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Graphic Design: A Practice in Search of Theory
Sharon Helmer Poggenpohl

Over the past two years, **Visible Language** conducted an international survey of design schools in order to determine the kind and vitality of the research effort. This special issue presents the theory, research, and visual experiment that was discovered.

The need for developing a theoretical structure, a more integrated approach to research and its impact on design education is explored. The problems associated with these tasks are analyzed.

Semiotics and Graphic Design Education
Thomas Ockerse and
Hans C. van Dijk

The difficulty associated with establishing definitions and goals in graphic design education are explored followed by semiotic theory which is being used as a structural basis and metalanguage for students within the graphic design program at the Rhode Island School of Design. Thomas Ockerse and Hans C. van Dijk collaborated in the design of an innovative curriculum which identifies significant communication principles and develops an experimental approach with emphasis on identification of alternative visual possibilities. Specific problems are discussed in terms of theory and complemented by a visual presentation of related student work.

A Language of Form: The Two-Dimensional Isometric Systems
David D. Stuhr

Designers create form in relation to processes or materials, but tradition in design has not established an objective method of inquiry that would lead to an understanding of the relationships present in forms. Rather, a subjective, nonintellectual, nonacademic precedent has persisted. Because an objective method of inquiry, one which would result in an augmented perception and comprehension of form in relation to the visual world, is desirable a recent and extensive search of the current literature was undertaken. This search revealed that an objective point of view does not exist, but a system of relationships used by physical scientists—classical symmetry theory—could be adapted for design studies. This system reflects an objective point of view, requires a rigorous academic discipline, and has the possibility of extensive application. Ultimately, it may lead to the formation and conventionalization of a visual language.

Notes on the Visual Differential Theory
Robert A. Manning

This work attempts to de-mystify and objectify what has been considered by many teachers, students, and practitioners of visual communication to be an intuitive process; namely, the creation of art and communication design.

Expressionists art and communication design are not distinct and unrelated practices but are part of a continuum which can be identified and understood.

The visual differential theory develops a conceptual model which attempts to show relationships between visual manipulation and its effect on the communication process.

The semantic differential technique serves as the basis for establishing the parameters of the model's components; order, graphic, and literal. Once grasped, the model provides the basis for systematic teaching and analysis of the communication design.

The Work of the Graphic Information Research Unit
Linda Reynolds

For the past 8 years the Graphic Information Research Unit has been working on various projects relating to the legibilty of scientific and technical information. Much of this work has been funded by The British Library, and has been concerned with problems such as the degradation of printed images as a result of copying processes, the effects of show-through and other background patterns on legibility, the design of typewritten and typeset bibliographics, the design of COM catalogues, and the design of library guiding systems. The Unit's survey of some of the problems of providing adequate guiding in libraries and museums is summarised, and two recent studies of COM catalogues are described.

Graphic Design: A Practice in Search of Theory

Sharon Helmer Poggenpohl

Recent issues of this journal have been designed by graphic designers who, in the process, have exposed many of the ideas and traditions related to the presentation of visible language. This issue explores the research and education supporting the development of graphic designers.

Graphic designers function as visual interpreters, converting communication concepts into visible words and images. The act of interpretation is not always obvious or direct for the designer skillfully focuses attention, insists on visual remembrance of a word or image, alters the rhythm of information delivery, or otherwise uses the potential character of the visual space and the mark-making activity to develop an appropriate pattern for the communication idea. The activity combines the practical considerations of reproduction in a specific medium, an analysis of the communication skills of the target audience, as well as creative, insightful visual translation and aesthetic refinement. In a sense, the designer is to the visual word what an elocutionist is to the spoken word. Both help us to capture the structural and feeling dimensions of a message; they articulate the message; they improve the accessibility and memorability of information.

The Issue

Over the past two years, I have conducted an international research census of design schools for **Visible Language** in order to find out the character of the research effort as well as learn about specific projects. The content of this issue is the result of that census and is in my judgment the most interesting and provocative work discovered. With this special issue, **Visible Language** becomes a resource for educators and professionals alike, who are interested in coming to an understanding of design as an emerging discipline, and in tapping the intellectual resources of those who are contributing to this enterprise.

Our immediate goal is to encourage wider exchange of information about current communication projects among design programs worldwide. Our long-range goal is the development of a design research literature in much the same way that a reading research literature has been developed.

While there is a wealth of scientific study on our reaction to visible language (in psychology, linguistics, anthropology), the crucial role of the designer in our conception of visible language including its generation and application has yet to be adequately organized and understood.

Of the many codes used by graphic designers—photograph, diagram, drawing, ideogram, or typography—typography has the most explicit discipline. The visual variables such as size and space, face and weight, and methods for organization can be clearly delineated.[1] The larger issues of legibility, symbolic appropriateness, or meaning are more objectively available for scrutiny; the tension between meaning and form is apparent. Typography, because of its very nature, could provide the model for organizing more general research in graphic design. For these reasons, the bringing of research and theory to this journal, honing it to show application, makes sense.

1
One of the best expositions of the visual variables found in visible language is Karl Gerstner's book, **A Compendium for Literates,** Cambridge: The MIT Press, 1974.

A common thread runs through much of this issue: the attempt to objectify the process of graphic design and to subject the results to analysis. This runs directly counter to traditional practice which continues to be a pragmatic operation based on seat-of-the-pants intuitive solution. Designers are increasingly confronted with more complex problems whose impact on society is substantial. Recognition of this complexity produces a need for a more objective understanding of the design activity in the expectation that such an understanding will enhance the designer's performance.

The communication activity contains many variables. Identification of common patterns or similarities among problems rather than limiting and stereotyping solutions could, in fact, support its reverse; an expansion of solution or a more specifically creative one. If the structure of the activity can be revealed, we can then alter and amend the rules; they become subject to our control, even our whims; we can invent new rules; we are in control of the process rather than blindly following an unquestioned tradition.

In a recent issue of Industrial Design magazine, Jay Doblin describes three levels of design activity: the practical, elemental, and theoretical. He compares these to the development of a profession, where the profession begins when substantial theory has been generated. While design is not a profession in the formal sense, there is increasing recognition that research exists which supports the generation of theory. According to Doblin, this theory is emerging in bits and pieces; its fragmented form demanding organization.[2]

2
Jay Doblin, "Part 1.: A Theoretical model for design evaluation." **Industrial Design,** January/ February 1979, pp. 40-44.

The pure research being slowly integrated into design school curricula has been generated by psychologists, sociologists, and computer scientists. Pure research for most designers is an alien concept because they are involved in a field that demands pragmatic performance. On the other hand, increasing numbers of designers find that applied research—that which is necessary to solve a specific problem or to evaluate a potential solution—is increasingly becoming a factor in their environment.[3]

3
The ICOGRADA (International Council of Graphic Design Associations) conference in Chicago, during the summer of 1978, dealt with methods for evaluating graphic design using a case study approach.

It is only in the very recent past that some university design programs have begun to integrate the results of pure research into the program of study. The difficulty in using research and theory from another discipline is that someone sensitive to both the specific research and to design must make a translation; must find the significance in the research and the fit to design. Another recent educational objective is to prepare student designers to deal with an objective evaluation of design performance. It is interesting to note that while the environment within which design must perform is becoming more precise, few design programs encourage the undergraduate designer to engage in even limited research activities in order to become exposed to this more rigorous means of obtaining information or exploring alternatives.

What is presented in this special issue are fragments of theory as well as interesting pieces of research. In order to see relationships among the articles and census items, they are categorized according to whether they represent theory (either borrowed or original), research (developed in a fairly academic sense), or visual experiment (explorations in extending the language or the state-of-the-art). Key words further support closer identification of the ideas.

Graphic design education is a synthetic operation; it draws its content and concepts from diverse disciplines. The first two articles trade on existing theory; the authors see value in playing design off against an existing struc-

ture. Thomas Ockerse and Hans van Dijk have developed at the Rhode Island School of Design a semiotic approach to graphic design. Semiotic theory uncovers the process of generating and reading symbols. The students use this structure to analyze communication problems and to move beyond concepts of visual surface control into those of content and meaning. David Stuhr deals exclusively with visual form concepts using classical symmetry theory as the structure. In it he finds a basis for organizing form-making activities in the explicit elements and relationships and their interplay with specific rules.

An original theory of Robert Manning joins form and content as he discusses a method for analyzing communication in terms of its order, graphic, and literal dimensions. While the theory owes a debt to Charles Osgood (semantic differential technique) and Jay Doblin (who was among the first to use this technique in design analysis) it emerges largely from the author's experience as a designer and educator.

The Royal College of Art's Graphic Information Unit is a unique on-going research enterprise in graphic design. Linda Reynolds relates the history of this organization together with a synopsis of two recent research projects.

The census items culled from the international study provide at a glance some interesting work in progress or recently concluded. They demonstrate the diversity of the research effort. The census items are isolated only if we fail to look for the connections. Steven Skaggs' visual experiments with video transformation of typographic elements can be viewed in juxtaposition with the Graphic Information Unit's technical research on typographic organization for information display on video. Charles Bigelow's generation of new characters for the presentation of native American language can be examined in relationship to Constance White's analysis of existing experimental alphabets. Roger Remington's Sign Game is a look at a large and pervasive environmental problem in terms of increasing human understanding and altering behavior. This can be paired with Aaron Marcus' Visualizing Global Interdependencies. The work of Jerry Kuypers and his student are squarely in the best tradition of exploring visual alternatives.

The editors see the presentation of these census items as an on-going event through which individuals may make contact with projects or researchers at other schools involved in addressing similar questions. The very last pages are an on-going survey which we urge you to return to us.

Many graduate students do substantial research in order to develop a thesis. For the most part, this work is unknown except to the sponsoring institution or by word-of-mouth. **Visible Language** is interested in recognizing this work and making it accessible. Graduate student theses are represented in the census items toward the end of the journal. A survey form immediately follows this section. Its function is to obtain current information concerning theses dealing with visible language.

Another survey page requests information concerning the development and emphasis of university courses in typography or visible language. We are interested in publishing innovative class projects—in sharing ideas and objectives as they relate to design education.

It is evident from the results of the first census and its generation of contents for this issue that research and theory in graphic design is in its infancy. There is not widespread recognition of the need to develop a structure for understanding graphic design. Design educators appear to be committed to maintaining the state of the art. They may entertain new technology but for the most part they are not examining the changing pattern of communication within the culture. They are not questioning basic assumptions, looking for pattern, or generating new information. An issue such as this one should stimulate interest in serious investigation into research and theory as it relates to graphic design.

The practice of graphic design is moving from isolated solutions to visual systems. Dramatic changes in the communication environment—such as increased computer use, the availablity of in-house typography, and visual production systems—have pragmatically altered the context of design. But the need for a more integrated understanding of graphic design revolves around the complexity of the communication task, the number of variables which are part of a communication. There are methods for dealing with complexity but in a hunger for simplicity and quick resolution of problems, many designers move visual elements around on the surface, clutch a tradition that is tentative at best, and in the long run avoid the deeper more complex issues that begin to define the communication process.

Visual systems increase the designer's impact on society at the same time it uses the designer's time efficiently allowing a more creative, innovative approach to the specific communication problem. But if the designer is capable of analyzing a communication problem only in terms of its surface organization or production technique, then there has been a fundamental failure in his preparation as a designer. Identifying and isolating the symbolic reference possibilities, the inherent possibilities and limitations of different communication codes, together with the development of visual metaphor become an approach to communication that goes beyond surface concerns into the substance and function of communication itself.

If we succeed in beginning to integrate some research and theory, it will be because enough students, faculty, and professional designers have the curiousity, the tenacity, maybe even the audacity to look for the connections that deeply identify the structure of graphic design.

Semiotics
and Graphic Design Education
Thomas Ockerse
Hans van Dijk

The Graphic Design Department at the Rhode Island School of Design is developing a philosophy and an approach to visual communication that reflects both an intellectual/theoretical tradition while it fosters the generation of visual experiment. This approach is based on the understanding that graphic design is visual communication design wherein the designer purposefully marks, signs, and names, thoughts events or facts, and conveys information with a definite meaning and significance. In developing communication systems, the graphic designer coordinates structural and functional relations to produce concise and clear communication for both sender and receiver. Moreover, recognizing the social responsibility involved in this communication, as an interpreter of and contributor to human communications, the designer must be fully aware of not only what is said but how it is said, and must demonstrate a sensitivity to what is implied and consequently inferred. Thus, as a problem solver the graphic designer's qualifications must include at least a knowledge of communication and sign theory, as well as an understanding of form perception and a command of communication and reproduction processes.

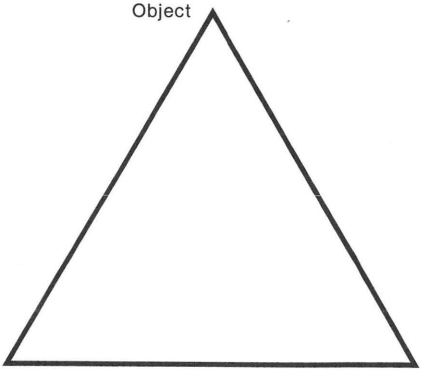
In semiotic terms, the graphic designer aids his fellow man in the process of generating and digesting "signs." Semiotics is the theory of signs in which one studies problems of sign production and interpretation. A sign stands for something not physically present; it is the physical embodiment of thoughts, objects, or events to be transmitted for the purpose of clearer understanding.[1] Semiotics becomes a significant, if not essential tool for the graphic designer, because the designer must understand the way man assigns meaning and responds to a sign, and because he must be capable of ascertaining which sign-vehicle under which conditions can carry specific communication and therefore become a sign.

1
In everyday language, the sign is understood to have a physical quality; but in semiotic terms, it is a relational concept which ties a stimulus to an abstract something. Charles Sanders Peirce formulated it most clearly when he stated that:

A sign is anything which determines something else (its *interpretant*) to refer to an object to which itself refers (the *object*) in the same way, the interpretant becoming in turn a sign, and so on ad infinitum.

It is the entire *triadic relation* which is called the sign in semiotic terms. In other words, when one uses the term sign, one denotes a *process* characterized by a stimulus (the *sign-vehicle* according to Morris,1938) which is capable of representing an absent something (the object) in someone's mind in a certain way (the interpretant). Therefore, a sign is not a specific object or concretion. It is what it is by virtue of relations which participate in constituting it. What is of specific concern is not the concretion of the relation, the sign-vehicle, but the meaning of the relation, which is determined by the function "standing for."

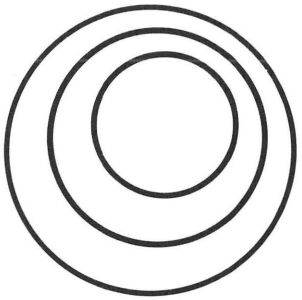
The Sign Process



Semiotics has become an enlightening and useful tool in defining curriculum needs relative to language systems for the student of graphic design. It has not only allowed for a more scientific inquiry using the rules of combination and transformation, but it has aided us in clarifying and identifying a three year curriculum sequence. In principle we are using Charles Morris' triadic model of semiotics which specifies a breakdown of language into three basic categories: syntactics, or signs and their formal relations to other signs; semantics, or signs and their relations to the objects for which they stand; and pragmatics, or signs and their relations to interpreters.[2]

2
Charles Morris, **Foundations of the Theory of Signs,** Chicago: The University of Chicago Press, 1938.

Figure 1



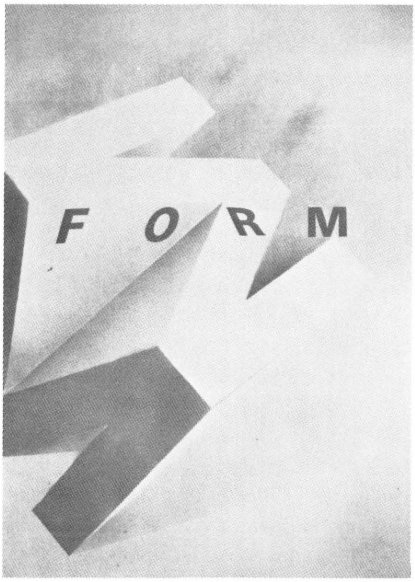
Since the three categories are interdependent of each other (see Figure 1), their separation at any stage of the education process is only one of degree. While this artificial breakdown is not reflected in ordinary sign use, it allows one to focus more on one aspect of the functioning of a sign over the other two, and vice versa. By isolating to a degree one function, the student begins to identify and know its significance in the sign complex. Thus, the first third of instruction deals with problems of syntax, the sign-object relation in terms of the "grammar" of form (proportion, gestalt principles, symmetry, etc); the second third deals with problems of semantics, or representation with respect to sign-object as well as sign-interpretant correlation; and the last third deals with problems of pragmatics, or the sign in relation to the user/subject, and the evaluation of sign-vehicle and codes.

Traditionally, many design programs focus primarily on syntax, the formal visual structure of communication. However, if the designer is to communicate comprehensively and clearly, the semantic and pragmatic aspects of the process cannot be excluded; aspects of structure, meaning, and use must be considered in a symbiotic manner.

Special attention is paid to semantic issues during the second third of the curriculum. This is introduced through the study of semiotics in a required junior level course and is pursued in various other courses in the department and as individual research at advanced levels. The experience has demonstrated that the introduction to semiotics has been particularly helpful in clarifying the problems in visual communication and sign-production. Because of the unusual quality of this segment of the curriculum, a review of the theoretical basis of the course and projects follow. Since 1974 Thomas Ockerse and Hans van Dijk co-directed and are responsible for the thrust of these studies.[3]

3
Some of the following text was extracted from Hans van Dijk's unpublished thesis "The Role of Semiotics in Graphic Design," 1978.

piccolo
bassoon
french horn
clarinet
oboe
flute

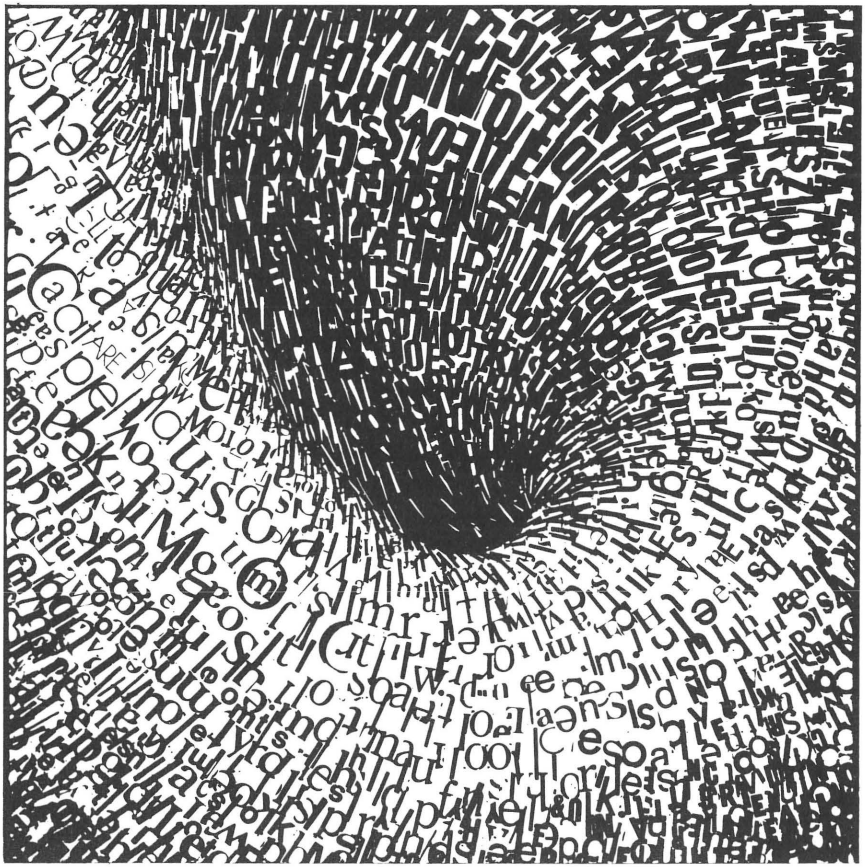


Each of these projects deals with specific modes of *formation* and *transformation* and with the sign-object as well as sign-interpretant relationship. The types of formation and transformation these projects deal with, while considered significant, are not yet classified in a system for sign-production. The labels that identify the processes are chosen rather intuitively, although each of them deals with a specific operation or distinct combination. It seems necessary, though, to start working towards a consistent system of sign-production so that graphic designers can more precisely describe and select the operation which determines specific correlations of signs and their object and interpretant. In the given projects, these dimensions interact rather freely, although sometimes there seems to be a bias towards the sign-interpretant interaction. The relationship between sign and interpretant is a more challenging dimension which specifically supports studies of sign mode translation (such as verbal-visual equations which will be explored later), identifies the range of design decisions a student has to make, and aids the student in his creative development as well. Projects of sign-object relationships seem to be of a more traditional nature (universal signs are an example of this and will be discussed later) and become rather quickly studies of representation versus perception; the abstraction of features and their level of informational content.

All projects described here are not the result of a rigorous analysis of semiotics and do not represent the process of sign-production in some hierarchical order. Although the projects are based on certain semiotic theories or conventions, their origin and relation are still vague and tentative. The modes of production require further testing and refinement. But at least the projects start to define some basic problems and stimulate many more questions than they sought to answer.

Some of the projects deal with equivalencies at the structural or semantical level as influenced by processes of substitution. In other projects, contextual manipulation determined degrees of significance. Some projects (such as the score) mainly concerned with sign-object relations and rules of logical formation in the end become supersigns. The development of a functional signage system allowed for investigation of denotative and connotative dimensions beyond the concern for syntactical consistency. What follows is a description and visual sampling of each problem of sign-production developed thus far.

Supersign: a sign which allows for a complex simultaneity of possible interpretants.



The student is provided with a specific photograph as a starting point and asked to substitute other pictorial elements for the main components of the picture.

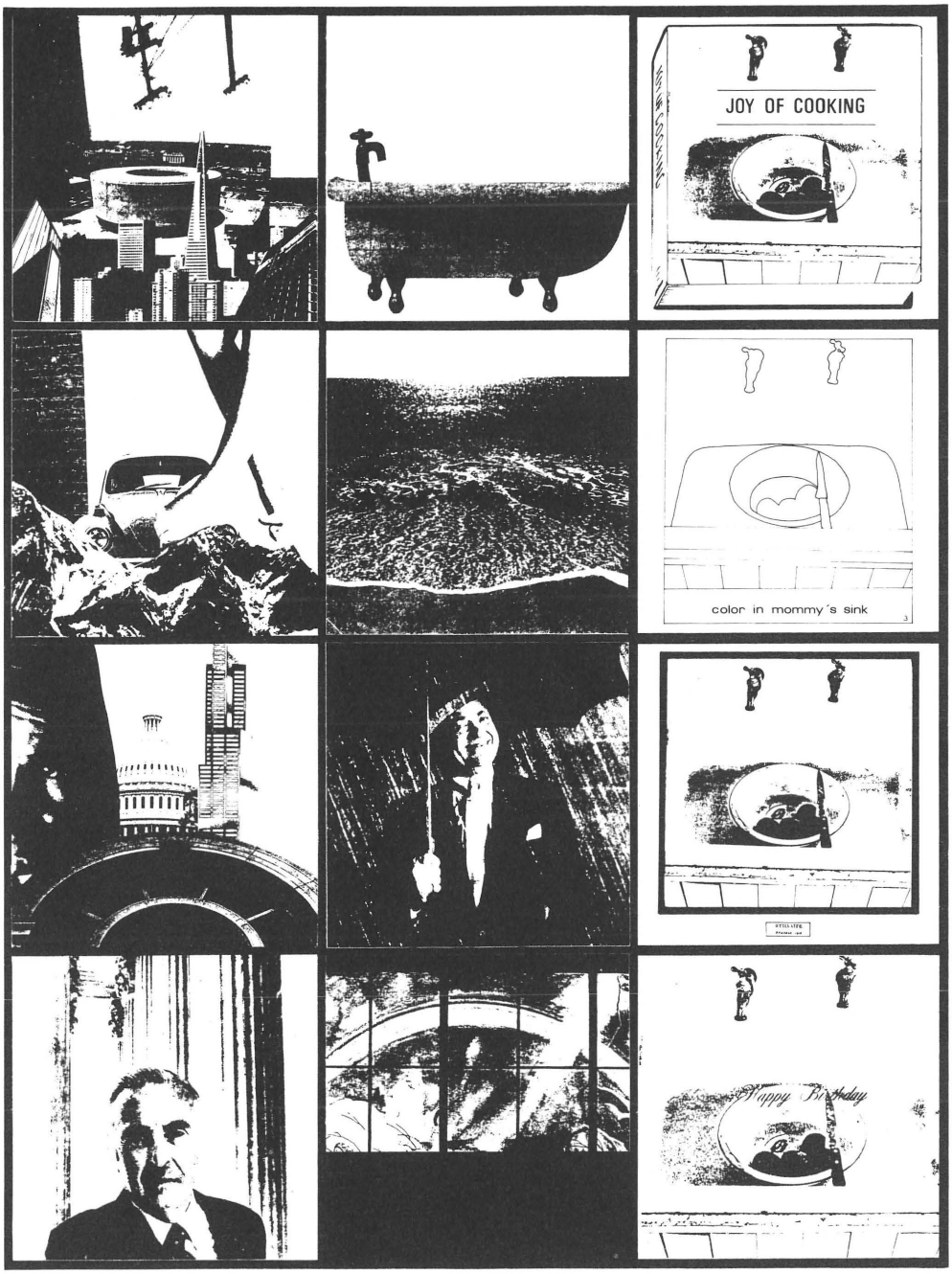
The logic for the substitution is based on either syntactic, semantic, or pragmatic aspects. Consequently three series, each of at least four variations, is developed. Each variation relates in some logical manner to the sign immediately preceeding it.

In the syntactic substitutions, shown in the first row of Figure 2, the changing element in each plate involves replacement of visual forms and structures with other elements which have some formal correlation: two shapes at the top (faucets, telephone poles, legs, etc.); the oval shape in the center; and the slightly angular linear pattern at the bottom. The number of elements and their spatial relation is generally maintained in respect to the preceding plate, although changes occur progressively because of the differences between the substitutes. This part of the assignment emphasizes the interdependence of structure and meaning.

The semantic variations explore the sign-interpretant or interpretant-interpretant relation. Each variation is motivated by something in the sign before it. Consequently, all variations must have some relation to the original sign; all signs could be considered interpretants of one another.

In the final series the students explore the original sign in terms of various potential uses. By superimposing some new sign on the given one, the original significance is transformed: the sign-object relation changes. The same sign can now be connected with a variety of objects.

Figure 2


Syntactic
Semantic
Pragmatic
JOY OF COOKING
color in mommy's sink
Happy Birthday

The kind and amount of information one can convey about a situation or object by means of a sign depends on the contextual conditions of that sign. When one changes one's point of view (physically) with regard to an object or situation, different features are perceived, while features perceived earlier appear in a changed spatial position or disappear altogether. The order in which features are perceived becomes a significant aspect in the representation of a situation taking place in time.

The students represent (by means of photographic slides) several discrete moments of an event taking place in time from as many as eight different points of view. Each different point of view addresses the same discrete moment of the event in question. Consequently, the result takes on the character of a two-dimensional interaction matrix. Along the horizontal rows of the matrix (Figure 3), the steps of the event are listed; each vertical column lists the same step as seen from eight different points of view. This result can be called, after Eco, the expression field about a certain content field. At the end of this process, the students are asked to edit from this entire expression field one sequence which most eloquently, effectively, and aesthetically represents the event.

This part of the project explores variations in the sign-object relationship. These are studied by means of manipulating the environment and focusing in on the significant features by means of photographic operations like focus, cropping, angle, and lighting. The students' editorial involvement with selection of characteristic aspects of the event is also significant. This is a pure semiotic task because it involves identifying the potential of movements, features, and expressions to act as signs.

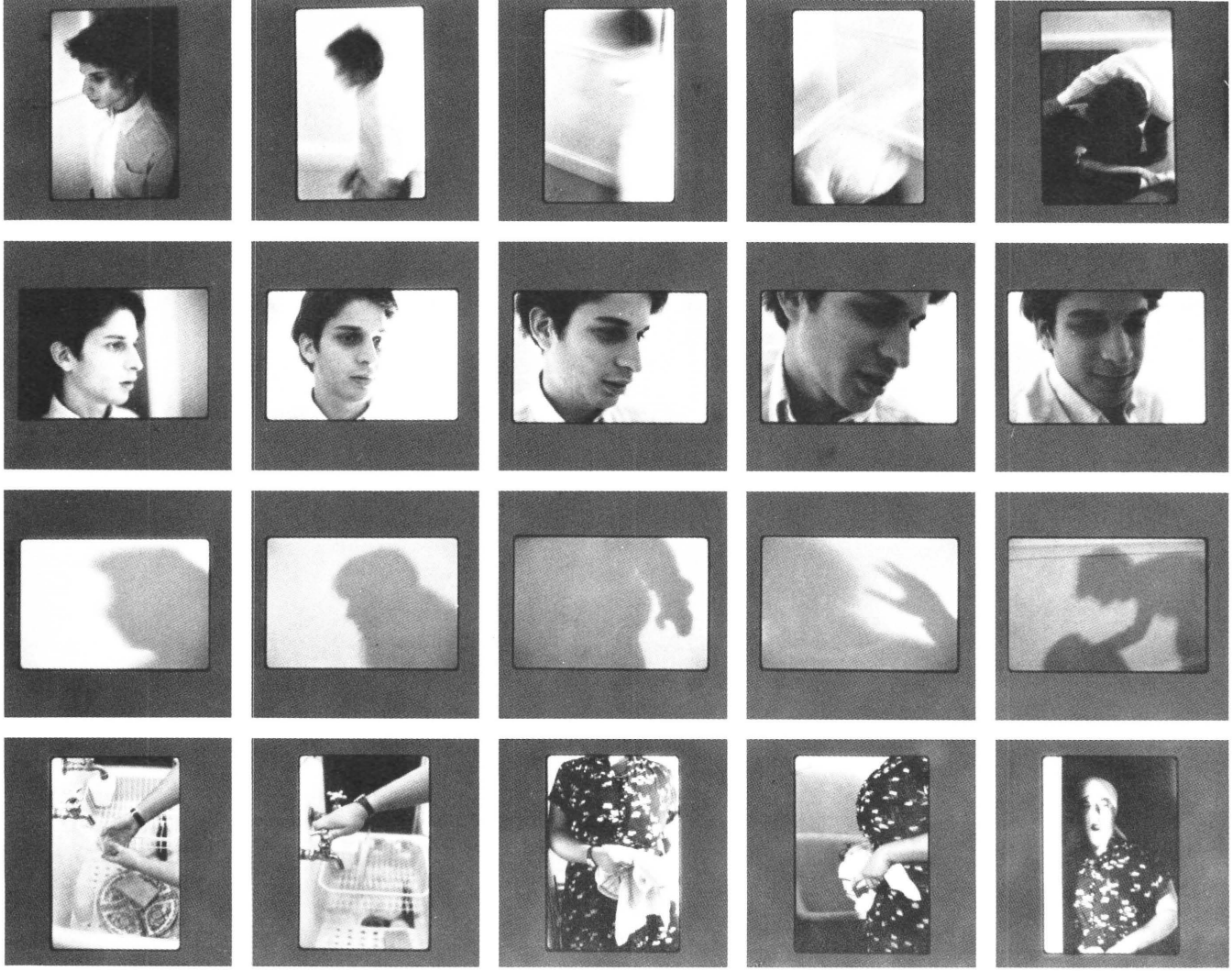


Figure 3

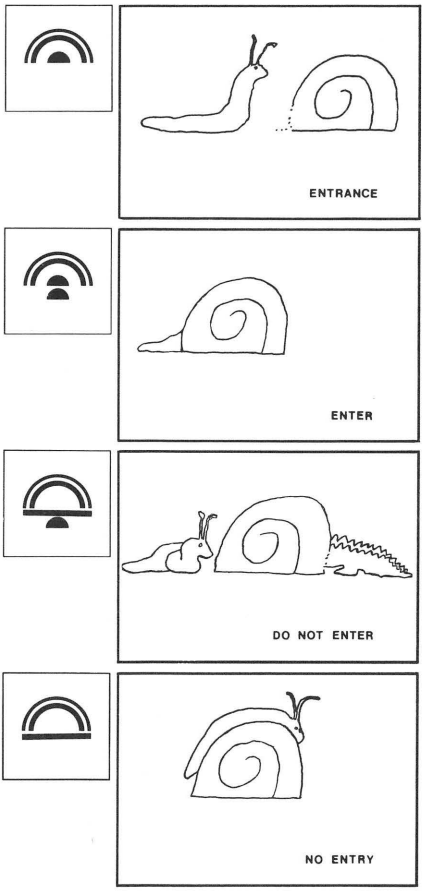


Figure 4

This project combines rules of formation and transformation. It is, as such, the beginning of the development of a logical language. The content concerns a set of international transportation situations, such as entrance, exit, no entry, no exit, enter, do not enter, exit, do not exit (Figure 4). The sign-object relation can be either iconic, indexical, or symbolic, but one mode is to dominate the system. A code which governs the sign-interpretant relation is selected or developed, and is included in the sign system itself as metalanguage.

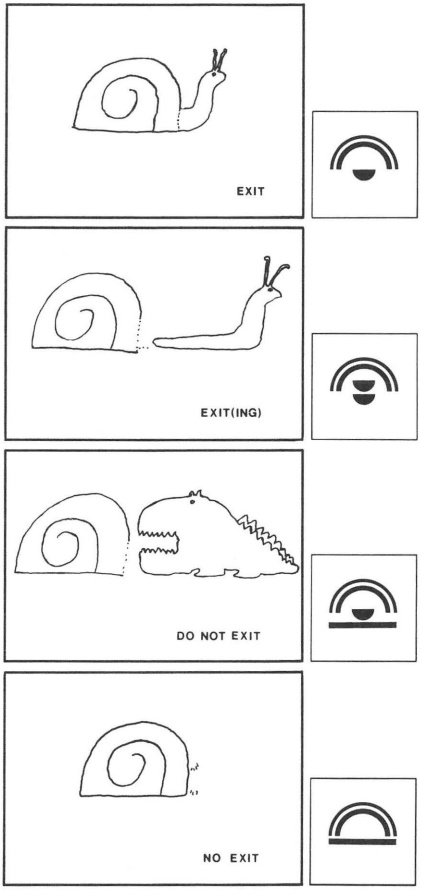
Icon: a sign which has features in common with the object, and characterizes, pictures, or imitates this object.

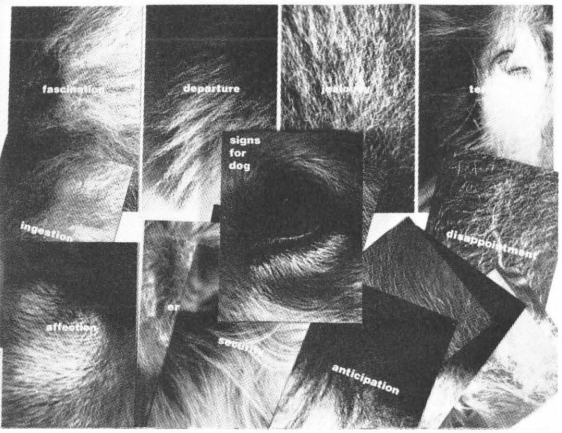
Index: a pointing sign which has direct, causal, or real relation to its object.

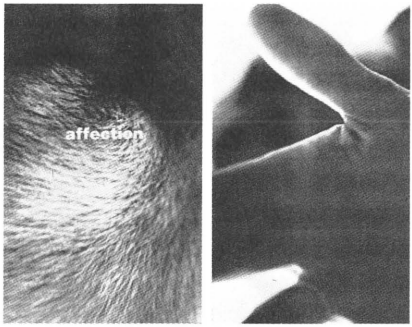
Symbol: a sign which does not depend on likeness, correspondence, or real connection with its object.

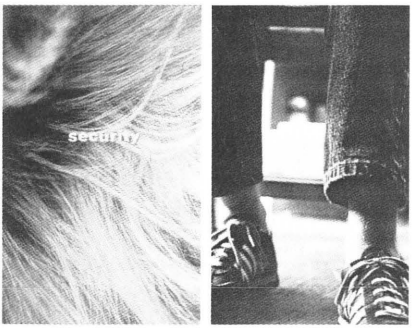
At first, we thought that all solutions would consist of symbolic or functional-iconic symbolic types, because they are so visible in our culture. We were surprised to find that at least one student submitted solutions with strong metaphorical qualities (not to mention the illuminating humor it brought to this downtrodden subject). We also believed that so-called universal signs could be only of a denotative nature but this series shows an entire range of connotative possibilities.

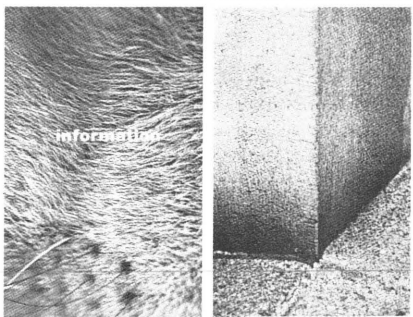
All solutions assume a fixed interpretant relation which is warranted by the pragmatic conditions of the problem of international traffic signs. The interpreter responds in only one way to a given sign; other interpretants stimulated by the sign-vehicle were considered only if they did not divert the desired behavioral response. In this respect, the cartoon-like solution is highly speculative. But since none of the solutions were tested with respect to their pragmatic qualities, this whimsical proposal is equally valid. In fact, this latter solution challenges, ironically enough, rather ingrained notions about international signs.









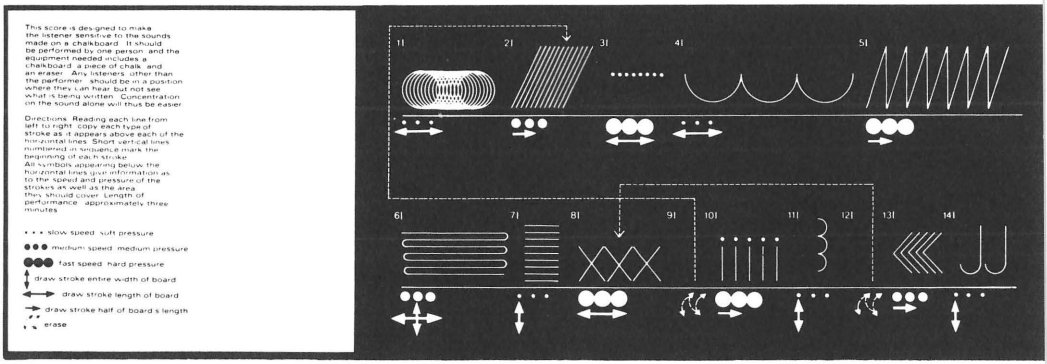


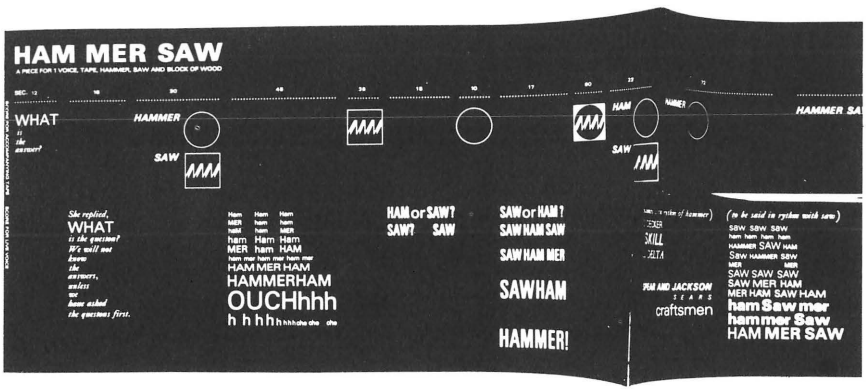
Continuing the exploration of sign/language systems, another assignment asks for the graphic definition of a number of individual parts (signs) but differs from the universal sign problem in that it requires the sum total and interaction of these parts to form another mode of signification. The content is the representation of an "individual" (in this case a dog) through a series of signs in which characteristic actions, qualities, or objects are communicated. (Figure 5).

Figure 5

Scoring an event so that others can reproduce this event at some different time and place involves problems of sign language development, the result of which takes on the qualities of a supersign. An important criteria for scores is that they had to function, as much as possible, without the help of verbal language (Figure 6). Consequently, these scores need strong qualities of metalanguage in order to be understood; to function as tools in the reproduction of the original event. Performing these scores would be, in effect, testing the validity of the sign code and the sign-object relationship as they have been developed by the student. This has not been done to date, but it could be an excellent method for sign system evaluation.

Figure 6





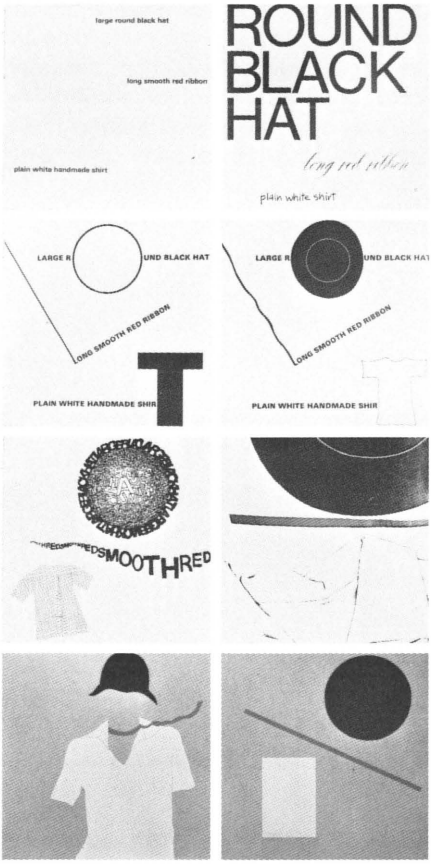
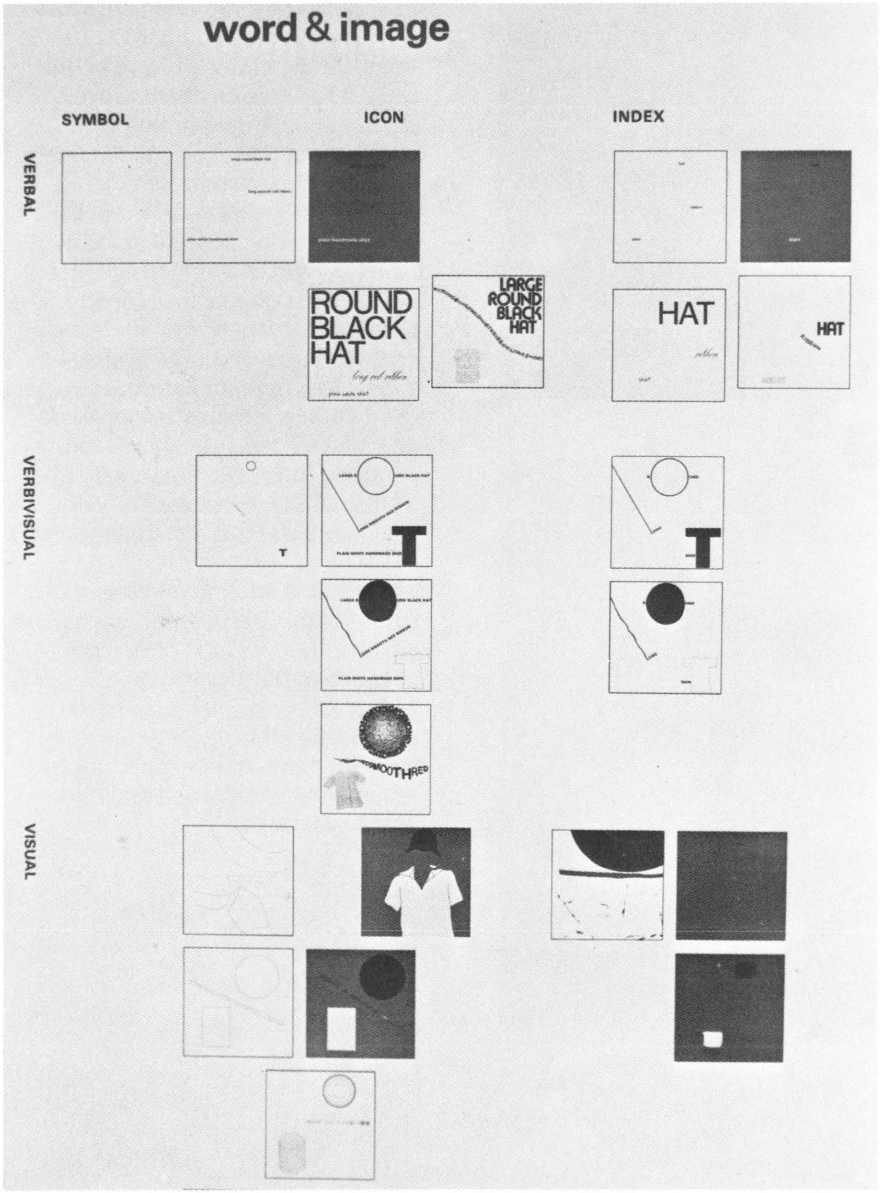


Figure 7

In this project, the students select a simple but expressive text. In a number of steps, they translate from an entirely symbolic-verbal representation, through various iconic-symbolic modes of representation, back to a wholly symbolic but nonverbal situation (Figure 7). In effect, the study explores the semiotic problem of structural correlation of different language systems.

This type of sign correlation is primarily between sign and object; denotative and connotative qualities mix freely. The main objectives are to find equivalencies of either symbolic or iconic nature, and to guide students into questioning the nature of representation. They begin to integrate aspects of sign typology with their intuitive/traditional searches for solutions. An extension of this process could be the description of the codes used in developing the various stages in the classification of the signs on the basis of some morphology as is shown in Figure 8.


word & image
SYMBOL
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INDEX
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ROUND BLACK HAT
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Figure 8

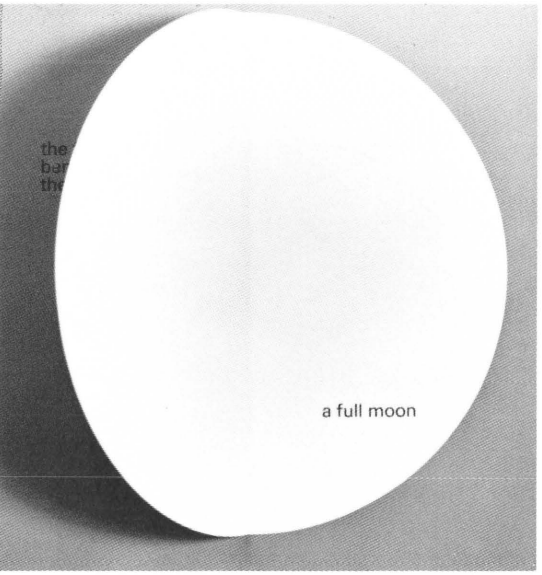


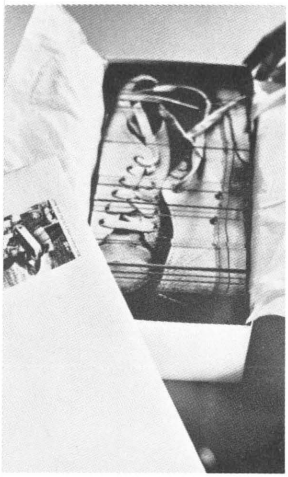
Figure 9

Following the morphological investigation of word and image equations, the continuing phase of that project focuses on connotative possibilities. Transcription of a message (in this case a haiku poem, Figure 9) into an appropriate and more visually concrete language, without altering content is the goal. Development of a single sign in which the syntax of form, space-time structure as well as materials are all considered as essential devices (signs) for communication, and where the resulting atomization of words and images create an increased dependency on visual literacy. In other words, all components involved work holistically in a meaningful way.

The result is a rather complex sign which, in this particular case, can be called a "super-sign." This is *not* because of the sign's syntactic complexity but rather because of the various possible interpretant relations it allows and the opportunity for personal interaction and alternative response.

In conclusion, we show a project by an advanced student, Hilda Stauss Owens. This study develops a visual stimulus system for beginning readers (Figure 10). By using the environment as a source book, it resolves the problem of discrimination between verbal and visuo-kinesthetic learners.

Figure 10



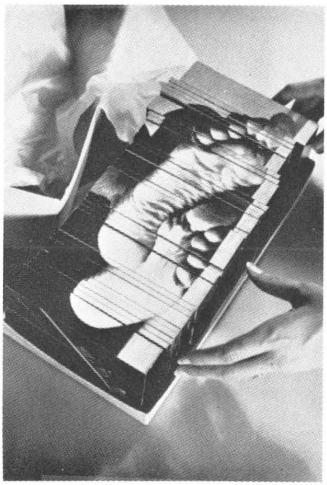


Figure 10

Conclusion

While these studies identify a structural basis from which to view the world of signs, and point a way to implement semiotics in a design education curriculum we realize the tentativeness of our solutions. Problems regarding the sign-interpretant relation and problems of sign-mode equivalency need more close study. Developing strategies for sign usage, with regard to the concept of multiple readings of texts, should be considered in depth, especially concerning functional texts. But at the very least, besides its didactic potential, systems of sign-classification, and methods of sign-production, semiotics provides us with an attitude toward human communication. We are forced to consider with renewed interest our everyday utterances, gestures, and scribbles.

A Language of Form
The Two-Dimensional Isometric System
David Stuhr

The Department of Design at The University of Kansas, under the direction of Professor Richard Branham, has been investigating a new approach to teaching basic design. A more precise understanding of the relationships possible in two and three dimensions has been our goal. The use of classical symmetry theory offers a very precise study of relationships found in many natural and man-made forms and has served as the basis of our search.

Symmetry theory is a powerful intellectual tool which can be used to clarify the nature of relationships found in objects, processes, and ideas. Man typically is aware of and utilizes only a small portion of the relationships possible within a system. He uses only those relationships which are relevent to his questions. Symmetry theory brings to light many of the relationships possible within a system.

A system can be anything we choose to consider. Symmetry theory studies the possible relationships in systems. A system can have any number of possible relationships, and those relationships are limited only by the imagination of the observer; however certain relationships have proven to be more beneficial than others.

The physical scientist deals with the structural relationships present in particles, atoms, crystal, the earth, the solar system, and our galaxy. He has observed (most often indirectly) and confirmed that certain spatial relationships appear to operate in our world. These relationships reflect the order (although never perfectly realized) thought to be present in time and space. Certain of these relationships are included under the concept of *Symmetry*.

Few designers have observed or used the concept of a system of possible relationships operating in their activities, a concept which could lead to more solutions to their problems. Many prefer to reiterate the intuitive and subjective experiences of the past, rather than to identify the framework of a problem and the invariants and transformations possible therein. Symmetry theory can be useful in arranging information and thus facilitating its manipulation in a variety of situations.

Form makers (artists, craftsmen, and architects) have been aware of symmetry relationships for centuries. The band patterns, found on Greek vases and in Greek architecture can be classified through the use of symmetry theory. The Egyptians and Persians have also left evidence that they were aware of the symmetry of two-dimensional space-filling patterns. It is interesting to note that it was the form makers who first discovered and used the possible regular ways of creating patterns, but that it was not until the late nineteenth century that mathematicians confirmed what had been practiced two thousand years before.

Many take as a beginning of symmetry theory a pamphlet by the astronomer Johannes Kepler who in 1611 wrote "A New Year's present; on hexagonal snow." Kepler's uneasy speculation about the possibility of 'the regular geometric arrangement of minute and equal brick-like units' was thought by himself to be of "nothing." Crystallographers have described the characteristic angles between the faces of crystals. This was first done by Stensen in 1669. This led by many routes to the laws of symmetry, the indexing of faces, and the classification of crystals in 32 classes by Hessel in 1830 and also by Gadolin in 1867. The question of how many pure three-dimensional translation lattices exist was solved by Auguste Bravis in 1850. The fourteen lattices Bravis discovered still carry his name. Fedorov and Schoenflies in the 1890's answered the question of how many symmetry operations are possible on a system containing a three-dimensional lattice. However, not until the application of the x-ray in the second decade of the century was it possible to confirm that the symmetry many men had speculated about was indeed present in three dimensions!

Many designers today will think, like Kepler, that this system has no value, nothing to offer them in their creative work—there is no need of considering the structure of the work they pursue. It is very evident that the persons responsible for patterns used on wall coverings, wrapping paper, ribbon, lines of paper goods, and similar products today, are often unaware of the full range of the theoretical relationships which are possible. They manipulate symbols on surfaces, trapped by the constraints of production tools and traditions. These become insurmountable barriers to new creative acts. They are not aware that a system can be manipulated by the use of symmetry to create and maintain a new level of relationships between many apparently divergent products.

Symmetry is the study of relationships. This paper presents the simplest and most easily understood symmetrical relationships. A two-dimensional form is called symmetrical if certain operations leave the form unchanged after the operation has been performed. An understanding of these basic symmetry concepts makes clear the two-dimensional patterns and can lead to the consideration of the nature of other relationships.

The concepts presented in this paper are not new, they have been presented before and are well documented. I have tried to communicate these concepts, to a new audience, an audience unfamiliar with theory. This has lead me to reorder the use of terminology and to develop another notation system. If the concept of symmetry is as powerful as the theorist would have us believe, and I believe it is, it must be communicated and made understandable to a larger audience.

Visible Language, XIII 4. Copyright 1979 by Visible Language, Box 1972 CMA, Cleveland, OH 44106. Author's address: Royal College of Art, House 12, Evelyn Gardens, London SW7.

This paper will enumerate the sets of symmetry relationships which are possible in a very small, clearly defined segment of space. (Others are possible but cannot be discussed in this short paper.) Acquaintance with symmetry can lead to a better understanding of the nature of relationships and to new ways of proceeding to search for new relationships. This basic understanding of the theory of the restraints on the symmetry transformations is not widely understood. In what follows, the possible relationships in a symmetrical system will be illustrated by the familiar letterform, a lower-case Helvetica 'a'.

I chose to use this character for several reasons: it has no mirror planes, such as the characters E, U, v, and w; it has no rotation axes, such as the characters N, s, and z; it has no combination of mirror planes and rotation axes such as the characters H, I, O, 1, and x; and its enantiomorphic form is not another character, e.g., such as in the pairs b and d, or p and q. Also, it is a very aesthetically pleasing letter form.

To introduce the idea of forms in relationship we consider a set of examples. Two forms can be called equal if both share a common description. Two letter forms can be considered equal when they belong to the same language. They can, and often have, other relationships. Of the possible relationships between two letter forms, character form (a, b, c), family of type (serif, sanserif), face (Times Roman, Univers, Helvetica), case (upper, lower), weight (bold, medium, light), and size (40 points, 20 points, 10 points) exist. The study of symmetry deals with forms and the relationships which can be observed between them.

Two letter forms are really not equal if they occupy different positions in space. Two forms separated by time or space are essentially unequal. However, it is possible to set up a standard or a criterion against which one can measure relative equality. Symmetry deals with this relative equality of forms.

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unequal unequal unequal u

unequal

unequal unequa
unequal unequal unequal une
equal equal equal equal equal
equal equal equal equal equal

a ≠ Ω Language

a ≠ Z Character

a ≠ A Family

a ≠ A Case

a ≠ a Face

a ≠ a Weight

a ≠ a Size

a = a

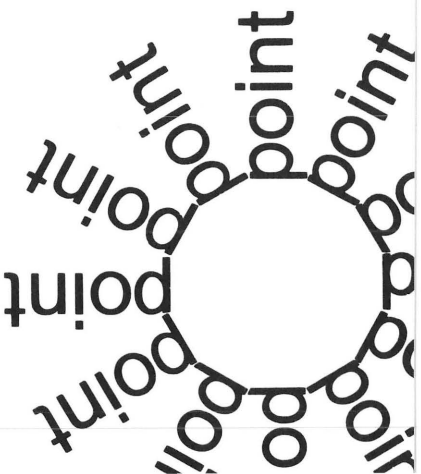
The symmetry systems considered in this paper will be easier to understand if the limits of our consideration are defined. This will allow the concepts and groups of forms to be placed in context. The definitions are quite specific and leave no latitude for interpretation. We define them specifically for two reasons: to identify the limits of consideration and to provide a context within which many forms can be related to each other. Several concepts are defined in the next section so you will be familiar with the context in which they are used in this paper.

Singularity

A point is singular if there are no other equivalent points in the form under consideration. For example, the point at the center of a circle is singular, for there are no other points in the circle which are its equivalent. When a number of points are considered, they will have a specific relationship. For example, on a meter stick there are a great number of pairs of points which are at an equal distance from each other. Because each point of a pair bears a similar relationship to the other, no one such point on the stick can be called singular. Another example is a chess board, where a number of red squares (points) are in the same relationship to the neighboring black squares (points); hence, the squares are equal to one another except for their color. A form has *symmetry* if there is a set of operations—the *Symmetry Group* —which, when applied to the object, leave it apparently unchanged. The concept of singularity can be applied to points and axes of symmetry. A point or axis is singular if only one such point or axis can be located in the set of symmetry operations in the symmetry group of the form.

A point

A point is dimensionless; it defines a position and is the most basic element in geometric constructions. When a point is placed on a plane, it defines a position on that plane. The term "point" in the name of a group indicates that the relationships occur around a singular point. Such a group is called a "point group."



One-sidedness

Consideration is limited to one side of a plane. An ideal plane does not exist in the real world. A piece of paper, often given as an example of a plane, has two distinct sides; a plane in the mathematical sense, however, has absolutely no third dimension. Attention is directed to one side of the plane only. There are groups of forms which explore the possible relationships occurring around the two surfaces of a plane in space, but those relationships are beyond the scope of this short paper. When only one side of a plane is considered, the plane is called one-sided. The term two-dimensional indicates that the relationships occur on one side of the plane only.

A line

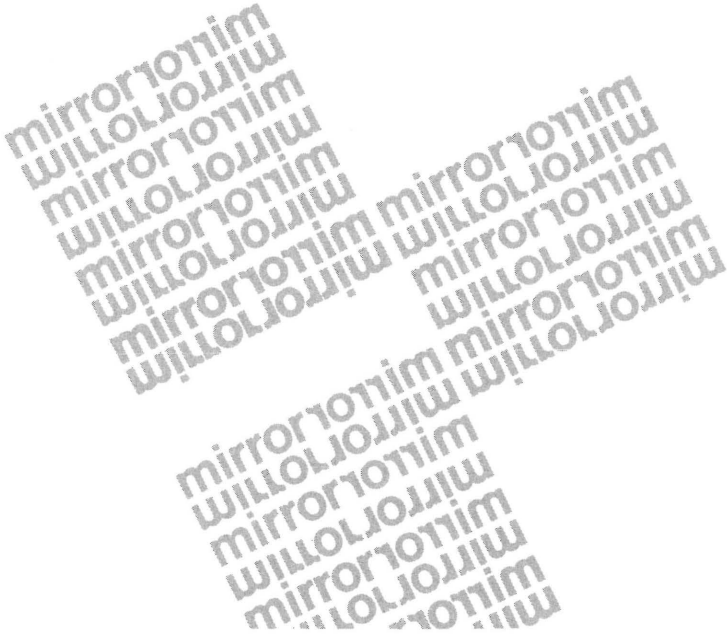
A line can be understood as being composed of a number of points in a certain relationship. No longer can the points which make up the line be called singular, for many points can be identified on the line. When a line is placed on a plane, it defines a direction on that plane. An axis is another name given to a line on a plane. The term mono-axial in the name of a group indicates that the forms occur in relationship to one axis. For example, a certain class of architectural frieze possesses a mono-axial symmetry group. The term bi-axial in the name of a group indicates that the forms occur in relationship to two axis. For example, a wall covering can possess a bi-axial symmetry group.

An isometric system

The group of symmtery operations presented in this paper are isometric. The variable of length is held constant. If a form is a repeated pattern, all lengths in the form are preserved. This means in theory that the forms in the object considered could be repeated infinitely. Other systems can be considered which do not hold the variable of length constant but which hold other variables constant. We are not considering those systems in this paper. The next section of this paper discusses the possible transformations or symmetry operations which preserve the variable of length.

The transformations

A transformation creates a one-to-one correspondence between an initial state and a subsequent state of a system. The transformation is expressed by a rule. An isometry transformation preserves length and creates a congruence among all parts on a plane. It creates a relationship, expressed as a process, which leaves the whole form unchanged but changes the parts. The symmetry operations which are possible on one side of a plane are defined as follows.



A mirror plane—m

The word symmetry generally calls to mind bilateral symmetry. This idea is very old and very familiar, since bilateral forms can be found in many places in our world. Most mammals (including man), fish, birds, and insects exhibit this type of symmetry in their exterior form. Many of the objects that humans make for their own use (chairs, tables, cars, and airplanes) have one half identical to the mirror image of the other half. Often this symmetrical relationship is the result of functional characteristics, but sometimes it appears, apparently, for aesthetic reasons alone. Bilateral symmetry locates a mirror plane between two halves of a form so that the two halves are related as an object is related to its reflection in a mirror.

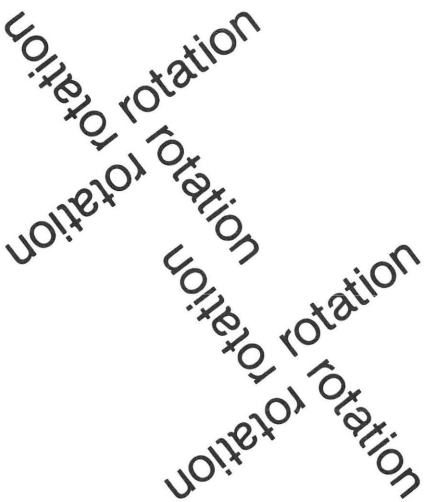
When the symmetry operation of reflection through a mirror plane occurs, the parts of the form superimpose. Similar points on the form can be connected through the mirror plane. Observe that in the form illustrated, corresponding points are located at an equal distance on either side of the mirror plane, and that the connecting lines are at right angles to the mirror plane. Reflection through a mirror plane produces forms which have a mirror plane relationship. A form can have one or many mirror planes in various relationships.

A rotation axis—r

General understanding of symmetry is usually limited to the symmetry operation of a mirror plane. Several other concepts, the first of which is rotational symmetry, need introduction. Not only do rotation axes occur in the natural world, but the principle of rotation has significant application in the inventions of man. The wheel, which is one of man's most useful and labor-saving inventions, is most easily understood as a rotation of a form around an axis perpendicular to its plane. For example, the wheels and gears used in bicycles, automobiles, and tractors rotate around axes. Likewise, the petals on a daisy are arranged in a rotational manner around a stem; and the sections of a grapefruit or the pieces of a pie all are related by a rotation axis.

When the symmetry operation around a rotation axis is repeated, the parts of the form coincide several times. The smallest angle of rotation which causes the form to coincide with itself is called the *elementary angle* of rotation. The distance from the rotation axis to equivalent parts and the angular relationships at the rotation axis are the same for all parts of the object. Repeated rotation of an element through an elementary angle around a rotation axis produces a form which has a rotation axis of symmetry.

The number of times the object superimposes on itself in a complete (360°) rotation is called the *order* of the rotation axis or the *folds* of rotation. A two-dimensional axial object may have from one to an infinite number of identical forms, depending on the order of the axis. A form has any number of one-fold axes, such that if the form is rotated through 360°, it comes back into coincidence with itself. This "one-fold" rotation axis must be included for theoretical reasons. A form that has axes of only one-fold rotation is called an identity. Some forms, on the other hand, have infinite folds of rotation that is, they come into coincidence no matter how small or large the elementary angle of rotation; a perfect circle. Between these extremes, a large number of forms exist which have a specific number of folds of rotation. Illustration of rotation axes is here limited to one-, two-, three-, four-, and six-fold rotation axes, for no other axes of rotation are possible when a whole system is considered which repeats itself, after being moved along lines in a plane.



A translation axis—p

Translation axes occur in the natural world, but the principal of translation has significant application in the inventions of man. Ropes, cables, chains, and wires are examples of repetition by translation occurring in forms made by man. Forms which have translation axes repeat themselves in a given length. They are often used to transmit effort or power over a distance, to hold other forms in relationship, to move information from one place to another, or to decorate a surface. A translation axis may occur along with other symmetry relationships.

When the symmetry operation along a translation axis occurs, the parts of the form coincide several times. The translation does not change the relative positions of the parts of the form but only their positions relative to the other equivalent parts along a straight line. The shortest distance causing an element to superimpose with itself is called the *elementary translation* or *period*. The elementary translation is equal between all neighboring parts of the form, and it may be repeated many times in either direction along the translation axis. Any line parallel to the translation axis is equivalent to the translation axis. The translation axis can be taken to be any line which lies parallel to this form.

Translation axes may occur in one direction or two non-parallel directions on the surface of a plane. When two directions of translation are allowed, four two-dimensional lattice systems can be defined. The two-dimensional lattice systems are defined as having two axes of translation which are not parallel and as having an angular relationship between the two axes of translation. The four lattice systems are called oblique, rectangular, square, and hexagonal. A fifth translation system exists which has a relationship to the rectangular lattice. It is call the centered rectangular or rhombic translation lattice. The measurable qualities of the four two-dimensional lattice systems are discussed in the following section.

translation
translation
translation
translation
translation
translation
translation
translation

The two-dimensional, oblique lattice system has two non-parallel translation periods which are not equal, and the angle between the two translation periods is not equal to 90°.

The two-dimensional, rectangular lattice system has two non-parallel translation periods which are not equal, and the angle between the two translation periods is equal to 90°.

The two-dimensional, square lattice system has two non-parallel translation periods which are equal, and the angle between the two translation periods is equal to 90°.

The two-dimensional, hexagonal lattice system has two non-parallel translation periods which are equal, and the angle between the two translation periods is equal to 120° or 60°. The 60° angle identifies an equilateral triangle which divides the hexagon into six parts.

The two-dimensional, centered rectangular lattice system is related to the rectangular lattice. It is possible to translate to a point in the center as well as to the four usual points associated with the rectangular lattice unit. This is a unique translation which is possible in the rectangular lattice. If this were to occur in the other lattice systems, a unique relationship is not created but only a lattice unit which has translation lengths different from the original length. This relationship is possible in the context of the two-dimensional bi-axial forms. The centered rectangular lattice is often called a rhombic lattice.

A glide plane—g

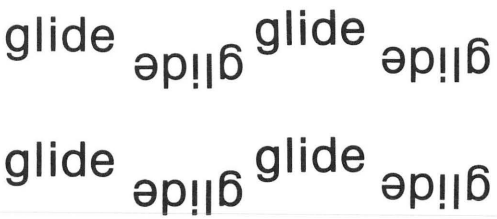
The compound symmetry operation of a glide plane is possible in two-dimensional forms. The glide plane operation can be understood as the sequential application of the reflection and translation operations. The glide plane operation makes a form coincide with itself after reflection through a mirror plane which lies parallel to the translation axis and translation through one half of the elementary translation in the form. If the mirror plane and the elementary translation remain constant, it does not matter which symmetry operation is performed first—the results are the same. If considered separately, the reflection and translation do not make the form coincide with itself; it is the compound operation which makes the form coincide. When performed twice, the glide plane operation creates the elementary translation in the form.

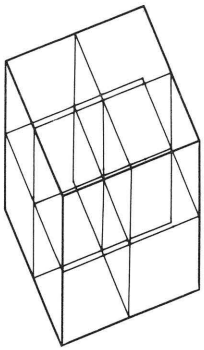
Orientation to the system

As a means of orientation, three symmetrical groups are presented in this paper. A two unit by two unit square can be used to represent the three groups and their relationship to one another.

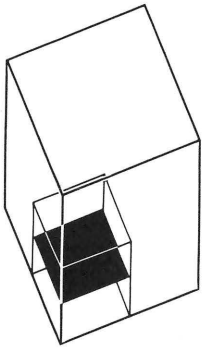
The three symmetry groups will be related by a *general* orientation of the axes in the system. The axes are tools used to understand the relationships in each group and among the three groups. The axes give consistency to certain relationships and are a standard for the notation systems. There are exceptions to the *general* orientation of the axes when three-, four-, and six-fold rotation occurs. The axes identified relate to the forms under consideration, not to the world at large or the usual understanding of axes.

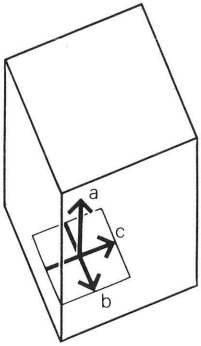
Relationships in the *general* orientation refer to the a-axis pointing off the two unit by two unit square, the b-axis pointing back on the square, and the c-axis pointing to the right in the square. There are specific exceptions to the general orientation of the b- and c-axes, which change with specific rotational transformations.
tions.





Written and graphic notation systems are necessary for the forms which are members of the symmetry groups. The written and graphic notation systems parallel each other. The notation systems are based on a coordinate axis system, which places three axes in specific relationships to one another. The general orientation of axes serves as a standard for all relationships notated. There are exceptions to the general orientation when forms which have three-, four-, and six-fold rotation are considered.





The written notation system

The written notation system uses letters and numbers placed in sequence to denote the symmetry operations found in periodic forms. The written notation has four positions. The first position denotes the symmetry operations of translation, the second denotes the symmetry operations related to the a-axis, the third denotes the symmetry operations related to the b-axis, and the fourth denotes symmetry operations related to the c-axis.

The symmetry operations of a form are symbolized in relationship to the axes with which they are identified. The written symbols in the second, third, and fourth positions denote the symmetry operations related to the coordinate axes. The number 1 is used in the written notation to maintain the relative positions of the written symbols.

In the written notation system the presence of a translation axis is denoted with a letter and subscript in the first position. The primitive translations are denoted with the letter p. The centered rectangular translation net is denoted with the letter c. The subscript used in conjunction with the letter denotes the number of translation axes present; zero denotes no translation, one denotes one axis of translation, two denotes two axes of translation.

The presence of a mirror plane is denoted with the letter m. Mirror planes are noted perpendicular to axes. A mirror plane which is denoted in the b-axis position lies perpendicular to the b-axis.

The presence and order of a rotation axis in a form is denoted with a whole number. Rotation axes are noted parallel to axes. A rotation axis which is denoted in the a-axis position lies parallel to the a-axis, etc.

The presence of a glide plane is denoted with the letter g and a subscript. Glide planes are noted perpendicular to axes. The subscript notes the translation direction present in the glide plane. A glide plane which is denoted g_c in the b-axis position lies perpendicular to the b-axis and has a translation component parallel to the c-axis.

The graphic notation system

The graphic notation system uses symbols placed in relationship to denote the symmetry operations found in forms. The graphic notation has four positions. The first position denotes the lattice unit found in the form, the second denotes the symmetry operations in relationship to the a-axis, the third denotes the symmetry operations in relationship to the b-axis, and the fourth denotes the symmetry operations in relationship to the c-axis.

The symmetry operations in a form are symbolized in relationship to the axes with which they are identified. The graphic symbols in the second, third, and fourth positions denote the symmetry operations in relationship to the coordinate axes. An unfilled space is used in the graphic notation to maintain the relative positions of the graphic symbols.

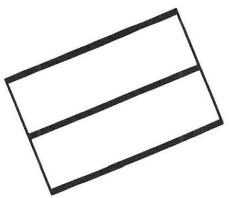
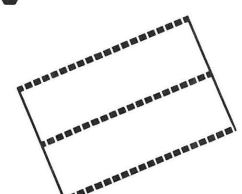
In the graphic notation system the translation unit is denoted in the first position. The translation unit is determined by the symmetry operations in the form. The three coordinate axes are shown in relationship to the translation unit in the first position.

The location of a mirror plane is denoted with a line. Mirror planes are noted perpendicular to axes. A mirror plane which is denoted in the b-axis position lies perpendicular to the b-axis.

The location and order of the rotation axis is denoted with a symbol having the same number of sides as the order of the rotation axis. Rotation axes are noted parallel to axes. A rotation axis which is denoted in the a-axis lies parallel to the a-axis.

The location of a glide plane is denoted with a broken line. Glide planes are noted perpendicular to axes. A glide plane which is denoted in the b-axis position lies perpendicular to the b-axis.

The notation systems for the two-dimensional bi-axial forms

	Printed symbol	Graphic symbol	Operator
Translation axes	p_2 c_2	Various — Dependent upon symmetry operations present	Movement along two axes
A mirror plane	m		Reflection plane
A rotation axis	1	None	One-fold (360°) axis
	2	⬮	Two-fold (180°) axis
	3	▲	Three-fold (120°) axis
	4	■	Four-fold (90°) axis
	6	⬢	Six-fold (60°) axis
A glide plane	g_b		Reflection and a one-half translation length in the b-axis
	g_c		Reflection and a one-half translation length in the c-axis

The groups

Having defined the system, the symmetry operations and an orientation to the system, we can now define the three groups of forms—the two-dimensional centric forms, the two-dimensional mono-axial forms, and the two-dimensional bi-axial forms—considered in this paper, and present the classes in each. It is important to remember that the first group contains a singular point, the second group a singular axis, and the third group two axes.

Group 1
The two-dimensional centric forms

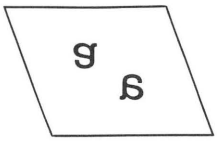
A two-dimensional centric form is a figure which is organized around a singular point on a plane. (The term two-dimensional indicates that the relationships occur on one side of the plane.) The term centric indicates that the relationships occur around a singular point or center. A two-dimensional centric form is a figure which possesses a singular point on a one-sided plane. The space considered in this group of forms, and the transformations which are possible, are limited by this definition.

Two series of forms can be identified by using the symmetry operations of mirror planes and rotation axes in the two-dimensional centric forms. A series is a subset composed of a number of classes of forms which have common transformations. The first series, forms with a single rotation axis—r, is composed of classes which have rotation axes as a common transformation. The second series, forms with a single rotation axis and a parallel mirror plane—r || m, is composed of classes which have as a common transformation a mirror plane parallel to the rotation axes.

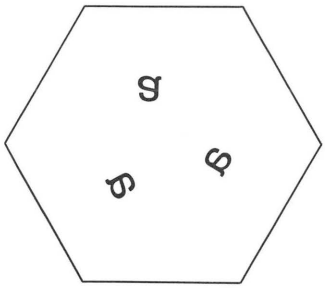
Finite objects on a one-sided plane contain at least one singular point. If more than one singular point exists in such a finite object, it possesses no rotational symmetry other than one-fold axes.

When we consider the limits of the system of which the two-dimensional finite forms are a part, there are only ten classes in the group. Other finite forms are possible, but they lie outside the system. We illustrate the ten two-dimensional finite forms and their notation systems.

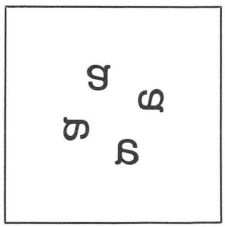
Forms with a single rotation axis—r



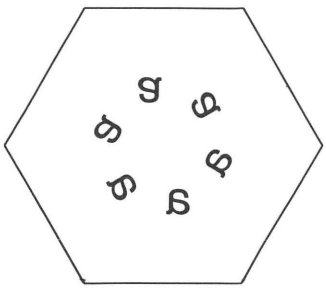
p○ 2 1 1



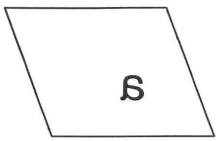
p○ 3 1 1



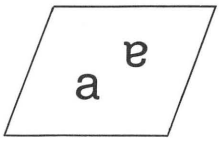
p○ 4 1 1



p○ 6 1 1

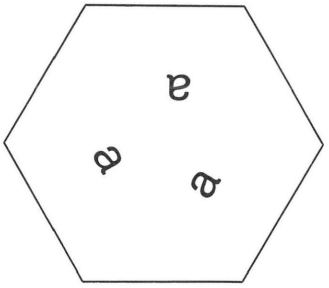


p○ 1 1 1

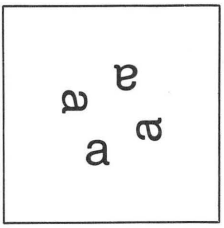


p_o 2 1 1

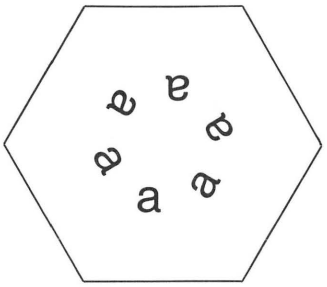
Enantiomorphism is a concept which becomes important when dealing with forms containing only axes of rotation. The transformations around a rotation axis allow rotation in a left-handed or a right-handed direction. Two forms which are constructed of similar parts and which have the same order of rotation are enantiomorphic if they exist as left- and right-handed forms. The two forms have the same shape, size and order of rotation, but they do not coincide when placed on top of each other. An enantiomorphic relationship exists between a form with a single rotation axis and the mirror image of that form.



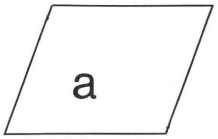
p_o 3 1 1



p_o 4 1 1

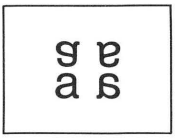


p_o 6 1 1

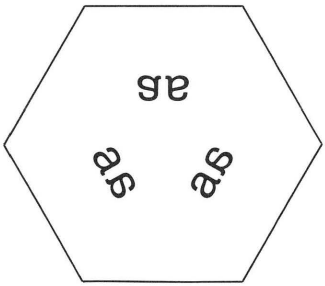


p_o 1 1 1

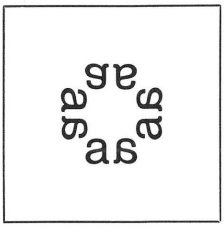
Forms with a single rotation axis and a parallel mirror plane—r || m



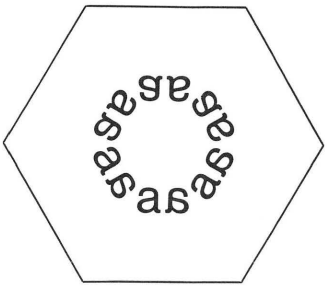
p◦ 2 m m



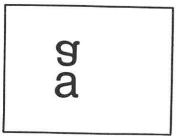
p◦ 3 m 1



p◦ 4 m m



p◦ 6 m m

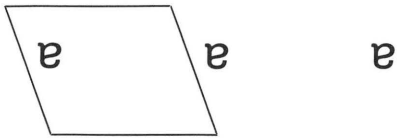


p◦ 1 m 1

Generalizations

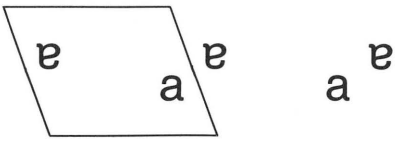
The following generalizations can be made about the forms with a single rotation axis and a parallel mirror plane: the interaction of an *even* order rotation axis and a mirror plane produces two sets of different mirror planes intersecting in the single axis; and the interaction of an *odd* order rotation axis and a mirror plane produces one set of identical mirror planes interesecting in the single axis. These generalizations can be applied to rotation axes of any order, and are denoted in the written and graphic notation of the forms.

Group 2
The two-dimensional mono-axial forms

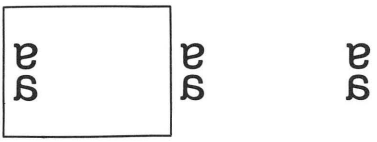


p1 1 1 1

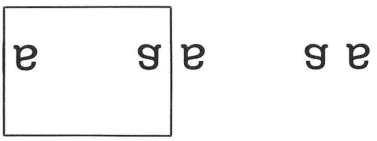
The two-dimensional mono-axial form is a figure which is organized about a singular axis on a plane. The term mono-axial indicates that the relationships occur about a singular axis. A two-dimensional mono-axial form is a figure which occurs about a singular axis, on a one-sided plane. The space considered in this group of forms, and the transformations which are possible, are limited by this definition. There are seven two-dimensional mono-axial forms.



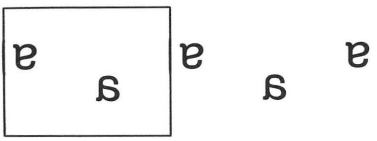
p1 2 1 1



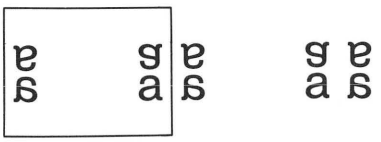
p1 1 m 1



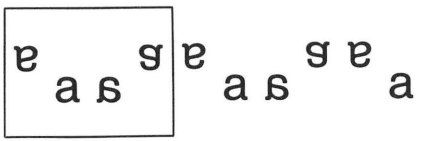
p1 1 1 m



p1 1 gc 1



p1 2 m m



p1 2 gc m

Group 3

The two-dimensional bi-axial forms

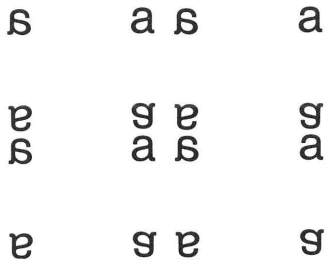
p_2 1 m 1

A two-dimensional bi-axial form is a figure which is organized about two axes on a plane. A two-dimensional bi-axial form is a figure which occurs about two axes on a one-sided plane. The space considered in this group of forms, and the transformations which are possible, are limited by this definition. There are seventeen two-dimensional bi-axial forms.

p_2 1 1 1

p_2 2 1 1

p_2 1 g_c 1



p_2 2 m m

p_2 2 m g_b

c_2 1 m 1

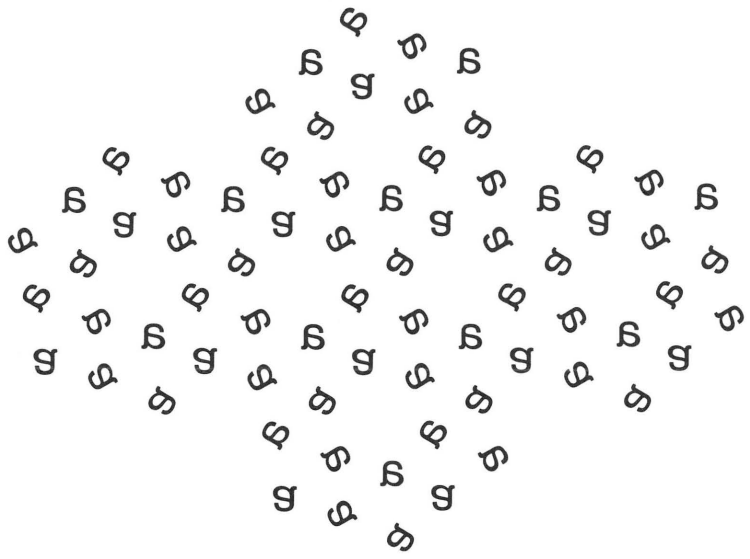
p_2 2 g_c g_b

c_2 2 m m

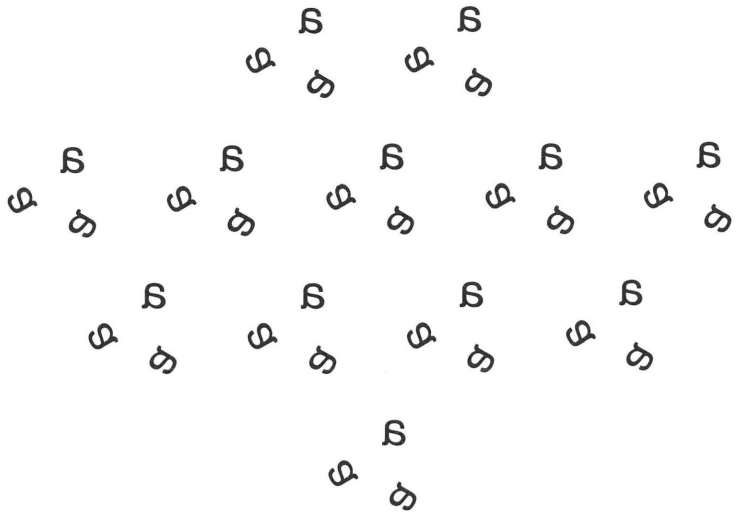
p_2 4 1 1

p_2 4 m m

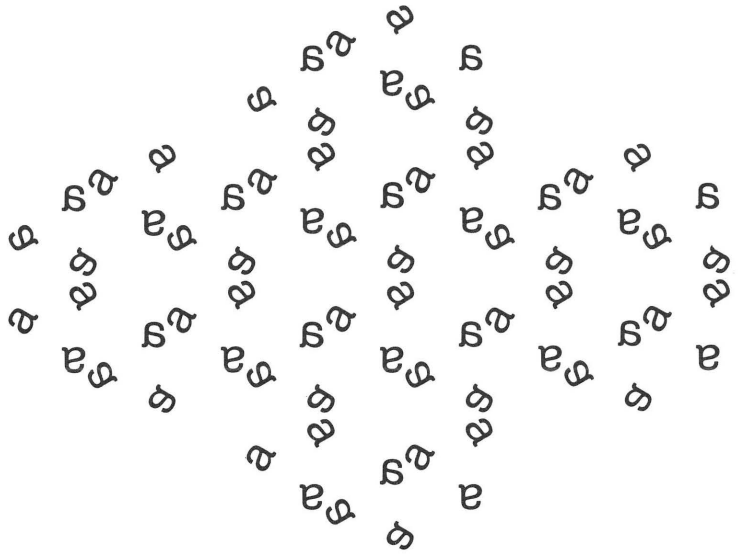
p_2 4 g_b m



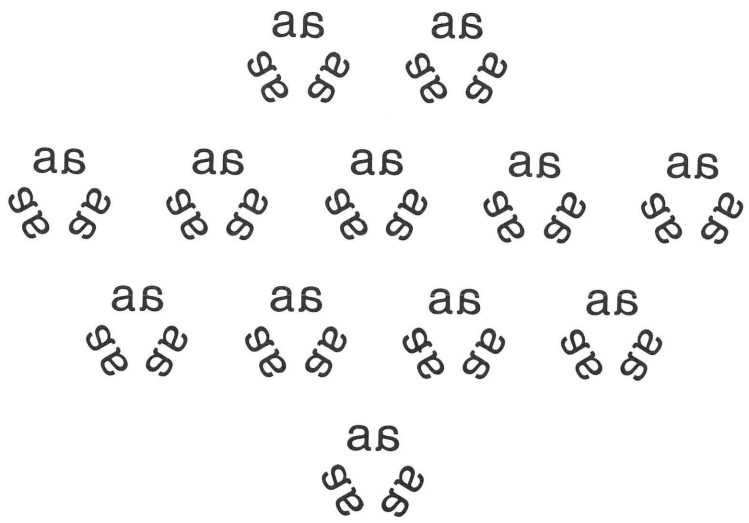
p_2 6 1 1



p_2 3 1 1



p_2 3 m 1

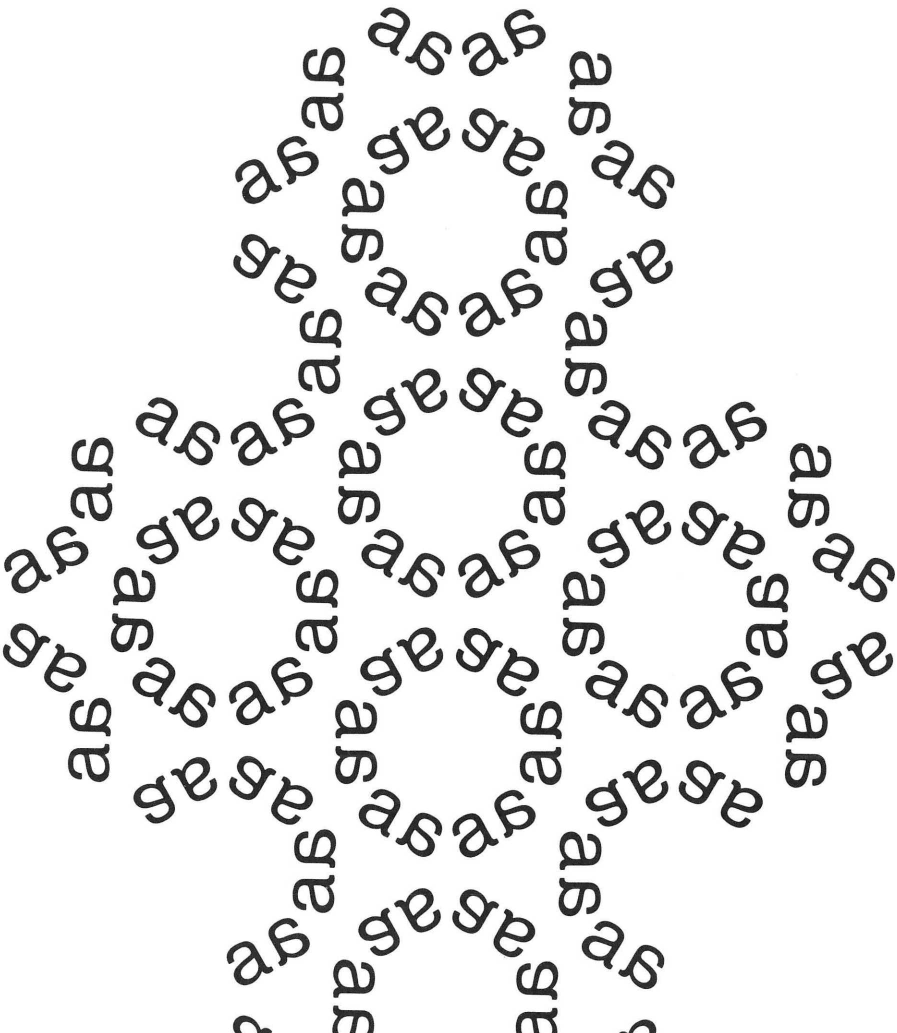


p_2 3 1 m

We have presented the classes which belong to the three groups of the regular two-dimensional forms. The relationships present in these three groups can be applied to an infinite number of forms. Every culture throughout history has made forms which can be understood as belonging to these three groups. Examples range from modern corporate logos to historic wall coverings.

The strength of this system is that it allows consideration of a great number of forms which may not appear to have relationships in common. It looks beyond the surface to the underlying structure of the form and the geometry associated with this time and space. The system considers how the element, an identity, the smallest portion, is manipulated or transformed in relationship. As one becomes familiar with the idea of a system in relationship, transformations are not limited to mirror planes, rotation axes, translation axes, and glide planes but can become any relationship (color, size, placement) which one chooses to consider.

Every problem has restraints, constants, and variables, and it is within these parameters that a number of solutions are possible. Given the restraints of the space considered and the few transformations allowed in the system, the numbers of forms are not great. But when one brings to this system infinite numbers of visual elements (identities), the forms possible become infinite. To know the possible relationships does not limit creativity but gives the information necessary to create. The challenge of discovering visual forms remains, but these forms can reflect the order present in this time and space as man has come to understand it.



p2 6 mm

References

1
The symmetry of three-dimensional forms is listed in: **International Tables for X-ray Crystallography**, Vol. 1., The International Union of Crystallography, Birmingham, England: The Kynock Press, 1952.

Notes on the Visual Differential Theory
Robert A. Manning

Conceptual Framework

The notion of a visual differential is derived from the concept of a semantic differential, a psychological testing technique developed by Charles Osgood[1] at the University of Illinois and used subsequently by numerous researchers.[2] Practically, the visual differential theory first developed out of a need to explain why various types of visual manipulations could result in different kinds of communication design, i.e., information, persuasion, and stimulation. To discover the basis of such manipulatory techniques would be of obvious benefit in education as well as in the practice of visual communication design.

Given this background, the function of the visual differential theory is twofold: it can provide a model for comparative visual analysis, and it can provide a framework which will enable a student to consciously expand his visual vocabulary.

That a visual differential exists is an observable phenomenon. In her book, *A Primer of Visual Literacy*, Dondis presents many bi-polar adjectives as a means of describing the visual forces at work in various examples of communication design. Balance-instability, unity-fragmentation, subtlety-boldness, transparency-opacity are only a few of such pairs used in her work. Other writers on visual fundamentals have generated similar lists of bi-polar adjectives.

In order to develop a paradigm of visual manipulation and a subsequent theoretic model, the complexity inherent in visual communication has to be reduced; i.e., stated with a minimum number of components.

Conceptual Model

The visual differential theory is based on three[3] components. Investigation reveals that some concepts in visual communication design are prime; and by their innate virtue as basic ideas (or collections of ideas) have become the components upon which the model is based. The three components are: order, graphic, and literal modes.[4]

Since the three dimensions of the visual differential theory are based on semantic differential technique, a list consisting of bi-polar adjectives is required to define each of the components of the theory.

Many pairs of words were generated and tested through their application to images and with computer aided correlation studies of responses. The lists used here to define each mode (order, graphic, or literal) have evolved as a result of such testing and reliability studies. They are not absolute and other reliable lists could be generated and used for the same purpose. The bi-polar adjectives and their reliability will vary depending on who develops them. It is important that the lists of word pairs[5] support the notion of the mode for which they are generated.

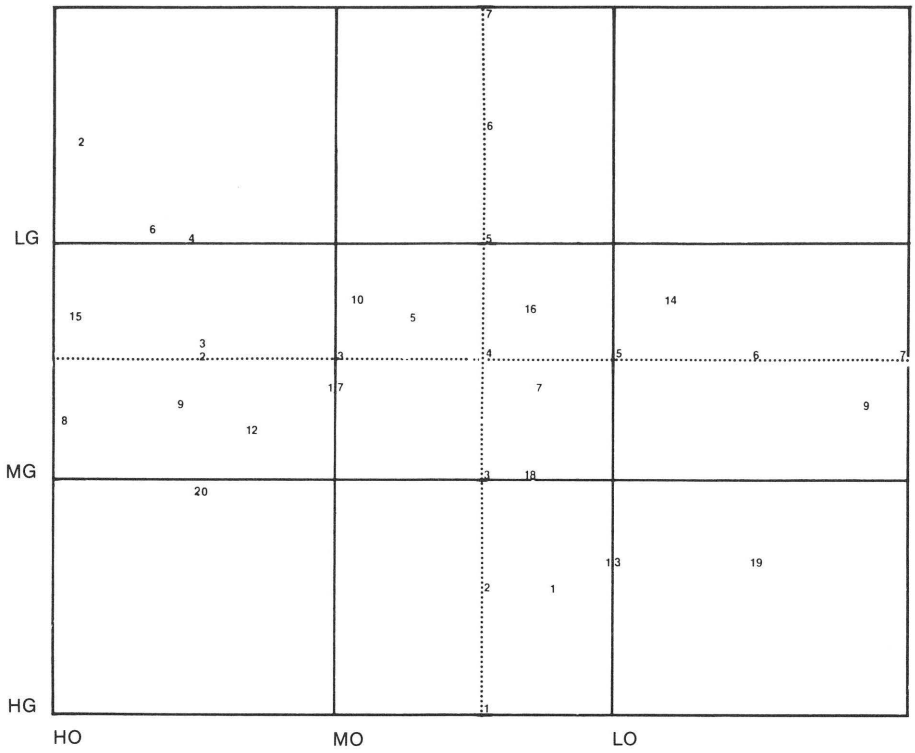


Figure 1
SEMMAP presentation of twenty images in relation to the graphic and order modes.

Lists of bi-polar adjectives were developed collectively by groups of about twenty people. This was done essentially as a democratic process with much discussion of the virtues of the word pairs and their application to the scales which they define. The lists were then systematically reduced to five pairs each to facilitate the parameters of the computer program SEMMAP (Semantic Mapping Program) subsequently used.[6]

The SEMMAP program produces two-dimensional maps of concepts seen from the viewpoints of individual observers or groups of observers. Concepts may be ideas, objects, people, or anything that may be evaluated using bi-polar semantic differential scales. The location of concepts on a map is determined by two coordinates representing position on the two major axes, or factors, defining the semantic space mapped. Coordinates are calculated by averaging the values from two or more bi-polar adjective scales highly correlated with the individual factors.

Two runs are made in a normal mapping study. The first run produces a correlation matrix for all the scales used (up to 10). From this matrix, scales are selected that correlate well with the intended factors. In the second run the designated scales are used to calculate two dimensional coordinates for each concept and maps are produced from the view point of any individual observer or group of observers. A master map is printed averaging the views of all observers and identifying concepts by number (Figure 1).

Order Mode

Bi-polar adjectives generated for the component, order, are shown in Table 1.

The top of the scale represents the theoretic maximum order[7] (high order, HO) and the bottom, the theoretic minimum order (low order, LO) regardless of which combination of bi-polar adjectives is used. It is also implied that this is a sliding scale and the exact middle represents medium order (MO). All other points in between maximum and minimum order represent degrees of orderliness. Simply illustrated with lines, the scale can look like this (Figure 2).[8] The logotypes juxtaposed with the linear presentation show how this mode can be used to analyze an existing category of design.

Table 1

Order Mode

Maximum* or High Order		Minimum* or Low Order
orderly	— — — — — — —	chaotic
geometric	— — — — — — —	amorphic
formal	— — — — — — —	casual
modular	— — — — — — —	erratic
systematic	— — — — — — —	sporatic

Supports the notion of High Order

Supports the notion of Low Order

*Maximum and minimum, high and low are relative terms indicating opposite ends of the scale and do not indicate the desirability of a characteristic.

Figure 2
Order scale and its application in analyzing logotype design.

High Order (HO)
Medium Order (MO)
Low Order (LO)
IBM
RCA
EATON
SHULTZYS

Graphic Mode

The graphic mode describes the use and manipulation of basic visual elements such as line, plane, volume, color and value, texture, number of elements used (complexity), scale relationship, and juxtaposition.

The graphic mode, like the order mode, can be described with bi-polar adjectives which help to define the term graphic (Table 2).

The graphic mode also makes use of a sliding scale from the theoretic maximum[9] to the theoretic minimum. Similarly, a graphic scale could be illustrated as follows (Figure 3). Again, existing elements from the world of communication design, i.e., abstract trade marks, show the application of the graphic mode as an analytical device.

Table 2

Graphic Mode

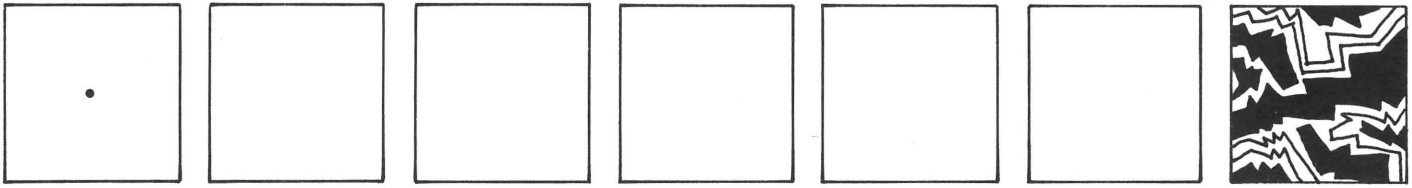
Maximum or High Graphic		Minimum or Low Graphic
spatial	— — — — — — —	flat
heterogenic	— — — — — — —	homogenic
active	— — — — — — —	passive
bold	— — — — — — —	weak
exciting	— — — — — — —	dull

Supports the notion of High Graphic

Supports the notion of Low Graphic

Figure 3
Graphic scale and its application in analyzing abstract visual elements.

(The reader may fill in the rest of the scale.)



Low Graphic (LG) Medium Graphic (MG) High Graphic (HG)

Literal Mode

The third and last component of the Visual Differential is the literal mode. A conscious attempt has been made to avoid representing images of people, objects or places; that is, content was eliminated in order to keep a focus on the key idea of each of the two previous modes, i.e., order and graphic.

The literal mode, however, can be thought of as a scale of ambiguity with real, or content images at one end and no-content at the other. The semantic differential which supports these notions is shown in Table 3.

The literal scale can be further defined in a very simple way (Figure 4). The literal character of the bird symbols are apparent, and in relationship on the scale, clearly show alternative possibilities.

Table 3

Literal Mode

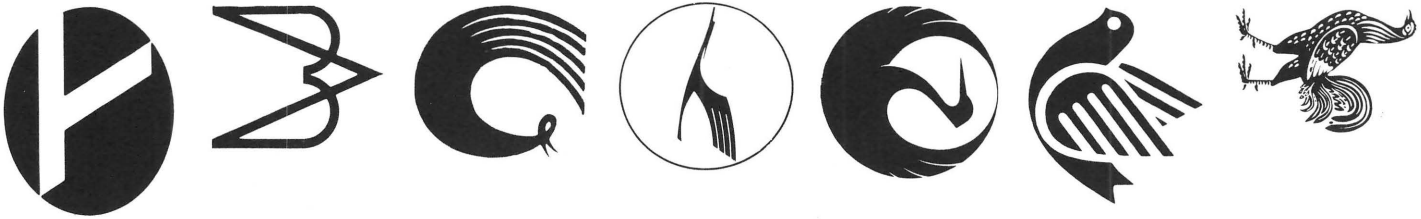
Maximum or High Literal		Minimum or Low Literal
representation	— — — — — — —	figurative
meaningful	— — — — — — —	meaningless
actual	— — — — — — —	symbolic
real	— — — — — — —	abstract
understandable	— — — — — — —	ambiguous

Supports the notion of High Literal

Supports the notion of Low Literal

Figure 4
Literal scale and its application in analyzing bird-form trademarks.

Low Literal (LL) Medium Literal (ML) High Literal (HL)



Sign

Abstract

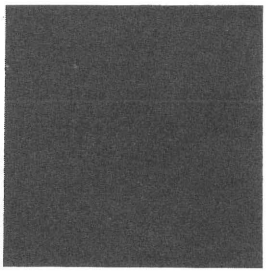


Figure 5
An example of literal scale played out using Frank Lloyd Wright as content for communication.

Drawing

To illustrate the literal mode in another way, consider an individual as an example on a scale from real to abstract (Figure 5). Real is physical presence and in terms of visual representation it is the least ambiguous. Less real on the scale would be a representational model of the individual or a robot made to represent physical attributes. Next would be a bit of film footage, a holograph and then a still photograph. With each change of code as we move toward the low literal end of the scale the potential for transmitting information about the individual decreases. A drawing or sketch transmits less to the decoder than the previous examples as will a mechanical drawing or a diagram of body functions. Next, design a sign or mark which represents the individual (for instance, a typographic sign could be a name). Last on the scale is an abstract image of the individual. This communicates only speculative and ambiguous information.

Diagram

Frank Lloyd Wright

Model

1869 born

civil engineering
student, University
of Wisconsin
worked in Adler &
1889 Sullivan Office

1892 Winslow House

Photograph

1903 Larkin Building

1908 University Temple
Coonley House
1911 Taliesin

1914 Midway Gardens

1922 Imperial Hotel

1937 Kaufman House
1938 Taliesin West
1939 Johnson Administration

1943 Guggenheim Museum
1944 Tower

1952 Price Tower

1959 died

Application

Experiments which focus on each of the three components of the visual differential are a means to expand one's visual vocabulary in a systematic way. For example, try studies using just color and form (no-content image) to create an illustration of high order. Next, create an illustration of high graphic. Each illustration can be attempted without regard to the other component. In this manner the effect of the isolated component can be more readily understood.

As soon as one becomes familiar with the independent effects of the order and graphic modes these components can be thought of as factors which operate simultaneously within a visual composition. The following example utilizes letterform as the element of manipulation (Figure 6). These nine permutations of order and graphic demonstrate some possible ways a systematic manipulation of letterforms can be achieved.

A single letterform can be said to have content as compared to an abstract form which verges on no-content. Some letterforms have greater potential for recognition than do others as well as increased potential for intelligibility. The letter I, for example, can stand alone as opposed to the letter, Q, which needs other characters to support it. The letterform H,[10] as used in Figure 6, is a form (to people who use our alphabet) with some content and is therefore less ambiguous than a letter from a non-Roman alphabet. It is interesting to note that the manipulations consistant with the visual differential of order and graphic clearly affect the literal level of this letter. Stated in another way, the semantic of the letter H is affected by the aesthetic treatment employed. This will be generally true regardless of the image used or its literal level at the start of the manipulation.

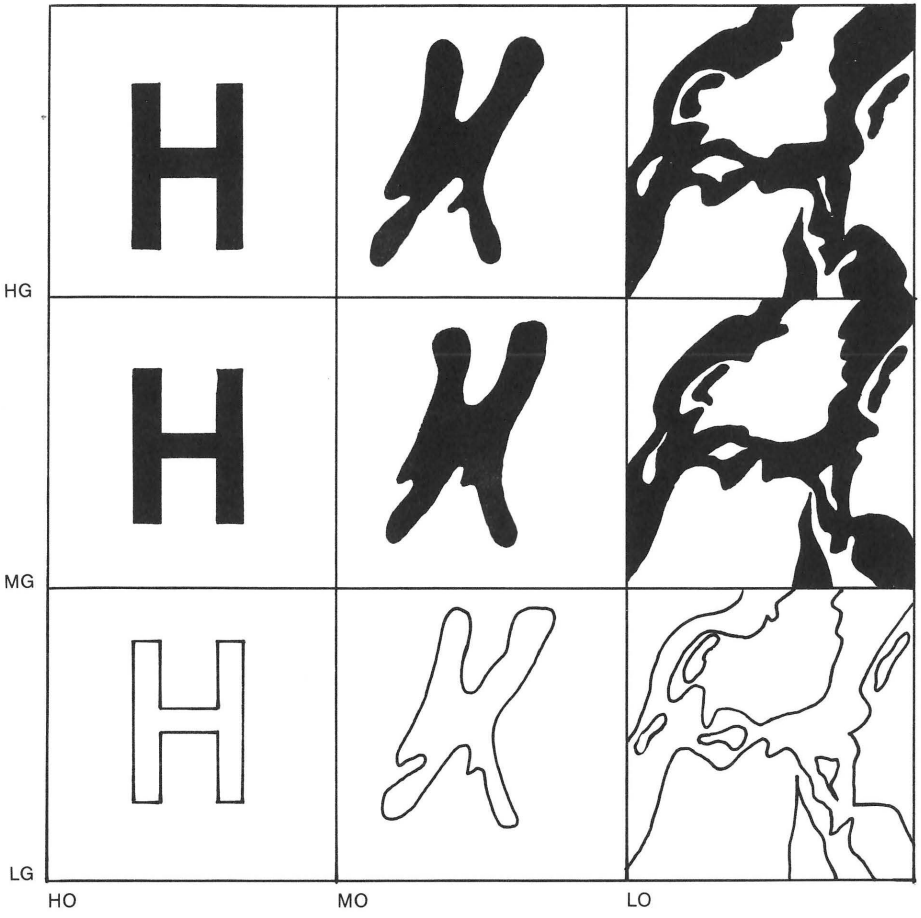


Figure 6
An example combining order and graphic modes.

As the visual information bit count increases in a potential message, the opportunity for greater variation in the image also increases. Manipulation of the order and graphic differential results in increased ambiguity, which is magnified by a high visual bit count. The more complex the message, the more delicate the relationship of the parts to the whole. Consequently, ambiguity can be more easily created in complex messages. This is more quickly noticed if the delicate balance of the syntax and content of the message is manipulated along with the visual order and graphic treatment. Examples of these kinds of manipulations can be found in commercial print advertising almost everywhere (Figure 7). In addition to the potential loss or distortion of information which often results from poorly managed designs, another effect is a loss of integrity of the merchandise or service advertised.

From assembly instructions, powerful advertisements, to expressionistic art forms, all kinds of visual communication can be roughly characterized as some combination of high, medium, or low, literal, graphic, and order. Specifically, information, persuasion, and stimulation design can be identified on the visual differential model in a general way and as such the model offers a guide to basic application (Figure 8).

As a design project or just as a mental exercise try to generate a list of examples that could fit specific areas of the model. What is (or could be) an example of high literal, high graphic, and high order? It is interesting to speculate like this with all twenty-seven permutations of the model.

Such design problems become the basis for a systematic study of the effects of visual manipulation on communication. Although it is fascinating to theorize about these results, the real value ultimately depends on reliable testing and application of the findings to the practical problems designers face.

Figure 7

WIN UP TO 1,0

PICK UP YOUR DOUBLE PUNCH BOARD BINGO COLLECTOR CARD AT YOUR NEARBY DOMINICK'S!

$1000.00 G. DYER CHICAGO

$1000.00 C. TOZER WINNETKA

$1000.00 E. HAROLD HILLSIDE

$1000.00 P. WATKINS ELGIN

Prize Value	
1,000	
250	
100	
50	
10	
5	
1	
TOTAL	

FREE

$280,000 IN CASH PRIZES

EMS ON SALE THURSDAY JUNE 15
WEDNESDAY JUNE 21, 1978
OTHERWISE INDICATED.

DOMINICK'S RESERVES THE RIGHT TO LIMIT QUANTITIES ON ALL ADVERTISED AND FEATURED ITEMS.

Dominick's FINER FOODS

WIN!

- 1978 MALIBU WAGON
- SIX FLAGS WEEKEND

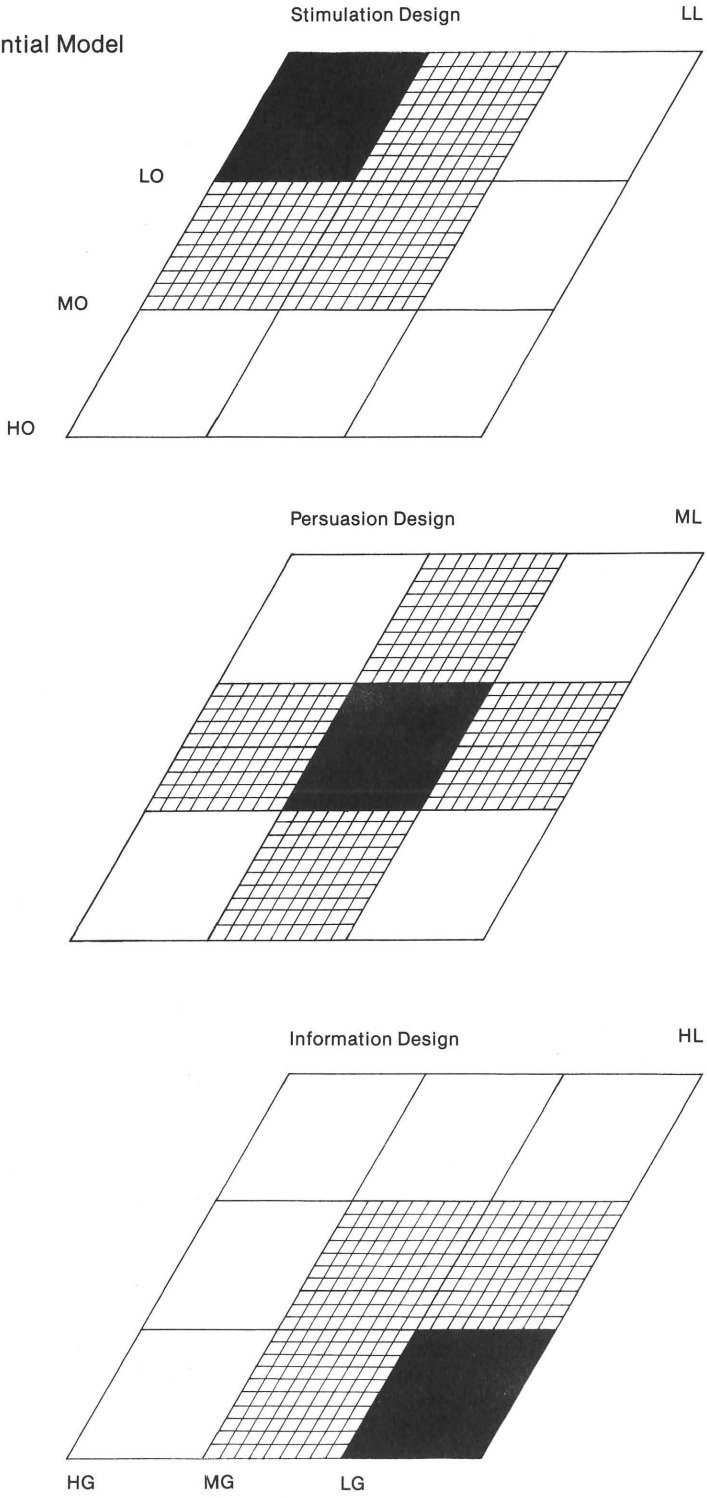
SEE DETAILS ON BACK OF THIS CIRCULAR

BLA

ASHIONED
RY STYLE
ICED
CON

LIMIT 3 PLEASE

Figure 8
Visual Differential Model



Stimulation Design

Low Literal
Greater ambiguity results in a sense of insecurity and vulnerability. Provides a focus on form.

Low Order
Creates a sense of disorientation, diminished stability, and increased visual stimulation.

High Graphic
Contributes to sensory overload and anxiety.

Persuasion Design

Medium Literal
Provides literal options–some ambiguity important to persuasion process.

Medium Order
Flexible structure permits interaction between content and form.

Medium Graphic
Controlled visual excitation contributes to the persuasion process.

Information Design

High Literal
Real phenomenon or reliable representation provide content focus.

High Order
Supports presentation of information.

Low Graphic
Non-distracting graphic level supports a focus on content.

References

1
Osgood, C.E., Suci, G.J., and Tannenbaum, P.H. **The Measurement of Meaning**. Urbana: University of Illinois Press, 1957.
2
A similar example of this approach can be found in: **An Approach to Environmental Psychology**, Albert Inehrabian and James A. Russell, Cambridge: The MIT Press, 1974.
3
It is possible to add dimensions to the basic model. For example, the author has often used an aesthetic mode as a supplementary dimension.
4
The author is aware of the problem of semantics, that is, what should be called by what names. The words "order" and "literal" are usually defined by others in a manner consistent with the author, but difficulty is sometimes encountered with the term "graphic."
5
Correlation studies should be done to test the reliability of the words which are thought to be synonyms.
6
The SEMMAP program was used through the courtesy of its author, Charles Owen, Professor of Design, Institute of Design, Illinois Institute of Technology, Chicago.
7
It must be remembered that all the component names apply to the visual state. It is understood that there are other kinds of order than visual, i.e., mathematical, etc.
8
Visual order can be ascribed to both form and the position of form within a given space.
9
It is sometimes difficult to determine when an illustration has reached the point of maximum graphic. When the further addition of visual elements or increased juxtaposition yields no increased sensory stimulation for an individual observer, it may be assumed that the illustration represents an example of high graphic for that individual. It is the author's experience that a concensus of opinion can be reached in the determination.
10
The letterform "H" was chosen for use as an example because it is visually a high order configuration by virtue of design.

The Graphic Information Research Unit: Background and Recent Research

Linda Reynolds

About the Graphic Information Research Unit

The Graphic Information Research Unit was established by Herbert Spencer at the Royal College of Art in 1966, under the name of 'Readability of Print Research Unit'. It was initially supported by a two-year grant from the International Publishing Corporation, to investigate problems of legibility in information publishing. The study was mainly concerned with the evaluation of research to date, and with the compilation of a comprehensive bibliography. The results were published by Professor Spencer in 1969, under the title 'The visible word: problems of legibility'[1].

This first project was followed in 1969 by a commission from the Post Office to investigate various aspects of the legibility of telephone directories, including the implications of the addition of post codes and the effects of using tinted papers.

In 1971 the Unit commenced work on the first of a series of projects for the British Library Research and Development Department (BLR&DD), formerly the Office for Scientific and Technical Information. This three-year project comprised five experimental studies. The first of these was concerned with the relative legibility of alternative letter shapes[2], with a view to the design of a single alphabet utilising a mixture of the most legible upper and lower case character forms. Such an alphabet, it was felt, could be of use in situations where, for technical reasons, only one set of 26 letters is available.

There then followed three experiments relating to the design of bibliographical materials such as reading lists and library catalogues. The effectiveness of selected typographic variations was first of all studied out of context using non-typographers as test subjects[3]. Typographic variations and spatial coding devices were then used to create ten different styles of presentation for typewritten bibliographies[4], and eighteen different styles for typeset bibliographies[5]. The relative effectiveness of these different styles was objectively assessed in both cases by asking subjects to perform a realistic task on bibliographies presented in the different styles and by measuring the amount of work that they were able to do within a given time period. The last experiment was concerned with the effects of poor quality reproduction on the legibility of different typefaces[6]. Texts set in Baskerville, Rockwell, Times New Roman and Univers (Figure 1) were subjected to image degradation in the form of various degrees of thinning-down or thickening-up of the type image, and to the introduction of background 'noise' in the form of a random dot pattern. Legibility was measured by means of a scanning task.

This work was followed by further investigations on the effects of various kinds of visual 'noise' on legibility. Four different background patterns, including a continuous tone, two regular dot screens and a random dot screen, were studied at dif-

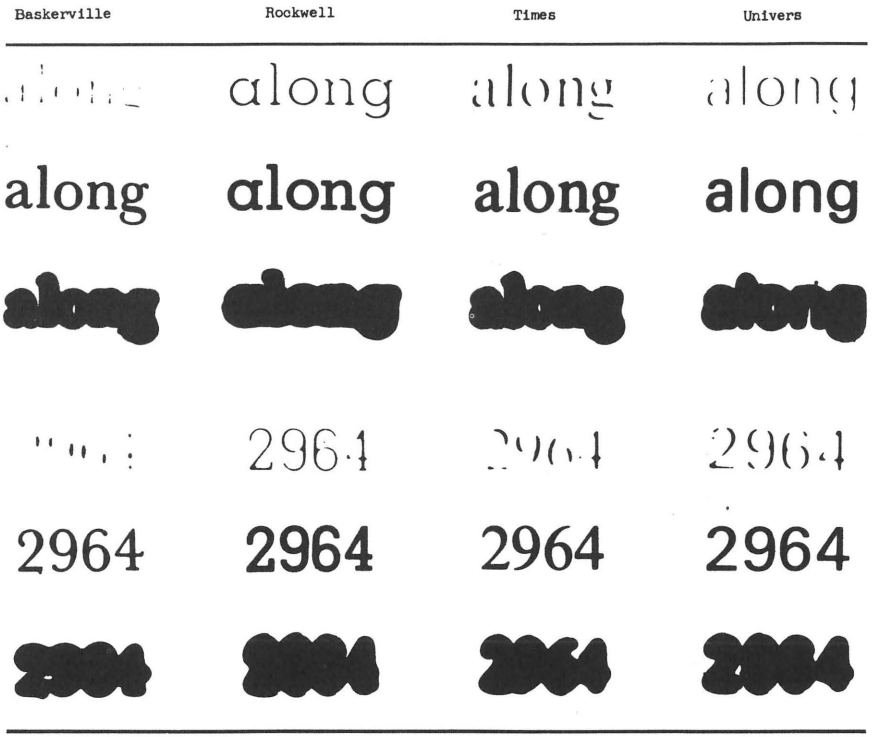


Figure 1
Image degradation

ferent densities on both continuous text and numerical information[7]. A scanning task was used as a measure of legibility for both kinds of material. A second experiment in this series was concerned with the effects of loss of contrast in the form of 'greying' of the background and/or image[8]. The third and final experiment was an investigation of the effects of 'show-through'[9]. Four papers of different opacities were printed single-sided, backed-up, and with the lines on successive pages either aligned or unaligned. The effects of the resulting show-through were again measured by means of a scanning task on continuous text.

At this point, the Unit's interests began to extend to other media besides print. In 1976 a literature survey on factors affecting the acceptability of microforms was published[10]. The emphasis was on visual factors relating to the design of the microforms and of the reading equipment. In 1977 a second survey report was published, this time dealing with the problems of directional signing, guiding, and labelling in libraries and museums[11]. The purpose of the survey was to investigate existing practices in libraries and museums, to review relevant research literature in a number of disciplines, and to suggest where further research was most needed. This study is described in more detail below. Both of these surveys were funded by the British Library.

A third survey report, commissioned by the Post Office, was completed in 1978. This was concerned with the legibility and readability of Prestel displays. Prestel is a system whereby alphanumeric information stored on a central computer can be accessed via the telephone network and displayed on domestic colour television receivers. The report attempted to draw together relevant research from a number of disciplines and to recommend where further research of specific relevance to Prestel was most badly needed[12].

Recent work for the British Library has been mainly concerned with the design of Computer Output Microfilm library catalogues[13,14], and the two projects carried out to date are summarised below. The Unit was also requested by the British Library to prepare a set of publicity leaflets describing the various projects carried out over the years. These have now been sent out to an initial mailing list of 1,000 organizations, with the aim of disseminating the results of the Unit's work more widely.

The work of the Unit has therefore diversified considerably over the years, and this has been reflected in the change of name from 'Readability of Print Research Unit' to 'Graphic Information Research Unit'. In addition to the legibility of conventionally printed materials, the Unit is now becoming increasingly concerned with the effects of new technology on the legibility of scientific and technical information, whether it be in print, microform, or displayed on a VDU. It is also concerned with information graphics in a broader sense, as exemplified by the library guiding work.

Directional signing, guiding and labelling in libraries and museums

Introduction

In this study we were concerned with identifying some of the outstanding problems in providing effective graphics in libraries and museums, rather than with providing solutions by carrying out our own experimental work. The investigation included the examination of existing signing, guiding, and labelling systems in 27 libraries, 18 museums, and a total of 14 transport termini, hospitals, shops, and offices. In-depth interviews with those responsible for designing and implementing the systems were carried out in most of the libraries and museums visited. Architects, designers, and psychologists from a number of other organisations were also consulted. The literature survey covered items relating to librarianship, museum studies, psychology, ergonomics, architecture, and graphic design. Some of the conclusions drawn from the study are summarised below.

The present state-of-the-art

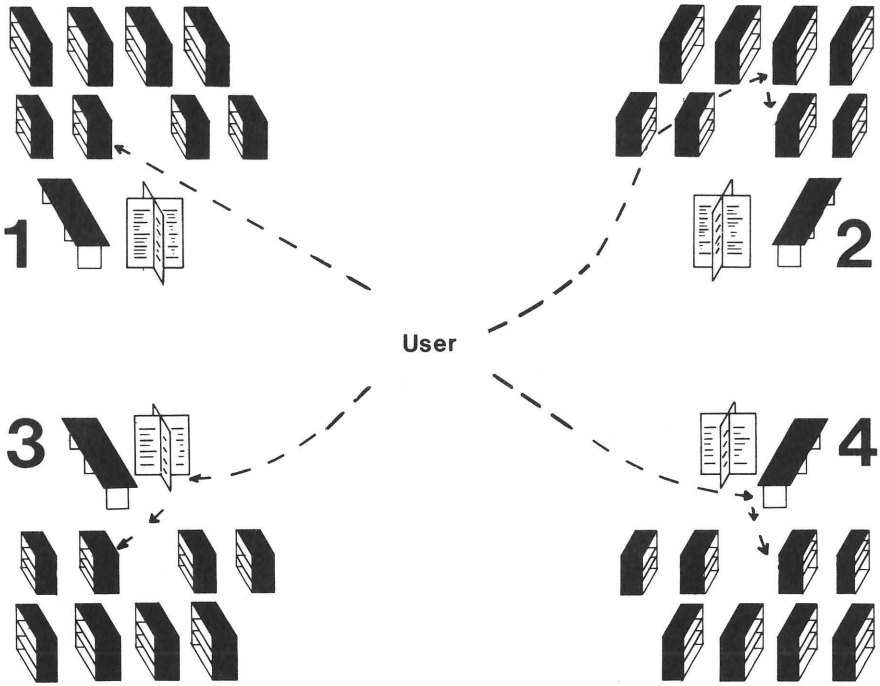
Libraries

The standard of graphics in most of the libraries visited was poor, in terms of both visual appearance and content. Rarely was there any attempt to coordinate signs, guiding, labels, stationery, and printed information, and in many cases there was little similarity between items within these categories. Signs and guiding had often been applied haphazardly as and when the need for them was felt, rather than being planned as a complete system. This often gave rise to omissions and duplications of information. Inappropriate positioning of signs and failure to achieve a reasonable density of signs—neither too few nor too many—were other common faults. The overall effect was often one of untidiness and disorganisation, though this may not have been true of the running of the libraries themselves.

There were three main reasons for this state of affairs. First, very few libraries could afford to employ a graphic designer. Of the remainder, many had no staff member with any design skills, and it was unusual for any one person to be given overall responsibility for library graphics. The result was often a total lack of coordination. Second, many libraries felt that the provision of adequate guiding was an expensive luxury. They had not considered the positive effect that a visually coordinated system of graphics might have on staff morale and on the library's image in the minds of the users, nor had they considered the potential increase in the efficiency of both staff and users. As a result, an allowance for signing, guiding, and labelling had not been included in the library budget. Third, many libraries wanting to make improvements did not have ready access to advice or facilities which would help them in preparing their own graphics or in commissioning them from outside.

Museums

In general the standard of graphics observed in museums was much higher than that in libraries. Museums tended to be far more aware of the need to present information attractively, legibly, logically, and in easily assimilable amounts. Most of the larger museums had at least one designer if not a design department, and the cost of designing and producing signs and

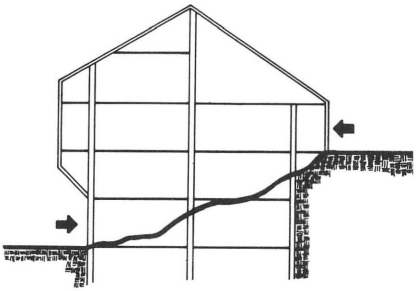


labels was included in the budget. Many of the smaller provincial museums did not have trained design staff however, and their problems were similar in many ways to those of the libraries.

Directional signing

Factors influencing signing requirements

The study showed that the requirements for an effective signing system are dependent on a number of factors such as the background and motives of users, the policy of the library or museum with regard to signing, the physical characteristics of the building, and the way in which the various departments are distributed throughout the building. Some users will have very specific interests which will lead them to a particular department, whereas others may wish to browse at random; some libraries and museums will expect users to rely heavily on signing, whereas others will prefer them to ask a member of staff for directions; some buildings are relatively simple in their design and therefore require a minimum of signing, whereas others are extremely complex and need to be very well signposted; libraries and museums in newer buildings are likely to have a more logical arrangement of materials and services which will facilitate signing, whereas in older buildings the departments are likely to have expanded haphazardly and will be difficult to signpost satisfactorily.



Density and siting of signs

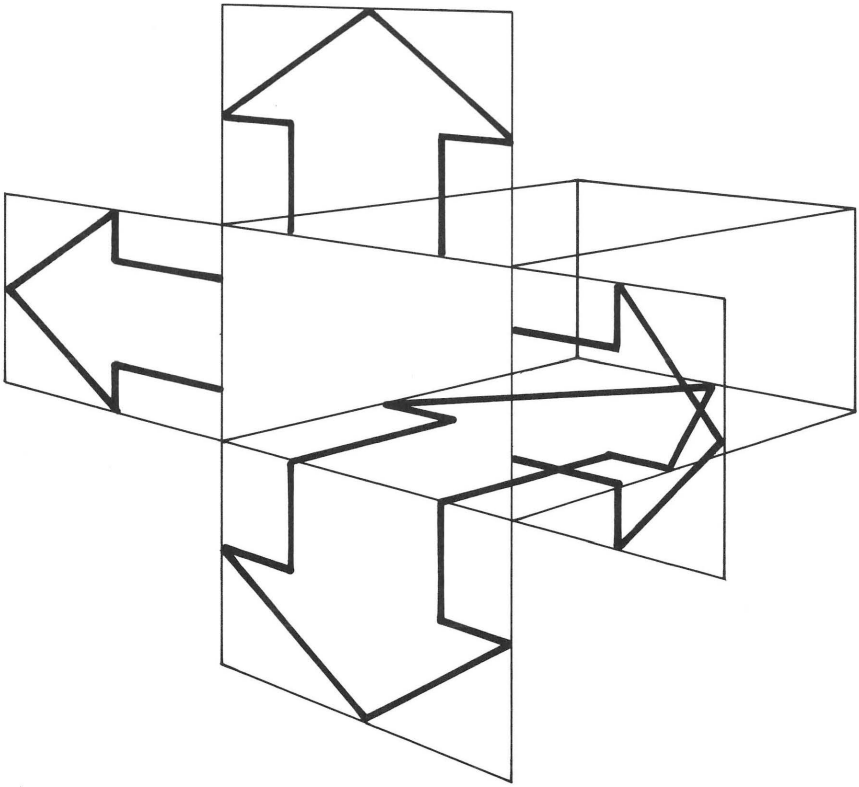
It is important that directional signing should be thought out and applied as a coordinated system. It was clear from a number of the libraries and museums visited that the addition of 'helpful' signs as and when the need for them is felt can result in utter confusion. The system must be designed to explain the overall size and shape of the building and the spatial relationships between the various functional areas within it; it must then direct visitors to specific destinations. Adequate signing between destinations and to exits is also important. Care must be taken to avoid over-signing, however, as the more signs there are and the more information they carry, the less likely they are to be read. The positioning of signs is also significant. Research has shown that information should be given just before each 'decision point' on a route. The information should relate only to the next decision point however; instructions for later decision points will often be ignored or forgotten.

Information content

The amount of information given on each sign should be kept to a minimum. This can sometimes be done by grouping destinations under general headings initially, and then using progressively more specific terms as the final destinations are approached. Ideally the names of destinations should describe their functions and abbreviations should be avoided.

The naming or numbering of floors needs to be carefully thought out, particularly on sloping sites where ground level on one side may be basement or first floor on the other.

Floor plans are an important part of any directional signing system, but many people apparently have difficulty in understanding them. Confusion is often caused by inappropriately oriented plans; ideally they should be redrawn if necessary so that their orientation always matches reality.



The use of arrows on signs should be carefully thought through. Arrows indicating right or left are generally unambiguous, as are arrows pointing up or down to indicate straight on. Diagonal arrows can be very confusing however, especially in situations where both vertical and horizontal movement are possible.

Symbols can often be used to present simple messages concisely and clearly, and they are particularly useful in situations where users are likely to be of several different nationalities. Standard symbols should be used wherever these exist.

Design

In designing a signing system it is important to choose materials which are appropriate for the application. In the case of libraries and musuems, factors to be considered include visual appearance, flexibility, cost, and resistance to wear and tear and vandalism.

Lettering on signs should be in upper and lower case as this will facilitate the recognition of familiar word shapes. A simple sans serif face will generally be the most legible. Character size should be determined in relation to the greatest distance from which the signs must be read and acted upon. The size should be consistent throughout the series of signs, and not varied simply to accommodate messages of different lengths. Different sizes may be used to distinguish between information which differs in kind or importance however.

As a general rule, each line of information should begin at the left hand margin unless an indent is required. Centering is unhelpful, particularly in the case of lists of destinations. Layout should be consistent between signs, and on no account should character spacing or line spacing be varied according to the length of the message.

In choosing colour combinations for sign backgrounds and lettering, it is important to achieve a high level of contrast between the colours in terms of their intensity as well as in terms of their hue. Experiments on printed materials have shown that some of the best combinations for legibility are black and yellow, and white with blue, green or red. One of the worst possible combinations is black and red. Colour can be used very effectively in directional signing as a way of coding information, but no more than about 6 or 8 different colours should be used. Ideally, colour coding should be used redundantly, as a way of reinforcing information which is also given in some other way. Mistakes in discriminating between colours, particularly by persons with defective colour vision, make total reliance on colour codes impractical.

Placement of signs

Signs may be fixed to a vertical surface such as a wall, in which case they should be facing the oncoming user. Alternatively, they may be suspended from the ceiling if it will support them—this often gives optimal visibility. If walls or ceilings are unsuitable, free-standing signs may be used. These can be used as an obstacle to attract attention, but they are easily obscured. Certain kinds of signs, such as route markings, may be placed on the floor, but again they are easily obscured.

Directional signs should be displayed at a constant height to avoid confusion with other kinds of information. Ideally they should not be outside an angle of 10 degrees above or below eye level.

Library guiding

Guiding requirements

As with directional signing, the level of library guiding required will depend on the characteristics of the users and on the policy of the library. Some libraries prefer users to rely on guiding as far as they can, whereas others deliberately force them to ask staff for help by providing very little guiding.

It is important that library guiding should also be thought of as a system, and the design of a successful system will require a careful analysis of all library procedures which affect users. The simpler and more logical the arrangement of the materials and services within the library and the procedures associated with their use, the simpler the guiding system will be. Once the procedures have been analysed, they can then be set out logically and should be presented visually in a way which makes the logic clear to the user.

Information content

Library guiding systems comprise a number of different kinds of displayed information such as notices, instructions, indexes, keys, labelling of catalogues, labelling of storage units and labelling of stock. Wording on all of these should be as concise and clear as possible. On notices and instructions in particular, it is important to consider whether narrative prose is necessarily the best way of presenting the information, and whether some other form such as a list, flow chart or diagram of some kind might be more effective.

Design

The choice of materials for these items will depend in many cases on their degree of permanence. Ideally their appearance should be coordinated in terms of materials, colours, letter forms etc., and there is no reason why even the most temporary items should not be neat and legible. The general principles of design outlined in relation to directional signing will also apply here.

a. identify

b. describe

c. detail

Museum labelling

Information content

One of the greatest problems in museum labelling is that of providing sufficient information for the specialist without frightening away the layman. This problem can sometimes be solved by providing several 'levels' of text on a descriptive label, so that visitors can read as much or as little as they wish.

In some instances it will be appropriate to label each object individually, but where there are large numbers of small objects, or in situations where labels would be intrusive, it is often necessary to use a key of some kind. This makes more work for the user because he has to relate the objects to the key before he can find out what they are. In some cases the objects will be numbered and it is only necessary to look up the appropriate number on the key; in other cases the user may be required to match the object with a diagram according to its position, read off a number on the diagram, and then refer to a numbered list of captions. Studies on user's reactions to these kinds of key would be valuable.

Design

Again, the general principles outlined in relation to signs also apply here. The type style should blend with the nature of the exhibits, but it should not be so gimmicky that it attracts attention to itself rather than to its message. Type size should be carefully chosen in relation to the likely maximum reading distance, and should be used logically and consistently.

Very little research has been done on optimum line lengths and line spacing for type sizes of 14 points upwards, so this will be largely a matter of judgement. The question of whether the right hand margin of labels should be justified or unjustified is partly one of taste, but for relatively short line lengths, justification is likely to result in very irregular word spacing and in an excessive number of broken words at the ends of lines.

Positioning of labels

The optimum height for vertical descriptive panels would seem to be between about 3 ft and 6 ft. Ideally, object labels should be at right angles to the the visitor's normal line of sight. This will often mean that they should be at an angle of about 45 degrees rather than horizontal or vertical. They should be displayed in approximately the same plane as the objects to which they relate, to save constant refocussing of the eyes.

Introduction

Following the Unit's survey of visual factors affecting the acceptability of microforms[11], it was felt that further research would have its greatest impact if directed towards Computer Output Microfilm as opposed to source document microfilm. The Unit therefore set out to investigate several basic questions relating to the layout of information on COM by means of an experimental study[13], and to carry out a survey of the various styles of presentation currently used in COM library catalogues[14].

The layout of information on COM

Column spacing and horizontal coding in tables and indexes

The first of the two experiments in this study was concerned with the effects of column spacing on subjects' ability to read across between columns of information quickly and accurately. Excessively wide column spacings are by no means unusual in COM materials and are sometimes unavoidable; the experiment therefore included an investigation of various horizontal coding devices which might help in reading across.

Two different kinds of two-column index were used as test material, one an alphabetical index of names and the other a numerical index. These are illustrated in Figures 2 and 3. Each index consisted of 640 entries, presented in cine mode on roll film (i.e., with the frames arranged vertically on the film in a scroll-like manner).

Column spacings of 5, 20 and 30 blank character spaces were used. In the case of the alphabetical index, the blank character spaces were counted from the end of the longest name, so that the spacing was in effect greater on this index than on the numerical index. The following six 'horizontal' codings were used:

1. Lines set solid
2. Lines double spaced
3. Lines set solid with a line space after every fifth entry
4. Lines set solid with a rule after every fifth entry
5. Lines set solid with a line space and a rule after every fifth entry
6. Lines set solid with leader dots between columns

The three column spacings were combined with the six horizontal codings to give a total of 18 different layouts.

One group of 18 subjects was presented with all 18 layouts for the alphabetical index, and another group of 18 worked on the numerical index. An 18 x 18 latin square design was used to determine the order in which each subject saw his 18 layouts. For each layout, subjects were given a list of 30 entries from the first column of the index and were asked to find the entries on the film and write down the corresponding three-character codes, working against time.

The results showed a significant decrease in scores between column spacings of 5 and 30 characters on both kinds of index. There were relatively few errors however.

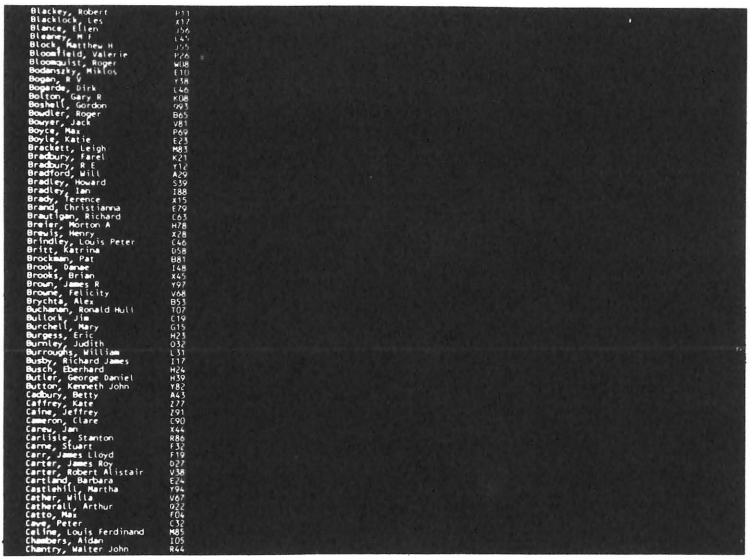


Figure 2
Extract from the names index

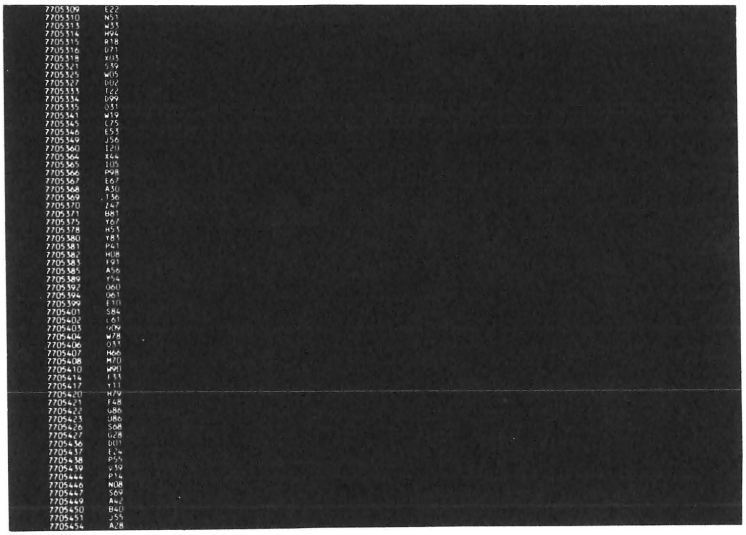


Figure 3
Extract from the numbers index

Figure 6
The single column format

Single versus double column formats for cine and comic mode library catalogues

The majority of COM library catalogues have either a single column or a double column format, and the purpose of this experiment was to determine whether the two formats are equally effective in terms of searching the catalogue for a given entry and for finding specific information within the entry. Since some roll film catalogues are in cine mode (vertical frame progression) and some are in comic mode (horizontal frame progression), this variable was also included in the experiment.

A small catalogue consisting of 640 entries was compiled and presented in the two formats shown in Figures 6 and 7 in both cine and comic mode. In Figure 6 the various elements of each entry are listed horizontally across the frame, and in Figure 7 they are listed vertically. The single column format gave an average of 25 entries per frame and the double column format gave 20 entries per frame.

Twenty four subjects each saw all four combinations of format and film mode. For each condition, subjects were given a question sheet consisting of a list of 60 authors' names in random order, and were given 8 minutes in which to write down as many of the appropriate three-character codes as possible.

In a second part of the experiment, subjects used the two cine mode versions only. The names on the question sheets were in alphabetical order and spread over a small number of frames, thus minimising the time spent on searching for the correct entries.

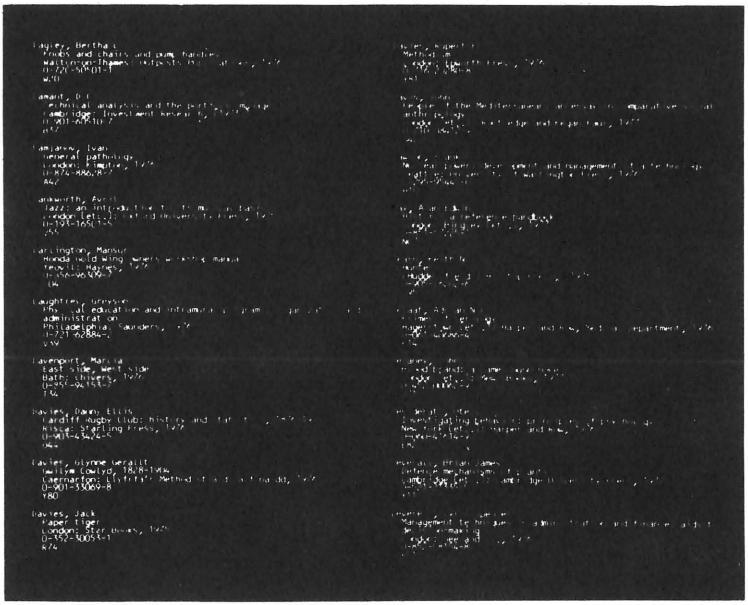


Figure 7
The double column format

The results of the experiments are shown in Table 1. It may be seen that, overall, the double column format was superior to the single column, and the cine mode better than the comic mode. There was, however, a strong interaction between format and film mode, the combination of single column format and comic mode resulting in significantly lower scores than any of the other three conditions. In the second part of the experiment, where the task of searching for the correct entry was minimised, the double column format showed a significant advantage. This suggests that where the task involves searching for a particular entry and for a specific element within the entry, the advantage of the double column format for within-entry searching is counter-balanced by the advantage of the single column format for between-entry searching. The optimum format therefore depends on the task.

Table 1

Mean scores for questions in random order*

	single column	double column	$\overline{X}$
cine mode	45.71	44.04	44.87
comic mode	30.79	42.92	36.85
$\overline{X}$	38.25	43.48	

Mean scores for questions in alphabetical order**

	single column	double column
cine mode	39.70	45.00

* number of questions correctly answered in 8 minutes

** number of questions correctly answered in 4 minutes

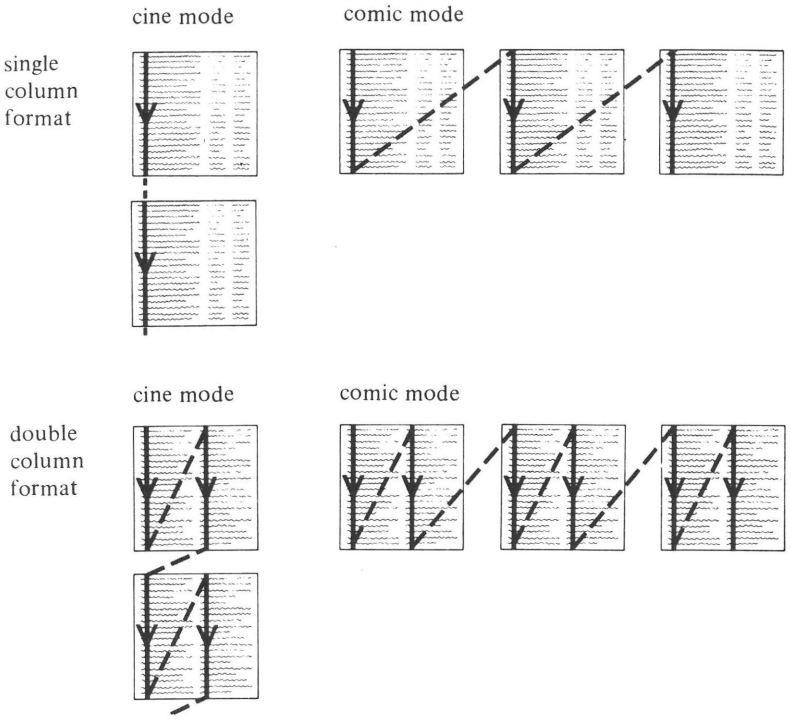


Figure 8
Scanning strategies in relation to layout and frame progression

The single column format is likely to be better for between-entry searching because in effect it presents a continuous sequence of authors' names in a constant position on the film, the names are close together with no intervening data and are therefore easily compared, and there is less film to wind through because this format accommodates more entries per frame. The double column format is likely to be better for within-entry searching because the problem of reading across between columns of information is eliminated and the various elements of the entry are physically closer together and therefore more easily scanned.

The cine mode of frame progression is preferable for single column formats because it creates a continous sequence of entries; the comic mode breaks the sequence unnecessarily (Figure 8). The comic mode with the single column format has the disadvantage of requiring accurate centering each time the film is moved, whereas with the double column format it is only necessary to center the film to the nearest half frame in order to be able to use the information. In some ways the comic presentation is more logical for double column formats, since the sequence of entries is already broken within the frame.

Visual presentation of information in COM library catalogues: a survey

Introduction

This survey was originally designed to provide information needed by the Bath University Programme of Catalogue Research.

The results of the survey were felt to be of sufficient interest to the library community in general to be published as a report which might be referred to by those designing a COM catalogue for the first time or re-designing an existing one[14]. Examples of catalogues from some 60 U.K. libraries of various kinds were examined in the course of the study.

The importance of presentation

The examples examined in the survey showed that in many cases the importance of good presentation had not been fully realised or sufficiently considered. The presentation of the information will not only affect the ease and speed with which users are able to find what they want in a catalogue; it is also likely to affect their psychological approach. Microforms in general undoubtedly have disadvantages as a reading medium, and many people are already prejudiced against them to some degree. It is therefore all the more important that the presentation of the information itself should be optimal, within the limitations of the medium. But while the importance of good presentation cannot be overemphasized, it is more difficult to achieve on microforms than in print. Given that most library materials are recorded in utility fonts, there is very little scope for typographic 'coding' of the information. This means that spatial 'coding' must be heavily relied upon, and layout becomes crucial. Even here, however, there are limitations imposed by COM recording equipment and computer software.

Historical aspects of layout

The study revealed that the layouts used for COM catalogues have been strongly influenced by trends in computer hardware and software.

The earliest COM catalogues were derived from pre-existing computer systems, especially in public libraries. The original output was often on paper or cards, and the layout was largely dictated by systems considerations. The input was in upper case only, and the output likewise. Both input and output were slow, and the large storage capacity required for text handling was expensive and cumbersome to access. There was therefore a need to keep the length of the entries to a minimum. The lack of sophisticated text handling packages meant that there was also a need to keep the file structure and layout as simple as possible. The result of all these constraints was the single-column format, with the information strung out across the width of the frame in a series of fixed fields. Figure 9 is a typical example of this style of presentation.

In recent years, however, the development of more sophisticated hardware and software has meant that large quantities of data can be stored and easily accessed, and much more sophisticated layouts are possible. This has resulted in a trend towards longer entries, and because these could not be satisfactorily accommodated in the single column format, there has been an accompanying trend towards double column formats. In some cases a treble column format has been found to be more suitable for shorter entries, as illustrated in Figure 10.

AUTHOR/ TITLE	CLASSIFICATION	YEAR	LOCATION	ACC.NO.	
TRICK/CHIEW/(IEEE) CIRCUIT & SYSTEMS THEORY 6TH 1968	621.301	1968	CONFERENCE	6806195	2
TRICKER/ ACCOUNTANT IN MANAGEMENT	657	1967		6762109	
				7614895	
TRICKER/ CONTRIBUTION OF SCIENCE TO EDUCATION	5:371.3	1967		6761087	
TRICKER/ EARLY ELECTRODYNAMICS	538.1(091)	1965		6738956	
TRICKER/ MANAGEMENT INFORMATION & CONTROL SYSTEMS	658	1976		7611182	
TRICKER/ MANAGEMENT INFORMATION SYSTEMS	016:658	1969	QUICK REF	6805674	
TRICKER/(RUFFIELD FOUND) ADV SCI:BIOL SCI.PROJECTS	574:371.3	1970		7400644	1
TRICKER/TRICKER/ SCIENCE OF MOVEMENT	591.17	1966		6757451	
				6801148	
TRICKETT/ HONEST MUSE	821	1967		7301679	
TRICKEY/ QUANTUM STATISTICS & THE MANY-BODY PROBLEM	536.48	1975	CONFERENCE	7605686	
TRICKEY/ TEACHING & LEARNING IN CHEMISTRY SYM 72	54:371.3	1972	CONFERENCE	7203874	
TRICOMI/ DIFFERENTIAL EQUATIONS	517.91	1961		6721696	
				6750933	
TRIDENT I G - ARPI:REPORT OF ACCIDENT INQUIRY/(DTI)	656.708	1973	GOV PUB	7207013	1
TRIER/(LANG) WALTER TRIER	837	1971	3-HR LOAN	7008561	1
TRIER/(WIESE/BORCK) FESTSCHRIFT	327	1964		6743000	1
TRIEWALD/ KORT BESKRIFNING ELB- & LUFT-MACHIN1734[LOS]	5(091)		MICROFORM	ID 13325	
TRIFFET/ MECHANICS	531.01	1968		6801724	
				7004923	
TRIFFIN/ BALANCE OF PAYMENTS & FOREIGN INVESTMENT US	332.6		PAMPHLET	7002115	
TRIFFIN/ EUROPE & THE MONEY MUDDLE	332.4(4)	1957		6733538	
TRIFFIN/ EVOLUTION OF INTERNATIONAL MONETARY SYSTEM	332.43	1964	PAMPHLET	6800244	
			PAMPHLET	7002108	
			PAMPHLET	7403240	
TRIFFIN/ FATE OF THE POUND [IN ATLANTIC PAPERS 1969,2]	332.42			ID 13326	
TRIFFIN/ GOLD & THE DOLLAR CRISIS	332.453	1961		6731229	
TRIFFIN/ MONOPOLISTIC COMPETITION & GENERAL EQUIL THY	301.81	1940		6728526	
TRIFFIN/ OUR INTERNATIONAL MONEY SYSTEM	332.45	1968		6802718	
TRIFFIN/ WORLD MONEY MAZE	332.4(4)	1966		6743741	
				6909116	
TRIFONOV/ A.V.LUNACHARSKII I SOVETSKAIA LITERATURA	882.95	1974	CYRILLIC	7308851	
TRIFONOV/KUDRIASHEV/ RUSSKAIA SOVETSKAIA LITERATURA	882	1956	CYRILLIC	6740414	
TRIFONOV/SHURA-BURA/ SISTEMA AVTOMATIZATS PROGRAMMIROV	518.5	1961	CYRILLIC	7000952	
TRIGG/ CRUCIAL EXPERIMENTS IN MODERN PHYSICS	53	1971		7011687	
TRIGG/ PAIN & EMOTION	159.901	1970		6907737	
TRIGG/ QUANTUM MECHANICS	530.145	1964		6729257	
TRIGGLE/ CHEMICAL ASPECTS OF THE AUTONOMIC NERVOUS SYS	577.1:591.18	1965		6747560	
TRIGGLE/ CHOLINERGIC LIGAND INTERACTIONS 1970	577.15	1971	CONFERENCE	7010117	
TRILLAT/(WSRC) IONIC BOMBARDMENT BELLEVUE 1962	539.19	1964	CONFERENCE	7006252	2
TRILLING/ BEYOND CULTURE	820	1966		6741365	
TRILLING/ LIBERAL IMAGINATION	8:3	1970		7205624	
TRILLING/ SINCERITY & AUTHENTICITY	008	1972		7200552	
TRILLING/(ARNOLD) PORTABLE MATTHEW ARNOLD	820	1949		7200872	1
TRILLING/BLOOM/ VICTORIAN PROSE & POETRY	820	1973		7605932	
TRILLING/WACHMAN/ RAREFIED GAS DYNAMICS.INT SYM6 68 V1	533.5	1969	CONFERENCE	7309041	
TRILLING/WACHMAN/ RAREFIED GAS DYNAMICS.INT SYM6 68 V2	533.5	1969	CONFERENCE	7309042	
TRIMINGHAM/ HISTORY OF ISLAM IN WEST AFRICA	297(66)	1962		7503358	
TRIMINGHAM/ ISLAM IN EAST AFRICA	297	1964		6803439	
TRIMINGHAM/ ISLAM IN WEST AFRICA	297(66)	1959		7502723	
TRINIDAD & TOBAGO REPUBLIC ACT 1976		1976	GOV PUB	7618271	
TRINKAUS/ CELLS INTO ORGANS	576.31	1969		7002173	
TRINKS/ INDUSTRIAL FURNACES 2E V2	669.04	1934		6713513	
				6712621	
TRINKS/ INDUSTRIAL FURNACES 3E V1	669.04	1942		6713512	
TRINKS/ INDUSTRIAL FURNACES 3E V2	669.04	1955		6736982	
TRINKS/ INDUSTRIAL FURNACES 4E V1	669.04	1951		6712307	

Figure 9
Single column format with single line entries

ACTON, HAROLD
MORE MEMOIRS OF AN AESTHETE.
METHUEN, 1970.
G
0416129005 828.912

ACTON, SIR HAROLD
NANCY MITFORD: A MEMOIR. HAMILTON, 1975.
B2 D E F G H J L P2 V X Y
0241892848 823.912

ACTON, HAROLD
TUSCAN VILLAS: WITH PHOTOGRAPHS BY ALEXANDER ZIELCKE. THAMES AND HUDSON, 1973.
ILL. ON LINING PAPERS.
G
050024085X 914.55

ACTON, HARRY BURROWS
KANT'S MORAL PHILOSOPHY. MACMILLAN, 1970.
J
0333104498 170.924

ACTON, JOHN EMERICH EDWARD DALBERG
ESSAYS ON FREEDOM AND POWER; SELECTED BY GERTRUDE HIMMELFARB. THAMES & HUDSON, 1956.
ZR
85613129 320

ACTON, JOHN EMERICH EDWARD DALBERG-ACTON
ESSAYS ON CHURCH AND STATE: EDITED BY DOUGLAS WOODRUFF. HOLLIS & CARTER, 1952.
ZR
85208152 282

ACTON, THOMAS ALAN
GYPSY POLITICS AND SOCIAL CHANGE: THE DEVELOPMENT OF ETHNIC IDEOLOGY AND PRESSURE POLITICS AMONG BRITISH GYPSIES FROM VICTORIAN REFORMISM TO ROMANY NATIONALISM: [BY] THOMAS ACTON. ROUTLEDGE AND KEGAN PAUL, 1974.
Y
0710078352 301.451914970041

ACWORTH, BERNARD
BIRD AND BUTTERFLY MYSTERIES: REALITIES OF MIGRATION. EYRE & SPOTTISWOODE, 1955.
ZR
85515252 598.25

AD HOC INQUIRIES IN LOCAL GOVERNMENT: A SOLACE-RIPA PROJECT STEERED BY A COMMITTEE CHAIRED BY SIR ALAN MARRE. SOLACE, 1978.
ZC
0905566025 352.16

ADAIR, CORNELIA
MY DIARY, AUGUST 30TH TO NOVEMBER 5TH, 1874; ILLUSTRATED BY MALCOLM THURGOOD. NEW ED. TEXAS U.P, 1965.
ZR
86611770 978.020924

ADAIR, IAN
CONJURING AS A CRAFT. DAVID & CHARLES, 1970.
D F G J N P V Y
0715347977 793.8

ADAIR, IAN
PAPERCRAFT: LINE DRAWINGS BY THE AUTHOR AND SUZANNE STEPHENSON; PHOTOGRAPHS BY A.C. LITTLEJOHNS. DAVID AND CHARLES, 1975.
B E2 N
0715366386 745.54

ADAIR, IAN
PARTY PLANNING AND ENTERTAINMENT. LINE DRAWINGS BY THE AUTHOR. PHOTOGRAPHS BY A.C. LITTLEJOHNS AND THE AUTHOR. DAVID AND CHARLES, 1971.
B2 F G2 H J K2 N P X2 Y
0715352687 793.2

ADAIR, JOHN, B.1934
A LIFE OF JOHN HAMPDEN, THE PATRIOT (1594-1643). MACDONALD AND JANE'S, 1976.
SPINE TITLE: JOHN HAMPDEN, THE PATRIOT.
F
0354040146 942.0620924

ADAIR, JOHN, B.1934
ROUNDHEAD GENERAL: A MILITARY BIOGRAPHY OF SIR WILLIAM WALLER. MACDONALD & CO, 1969.
K
0356026418 941.620924

ADAM, AGNES
BUSINESS MEETING: A SCOTS COMEDY FOR SIX WOMEN. BROWN, SON & FERGUSON, N.D.
ZC
Q7
X0C0000159 822.041

ADAM, ANTOINE
GRANDEUR AND ILLUSION: FRENCH LITERATURE AND SOCIETY, 1600-1715; TRANSLATED [FROM THE FRENCH MS.] BY HERBERT TINT. WEIDENFELD AND NICOLSON, 1972.
D
0297763520 840.9004

ADAM, FRANK
THE CLANS, SEPTS AND REGIMENTS OF THE SCOTTISH HIGHLANDS; REVISED BY SIR THOMAS INNES OF LEARNEY. 7TH ED. JOHNSTON & BACON, 1965.
PREVIOUS ED. (860-20766) 1960.
ZR
86711775 929.209411

ADAM, FRANK
THE CLANS, SEPTS, AND REGIMENTS OF THE SCOTTISH HIGHLANDS. 8TH ED. JOHNSTON & BACON, 1970.
ZI
0717945006 929.209411

ADAM, IAN
GEORGE ELIOT. ROUTLEDGE & K. PAUL, 1969.
PBK. 9/-. SBN 7100 6735 6.
ZR
0710067364 823.8

ADAM, JAMES BRYCE
THE LANGUAGE LABORATORY. PITMAN, 1963.
ZR
8601704 407.8

Figure 10
A three column format

```
954.02V035SP
     SPEAR PERCIVAL                    OXFORD HISTORY OF MODERN INDIA, 1740-1947 BY PERCI
                    DELHI [ETC.] LONDON OXFORD UNI    1        P1                0195605675

954.038RI       (355.332BRI)
     BRISTOW ROBERT                    MEMORIES OF THE BRITISH RAJ A SOLDIER IN INDIA [BY
                    LONDON JOHNSON 1974               3       C1   P2           0853071322

954.03WIL
     SMITH BILLTHEON                   TWO MONSOONS [BY] THEON WILKINSON WITH DRAWINGS BY
                    LONDON DUCKWORTH 1976             1       C1_               0715610155

954.03WIL
     WILKINSON THEON                   TWO MONSOONS [BY] THEON WILKINSON WITH DRAWINGS BY
                    LONDON DUCKWORTH 1976             1       C1_               0715610155

954.035AUT
                                       AUTOBIOGRAPHY OF A PRINCESS ALSO BEING THE ADVENTU
                    LONDON J. MURRAY 1975             1       C1                0719532892

954.035MOO
     MOON  PENDEREL                    DIVIDE AND QUIT
                    CHATTO AND WINDUS 1961            1       C1                B6122333

954.035MOO      (320.954035M
     MOORE ROBIN JAMES                 CRISIS OF INDIAN UNITY, 1917-1940 BY R.J. MOORE
                    OXFORD CLARENDON PRESS 1974       1       C1                0198215606

954.035WIL      [915.4WIL]
     BROWNE HERBERT JOSE PIERSON       DEKHO! THE INDIA THAT WAS BY ELIZABETH CRAWFORD WI
                    LONDON COOPER 1974                3       C1 M2             085052167X

954.035WIL      [915.4WIL]
     WILKIN ELIZABETH CRAWFORD         DEKHO! THE INDIA THAT WAS BY ELIZABETH CRAWFORD WI
                    LONDON COOPER 1974                3       C1 M2             085052167X

954.0350922A
                                       PLAIN TALES FROM THE RAJ IMAGES OF BRITISH INDIA I
                    LONDON DEUTSCH BRITISH BROADCA    3       C3                0233967109      0563129042 V

954.04GAN)      920GAN
     GANDHI INDIRA                     INDIA THE SPEECHES AND REMIMISCENCES OF INDIRA GAN
                    LONDON [ETC.] HODDER AND STOUG    1       C1                0340193875
```

Figure 11
A single column format with overlapping columns


```
133.1          TABORI, PAUL                                                          ABCDGHKM
                    BEYOND THE SENSES: A REPORT ON PSYCHICAL RESEARCH AND OCCULT PHENOMENA
                    IN THE SIXTIES, BY PAUL TABORI AND PHYLLIS RAPHAEL. (FRONTIERS OF THE
                    UNKNOWN)
                    SOUVENIR,  1971.  S 028 562 0118

133.1          TACKABERRY, ANDREW                                                    A
                    FAMOUR GHOSTS, PHANTOMS, AND POLTERGEISTS FOR THE MILLIONS.
                    NEW YORK: BELL,  1966.  C 120 012 2089

133.1          TACKABERRY, ANDREW                                                    A
                    FAMOUS GHOSTS, PHANTOMS, AND POLTERGEISTS FOR THE MILLIONS.
                    LOS ANGELES: SHERBOURNE P.,  1966.  C 140 001 865X

133.1          TAILLEPIED, NOEL (FATHER)                                             A
                    TREATISE OF GHOSTS: BEING THE PSICHOLOGIE, OR TREATISE UPON
                    APPARITIONS AND DISEMBODIED SOULS, PHANTOM FIGURES, STRANGE PRODIGIES,
                    AND OF OTHER MIRACLES...; TR. BY MONTAGUE SUMMERS.
                    FORTUNE,  [N.D.]  C 120 012 2267

133.1          TYRRELL, G. H. M.                                                     B
                    APPARITIONS. REV. ED.
                    COLLIER,  1963.  C 120 013 8171

133.1          UNDERWOOD, PETER                                                      ACDEFGHIKLMO
                    HOST OF HAUNTINGS: A SHUDDERSOME BOOK OF GHOSTS AND GHOSTLY
                    ADVENTURES.
                    FREWIN,  1973.  S 085 632 0277

133.12         HARRIES, JOHN                                                         ACDFHILM
                    GHOST HUNTER'S ROAD BOOK.
                    MULLER,  1968.  S 058 410 1066

133.122        BRADDOCK, JOSEPH                                                      I
                    HAUNTED HOUSES.
                    CHIVERS,  1972.  S 085 594 658X

133.122        LAFFOREST, ROGER DE                                                   A
                    CES MAISONS QUI TUENT. - NOUVELLE EDITION REVUE ET AUGMENTEE.
                    PARIS : LAFFONT,  1972  C 200 017 5732

133.12941      BYRD, ELIZABETH                                                       AFHILN
                    STRANGE AND SEEING TIME.
                    HALE,  1971.  S 070 912 0818
```

Figure 12
The trend toward blocked entries

The single column format

From the user's point of view, the single column format can create real difficulties in relating the different elements of each entry. There are often wide gaps between columns which can give rise to errors in reading off information such as ISBN numbers, accession numbers, and locations.

In some catalogues, an attempt has been made to accommodate more information by allowing two or three lines for each entry, with the information in each line arranged in fixed fields, thus creating a series of overlapping columns. This is illustrated in Figure 11. In this case it is much less easy for the user to scan down the information in any given column. A more successful method of fitting in more information is to create turnover lines double column format (Figure 7). This layout is likely to waste space however. The single column format is therefore best suited for short entries which can be accommodated within a single line. Some single column formats show a strong trend towards the blocked entries typical of double column formats, as illustrated in Figure 12. This often wastes space however.

The double column layout

The answer to the problem of accommodating more information within each entry without causing visual confusion or wasting large amounts of space is the double column format (Figure 3G). This eliminates the problem of reading across between columns of information and therefore makes the task of finding any given element within an entry much easier. It does, however, have the disadvantage of breaking sequence of entries within each frame as well as between frames, and is therefore likely to make the process of finding any given entry somewhat slower. There is little doubt, however, that for entries of moderate length the double column format is the best all-purpose solution.

There are numerous variations between catalogues in the detailed layout of entries in double column formats. Too many libraries have tried to exactly mimic the layout of catalogue cards, and have positioned items such as the classmark or ISBN number at the top or bottom right of the entry. On a card this would cause no confusion, but on film it is often unclear which entry such information belongs to. It is wiser, therefore, to begin all elements at the left hand side of the entry. The entry heading, or the element under which it is filed, should always stand clear from the rest of the entry by two or three characters; this means that the first line of the entry should begin at the left hand margin and all subsequent lines should be indented by two or three characters. This will greatly facilitate the location of a particular entry in an alphabetical or numerical sequence because it will be relatively easy to compare the first few characters of each heading.

The various information elements within each entry may either run on or begin a new line. In the latter case, there will be a considerable wastage of space with entries which give only a minimum of detail in each data field. In this case, the three column format is likely to save space.

Present and future work

The Unit is currently working on the preparation of a manual for use by librarians who are faced with the problem of designing and implementing a library guiding system. It might be argued that rather than attempting to turn professional librarians into amateur graphic designers, one should persuade them to employ a professional designer. Unfortunately, however, many smaller libraries simply cannot afford to do this, and there is therefore a need to provide them with information which will help them to produce the best result they can with the resources they have available to them. The manual will cover the following topics: the planning of the guiding system in terms of the content, number and positioning of signs; basic design principles; materials and methods currently available; sample design schemes at two levels of cost, one for production in-house and the other assuming that some of the items will be commissioned from outside; advice on how to specify requirements and liaise with designers and manufacturers.

In the future, the Unit's work is likely to include further studies on the layout of COM catalogues in relation to ease of use and economy of space. With some libraries in Great Britain now experimenting with on-line catalogues, there is also a need for a study of suitable entry layouts for VDU's. There is also considerable scope for further work on the use of colour in displays such as Prestel.

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Spencer, H. **The visible word: problems of legibility**. London: Lund Humphries, 1969.

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Spencer, H., Reynolds, L., and Coe, B. **A report on the relative legibility of alternative letter shapes**. London: Royal College of Art, Readability of Print Research Unit, 1973.

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Spencer, H., Reynolds, L., and Coe, B. **A comparison of the effectiveness of selected typographic variations**. London: Royal College of Art, Readability of Print Research Unit, 1973.

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Spencer, H., Reynolds, L., and Coe, B. **The relative effectiveness of ten alternative systems of typographic coding in bibliographical material**. London: Royal College of Art, Readability of Print Research Unit, 1973.

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Spencer, H., Reynolds, L., and Coe, B. **The relative effectiveness of spatial and typographic coding systems within bibliographical entries**. London: Royal College of Art, Readability of Print Research Unit, 1974.

6
Spencer, H., Reynolds, L., and Coe, B. **The effect of image, degradation and background noise on the legibility of text and numerals in four different typefaces**. London: Royal College of Art, Readability of Print Unit, 1975, revised 1977.

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Spencer, H., and Reynolds, L. **Directional signing and labelling in libraries and museum: a review of current theory and practice**. London: Royal College of Art, Readability of Print Research Unit, 1977.

12
Reynolds, L. **Teletext and viewdata—a new challenge for design**. London: Information Design Journal 1979 1 (1) 2-14.

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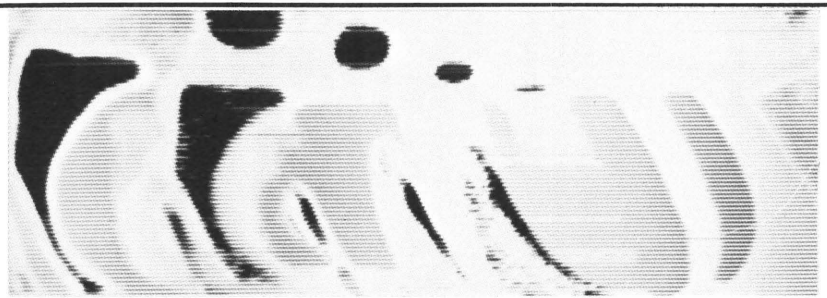
14
Reynolds, L. **Visual presentation of information in COM library catalogues: a survey**. BL R&D Report 5472. London: British Library Research and Development Department, 1979.

census

Research

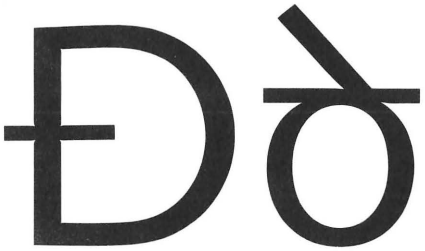
Experiment



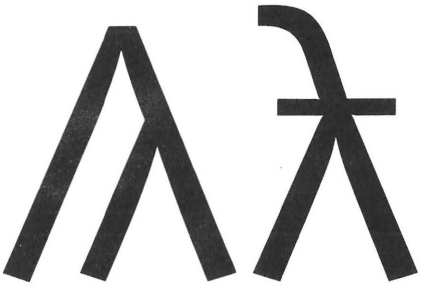
Native American Texts

Charles A. Bigelow
Funded Professional Research

Native North American literature was predominantly oral, and the suppression of native languages and cultures by Euro-Americans extinguished much of that vast, rich, and irreplaceable tradition.



Capital and lowercase "Edh" (eth)—voiced dental fricative



Capital and lowercase "Barred lambda"—voiceless lateral affricate

The collection, transcription, and translation of traditional native texts was begun by Franz Boas and has been carried on by generations of his students and followers as an important part of the American linguistic study. Recently, the traditions have been reinvigorated by native American writing and publishing programs.

The publication of both traditional and modern literary texts in native languages has been severely hampered by the lack of suitable type designs and composition systems adequate to the texts and the phonetic alphabets used to represent them.

Charles Bigelow and Kris Holmes have designed a set of Americanist Phonetic Alphabet characters to accompany the typeface Syntax-Antiqua, in collaboration with Hans Ed. Meier, designer of Syntax. The characters were selected and designed in consultation with the linguistic anthropologists Dell Hymes, Virginia Hymes, David French, and Michael Silverstein.

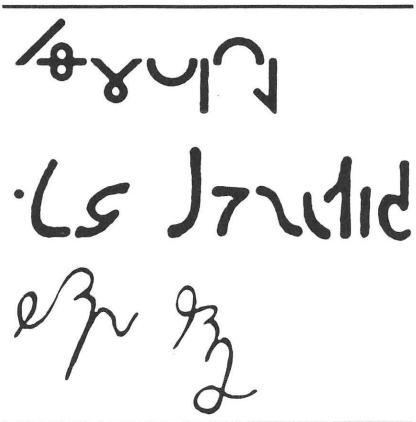
The Syntax phonetic font is currently in production by Mergenthaler Linotype for text and display composition on the VIP phototypesetter.

Rhode Island School of Design
Market House
Providence, Rhode Island
02903

Writing System Design: Finding the Optimal Written Translation of the English Language

Constance White
Institute of Design
Masters Thesis
Patrick Whitney, Charles Owen,
Advisors

Several new writing systems have been designed to replace the Roman alphabet. This project researched if and how the Roman system is inadequate and in a more positive light, what characteristics must be included in an effective written translation of the English language.



Major research was conducted in the evolution of the Roman alphabet, perception, information theory and phonetics. These explorations produced variables with which to evaluate the performance of each writing system (including a representative of the Roman system). The performance evaluations were then used as data in a computer program designed to find similarities among entities; the writing systems were clustered into sets of similarity based on their performance.

The Roman alphabet was found inadequate phonetically and visually. No new system was found optimally effective without modification. The new systems broke down into four sets exhibiting four versions of visual and phonetic redundancy and complexity. The set exhibiting visually complex and phonetically redundant systems was selected as the best direction for design. Redundancy seems to have been ignored in the new systems. There exist three separate but dependent levels of redundancy which should be researched and balanced.

Herron School of Art
1701 N. Pennsylvania
Indianapolis, Indiana
46202

Image Degradation and Backgound Noise/Legibility

Herbert Spencer
Linda Reynolds
Brian Coe
Graphic Information Unit
Royal College of Art
Funded Professional Research

The effects of poor quality reproduction on legibility was studied. Text and numerical information were set in Times New Roman, Baskerville, Rockwell, and Univers. These were tested at 7 levels of image quality (ranging from very much thinned-down type to very much thickened-up type) in combination with four different levels of background 'noise' (no noise, plus three different intensities of a random dot pattern). Legibility was tested by means of a scanning task for text and a transcription task for numerals.

The results showed that image quality was a more important factor than background noise, and any absolute amount of thinning-down reduced legibility more than the same amount of thickening-up. There was little difference between the four type styles at the better levels of image quality, but at the extremes of degradation some styles were much less legible than others. Baskerville performed very badly when thinned-down, and Rockwell performed very badly when thickened-up. These differences are related to various characteristics of the type design.

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Royal Collage of Art
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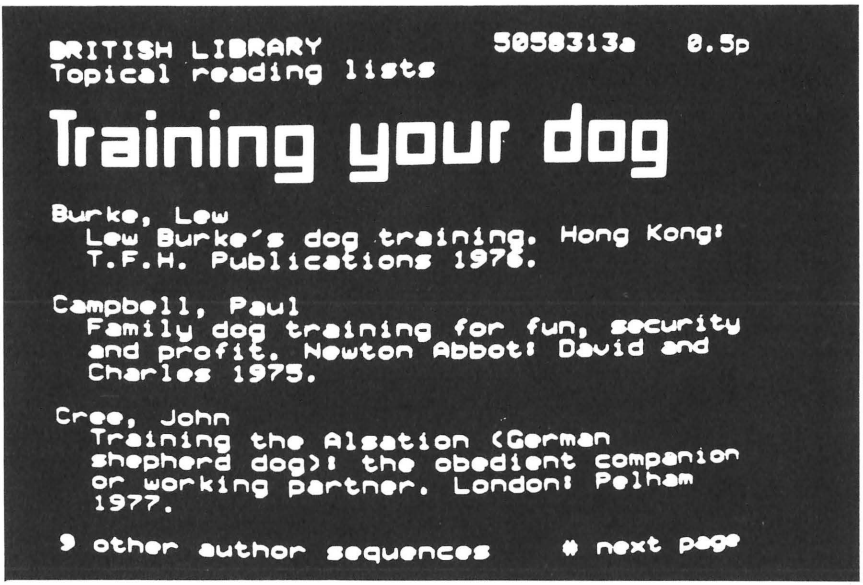
London SW7



Linda Reynolds
Herbert Spencer
George Glaze
Graphic Information Research Unit
Royal College of Art
Funded Professional Research

The display of digitised alphanumeric information on domestic color television screens, as in the British Post Office's viewdata system (now called Prestel), presents the information designer with a number of severe constraints, and a new freedom–color. The purpose of this report was to summarize the results of any relevant research which might give guidance to those responsible for creating the display pages, and to suggest what further research is necessary both in the long and short term. The report dealt with factors such as the design of dot matrix characters, character size and brightness, character color, viewing distance, etc., all of which affect the legibility of the displays. It also dealt with layout and the use of color for presenting various kinds of information such as text, indexes, tables, and graphics.

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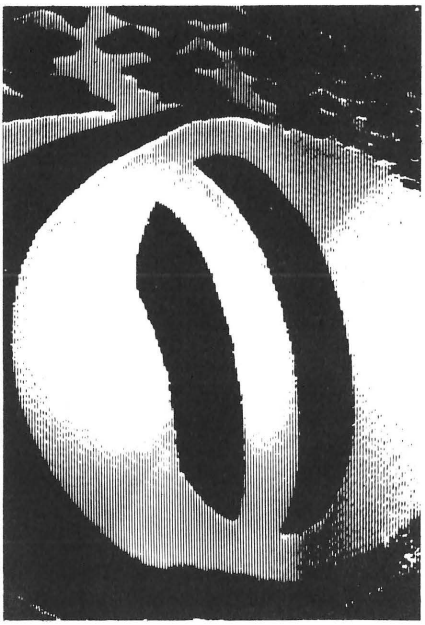
Type Manipulation with Video Technology



Steven Skaggs
Pratt Institute
Masters Thesis

This project was an exploration of letterforms manipulated by video equipment with particular attention to the form and aesthetics of the medium.

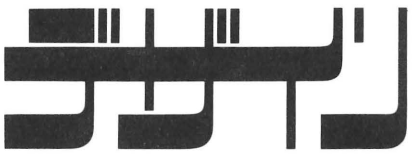
The process used black and white video technology, basic letters for modification, videotaping of experiments, evaluation, and selection from the experiments for print.

The results demonstrate the special vocabulary that video brings to the visual world along with its powerful ability to feedback visual ideas quickly; allowing the designer increased latitude for experimentation.

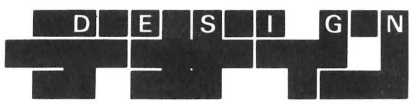
546 Ridgecrest Road NE
Atlanta, Georgia
30307

Investigation of the Word Design in the Katakana Form of Japanese

Tadao Tanaka
University of Hawaii at Manoa
Jerry L. Kuyper, Advisor
Student Project



The project began with the calligraphic generation of design in the Katakana form of Japanese. The process continued with simplifying and altering the characters in stylistically consistent ways. While legibility of the word diminished to varying degrees, the communication of design was reinforced through systematic character variation. The end of the sequence joined english with the japanese presentation.



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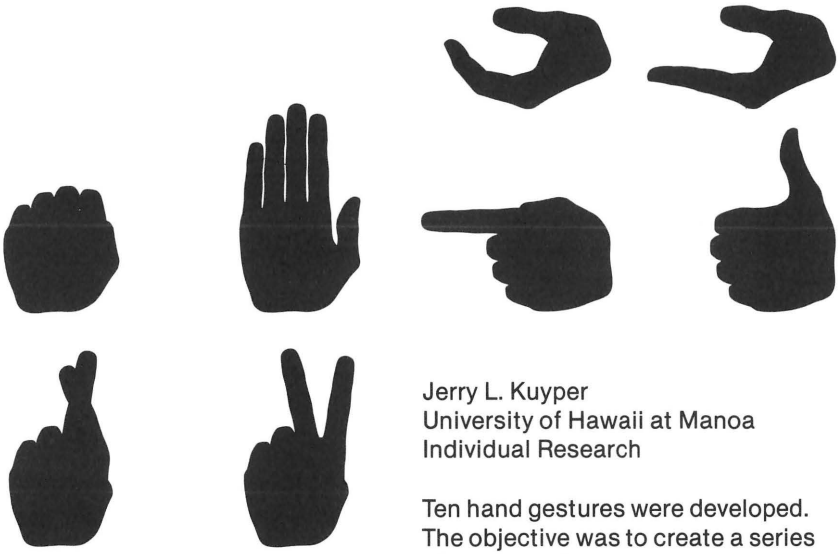
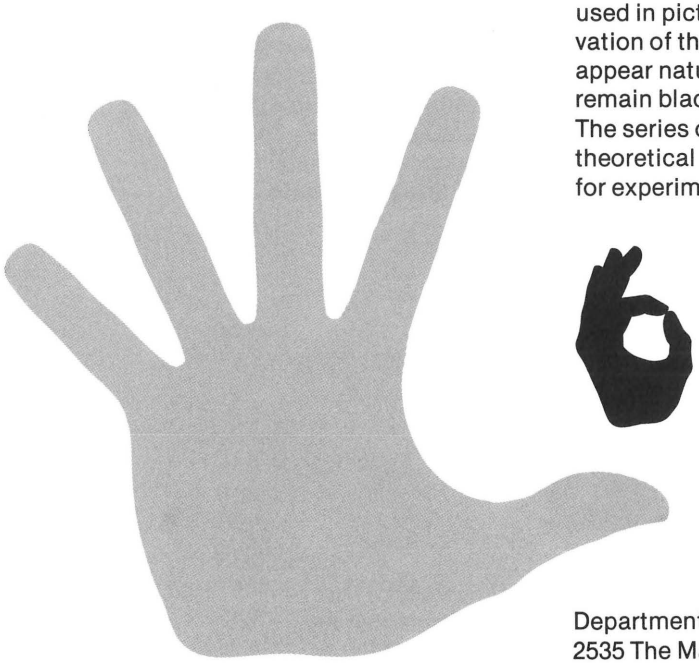
Department of Art
2535 The Mall
Honolulu, Hawaii
96822

Investigation/Hand Gestures



Jerry L. Kuyper
University of Hawaii at Manoa
Individual Research

Ten hand gestures were developed. The objective was to create a series of gestures that were not as mechanical and sterile as those commonly used in pictograms. By careful observation of the hand, the variations appear naturalistic although they remain black shapes on a white field. The series of hands was used in a theoretical poster and as the basis for experiment in film.



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96822

Zoo Symbol Sign

Jerry L. Kuyper
University of Hawaii at Manoa
Individual Research

Developing a symbol sign for the zoo was the focus of this project. After drawing various animals, the possibility of an integrated presentation of land, air, and sea animals emerged. (Part of the developmental sequence is visually presented.)

Aside from the obvious aesthetic concerns, legibility of form, and readability of content were also primary concerns. The result is interesting in that various shapes function as parts of different animals enhancing the overall integration.

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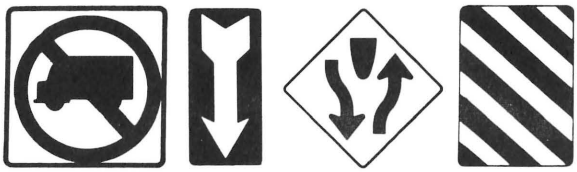

The Sign Game

The Sign Game

R. Roger Remington
Rochester Institute of Technology
Funded Professional Research

The Sign Game is a new simulation game which uses interactive communication methods to achieve its objectives.

Signs are an essential form of communication in our society. The manner in which they become part of the landscape at times produces controversies in communities. Businessmen, citizens, government, and the sign industry are now and then involved in situations which polarize attitudes and may require resolutions in court.

The game includes role-playing which simulates conflicting interests, scavenger hunts which simulate the design and implementation of signs, and the real world function of acquiring goods and services. Each round of the game involves role changes, active tasks, and debriefing/strategy discussions.

The result is that players consistently show a new breadth of awareness concerning the issue of signs in the environment, understanding opposing viewpoints, and a more informed, objective attitude about signs.

Department of Communication Design
Rochester Institute of Technology
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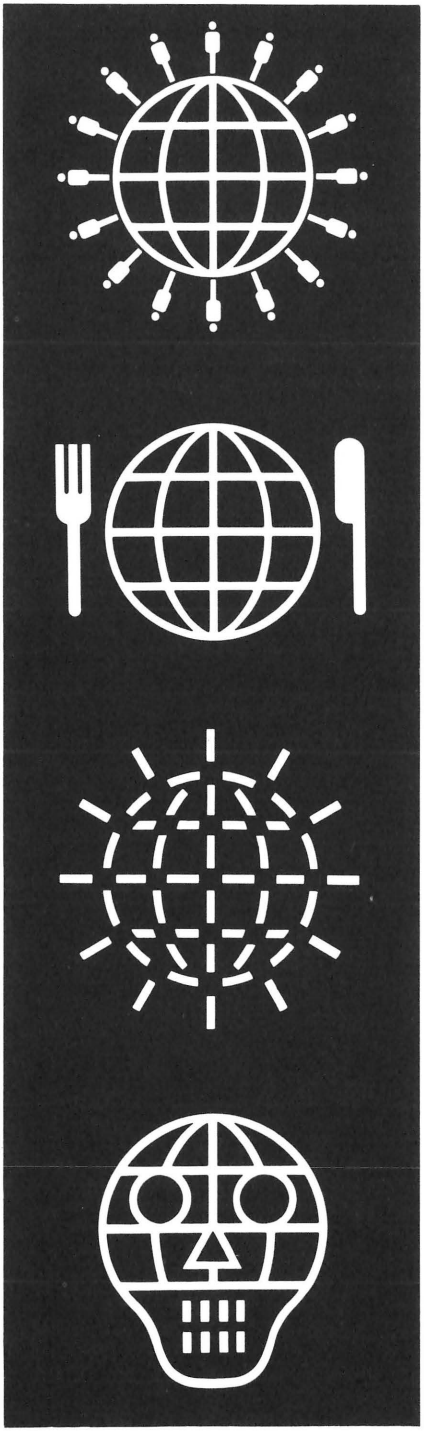
Visualizing Global Interdependencies



Aaron Marcus
East-West Center
Funded Professional Research

The project's objectives were: to identify some of the major kinds of interdependence among nations which could be expressed visually; to assemble the facts about these interdependencies; to design ways to display these data; and to develop some visual prototypes.

An international team was formed to develop designs and create prototypes of visual products such as innovative maps, charts, photographs, slide sequences, dynamic physical models, and computer displays, all of which illustrated the facts of interdependence among nations, especially among the United States, Asia, and the Pacific. Example areas of interdependence included transport, trade, resource systems, language, cultural products, environmental quality, communication, technology, and the arts.

It is anticipated that this project will provide: materials on international constraints for national policy making; prototype educational materials for higher education in Asia, the Pacific, and the United States; and designs for exhibitions and displays in the East-West Center's Learning Resource Center, in support of academic programs at the Center.

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University of California
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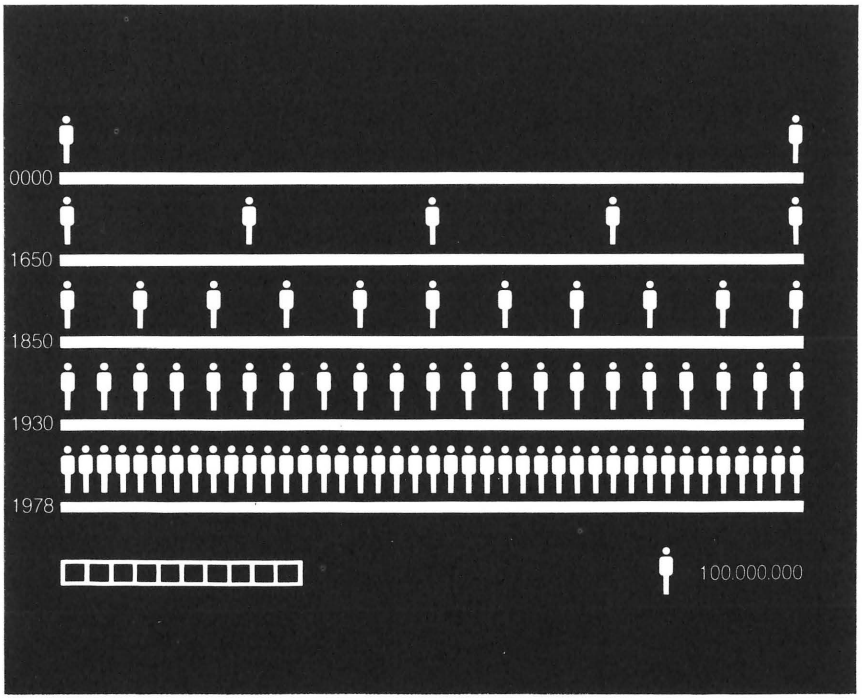
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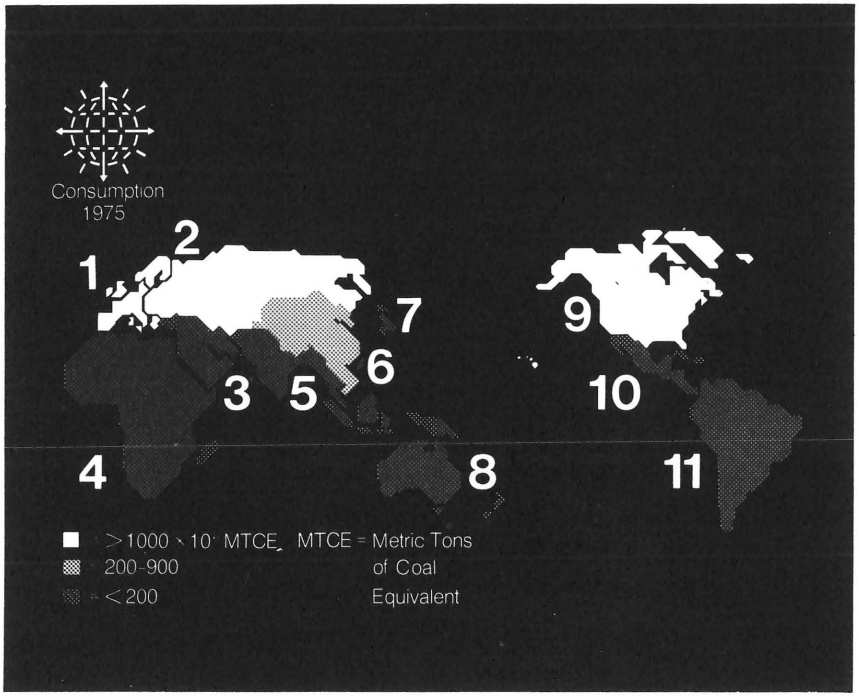
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MTCE = Metric Tons of Coal Equivalent

History of Graphic Design

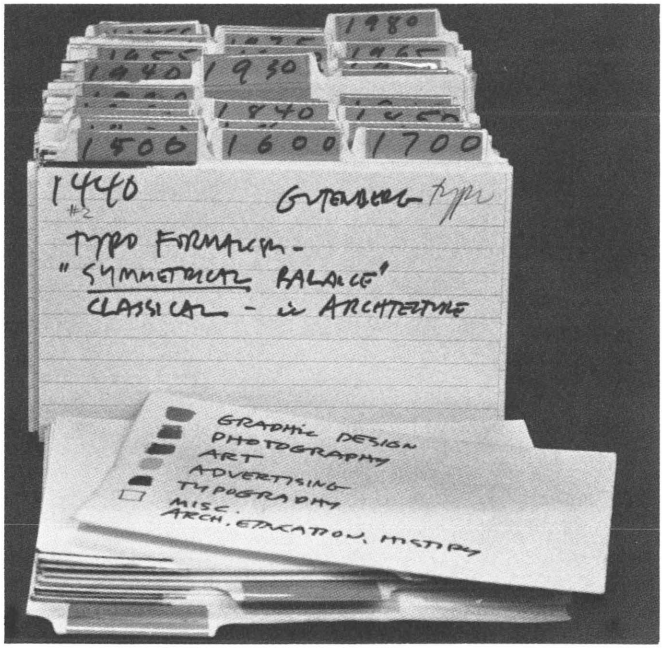
R. Roger Remington
Rochester Institute of Technology
Independent Research

Several years ago a prominent design educator remarked that "No where is there a comprehensive source of reference about the history of Graphic Design." The intervening years do not indicate any sudden change in this situation.

The RIT History of Graphic Design Project has as its goal to research, gather, document, develop, and disseminate materials which illuminate the emerging history of the field of Graphic Design.

The research base already generated includes information relating to the development of photography, typography, printing, advertising, and art, and to a lesser extent industrial design and architecture. Beginning with 28,000 BC, the research integrates and traces significant contributions to graphic design.

The scale of this project is substantial. Many activities are going on simultaneously. For example, an animated film taking a time capsule approach to presenting graphic design history is being developed while an archive of E. McKnight Kauffer materials is being restored for exhibition. General research continues while more specific projects are developed.



Department of Communication Design
Rochester Institute of Technology
One Lomb Memorial Drive
Rochester, New York 14623

Design Thesis Abstract

Institution	Department School Address Telephone
Author	Name Address Degree Earned Date
Thesis	Title Subtitle
	Number of Pages Types of Visuals Advisor Bibliography

Thesis Abstract

Return to: Visible Language c/o Sharon Poggenpohl, 300 Art & Design, University of Kansas, Lawrence, KS 66045 USA

Class Project Survey

Institution	Department School Address Telephone
Faculty	Name
Class	Title Level
Project	Title Subtitle
	Types of Visual Material Bibliography

Project Objectives and Description

Return to: Visible Language c/o Sharon Poggenpohl, 300 Art & Design, University of Kansas, Lawrence, KS 66045 USA

Contributors

Sharon Helmer Poggenpohl is an assistant professor of design at the University of Kansas (300 Art & Design Building, Lawrence, Ks. 66045, USA) and design school editor for **Visible Language**. She was formerly on the faculty of the Institute of Design at the Illinois Institute of Technology where she received a BS and MS in design. In addition to teaching and lecturing, she consults. She has been a practicing designer since 1965. Current projects include developing a visual system for promoting Performance (music, theater, dance) at the University of Kansas. Her interest in theoretical issues related to design has developed into the writing of a book exploring the interacting processes of valuing, symbolizing, and designing.

Hans C. van Dijk is associate professor in graphic design and head of graphic design studies at the State University of New York, College at Purchase (N.Y., 10577). He is also a partner with the New York design group WORKS. From 1973 to 1978 he taught at the Rhode Island School of Design, and he has taught at Southeastern Massachusetts University and at Ohio State University. A Dutch citizen, he received his undergraduate education in Holland and practiced design in the that country before moving to the USA to do postgraduate work at Carnegie-Mellon University. He received an MA in Industrial Design from Ohio State University. While his teaching includes a variety of subjects in graphic design, his principle interests are with theoretical aspects relating to visual communication and design practices.

Thomas Ockerse is associate professor in graphic design and head of the graphic design department at the Rhode Island School of Design (2 College Street, Providence, R.I. 02903, USA) since 1971. He taught previously at Indiana University and has been a practicing designer since 1965. He has a BFA from Ohio State University and an MFA from Yale University. Since 1967, along with his teaching and design practices, his activities have increasingly included personal investigations in visible language relative to poetry, semiotics, and the visual arts. The results of these studies, often produced as bookworks (e.g. *The A-Z Book, Word and Image Equations, 26 Poems + 1*) by Tom Ockerse Editions, have been recognized nationally and internationally in numerous exhibitions and publications. His *Graphic Design Education: an Exposition,* a review of the pedagogy of the department he heads, was recently published by the Rhode Island School of Design.

David D. Stuhr was assistant instructor in the Department of Design, The University of Kansas (300 Art and Design Building, Lawrence, Kansas 66045). He has completed his Master of Fine Arts degree from The University of Kansas and is continuing his interest in the development of a language of form at The Royal College of Art, London, in the Department of Design Research under Professor Bruce Archer. The Leopold Schepp Foundation has awarded Mr. Stuhr a three year scholarship to continue his studies. The material in his article is part of the content of the introductory design course at The University of Kansas and was developed in collaboration with Professor Richard L. Branham. A text, *A Language of Form,* will be published in the spring of 1980.

Robert A. Manning (4714 Lee St., Downers Grove, IL 60515 USA) has taught communication design at the Institute of Design, Illinois Institute of Technology, Chicago, Ill., The School of the Art Institute of Chicago, and Northern Illinois University, DeKalb, Ill. He received his formal training at the School of the Art Institute, Chicago (BAE), and at the Institute of Design, IIT, Chicago (MSVD). He is currently a candidate for an MS in Sociology at IIT.

Mr. Manning has been a staff designer for Robert Vogele Incorporated (RVI), Container Corporation of America, and Unimark International. He has served as a consulting designer for Design Planning Group in Chicago and for Interface Design Group, Milwaukee, Wisconsin.

Mr. Manning is author of the article *Grandson of Bauhaus.* He has lectured and acted as a discussion panelist over the last fifteen years. He is currently working as a corporate designer for a major corporation in Chicago.

Linda Reynolds is Senior Research Fellow in the Graphic Information Research Unit at the Royal College of Art (6A Cromwell Place, London, SW7, GB). She graduated from Bristol University with a General Honours degree which included psychology, and followed this with a Master's degree in information science. It was at this time that she first became interested in legibility. After working as an information scientist in a research institute and a publishing house, she joined the Research Unit at the RCA in 1973. Her training in information science has given her a particular awareness of the problems of legibility which arise in relation to the use of present-day information handling techniques.

Resumes
des Articles
Traduction:
Fernand Baudin

A propos de la differentiation visuelle par Robert A. Manning

L'auteur s'efforce de demystifier et de rationaliser un processus qui a toujours été considéré comme intuitif par bon nombre d'enseignants, de chercheurs et de professionnels; à savoir la créativité dans les arts graphiques et dans la communication graphique. Les arts d'expression et le graphisme ne sont pas des activités distinctes, étrangères l'une à l'autre; elles s'inscrivent dans un continuum identifiable et explicable comme tel. L'auteur propose un modele conceptuel qui tend a montrer qu'il existe des rapports entre la manipulation visuelle et son effet sur le processus de la communication. La différentiation sémantique lui en fournit les paramètres: ordre, graphique et littéraire. Le modèle fournit également un fondement pour un enseignement et pour une étude systematique de la communication graphique.

Les travaux du Graphic Information Research Unit par Lynda Reynolds

Depuis 8 ans ce groupe d'études londonien a travaillé sur la lisibilité des imprimés scientifiques et techniques, et notamment sur la dégradation des imprimés attribuable aux procédes de copie; sur les inconvénients des fonds transparents ou bariolés; sur la présentation dactylographique ou typographique des bibliographies. L'article résume les conclusions du groupe concernant la signalisation dans les bibliothèques et les musées et présente deux études sur les catalogues COM.

Un langage des formes: les systèmes d'isométrie à deux dimensions par David D. Stuhr

Les dessinateurs créent intuitivement des formes selon les techniques et les matériaux mis en oeuvre, mais ils n'ont aucune méthode objective qui permette de saisir les relations qui existent entre les formes. Au contraire. Ce qui prévaut, c'est une attitude subjective, non-intellectuelle, non-universitaire. Une recherche approfondie dans la littérature spécialisée a révélé que la théorie de la symmetrie classique—utilisée par les physiciens—pourrait parfaitement être récupéreé par les dessinateurs. Il exprime en effet un point de vue objectif, implique une discipline universitaire et est riche en applications possibles. En fait, il pourrait mener à l'élaboration et à la vulgarisation d'un langage visuel.

L'enseignement du graphisme: un numéro spécial par Sharon Helmer Poggenpohl

Pendant deux ans **Visible Language** a méne une enquête au niveau international dans les écoles d'art afin de se faire une idée concernant la nature et l'étendue de leurs recherches. Ce numéro spécial est entièrement consacré aux résultats de l'enquête. Ce qui en ressort c'est la nécessité d'une théorie bien structurée, cohérente; et d'une conception plus réaliste de la recherche et la répercussion de l'une et l'autre sur l'enseignement. L'article aborde également les problèmes proposés à la recherche.

Le langage visuel et l'enseignement du graphisme par Thomas Ockerse et Hans C. van Dijk

L'auteur expose les difficultés que l'on rencontre lorsqu'il est question de donner des définitions ou de proposer des objectifs à l'enseignement du graphisme. Il développe ensuite la théorie sémiotique qui sert de fondement et de métalangage pour structurer le programme d'enseignement dans la section graphique à la Rhode Island School of Design. Ce programme dégage quelques principes significatifs pour la communication et détermine une attitude expérimentale en insistant sur les différentes solutions visuelles possibles. Des problèmes concrets sont d'abord exposes en termes théoriques et ensuite abordés par les étudiants sous forme de travaux pratiques.

La educación del diseño: un número especial por Sharon Helmer Poggenpohl

A través de los últimos dos años **Visible Language** ha conducido una encuesta internacional en las escuelas de diseño para determinar la vitalidad y el tipo de su esfuerzo de investigación. Este número especial presenta la teoría, la investigación y el experimento visual que se descubrió. Se exploró la necesidad de desarrollar una estructura teórica integrada y un acercamiento más viable para la investigación. Se analizan problemas asociados con la investigación en el diseño.

Lenguaje visible y educación de diseño gráfico por Thomas Ockerse y Hans C. van Dijk

Se explora la dificultad asociada al establecimiento de definiciones y objetivos en la educación de diseño gráfico, seguida por la teoría semiótica usada como una base estructural y metalenguaje para estudiantes dentro del programa de diseño gráfico en la escuela de diseño de Rhode Island. Un plan de estudios innovador identifica principios de comunicación significativos y desarrolla un punto de vista experimental con un énfasis en la identificación de alternativas posibilidades visuales. Se discuten problemas específicos en términos de teoría complementados por una presentación visual de relacionados trabajos de estudiantes.

Un lenguaje de forma: los sistemas isométricos de dos dimensiones por David D. Stuhr

Los diseñadores crean formas de acuerdo a los procesos y materiales pero la tradición en el diseño no ha establecido un método objetivo de investigación de las relaciones presentes en las formas. Mas bien, ha persistido un precedente subjectivo, no intelectual y no académico. Se llevó a cabo una intensa búsqueda de la literatura que reveló que un sistema de relaciones usado por científicos físicos—teoría clásica de la simetría—puede ser adaptado para estudios de diseño. Este sistema refleja un punto de vista objetivo, requiere una disciplina académica rigurosa, y tiene la posibilidad de aplicación extensiva. Finalmente puede conducir a la formación y convencionalización del lenguaje visible.

Notas sobre la teoría visual diferencial por Robert A. Manning

Este trabajo trata de demistificar y objetivar lo que ha sido considerado como proceso intuitivo, por muchos maestros, estudiantes y practicantes de comunicación visual; principalmente, la creación del diseño del arte y comunicación. El diseño del arte y la comunicación expresionista no son prácticas diferentes y sin relación sind que son parte de un continuo que puede ser entendido e identificado. La teoría visual diferencial desarrolla un modelo conceptual que trata de mostrar relaciones entre la manipulación visual y su efecto en el proceso de comunicación. La técnica de diferenciación semántica sirve como una base para establecer los parámetros de los componentes del modelo: orden, gráfico y literal. El modelo provee la base para la enseñanza sistemática y el análisis del diseño de comunicación.

El trabajo de la Unidad de Investigación de la Información Gráfica por Linda Reynolds

En los últimos 8 años la Unidad de Investigación de la Información Gráfica (Londres) ha estado trabajando sobre la legibilidad de la información científica y técnica; por ejemplo, la degradación de las imágenes impresas como resultado de los procesos de reproducción, los efectos de motivos de fondo, el diseño de bibliografías escritas a máquina o impresas. Se resume la encuesta de la Unidad sobre la guía adecuada en bibliotecas y museos y se describen dos estudios recientes de los catálogos COM.

Kurzfassungen der Beiträge
Übersetzung: Dirk Wendt

Ausbildung in Gestaltung: Eine Sonderausgabe von Sharon Helmer Poggenpohl

Während der letzten zwei Jahre hat **Visible Language** einen internationalen Überblick über Hochschulen für Gestaltung erhoben, um die Art und Intensität ihrer Forschung zu ermitteln. Diese Sonderausgabe gibt die Theorie, Forschung und visuellen Experimente wieder, die gefunden wurden. Das Bedürfnis nach einer integrierten theoretischen Struktur und einem lebensfahigen Ansatz zur Forschung wurde untersucht, ebenso wie die Auswirkung diese Bedurfnisses auf die Ausbildung in Gestaltung. Es werden Probleme analysiert, die mit der Gestaltungsforschung verbunden sind.

Sichtbare Sprache und Ausbildung in graphischer Gestaltung von Thomas Ockerse und Hans C. van Dijk

Die Schwierigkeiten bei der Aufstellung von Definitionen und Zielen bei der Ausbildung in graphischer Gestaltung werden untersucht, gefolgt von einer semiotischen Theorie, die als strukturelle Basis und Metasprache für Studenten des Ausbildungsprogramms in graphischer Gestaltung an der Rhode Island School of Design benutzt wird.

In einem neuen Lehrplan werden wichtige Kommunikationsgrundsätze festgelegt und ein experimenteller Ansatz entwickelt, wobei die Entdeckung alternativer visueller Möglichkeiten betont wird. Besondere Probleme werden in der Terminologie der Theorie besprochen, ergänzt durch visuelle Darstellungen von entsprechenden Studenten-Arbeiten.

Eine Sprache der Form: Die zweidimensionalen isometrischen Systeme von David D. Stuhr

Entwerfer schaffen Form in Beziehung zu Vorgängen und Materialien, aber die Tradition der Gestaltung hat keine objektive Untersuchungsmethode bereitgestellt, die zu einem Verständnis der Beziehungen fuhren würde, die in den Formen dargestellt sind. Stattdessen hat sich eine subjektive, nicht-intellektuelle, nicht-akademische Vorform gehalten. Es wurde eine intensive Literatursichtung vorgenommen, die ergab, dass sich ein System von Beziehungen, das von Physikern benutzt wird—klassische Symmetrie—Theorie—für Gestaltungsstudien anwenden lässt. Dieses System gibt einen objektiven Gesichtspunkt, erfordert strikte akademische Disziplin, und birgt in sich die Möglichkeit zu vielfältiger Anwendung. Letzten Endes könnte es zur Bildung und Konventionalisierung einer sichtbaren Sprache fuhren.

Bemerkungen zur Theorie des visuellen Differentials von Robert A. Manning

In dieser Arbeit wird versucht, etwas zu objektivieren und entmystifizieren, was von vielen Lehrern, Schülern und Praktikern der visuellen Kommunikation als intuitiver Prozess betrachtet worden ist, nämlich die Entstehung von Kunst und Kommunikationsentwürfen. Expressionistische Kunst und Kommunikationsgestaltung sind keine verschiedenen und unverbundenen Praktiken, sondern Teil eines Kontinuums, das erkannt und verstanden werden kann. Die Theorie des visuellen Differentials entwickelt ein begriffliches Modell, das Beziehungen zwischen visueller Manipulation und ihren Auswirkungen auf den Kommunikationsvorgang aufzeigt. Die Technik des semantischen Differentials dient als Grundlage für die Aufstellung der Parameter der Komponenten des Modells: solche der Ordnung, graphische und bushstäbliche. Das Modell bietet eine Grundlage für den systematischen Unterricht und die Analyse von Kommunikationsgestaltung.

Die Arbeit der Graphic Information Research Unit von Linda Reynolds

Während der letzten 8 Jahre hat sich die Graphic Information Research Unit (London) mit der Lesbarkeit von wissenschaftlicher und technischer Information beschäftigt; d.h. mit dem Zerfall des Druckbildes als Resultat des Kopierens, der Wirkung des Durchscheinens und anderer Hintergrundmuster, der Gestaltung von maschinengeschreibenen und gestzten Bibliographien. Die Übersicht der Unit zur angemessenen Führung von Bibliotheken und Museen wird zusammengefasst und zwei neuere Studien über COM Kataloge werden beschrieben.

Design Notes

Under the guidance of Sharon Poggenpohl, five undergraduate students at the University of Kansas designed this issue: Shenaya Bhote, Thad Dilley, Karen Huntington, Nancy Naylor, and Dan Van Leeuwen.

In contrast with recent issues which experiment with form, the design of this issue emphasizes access to the content. Connections between articles are developed through the use of key words on the contents page and the article's first page; they facilitate integration or comparison of the contents.

Each article was organized on a grid which allowed changing visual emphasis for the content and an overall flexibility in the visual style of the presentation. Every effort was made to develop the contents in as clear and visually stimulating a manner as possible. Because of the theoretical nature of much of the contents, the rhythm or pace of information delivery was a primary concern.

Our goal is to let the authors speak, but to help them do it visually.

Colophon

The bodycopy for this issue was set in 7/9 and 9/11 Helvetica with Medium and Times Roman with Bold by Lettergraphics/Denver on the Compugraphic Editwriter 7500 system.

The paper stock for this issue is 70 lb. smooth white Mohawk Superfine with a 65 lb. Navajo sandstone cover.

McNaughton-Gunn in Saline, Michigan were the lithographers.

General Information

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Visible Language is concerned with research and ideas that help define the unique role and properties of written language. It is a basic premise of the Journal that writing/reading form a distinct system of language expression which must be defined and developed on its own terms. Published quarterly since 1967, Visible Language has no formal organizational affiliation. All communications should be addressed to:

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	One Year	Two Years	Three Years
Individual	$15.	$28.	$39.
Institutional	25.	47.	66.

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