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Principles

Cities and nature

Nature in the city. The great urban spaces of the world owe their existence to artists who have consciously transformed nature. Our enjoyment of these spaces is attributed to the hand of man as much as to the existence of natural materials. Though all of our building materials were extracted from the earth, the use of living materials, trees, best recalls the interdependency of man and the natural systems and gives our cities symbolic significance. The potential of trees in shaping and humanizing cities remains an unperceived amelioration for a civilization that has nearly forgotten the relevance of art in civic design. Paradoxically, the opportunity to use trees as part of the city has been impeded by confusing the intrinsic characteristics of the forest and the city. Current urban planting design is an abstract art in the sense that it represents or symbolizes the way trees grow in nature. This is our inheritance from the nineteenth century and it is unneccessary to repeat the tastes of another age. The proper use of trees in cities should reinforce the structure of the city according to the disciplines of urban design, not plant ecology. Unity, continuity and scale have more consequence than natural history in weaving together the diverse threads of the urban fabric. The civic designer, like the artist and craftsman, expresses his understanding of nature not by copying but by creating an interpretation of our elusive relationship with the organic world.

Parks. We have come to regard parks as a collecting ground for activities rather than as a place to experience the *nature* of the city. In our arguments over what facilities belong in a city park, we have overlooked the obvious fact that none of them may belong there. Ours is a civilization of clutter reflected in the interiors of our homes, our sidewalks, and our city parks which are filled with "things." A cogent example of this clutter is the substitute for creativity that we call playground equipment. The glut of "creatively" designed new play forms that fills American parks should be testimoney enough of this phenomenon. It is hardly surprising that instead of more trees, we get more manufactured objects.

The highest expression of an ecologically sound urban park in our age would be an uncluttered space dominated by a reticulum of tall trees growing through a mantle of crushed stone. Stone, water, trees—all else would be superfluous. A city park with these elemental components could fulfill its highest mission in a setting of inspiring simplicity. Though it is unrealistic to believe that we could build such a park in an age of materialistic consumption, this idealized uncomplicated form is timeless and universal in its human appeal. The closer we can come to this basic simplicity of materials in building urban parks, the more evocative and satisfying will be the result.

Streets. The historical continuity of the gridiron street layout is evidence of its appropriateness for cities. City blocks make regular intervals that give scale. The

strong pattern of building walls established by the street system cannot be visually changed in an effective way with trees, especially where the buildings are taller than the trees. Reinforcement of the gridiron pattern with straight rows of trees on both sides of the streets usually achieves greater aesthetic integrity and improves the scale and continuity of pedestrian zones.

Open spaces. Other open spaces in the city—chiefly squares, plazas, institutional grounds, public building sites, roof tops, waterfronts and parking lots—should be planted with large deciduous trees as a matter of biological necessity. Often vacant lots, traffic islands and other residual spaces present a latent opportunity to increase the span of the city forest. Strategies for planting these empty spaces could provide from 10 to 30 percent more trees in our cities. They remain unplanted because their owners or custodians are uncommitted to the enrichment of public areas. In 1934, Robert Moses demonstrated what could be done with unused land in New York City by assembling separate bits of property and turning them into 69 playgrounds and parks. The acquired land included areas such as former construction equipment storage sites, abandoned elementary schools, vacant waterfront property and land left over from street widening procedures. All of these were vacant city owned parcels. (Caro) If all else fails, these spaces can sometimes be planted surreptitiously. Every vacant space in the city without trees represents an unperceived opportunity.*

* There is a group in New York City calling itself the Green Guerrillas!

Cultural constraints

Romantic naturalism. Cultural historians and literary critics have often found it enlightening to view their chosen subjects through the kaleidoscope of attitudes resulting from idealized visions of pastoral life and opaque views of urban experience. The *romantic naturalism* that has influenced urban design in America since the early nineteenth century, reinforced by Olmsted's design philosophy, still presents an obstacle to clear understanding of the nature of the city.* Urban open space in this country and particularly its plantings are still treated in the spirit of romantic naturalism. On the other hand, new urban building is based on the ideal of "technological progress." This dichotomy continues to pose problems for the urban designer and, indeed, is indicative of the conflicts now raging in the post-modernism movement in architecture and urban design.

* Leo Marx's *The Machine in the Garden* describes and evaluates the "pastoral ideal" of American life. His interpretation of the American experience helps in understanding the profound influence of romanticism on our attitudes toward cities. (Marx)

Functional and aesthetic. There is a tendency to give the current aesthetic conceptions about urban trees a rational justification on functional rather than aesthetic grounds. A number of recent publications emphasize the functional values of plants in the city. (Smith, DeChira, Robinette, Hartmann) Yet there is also research which questions these values. (Woodwell) The most vociferous support for continuation of the romantic design tradition in urban parks is based on the notion that species diversity will help stabilize natural plant populations in cities.

Studies have been made to evaluate the functional worth of trees in dollars. (Bernatsky, Pinkard, International Shade Tree Conference) The effort to establish a tree's value on a functional basis shows the difficulty of developing completely objective universal criteria for worth. The most widely accepted method of appraising the worth of trees on residential land in monetary value is based on how trees affect the assessed cost of the land. (Payne) This method does not incorporate an estimate of timber value and therefore suggests that aesthetic value is of greatest significance in our perception of the importance of trees. Despite the substantial functional capabilities of trees in the urban landscape their aesthetic impact is even more dramatic, and provides a compelling justification for extensive tree planting.

Plants as a palliative. The main function of planting, particularly trees, is not to hide architectural flaws, yet consistent reference is made to the use of trees to "soften" or "screen" buildings. Curiously, many architects suggest this type of planting treatment for their own buildings. This attitude may arise from the perception of brutalism and lack of rich detail that characterizes much modern architecture. Nonetheless, the pervasiveness of this idea among designers is revealing. Good architecture should not be softened or hidden with plants, but should be reinforced and sometimes embellished. It is not the nature of our cities or urban buildings to be soft. Planting trees to screen views in cities should be limited to masking the less avoidable visual disorder such as automobile parking. Buildings should stand clearly visible as a tribute or admonition to those responsible for their appearance. If flaws are hidden, they are not as likely to be corrected. Trees have a more important positive spatial function, and are used only as a last resort to mask.

Over planting. A curious fear of planting "too many" trees is often expressed by municipal authorities and private clients of landscape architects. It is as likely to come from the municipal forester or arborist as it is from someone totally unfamiliar with plants. While there is still considerable sympathy for the idea that trees are healthier the farther apart they are grown, the reasons given for objecting to closer, more dense planting of trees are usually covertly aesthetic rather than scientific. When confronted by the question, "What do you mean by *too close together?*" the reply usually begins with a technical reason and ends with an observation about the untoward visual effect of close tree spacing. An Arborist of one Eastern United States city, in objecting to the proposed close (20 feet apart) spacing of Red Maple trees near a new courthouse building, based his disagreement on the cost of the additional maintenance that would result from having so *many* trees.

Language

There are three important examples in our language of how landscape architecture and urban open space design, in particular, are hampered by deficiencies in terminology. Several words have had a complex influence on the use of trees in urban design. The word "nature" with all of its subtle nuances and meanings perhaps poses the most difficulty. This problem is compounded by different concepts about man and nature in which man may or may not be considered part of nature. Clear communication requires us to refine our mode of expression and become more precise when we describe man's complex relationship to the landscape. Use of the word "nature" herein means the undisturbed out-of-doors, such as "natural scenery." It is a convenient word for separating the man-influenced landscape (agrarian and urban) from the wild (uncultivated) landscape, even though we recognize human beings and their works as part of the natural environment.

The conventional sense of the word "formal" in referring to a garden or landscape implies a style that is very exact, methodical, orderly, and usually stiff, arranged symmetrically on one or more axes. Landscapes less thoroughly organized, including naturalistic arrangements, are referred to as "informal." The vast majority of urban landscape designs cannot be accurately characterized by either the word formal or informal. They are often eclectic, employing several, more or less organized, styles. Even the romantic English landscape, often referred to as informal, is a highly stylized mode of design incorporating occult balance, exaggerated perspective, and other devices employed by painters to create illusions in depicting three dimensional spaces. Highly organized urban spaces can employ asymmetrical geometry and have apparent random qualities.

As a result of these ambiguities, the words "formal" and "informal" are best avoided in descriptions of open space design.

Another instance of terminology that misleads is the use of the terms "landscaping" and "beautifying." The latter term, which means masking something that is plain or unattractive to make it more attractive, is not characteristic of good urban design. The implication is one of superficial beauty. It was popularized in the 1960's by Lady Bird Johnson, who advised people to go out and plant a tree or shrub in their community. Consequently the word is now written into many of the Federal documents that deal with visual enhancement of cities. The word "landscaping" has taken on a similar cosmetic meaning through the excessive commercialization of the term. The planting of trees should be an intrinsic part of the city's structure, not a mask for inept design.

The need for order

To say that today, most American cities are visually disordered seems to be a truism, yet designers often recommend proposals that further impair the aesthetic coherence of a city. Mechanical order has become associated with industrialism and the dehumanizing effects of industrial production in a capitalist society. We see the response to this everywhere from the superficial diversity of suburban tract houses to the urban planning schemes that introduce variety as an antidote to regimentation. "Variety" and "diversity" have become the catch words for good design. The designer, who is powerless to control technology, attempts to camouflage its visual structure by introducing randomness into the functional order of the city. This is illustrated in the critical reaction to the gridiron street layout. The construction of streets in a right angle grid pattern has been blamed for almost every shortcoming of the modern city. A common visual expression of this reaction is seen in recent designs for "pedestrian malls" that use trees in deliberately disruptive patterns to counter the basic linear street alignment. The most publicized of these designs is the Nicolette Mall in Minneapolis, where the pavement and trees are wiggled within the straight right-of-way. Since the sinuously disposed elements are visually less emphatic than the strong building lines, the visual effect is to weaken rather than reinforce the sense of space. The spatial quality of the city is sacrificed for the sake of arbitrary diversity in design.

This spurious design approach runs counter to the nature of the city. The error is obscured by a belief that irregularity is a hallmark of nature. Therefore, the new pattern is thought to be more in harmony with "nature." "Art" is limited to the creation of sculptural objects placed in a space. Yet instead of an artistic achievement, the actual design of the open space is a pathetic copy of what nature is mistakenly thought to be.

The largest and most important principle of urban design is spatial order.* Just as building architecture is concerned with forming and ordering spaces, so the urban designer modulates spaces, but in a larger context. Even though the major definition of outdoor space is achieved in most urban places by buildings, the most important function of trees is to define, reinforce or create spaces. The definition of horizontal space by walls, and vertical space by canopies underlies all of the examples and discussions of tree use in this and subsequent chapters. The use of trees as sculpture or decoration is incidental to fundamental spatial arrangement in urban design.

To purposefully produce diversity as an end product of design is to create visual disorder. Diversity that occurs as a result of functional aesthetic purpose is more likely to be visually satisfying. The important contribution of Robert Venturi in writing about complexity and contradiction in architecture has been misconstrued as a plea for arbitrary diversity even though its aims were profoundly

* Bruno Zevi's thesis that space in and around a building should be the basis for judgment of the building is even more applicable to urban design and open space. As in architecture, all other aesthetic criteria must be subordinate to the spatial idea in assessing the urban landscape. (Zevi)

different. (Venturi) The city, like the forest, can accommodate great variety and complexity when it is an expression of complex organization. Modern cities lack the unity of consistent materials and homogeneity of scale that characterize cities built prior to this century. The complexity of the architecture or other eras was given coherence by materials, handcrafted details and reflection of human use to a degree that is almost totally absent from today's metropolis. One function of trees in the urban landscape is to restore that rich textural detail missing from modern architecture.

Physical design principles

Coherence. Spatial definition using trees becomes more coherent with repetition and continuity. This important urban design principle, coherence, has been degraded by the greater emphasis given to diversity in recent times. The confusing visual disorganization of most cities in the United States desperately needs to be reorganized by physically linking the disparate parts, including the fragmented open space. Bands of large deciduous shade trees can achieve this coherence by establishing an ordered continuity of trunk spacing and branch texture. Trees are the most prominent design element capable of linking together an entire city.

Organization. In considering the landscape, we can recognize three more or less discrete levels of natural order. Large areas of land relatively undisturbed by human intervention are referred to as wild or *uncultivated nature*. In this kind of landscape, trees interact with the organic surroundings according to certain ecological principles that tend toward stability and continuity.

Where human activities have interrupted natural order, we have established a compromise with nature, as in our New England farms. There human toil and energy have replaced the energy of the natural systems to maintain order that is more or less in harmony with the biosphere. The satisfying visual order of farm land is a result of learning over time how to cooperate with the landscape and adapt our rational intellectual process to the natural order. Rural land is aesthetically pleasing because human artistry had molded and played upon a canvas of natural forms with economy. The contrast of natural and man-made forms is pleasingly expressed by the juxtaposition of pastures, fences, farm buildings, hedgerows and the native topography of forests. In this pastoral or *agrarian nature,* trees are less numerous and are often found growing in open fields where they develop an open grown form.

In the village or city, human intervention is carried quite far and the accommodation with natural order is more likely to occur at the boundaries than in a meshed centralized pattern. When urban development spreads too far—the suburban ring—the accommodation of urban with natural conditions is further compromised, and the visually satisfying contrast between *agrarian nature* and *civilized nature* is lost. In urban space and parks, trees grow under artificially controlled conditions and are not subject to principles of forest ecology. Attempts to recreate an *agrarian* or *uncultivated* natural order within the city are biologically unsound. The growing conditions of the city do not permit the multilayered species diversity that is characteristic of uncultivated natural woodlands.

A haphazard arrangement of trees in an effort to duplicate nature fails because it lacks the complex organization of woodland organisms that gives the forest an inimitable beauty. Each natural plant community is organized by species, composition, horizontal spacing, vertical layering, and the adaptive geometry of the individual plants. Far from being a random planting of different tree types, the forest is a profoundly ordered system of plants.

Geometric pattern. The arrangment of trees in definite purposeful patterns enlivens spaces. Our habit of considering geometric composition as static comes from the limitations of two dimensional representation in drawings. Moving through a space, what appears in plan as static row or grid, becomes a rhythm sprung from tree trunks and provides a visual syncopation that improves human comprehension of the space, just as metrical form in poetry guides measurement and understanding. The effect is also like the shifting scene of a kaleidoscope with each twist compounding a fixed number of elements.

Tree patterns that reflect or amplify the building geometry can improve the connection between indoor and outdoor space. This is an important reason for designing building and landscape together as a single composition inspired by one unified conceptual grasp of the problem. The arrangement of trees at calculated intervals, that can be varied, gives the open space designer a greater freedom than the building architect when it comes to using space forming elements artistically. The opportunities that are latent in the two perfect forms—the circle and the square—for creating spatial patterns with trees are infinite and fascinating.

Abstract design principles

Transitions. An important, though less obvious, responsibility of the open space designer is the creation of transitions between spaces and between buildings and spaces. Trees link and divide human scale spaces and monumental buildings and spaces in a way that allows simultaneous comprehension of both scales. Trees function well as materials for transitional connections because of their transparency, texture, contrast, and size. This linking capacity can be used to form arcades that connect buildings, to separate areas with different scales or geometric configurations; and to create entrance canopies for buildings.

Scale. An aesthetic function of trees is the resolution of conflicting scale demands of the city. Scale implies a relationship, in this instance between the dimensions of the trees and urban spaces as perceived by human beings. Trees establish a lower space that is comfortably sized for human use and still permits people to experience the larger space. Tree branches create a partially transparent tent or canopy that allows awareness of the space beyond, but confers a psychological sense of containment and protection. The intricacy of the branches and foliage provides a foil for the monumentality of the larger space and buildings that appeals to our visual perceptions. Thus, the addition of an arcade of trees in a large space can create a zone that is visually comfortable for the pedestrian without compromising the scale of the larger space. Trees can do this more easily than inert materials because of their unique properties. Their size, irregularity, subtle translucency and psychological impact make them appropriate where no other structure would seem suitable. This is clear to any architect who has struggled with the intractable problem of trying to design a visually suitable pedestrian canopy for a large space in front of a monumental building. There is often no satisfactory way to make the scale transition with architectural building materials. Any structural addition looks tacked on. A grove or arcade of large trees may resolve the problem where there is adequate horizontal space.

Light and shadow. Lights gives life to a space. Manipulation of light and shade gives the urban designer power to transform spaces of stone, bitumen and concrete into tapestries of sunlight and shadow. No medium for accomplishing this modulation of light is more appropriate than the structure of a tree in its seasonally adapted forms. Intricate shadow patterns on pavement and building walls create architectural richness from even the crudest materials.

In most urban spaces, direct sunlight is limited to certain hours of the day. Therefore trees must be arranged in relation to building shadows to give shade and admit light in critical areas at appropriate times. Deciduous trees are indispensable in warm, temperate climates, because they adjust to seasonal light demands and temperatures. Most urban spaces requiring summer shade are equally in need of winter sunlight for warmth and brightness. Evergreen trees, except in the warmest United States climates make spaces cold and dreary in winter. The use of evergreen trees in the city, because of their dense, unchanging foliage in temperate climates, should be limited to wide open areas where their winter shade will not be oppressive. By contrast, seasonal change in deciduous trees provides a continual and infinite variety of colors and textures during the entire year. The least appreciated of seasonal effects, the loss of leaves, provides nature's most welcome bounty—winter sunlight.

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