Chapter 18
Architecture and Systemics: In Praise of Roughness

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1 Introduction

In the first Book of his monumental, ultimate theoretic work[1] about the principles of architectural and urban design, Christopher Alexander identifies fifteen structural features which

> appear again and again in things which do have life.

These properties are: 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, not-separateness [1]. The property of ROUGHNESS seems to me a promising starting point on the way of clarifying the possible links between Architecture and Systemics.

2 Roughness

Roughness, according to Alexander, is an essential structural characteristic of things which have real life because these things "have a certain ease" which prevents them from being morphologically perfect and thoroughly regular. Roughness is not a residue of technical flaws or manufacturing inaccuracy: it is

> an essential structural feature without which a thing cannot be whole.[2]

[1] C. Alexander [1].
[2] C. Alexander, Op. Cit. Book 1, p. 210.

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Provided that the industrial idea of optimization is eliminating uncertainty and flaws from the product, Alexander claims that in architecture "life" and "wholeness" have nothing to do with flawlessness. Rather, the act itself of making things gives them life, as

> process is the key to making life in things.[3]

More than that, roughness becomes an inherent, essential quality of architecture, and it should be pursued by design at all scales.

In public spaces, Alexander explains, "the power of instincts" encourages people to take up positions from which they "can protect their backs". He says that, in a courtyard as well as in a public square, "something in the middle"—such as a tree, a monument, a seat, a fountain—is a necessary feature precisely because it allows people to feel more protected.[4] Alexander argues that these centrepieces should be placed according to the pattern of the natural lines of communication which cross a public space, as traced by the people's movement, as in the teaching of the great Viennese planner Camillo Sitte.[5] On this point, Alexander makes a significant observation, noting Sitte's critique that

> the impulse to centre something *perfectly* in a square is an "affliction" of modern times.[6]

That is the reason why the title of this chapter of Alexander's great treatise is: "Something *roughly* in the middle".

At the other end of the scale we find the design of a component, such as a window. Windows are capital transition points in a house, connecting indoor and outdoor space, letting air and light in, keeping cold weather and rain out. In windows, different parts open and close, and different materials meet and connect with each other, according to functional as well as to aesthetic requirements. Industrial components, and the modern system building, normally guarantee the functional quality and the "perfect fit" required. Alexander argues that

> the precision of the component can only be obtained by the most tyrannical control over the plan

in order to reduce tolerances and inaccuracies, while a natural building should be able to keep adapting to the site all along the construction process. Thus,

> a free and natural building cannot be conceived without the possibility of finishing it with trim, to cover up the minor variations which have arisen in the plan, and during the construction.

In such a way, tolerance can be larger and mistakes on the order of half an inch or more can be allowed. While concealing inaccuracies from variations, trims give life to the building, they make its image richer and whole.

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[3] C. Alexander, Op. Cit. Book 2, p. 4.

[4] C. Alexander et al. [2], pp. 606–607.

[5] C. Alexander et al. [2].

[6] C. Alexander et al. [2].

> Indeed, within this attitude to building, the trim is not a trivial decoration added as a finishing touch, but an essential phase of the construction (…) [it] is in fact a vital part of the process of making buildings natural.[7]

So, ornamentation goes along with function, within a design approach which is actually a philosophy:

> Totalitarian, machine buildings do not require trim because they are precise enough to do without. But they buy their precision at a dreadful price: by killing the possibility of freedom in the building plan.[8]

Arguably, perfect symmetry does not belong to Nature: the interplay between the well-defined order of natural objects and living things, and the constraints of the three-dimensional space in which they grow and develop, seems to result in roughness as a natural quality. In itself, Nature constantly puts constraints in any developing process, which result in variations of each individual—being it a sea-wave, a crystal, a flower …—within the boundaries of the customary features of its own kind. Thus, the quality of roughness is not caused by inaccuracy but it is the consequence of a well-defined and necessary order.[9]

3 Conclusion

These considerations refer to the introduction of ideas and words coming from the realm of systemics into the world of architectural design, in the early ’60s of twentieth century. In those days, design method was investigated and developed as a discipline in its own right.[10] Morris Asimow, one of the most influential author, in his seminal book *Introduction to Design*[11] describes design as an information process[12] consisting in

> the gathering, handling and creative organizing of information relevant to the problem situation; it prescribes the derivation of decisions which are optimized, communicated and tested or otherwise evaluated; it has an iterative character (…).

The idea of performance stemming from this approach was part of a complex design device aimed at reducing uncertainty in the design/construction process and promoting regularity in the product. Architecture is about life, and—as life itself—is admits and endless variability. A wider idea of performance should take into account that

> the system chooses among equivalent configurations according to opportunities which are not prescribed. Equivalent configurations are such because all of them have freedom degrees

[7] C. Alexander [2], pp. 1113–1114.

[8] C. Alexander [2].

[9] C. Alexander, Op. Cit. Book 1.

[10] G. Broadbent [4].

[11] M. Asimow [3].

[12] G. Broadbent [4] , p. 254

and thus all of them are *allowed to happen*. In this way, the system takes on a unique behavior among infinite possibilities. This is the richness of indetermination, as investigated by emergence processes. (…) Concepts such as correct, precise, comprehensive, rigorous, true-false, exact (…) are inadequate for the systemic complexity.[13]

References

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[13] G. Minati [5].