systema

2015 | Volume 3
Issue 2 | 72–79

ISSN 2305-6991
BCSSS

Deciding Architecture: a Framework for the Definition of a Temporary Autonomous Architecture

Lila PanahiKazemi [1]
Temporary Autonomous Architecture, Frankfurt, Germany, lilapanahi@gmail.com

Andrea Rossi [2]
Temporary Autonomous Architecture, Vienna, Austria, a.rossi.andrea@gmail.com

Abstract: This paper attempts to propose a new perspective on the role of computational tools in architecture, and through this, to outline a model of architectural knowledge which is not closed into itself, but rather open to the contingencies of real world. By displaying the problematics generated by the adoption of concepts such as self-organization and emergence, which have posed the designer as an outsider of the design process itself (Sanchez, 2013), and focusing instead on the idea of architecture as decision-making process (Shaviro, 2009), it proposes to reconsider the possibilities for the autonomy of the discipline within its socio-political context (Zizek, 2014) (Bey, 1985). This would requires a shift in the ways of adoption of computational tools in architecture, shifting them from the generation of self-referential complexity to the definition of ecologies of interaction where the intricate relationship which architecture is called to build can be clarified, tested and understood. This could also suggest the possibility to use programming, understood as craft (Michalatos, Kaijma 2008), as basis to create novel ways of communication both within architecture profession as well as between the profession and its outside, following the idea of the architect as “incompetent master”, and allowing the introduction of new perspectives and new actors within the design process itself.

Keywords: Computational Design, Decision, Autonomy, Temporary Autonomous Architecture, Design Process.

This paper attempts to propose a different perspective on the application of computational tools in architecture, and through this, propose a model of architectural knowledge which is not closed into itself, but rather open to the complexity of the real worlds, with the aim to understand it and work within its limits, instead of simply mimicking it. The fundamental idea is that, by shifting the use of computation from the generation of self-referential complexity to the creation of tools for the exploration, analysis and understanding of the intricate relationships which architecture is called to build, would allow architects to regain a role in the process of creation of our built environments, while at the same time allowing for the discipline to open up to a stronger interaction with other actors, as well as with the end users.

1 Against Self-Organization in Architecture

> *"Aren't there other directions to work and think in, besides 'below' and 'above'?" (Shaviro, 2009)*

During the last 50 years, architects, planners and designers have been taking a deeper interest in cybernetics and system theory (Pask, 1969), and with the introduction of computational tools in architecture, this tendency received a strong acceleration during the last decade (Eiroa, 2013). This revolution has replenished architecture's discourse with a series of new concepts and tools to engage with the complexity of the real.

Between these concepts, a set of ideas have been borrowed from the field of the sciences of complexity and self-organization, and has had a deep impact in the understanding of the discipline. Complex forms and organic geometries have become the conventional outcome associated with the application of computational tools in architecture, and the production of those same forms appears to have become the new goal in itself (Michalatos, Kaijima, 2008). Various algorithms and concepts developed in other fields, such as swarm intelligence, neural networks, cellular automata, fractals and others, have been applied to architecture as a renewed source for the generation of a wide repertoire of forms. At the same time, this attitude found a loyal and committed partner in the powers of contemporary post-fordist network society, which would see the possibility to seamlessly integrate the fluid aesthetics and flexible program distributions of such architectural artifacts and theories in the complexity of contemporary neoliberal power relationships (Schumacher, 2012).

This radical shift in architectural production have been fuelled by a deep, and to some extent blind, faith in the concepts of complexity, self-organization and emergence as the only possible tools to understand and cope with the growing intricacy of contemporary world (Shaviro, 2009). This proves to be problematic due to the overlooking of the fact that self-organizing processes in nature are not aimed necessarily at the stability and preservation of a system, but often also towards instability, chaos and self- destruction (Ward, 2009). This shows clearly how it is not possible to use such processes a-critically, but rather claims for a necessary and continuous critical revision of the tools and techniques employed for architectural production. Nevertheless, a widespread attitude uses algorithms to produce complex outcomes which are never questioned after their generations, following the assumption that since the parameters and the relationships in the beginning are reasonably set, the outcome must be consequently correct. This approach becomes immediately problematic, due to the use of programming and computational techniques as the tool "to construct a pseudo-science of design and hence justify and present as rational inherently

irrational choices" (Michalatos, Kaijima, 2008). This becomes problematic, since it clashes with the fundamental notion of "programming as craft" (ibid.), which is completely incompatible with the application of algorithms as the basis for a new scientific rationality in architecture.

If the two issues discusses above are fundamentally operational, there is also a deeper consequence of such approach, which questions directly the societal and political role of architecture in our societies. As stated by Patrick Schumacher, the application of the concept of "autopoiesis" to architecture could offer the possibility to reconsider the discipline as an autonomous field of inquiry, with its own internal rules and models of communications (Schumacher, 2010). This would apparently offer the promise of autonomy, by allowing the discipline to set its own goals and define its operational models and procedures. However, by accepting its own closure around itself, architecture would be destined to lose any possible social and political role, becoming a self-referential field of inquiry. As noted by Jose Sanchez (2013), the focus on self-organization as the only tool to resolve architectural constrains through software simulations, would inevitably "reach a convergence, or what we call a style". In this sense, the introduction of algorithms and logics borrowed from other fields would point more to the definition of systems of articulation of existing norms, rather than as creative possibilities to redefine the discipline. In this way, architecture could fail to maintain openness and define possible transformative procedures, by accepting their exclusive use as devices for the articulation of formal aspects. Indeed, architecture could lose any political and social implication, becoming the discipline of articulating spatially decisions taken elsewhere. In this way, it would transform itself as a passive translator of current neoliberal power structures into built forms, missing any possibility of "spatializing the conflicts that are at the core of the very nature of its context" (Miessen, 2011).

2 Autonomy and Decision

> *"As to the future - only the autonomous can plan autonomy, organize for it, create it. It's a bootstrap operation." (Hakim Bey, 1985)*

We argue that architecture, both as discipline and as a socio-political function, could be understood as a practice based on processes of decision-making, and that is exactly this process that could allow the discipline to continuously redefine its tools and scope. We suggest that, to allow architecture to become truly autonomous in the current neoliberal world, would require to maintain the concept of decision to its true core, and to address all efforts to empower architects with a broader understanding of the complexity of the world, in order to allow the definition of strategies and tactics to address it in a productive way.

In this context, we use the term "decision" with a Whiteheadian connotation, as the moment in which an entity generates an event by breaking the continuity of the temporal and spatial flow (Shaviro, 2009). According to Whitehead, each entity presents a specific and unique "appetition towards a difference", and this drives it towards the production of unique and unrepeatable decisions, which generate the variety of the world as we know it. What is necessary to notice is that such a conception is incompatible with notions such as "autopoiesis", since an entity is hereby defined by its ability to "strive for something other than the mere continuation of what already is" (Shaviro, 2009).

In this sense, it appears possible to redefine the processes of production of novelty in a radically different way, shifting away from a "metaphysics of emergence", towards the application of an "aesthetics of decision" (Shaviro, 2009). Understanding processes as

fundamentally aesthetic ones presents a fundamental consequence in the relationship between the subject and the object: rather than grasping an object and operating on it based on a predetermined ideal set of rules to which the object is subordinated, the interaction happens between two individual irreducible entities, which redefine the rules of interaction in the very moment of their encounter. What such approach offers is a truly "autonomous" mode of operation, where every act, even if it is based on the influences generated by the specific environment in which is taking place, it is not univocally determined by those influences, but it is rather always redefining the relationship with these same entities by creating a new rule in the very moment of action (Zizek, 2014).

In the field of architecture, such conception offers an interesting model to redefine the relationship between architectural decisions and the tools, in particular computation, used to support such decisions. It allows to overcome a concept such as "autopoiesis", as posed by Schumacher (2010), where the definition of the architectural discipline as a closed field, and consequently of the design process as a self-organized emergent phenomena, leads to position the designer outside of the design system, and where *performance*, being it structural, environmental, economic or "societal" (Ibid.) becomes the only validation criteria for the design itself (Sanchez, 2013). By excluding such process, architecture could refuse characterizations of style and design process as given a priori, in order to engage with the complexity of the world in a contingent manner. Moreover, this would suggest the use of computational tools not as simple generators of exterior formal complexity, but also and foremost as the necessary elements to dissect, analyze and subsequently recombine the different aspects of the environment where architecture is taking place, in this way allowing the designer to rationally understand those same parameters and creatively interpret them.

Exactly this ecological interaction between designer, environment and computational tools is what could suggest new ways for architectural research. Rather than disregarding the complex set of influences coming from its social, political and environmental context, and subsequently using algorithms derived from complexity theory to generate intricate designs that attempt to mimics the complex systems embedded in the context itself (without any real relation to it), and in this way constraining the decision role of the designer to the setup of a series of rigid and unclear parameters and relationships, this approach would allow to use computational tools to clarify aspects of the environment-system which are unclear, by both analyzing, synthesizing and making complexity intelligible, allowing in this way the designer to rationally and autonomously take creative decision, overcoming both the limits determined by the environment and by the technical means available (Watanabe, 2002).

In this way, the constraints which are normally applied to architecture as limits for the unfolding of self-organizing autopoietic systems, could be re-conceptualized into its very source of creativity and innovation, by stimulating a complex ecosystem of environmental parameters, analytic and synthetic algorithms and autonomous design decision which express the creative interpretation of the contingent interaction between architecture and its own specific constraints and determinants. In this sense, this would offer a coherent and effective answer to the issue raised by Nicholas Negroponte, when he observed that he did not "believe that there are truths in architecture: all principles are qualified by context". And this is also the reason for the necessity to stress the temporality of such interactions and their absolute contingency to the specific condition of each project, observing how such model of production asks for a continuous redefinition of such relationships between designer, environment and tools, moving away from ideas of style and structured processes, to operate for the integration of the contradictory structure of the real within the design process itself.

3 Computational Tools for Decision-Making

> *"The Machine is the architect's tool - whether he likes it or not. Unless he masters it, the Machine has mastered him." (Frank Lloyd Wright, 1908)*

In the light of what noted before, we suggest it could be possible to redefine the role and scope of computational tools within the ecosystem of production of architecture, in order to better understand the characteristics which such tools might need to exhibit in order to enable designers to understand and deploy their decisions within the fabric of the real.

First, it is important to note how much of the discussion outlined above is caused, and at the same time made possible, by the introduction of programming practices within architecture. During the last years, we assisted in a shift from the application of CAD packages in architecture, often borrowed from other fields, to the definition of specific tools to produce architecture which have been developed directly by architects in response to the needs of specific projects or researches. This has meant a large proliferation of new tools, in the form of plug-ins for other CAD packages, scripts, and fully functional custom software developed in different programming languages. This has caused a shift in the specific knowledge field of architecture, introducing programming and relational thinking as one of the main topic of explorations.

However, a large part of such research relied on the reproduction, within the architectural domain, of shapes and processes borrowed from the fields of complexity theory, self-organization and emergence, with a particular emphasis on biologically-inspired systems. Moreover, a large part of the outcomes of such processes have been the direct and linear materialization of the output of such scripts, which have been taken as defining a new rationality for the production of architectural forms. What this fails to address entirely is the fundamental idea that the construction of algorithms does not exhaust the process of design in itself, but rather represent an initial step into the definition of an open and complex space of possibilities. In this sense, the algorithm operates as the interface between architectural requirements and the geometry which will embody those same requirements into a 3-dimensional relational structure. What this means is that setting up an algorithm accounts for the construction of a field of possibilities, from where the design can subsequently start to be developed in a coherent manner (Aranda, Lasch, 2006).

In this context, a new perspective can be suggested in the application of programming knowledge in architecture. Rather than working on procedures which aim at the proliferation of complexity, often without any real rational driver, a more effective and useful option would aim at defining specific environment where the parameters and logics of the system under discussion could be combined in a coherent way and subsequently offered to the designer in order to create a deeper understanding of the system itself. In this light, the concept of "simplexity", the complementary term of complexity, offers an alternative to the current approach, by describing the process of coherent and meaningful simplification of a system in order to make its aspect more accessible to the user/designer (Michalatos, Kaijima, 2008). Such a process is more complex than other procedures, and requires the designer/programmer to build a deeper understanding of the system and its functioning, in order to consider and combine in a meaningful way the specific set of rules which are relevant for the coherence of the system.

Moreover, a second fundamental aspect of such operational mode is the absolute necessity of the development of custom user interfaces, which allow the access to otherwise too complex aspects of the system (Ibid.). User interfaces allow the selection and visualization of specific components of the system, as well as the filtering of information and

parameters for custom scripted simulations. What this allows is the construction of a better understanding of the user, which becomes more knowledgeable about the systems he is dealing with, and in this way it is able to consider the different effects of any specific decision within the system (PanahiKazemi, Rossi, 2013). User interfaces might also allow the access to tools and techniques once considered exclusively pertaining to construction, in particular to fabrication machines, allowing to break down the division between design and fabrication, and allow for the emergence of new hybrid practices focusing more on process generation rather than exclusively on objects (Maxwell, Pigram, 2012).

Indeed, the focus on user interfaces can be also directed towards two different, but complementary aims: from one side, the process of translation of reality into code involves the definition of the first into numerical terms, and in this sense it generates a process of "defamiliarization" (Michalatos, Kaijima, 2008), presenting known problems in a different form, and in this way offering the possibility to creatively redefine the process of searching for a design solution, while being forced to abandon familiar solutions bound to the exterior appearance of a design problem. At the same time, this same possibility of translation of the same problem into different forms and languages through code opens up a great potential for the creation of complex collaboration networks between the various professions and disciplines which contribute to architecture (and potentially, to other ones as well). In this sense, a complex set of feedback loops can be determined between different and traditionally separated design phases, allowing for the generation of more direct and coherent responses to specific design problems, as well as the definition of complex search spaces where the design decision-making process can happen.

This possibility of continuously shifting between modes of representation and data represented could also give rise to a reconceptualization of such modes of collaboration: indeed, the true possibility of directly embedding knowledge from disciplines alien to architecture directly within computational models, would allow the architect to explore novel layers of understanding, traditionally outside of its scope, and operate on such layers as "an incompetent master navigating the ocean of practices, not a more specialized master of a single terrain" (Miessen, 2011). Moreover, what could become relevant within such process is its inherent bi-directionality: indeed, as much as the architect becomes able to transverse between knowledge once inaccessible, at the same time professionals from such fields, as well as non-professionals, who would be the end users of such architectural product, could be allowed to enter the architectural decision process, and provide new creative strategies to tackle familiar problem, by displacing them through radically different perspectives.

By creating computational tools and environments which open up the core of architectural knowledge, as well might redefine architecture as a dynamic interrelated operation, the architect accepts to abandon the role of the unique "masterbuilder", to become at once a critical voice within a multitude of practices, as well as the facilitator of the generation of new modes of interaction between such practices of design and construction (Wigley, 2012).

4 Towards a Temporary Autonomous Architecture

> *"The stuttering between Resilience (recognizing vitalism as a force of life) and Resistance ("creating is resisting") seems, in a schizophrenic logic, a plausible hypothesis…" (Francois Roche, 2012)*

The approach highlighted throughout this paper highlights the possibility for a reconsideration of both the structure of our architectural design processes, as well as the role and tasks associated with the use of computational tools within these same processes. What this entails is the abandon of approaches devoted exclusively to the use of computation as generator of complex formal outcomes, to attempt at understanding it as a dynamic information processing process able to deeply inform architectural decisions with relational knowledge. At the same time, this would require the structuring of such process in order to generate environments and interfaces where decision can happen, be tested and evaluated against the complex influences of the real world.

As noted already by Gordon Pask (1969), such architectural system must rely mostly on second order cybernetic systems, controlling the parameters of an environment where the decision can be unfolded. However, this accounts for just one of the possible procedures, and the whole structure of interaction within the process can be in any moment reconsidered and inverted. This account to the fundamental idea that architecture is "a form of communication conditioned to occur without common rules", due to the fundamental fact that is a communication happening "with the other, who, by definition, does not follow the same set of rules" (Karatani, 1995). In this sense, the processes of collaboration within architecture can be better defined, as noted by Florian Schneider (2011), as "to work together with an agency or instrumentality with which one is not immediately connected".

For this exact reason, architecture would need to accepts this deep contradiction, and embrace it by developing continuously new tactics to understand this alter rules, evaluate them and operate within them, always attempting to generate procedures which are truly autonomous, and thus able to redefine those same rule in the act of design. Moreover, this autonomy can never be considered a definitive operational procedure, but always needs to be redefined in response to a new alterity, which would force a reconfiguration in the relationships between design and production tools and methods. In this sense, the use of computation, with its ability to translate complex influences and parameters into dynamic forms which can be combined, presented and interrelated in always novel ways, as well as re-translated in a variety of forms and contexts, proves to be a fundamental tools for the exploration of such endeavor.

The final aim would then be to outline a model of practice where the generation of complex relational models between architecture, and its tools can provide new scenarios for the unfolding of the dialectics between the complexity of the real world and the wills and needs of its inhabitants. This unfolding would be continuously redefined and regulated by a dynamic set of procedures and algorithms, which could come to constitute the infrastructure for the definition of a truly temporary autonomous architecture.

References

Aranda, C. & Lasch, B. (2006). *Pamphlet Architecture 27: Tooling*. Princeton: Architectural Press.

Bey, H. (1985). T.A.Z.: The Temporary Autonomous Zone, Ontological Anarchy, Poetic Terrorism. Retrieved January 12, 2015 from http://hermetic.com/bey/taz_cont.html

De Carlo, G. (1972). *An Architecture of Participation*. Melbourne: Royal Australian Institute of Architects.

Eiroa, P. L. (2013). *Architecture in Formation: On the Nature of Information in Digital Architecture*. New York: Routledge.

Kaijima, S. & Michalatos, P. (2008). Simplexity. In *26th eCAADe Conference Proceedings* (pp. 719-726). Antwerp.

Karatani, K. (1995). *Architecture as Metaphor*. Cambridge: The MIT Press.

Maxwell, I. & Pigram, D. (2012). In the cause of Architecture: Traversing Design & Making. In *Log 25: Reclaim Resi[lience]stance*. New York: Anyone Corporation.

Miessen, M. (2011). The Nightmare of Participation, or Considering the Value of Failure as Proactive Catalyst for Change. In *San Rocco 03: Mistakes*. Milan: San Rocco.

Negroponte, N. (1975). *Soft-Architecture Machines*. Cambridge: The MIT Press.

PanahiKazemi, L. & Rossi, A. (2013). Spatializing the Social: Computational Strategies for Intervention in Informal Settlements. In *39th IAHS World Congress*. Milan.

Pask, G. (1969). The Architectural Relevance of Cybernetics. In *Architectural Design (9)*. London: Wiley & Sons.

Roche, F. (2012). Reclaim Resi[lience]stance. In *Log 25: Reclaim Resi[lience]stance*. New York: Anyone Corporation.

Sanchez, J. (2013). Gamescapes. In *ACADIA 2013: Adaptive Architecture*. Cambridge: Riverside Architectural Press.

Schneider, F. (2011). Collaboration: the Dark Side of the Multitude. Retrieve February, 22, 2015, from http://www.zamyn.org/commissions/collaboration-the-dark-side-of-the-multitude.html

Schumacher, P. (2010). *The Autopoiesis of Architecture* Vol. I. London: Wiley & Sons.

Schumacher, P. (2012). *The Autopoiesis of Architecture* Vol. II. London: Wiley & Sons.

Shaviro, S. (2009). Against Self-Organization. Retrieved January 12, 2015, from http://www.shaviro.com/Blog/?p=756

Shaviro, S. (2009). *Without Criteria: Kant, Whitehead, Deleuze and Aesthetics*. Cambridge: The MIT Press.

Ward, P. (2009). *The Medea Hypotesis: Is Life on Earth Ultimately Self-Destructive*. Princeton: University Press.

Watanabe, M. S. (2002). *Induction Design: A Method for Evolutionary Design.* Basel: Birkhauser.

Wright, F. L. (1908). In the Cause of Architecture. Retrieved January 12, 2015, from http://www.learn.columbia.edu/courses/arch20/pdf/art_hum_reading_51.pdf

Zizek, S. (2014). *Absolute Recoil: Towards a New Foundation for Dialectical Materialism*. London: Verso.

About the Author

Lila PanahiKazemi

Lila PanahiKazemi is an architectural researcher and system engineer, currently based in Frankfurt, where she is working as computational design specialist for KSP Architekten. She is the co-founder of Temporary Autonomous Architecture, a research and design practice involved in the exploration of the potential of computational tools in the realm of architecture and urban design, run together with Andrea Rossi. PanahiKazemi's research focuses on the impact of the digital tools in architecture, with a special focus on self-assembly and evolutionary fabrication logics. In recent years she has been practicing internationally, teaching a number of workshops on computational design tools and coding in Germany, Italy and USA.

Andrea Rossi

Andrea Rossi is an architectural researcher based in Vienna, where he is developing research on robotic fabrication at Coop Himmelb(l)au. He is the co-founder of Temporary Autonomous Architecture, a research and design practice involved in the exploration of the potential of computational tools and scripting in the realm of architecture and urban design, run together with Lila PanahiKazemi. In recent years Rossi has been practicing internationally, teaching a number of workshops on computational design tools and coding in Germany, Italy and USA, as well as developing collaborations with companies and research institutions on the topic of robotic fabrication.