. Ein Wiedererkennungs-Test wurde angewendet, wobei die Vpn bestimmte Aufschriften aus einer Tafel herauszufinden hatten. Die Ergebnisse zeigten, (1) daß maschinengeschriebene Aufschriften besser erkannt wurden als handgeschriebene, (2) daß in 10 Punkt Schrift gedruckte schneller erkannt wurden als in 6 Punkt Schrift gedruckte, (3) daß bei der 6 Punkt Schrift die in Versalien gedruckten Aufschriften leichter erkannt wurden als die in Gemeinen gedruckten, (4) daß das Layout der Etikette-Beschriftung keinen Einfluß auf die Erkennbarkeit hatte.

Typographie mit dem IBM Selectric Composer—ADRIAN FRUTIGER

Die Bedeutung des IBM Selectric Composers für die Entwicklung der Buchherstellung wird dargestellt: Er ermöglicht eine Rückkehr zur Direktheit und Einfachheit, kombiniert mit der Geschwindigkeit der Mechanisierung. Einige Einschränkungen und Probleme, welche die neue Maschine für den Entwerfer von Schriften mit sich bringt, werden beschrieben. Der Artikel war ursprünglich im vorigen Herbst als Vortrag in der Gallery 303 in New York gegeben worden. Er ist auf dem IBM Selectric Composer in der Univers-Schrift gesetzt, die der Verfasser den Bedürfnissen der Maschine angepaßt hat.

Konkrete Dichtung—MIKE WEAVER

Die Anfänge der Konkreten Bewegung in der Dichtung werden kurz dargestellt, mit frühen Manifesten im Anhang. Drei Wahrnehmungs-Richtungen, klassifiziert als optisch, kinetisch und phonetisch, werden unterschieden an Hand von 21 Beispielen. Die Betonung liegt auf der Entwicklung einer neuen festen Form, die in unser Zeitalter paßt.

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The Authors

James Pierce is associate professor of art history at Western Reserve University (Cleveland, Ohio 44106). He received the Ph.D. in Fine Arts at Harvard in 1962. The article which he has written for this number of the Journal is adapted from a chapter of his dissertation, "Paul Klee and Primitive Art." His art history handbook, *From Abacus to Zeus,* will be published by Prentice-Hall early next year.

Richard E. Huss is president of Graphic Crafts, Inc. (Lancaster, Penna. 17602). At age sixteen he entered the composing room of the old *Lancaster Intelligencer* as an apprentice. About 1954 he established himself in business as a commercial printer and bookbinder. His chief personal interest for many years has been the history of typesetting methods and machines.

Maxwell J. Hailstone has his own free-lance practice (166 Manchester Road, Manchester 16, England) and is assistant lecturer in typographic design at Liverpool College of Art. A graduate of both Leicester College of Art and London College of Printing, he has just completed two years as research fellow in the School of Advanced Studies of Manchester College of Art and Design carrying out a program of research into the efficiency of pharmaceutical labelling.

Jeremy J. Foster is research associate in the Psychology Department, University of Newcastle-on-Tyne, England. A graduate in psychology from Manchester University, he spent two years as research fellow in the School of Advanced Studies of Manchester College of Art and Design carrying out a program of research into the legibility of print.

Adrian Frutiger (23 Villa Moderne, Arcueil, Seine, France) is a type designer. His principal creation is the Univers sans serif family which is adapted to foundry types, mechanical and photographical composing machines, and most recently to the new IBM-Selectric Composer described in the article. Frutiger started his own studio at Paris in 1961.

Mike Weaver organized the first international exhibition of Concrete poetry in Britain, held in Cambridge in the fall of 1964, and is an editor of *Form* (Cambridge, England). At present he is engaged on a study of William Carlos Williams and a book of documents on Black Mountain College, North Carolina. He is lecturer in American literature at the University of Exeter in England, where he may be reached care of the English Department.

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