Chapter 1
Anexact Paths: Computation, Continuity, and Tectonics in the Design Process

Alessio Erioli
Università di Bologna, Italy

ABSTRACT
This chapter attempts to unfold the aspects of a design approach aimed to channel the full potential of complexity-grounded paradigms and self-organization based strategies applied through computation and algorithmic approaches, with a focus on (but not limited to) architecture. Computation is a necessary precondition to the whole discourse, not an inert tool but an integral part of the theoretical/operational apparatus, both vessel and medium of the design exploration, considering algorithms as modes of thought, logic as aesthetic operation and the implications of the inevitable limits of computability. A design process grounded in computation calls for a radical redesign of itself, a paradigm shift encompassing its full gamut, conception to fabrication. This implies an extended definition of tectonics, an intensification and redeployment of the decisional pattern scale at the metabolic level, a consequent remapping of the involved personas and a transcending of the designing-making divide.

INTRODUCTION
The diffusion of a new paradigm is a transformative rather than a substitutive process. It is akin to a force acting upon a heterogeneous material compound: the parts that are liable to move, bend or restructure will process it, adapt and rearrange accordingly, while the more rigid ones (unable to process the new information, anchored to the old paradigm) will either crumble under the pressure (at the cost of losing their identity, while their sub-parts will be subsequently transformed as well) or resist and survive on a changed map, relocated and with changes in the shape and size of their range of influence. Not everything is destroyed, but nothing remains immune to change. Complexity-grounded paradigms and self-organization based strategies in their current stage of implementation and near-future foreseeable developments promise enormous potential when channeled in a design process, but while delivering groundbreaking results in research, they still strive to make a significant impact in the widespread architectural practice. Despite the
adoption of computers is no longer a matter of debate, the supposed aura of pseudo-objectivity surrounding computation confined their use and understanding to an extension either of the drawing apparatus paradigm, ever since Sutherland’s Sketchpad (Davis, 2013), or the table calculator, in the management of quantitative information as such (the tedious task of automating arithmetic operations on quantities). In both cases, its place in the design pipeline always lies downstream of the conception part. It is only in recent years that the inherent potential for algorithmic creation surfaces, releasing computation from the perceptual cage of a crude, number-crunching tool and/or a sort of rectifier to imbue conceptual poetry with the necessary technical means for its engendering in the real world. Given the exponential shape of the curve that describes the development of an innovation or technology, this initial exposure is merely the anticipatory act of a big exploit to come that a broader, more significant accelerated process of change has in the making. In most cases, while tools are upgraded, previous theoretical backgrounds still persist and inform design approaches, thus hindering a proper understanding and application of the novel potential for creation. It is then of primary importance to adopt a design approach able to harness such potential and convey it in the generation of outcomes that favor a richer and heterogeneous ecological entanglement. To do so, first of all a stance switch is required: from a predictive towards a speculative interpretation of the project, in a rigorous yet open-ended fashion, to redefine and reshape the distribution of control, choices and information throughout the whole process (including the role of materials and construction as morphogenetic drivers and constraints).

This chapter will investigate the unfolding of such design process and the actors involved (mainly gravitating around - but not limited to - the discipline of architecture, since the act of design has broader coverage) within a framework of complexity and self-organization, analysing its impact, potential, consequences and evolution. A process that transcends the still persisting Albertian divide between designing and making, calls for a paradigm shift that encompasses its full gamut (conception to fabrication), and radically redesigns it along with the role and identity of the subjects involved.

Computation is here considered as foundational, an established and necessary premise to the whole discourse: not an accessory or an inert tool but an integral part of the theoretical/operational apparatus. Part of the chapter will expose the considerations on algorithms as modes of thought, logic as aesthetic operation, the implications of the inevitable limits of incomputability and how these limits constitute an untapped reserve of potential for future design processes. The implications of what will be exposed are a progressive redistribution of agency and computation, both of which lead to the embodiment of programmed behavioral qualities and processes on a metabolic level, involving a necessary redefinition of tectonics and its pivotal role in a design process grounded in computation. Tectonics is here defined as the realm in which the relations between formal organization and internal logics of a system are established; a case will be made for the centrality of the role of morphology (form and shape) as organization, structure and conveyor of information (which embodies performance, meaning and policy altogether) in the establishment and operation of this network of relations. The dynamic nature of such relations is considered within the concept of continuity, in a twofold way: as a condition regulating the links between relations and the genesis of form and objects, and as perpetual, relentless action. A continuous tectonic embodies agency in the fabric of the construction itself, fusing object and process by embedding material and geometry logics as part of its mereotopology (a notion that will be expanded later in this chapter), in the elements and relations (behaviors) involved in an unfolding process that operates with internal coherence but resists finality. The methods suggested for this design processes rely on iterative computational simulation through multi-agent system coupled with material experimentations and robotic fabrication as current instances of distributed intelligent machines.
Related Content

Use of Laser Scanner for Digital Surveying of the Sarnicli Inn and the Byzantine Cistern Underneath
www.igi-global.com/chapter/use-of-laser-scanner-for-digital-surveying-of-the-sarnicli-inn-and-the-byzantine-cistern-underneath/164368?camid=4v1a

Revitalising the South African Museum Sector: New Museological Trends
www.igi-global.com/chapter/revitalising-the-south-african-museum-sector/196857?camid=4v1a

Web Content Management in Institutions of Higher Learning in Emerging Economies
www.igi-global.com/chapter/web-content-management-in-institutions-of-higher-learning-in-emerging-economies/209325?camid=4v1a

Experiencing Commercial Videos for Online Shopping: A Cross-Cultural User's Design Approach
Jose Cañas-Bajo and Johanna Silvennoinen (2018). Enhancing Art, Culture, and Design With Technological Integration (pp. 183-214).
www.igi-global.com/chapter/experiencing-commercial-videos-for-online-shopping/201643?camid=4v1a