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The Parametricism manifest: prospects about a "new global style" for architectural design and urban planning

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ABSTRACT

In the post-theoretical scenario of digital culture and experimentation in contemporary architecture, parametric design is highlighted by the positive response to desire for innovation and control of the design process. Patrik Schumacher - Zaha Hadid Architects and AA Design Research Lab - support a new unified style for contemporary architecture, based on parametrization and theoretical principles that constitute the paradigm of Parametricism. The paper aims to clarify and deepen the theoretical discourse, proposals, concepts and techniques about Parametricism as well as its position among other manifestos in history. Schumacher's manifesto is critically analyzed in relation to the context in which it emerges, the consolidation of its projects and critical notes from other authors.

KEYWORDS

parametrization, parametricism, parametric design, Patrik Schumacher, Zaha Hadid

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1. SET PARAMETERS: INTRODUCTION TO RELATIONAL THINKING IN CONTEMPORARY ARCHITECTURE

The current architectural scenario reflects the multiplicity of phenomena and emerging projective proposals due to technical and technological advancement. As pointed out by Hugh Whitehead in Robert Woodbury's book "Elements of Parametric Design" (2010, p.01), parametric design "is more about an attitude of mind than any particular software application". This way of thinking is founded by the current definitions between parts or elements of a model.

The "parameter" concept first appeared in mathematics and was first introduced into architecture by the Italian architect, Luigi Moretti, in the 1940s (Davis, 2013), which interpreted the "parametric architecture" as the study of systems that defined relations between dimensions dependent on parameters. In the "Parametric Architecture" exhibition at the 20th Milan Triennale in 1960, Moretti explained that the forms that defined his Sports Stadium were a result of nineteen parameters relative to its viewing angles and concrete costs.

The term "parametric design" means the allocation of settings and process control that determines relations and results from an ensemble of parameters and gives "interactive behaviour to building components and systems" (Woodbury, 2010, p.2). It is a process that uses templates that are a set of geometrical components with varying attributes - parameter - and other fixed - static or limited - to adopt a flexible edition (Barrios, 2011, p.204).

Contrary to geometrically fixed models, in which greater efforts are required in order to make further alterations to its forms - conventional design - aspects of the project are previously assigned - parametric design - in order to explore the flexibility of the relations in the model. The difference is established that "in parametric design, it is the parameters of a particular design that are declared, not its shape" (Kolarevic, 2000, p.4). A fundamental change is introduced in the process, in which parts relate to each other and change in a systematic way; coordinating and re-establishing connections (Woodbury, 2010, p.11).

The parametric allows the increase in formal possibilities - not restricting to complex shapes - and organization of architectural project, by handling relations and creating associative geometries for problem-solving (Kolarevic, 2005, p.149) that emerges without a pre-determined formal outcome - form-finding. Software offers the possibilities of algorithms management, allowing the manipulation of large amounts of data and the increasing level of complexity of the systems in the digital simulation environment. Thus, the real change is not about design but technological.

The assimilation of parametric design encloses the desire for immediacy in the use of digital technologies; demonstrating analysis optimization, control, and production of architectural project. Its insertion in architecture stems from a scenario that contemplates a broad improvement of systemic and technological features. In parallel, between 1960 and 1980, theoretical and critical investigations led to the aggregation of disciplines such as linguistics and philosophy to the theory of Architecture.

The context of parallelism allows the interpretation of Patrik Schumacher's proposal; by reconciling a theoretical manifesto with the positive paradigm of parametric design and exposing it as a hegemonic style of the architectural avant-garde: Parametricism.

2. PARALLEL VIEWS: THEORETICAL-CRITICAL DOMAIN AND THE COMPUTATIONAL PRAGMATISM

The freedom of experimentation in digital dimension allowed some parts of contemporary architectural investigations to be directed by practical speculation - the pragmatism of seeking solutions and project designs that prioritize organizational, formal and material factors.

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"Both the perception and realisation of architectural form, space and structure" (Menges and Ahlquist, 2011, p.10) profoundly impacted Computation. Their integration with architectural design created a particular conceptual and technical basis, converging thinking, scientific, technological and cultural innovations. The combination of these elements happened "through approaches like cybernetics and artificial intelligence, system theory and operations research, the computer was instrumental in shaping a new vision of the world" (Picon, 2010, p.28).

The relation between design and computation consist in is a specific way of processing information and interactions between elements, in which processes of generation of objects that incorporate information on symbolic representations are raised to a level at which codes describe values and actions (Menges and Ahlquist, 2011, p.11). These distinctions reflect the mode of integration between architecture and computer - despite being more agile in handling information. However, this was halted until further processed forms through relations or parameters were mastered.

The computational use by architecture can be summarized in three levels of digital computability (Kotnik, 2010; Oxman, 2006): 1) representational, 2) parametric and 3) algorithmic. The first uses the computer as digital media design tool. The second is characterized by continuous variation in ratio of predefined parameters that maintain the interdependence between parts and elements. And the latter being characterized by advances in control and manipulation of formal descriptions, functions, and application of codes.

At the same time, between the late 1960s and 1980, the "architecture theory" has transformed the theoretical approach to architecture (Hays, 2000, p.x). Defined as a form of mediation and production of relations between the formal analysis of a work and its context, it denotes "a desire to organize a new vision of a world perceived as unsatisfactory or incomplete" (Hays, 2000, p.xiv). By rearticulating of discursive totality, it allows Architecture an autonomous force by expanding its range to absorb what is thought of external codes of the discipline.

Subsequently, the fact that the architecture in vogue is heavily dependent on numbers, or to be more precise, information (Hays, 2013, p.253), has become a naturalized characteristic to achieve highly complex design. Consequently, the design practice with this approach led to the post-theoretical framework, or overcoming it. With the increasing of information processing made possible by the computer, the architecture would not need to be fed with abstractions of theory models applied in the 1960s.

As a result of computation modelling processes, theoretical inputs arising from external disciplines to the architecture "become mere ornaments" (Hays, 2013, p.254). The "theory", however, of these specific relations is not relied on a single method, it is possible to rethink disciplinary concepts that can support different processes. The digital manipulation focused on design practice develops through technological-based advances, for example, in geometric control techniques, functions and values in the simulation; avoiding essentialisms or immutable canons about architectural objects (Hays, 2013, p.257).

Besides generative capacity and exploratory freedom, parametric design allows defining and coordinating, in a controlled manner, different aspects of project in virtual environment. However, the technology applied can't explain by itself the imposition of formal and aesthetics preferences, leading some theories in investigations of digital architecture – as in the case of Deleuzian's fold in the middle of 1990 (Picon, 2010, p.64-5).

Some theoretical proposals were incorporated in the attempt to fill such a gap between the positivity of computational application and theoretical conception. Recently, an author who captured critical attention – due to the prominent position in the international architectural scene - was Patrik Schumacher, by presenting a theoretical manifesto that marked a new distinct moment in contemporary architecture. The framework of its publication refers another examples of theoretical manifestos in recent historiography.

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3. CRITICAL APPROPRIATIONS AND THE ROLE OF THEORETICAL MANIFESTOS

In the history of art and architecture, manifestos represent the positioning and the defence of a worldview determined by authors in a system of productive activities. Its function is to claim a style that represents the spirit of time of a discipline and the will to transform it. Besides defending its importance in relation to others. The ideological dimension is expressed in creation of determinants or normative principles. Manifestos "call to action" and are presented in form of texts as rhetorical tools that allow one to understand the resultant production from the style on account of thought that shaped it, and in order to generate a sense of contestation.

There are several examples of contributions linked to the "manifestos logic" (Jencks and Kropf, 2006, p.10) in the history of architecture. In the modernist period, the "Manifesto of Futurist architecture", 1914, by Antonio Sant'Elia and "Vers une architecture" by Le Corbusier, 1920. In the 1960s, the manifestos from collective such as Archigram (Universal structure - 1964) and Superstudio (Description of the microevent / microenvironment - 1966), and individual proposals of Robert Venturi (Complexity and Contradiction in Architecture - 1966), Aldo Rossi (The architecture of the city - 1966) and Kevin Lynch (The image of the city - 1960) influenced the contemporary architecture. Subsequently, authors like Bernard Tschumi, Peter Eisenman and Rem Koolhaas launched theoretical manifestos of analytical and challenging nature.

At the symposium "What happened to the architectural manifesto?" held in 2011 at the Graduate School of Architecture, Planning and Preservation (GSAPP) at Columbia University, it was discussed the validity of manifesto today. The position of panellists were that "the manifesto was dead or its status diluted, primarily through the argument that it is no longer necessary in a profession driven not by the 'lone genius'" (Holt and Looby, 2011). In addition, they found that critical position disappeared with domesticated publications, without analysis of the relation between the city and the architecture, and deprived of invention, research and interpretation.

In an effort to resist this condition, Patrik Schumacher proposes a dense theoretical framework for a new agenda in contemporary architecture, the manifesto entitled "The Autopoiesis of Architecture", the first volume published in 2011 and the second in 2012. In the latter, the author states his treatise in parallel with other three in the history of architecture¹ they called "classic treatises". Because each designates the presentation of "a mature self-description of the architecture" (Schumacher, 2012, p.509). According to him, every "epochal style"² has at least one decisive treatise, as his book, that depicts the architecture in a particular system. Schumacher believes each avant-garde style has a core of principles defended by the production of manifestos - paradigmatic exhibitions of its potential (Schumacher, 2012, p.652-3).

4. THE PERSISTENCE OF THEORETICAL SUPPORT AND THE EDUCATIONAL SPACES: THE ARTICULATION OF CONTEMPORARY MANIFESTO APPLIED TO ARCHITECTURAL DESIGN

After years of research in the studio Design Research Laboratory (DRL)³ at the Architectural Association School of Architecture (AA) and in the Computational Design Research at Zaha Hadid Architects (ZHA)⁴ Office, both in London - environments that converge experimental interests and new architectural agendas, besides most prominent advances in research and experimentation - Patrik Schumacher articulated the theory of a new paradigm for contemporary architecture which includes the process of parametric design.

¹ Alberti's "*De re aedificatoria*", Durand's "*Précis des leçons d'architecture*", Le Corbusier's "*Vers une architecture*" and his "The autopoiesis of architecture".

² Such as the Renaissance, Baroque, Neoclassicism, Modernism and now the Parametricism.

³ The DRL is a design course based on a teaching studio of advanced architectural project, founded in 1996 with Brett Stelle. [<http://drl.aaschool.ac.uk/>]

⁴ In 1988, he joined architect Zaha Hadid, later becoming one of the office directors.

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The constitution of this paradigm occurred cumulatively; through a succession of experiences in the areas of training and work, as well as lectures and articles aimed to disseminate his ideas, mature them and set them on the manifesto. Although the parametric design is not understood as a style, but as a procedure, Schumacher insists to insert it this way, by naming it and assigning specific features to position it as a reference in contemporary architecture.

At the 11th Architecture Biennale in Venice in 2008, Schumacher presented the text "Parametricism as Style - Parametricist Manifesto" – as a draft, which was unfolded later. At that time, the author believed that the paradigm of parametric design should be pursued in a comprehensive way in architecture, from the detailed level to urbanism. To Schumacher, architecture is in a cycle of "innovative adaptation": the experimental and productive scenario was digitally retooled and adapted to heterogeneous society, with the role to organize and articulate their complexity in order to create a repertoire guided by the same patterns. For him, the task conforms a style achieved through a "research program based": the Parametricism (Schumacher, 2008).

In the text, Schumacher (2008) exhibits five agendas to promote the aspects of Parametricism: 1) Inter-articulation of sub-systems; 2) parametric accentuation (enhance the overall sense of organic integration through correlations); 3) parametric figuration (visual perception of order and configuration beyond the usual parameters of geometric objects); 4) parametric responsiveness (reconfiguration and adaptation); 5) parametric urbanism (buildings form a continuously changing field)⁵.

In 2009 Schumacher published the article entitled "Parametricism - A New Global Style for Architecture and Urban Design" in Architectural Design magazine. The article, which released Parametricism broadly, restates and expands some of the ideas communicated in the previous year. In which was articulated through a manifesto that summoned the magazine's audience to consider a new avant-garde style for architecture. There is an inherent claim to the published content: overcome Modernism, amongst other episodes in Architecture. Because the innovation he pursues "proceeds via the progression of styles [...] represent cycles of innovation" (Schumacher, 2009, p.16).

In the article, he sets the agenda - displayed earlier - and the relevant heuristic to Parametricism, which is divided into some characteristics. The negative character, which avoids rigid geometric primitives - such as squares, triangles and circles -, avoids simple repetition of elements and the juxtaposition of unrelated elements or systems. The positive character considers all forms to be parametrically malleable, differentiate gradually (at varying rates), inflect and correlate systematically. The heuristic is expanded and divided into formal and functional principles.

This was the starting point to a style in which the author would later defend his treatises into two volumes. The defence of a style is, as he said, the attempt to go beyond the development of a simple formal basis for architecture, by including a number of works and establishing language connections with each other, since the form varies and becomes specific to only one project.

In the first volume of his book *The Autopoiesis of Architecture* entitled "A new framework for architecture", Schumacher structures a conceptual framework that underlies their theoretical proposals - a project that he calls "super-theory of specific domain". The Architecture operates globally as a universal system of communication, which "is delivering an image of architecture with sufficient detail for architecture to recognize itself [...] the reflection on its own contingency and its historical-discursive embeddedness [...] as clear as possible so that an observer may decide whether to follow their suggestions" (Schumacher, 2011, p.59-61).

⁵ In the latter volume, Schumacher extends to 7 agendas, adding "parametric semiology" - the importance of semantic dimension to architecture, and "parametric ecology" - ecological challenges as an opportunity to develop morphological adaptations from the environment parameters.

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In "A New Agenda for Architecture", his second volume, the author devotes a chapter to Parametricism: a theory about a new "epochal style". The new style is one component of the "super-theory" of Autopoiesis, characterized by concepts, formal repertoire, tectonic logic and computational techniques (Schumacher, 2012, p.617). Schumacher (2012, p.618) connects the requirement for a style that represents the potential of contemporary architecture to its innovation capability based on systematic practices of design experiments.

After fifteen years of maturation, Schumacher defends the hegemony of Parametricism as the architectural avant-garde style for established systematic innovation (2012, p.619), as well as Modernism and Postmodernism in the past. The concepts of Parametricism align complex and post-fordist society articulated in networks, in which systems with elements functionally integrated, mutually interdependent, and connecting variations emerge (Schumacher, 2012, p.623). He believes that the role of contemporary architecture and urbanism is to organize and coordinate this growing complexity (Schumacher, 2012, p.640). In other words, the exploration of design systems is able to spatially organize the processes and social institutions.

Patrik Schumacher defends a unified style as a paradigm that redefines the fundamental categories, objectives and methods for a collective enterprise aimed at an innovation process in Architecture (2012, p.643-4). The modus operandi of Parametricism is based on digital simulation and a form-finding tool that allows the association of parameters set by rules and logic that are found in natural field and others artificially created in virtual field (Schumacher, 2012, p.621).

The positive reinterpretation of the concept of "formalism" as a "formal research" can be understood "as the expansion of the formal repertoire [...] through solution spaces in terms of a form-to-programme heuristic" (Schumacher, 2012, p.338). The formulation of the problem is understood that contemporary architecture cannot be restricted to definitive functions. The fluid space condition was incorporated into the architecture recently, which were explored by digital tools, that enabled the establishment of spaces with multiple transfer surfaces; To avoiding circulation bottlenecks and segmentation of orthogonal spaces (Schumacher, 2012, p.353).

The genealogy of Parametricism as a style, according to Schumacher (2012, p.660), is inspired by the research of Peter Eisenman - language uses and strategies of formal manipulation - and Greg Lynn - referring to the slogan "continuous differentiation" widespread in the 1990s, following a dynamic curvilinearity architecture - and in Jeffrey Kipnis lessons at the AA in 1990 about fold - in which lies the origin of formal values of Parametricism. Besides, the practical experience obtained in the Design Research Lab and the massive use of data in projects from offices such as OMA and MVRDV were references that unfolded in a number of projects implemented by Zaha Hadid office since the end of the 1990s.

Moreover, the most recurrent theoretical Schumacher's references are Christopher Alexander, Noam Chomsky, Gilles Deleuze, Jacques Derrida, Peter Eisenman, Niklas Luhmann, Ferdinand de Saussure and Alejandro Zaera-Polo. They are architects, philosophers, linguists and sociologists who have no direct involvement with the parametric design.

According to Schumacher (2011, p.45), the architecture advance through the progression of styles with a theoretical articulation. Styles are essentially based on working conditions, material and technological constraints, which cannot be reduced to their formal characteristics, as they define aesthetic values for architecture, but also the control of the relationship between form and function (Schumacher, 2011, p.254-8). The value of innovation and creativity of a style is "avant-garde" because it condenses, in its practical and speculative development, the propositive conceptual formation and experimental research accumulated by certain techniques (Schumacher, 2011, p.279-282).

The promise of Parametricism is to achieve adaptive variations for different design conditions (Schumacher, 2012, p.649). From this variability condition, the definition of Parametricism implies that "all architectural elements and complexes are parametrically malleable" (Schumacher, 2012, p.654). Schumacher believes that this is a fundamental ontological change

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from constitution of classic and modern elements - cubes, cylinders, pyramids, etc. - to animated geometric entities - based on splines, NURBS, etc. - generating blobs and other curved surfaces.

The techniques used to control variability are "associative modeling" and "scripting functions" - the ability to establish associations between properties of various elements through generation of codes in programming language and use of algorithms. The new ontology depends on a new medium. Although Parametricism cannot be reduced to use of new digital media, it was inspired by it and remains dependent upon it (Schumacher, 2012, p.605-6).

The style of Parametricism is a set of theoretical principles, techniques, values, methods and goals that are highly dependent on computational advances - that "can only progress via the continuous advancement and appropriation of sophisticated computational techniques" (Schumacher, 2012, p.669). The Parametricism isn't limited to parametric design because it is operational and the decisions that guide the use of parametric potential - a tool with certain function in the theoretical plan proposed by Schumacher - can be applied in other ways even it does not constitute the style agenda.

5. IMPRESSIONS ABOUT THE MANIFEST IN PRAGMATIC EXPERIMENTATION TIMES

For the purpose of critically presenting some implications of ideas that Schumacher defends as hegemonic, here are three vectors for the debate: 1) the manifesto dissemination strategy; 2) the consistency of the theoretical basis and the proposal of a paradigm for contemporary architecture; 3) the application of the guidelines on project and research proposals.

Schumacher's perspective is based on the state of the current architectural production and resultant of a personal understanding of the world - a certain liberal position. In order to allow other people to take and develop their speculations about Architecture, there arises the necessity to publish the extensive treatise. However, these processes are later performed by Zaha Hadid office and research in AADRL (Architectural Association Design Research Lab). The author seems to justify and validate their current activity, because the impact of projects in mainstream proves to be more effective in disseminating its image than the effect of the subsequent theoretical discourse.

The two volumes have more than one thousand and two hundred pages, something unattractive for foreign readers to the architectural and academic level. Schumacher points out an ideal for architectural system and focus on creation of a manifest as a "communicative signal" that emphasizes beyond aesthetic aspects, which would justify developing a text due to its explanatory ability. Although the attempt to rescue a set of theories in order to framework it points out a distinction of their manifesto on previous, his references take an approach to its technical discussion about the use of parametric design.

The discussion cannot be reduced to a matter of taste, but that this perspective becomes global. This brings us to the problem of normativity, or who decides the objectives of a new style and whose interest to be established. Schumacher seems to combine his critical role to trends that are dictated by constructive means that values acquisition of the signature from a "stararchitects". The strategy of textual dissemination by architects and their reference works - an appropriate position for Schumacher - exposes the state of relevance and communication of contemporary production processes. This remains in dominance of large formal agents in the official architectural scene. The determinism of the author's position would be a rhetorical inspiration to reach a large index of reproduction of their work, emerging after years of experimentation and performance.

The heuristic of formal and functional principles of Parametricism does not go forward to achieve a single result in which other styles in contemporary architecture cannot establish. But it reinforces the use of complex geometries - subject not exclusively belonging to a parametric process. The agendas advance towards a specificity for style, contributing to their understanding by the lay reader. Parametricism does not define a style based on parametric

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design, but on a continuous form, in the fluid appearance and curvilinearity that integrates and organizes spaces, only enhanced by the use of parametrization.

Even manifesting certain anachronism, Schumacher defends a unified style - as in Modernism - arguing that the Parametricism absorbs the propositions of other styles to forge them into new affiliations networks (Schumacher, 2012, p.648). The hybrid capacity of Parametricism - associating processes, formal principles and theories - seems to ably suit any architectural expression and absorb it to one's style; by presenting a broad content which even does not prevent the emergence of plural projects.

There is always the danger in emerging tendency to homogenization and architectural universality, denying the coexistence of styles through a more critical position - despite an impositive vision not be the intention of Schumacher. The Parametricism is a response to representation of contemporary world, which considers the organization of social complexity and fluidity of their relations as elements for a global representation that is translated as a specifically language associated with the style.

Davis (2010) criticizes Schumacher's use of Parametricism term, because there is already a specific vocabulary with different meanings in digital architecture, and its theory uses indiscriminately descriptions from different digital fields. Although Schumacher identify it as a global style, a few built examples are found beyond Zaha Hadid's office. He argues that the office's work cannot be considered parametric in its entirety, because it uses the computer in traditional processes of top-down design to maintain stylistic consistency, only varying the complex form. That is, if the parametric design is able to realize so many external and internal variables to the object, the variability of the project was already guaranteed through a process that computes this data without being tied to a predetermined style and theoretically guarantee. However, Schumacher appropriates an idea of complexity that does not privilege the emergence, so the emphasis in developing projects by bottom-up processes is not the main focus of his work.

Owen Moss (2011) points out that Schumacher appropriated the parametric hypothesis, built and cataloged it by denying critical plausible opposition, besides his appeal to Zaha Hadid's work be of personal nature and not critical. The fact that the parametric theme has become acceptable and desired, with a special interest to students, it does not mean that it obtained credence as a measure of architectural content.

In projects involving the principles of Parametricism, we can mention the Kartal Masterplan (Istanbul, Turkey) 2006 and the Guangzhou Opera House (Guangzhou, China) 2003-2010. The first is an unbuilt project that articulates a script, generating different typologies in response to various demands. Parametrically adapting an interconnected network of spaces with existent urban context⁶. The second articulates in an architectural project curvilinearity and fluidity material dynamic effect. Creating a monolithic form, surfaces and continuous spaces in which parametrization were used to form the triangular patterns of structure and coatings, instead of organizing the program⁷. The former applies more properly in both the ideal of style as process variability, and the latter captures the style but leaves in the background the potentiality of the process to sign a built icon.

The working guidelines developed in AADRL perform research of virtual experiments and materials from the heuristic and parametric ontology of Parametricism, where one can see a large potential of exploration with dynamic and malleable shapes incorporating responsive variation of resolving problems⁸. It seems like as the uncompromising operation becomes the

⁶ More information: <<http://www.zaha-hadid.com/masterplans/kartal-pendik-masterplan/>>

⁷ More information: <<http://www.zaha-hadid.com/architecture/guangzhou-opera-house/>>

⁸ Video: "PARAMETRICISM" by Patrik Schumacher - Zaha Hadid Architects - AADRL.
<https://youtu.be/yVJPeo_Vc5c>

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motivation, Parametricism shown capable of bringing the practice to his ideals.

Coming back to the question: "What happened to the architectural manifesto?" it is clear that is not dead, however, it serves other purposes without the same ideological force. The Parametricism runs the risk of being just another "-ism" discredited in the history of Architecture if in the future a number of agents are not able to conduct their premises to an effective level that will develop the design process related to the parametric potential, associating the spatial and programmatic organization on projects that go beyond the style.

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