PATTERN

EQUAL MOVEMENT OF EQUAL ELEMENTS OVER THE SURFACE

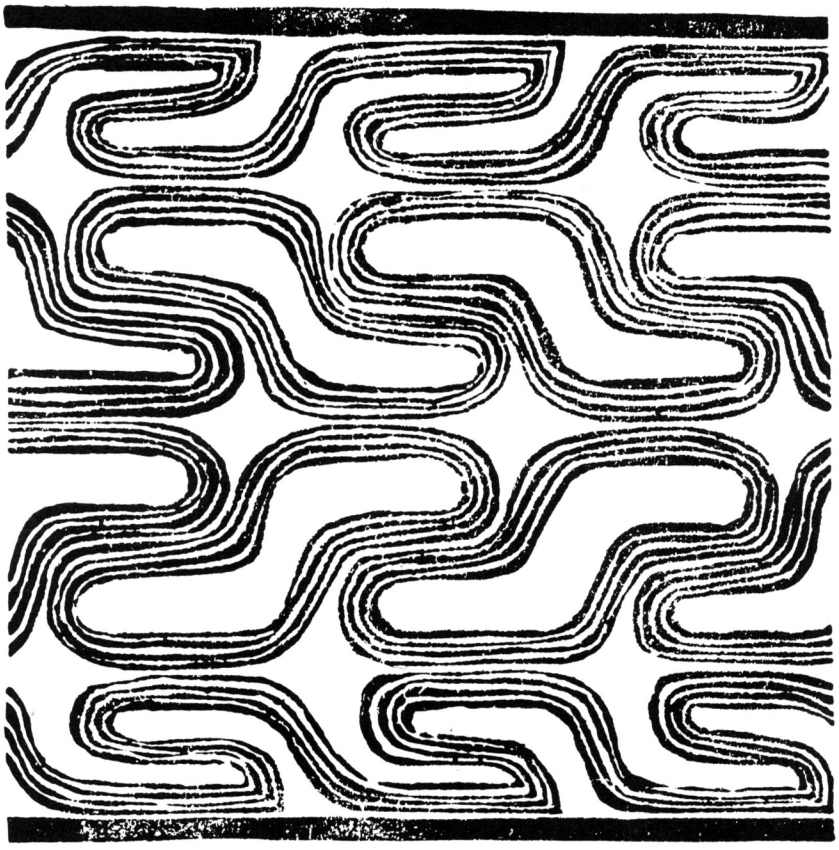


FIGURE 1–1
Carved relief on a Bushongo
wooden drinking vessel, Congo-Kinshana.
From *African Designs from Traditional Sources* by Geoffrey Williams.

Pattern is the foundation for all of the work in this book. From the obvious repetition of the classic form of the checkerboard, where elements are reduced to a minimum, to the complexities of composition, in which repetition is visually "felt" and less obviously stated, pattern establishes the fundamental rhythm for organizing a surface. It provides an understandable common denominator which can make otherwise seemingly unequal or opposing material comprehensible in its method of relational development.

Pattern in its initial form is simple and static: the surface is grasped as continuous uniform beats without break or variation in its sequence of movement. It is analogous to time being defined in increments of seconds or minutes, or measured in hours, or to the use of meter and rhyme in verse. Pattern establishes a visual rhythm of repetition that is as basic a support to ordered seeing as rhythm and beat are in producing musical phrases. One may say a "minute-and-a-half" or "an hour-and-a-half" or make whatever groupings of time units of seconds, minutes, or hours that is clear and necessary, yet the basic unit of measure remains constant throughout the variations.

Identification of a single visual element that organizes because it repeats can produce a coherency in what would otherwise seem to be only confusion. In the same sense, what one extrapolates and correlates from random visual materials as salient, as essential, is an activity of pattern making. Identification of the rhythmic relationships—relationships in time, sequence, sameness—is the necessary intellectual effort that must be made in the perceptual process. It provides the thematic basis for interpretation that has at its center the idea that connection, the relationship between the parts, is the basis of making systems of communicable order.

Thought of as a method of re-ordering random visual impressions into sensible order, pattern becomes an expressive form rather than being limited to the traditional definition of a type of decoration or ornament which must be applied to pre-existing forms to complete itself. Although pattern is used in many ornamental ways, that usage is more a by-product of the pleasant effect of patterned surfaces, rather than the cause of pattern. Certainly, the aspect of spontaneous adornment, or simple sensuous visual pleasure in pattern exists. Art expressions from many cultures—Eastern and Western—offer hundreds of delightful examples that can be thought of as pure bouyancy of human spirit and the innate will to embellish. Visually the world would be a very stuffy place without them. However, emphasis here is not on the history of decorative design, but on certain formal qualities and elements relating to pattern structures and the surface. Pattern is the basis, and it is defined in the strict sense of producing an articulated surface of similar elements evenly repeated, as well as in the broad sense of visually comprehending a whole because of the clarity of relations between its parts.

GAME A
PERCENTAGES

A percentage is a portion of a whole, or a matter of proportion, which is the size relation of the parts of a whole. *Percentages* is a game played to explore the importance of shape and size relationships and the dark-light interchange between them, factors that must be considered when making a design unit. The structural idea of Percentages is that of the simultaneous exchange of dark and light in the shape configuration within the design unit. The effect of this exchange on the entire surface can be studied by repeating the unit in an even rhythm without variation—a uniform beat over the surface—to make a pattern.

The dark-light relation is the working material of the pattern, for it is not dark nor light alone that makes the surface, but the joining of their contrasts that becomes an experience of visual union. This dark-light interdependence has often been described as that of a "positive-negative" balance, but since it is impossible to read dark without light and vice-versa, that term seems somewhat flimsy. Shapes are mutually defining and read as a single unit whether the dark or the light occupies a greater percentage of the area within the grid unit. The visual reading is in the single contrast of the two parts; the hyphenated term "dark-light" seems clearly descriptive and will be used rather than "positive-negative." For the purposes of the game it doesn't matter whether the light areas are placed on a dark ground or the other way around, although the

convenience of conventional usage usually has dark marks being made on a light surface.

The result of playing Percentages will be a series of simple patterns, all realized on the same size format, but each using a different shape. When the series is complete the patterns can be compared to one another to discover what kinds of shapes and amounts produce what kinds of surfaces. Comparison clearly demonstrates the significant contrasts created when using shapes that have a 50–50 percent balance in dark-light, and when using shapes in a 25–75 percentage balance. The first is an equally distributed alternation of dark-light over the surface while the second emphasizes either dominant dark or light areas and results in an entirely different proportionate reading. To make comparisons is to make necessary design connections and is the reason for always working in a series of designs rather than doing a single piece at a time. Proportionately integrated surfaces are grasped as complete; all the composing elements appear to belong together with no irrelevant visual interferences. Weaker surfaces have composing elements that call attention to themselves and disrupt the organization, slowing the visual search for the whole or fragmenting the impression. A basic question asked when developing a patterned surface is: Do the elements join together and appear as complete and balanced, or do they tend to separate, one visually floating on the surface of the other? The answer is found by making comparisons in a connected sequence of pattern statements.

FIRST MOVES: GRID AND SHAPE RELATIONSHIP

Once you have made some shapes according to the methods discussed in the Introduction, begin to experiment with them. Draw a grid of 1½ or 2 inch units in 2H or 4H pencil on white paper using a T-square and a triangle or other drawing tools. Trial areas can be done on a three by three unit repeat, then expanded to a six by six, or eight by eight size for a better reading. Transfer the shape, measured to fit the size of the grid unit, to black paper, and by putting several sheets together, cut out multiples of the shape. Align them on the grid, and stand back and look at them. A handy device is to use a thick backing board made of material that can be pinned into; the grid and the shapes can be fastened to it with straight pins and the whole apparatus propped up and viewed from a distance. If space is very limited a reducing glass should be used. Whatever the method, it is important that the work be studied from close and far to make accurate visual judgments. It is likely that changes will have to be made in the shape, and that can be done by cutting directly into it without preliminary drawing.

VARYING SHAPE SIZE AND POSITION

The following illustrations show some methods of experimenting with relative percentages of dark-light shape interaction within the grid unit. Certain of them have been selected and used as all-over patterns to illustrate the idea of comparative criticism. The examples are planned and shown in sequence, which is meant to serve as a model of procedure for all the Pattern games.

Figure 1-2 illustrates a series of four percentage variations on a basic shape. Whether or not the shapes are inherently interesting is not the point, which is that they may become so when combined. The shape second from the left shows an equal balance of exchange of dark-light within the grid unit, which in this case composes the complete design unit. It is 50 percent dark and 50 percent light. The design unit on the left is dominantly light, while that on the right is dominantly dark.

Four closely related patterns are produced with a simple alignment of the design units on the grid—in a one-to-one repetition—and compared for their dark-light exchange in Figure 1-3. The first, in the upper left, is a vertical saw-tooth dark stripe on a light

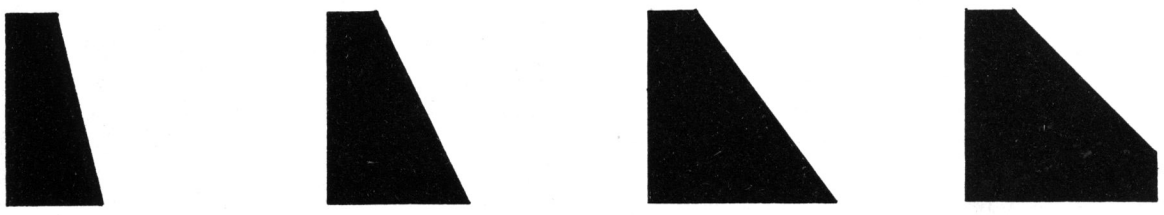


FIGURE 1–2
Percentage shape sequence.

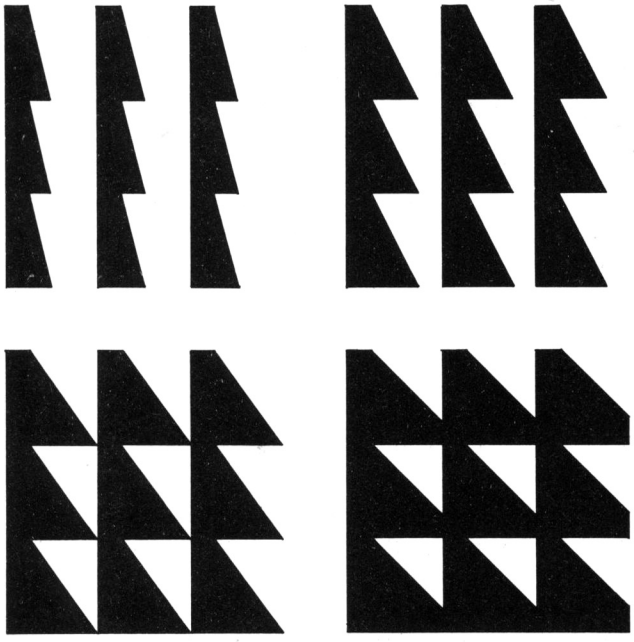


FIGURE 1–3
Percentage pattern sequence.

ground. Usually, the greater the amount of relative light to relative dark, the greater the emphasis will be on the smaller amount, which is true here. The saw-tooth line reads as belonging to dark, not to both dark and light, and tends to minimize the activity of the light area causing it to recede to the position of a supporting field. Whether from the long established habit of reading black letters on a white page, or from drawing with dark marks on a light page, there appears to be an assumption in most viewers that light functions as a support, or a passive receiver for dark; the viewer's attention is drawn to the darks and the surface is read as dark on light. In a specific instance, such as the pattern being discussed, this observation is true; however, in pattern work in general it cannot be substantiated. The pattern shown in the lower right reverses the importance of the dark-light relationship: here triangles of white appear as regularly positioned on a dark field. Although reversed, light on dark, rather than dark on light, the thinking remains the same: that one or the other of the dark-light areas is acting as a passive support to an active figure through which the pattern configuration is recognized. In certain situations this attitude of surface will work, but it does not deal with the central issue of dark-light interchange, or the idea that there is a continuous figure-field fluctuation in which the dark figure becomes the field of a light figure, which in turn exchanges with an adjoining dark. In fact, the figure-field relationship ceases to be as such, and all shapes interact with one another. For example, the pattern shown in the upper right of Figure 1-3 shows an equal amount distribution of dark and light shapes. The observer can at will call up the light areas as dominant, or the dark areas as dominant. After prolonged viewing the dark-light exchange appears to fluctuate—their balance is equal. Certainly there is nothing wrong with less dark and more light in a pattern, or vice-versa, but control of proportion comes through the recognition of the idea that both dark and light must be treated as equally important when constructing a surface. Equal balance is not the ony method of achieving dark-light interaction. The pattern in the lower left of the illustration shows a lesser proportion of light to dark than that shown in the upper right, but it is still possible to visually exchange the dark and light planes more easily than those shown in the saw-tooth stripe.

This discussion of grid alignments, shape control, repetition and what to do and what not to do and look for on the surface can sound very restrictive, if not downright oppressive. Not so, however, when it is actually being done and the relationships come up from the page with an immediate visual impact. Then the possibilities begin to suggest themselves, not only in shape development—and never let a good shape idea pass without making a note of it—but in placement and combinations, and the game becomes exciting and interesting to play.

Continuing the sequence of shape development by giving the shape seen second from the right in Figure 1-2 a quarter-turn counterclockwise and removing a part of it, produces the shape shown at the upper left in Figure 1-4. By lessening the amount of

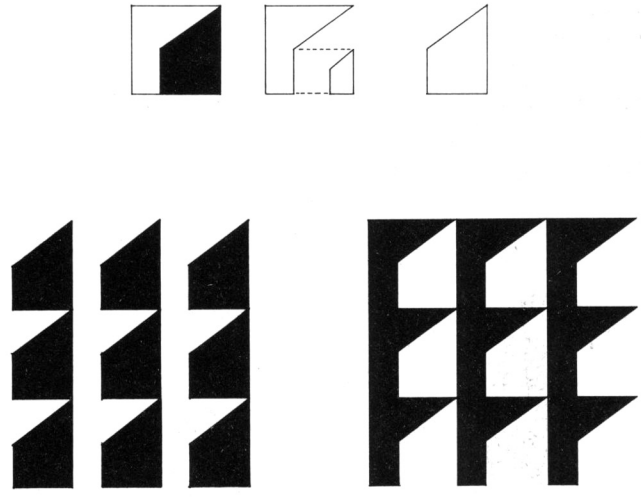


FIGURE 1–4
Percentage shape and pattern sequence with reversal.

dark area the balance of relative percents of dark-light is nearly equalized, and again the shapes begin to merge in a reciprocal exchange between figure and field. An important factor that increases the tension, and therefore the visual exchange between the shapes composing the single design unit, is that by removing part of the dark the increased light area becomes a compound shape made up of the parts shown in the upper right of the illustration. The distinct difference in dark and light configuration that make the one shape creates a contrast and ambiguity of visual importance between the two that is effective in maintaining an integrated dark-light exchange within the design unit. It is based on the same observations made about the continuity of areas that successively define one another rather than the idea of an emphatic reading of a clearly defined and isolated shape on a supporting ground. The pattern made from the new shape is shown at the lower left in the illustration, opposed to another version on the right in which the dark-light is reversed for a complete study comparison.

The dark area is reduced further in Figure 1-5, and taken down to a minimal amount in the design unit shown in the upper right which is also shown organized as a pattern. This figure should be compared to the saw-tooth stripe at the beginning of this sequence since it completes this series of examinations of a basic shape by returning to a pattern in which the dark is stressed in importance by its contrast in proportion to light.

Comparing the figures in the sequence should clarify the point of Percentages since, finally, it must be a visual rather than a verbal definition. Adjusting relative amounts of dark and light in design units based on a common shape, without deviating from a standard method of placement of the completed design unit on the grid structure, gives many different char-

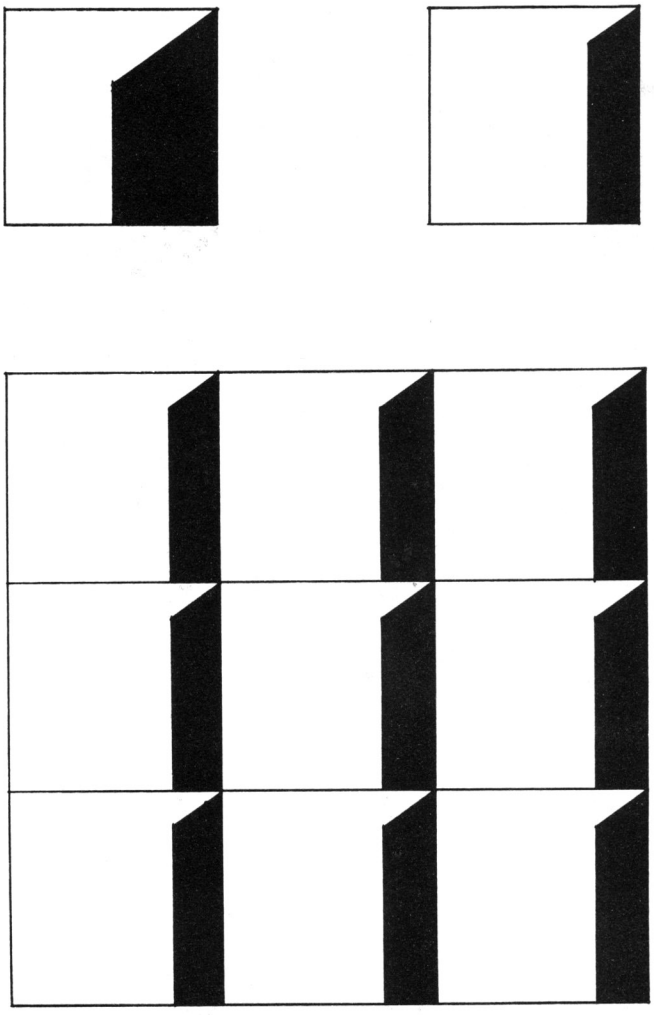


FIGURE 1–5
Percentage shape and pattern sequence, minimal amounts.

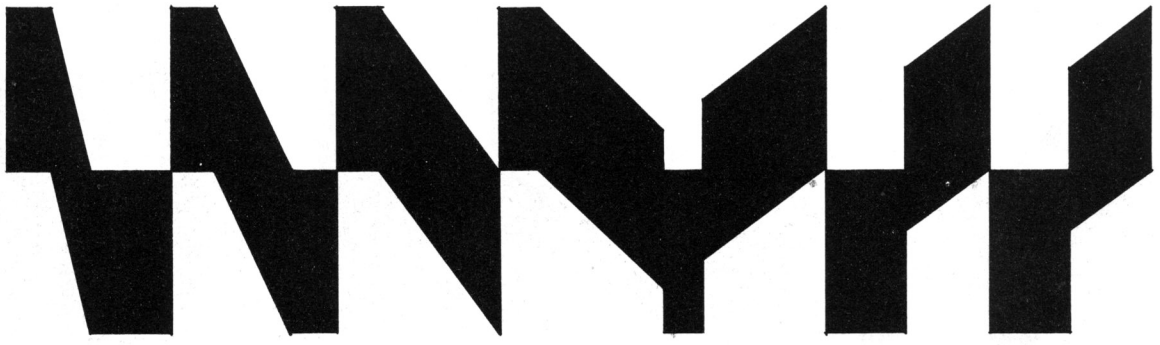


FIGURE 1–6
Percentage shape diagram.

acteristics to the final patterned surface: shapes on a supporting field, stripes, all-over pattern, strong directional movement, or contained pattern activity. In all of them the final effect is created by the relative amounts of dark and light. Patterned surfaces may fail for a variety of reasons, but one of the most common is because this primary idea of dark-light interdependence is not carefully considered and concientiously controlled. When the dark shape, for example, is looked upon as independent rather than part of the dark-light combination that makes the design unit, light areas will not receive equal attention and problems are bound to occur when constructing the surface. It is relative amounts of dark and light in combination that create the whole impression.

DEVELOPING DARK-LIGHT INTERCHANGE

A simple demonstration of this interchange and what it can do is the subject of the following set of illustrations (Figures 1-7 to 1-10). To isolate and underscore the point of dark-light interchange, the design material has been taken out of the frame of reference of the right-angled grid for the moment and put into a slightly different context.

FIGURE 1–7
Ashanti "Adinkira" printing stamp pattern, Ghana.
From *African Designs from Traditional Sources* by Geoffrey Williams. © 1971 Dover Publications, Inc., New York.

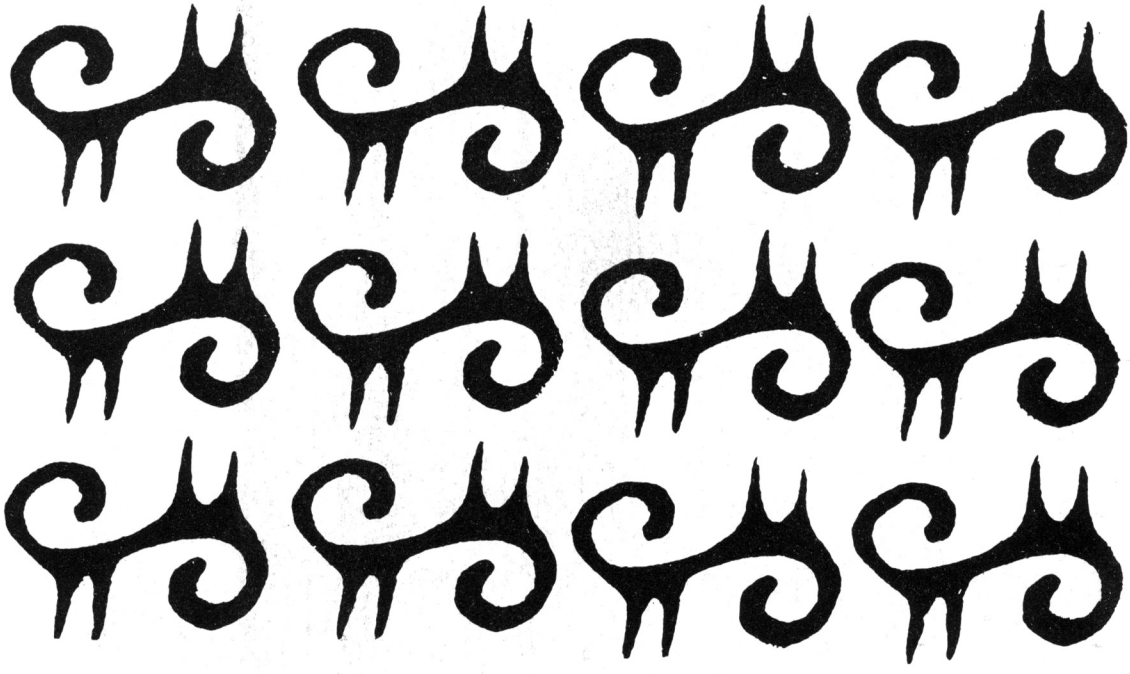


FIGURE 1–8
Ashanti, field manipulation.

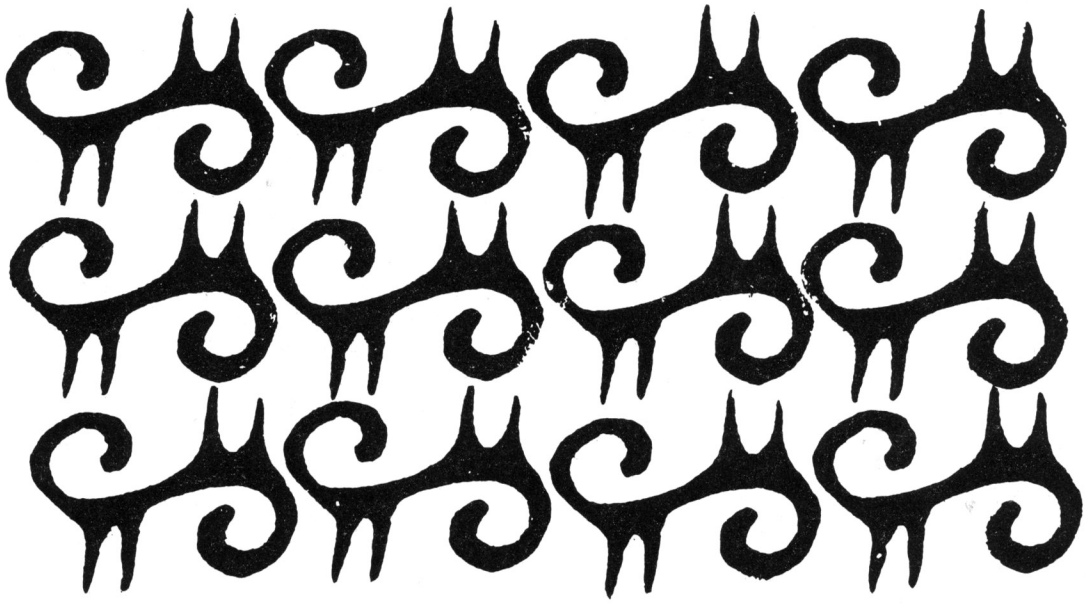


FIGURE 1–9
Ashanti, field manipulation.

The linear motif, Figure 1-7, suggesting a fanciful animal with a long snout, or a thorny arabesque, or perhaps a dollar sign gone wrong, is from an African Ashanti printing stamp from Ghana. It possesses a naive charm coupled with considerable authority in its simple reverse symmetry. Figure 1-8 shows a standard method of using the shape—a straight row, space, another straight row, space, and so on—until the desired area is filled. Since the shape has an attractive if ambiguous figurative meaning and the white ground has none at all, attention is concentrated on the shape, or dark. However, in the curves of the snout-tail parts the light spaces can be seen as definite shapes with a character particularly their own, and the concept of "mutually defining dark-light" functions. But from row to subsequent row a light line appears, a thin horizontal stripe that contains no dark elements, and that visually seems lighter than the other light areas. This light stripe is a separation that weakens the all-over impression of the surface. By a simple shift, moving the rows closer together, as shown in Figure 1-9, the light areas make definite

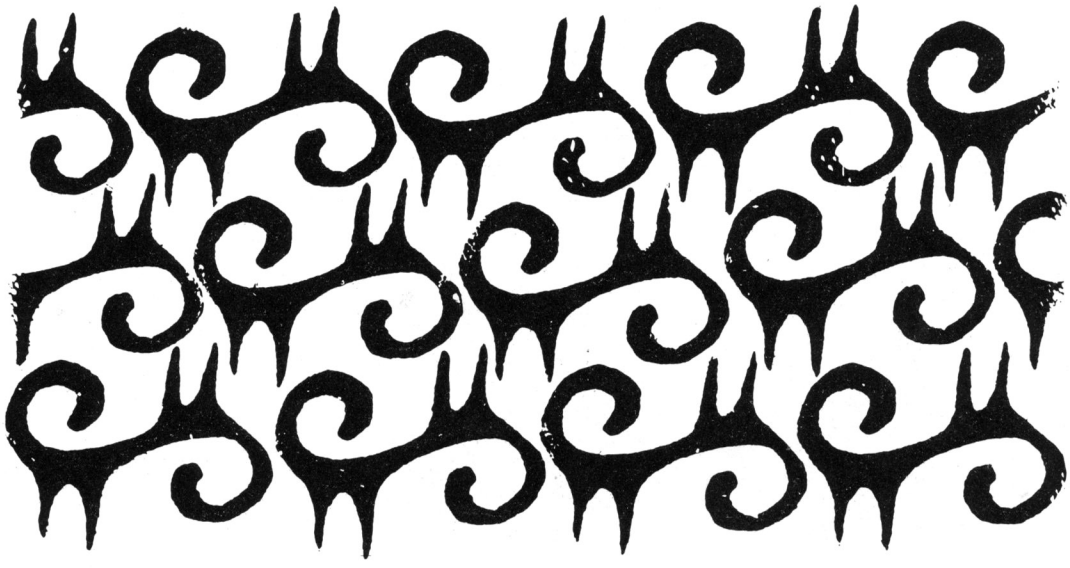


FIGURE 1–10
Ashanti, field manipulation.

rounded joining shapes. It is possible to visually call up the white shapes as being of near equal importance to the darks.

Shifting the positions of the darks to that of an alternation, Figure 1-10, creates an entirely different emphasis in the reading: The surface loosens, becomes more curvilinear, and the horizontal banding of the rows is countered by subtle diagonal movements. The reverse curve of the figure becomes more emphatic and the thorn-like pairs of marks appended to them less important. By moving the rows closer together to minimize the amount of light, definite solid areas of light are created and read as shapes clearly combining with dark. The action and counteraction of dark-light become interdependent. They may not be equal to one another in amount or configuration, but they are equal in visual content and function in composing the surface.

DEVELOPING SHAPE SEQUENCES

Tracking a shape through variations while working with it is a rewarding way in which to build a large vocabulary of related shapes by learning to develop what the shape itself suggests. The ax-head (Figure 19 in the Introduction), varied by eliminating one of the small curved light areas, is used as a beginning for such a sequence, shown in Figure 1-11. The light bulge is enlarged, then relaxed to a quarter-circle, which in turn diminishes in amount as it pushes to the upper right hand corner of the grid unit, through the sequence. The dark areas correspondingly decrease and increase, and the sequence could as easily be started with dominant light as dominant dark. A new idea is introduced in the lower design units: Dark-light is shown not as two joined areas within the design

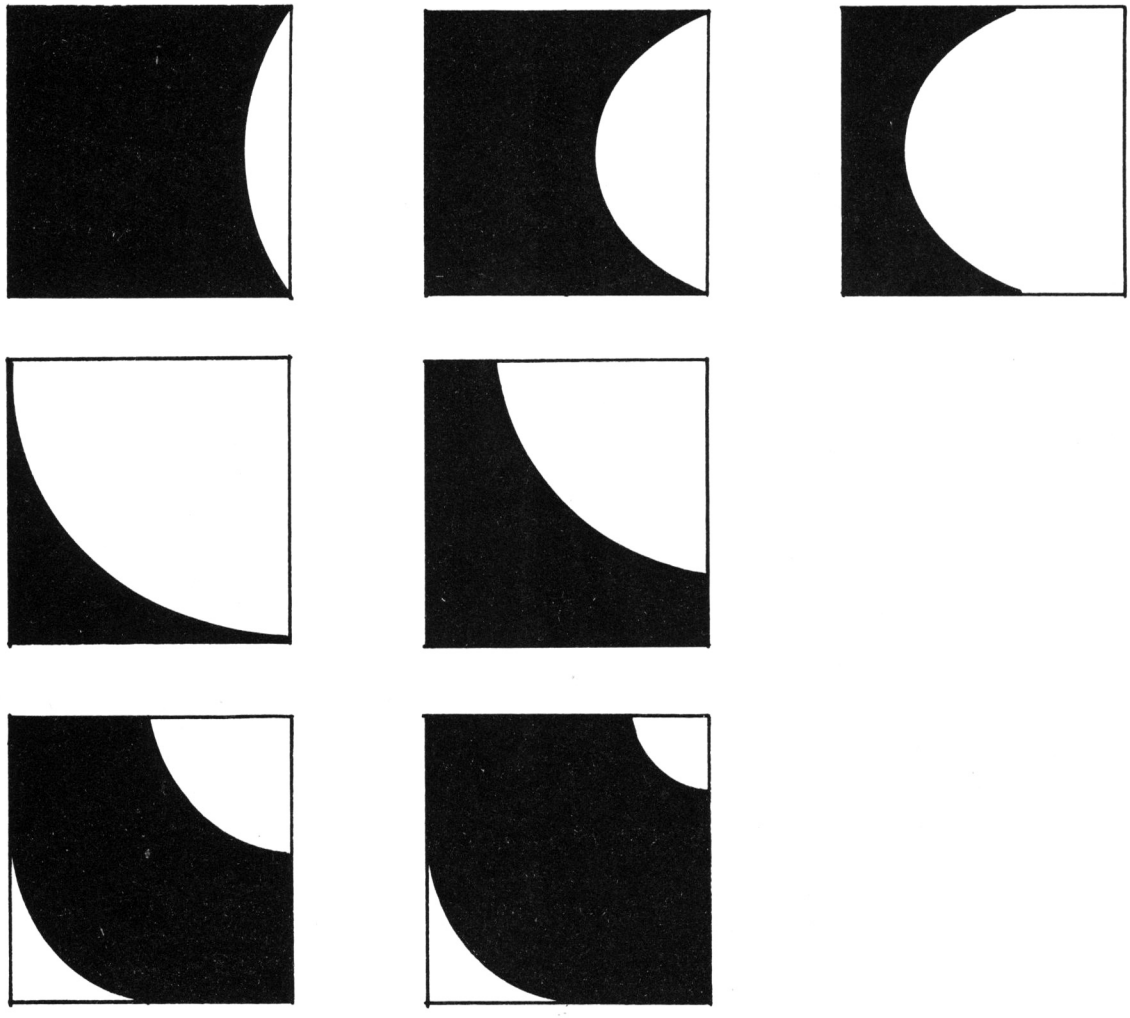


FIGURE 1–11
Ax-head variation sequence.

unit, but as three. The shape idea of the lower design unit could be sustained through another sequence, but there is enough material in the one shown to clearly demonstrate the idea of the method. There is need for imagination and free play in creating shapes—otherwise it is all dry bones. Once the creative juices have been primed by action as well as by reflection and start flowing, and attention has been taken away from the concern of making *a* shape, and thinking through connections instead, the process moves along and shapes develop almost spontaneously.

A summary sequence of patterns, in which the inner workings of proportionate amounts that effect the final surface reading can be studied, is shown in Figure 1-12. Four shapes from the examples in Figure 1-11 have been put in pattern statement on the grid,

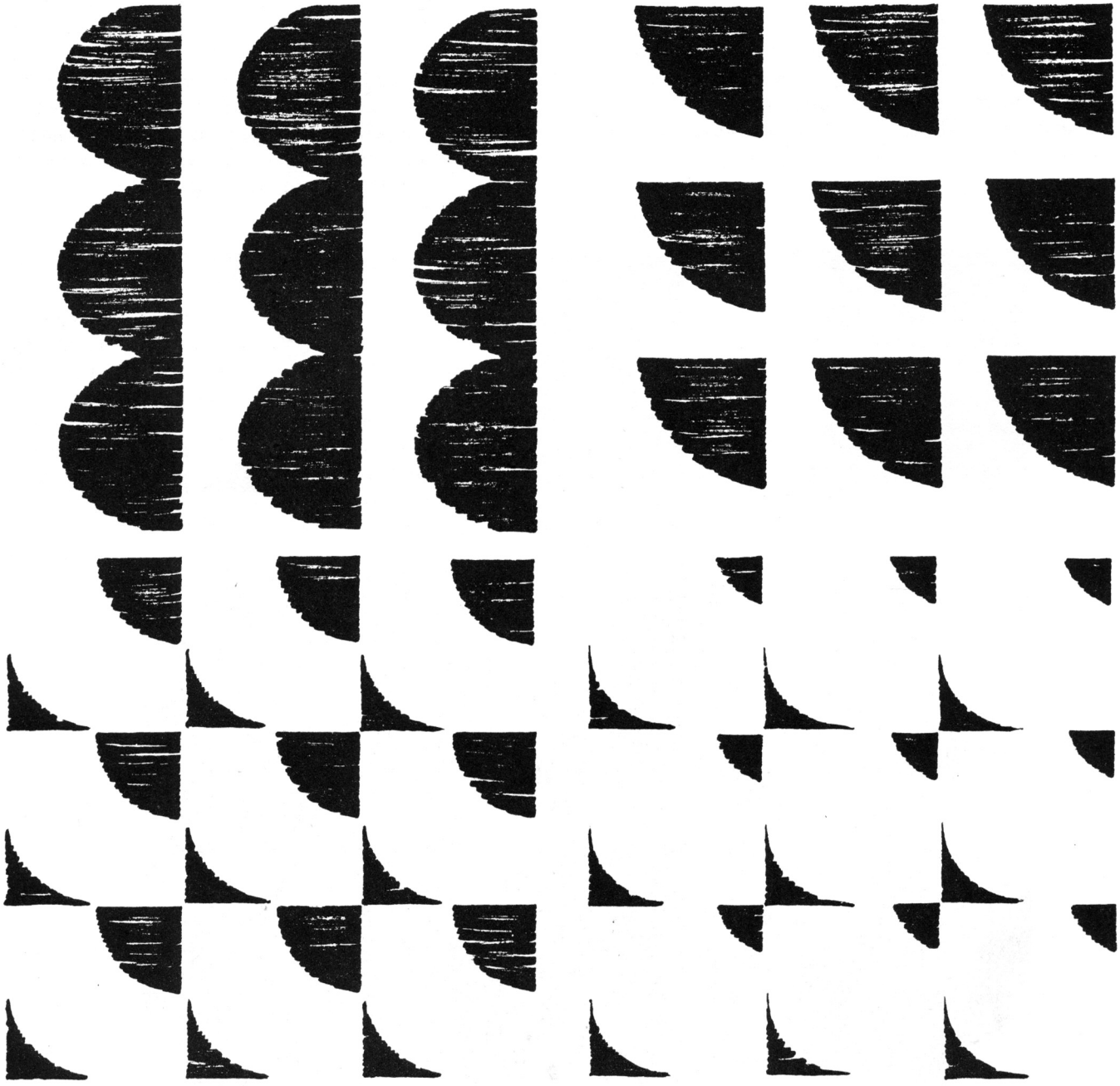


FIGURE 1–12
Patterns based on Figure 1–11.

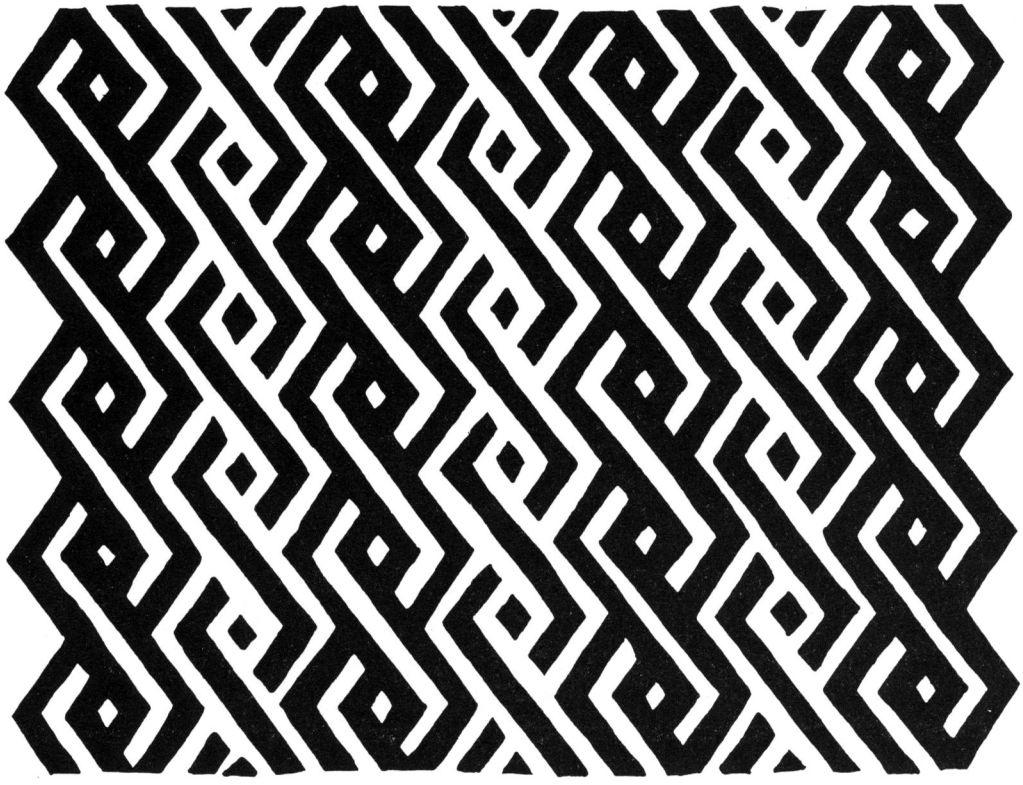
using a value reversal. The percentages of relative dark-light vary in each, consequently the surfaces appear quite different from one another although they are based on shapes taken from a closely related group. Using the experience from earlier series of shapes and patterns it is predictable that the two upper design units shown in Figure 1-11 will create stripes when aligned on the grid, and that the design unit shown last in the sequence will "spot out" or float, as indeed it does as shown in the pattern at the lower right of Figure 1-12.

The exchange of dark and light is best realized in the patterns at the upper and lower left of the illustration. In the first example, the dark-light shapes begin to fuse in a balance of proportionate amounts. The pattern has little else to recommend it, being somewhat banal in character. A sharp point created where the darks join in the repeat seems overly emphatic, calling too much attention to itself in contrast to the other softer, rounded elements of the surface, and calling up a stripe at the contrasting edge which partially negates the visual development of the curved element. The balance of dark-light in the pattern at the lower left is subtler, with angles and curves more evenly distributed for a better overall organization and containment of contrast. Here, too, there is not the obvious 50 percent dark and 50 percent light balance, which works successfully in many instances, but does not always have the interest that slightly more dark in relation to light, or more light to less dark, gives. The pattern shown at the upper right tends towards that loss of surface integration that has been seen when related amounts of dark-light in the design unit become too dissimilar in proportion, and the quarter circle begins to detach from the dark shape reducing it to the function of a ground rather than an equally interactive part of the entire surface. This effect is carried to the extreme in the pattern at the lower right, in which different proportionate amounts of shapes identical to those at its left are used. The darks are poorly defined, and the lights join in a complex shape, in high contrast to the dark, and read as small visual complications evenly spaced on the surface.

A PATTERN ANALYSIS

The pattern from a Bushongo raffia pile weave mat from the Republic of Zaïre (Figure 1-13) is a strong study in dark-light. The fretwork surface appears to

FIGURE 1–13
Bushongo raffia pile cloth pattern, Congo-Kinshana.
From *African Designs from Traditional Sources* by Geoffrey Williams.



be very complex, but a close look reveals the simplicity of its organization: two bands of intertwined angles, one dominantly dark, the other light, join to form a single wide horizontal stripe. The dark-light balance is reversed from one half of the stripe to the other—easily seen if either the small light or dark diamond is thought of as the center of each of the bands, and the continuous zigzag line as the center of the entire stripe. This compound stripe is repeated along the length of the finished mat.

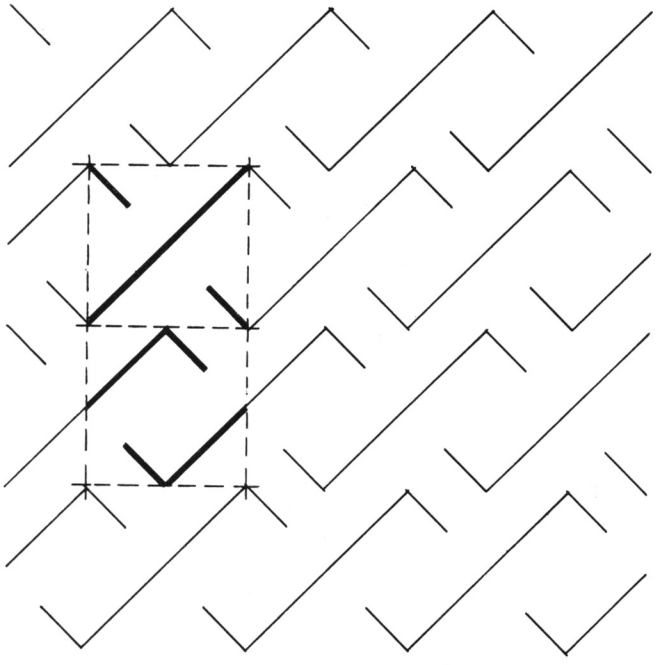


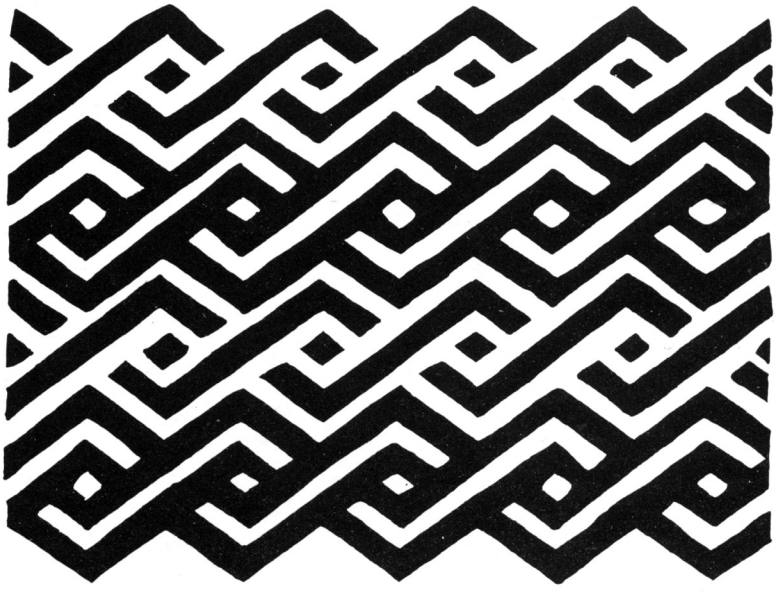
FIGURE 1–14
Diagram of Figure 1–13.

The motif of intertwining elements, or fretwork, is a common one appearing throughout the world in one stylistic version or another, and in fact, this example is but one of many variations used by the Bushongo for cloth patterning. It is a simple organization and its relation to the grid is diagrammed in Figure 1-14 as a repeat composed of two grid units arranged vertically.

This Bushongo pattern is a powerful example of dark-light interchange. There is no visual ambiguity in this surface. Every part is active in the composition of the whole: The amounts of dark and light are equal and interdependently defining. Although the pattern moves rapidly from left to right across the field, the composing elements are balanced and held within the pattern area. The long diagonal line is countered by shorter hook-like returns at top and bottom that make the intertwine, and the small central diamond shape is framed in such a way that it does not move but makes a series of centers in the bands. Both movements are subordinate to the dominant diagonal and keep the tensions of the surface in balance.

It is interesting to notice the differences between the top and bottom edges in the smaller section of the pattern shown in Figure 1-15. The top line is resolved in the light area framing the section, while the lower edge is aggressively contrasting to it and appears to move forward on the plane.

FIGURE 1–15
Edge detail of Figure 1–13.



GAME B

REVERSALS:
PLAYING WITH DARK-LIGHT COUNTERCHANGE

The ideas in every game played can be extended to discover new relationships and create new surfaces. Percentages stresses making shapes, dark-light, and how these relate to the grid and to surface structure. But Percentages is not all of pattern study. Design ideas are cumulative. Those already developed in one way may be continued or varied in new games.

Reversals builds upon the previous game and can be played with the same shapes. The new idea is the old one of the checkerboard, or counterchange in dark and light in its simplest form—one square dark and one light, alternated in placement in succeeding rows, left to right, as shown in Figure 1-16. A more sophisticated use of reversing can be seen in Figure 1-13, in which the bands are alternately dark, then light, in turn. Although the bands are identical in design, the dark-light reversal gives each its particular character and creates the strong articulation of the pattern when they are interlocked to complete the dark-light interchange.

FIRST MOVES

Any shapes from the previous sequences can be used to play Reversals. But to demonstrate that nothing is really lost, even though it may not succeed in its immediate context, two examples found to be weak when realized in pattern have been deliberately chosen to show the possibilities of transformation of the materials in this new framework. The first example is the smaller of the two angle shapes from Figure 1-5, which formed a stripe with a subordinate counterpoint angle in the upper right of the grid square, resulting in a surface on which the light area was so great—or the dark so small—that it lost identity as an interacting shape and became the ground for the dark figure. The second example, chosen to give contrast, is the curved shape shown in Figure 1-12, which has a better balance of dark-light, but gives an unresolved pattern configuration when joined with itself.

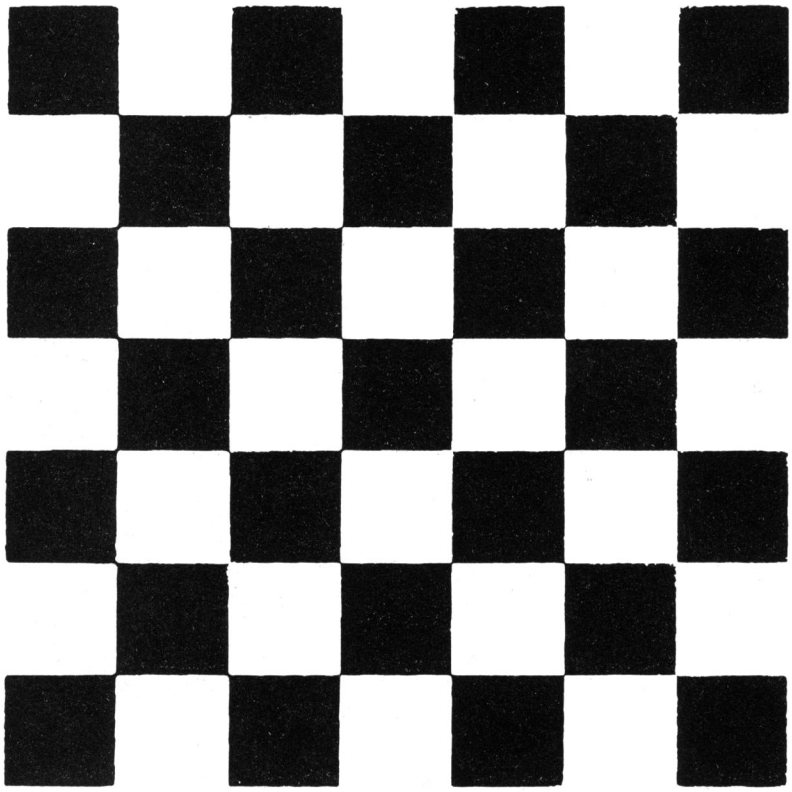


FIGURE 1–16
The checkerboard.

The first design unit is shown in Figure 1-17. When it is placed on the grid and each square in each row is reversed in dark-light without alternating the rows as in the checkerboard, a bold vertical stripe—shown on the left—is produced that is evenly balanced in its percentages of dark and light. When the placement is alternated, that is, a dominantly dark unit placed under a light one, the variation of a checkerboard shown on the right is produced—again, evenly balanced in dark-light proportions. It is interesting to compare the differences in pattern character revealed by these simple changes and study the contrast in scale between surfaces created from the original design unit and those which have been reversed, as well as the differences in character between stripe and checkerboard.

INCREASED REPEAT SIZE

When any set of design units is handled as a reversal the result will always be an equation of dark and light areas in the pattern, an even balance between them, and an immediate increase in the repeat size. This is because the areas are no longer complete within a single grid unit, but expand to two, joined side to side, when making a stripe, and four, when making a complete checkerboard unit since the alternation of position must be included in the repeat. In Reversals, emphasis again is placed not so much on what may appear to be an "interesting" design unit in itself, but on material to be worked through in different relationships.

The curved motif, or "C" shape, shown in Figure 1-18, has been given a quarter-turn clockwise within the grid unit to introduce the idea of a change of position as another method of gaining variety in the results of a thorough examination of a single design unit. Patterns are usually worked from one viewpoint, but any pattern should maintain a balance between its composing elements when turned and seen from different positions. Two patterns are produced using the methods described for the design shown in Figure 1-17. The results are those that would be expected, the difference being that the dominant movement of the surface on the left in Figure 1-18 is horizontal rather than vertical. The pattern on the right shows

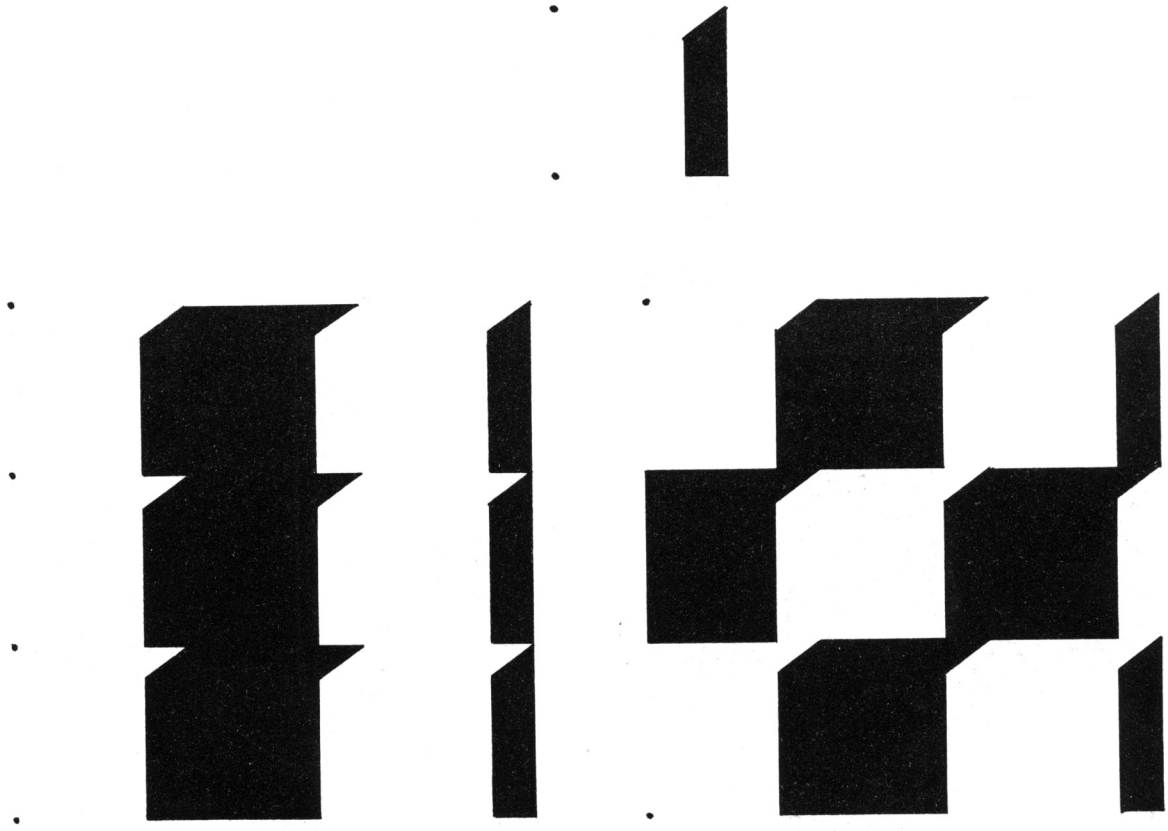


FIGURE 1–17
Small percent shape.

a more elaborate variation on a checkerboard than that seen in Figure 1-17. The small points abutting the straight line of the stripe seen in Figure 1-12 are resolved in both patterns as a continuous curvilinear flow against which the points contrast, but contrast within the context established by the pattern rather than as the contradiction to it seen in its previous use.

CHANGING SHAPE POSITIONS

As basic design units are transformed through the dark-light placement, the strengths and weaknesses of their potential surface movements are revealed. In addition to a vertical or horizontal movement, when a design unit is alternated row to row in dark-light, often a diagonal movement occurs in the pattern, such as that seen at the left in Figure 1-19. Although based on a very simple design unit taken from Figure 1-11, the continual interruption of the curve by the angle produces an unnecessary busyness at the line of dark-light contrast. The other pattern, shown at the right—based on another unit in the same series—eliminates the angles and simplifies the dominant line of the pattern movement. Here, as in all of the preceding examples, critical comparison builds a foundation of experience upon which to make visual judgments, and emphasizes the importance of continuous work in shape development.

Three patterns, based on a design unit taken from Figure 1-2, are included in a final sequence of examples. Each one uses the foundation shown in Figure 1-20 to develop a surface. By following the methods used in the preceding illustrations the patterns shown in Figures 1-21 and 1-22 are produced. The first is a balanced surface with enough visual activity in its contained movements to make an interesting sharp-angled variation on a stripe. Composed of joined parallelograms, it reads equally well either vertically or horizontally. The alternation shown in Figure 1-22 is tentative and the dark-light line of contrast is poorly defined in comparison with the other examples. The long linear diagonal movement across the surface appears as structurally weak in relation to the planes and becomes all direction across the areas with little left *in* the surface.

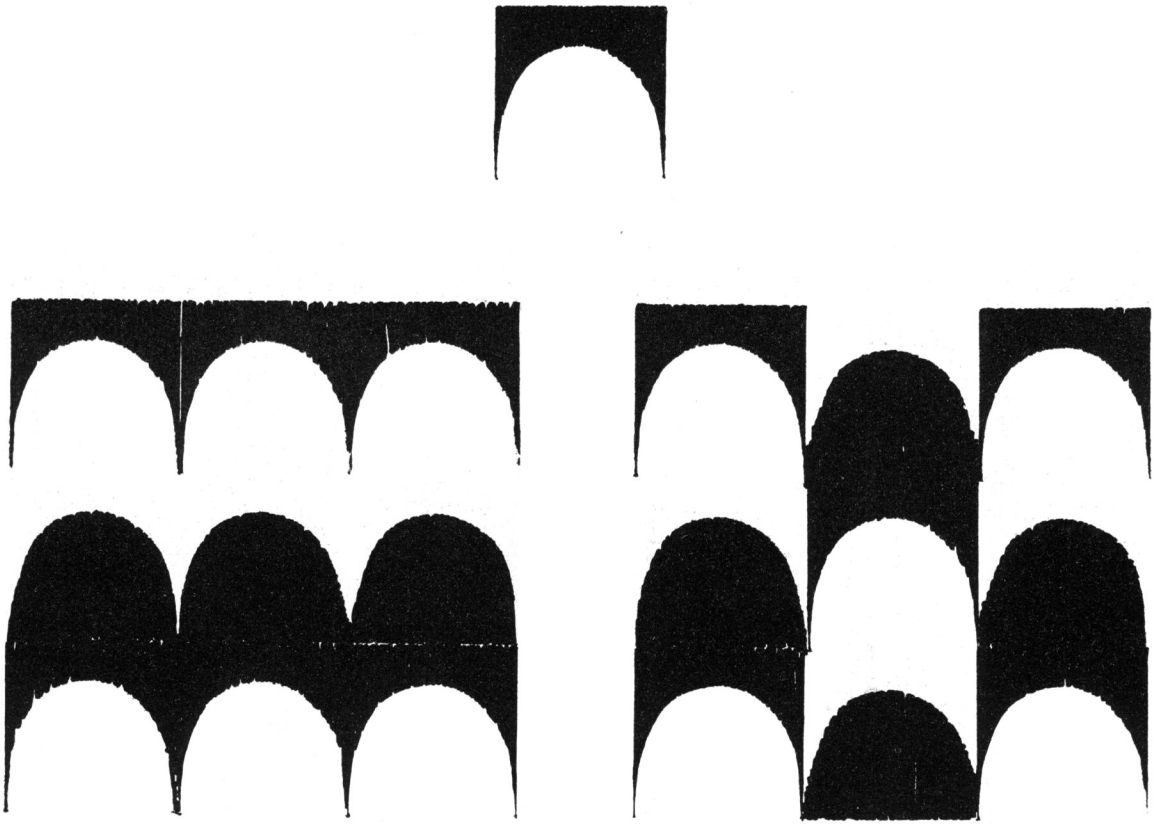


FIGURE 1–18
Reversal shape.

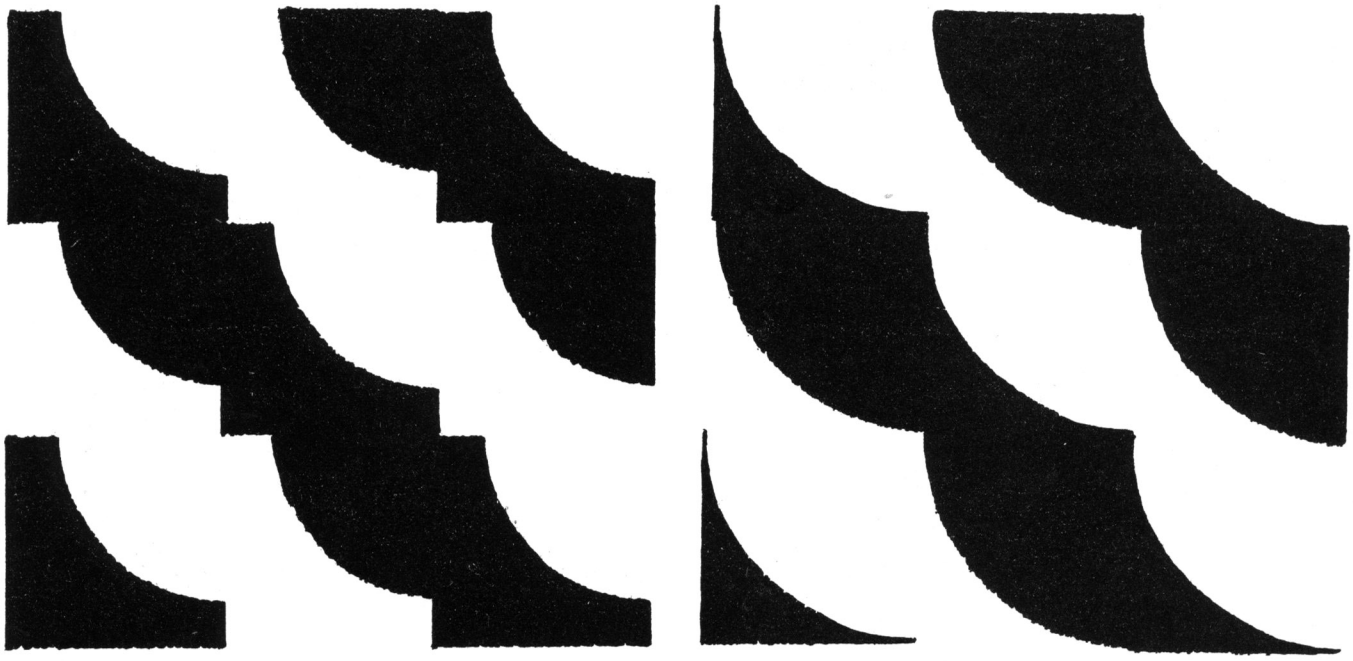
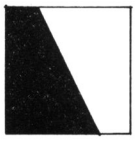


FIGURE 1–19
Pattern comparison based on elements from Figure 1–11.



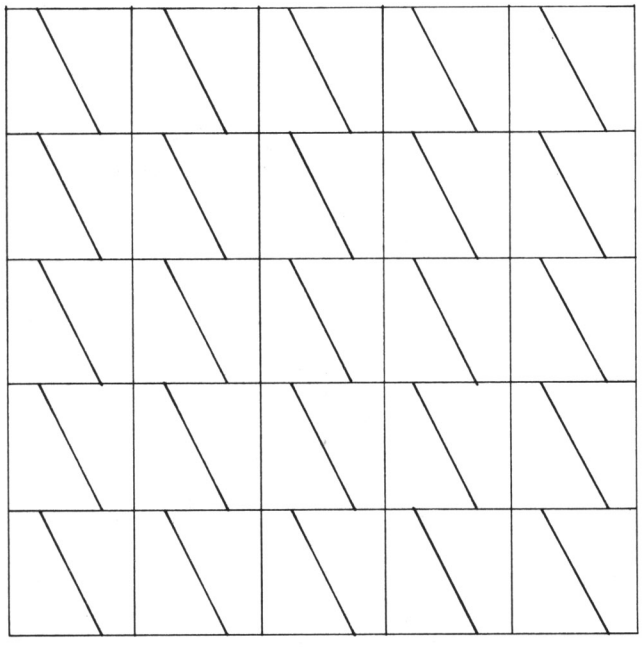


FIGURE 1–20
Reversal of Figure 1–2.

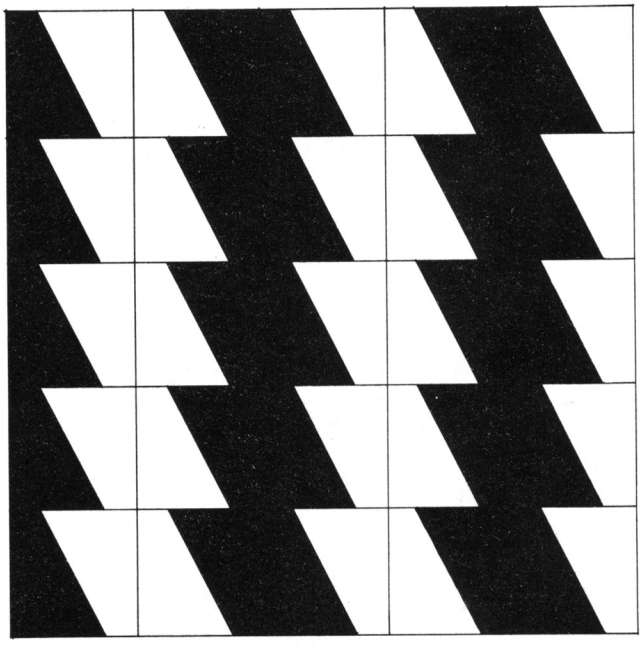


FIGURE 1–21
Reversal of Figure 1–2.

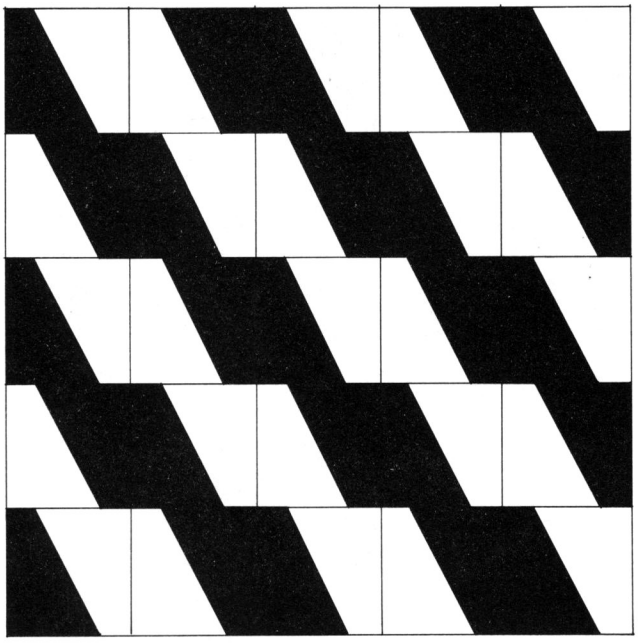


FIGURE 1–22
Reversal of Figure 1–2.

Figure 1-23, the strongest pattern in the group, shows a reversal row by row down, rather than by grid unit to grid unit across. The second row is a dark-light reversal of the first, making a repeat that includes the upper and lower units; that, in turn, is repeated evenly across the surface. This device gives a much tighter, more contained shape, preventing the ambiguous sprawl seen in Figure 1-22. The small right-angled articulations that appear where the design units join are completely integrated within the character of the design. The balance of the complete shape, which involves its equal—an idea similar to that of the African motif seen in Figure 1-7—and the diagonal movement on the surface is countered by the center of balance in the shape itself, giving a contained and clear surface reading to the pattern.

By comparing examples from Reversals with those of Percentages a shift in emphasis in relation to the grid can be seen. The grid was used as a right-angled control of the area in all of the work done in Percentages and is still used as such in Reversals. However, when shapes join to form new shapes, such as those in the lower right in Figures 1-18 and 1-23, much of the visual insistence of the grid framework diminishes in importance. It is still there as a static base, but curves, angles, horizontal, vertical, and diagonal movements become more dominant factors when reading the completed patterns.

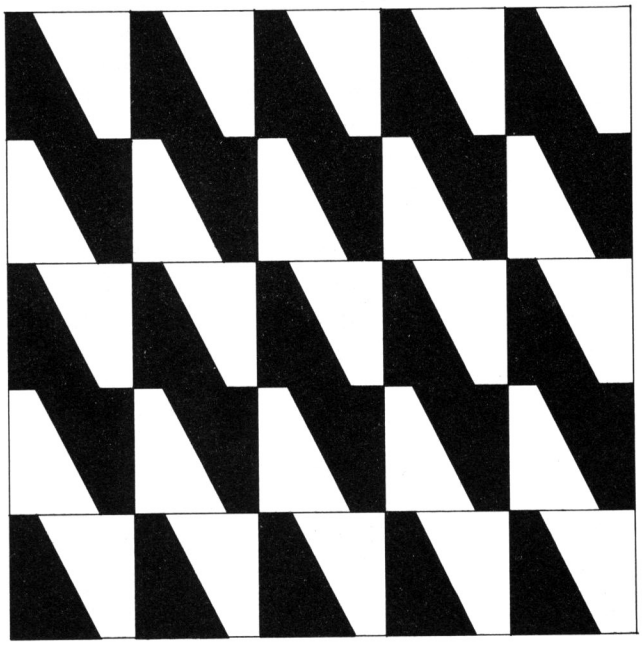


FIGURE 1–23
Reversal of Figure 1–2.

GAME C

MANIPULATIONS:
VARYING SHAPE PLACEMENT ON THE GRID

To manipulate a shape means to move it, to change its position. As position changes, new alignments and relationships are discovered, and when these relationships are repeated new patterns are formed. The Manipulations game is played by moving a single design unit—the basic dark-light combination—over the grid. Using the grid as a constant, and the design unit as a variable, the object of the game is to discover as many variations of the unit's position on the grid as possible. The design unit is placed in each grid unit in a certain way and repeated over the surface, or it is placed one way in one grid unit and another in the adjoining units, and this combination becomes the pattern repeat. Game A (Percentages) emphasized the porportionate relationship of dark-light balance in the design unit which was placed within the grid unit in a single position and repeated evenly over the surface to develop a pattern. There was no variation of position or placement of the design unit—it was always uniform. Game B (Reversals) continued the emphasis on dark-light balance in counterchange, or maintain-

ing an equal balance from design unit to design unit by exchanging the placement of dark-light in adjoining design units, with the objective of keeping an equal balance of these elements on the surface.

Manipulations incorporates ideas from both games A and B, but places emphasis on variation of placement of the design unit within the grid units, and from unit to unit by rotating it, reversing it, or alternating its position. The result of playing Manipulations will be a series of contrasting patterned surfaces, all of which have been developed from the same visual elements, but with each showing different relationships between those elements. The important maneuver is one of changing—slightly or greatly—the relationship of position: it compounds shapes, creates new ones, and affects scale by increasing repeat size. These patterns are seen as the result of changing relationships, and although they may take forms such as checkerboard, stripe, half-drop, and so on, they do not evolve from working with predetermined or conventional pattern forms, but from working directly with the flat relations of the surface.

Another result is that the grid, so clearly stated as foundation in many patterns made while playing Percentages or Reversals, becomes subordinate to the pattern activity it supports. The diminution of the visual insistence of the grid structure was seen in Figures 1-18 and 1-19 in Game B, but as shapes are manipulated, and repeats become more complicated as a result, the grid disappears completely into the surface. When a half-dozen patterns are completed and viewed as a series, their resemblances in basic shape vocabulary, contrasted with their variety of repeat arrangements, clearly show a new emphasis on surface variety derived from working with a controlled distribution of shape relationships over the grid rather than using it as a contained structure with each cellular unit intact.

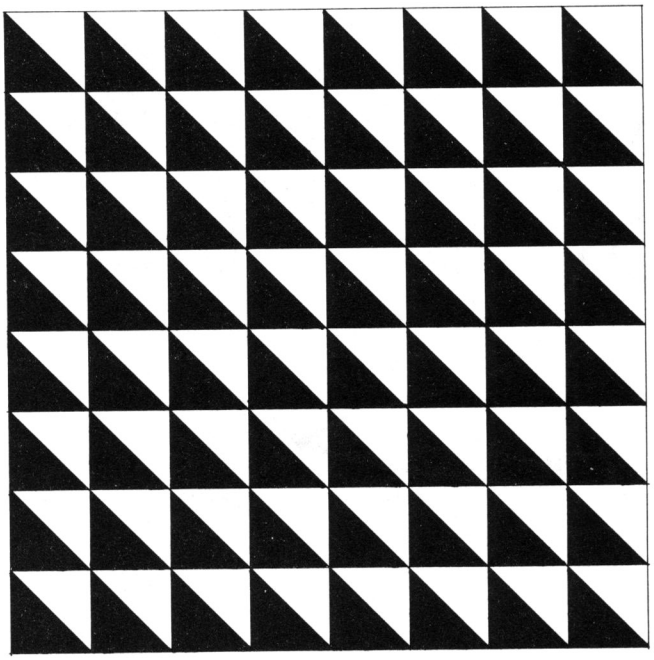


FIGURE 1–24
Pattern manipulation.

FIRST MOVES

Begin simply. As always, simplicity is stressed when designing an elementary design unit since complex or compound units are limited in the variety and number of their possible combination, and the connection between elements is certainly more important than the element itself in this game.

A right-angle triangle has been chosen to illustrate key moves in Manipulations. This familiar geometric shape when placed on the grid creates a design unit equal in dark-light balance. A one-to-one alignment over the surface produces the strong pattern structure shown in Figure 1-24. When two dark triangular shapes are placed in the same position in adjoining grid units the light interval between them becomes a complementary light triangle and the design unit is formed. When the third dark is positioned the relation of the design units clarifies and shows a complete interchange of equal dark and light, which is then repeated evenly across the surface. The pattern repeat is small scale, occupying only one grid unit. The shapes combine well because of their relative proportions and because the edge relation of the triangle is clear as it joins the grid outline on two sides, defining the complementary light triangle. The design unit does not give an imbalanced or disjointed effect which could result from overemphasizing either dark or light amounts or failing to relate the design unit to the edge of the grid unit. The pattern shown in Figure 1-24 is a straightforward use of the shape, giving a nicely proportioned surface that reads well when seen from any side. It is familiar as a foundation for many patterned surfaces that have been created from ancient to modern times.

ROTATIONS

In Figure 1-25 the configuration of the upper left grid unit is the same as that seen in Figure 1-24, but the grid unit immediately to the right of it shows the design unit rotated a quarter-turn in a clockwise direction,

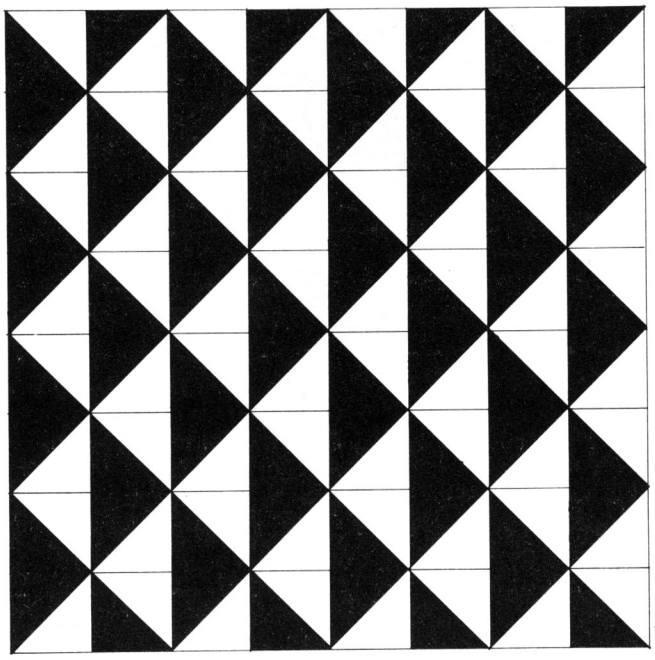


FIGURE 1–25
Pattern manipulation.

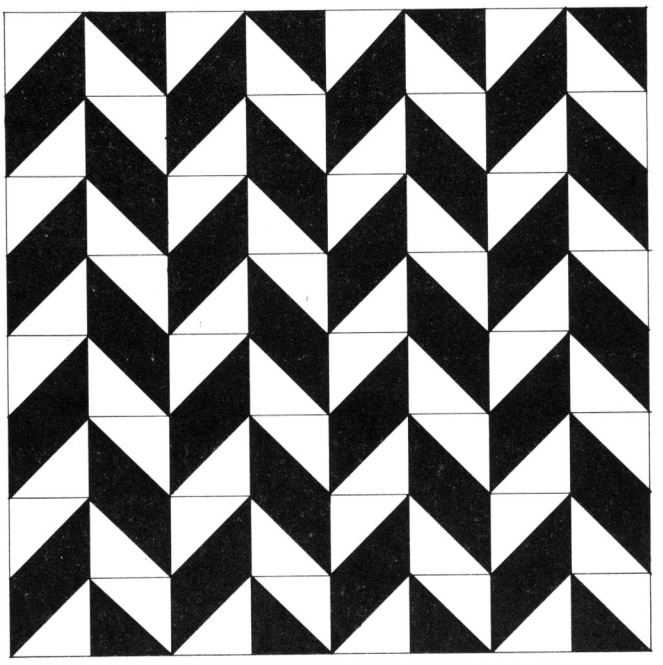


FIGURE 1–26
Pattern manipulation.

which doubles the repeat size. This new unit is repeated evenly across the top and then placed in alternation to the position of the design units in the top row, in the second row down, which doubles the repeat size again, making it an area of four grid units. This arrangement is then repeated evenly over the surface. The pattern produced by these manipulations is larger in scale than the first, but equally strong in dark-light balance and reading. It, too, is another long used pattern structure.

In the third example, Figure 1-26, the dark triangle makes edge contact with the grid unit on its right and lower sides—the design unit has been rotated a quarter-turn counterclockwise from the original position. Another turn counterclockwise gives the second square to the right and, following the method used in Figure 1-25, this configuration is repeated across the top row. The second row, rather than being positioned in alternation to the first row, is shown as a reversal of it, increasing the repeat to four grid units in area, and this is repeated over the surface to give a pattern composed of counterbalanced parallelograms. There are subtle differences in this surface from those of the first two examples: it is strongly directional in character, which changes its reading when viewed from different positions, and the left and right edges change the entire effect of the pattern when it is given a half turn. There is a tendency for the edges to detach from the body of the pattern and read—very slightly—as borders. This is an indication that the increase in repeat size, which results in an increase in the overall scale of the pattern, is becoming larger than the format can accomodate to maintain an integrated surface. This same effect can be seen in the right and left side triangles in Figure 1-25. They tend to be visually identified as separate units rather than being absorbed into a uniform surface distribution. If either pattern were to be increased in area the effect would diminish. Nevertheless, the pattern shown in Figure 1-26, with its contained countermotions is successful in its even balance of dynamic elements.

Figure 1-27 shows a pattern constructed with the same beginning move in the upper left grid unit as that shown in Figure 1-26. The design unit is flipped in mirror image in the adjoining unit to the right and the resultant design unit repeated in the top row. The second row is a dark-light reversal of the first, giving a large scale exchange of dark-light zigzag bars when repeated that can be read either vertically or horizontally. The grid foundation is taken over by the vigorous movement of dark and light on the surface.

Figure 1-28 is first cousin to Figures 1-26 and 1-27. The chevron is the same as that shown in Figure 1-27, and the method of reversal is that of Figure 1-26, but used with the symmetrical figure

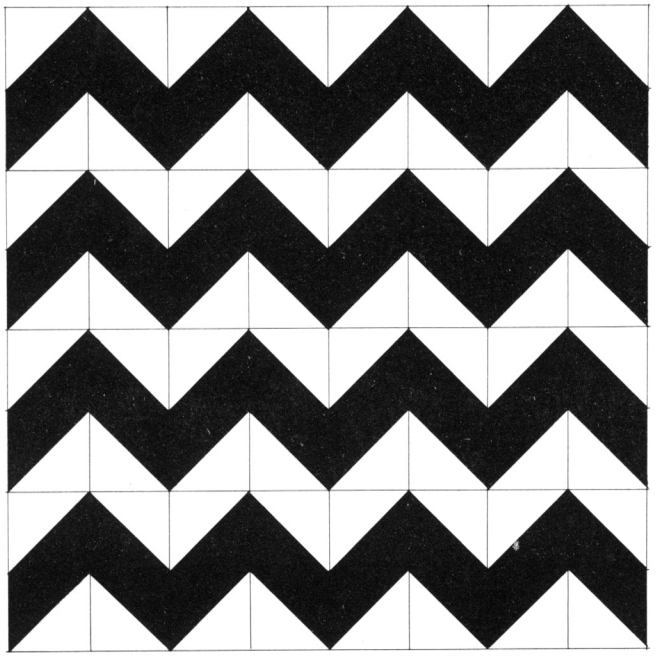


FIGURE 1–27
Pattern manipulation.

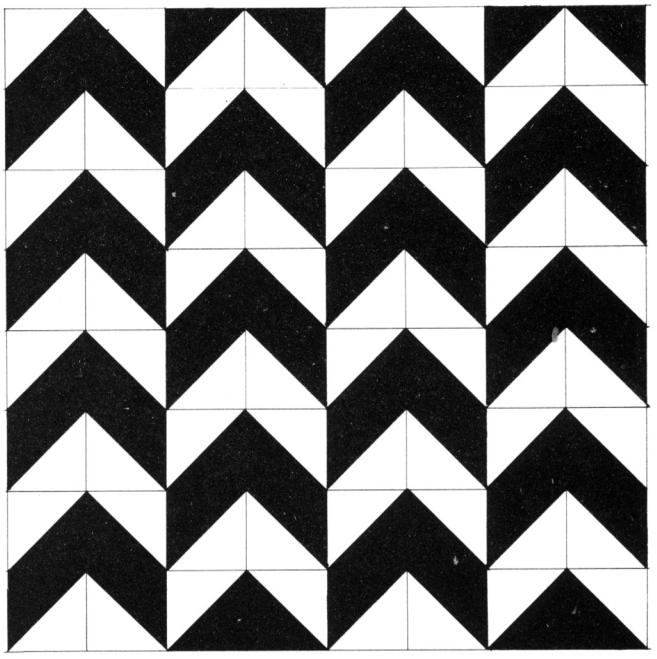


FIGURE 1–28
Pattern manipulation.

intact rather than halved. Although the three patterns are closely related, each surface possesses characteristics unique to itself. They demonstrate the method of playing Manipulations: Move from simple positions of the design unit to more complex by carefully controlling the repeat size, its dark-light balance, and its alignment with itself. Again, the grid is the control for all moves made. Always bring forward and apply material from the earlier games, for that establishes a working frame of reference.

THE SCALE OF REPEATS

Repeats should not become too large or overly complicated; they must be in scale with the area being covered or the sense of rhythm, essential in good pattern, will be lost. At least three full repeats across and down the surface should be shown so the relationship and the rhythm of their order is clear. With fewer repeats no sense of cumulative rhythm can be seen.

Figure 1-29 continues the idea shown in Figure 1-27, but with a dramatic increase in scale. It is a logical continuation of the design theme, but has outgrown the area available for its realization. An increase in the area—making it much larger in overall size—would solve the problem. The position of the dark-light design unit in the upper left corner is the same

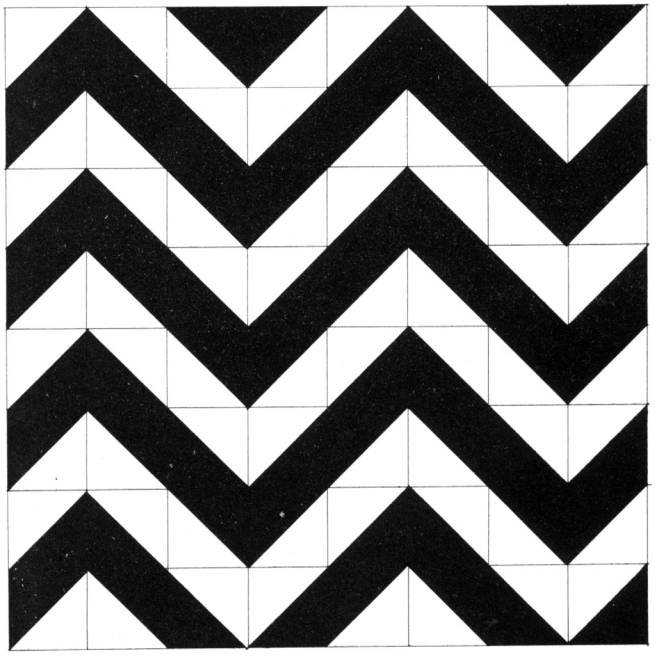


FIGURE 1–29
Pattern manipulation.

as that of the three preceding patterns; the second unit in the top row is a mirror image of the first, or a quarter rotation clockwise; the third unit is a reversal of the second, or a half-rotation counterclockwise; and the fourth a mirror image of the third, or a quarter rotation counterclockwise within the grid unit. The repeat is completed in the second row where the four design units reading from the left margin are shown as dark-light reversals of those in the top row. The pattern is made with a regular alignment of this eight unit repeat. Given a total grid area of eight by eight grid units, four full repeats can be shown going down the area, but only two across, thereby resulting in a crowded surface that is visually uncomfortable. The pattern demands more area—a large scale format—for full realization. The top and bottom edges show the same problem seen in previous examples: the two dark triangles at the top detach, and the entire line of the bottom appears as though made up of separate elements. Again, an increase in size would resolve the edges. This condition of edges detaching from the pattern area is a common one, and occurs again and again when working on a small format. But it is more important to create many examples of pattern manipulation and compare them in series than it is to make one or two very large examples that take as much time to finish as it would to make half a dozen smaller ones that give the same essential visual information.

The pattern shown in Figure 1-30 should be compared to that shown in Figure 1-26 since both use an identical shape with a contrasting result. The first move—the position of the design unit in the upper left corner of the grid—returns to that of Figure 1-24. The second design unit is a dark-light reversal of it, making a full repeat which gives a lively but balanced surface.

ALTERNATIONS

The same design unit used in Figure 1-30 is used in Figure 1-31, but it is reversed in the second row, or alternated in position. That is, the second square in the repeat developed in the first row becomes the first square of the second row in an alternation—or, it can be looked at as a reversal of the design unit in the upper left corner of the grid. The pattern is large in scale but so simple in organization that it holds well on the surface. It is interesting to compare this pattern with the one shown in Figure 1-24. There, the surface fluctuates between dark-light squares, diagonal movements, and right angles in dark and light, all equally balanced to give a nearly static reading when compared to the dramatic diagonal thrust of the surface shown in Figure 1-31. Yet each pattern contains exactly the same percentage of dark and light in the design unit and also in the finished surface. The first reflects the grid foundation; the second annihilates it.

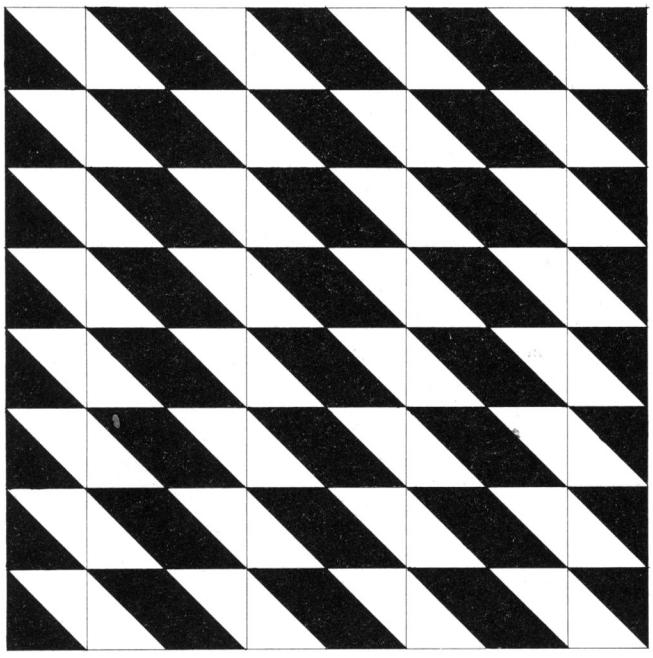


FIGURE 1–30
Pattern manipulation.

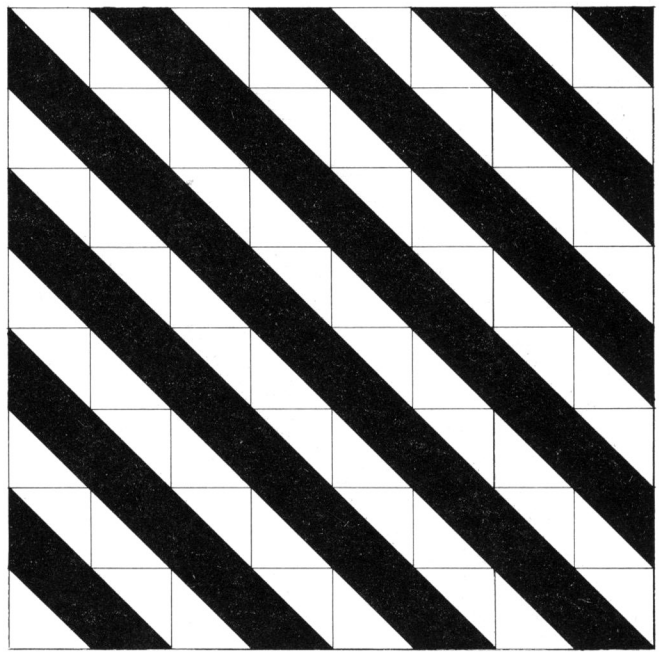


FIGURE 1–31
Pattern manipulation.

Essentially, the top row of Figure 1-32 reflects the organization of the top row of Figure 1-29, although the first move is that of the first pattern shown in the position of the design unit in the upper left corner of the grid. But primarily, this is an example of the effect of alternation of rows. If the grid units are numbered 1, 2, 3, 4, from upper left across in the top row, then in the second row 2 becomes 1, and 3 becomes 2; in the third row 3 becomes 1, and 4 becomes 2; and in the fourth row down 4 becomes 1, and so on. This is less complicated in practice than it reads, and gives a completely new pattern result.

The repeat is composed of sixteen grid units. Such a size can become unwieldly unless it is thought of as being built of carefully controlled single units combined in a planned alternated arrangement. Although the size of the repeat is large for the total area shown, the proportion of elements is small enough to give a good idea of the pattern, but the full effect of the diagonal cannot be seen until the total pattern area is increased in size.

COMBINING ROTATIONS AND ALTERNATIONS

The pattern shown in Figure 1-33 is developed by rotating the position of the design unit and then alternating its position from row to row. The dark-light triangles are turned clockwise, or rotated a quarter-turn in each of the four squares beginning in the upper left grid unit and moving to the right. The row is then placed in alternation in the second row down, the second unit of the first row now becomes the first unit in the second row, making a full repeat of eight grid units. An active surface, full of movements and countermovements, is the result. It can be read as a combination of diamonds, turnings in the small triangles, and cross diagonals, with all the elements in equilibrium.

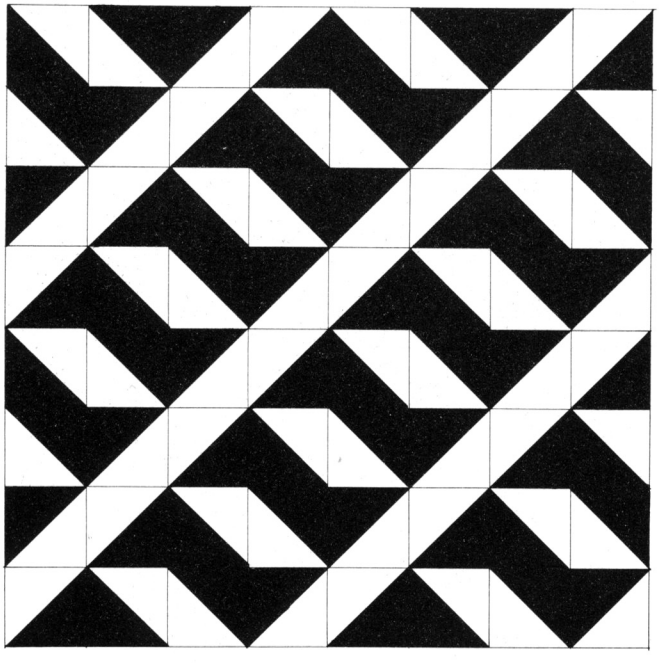


FIGURE 1–32
Pattern manipulation.

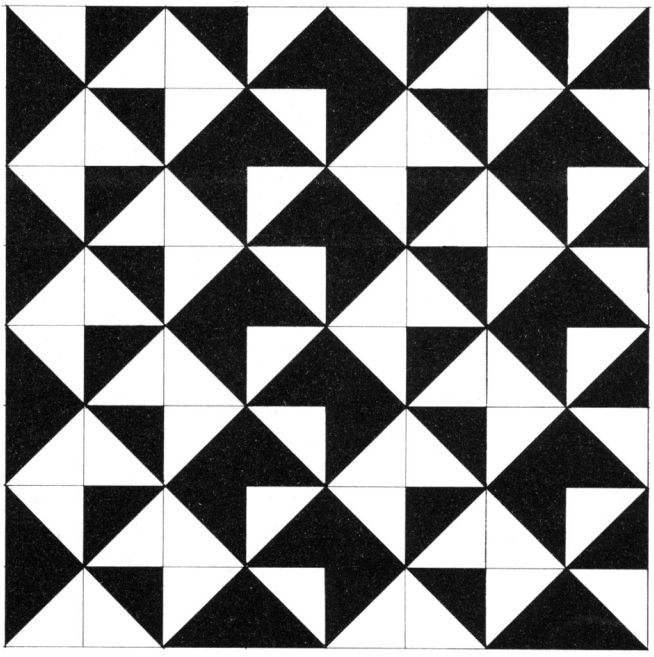


FIGURE 1–33
Pattern manipulation.

The same design unit is based in Figure 1-34, but the alternation is carried down four rows rather than two, which is the same method used to develop the surface shown in Figure 1-32. The pattern is simpler in organization, and clearer in its overall effect, than that of Figure 1-33. Although it does not have as much variety of content as that pattern, it is a better integrated surface, depending only upon cross diagonals in contrasting scales for its effect. Both patterns can be given a half-turn to change the surface character by having the small triangles point down rather than up, in much the same way that relative position affects the reading of almost any pattern except that of the completely static checkerboard.

The sequence of eleven patterned surfaces demonstrates some possibilities of playing Manipulations. The game may be continued with still more variations with the basic elements of grid and shape, additional patterns created using the dark-light triangle design unit, or a new series started with a unit different in

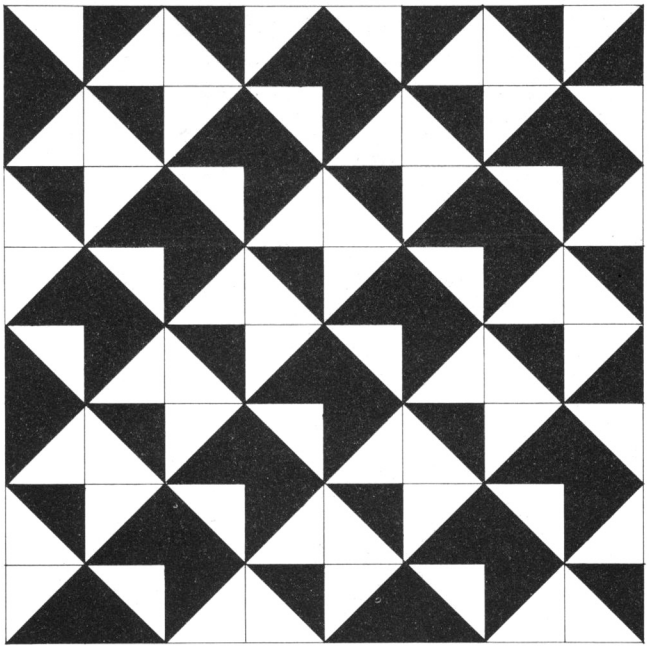


FIGURE 1–34
Pattern manipulation.

its percentage balance of dark and light, or one curvilinear rather than angular in outline. Each example uses exactly the same design vocabulary, the same proportionate amounts of dark and light, the same size grid unit, yet each is distinctly different from the other in its finished surface effect because of the continually changing relationship of the pattern components, not the components themselves.

Manipulations should be played as a progression from a simple unit placed on the grid, combined with itself, then varied, increasing in pattern complexity through a series of examples. Rather than concentrating on the limitation of creating a single pattern, it should be played as a continuum of expanding relationships, from simple to complex, between the common design elements, and should utilize the work done in Percentages and Reversals to increase the pattern making possibilities.

GAME D

VISUAL GRAY:
DEPTH IN THE PATTERN PLANE

Up to this point pattern surfaces have been defined by the single contrast of dark and light. The function of each value has been not to support but to exchange with the other, as all elements of the surface structure are utilized as being visually equal in importance. This balance of contrasts is easier to achieve when the percentage of dark is equal to that of light, but—as examples have shown—careful proportioning of unequal amounts of dark-light in the design unit can produce integrated surfaces. The basic parts of all patterns, simple or complex, have been the same: a grid, a shape, a design unit, a repeat. The interplay of these components has been developed as pattern through dark-light contrast on the surface. In a successful interchange, dark and light remain in the same plane:

FIGURE 1–35
Kata-gami: Bush Clover and Sky. 20 × 35.3 cm.
Courtesy of Cooper-Hewitt Museum, The Smithsonian Institution's National Museum of Design.