



DESIGN DYNAMICS

Integrating Design and Technology

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Joyce S. Hertzson
Eileen Feeney Bushnell
Stephanie Kirschen Cole
Karen Sardisco
Bruce Wenger

PREFACE

Design forms the basis of a universally utilized visual language. It transcends differing cultures, generational experiences, changes in technology, and advances in scientific knowledge. The computer—originally engineered as a toolbox for the mathematician, scientist, and business person—has in recent years become the media and tool of choice for many artists, designers, and visual thinkers. Though the media and methods of approach used to make visual products have broadened to include digital technology, the basic principles that govern design do not change.

As committed participants in the process of integrating technology into the study of design, the faculty of the Foundations Department in the College of Imaging Arts and Sciences at Rochester Institute of Technology have been “surfing the digital wave” for almost two decades. The two-dimensional design faculty has been experimenting with and using the personal computer and its attendant technologies as a teaching tool in Freshman Design courses. Though not always easy, it has always been a valuable experience for students and faculty alike. Our explorations have resulted in an innovative program of study that utilizes the computer to promote creative problem solving as a primary approach to learning. Although the origins of our curriculum lie in a traditional studio approach to design, the computer has become for us a flexible tool through which ideation, project development, and finished visual solutions may be accomplished.

Because we recognize that not everyone has had the same opportunity to explore the technology or exploit its creative potential, we have collectively worked on this book to share our experience and provide a framework that integrates digital technology and its creative applications with the more traditional realm of basic design. This is a project-based exploration of concepts and ideas, providing a variety of options for teaching and learning. We offer a diversity of ideas for independent study or curriculum enhancement in the classroom setting. The projects chosen for inclusion are those that most closely illustrate the premise of the book. Although inclusive and extensive, the book differs significantly from the comprehensive courses we each teach on site.

Design Dynamics demonstrates how the computer may be used as a tool to enhance visual vocabulary in an increasingly digital and web-connected culture. Our emphasis here at RIT is to explore the fundamentals of design through hands-on projects that teach design concepts and the incidental technical skills of art making. We have organized this book to explore structures in and of design through various options and themes of investigation. The projects generally progress from simple to complex both in underlying fundamental concepts and possible technological complexity. Most offer computer and noncomputer alternatives, as well as suggestions for other solutions to investigate. In fact, the digital portions of most of the projects evolved from their traditional counterparts when the computer provided a more efficient working method.

As imagemakers, we recognize that the transitions in identity, society, and technology causing great cultural shifts are occurring at a tremendous pace. Our excitement and experience in navigating the changing cultural landscape have led to the creation of this book. It is our hope that a broad range of visually interested persons will find this book stimulating and useful.

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CHAPTER 1

DESIGN ESSENCE

WHAT IS DESIGN?

What is “design”? Is it the newest sports car on the market, wallpaper patterns, or the latest in fashion magazines? Design is all of these and more. It is everywhere we look, from the structures in which we live, work, or play to what we read or wear.

While design might fill our environment, recognizing and appreciating good design is a learned skill. We grow up observing changes in fashion and style. What we like is often instilled in us by our surroundings; the cultures in which we live, both geographic and chronological. The particular taste of the people who influence our environment can be positive or negative. How do we separate design from the whims of fashion and taste? We focus on the aesthetics of forms and images combined with their intended function for the purpose of communication. Design centers on what we desire to communicate and how that affects the balance of form and function.

Design also comprises a complex and intricate set of issues including elements and principles that can be learned and applied two-dimensionally or three-dimensionally. Though the issues are similar, intrinsic differences appear when you add a third dimension.

A chair is a chair is a chair. Whether a comfortable easy chair or a drafting stool, we can measure the length, the width, and the depth. Two-dimensional design has length and width, remaining flat. Depth, the third dimension, creates objects that occupy space.

So how do we know when a chair, whether in two dimensions or three, is well designed? When form and function intertwine. The Form consists of more than surface decoration; it is the quality of line, the curve of a seat, the grace of the total object. As to function, a chair must provide seating, so it needs to support weight and be comfortable and appropriate for the chosen placement and purpose. “Appropriate” for a classroom likely differs from “appropriate” for in the living room. The overstuffed chair with ottoman does wonders for relaxation at the end of a long day, but proves a death knoll for the classroom environment, where students should remain active and alert. The appropriate studio chair must take into account the height of the desk or drafting table and a need for mobility. Any stool of the right height would work, but a stool with a back to lean against and a padded seat—ah, comfort as well as suitability for the purpose!

One additional aspect of function is cost. The stool with added attributes for comfort will certainly cost more. While cost does not change the intrinsic beauty of an object or how well it functions, the price may determine whether something is ultimately produced or purchased. If it is not made, can it be well designed? If a tree falls in the forest with no one there to hear, does it still make a sound?

Three-dimensional design is tangible—we can view it, touch it, and sit on it. If it looks good, feels good, and supports our weight, we deem it successful. What do we consider well designed in two dimensions? When the design is aesthetically pleasing and if it serves the necessary purpose—that being to communicate in the best way possible. Measurement of success in two dimensions is somewhat more difficult because you can’t sit in a drawing of a chair. So, how do we know when a drawing is balanced or whether it supports “weight”? What makes a painting the “best of show”? Is it the prettiest picture, with colors you like? If you were looking for that perfect painting to fill the space above the couch, then personal taste and purpose satisfy function.

But what if this flat image needs to do more than look good? What if it needs to “speak”? Two-dimensional design provides the vocabulary needed to speak in the complexity of visual imagery.

TO SEE, OR, THE ELEMENTS OF VISUAL LANGUAGE

If we use the same criteria for two dimensions that we have for three, we still need to look at

- Aesthetics—is it visually pleasing?
- Function—does it serve the necessary purpose?

Before we start learning how to design, maybe we should learn how to see. What exactly do we look for in an effective visual? If we look at the beautiful scene in Figure 1.1, do we stop and think about whether it is well designed? Does Nature do a good job? If we change our view, or our frame of reference as demonstrated in Figures 1.2a, b, c, does it change the success of the image?

Nature’s success in the form of a tree or the cut of the horizon is not in question. In fact, we are not really examining nature, but a photograph of nature, a two-dimensional representation. To measure the success of the photograph,



Figure 1.1

we look for the same elements we would measure in any two-dimensional creation, whether a photograph (Figure 1.3a), representational drawing (Figure 1.3b), or other abstract organization (Figure 1.3c).

So, what are those elements? To understand a photograph as a design, we must look for the *elements* of design that exist in the image. Let's start with the *horizon line*, where the sky meets the sea, and the graceful curved line we see in this view, where the sand meets the green of the grass in Figure 1.4.

Although clearly visible, some of the elements are truly visual while others are merely conceptual. In Figure 1.5, we see the horizon as line because the value of the sky contrasts with the darker value of the water, creating an edge or conceptual line element. There is, however, a dark band formed between the sand and the grass, in Figure 1.6, making this a visual line element. Our eye is drawn to the *point* where the land juts into the water, a point being the smallest, conceptual element of design (Figure 1.7).

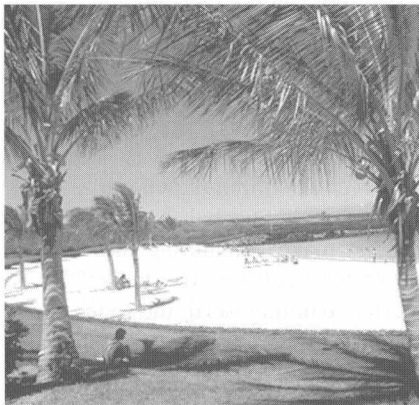
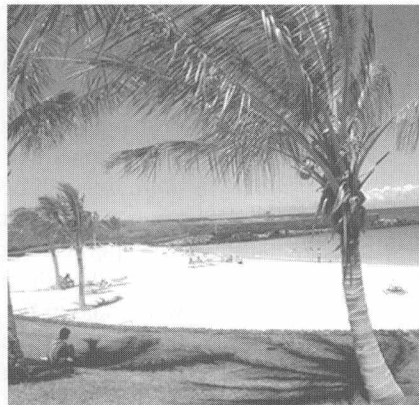
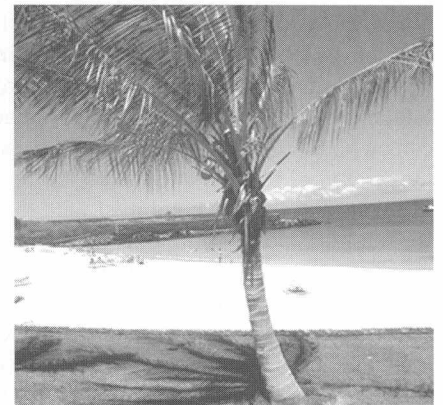


Figure 1.2(a)



(b)



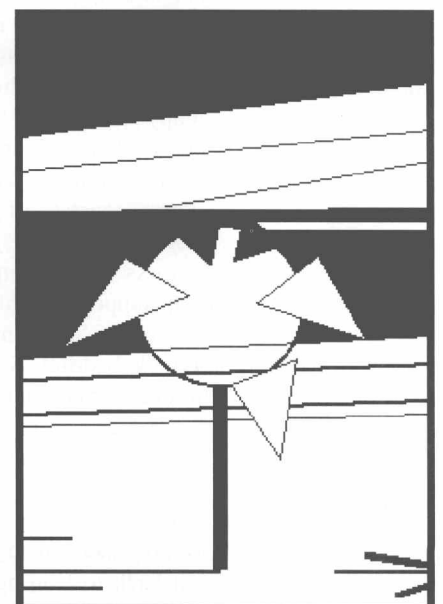
(c)



Figure 1.3(a) Photograph



(b) Representational Drawing



(c) Abstraction



FIGURE 1.4



FIGURE 1.5



Figure 1.6



Figure 1.7

From the point where the land ends in the water, in Figure 1.8, our eye is drawn to the white dot of a sailboat, forming a conceptual line from the point of land to the edge of the page. In Figure 1.9, the coconuts in the tree, though small and point-like, are examples of visual design *elements*, having definite *shape*, *size*, *color*, and *texture*. The trees, reduced to a basic expression as line, are angled, establishing direction and position by the relationship of their placement (Figure 1.10). Large or small, they convey a sense of weight, which helps their stability. The contrast in *scale* helps to create the *illusion of depth* within the *space* they occupy.

Like an arrow, the meeting of two edges forms a point in Figure 1.11, that directs our eyes and creates a shape with direction. As the movement of a point along a path creates a conceptual line, so the repetition of a line within a boundary creates a plane. In Figure 1.12, a few simple arcs convey the essence of the palms blowing in the wind, casting shadows on the ground, while the outlined circles help to isolate the visual space they occupy.

If we remove the photograph from Figure 1.13 to clearly view the graphic elements that have been established,

we can evaluate the design on the successful relationship of the elements to each other. Adding a border to Figure 1.14 shows how the elements relate to the image area or page within the frame of reference. While not necessarily visible, the frame of reference marks the boundaries of a design. How the created elements and remaining space work together within the frame is the essence of *composition*. (Figure 1.15). Therefore, the basic elements of design can be visual or conceptual and are relative to the context or environment in which they are placed.

NON-VERBAL COMMUNICATION, OR, LEARNING TO DO IT VISUALLY

While an “object d’art” can be aesthetically pleasing or serve as the personal expression of the creator, a design is creation with a purpose.

Three-dimensional design is tangible. With the well-designed chair, we can touch it or sit on it to know how it feels, whether it is balanced, and if it supports weight. We have tangible evidence of when the object satisfies its purpose.



Figure 1.8



Figure 1.9



Figure 1.10



Figure 1.11

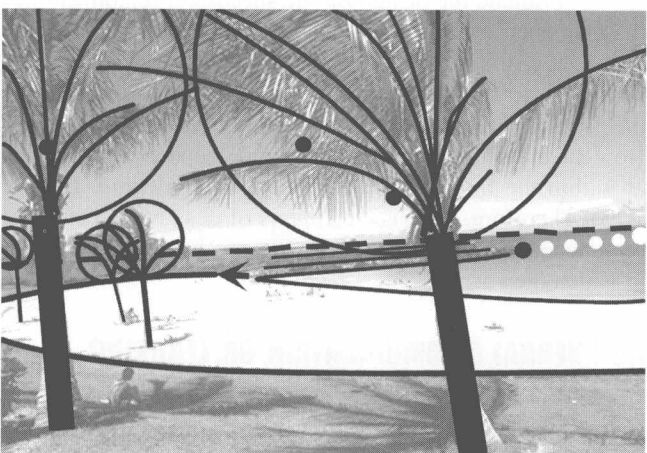


Figure 1.12



Figure 1.13

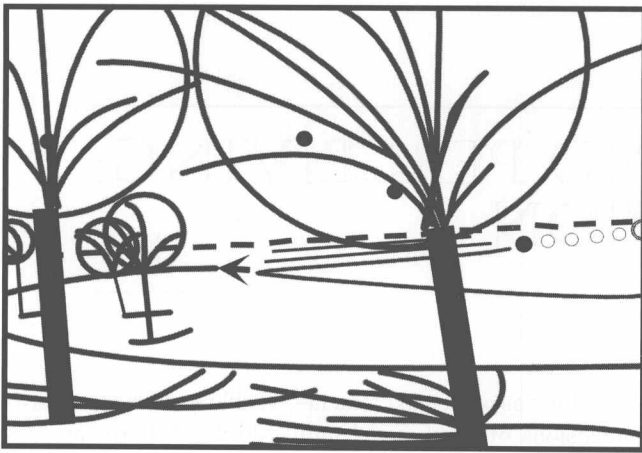


Figure 1.14

If we use the same criteria for two dimensions as we have for three, we still need to look at

- Aesthetics—is it visually pleasing?
- Function—does it serve the necessary purpose?

What is the purpose? To communicate in the best way possible.

But how do we communicate? We are raised with language, using words to express our ideas, our needs, and our wants. To design, we must now learn a visual language.

Let's start by analyzing a classic cigarette advertisement that might be found in our popular culture. Imagine

- A good looking man with a tan
- Portrait, head and shoulders view
- The character fills the page, bringing him closer to the viewer
- White cowboy hat
- Blue shirt collar
- Background out of focus
- Dramatic lighting, with half of the face in light, the other half in shadow
- A general projection of warmth
- A pack of cigarettes, with a strong color drawing the eye

All of this creates "the icon of American masculinity." What does it say? Smokers are rugged individualists, like the cowboys who tamed the American West. We have become so familiar with this *icon* that no more is needed to convey the message.

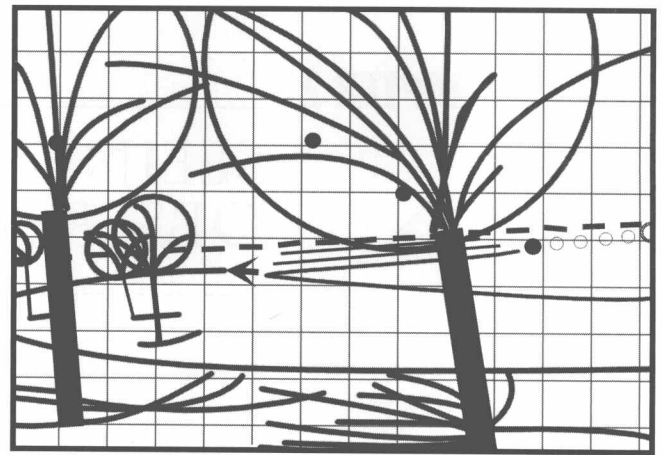


Figure 1.15

Now let's analyze an advertisement for a menthol brand of cigarette. What would you expect to see?

- A young couple walking along the beach
- Street clothes, not bathing attire
- Figures small in contrast to the environment, increasing our sense of space
- A blue sky and blue water crashing on the sand
- Pine trees in the distance
- Bright sunlight casting shadows on the wet sand

What does it say? If you too smoke a menthol cigarette, you too can be part of a couple, enjoying the clean, refreshing air and water with the pine scent.

Both of these advertisements convey a message that appeals to our senses through the manipulation of carefully selected elements. Issues of gender, age, attire, location, and quantity are coordinated to appeal to the appropriate audience. If we analyze the image characteristics and translate them into representative visual terms, we are looking at

- Shapes, their size, texture or color
- Position or placement on the page and the sense of space conveyed and the relationship to you, the viewer
- The quality of light and the time of day or temperature we perceive and how that makes us feel.

We have been manipulated by various elements and principles of design, those that are visible as well as those that are conceptual, perceived as opposed to seen, and the relationships they have to each other and to the page.



CHAPTER 2

SEEING AND PERCEIVING: OBSERVATION

LINE

Line is a basic two-dimensional *element* that can be described as a continuously moving point drawn across a surface. Defined and altered by weight, value, texture, and direction, line is often thought of, within the context of design, as a purely visual form. Like all of the elements, however, the genesis of line is found in the natural and human-made environment that surrounds us. The visual perimeters of forms, their contours, are considered to be linear (Figure 2.1)

These lines emerge as a result of *value contrasts* between forms and their surroundings. Trees, houses, horizon lines, edges of mountains, and even the human form are thought of as having an edge that we perceive as being linear. Modified by decreasing scale or extended length, forms themselves become lines within the environment. Branches, vines, painted lines on the road, telephone poles, and telephone wires are all perceived as linear forms (Figure 2.2).

Additionally, lines emerge at the intersection of planes as they meet in space. The edges of tables, the corners of houses, and the intersection between the back and seat of a chair, are all places where lines emerge within our environments (Figure 2.3).

Line as an actual element—visible and having the two dimensions of width and length—does not, however, exist within the external world. In the process of mediating the space between the actual environment and the two-dimensional picture plane, we abstract transitions between values and surfaces and “see” lines in the environment. Very few if any three-dimensional forms are actually outlined, and those forms that we “see” as lines, (branches, paint, poles, etc.) inevitably have a third dimension.

Lines are also seen when separate but visually related forms align within our surroundings. A line of people, a line of cars, a line of music, or a credit line are all examples of series of individual elements that we coalesce into a single form that we think of and see as a line.

These *implied lines* emerge as a function of the *gestalt principle of closure*, which is our mental and visual ability to finish or close forms when given even a limited amount of visual information (Figure 2.4).

Lines may even emerge or be sensed where there is no physical evidence of their existence. These *psychic lines* are perceived between two pairs of staring eyes, between a finger and a face (Figure 2.5) and behind a flock of geese as they move across the sky. Their presence as indicators of



Figure 2.1(a)



(b)

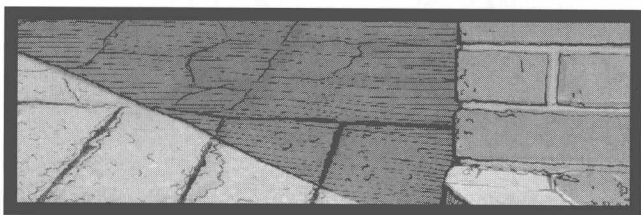


Figure 2.2(a)



(b)

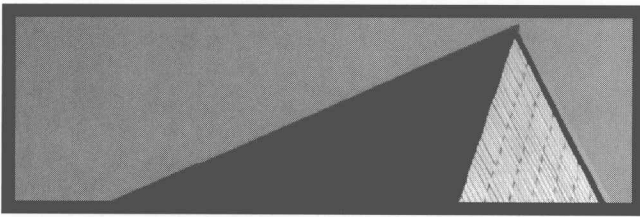
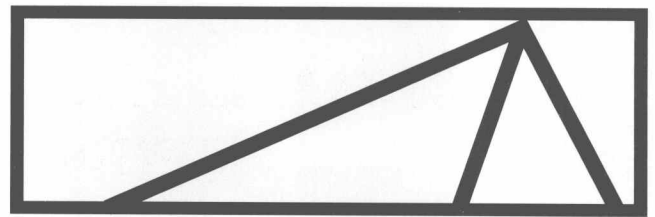


Figure 2.3(a)



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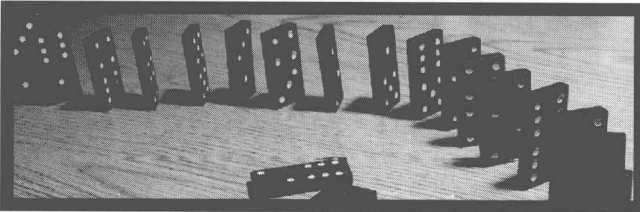


Figure 2.4

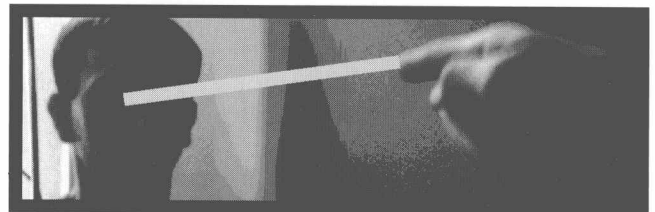


Figure 2.5

direction is indicative of the critical role of forms that point and therein govern movement within two-dimensional compositions.

On a two-dimensional surface, line functions to define edge. *Shapes* emerge as lines close on themselves, in turn creating positive and negative spaces within the picture plane. Directional movement is dependent on linear movement, either by the element itself as it moves through space or through the alignment of forms along linear paths.

Seen in parallel groupings, lines become purveyors of *rhythm* and *sequence* within a composition (Figure 2.6). Lines can change in terms of their *value*, (Figure 2.7) *texture* (Figure 2.8) and *weight* (Figure 2.9).

Perhaps the most dynamic quality of line, however, is its ability to convey emotional, visual, and even physical *movement* on a two-dimensional surface (Figure 2.10).

This quality is best understood when referenced to the movement lines in the environment around us. Horizontal lines are found on the horizon, in architectural forms, in the movement of waves, and in the sleeping posture of people and many animals. They are therein associated with quiet, calm, and stasis. Lines and aligned forms that move along horizontal paths reference these associations and can lend quiet, calm, and static qualities to the compositions in which they function. Vertical lines are found in trees, architectural elements and the path of growth of many living things. Quiet, strong, and stable, their association with growth makes them slightly more dynamic linear forms than horizontal lines. Their presence in a two-dimensional composition, like their presence in architectural forms, is indicative of the stability and strength that they lend to an image (Figure 2.11).

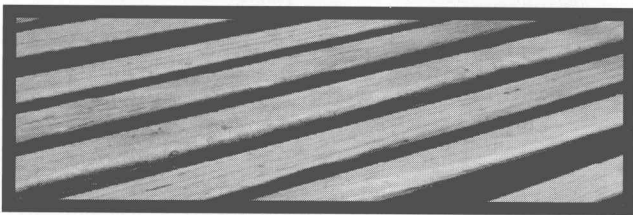


Figure 2.6



Figure 2.7

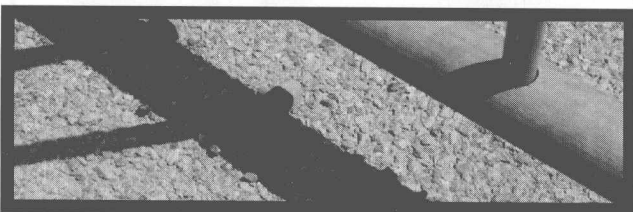


Figure 2.8

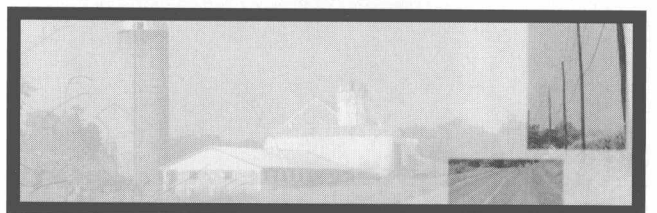


Figure 2.9

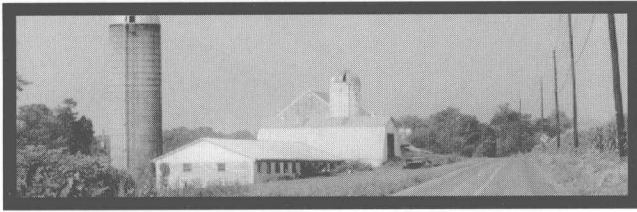
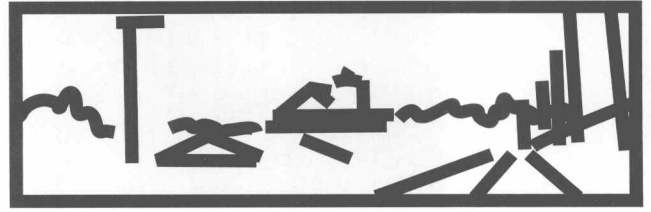


Figure 2.10(a)

Curved lines are found along the edges of many organic forms and patterns in nature. Water, coursing through a river or creating a pattern of erosion through the earth, travels in curved paths. Animals, moving within their immediate environments, tend to utilize repetitive movements that also create curved paths. Even the migratory flight patterns of birds take the form of curved spatial routes. These occurrences indicate the more dynamic and active nature of curved lines, which may be thought of as being lyrical, sensual, and flowing (Figure 2.12). Diagonal lines, found along the edges of mountains and volcanoes, and in the paths of lightning, are logically associated with action and energy.

The presence of both of these types of lines within a two-dimensional image creates a much greater level of motion and activity. As with all elements within compositions, these associations are generalized and their impact can only be truly assessed in the context of the entire design.

Perceptually, line has the ability to delineate edge and space within both two- and three-dimensional environments. Conceptually, line can convey emotional and psychological content and meaning. From a formal point of view, line is the most basic of all of the visual elements, defining edge and movement within two-dimensional compositions and



(b)

bridging the chasm between the three-dimensional fact of our environment and the two-dimensional reality of the picture plane.

Divine Inspiration, or, Line Rhythms in Nature

How do we know when a page is balanced, when the weight is well distributed? What keeps our interest and moves our eye around the page? We may now recognize the elements of design in an established composition, but how do we begin to design? How do we apply those elements to communicate most effectively?

We discussed in the section in Chapter 1 on nonverbal communication that it is successful expression of intangible emotions that communicates to us. Our next step is to understand how to appeal to those senses with basic, visual elements—building an intuitive understanding of the effect of a line or the correct placement of a shape is the next order of business. Once again we will look to a natural environment on which to build our understanding.

If we take a look at this single surfer moving diagonally across the page, (Figure 2.13(a)) we can choose to represent this graphically in many ways. We might want to identify those things we feel important to our understanding of the composition. While we see the diagonal trail of spray

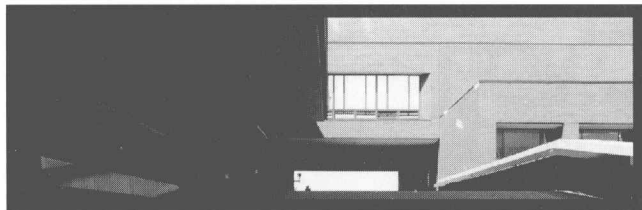
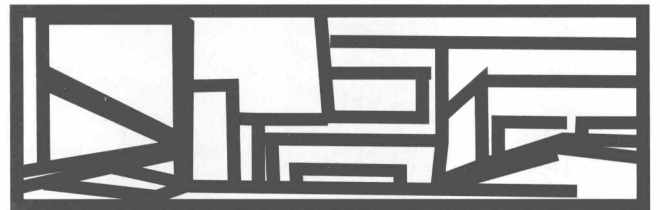


Figure 2.11(a)



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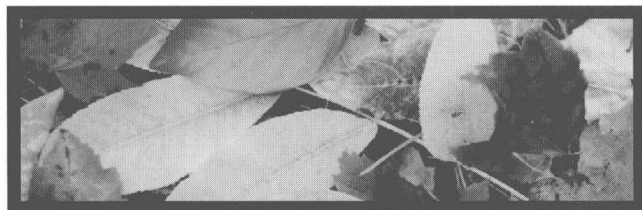


Figure 2.12(a)



(b)

left by the water (Figure 2.13(b)), what is the dominant element that draws our eye into the composition? It is the surfer who is forever frozen right in the middle of the page like a bullseye (Figure 2.13(c)). Whether we see the surfer as a single dot, or the triangle he forms in his relationship to the surfboard, it is the central focus that is important.

To stay focused on the substance of our search for design, the first step is to identify the key elements in a composition as we look for the patterns or rhythms they create by their placement. We will take a visual leap here, as we translate the surfer in (Figure 2.13(a)) into a single line of sufficient weight to represent the mass of the figure. (Figures 2.14(a, b))

This flag picture (Figure 2.15) is certainly easier to visualize as a line in relationship to the picture plane, demonstrating the asymmetry of the composition.

In Figure 2.16, the trees in the foreground are easy to identify as strong vertical lines (Figure 2.16(b)). The trees in the distance (Figure 2.16(c)) and the figures on the beach (Figure 2.16(d)) are less obvious, but can also be repre-

sented by lighter-weight lines, still running from the top to bottom of the page. (Figure 2.16(e))

We will continue to look for *line rhythms in the environment*, using vertical line as a means for identification and representation.

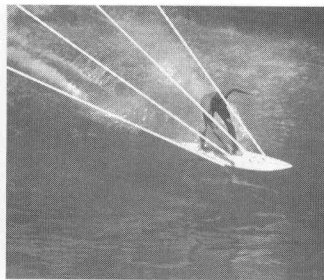
As we view this stand of trees at a distance (Figure 2.17(a)), the lines are lighter weight. We must not be distracted by the swell into shape of the palm leaves at the top (Figure 2.17(b)). Our focus is on the rhythm created by the repetition of trees (Figure 2.17(c)).

When our view moves closer to the trees (Figure 2.18(a)), the composition changes. We identify different line weights as the trees move forward (Figure 2.18(b)), and the balance of the page changes as the interval between trees appears to increase. We also lose the quantity of negative space on the right side, changing the balance of the composition (Figure 2.18(c)).

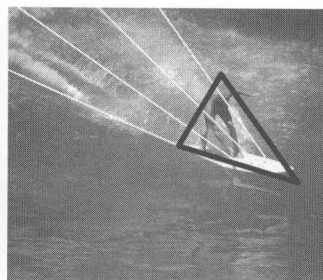
We will continue to look for interesting relationships by the placement of elements in various compositions (Figures 2.19 and 2.20).



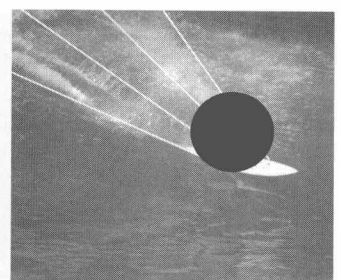
Figure 2.13(a)



(b)



(c)



(d)

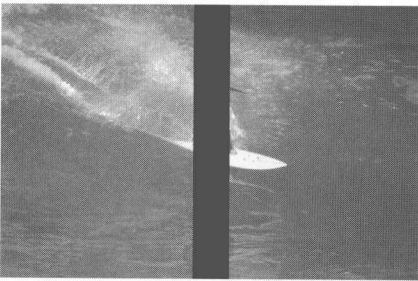
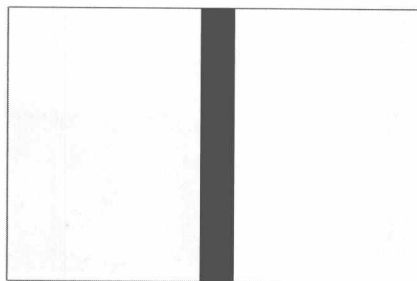


Figure 2.14(a)



(b)



Figure 2.15(a)



(b)



(c)

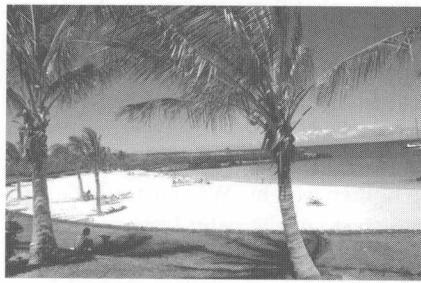
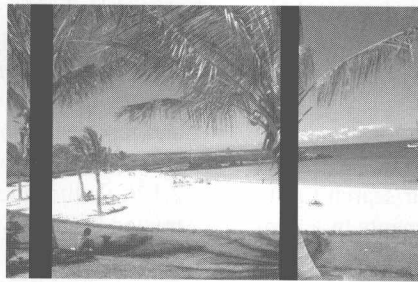
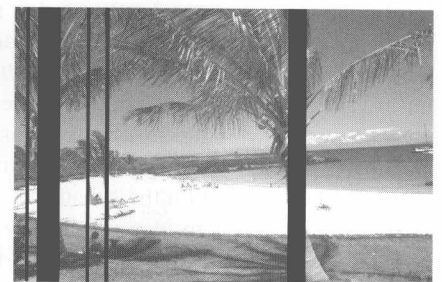


Figure 2.16(a)



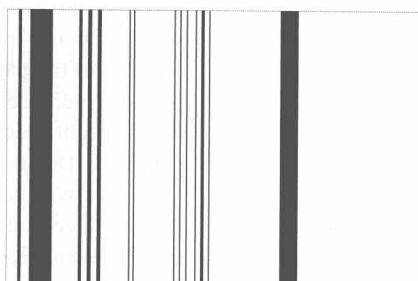
(b)



(c)



(d)



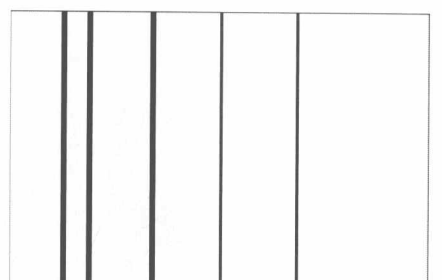
(e)



Figure 2.17(a)



(b)



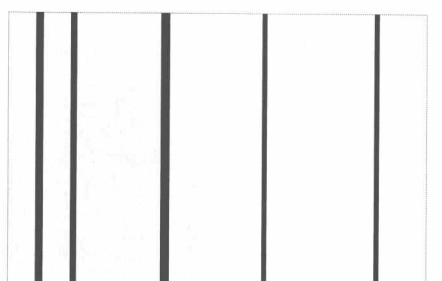
(c)



Figure 2.18(a)



(b)



(c)

A photograph, as in the case of this thatched hut (Figure 2.21), can have variables, allowing you to make choices as to what is line versus what is interval. Which of the following line rhythm solutions most closely represents not only the divisions in the image but the sense of weight and balance?

Notice the effect that perspective plays on the movement of line and interval in Figure 2.22.

Looking for clarity in this mass of trees (Figure 2.23), we can easily identify the many verticals of the tree trunks at a distance. The diagonals in the foreground add a dynamic emphasis (Figure 2.23(b)). To satisfy the requirements of

this exercise, allow the crossing lines to fill in and become the weight implied on the left side (Figure 2.23(c,d)).

This white monument is striking in the stand of trees. Fine lines that trace over tree trunks and fence posts are one possible line rhythm solution, as we saw previously.

But lines do not always have to be black. How much stronger is the solution when we invert the values, allowing the lines to be white while the shadows create strong, black negative space? (Figure 2.25)

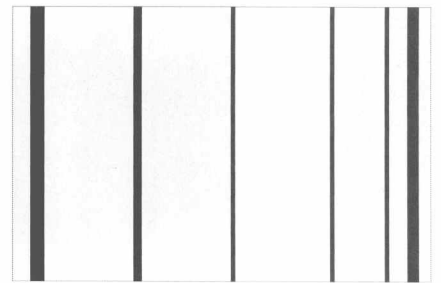
The stark contrast created by the waterfall in Figure 2.26, is easily represented by a white line of appropriate weight in a field of black.



Figure 2.19(a)



(b)



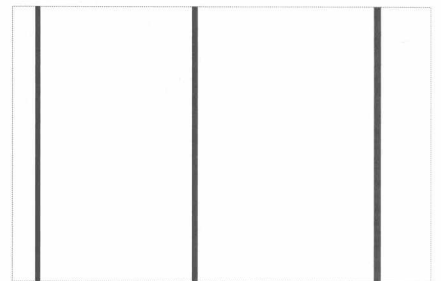
(c)



Figure 2.20(a)



(b)



(c)

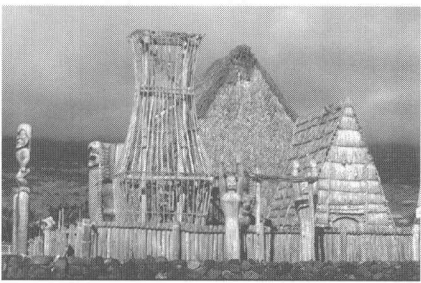
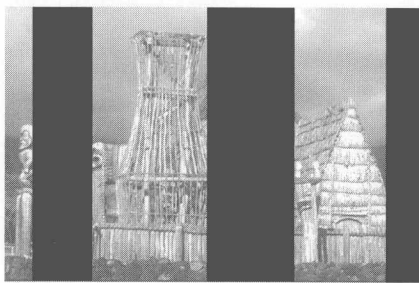


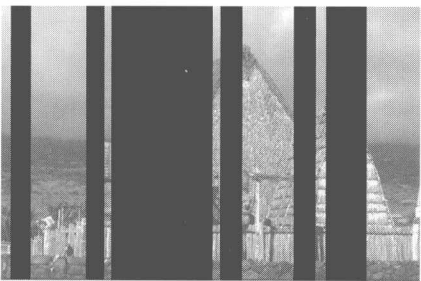
Figure 2.21(a)



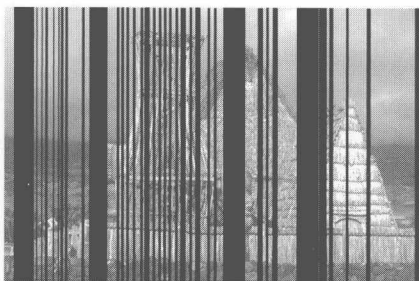
(b)



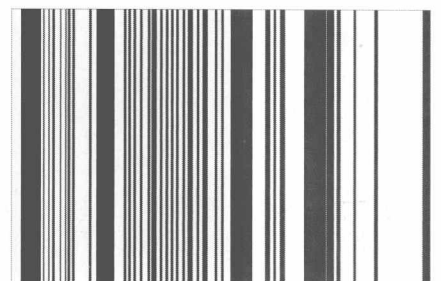
(c)



(d)



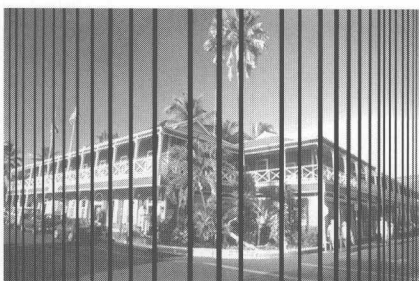
(e)



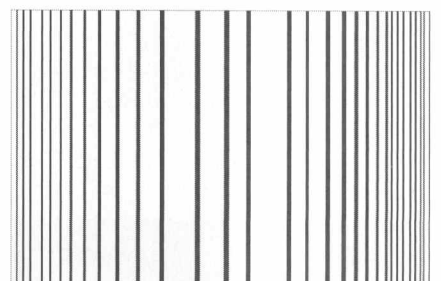
(f)



Figure 2.22(a)



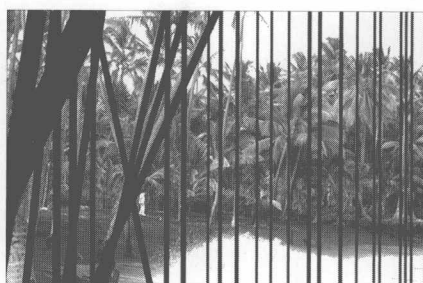
(b)



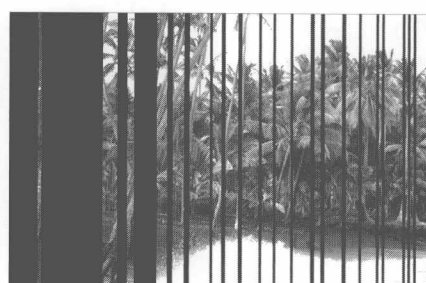
(c)



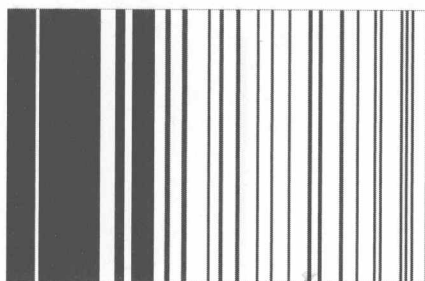
Figure 2.23(a)



(b)



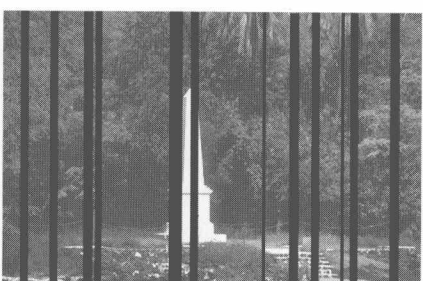
(c)



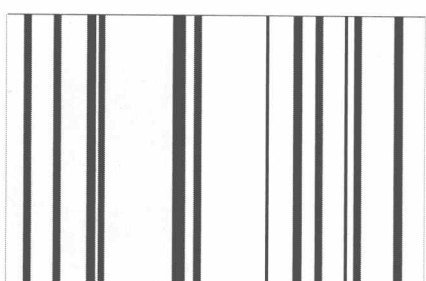
(d)



Figure 2.24(a)



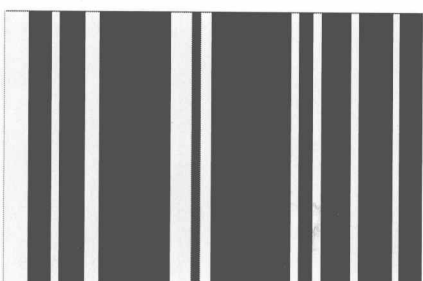
(b)



(c)



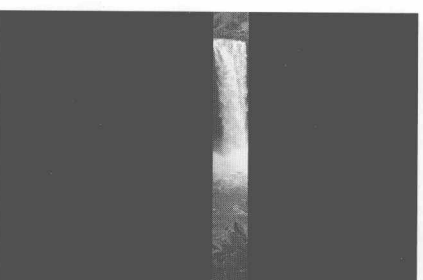
Figure 2.25(a)



(b)



Figure 2.26(a)



(b)



(c)