

THE NATURE OF ORDER: AN ESSAY ON THE ART OF BUILDING AND THE NATURE OF THE UNIVERSE
BOOK TWO: THE PROCESS OF CREATING LIFE

Christopher Alexander

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Review by ARRAN GARE

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In 1974 the radical political economist Samir Amin posed the question: “Why ... is it that we love the old cities, we even love Manhattan, but no one, not even the city planners who conceived it, dares defend the perfect functionalism of the latest ‘achievements’ of post-war capitalism?”¹ In posing this question, Amin (a political economist) was taking for granted that we can make objective judgments about the quality of our built environments, and that everyone, even Modernist architects and town planners if they are honest with themselves, can see that there is something fundamentally wrong. There is something hideous and desolate about recent architecture and town planning. This, assumed Amin, is not something that needs to be argued. It is common sense, even if architects, town planners, and theorists of aesthetics refuse to acknowledge it.

Christopher Alexander, a practitioner and theoretician of architecture and town planning, came to the same conclusion and attempted to explain it. In Book One (*The Phenomenon of Life*) of *The Nature of Order*, he argues that “life” is what is at issue. Most people experience degrees of life in the world around them; they can see what is more or less alive, even when they deny that physical things can be alive. “Life” is an objective quality of things that can be recognized. Even marble can be and be seen to be alive. And what people see as more alive, they see as more beautiful. To see beauty is to see what is alive. Beauty then also is an objective quality. The environments we are building are ugly and desolate because they lack life. In Book Two, *The Process of Creating Life*, Alexander argues that we have built lifeless, desolate environments because the processes by which we

now operate are inimical to life. The rules and processes “generate a world that is destroyed, that strongly lacks living structure,” and “they do so with a ferocity and speed which could make someone from outer space believe—if it were not patently absurd—that it is being done on purpose” (p. 513). The aim of Book Two is to diagnose what is wrong with these processes and to work out what processes should replace them.

To do this, Alexander sets out to identify the kind of processes that generate life and those that fail to do so. In Book One, Alexander argues that life can be defined and even measured. It is a kind of order, but a kind quite different from and unintelligible in terms of the mechanistic notions of order that dominate modern culture. Life, he argues, springs from wholeness. It is wholeness consisting of centers that augment each other so that each center enlivens the other centers. Alexander identifies fifteen structures that appear in things that do have life: levels of scale, strong centers, boundaries, alternating repetition, positive space, good shape, local symmetries, deep interlock and ambiguity, contrast, gradients, roughness, echoes, the void, simplicity and inner calm, and not-separateness. He shows how these work in Nature, art, and architecture, and how the absence of these structures accounts for the felt lack of life and beauty in much of modern architecture. But the solution is not a matter of designing buildings with these structures. In Book Two, he is concerned to show that it is not the design that gives life to human products, but rather the processes by which they are produced. The focus of the book is on process; a particular kind of process—the process of “unfolding from the whole.” He argues that the fifteen features of living structures emerge from the unfolding of the whole according to the following principle: “[A]t each moment in the emergence of a system, the system tends (“prefers”) to go in that direction which intensifies the already existing centers in the wholeness in just such a fashion that the new centers reinforce and intensify the LARGER configuration or wholeness which existed before”

(p. 47). This might be a new physical principle, Alexander suggests, a principle different from any other that in the past has been held to govern the evolution of physical systems. This principle, he postulates, operates not only in the generation of living structures in human art and buildings, but also throughout Nature. It explains the creation of form. The generation of living structure in human buildings is just a special case of the generation of living structure throughout Nature.

Unfolding from the whole, such processes preserve structure and wholeness as they generate new structures. They are structure-preserving transformations. Intricate and beautiful centers result from repeated applications of these structure-preserving transformations. Here Alexander modifies to some extent the ideas of Book One, characterizing the fifteen properties of life not merely as the results of structure-preserving transformations but as themselves types of structure-preserving transformations (p. 77). For instance, “levels of scale” can be considered as a transformation that introduces levels of scale into a given structure. “Local symmetries” may be viewed as a transformation that injects local symmetry into emerging centers. “Boundaries” can be thought of as transformations that strengthen one or more centers by providing fat boundaries to intensify and better define the coherence of the original centers. As wholeness unfolds through these fifteen structure-preserving transformations, the fifteen structures associated with life necessarily appear more and more often. According to Alexander, life in buildings is generated in the same way.

Unlike other principles of explanation deployed within science, such as the principle of “least action,” the principle of structure-preserving transformation does not always prevail. It is a principle subject to breakdown. Alexander argues that this is what has happened in modern architecture. While up until a century ago people who built did so according to the principle of structure-preserving transformation, modern architecture has developed according to different principles. In Book One, Alexander suggests that the mechanistic view of the world has infected our actions, our morals, and our sense of beauty. It is this that has made it all but impossible for us to make beautiful buildings. In Book Two, Alexander analyzes how the mechanistic worldview affects our practices. To look at something as a machine is to look at it as

directed toward a goal. To look at kindness mechanistically is to look at it as a means of getting something. True kindness, however, is not directed toward a goal but rather is a process guided by the minute-to-minute necessity of caring for the feelings and well-being of another. In the past, building was undertaken with a similar caring response to the unfolding structure of the building and beauty and life were the results. In the twentieth century, however, building came to be seen as a necessary way to achieve an end result. The goal was to build the design or master plan of the architect, while the process of getting to the goal was seen to be of little importance.

Taylorism played a major role in this change, replacing natural and organic processes that relied on judgment, participation, and common sense with rigidly applied rules and codification of tasks and functions, producing the modern organization with its machine-like repetition of processes that increase efficiency.² Taylorism involves dissociating the labor process from skills, craftsmanship, tradition, and knowledge; separating conception from execution; and monopolizing knowledge to control the labor process. The application of Taylorism in architecture has resulted in the complete separation of design from construction, and the increasing domination of building by profit-oriented development in which banks lend money on the basis of submitted plans. Consequently, the image has been valorized, with buildings being judged by how they look in magazines rather than by the felt satisfaction of people using them (p. 129). These images, created in support of unworkable structure-destroying transformations, have become the backbone of an accepted style. Alexander argues that the images of Le Corbusier, Mies van der Rohe, Archigram, Libeskind, Bofil, Botta and Piano, and others—images impossible to get by “unfolding”—have been fixed as the targets for architects to aim at. As a consequence of all this, architects “perhaps without realizing it, lived in a world of fake, taught by fake, worked by fake, and transmitted the fake” (p. 132). Architects have lost the sense of building “as a budding, as a flowering, as an unpredictable, unquenchable unfolding through which the future grows from the present in a way that is dominated by the goodness of the moment” (p. 12). Effectively, Alexander argues, “the modern process of development has all but destroyed our capacity to create living structure in the world” (p. 523).

Most of Book Two (Part Two: “Living Processes”) is devoted to clarifying the nature of the processes that can generate such living structure. Alexander gives examples of these from both biology and architecture and details the central features of such processes. These include the process of differentiation, step-by-step adaptation involving ongoing decision-making to enhance the whole rather than attempting to plan the final result from the beginning, recognizing sequential stages in this process, and giving a place to the generic rules for making centers while appreciating every part as unique. When the features of a building design “crystallize out” in the proper order, “Land, sun, rooms, structure, all take their shape, step by step, in a coherent and well-adapted manner that guarantees living structure to the emerging whole” (p. 129). In grappling with the problem of characterizing healthy processes, Alexander has confronted a number of oppositions. He is centrally concerned with what is involved in appreciating the whole (that is, achieving and maintaining a feel for the whole at each stage of building) but at the same time he is interested in the formal aspects of the production of life including the emergence of formal geometry. He is continuing the quest to develop a formal language to characterize what is involved in production, although he is highly critical of earlier efforts by Modernist architects to produce such a language. Divorced from living process, their language was forced, he claims; too gross and too crude to create the subtleties of living geometry. Alexander is also reacting against the mechanistic notion of simplicity of Modernist architecture and arguing for the importance of diversity and uniqueness, but he still recognizes the importance of simplicity and has attempted to characterize this in a different, more subtle way. That is, in each case, Alexander has attempted to embrace both sides of the oppositions that usually divide people. Mechanistic thinkers are sympathetic to geometry but they have no place for a feeling for the whole, while most thinkers who argue the need for a feel for the whole are anti-rationalist mystics or existentialists. The effort to transcend such oppositions—the feeling of wholeness and geometrical form, generic rules and living geometry, diversity and simplicity—generates some of Alexander’s most profound thinking.

Alexander is quite aware of the far-reaching nature of the revolution in thought and practice he is calling for, not only for architecture but also for society. Part Three of Book Two is titled “A New Paradigm for

Process in Society” and subtitled “Evolution towards a Society Where Living Process is the Norm.” The first chapter of Part Three is titled “Encouraging Freedom” and begins with the question “What would make it feasible to introduce living processes all over the Earth?” Alexander proposes improving processes that include improving zoning rules and improving streets to enhance neighborhoods. But these are only the beginning. He argues that we should not merely improve the sequences and processes in society but further that these changes must be *architectural* in the fullest sense of the word, meaning that they must be *morphogenetic*, creating, generating, or unfolding coherent shape or form embodying the fifteen transformations and preserving structure. A morphogenetic sequence will support, encourage, and to some degree embody “as many as possible of the features of living process which permit adaptation, structure-preserving transformations, uniqueness, feeling, and simplicity” (p. 508). Alexander calls for the slow improvement of *all* social processes in this way. He argues we can define the ultimate function of society as “generating a healed structure in the world through morphogenetic processes—and that this primary function is to allow us, the members of society, to adjust progressively all the small processes in such a way that individually, and together, they will more and more effectively create a living world” (p. 509).

This is identified with the quest for freedom because “it is the shape-creating, organization-generating, aspect of process which ultimately allows people to do what they want, what they desire, what they need, and what is deeply adapted to life as it is lived and to experience as it is felt” (p. 509).

This transformation cannot happen all at once, but rather through what are the equivalents of short “snippable” genes, small sequences of actions that work individually, being spread through society. In this way all processes having an impact on the environment can slowly be rethought and reconstituted as morphogenetic sequences. The morphogenetic sequences at large in society can then slowly coalesce to form a more coherent system, and our shared focus shift toward the task of improving these worldwide sequences through evolution. In the appendix, Alexander provides an example of building a house with different

relations between the clients, architect, engineers, tradespeople, and laborers based on the process of structure-preserving transformations unfolding from the whole as a first step in this direction. More generally, Alexander suggests, “we shall all gradually come to feel a concrete and realistic obligation to make sure that every action taken, by anyone, in any place, always, heals the land” (p. 548). In this, architects are to play a key role. Being “responsible for the life and well-being of *all the buildings of the Earth*,” their new role should be “to help the many societies in the world gain control of the processes which govern the shape of the built world, so that each place may become a living structure, and so that the world as a whole may become beautiful” (p. 555). This is “the *vision* of a world which is guided by feeling. Instead of technology, *feeling*” (p. 567).

These are extremely bold claims and proposals, the very boldness of which might provoke skepticism. This skepticism is likely only to be increased by the harsh judgments made by Alexander of the heroes of Modernist architecture (with the exception of Frank Lloyd Wright, who he acknowledges created some living structures earlier in his career). Alexander has offered a number of defences against such skepticism, including acknowledging how difficult it has been to uphold his beliefs in his own mind and showing why nevertheless it is so important to maintain these beliefs. One of the strongest arguments presented in Book One is that, as he has been able to demonstrate, most people do agree on what is alive and what is beautiful and that, as Samir Amin put it, it is the old cities we love. If nothing else, Alexander appears to have identified at least a good deal of what it is that leads people to see things as alive and beautiful. In Book Two Alexander has invoked the notion of paradigms to explain the difficulty architects have in appreciating his ideas and thereby justifying his efforts. It is difficult for people socialized into the old paradigm to break with this and look at the world in a different way, even when the new way is demonstrably superior. However, I believe the best way to see and judge Alexander’s work is as a contribution to a long tradition of thought that goes back to Goethe (and before that, to Herder).³

This tradition emerged in opposition to the mechanistic view of the world and has been far more influential and successful than is generally

acknowledged. Among the recent exponents of this tradition have been David Bohm in physics, Brian Goodwin in biology, and Ian Stewart in mathematics, and Alexander has invoked their work in developing his ideas. In opposition to the mainstream tradition of science, this tradition upholds a profound relationship between science and art. However, most of the exponents of this tradition are based in the sciences, and those who are not, appeal to scientists for authority. Alexander is different. Coming from architecture, he is not merely invoking the authority of science and scientists to justify his own views, but attempting to contribute to the advancement of this tradition within science. Acknowledging the recent achievements of complexity theory, he also has pointed out gaps in its exponents’ efforts to account for the development of life, particularly morphogenesis, and has suggested that his own work on structure-preserving transformations emerging from and acting upon the wholeness of a configuration could fill gaps in their explanations.⁴ Alexander acknowledges the exploratory nature of his work: “Although I have given a nearly adequate definition of what this means, I have not given precise enough treatment, yet, to provide a strict mathematical treatment. What follows, then, should be understood as proto-mathematics, where a structural idea, mathematical in principle, is available, and may guide our thought—but the hard work of formulating a mathematics with which one can calculate has only just begun” (p. 20). But he has advanced this way of thinking about morphogenesis sufficiently to demonstrate its promise and to justify taking this work very seriously. More profoundly, in analyzing the relationship between feeling for the whole required to produce a beautiful, living environment, and mathematical form and generative rules in architecture, he throws new light on core oppositions that have vitiated modern thought.

This does not mean that Alexander’s work is without problems. In presenting his work as proto-mathematics, his ideas can be compared to the work of Faraday. Faraday developed his ideas on electromagnetic fields non-mathematically, but sufficiently elaborated that Maxwell was able to give them a mathematical form and develop them further. Insofar as Alexander has characterized the degree of life as measurable, this suggestion is plausible. However, in Book Two Alexander is focusing on the

processes that generate living structure. One thing that does come out in this book is that the unfolding of the whole is a creative process of adaptation in which the outcome cannot be completely anticipated from the start. It could be argued that this is merely a limitation in what we can know while reality itself is deterministic, as in mainstream chaos and complexity theory; but Alexander's work suggests a different interpretation, that the processes of the world are both diverse and are responding to each other in ways that, while constrained by certain principles, result in some creativity that is not determined. That is, Alexander seems to uphold a stronger notion of emergence than does conventional complexity theory. Concomitantly, Alexander acknowledges that there can be a failure of creativity and real breakdown of principles, as he suggests has occurred in Modernist architecture and town planning. If this is the case, then a complete mathematical treatment based on precisely defined mathematical concepts might be an impossible and misleading goal since, as Charles Sanders Peirce pointed out, laws of Nature have no place for such creativity.⁵ It might be necessary to acknowledge the need to work with what Peirce called "objective vagues," along with mathematical concepts and mathematically defined objects.⁶ The effort to give a place to subjectivity, to "feeling" for the whole, and to the possibility of a basic explanatory principle of Nature breaking down in the world indicates the revolutionary nature of Alexander's thinking about science, and this would suggest that he should be sympathetic to Peirce's ideas in this regard (that the "laws" of Nature are merely "habits").

If this suggestion were accepted it would accentuate the ambiguous relationship between living structures as characterized in Book One and processes as characterized in Book Two. In Book One the fifteen features characterizing life are described statically as properties, while in Book Two they are characterized as structure-preserving processes. My own view is that life is process, and that Book Two provides a more profound understanding of life than does Book One. What then is "life" considered statically as a property? I would suggest that what in Book One is characterized as "life" is often manifestations and signs of life and of what is conducive to life—that is, what has been produced by an unfolding of the whole through structure-preserving transformations

and is conducive in some way to further such unfolding—rather than life as such. Whether one agrees with this or not, Alexander has opened a domain where morphogenesis can be studied in detail and where more basic issues can be thought about much more easily than in the domains of theoretical physics or even theoretical biology. This work provides the basis for further developing ways of thinking that could be important for clarifying and solving problems in the traditionally more prestigious disciplines.

While Alexander's ideas on morphogenesis and more basic theoretical issues are important, what is even more important for advancing the alternative "Goethean" tradition of thought is his revival of the notion of beauty, rescuing it from the triviality of taste and from theoretical and philosophical oblivion. In doing so he has provided the basis for rethinking the goals of civilization. Alexander's work makes it possible to revive the claim that the end of life is not raising GNP, developing the forces of production, or even the will to power but rather is creating a beautiful world, without being dismissed as an effete aesthetic. Alexander notes that "In every sphere of nature, and every sphere of human effort, there are trillions upon trillions of possible processes—that is, actually capable of generating living structure. Of these trillions, only a few are *living* processes—that is, actually capable of generating living structure" (p. 13). If Alexander is right, the human capacity to appreciate beauty—at present partly crippled by the mechanistic worldview and the practices generated by it—is the ability to see, feel, and appreciate which of these processes are living and are conducive to more life while, conversely, the human capacity to see ugliness is the ability to see and feel what is opposed to life. These abilities are essential to people's own self-creation through their creative participation in Nature and society, particularly through the environments they build for themselves, enabling them to augment the conditions for such self-creation and avoid activities that would undermine such conditions. Alexander's work provides the justification, orientation, and force to uphold and put into practice Aldo Leopold's land ethic: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it does otherwise."⁷ □

NOTES

1. Samir Amin, "In Praise of Socialism," *Monthly Review* (September 1974): 12–3.
2. "Taylorism" was the brainchild of Frederick Taylor, the management theorist who pioneered time and motion studies and the idea of the production line. This was first embraced by Henry Ford.
3. On this, see Frederick Amarine, Francis J. Zucker, and Harvey Wheeler, eds., *Goethe and the Sciences: A Reappraisal* (Dordrecht: Reidel, 1987) and Gerry Webster and Brian Goodwin, *Form and Transformation: Generative and Relational Principles in Biology* (Cambridge: Cambridge University Press, 1996).
4. For a further development of this argument see Christopher Alexander, "New Concepts in Complexity Theory Arising from Studies in the Field of Architecture: An Overview of the Four Books of *The Nature of Order* with Emphasis on the Scientific Problems Which Are Raised," *Katarxis No.3* (September 2004). This edition of *Katarxis* is devoted to Alexander's work.
5. Justus Buchler, ed., *Philosophical Writings of Peirce* (New York: Dover, 1955), 357.
6. *Ibid.*, 294ff.
7. Aldo Leopold, "The Land Ethic" in *A Sand County Almanac* [1949] (Oxford: Oxford University Press, 1968), 224–5.

THE NATURE OF ORDER: AN ESSAY ON THE ART OF BUILDING AND THE NATURE OF THE UNIVERSE BOOK THREE: A VISION OF A LIVING WORLD

Christopher Alexander

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Review by BRIAN HANSON

BRIAN HANSON is an architectural historian. He has traced the rise of the architect in his *Architects and the "Building World" from Chambers to Ruskin: Constructing Authority* (Cambridge University Press, 2003). In 2006 he will work on the "Building Culture" program of The Prince's Foundation (London), to see what craftspeople and architects can learn from each other.

Who is responsible for the oft-heard mantra that Christopher Alexander is an interesting theorist, but he ought to build more if he expects his theories to be taken seriously? Until recently, if you had asked Charles Jencks why there was no mention of Alexander in his *New Paradigm*, you would have received that stock response.¹ Peter Eisenman, by contrast—so the argument goes—is clearly building his theories (no matter exactly *what* it is he builds), so deserves to be included in Jencks's book. But the notion is a lot older than Jencks. In 1962, the young Alexander took the opportunity to talk to Team 10 (successor-body to CIAM, the Congrès Internationale d'Architecture Moderne) about his recent time in India and the ideas it had spawned. Both the Smithsons—doyens of English Modernism, and authors of Brutalism—and Aldo van Eyck were present. The brilliant young man received a lofty put-down (or, at least, this is how it was remembered when a partial transcript was published thirteen years later): "Team 10," the account went, "thought Alexander should go on to build, and by so doing accept responsibility for his analysis. Team 10 are all

builders by nature and tend to be nervous—if not suspicious—of those who proceed from one [piece of] research to another."² But by 1962 Alexander had built a village school in India. He had been building in concrete since the age of nine, going on to work for a concrete contractor. He had made furniture. He was as much a "builder by nature" as any in his audience, and more so than many of them. And since then he has (as one can see clearly from this book) built up an impressive roster of buildings that a well-informed critic like Charles Jencks has no excuse for being ignorant of. So what exactly is going on? Are those who are so eager to dismiss him as a "mere" theorist indulging in a little wishful thinking? Are they hoping these challenging theories are *not* provable in practice?

Christopher Alexander has never been content with what became his unrivaled status as über-theorist. After 1962 he continued to cultivate his roots in building, even while a university professor; enjoying his growing stature as a building contractor, his involvement in concrete work, bricklaying, carpentry, tile-work—even his stint as lead man on a "gunite" crew. By doing this he ennobled the act of building in a less ambiguous way than he was able to do through his theories alone, and should have left no one in doubt that he believed the end of architectural theory should be building.

So one should always be careful when attempting to separate Alexander's theory from his practice,



REGENERATING ART AND ARCHITECTURE IN NATURE'S LANDSCAPE