

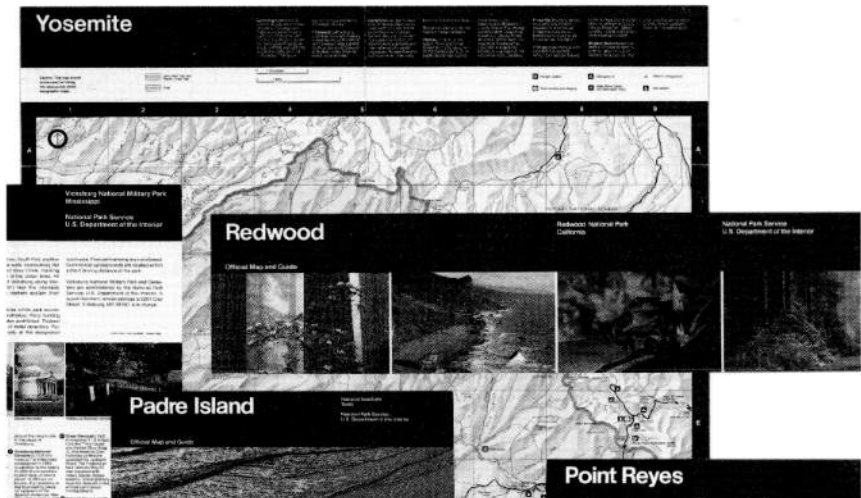
The module is a scale of proportions that makes the bad difficult and the good easy.

Albert Einstein
to Le Corbusier (1964)

Communication-oriented visual design is always concerned with the development of *programs*, or comprehensive systems of organization. Whether the designer's product spans multiple pages in a single printed piece or dozens of manufactured artifacts sharing a common design language, programmatic design is an essential facilitator. Programs are based on repeated sizes and proportions (module) or upon forms and ideas (theme) that bring regularity and structure to the user experience. The controlled variation seen in a well-designed program provides the flexibility needed for innovation while maintaining the integrity of a coherent aesthetic experience.

Aspects of program are applied throughout the spectrum of design activity. A corporate identity is not created by simply designing a mark. A printed book or brochure is not a singular entity; nor is it a collection of independent pages that can be designed in isolation. A GUI environment is not merely a random collection of programs that happen to operate on a bitmap display, nor is a GUI application a random assembly of "off-the-shelf" idioms and application-specific concepts. The designer must establish a program with sufficient flexibility to accommodate the demands of the each part while molding the components into an approachable, understandable system.

By establishing the rhythm and tone of the solution space, module and program orchestrate the synthesis of a complex solution for both designer and end-user. The benefits of a systematic approach include:



140: A standard design program ensures that informational brochures for the hundreds of sites administered by the U.S. National Park Service share the same high level of quality and consistency. Design by Vignelli Associates. (See also color plate 8).

Structure. Module is intimately related to structure. The module reflects and draws justification from structural requirements while the structure is revealed and reinforced through consistent application of the module. In most effective programs, the internal structure is drawn directly from the requirements of the communication problem. Highway signage, for example, has a clearly defined viewing distance, angle, and duration, all of which are used to determine the module upon which the program is based.

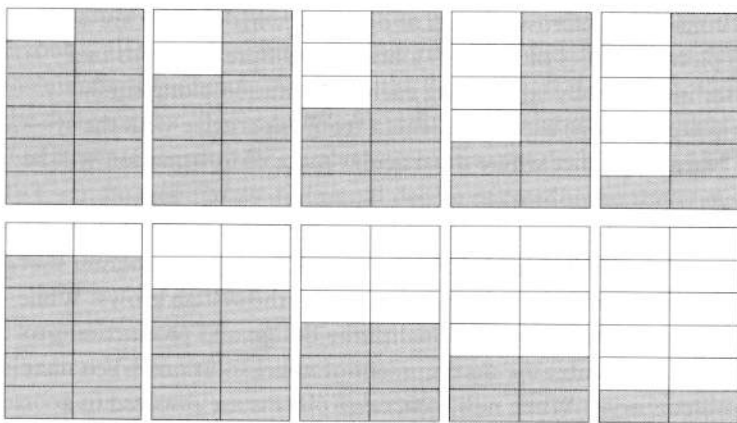
Predictability. Programmatic design simplifies the communication task by preparing the user to respond to a small number of familiar patterns in a predictable way. The critical nature of the information being conveyed means that traffic signage must be familiar enough to be processed accurately even in the absence of focused attention. The simplicity and regularity of the program make it easier to learn, easier to remember, and easier to apply correctly when a quick decision is required.

Efficiency. Modular design permits great economies of production once the general scheme has been extended to cover the entire problem space. The detailed plan that results allows large quantities of high-quality output to be produced in very little time while requiring minimal expertise. Because the program is clearly defined, highway signage can be assembled with remark-

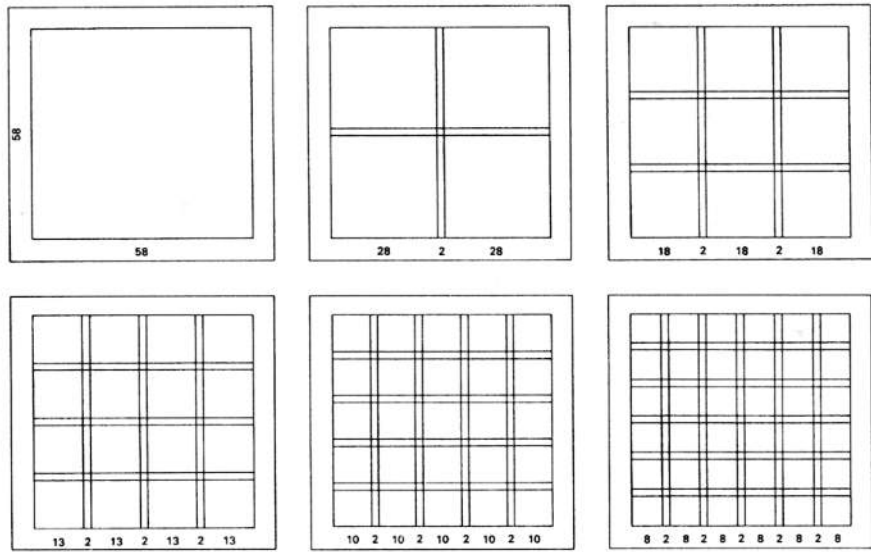
able quality and consistency by the maintenance arm of each local Department of Transportation instead of by a single central authority. This kind of efficiency is leveraged in exactly the same way by the corporate identity program, the weekly news magazine, and the GUI standard.

**Background:
Grid-Based Design**

Grid-based design is essential to the development of effective large-scale information systems. The design program (the UniGrid) for informational brochures developed by Massimo Vignelli Associates for the U.S. National Park Service (140) imposes a coherent structure on the printed materials distributed at hundreds of Park Service locations. This beautifully designed system accommodates ten different page formats to address the needs of sites as diverse as the sprawling Yellowstone National Park and the urban Freedom Trail in Boston. Each brochure contains a map of the site, which determines the format and orientation of the brochure. The broad black banner and bold headline spanning the top of each sheet unify the formats and provide a visual anchor for the viewer. Standard column widths and typographic conventions (141) ensure quality, consistency, and economy across the full range of publications, freeing the Park Service design staff to focus on content development. The program based on the Unigrigrid retains its freshness and vitality even after nearly twenty years as the most successful design system in the American public sector.



141: The flexible layout system used in the brochures for the U.S. National Park Service provides a paradigmatic example of programmatic design. The system is based on a single grid – the UniGrid – which is capable of supporting ten different publication formats. Because the same underlying grid governs the layout of each publication, even brochures that differ greatly in size share a unified typography, layout style, and folded size. Design by Vignelli Associates.



142: These typographic grids for book design subdivide the page uniformly into one to six columns. Grids for GUI design have important differences, but the goal of providing systematic structure is the same. From *Basic Typography: Design with Letters*, by Ruedi Rüegg, ABC-Verlag, Zurich, 1987.

The grid is the conceptual embodiment of the design program. It allows the static layout principles described in the previous chapter to be codified and propagated consistently across a series of displays, whether they are separate printed pieces, a series of pages in a book, or different screens in a graphical user interface. By structuring each presentation along similar lines, the grid ensures that users will benefit from experience with the system as they learn to predict where a particular piece of information will be found.

The grid is a tool that helps the designer maintain a coherent program that becomes apparent to users as their experience with the system grows. While the grid can greatly simplify and rationalize the design and production process, its use need not inhibit the development of novel solutions when unanticipated problems arise. When new, general problems are resolved in a systematic way, the grid can be modified to incorporate new techniques and exploited as a vehicle for propagating changes throughout the program.

Figures 142 and 143 show simple typographic grids for book design and some typical resulting layouts. Note the different formal qualities – particu-

Neue Typographie als Schlagwort und als Titel

Neue Typographie als Schlagwort und als Titel hatte zur Zeit des Fortschritts der technischen Buchdruckerei (die Neue Typographie) die Titel eines progressivem Buches mit einem neuen Typus in Buchdruckerei 1922 das in Zusammenarbeit mit dem Buchverleger in Wien erschienen ist, das auch ein technisches Lesebuch für Schüler. Nege hatte den erhabenen, erhabenen Charakter in allen typographischen Merkmalen. Die Gestaltung der vier ersten und der ersten vier Seiten des Buches ist ein Beispiel für die neue Typographie. Die Gestaltung des Buches ist ein Beispiel für die neue Typographie. Die Gestaltung des Buches ist ein Beispiel für die neue Typographie. Die Gestaltung des Buches ist ein Beispiel für die neue Typographie.

Ein Jahr später, 1924, veröffentlichte Maxime Régis seinen Aufsatz *Langue et Typographie*.

Typographie: Zeit, Preis, Form und 1924 haben sich nicht nur in der Gestaltung der Buchdruckerei, sondern auch in der Gestaltung der Buchdruckerei. Die Gestaltung der Buchdruckerei ist ein Beispiel für die neue Typographie. Die Gestaltung der Buchdruckerei ist ein Beispiel für die neue Typographie. Die Gestaltung der Buchdruckerei ist ein Beispiel für die neue Typographie.

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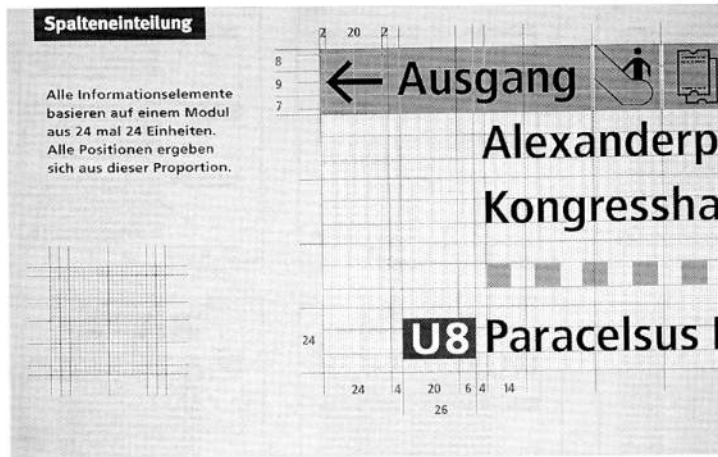
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143: Each of the grids in Figure 142 leaves a distinct imprint on the resulting layout. When the same grid is used throughout a book – or GUI application – this imprint becomes a unifying element for the entire work. From *Basic Typography: Design with Letters*, by Ruedi Rüttig, ABC-Verlag, Zurich, 1987.

larly the density, rhythm, and opacity – of the layout programs dividing the space into one to six columns. A one-column grid (142 – a) provides almost no structure to guide the eye, and the page becomes impossibly dense (the layout is all too reminiscent of many overcrowded dialog box designs). As the number of columns increases, the flexibility of the program grows, since the designer can choose to respect individual columns or to aggregate them into larger units providing a pleasing contrast in the layout (143 – c, 143 – e, 143 – f). Images add an additional degree of freedom to the grid, but they are handled in the same way as text, with major grid divisions determining where important text and image boundaries should fall.

The grid divides the page rationally into a small number of primitive units along each dimension and permits important structural elements to be placed consistently across displays. Note that the grid specifies the widths of gutters (the spaces between columns) as well as columns and includes both horizontal and vertical divisions. Typographic grid systems are more than simple-minded graph paper. They are carefully structured programs designed to produce readily apparent global structure, harmonious proportions and aesthetically pleasing contrasts, and adequate readability given the



144: The grid's value extends well beyond page design. A modular approach is essential in large scale public information systems such as this signage program for the Berlin Transit Authority (BVG). Courtesy of MetaDesign.

chosen text and display fonts. Far from locking the designer into a rigid, overbearing regime, the grid frees the designer to worry about more central issues dealing with the content itself.

Grids have widespread applicability to all areas of two and three-dimensional design. Swiss designer Josef Müller-Brockmann uses grids extensively even for individual poster designs. The grid, however, truly comes into its own in the design of large information systems whose complexity would quickly become unmanageable otherwise. The signage program developed for the Berlin Transit Authority (BVG) by MetaDesign is a good example of the rational structure provided by a coherent system (144). The grid's basic



145: Grids can also be used to govern the internal structure of an image program. The familiar U.S. DOT pictograms are based on an underlying grid defining standard element positions and orientations that are applied throughout the image set.

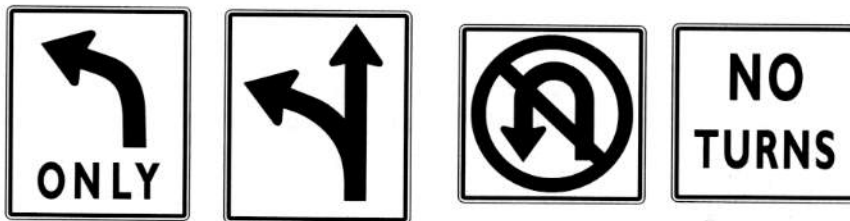
unit is the square used to relate the size of the primary typography and the system's pictograms and directional arrows. The subdivisions of this basic unit and the offsets for various critical margin points are designed to ensure proper spacing between letters, words, and lines. By fully specifying the system in advance, the designers can turn control over to the client without foregoing the possibility of quality results.

Even image programs can benefit greatly from grid-based design, as evidenced by the familiar pictograms developed for mass transit signage by the U.S. DOT (145). In addition to establishing the overall size limit for each pictogram, the grid restricts positions and orientations of major design elements to ensure a strong family resemblance when the images are viewed as a set. Note how the major internal structural division in each pictogram falls on the grid's centerline. Note too how the restriction of angular elements to the 45-degree orientation, along with the repetition of basic forms across images, promotes consistency across the image set.

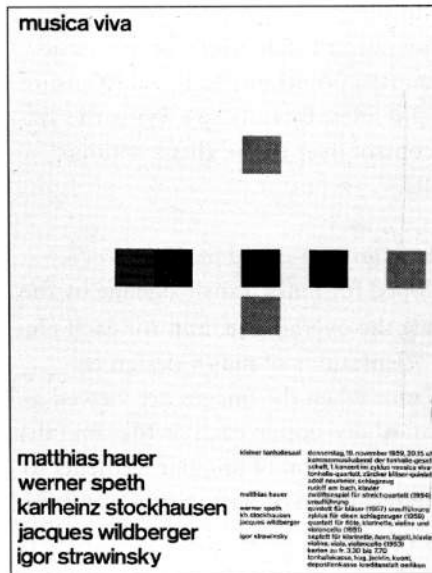
Principles

Design programs represent the pinnacle of achievement for systematic, communication-oriented visual design. The central element of any successful program is the grid, which provides a unifying framework for the diverse elements of the system. This framework must exhibit a focus that is natural for the information being conveyed while retaining the flexibility needed to deal with a variety of communication problems. The need to reinforce the program through consistent application of the framework must be balanced against the need to make conscious exceptions in dealing with unanticipated material.

Focus
Flexibility
Consistent Application



146: Traffic control signage employs a standard visual language combining textual and graphic notations. Because the signs are used fairly consistently throughout a nation's roadways, their meanings become clear "at a glance" to the experienced driver.

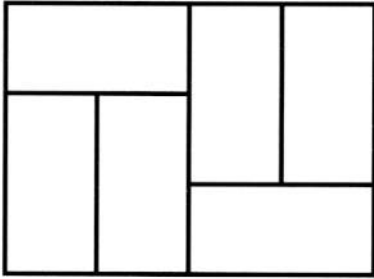


147: A crisp focus on the unit square is apparent in both positive and negative space in this concert poster by Josef Müller-Brockmann.

Focus

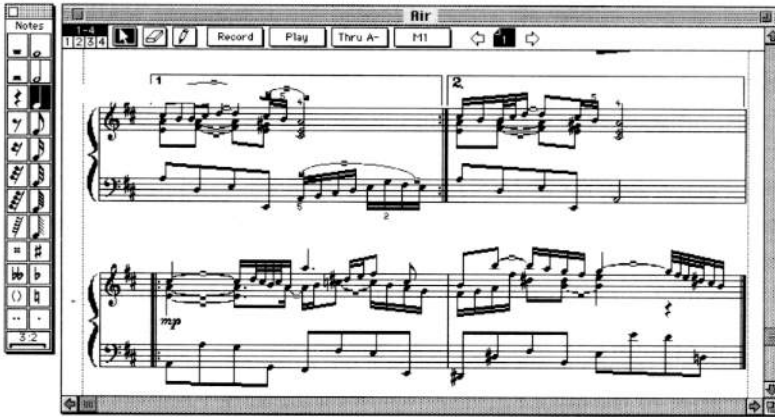
Any successful program should have a clear focus on one or a small number of modular units that reveal the underlying spatial logic of the program. In this exquisitely-structured concert poster by Josef Müller-Brockmann (147), the square embodies the basic unit of composition. Virtually every layout decision can be traced back to the size and position of the squares in the central vertical column. Major spatial divisions are multiples of one, one-half, or one-fourth of the unit embodied in the basic square. The resulting display ensures that each element is tightly integrated with the emergent whole while retaining the playful sense of randomness and freedom needed to characterize the music it promotes.

The same crisp focus on a central module is seen in the Japanese *tatami* (meaning, “*grid*”) mat system. The tatami system uses a dynamic symmetry based on the double square (148) to produce a space with clearly defined subdivisions upon which the traditional tea ceremony is based. The module used in the tatami system is based on an appropriately human-centered scale to bring important points on the “*grid*” within easy reach. By using the same grid to structure the dimensions of the tea room itself, the tatami system allows the common focus to unify the person, space, and actions.

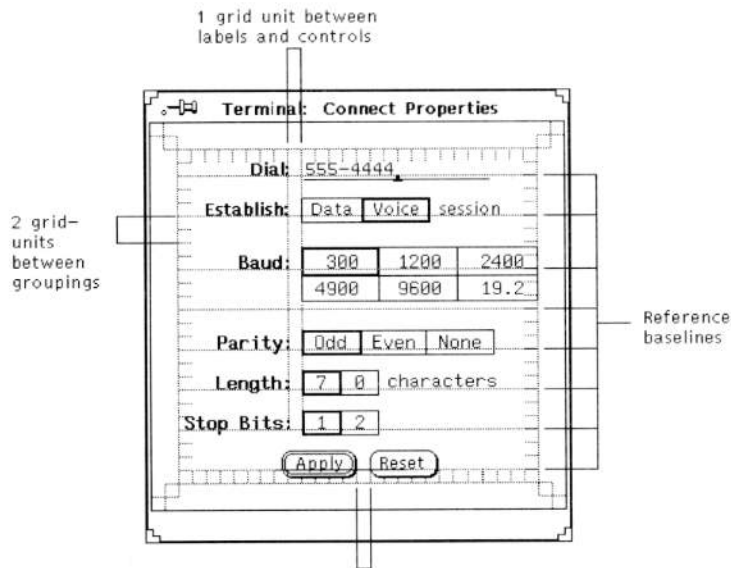


148: The human scale (3 x 6 ft.) of the *tatami* mat governs both the actions of participants and the subdivision of space in the Japanese tea ceremony.

A clear focus enhances the readability of a display by introducing a rhythm and regularity that makes make the structure predictable and explicit. These qualities simplify the movement of visual attention across the display by allowing the viewer to unconsciously estimate the distance between resting points and to skip over uninteresting portions when necessary. In this sense, the well-focused program functions very much like a spatial map of the information domain. Musical scores (149) provide one of the finest examples of this characteristic. Despite their flexibility and occasional complexity, they must communicate clearly and concisely to allow the musician to effectively divide attention between instrument and music.



149: A clear focus on a well-chosen module produces a visual rhythm that pleases the eye with its patterning effect. A clear underlying unit also allows an image to be read as a spatial map in representing temporal or statistical phenomena.

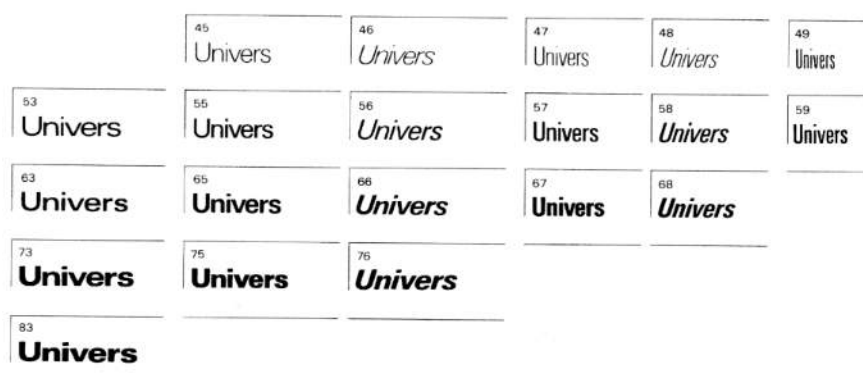


150: The focus on a key dimension in the design of a widget set allows a simple, parameterized layout system to be used throughout the OPEN LOOK GUI. Because each widget is structured in relation to the baseline of its typographic label, the widgets can be arbitrarily combined with uniform spacing on a standard grid.

A well-defined focus is essential in the graphical user interface as well. Individual applications and even layouts within an application will inevitably define their own higher-level structure, but important structuring devices are established most effectively at lower levels. A GUI standard, and ideally the user interface toolkits that support it, should provide mechanisms that make the systematic sizing and positioning of user interface elements the path of least resistance for the developer.

In the OPEN LOOK GUI, for example, elements are scaled and positioned according to a module based on one of four standard font sizes. Because the user interface elements are designed around a common module (the font size) and specify a common reference point (typographic baseline), a simple set of layout rules defining the canonical property window layout yields surprisingly credible results using only a single parameter. Designers position elements relative to the layout grid shown in Figure 150. Controls fill the window uniformly from top to bottom with the designer leaving one unit of space between controls, two units between groups of controls, and no extra space within controls spanning multiple rows.

39
Univers

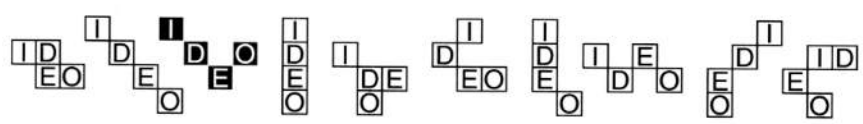


151: The incredible flexibility and dynamic range of Adrian Frutiger's Univers typographic program make it one of the most useful families ever created. The first digit in the numbering system indicates the weight of the face, while the second indicates both the set width and slant (even numbers denote italic faces; odd numbers denote increasingly narrow Roman faces), with "5" as the norm in either case. From *Typographic Design: Form and Communication*, Carter, Day, and Meggs (1985).

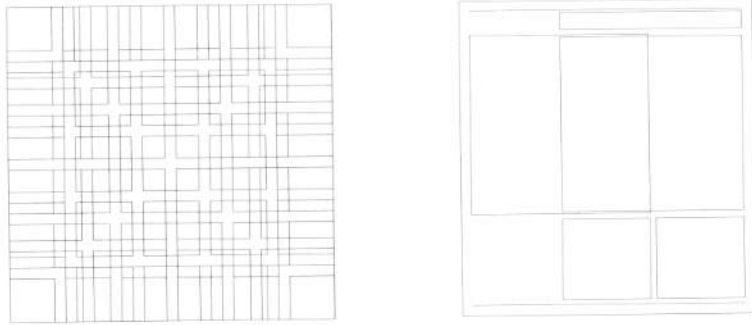
Flexibility in dealing with unanticipated situations is a hallmark of any successful design program. The best systems are consciously designed to encompass boundary conditions, since this is where breakdowns most often occur. Few systems provide a better example of this approach than Adrian Frutiger's Univers typographic family (151). The boldest and lightest faces push the limits of legibility, and the remainder of the program is designed to uniformly fill the space between these two extremes. The individual faces share ascender, descender, and character heights, allowing the varieties to be freely intermixed and the broad selection of available weights allows the family to represent almost any typographic contrast.

Flexibility

A similar flexibility is seen in the identity program created by Paul Rand for the design studios of IDEO (152). The individual elements can be presented in a wide range of permutations while still retaining the connectivity that

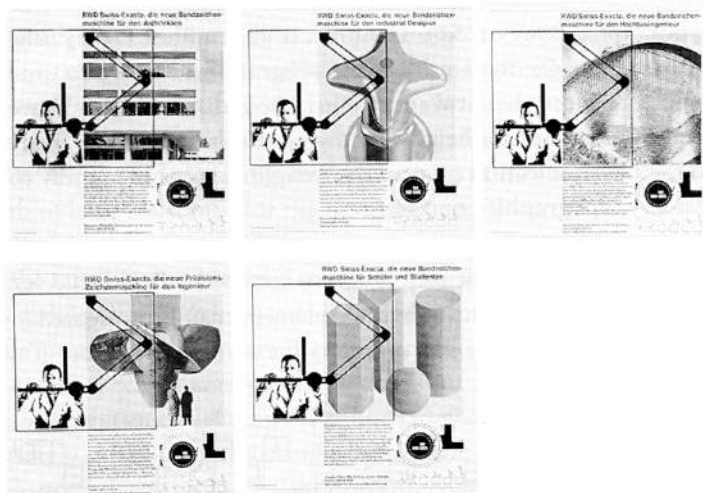


152: The flexible identity program created by Paul Rand for IDEO Product Associates reflects the creative, exploratory dynamic of the design process itself. In this program, the unifying element is not the order in which the elements appear, but rather, the rules that govern their connectivity.



153: These unusual grid designs by Karl Gerstner (a) and Josef Müller-Brockmann (b) underscore the flexibility of grid-based design. The grid is a tool reflecting the overriding theme of the program, not a straightjacket into which each new design must be coerced. When the requirements of the program change, the grid must change as well.

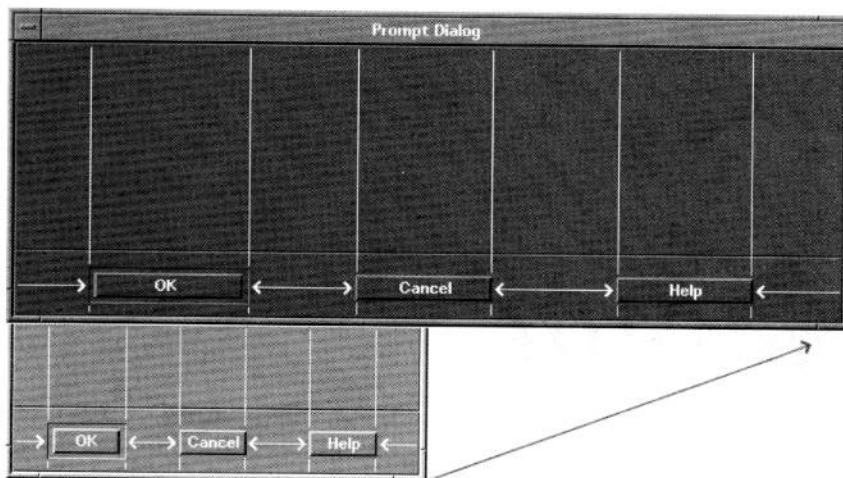
defines the corporate identity. The flexible application is particularly appropriate in this program, since it emphasizes the wide range of capabilities and creative focus of the company. The importance of flexibility, it should be noted, does not eliminate the need for focus: in fact, flexibility makes focus even more important if the programmatic nature of the design is to be made apparent.



154: The series of advertisements based on the grid in Figure 153 (b) shows the integration of the internal structure of the photographic elements with the global structure laid down by the grid. Design by Josef Müller-Brockmann.

Layout grids can provide flexibility as well. Karl Gerstner's grid for the Swiss magazine *Capital* (153-a) is complex but recognizable as the internal structure is grasped. The grid provides for two, three, four, five, or six column layouts, each defined by a series of squares that grow smaller as the number of columns increases. The wide variety of layouts possible within such a flexible system contrast sharply with the closely synchronized advertisement series (154) designed by Josef Müller-Brockmann using a much more problem-specific grid (153-b). This example shows that grids need not be restricted to simple, regular constructions, and that they can be varied to suit the unique requirements of the composition or the task domain.

Layout programs developed for GUI applications demand an additional dimension of flexibility in supporting dynamic layout. Since windows can generally be resized by the user, they must be able to recompute their layout on demand. Most toolkits for the X window system, for example, support some kind of higher-level *geometry management* system based on constraints satisfied continuously as the window is resized (155). In this system, the grid is defined relative to the current size of the window (expressed as a percentage of its overall dimensions) rather than in absolute terms. While the designer may choose to enforce a minimum of maximum size for the window, users are otherwise free to tailor its dimensions to address the demands of the task.



155: Constraint-based toolkits permitting "on-the-fly" layout as windows are resized by the user require grid systems with the flexibility to support dynamic re-configuration.



156: Consistent layout, typography, imagery, and color characterize the exquisite Dutch paper currency designed by R.D.E. Oxenaar. From the size and position of the denomination to the similarity of the portraits, these bills exemplify the *unity in diversity* that forms the core of every program. (See Color Plate 9, for additional examples). Photos courtesy of RC Publications, Inc., New York.

Consistent Application

For any design program to be effective it must be used consistently wherever it appears to ensure that its programmatic aspects will become visually apparent after even minimal exposure. The rich visual texture and extensive use of color and layering in the Dutch paper currency (156) are central aspects of the visual identity of this widely recognized program. The rich, colorful designs play a functional as well as an aesthetic role. The high end materials and processes needed to reproduce the delicate engravings and patterned overlays are intended to make counterfeiting difficult, if not impossible. In addition to its saturated colors and rich textures, the Dutch currency



157: A corporate identity becomes apparent only when the visual language seen in the identity mark and usage guidelines is applied consistently to the wide variety of products associated with the modern corporation. The program becomes the public image of the company.

