Patterns and Sequence

An architectural composition of room size space/forms is held together by patterns and sequences. In all physical design situations, the architect is organizing a total composition within a physical and social context. The characteristics of patterns and sequences form the grammar by which such compositions are developed and understood, and it is a necessity that the architect know them. A pattern is composed of combinations of repetitive elements. Different types of patterns are formed by different types of element combinations. A sequence is composed of a linear
perception of elements having characteristics that relate them as well as ones that amplify their differences. A sequence can be organized as a controlled contrast of elements with implied hierarchical and directional significance.

Man's ability to perceive patterns and sequences is severely limited by his capacity to recall information. Though there have been no rigorous studies to determine the maximum complexity of architectural sequences that can be remembered, one would guess, based on tests of alphabetic sequences, that typically only 3 to 5 different variables can be perceived. A composition may contain many more variables, but the perceived ones will be those 3 to 5 variables with the greatest contrast or similarity. The architect should keep this in mind, for manipulating too many variables can be a waste of effort. However, understanding of an environment need not rest entirely on the user's ability to recall information. An architect may refresh the user's memory by giving him a number of vantage points within the composition from which to survey where he has been and where he is going. This allows him to read the composition carefully without relaying exclusively on recall.

Patterns grouping by similarity and proximity. Rhythm Compositional termination
Peabody Terrace Housing, Harvard University 1964 Cambridge, Mass. Jose Louis Sert FJ

Overview of a sequence
Design Research 1960 Cambridge, Mass Benjamin Thompson MG

Parking Garage Boston, Mass. Gerhard Kallman FJ

A sequence is composed of places and transitions differentiated from each other by contrasts and related to each other by similarities. Contrast and similarity between elements are based on relationships of scale, mass, static vs. dynamic qualities, color, light, texture, continuation or discontinuity, pattern and cultural significance, open vs. closed, public vs. private, exterior vs. interior and proximity. As an example, one might use warm colors to identify place while using cool colors to identify transition (contrast), yet hold the color brightnesses and saturation the same (similarity) to provide continuity.

Patterns have some basic configurations that are gestalts. They include similarity, symmetry, and various alignments of grids, radial patterns, interlocking and nesting forms. An architectural composition of space/form is a balancing of the interrelationships between each space/form element and its physical context. We may simplify our analysis by looking at the hierarchies that can be perceived between two space/forms in different relationships to each other. A total composition must be treated as the cumulative effect of the relationships of each space/form to all other space/forms that make
up its context. The possible relationships are: one element is inside the other, one is penetrating the other, they are adjacent, and they are separated by some distance.

At building scale, if one element is inside another, the relationship can be described as a figure in a background. The sequential hierarchy experienced in such a situation is the dominance of the larger space over the smaller one. Scale is the dominant contrasting characteristic, while the sense of closure—one upon the other—is the relationship that binds them together. The smaller element gains more significance for the observer if it is located at the center of focus of the enclosing space and exhibits some cultural meaning. The ceremonial center of a cathedral provides the best example of this phenomenon.

Two elements can be inter-penetrating. In this case, hierarchy between the forms is based first on their difference in scale; and if there is none, it is then based on
the relative strength of the gestalts formed by the dynamic characteristics of the spaces. The domination of smaller spaces by larger ones is typically reinforced by the dynamic qualities of the smaller space. However, contrast can be used effectively in such circumstances to strengthen the sense of sequence while maintaining the dominance of the larger space. If the intersecting spaces are of similar size, the one exhibiting the stronger sense of closure or penetration will dominate.

There are a number of characteristics of space/form relationships that we instinctively perceive as hierarchically ordered. End points in a linear composition seem to us to have more significance than other locations within the composition. If there is a change in level, the upward direction is more significant than the downward. Lighter spaces tend to have more significance than dark ones in our culture because we expect activities to occur in them. If a total composition has a center of gravity, it will dominate. And if it has a major axis, that too will dominate. Larger elements are dominant over smaller ones. Good architects use these principles of hierarchy to form spatial sequences that orient the user to the spaces and to their relationship in the
total composition. Bad architecture disregards these principles and as likely as not suffers from misinterpretation based on our instinctive perceptions.

Patterns have implied hierarchies as well, and these can be used to reinforce organization concepts. The most widely used pattern is the rectangular grid. In its simplest form, its characteristics include edge similarity, constant space size and constant space shape, and some significance given to the edge intersections. One of the reasons for which this pattern is used so widely is its flexibility. It can be stretched along its axes to give direction to the composition; and within the pattern, sequences can be developed by varying the element sizes. Nesting and interlocking forms can be developed by deforming the grid. Its use has become standard in designing housing units with varying numbers of bedrooms. Other even more complicated element nests have been produced to provide different size spaces in repetitive compositions.

There are other regular grid systems that have been used by architects to plan spaces. These include triangular grids, hexagonal grids, octagonal grids (which pack with rectangular grids), etc. These grids are not
Square grid.
Dominance of larger grid over smaller.
Grouping by similarity.
Major and minor axes.
Symmetry of translation.

Richards Medical Research Building
1957
Louis Kahn
KF

Grid abutting large square.
Center of gravity dominance.
Scale dominance.
Sequence at entry developed along a dominant axis.

First Unitarian Church
1959
Rochester, N.Y.
Louis Kahn
KF

Importance of path intersection.
Center of gravity reinforced by open space texture hierarchy and scale of adjacent buildings.

Peabody Terrace
Cambridge, Mass.

Jose Louis Sert
KF

Stretched rectilinear grid.
Dominance of axes intersection reinforced by scale and density of elements.
Hierarchy based on significant vertical direction.

Haystack Mountain School of Crafts
1961
Deer Island, Maine
Edward Larabee Barnes
KF

71
as flexible as the rectangular grid and have some very rigid implied hierarchies that are appropriate to some situational needs. The hexagonal grid, for example, has better continuation along its sides than the rectangular grid, giving the space more inward focus. The octagonal grid is even more centrally focused; and where it has to nest with a rectangular grid, a spatial hierarchy of scale is produced in which the octagon is dominant.

There are numerous geometric organizations with considerably different hierarchical orders. An architect might select one because its hierarchy fits a particular design situation. It is possible to invent a set of rules for comfortable transition from one grid type to another. These can allow a certain amount of flexibility, and the transformation rules become the perceivable pattern of network characteristics.

Another standard organization follows the radial pattern. It is either center-oriented (if the closure follows a circular pattern around a center) or dispersing and centering (if the closure follows radial lines from a point).

Finally, there are the regular organizational patterns of symmetry. There are 3 basic types of symmetry: rotation, translation, and reflection. Symmetry hinges on the rela-
tion to an axis or center, and the
Gestalt laws of similarity and symme-
try say that we will perceive such
organizations as groups of related
elements. Thus, we can use symmetry
to relate what otherwise might be
considered unrelated elements.

We also must look at how two dis-
similar patterns can intersect or
overlap to produce hierarchies of
significance. The most prevalent
example of pattern intersection is
that of one rectangular grid inter-
secting with another or larger scale
and different orientation. While
both patterns have similar character-
sitics, the interruption of the
finer grain grid by the larger one
produces a diagonal or tension or
contrast which is more significant
to a viewer than uninterrupted cells
in the smaller pattern. Urban pat-
terns with diagonal streets are an
example. The diagonal usually be-
comes a major axis often leading to
some significant location in the
city as an end point. High land
use and density usually evolve
around such diagonals.

Superimposed patterns at the same
scale produce either a new pattern
or a situation in which the patterns
can be recognized alternately. Al-
ternating perceptions provide the
'both/and' characteristics that
Venturi describes. They enrich a
composition, where each pattern may express a different meaning. Where they intersect, we get tension and the complexity of two forces in contrast.

Two or more patterns can abut in harmony forming an architectural composition with significance given to the axes formed by the adjacency or by the more complex pattern. In Aalto's New York apartments, we see a grid intersecting with a radial pattern. The grid or more common pattern is used for service spaces, while the radial pattern forms the housing which is the served space. An axis is formed at their intersection and becomes a major circu-

lation line; progressive points on a perpendicular axis are used to radiate the walls of the apartment units.

Finally, we may recognize some non-regular patterns in buildings. These are styles and are usually particular to an individual architect or sub-culture. They are basically a set of form/spaces with particular characteristics which help the designer limit solution choices and give an overall cohesive quality to a composition through repetition and similarity. The shed roof style is an example. It is basically a grid in plan with all the possibilities a grid allows. In section, however,
it is very directional (toward the peak). This directional quality allows the designer to relate elements tightly by making them inflect toward each other. Flow and directional axis may be provided in plan by stretching the grid, or in section by good continuation and flow from space to space.

In the end, selection of appropriate element forms, sequences, and patterns for a specific design problem depends on the objectives of the designer. Skill in choosing the right combination comes from practice and a clear image of what one desires to accomplish.