Chapter 6

Dynamic Generative Systems: Simple Parametric Strategies for Complex Architectural Objects and Spaces

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ABSTRACT
This chapter describes that in recent decades, international architecture has used complex geometric systems and experimented widely with building form in an attempt to integrate new concepts and technological tools into spatial exploration. These design processes put forward non-linear multiplicity as an alternative to traditional design methods. The forms and spaces conceived arise out of design approaches whose results are more characteristic of the process itself than of the adoption of compositional categories (order, type, element) or functional-rational categories (system, typology, structure). Parametric design is an algorithmic mathematical technique that enables the user to alter determined characteristics of the model at any point in the process without having to recalculate other characteristics that would be affected by such changes. Dynamic generative systems are a vehicle for thought that can be modified and interrelated over time. Their principles are closer to dynamic performance, contextual adaptability and interface and open processes than to the definition of simple finished objects.

INTRODUCTION
In recent decades, international architecture has used complex geometric systems and experimented widely with building form in an attempt to integrate new concepts and technological tools into spatial exploration. These design processes put forward non-linear multiplicity as an alternative to traditional design methods. The forms and spaces conceived arise out of design approaches whose results are more characteristic of the process itself (indices, distances between moments, transitions, movements, displacements) than of the adoption of compositional categories (order, type, element, superposition) or functional-rational categories (system, typology, structure).
Dynamic Generative Systems

As spatial organization increases in complexity it becomes forced and inadequate to think of and describe it in terms of the traditional systems of geometric representation (parallel projections, Monge system) inherited from the industrial revolution. Classical orthographic projections limit the formal possibilities arising from a more complex compression of space, which can no longer be summarized in simple transversal and longitudinal descriptions of form using elevations, plans and sections.

Any early incorporation of parametric design would demand a review of current design processes to include concepts and dynamic variables from relational data. Parametric design is an algorithmic mathematical technique that enables the user to alter determined characteristics of the model at any point in the process without having to recalculate other characteristics that would be affected by such changes. It thus becomes a powerful tool for developing a codified (modifiable and adaptable) system able to automatically detect and assess a family of alternatives to the proposed problem in real time and according to pre-established parameters. Its use demands a change in mentality where space and objects fit into a new way of seeing the world that focuses on efficiency and adaptability. Dynamic generative systems are a vehicle for thought that can be modified and interrelated over time. Their principles are closer to dynamic performance, contextual adaptability and interface and open processes than to the definition of simple finished objects.

Project Design Thinking in Architecture

Architecture, as a profession in the contemporary world, is a multiple, diverse, complex and contradictory practice, its limits, set by a variety of economic, political and social interests and pressures. The figure of the architect takes on multiple images in contemporary society: successful businessperson, chief of a specific part of a large company, director of a public department, independent professional with individual clients; art consultant and critic, interdisciplinary team coordinator, employee, unemployed person, cyberspace artist. Each one represents different degrees of worth, incumbency and recognition in professional, economic and cultural terms. This makes very difficult to use principles and parameters to organize and evaluate the wide range of outputs from the different profiles and circumstances. The impossibility of imposing any single validation system on such diverse situations has marked contemporary project teaching practice in faculties and schools of architecture.

The emphasis on project design in architecture teaching corresponds to the adoption of territorial planning methods and strategies, formalization of professional responsibility and the establishment of legal mechanisms for practice in both the public and private sectors. Planned organization of habitable space in contemporary societies arises with the passage from pre-modern to modern social states. Architecture, as a modern profession, is regulated by rationalist and functionalist postulates (i.e., mechanisms that regulate and control habitable space), which usually advocate a homogeneous built environment for the masses. Most architectural design projects teaching in our academic communities are developed under these epistemological, philosophical and instrumental constructs (with their indisputable values and recognized shortcomings). Representation and simulation tools, with all their potential and limitations for understanding geometric form and space, are essential elements in the production of the architectural object both as an historical event and a cultural deed. The conception of space, the notion of spatiality that each geometric system stipulates and realizes is a fundamental condition of the paradigm of the times, determining the certainties, doubts and uncertainties of the thinking of each period of history.
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