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Laurence Kimmel

Blurred boundaries: aesthetic challenges of computational design

- ¹ In *Digital Culture in Architecture*¹ from 2010, Antoine Picon describes how computational design blurred the limits between fields. Architecture shifted from “architectural design” to “technology based architecture”. A first distinction can be made between “parametric design” and “computational design”, the former being about the use of parameters to design things whereby, if the parameters change, the results change, and the latter referring to the use of computers and a mathematical approach to the generation of geometries, objects and architecture. In both cases, the focus is on designed networks and processes instead of designed objects. Although the outcome may be transformable, it is nonetheless a tangible architectural feature and thus the question of its quality is legitimate. How can we safeguard the possibility of events and creative singularities in the system that keeps a space for critical thinking in architecture? In order to investigate this question, the article focuses on boundaries between spaces. The limits between public and private space is a question of key importance in architecture and urban planning in general, especially considering computational design technologies enable the shaping of complex transformative surfaces that tend to blur the limits between spaces. The article therefore focuses on boundaries between public and private space. Do computationally designed boundaries create a loss of distinction between public and private space? What do they enable in this area that was not possible before?

Blurred boundaries or a new structural paradigm ?

- 2 The whole field of computational architecture evolves constantly, like a “shifting landscape”. According to Matthias Hank Haeusler, director of the CODE program at UNSW Sydney, “computational design practices became linked with architecture as emerging modes of practice considering new technologies during the 90’s. Architecture has bifurcated, mutated, transformed, and totally abandoned into “architectures”²”. Antoine Picon and Frédéric Migayrou³ describe the fundamental blurring of limits as the philosophical background for this development. Paradoxically, Edmund Husserl and Gilles Deleuze are key theoreticians that can enlighten us on the aesthetics of computationally designed forms. Husserl is the father of phenomenology, a field that inspired an architecture based on sensations, and that differentiates itself completely from the field of computational architecture. With computational design, the opposition between phenomenology and analytical philosophy no longer stands. Technology’s evolution in time and its representation becomes so intertwined with forms and matter on the small scale that classical oppositions fail to embrace the challenge of these new tools⁴. Today, the first stages of computational design are based on rational systems inherited from historic techniques but in an extremely complex and dematerialised way: the digital dialectic between script (code, genotype) and parametric variations or algorithmic formula⁵ (phenotypical adaptations) are part of a complex system of a variety of forms through space and time. Although it can be linked to concepts from the past, especially those from the baroque era, it is done so in an extremely complex way. Malcolm McCullough⁶ defines a shift of paradigm with the passage from software scripting and coding to the creations and direct manipulation of blobs, when digital designers stopped being coders. He calls it the “Direct Manipulation Boom”, and it happened in the 1990s. According to Nicholas Negroponte, this is a shift from the age of information to the age of the digital⁷ and, even if coding and scripting come back again, it has created a revolution in architecture. While thinking informed by multivalent parameters was nothing new to practice and theory, parametricism, in opposition to parametric thinking mentioned before, connotes the arrival of a “global style”. Patrick Schumacher positions himself within the new era of parametricism⁸, which has produced an original style while other practices, like Foreign Office Architects, used these tools by keeping a critical positioning in their practice⁹. Other examples of “complex surfaces” that could be studied for their aesthetic qualities include TU Delft’s project *Hyperbody*, using “spider finger” joints; Paul Loh and David Leggett’s (Power to Make) *Articulated timber ground* from 2014, with a group of students from Melbourne university; Prof. A. Menges and S. Ahlquist’s *Deep Surface Membrane Morphologies* studio at the university of Stuttgart; Emmi Keskinen, Pekka Tynkkynen, Kristof Crolla and Sebastien Delagrangé’s *Dragon Skin Pavilion* from 2012. Although some of these examples are parametric surfaces, this article focuses theoretically on computationally designed boundaries, as they present a greater change of challenging aesthetics and enhancing critical thinking than the former (even if parameters or algorithms are involved in computationally designed boundaries mentioned in the article).
- 3 Complex surfaces replace traditional plain walls. “The digital turn in architecture and design has freed surface from the “body” of a built object to a new landscape of possibilities¹⁰.” Forms are replaced by “patterns”, and the increasing complexity of surfaces creates a shift towards the notion of “hypersurface”, as multiple implied

parameters or algorithms mimic the possibilities of a n-dimensional space, which are projected, interpreted or represented in our 3-dimensional space. One main of developing complex joining and panelling systems is to get curvature. The complexity of the structure enables the integration of electronic devices in the facades themselves¹¹; creating a media façade as a “productive zone” for the interfacing between architecture, city and human beings. The production mode of these hypersurfaces is a radical change, demonstrating a shift from the fabrication of modern walls – which can be considered as standardized for ideological or technological purposes – to nonstandard surfaces that open up a wide range of possibilities and versions based on a set of parameters or algorithms.

“Both the terms Nonstandard and Versioning do not relate to forms but to a mode of production. These modes of production generate series of different objects. They have revolutionized our understanding of serialization, and the very notion of reproducibility in which we have lived for five centuries of mechanical culture¹².”

- 4 The fundamental shift is between the consideration of a wide range of versions of the system and “versioning¹³”, which is when this is extended to the extreme of a continuous evolution of form. Hypersurfaces enable dynamic surfaces that are interacting with the context, especially humans. The system is controlled usually from the outside, but the dynamics mimic self-organized bodies as we can find them in nature. Systems and processes could accommodate ever-quickenings, continuously-changing contexts. According to the *Handbook of Interior Design*’s definition of versioning, this relates to “dynamic tectonics”. But the question is then: is it still about tectonics? What is the remaining structure of this system? According to Antoine Picon¹⁴, we lose the tectonics with the shift from the age of information to the age of the digital.

“Despite this general trend, one may still wonder whether the present crisis of tectonic corresponds to a definitive change or to a temporary weakening that will lead to its redefinition. Some theorists and practitioners, from Neil Leach to Cecil Balmond, are persuaded that new tectonic guidelines will eventually replace the traditional ones. For Leach, ‘swarm tectonics’ will emerge from a better understanding of dynamic systems, while Balmond is calling for the abandon of the Cartesian frame of thought that has curbed structural ingenuity for centuries¹⁵.”

- 5 Instead of relying on a fixed structure, we shift to complex, continuously dynamic systems; and, instead of a law, we shift to variations of the norm. For Frédéric Migayrou, in our current situation, where the object positions itself in a continuum through variation, we see the fluctuation of the norm replace the permanence of the law¹⁶.

“This norm, always in the process of being defined and always deferred, is transcribed into objects fluctuating on the variable curves of the new industrial series... There are no longer pre-established functions requiring a form, we have only the occasional functions of fluctuating forms¹⁷.”

- 6 To develop the reflection in this article, it was important to mention this shift in reference to a paradigm change and its implications at different levels. The challenges introduced by hypersurfaces raise fundamental questions about ways to consider boundaries, especially boundaries between spaces of different statuses. Before defining a new paradigm for “structure” and “tectonics” in the era of the digital, the old definition of “structure” in the context of complex systems in the age of information remains our landmark for this text. A “structure” is still part of a clear architectural statement at a large scale. Topological transformations of the “structure” through space and time are not yet deployed in our everyday environments, and exist only as laboratory prototypes for the moment¹⁸.

Technological innovation is not architectural innovation

- 7 Although technological innovation can create new kinds of shapes, and thus bodily sensations, there might be a difference between producing new bodily sensations and creating innovative architecture that leads to a specific concept (as will be defined in relation to Mehdi Belhaj Kacem's theory of affect). In what cases does the artistic potential associated with kinesthetic sensation create affect and enable critical thinking? An example of a highly technological project is Mark Goulthorpe(dECOi)'s *Hyposurface* from 2003. He uses triangular shapes that are animated through a mechanical system, creating moving "waves" at the surface in an interaction process with the people who approach it. This example is at the junction between parametric design and computational design. According to Goulthorpe, "*HypoSurface* is the World's first display system where the screen surface physically moves. Information and form are linked to give a radical new media technology: an info-form device." We can witness on his website's video how exactly this moving surface surprises and has a real impact on people. The system enables infinite possibilities and each iteration of the experience provides another slightly different pattern on the surface. The openness of the system questions the possibility for aesthetic value in an iteration or of the system as a whole and establishes the question to which there might not be an easy answer. But there is a difference between the two projects made by Mark Goulthorpe which shows how open moving structures are challenging an aesthetic point of view. One of dECOi's few built projects, the *Glaphyros* apartment in Paris completed in 2003, features an 8-by-6-foot aluminium screen whose form is based on a mathematically generated algorithm of three intersecting waves. The fixed surface evokes the movement of a liquid, and has a specific impact on the bodies who pass next to it. This materialisation of a "frozen moment" in time is linked to classical ideas in aesthetics¹⁹. As the surface is set vertically, it plays with the perception of gravity. The complexity of the wave design always creates slightly different bodily sensations, but in a specific way chosen by the designer. With *Hyposurface*, the classical aesthetic criteria vanishes. To develop new aesthetic landmarks for computational design, it is important to first make a distinction between sensation, especially bodily sensation in architecture, and real affect that would be linked with concept. The boundary is blurred, and theories like Gilles Deleuze's are major tools to define the difference or make the junction between sensation and concept. The aesthetic theory that will serve as a landmark in this article is Mehdi Belhaj Kacem's theory of affect²⁰ which is linked with concept. Kacem's theory of affect is also a theory of event, truth, and real presence. His theory could be summarised as follows: on the basis of Alain Badiou's philosophy, he defines "virtual" affect as a gap between presentation and representation, or what fails in the forcing of representation into presentation²¹. Affect is "the identity of this infinity." Kacem considers the event as the real of a disintegrated representation. There is a negative aspect in any relationship, and this aspect is inherited from Hegel's notion of the "Negative" as well as the negative of any relationship in Lacan's (the existence of pleasure proves it). Void is always integral to things, and the site of the event, or "eventual site", is always "at the border-of-the-void".
- 8 Today, there is a gap between the knowledge developed by cognitive sciences about the sensory impact of geometries on our bodies still displays a gap and philosophy, especially with what could be considered as affect in Kacem's definition. With a project like Mark Goulthorpe's *Hyposurface*, which does not give a clear enough aesthetic reference to make

a judgement, cognitive sciences could be useful in understanding the impact of this surface on the body. Cognitive scientist Alain Berthoz shows how the forms of our living environment have an impact on how we move. Movement is inherent to forms, particularly to geometrical forms. He defines the sensitive impact of forms on our bodies as “sense of movement²².” It relates to the representation of the virtual movement of our bodies in space as well as real movement induced by forms. Berthoz also found, as described in his book *La décision*²³, that the sense of movement arises from the perception of form: drawing a triangle in space using an arm is connected to the same brain zone as seeing a triangle. The platonic structures Berthoz considers are not isomorphic to the bodily structure nor are they representations of the body, rather perceived as a schema of possible actions²⁴. There are numerous examples of experimentations made by avant-gardes on this play between geometrical forms and body image, which can be called kinetics. Bodily reference systems frame these links²⁵. Philosopher and architect Rudolf Steiner (1861-1925) and his circle of acquaintances represent the utopia of the avant-gardes, as well as their esotericism. In the Wagnerian inheritance of the concept of *Gesamtkunstwerk*, they developed experiments in dance, in particular on the relationship between platonic structure and the movement of the body. Steiner named this research “eurythmy”, and it later inspired Rudolf Laban’s dance theories and annotation technique. In regards to the number of experiments on the theme of movement in connection to triangular structures, my research has explored the fact that a triangulated surface was favourable to the “sense of movement”. Triangular forms have a link with our perception processes, in particular with mental image constitution processes in relation to our systems of bodily perception²⁶. This has been proved in research on rats, and there is strong evidence that it is also valid for humans. Triangulation has become a standard computer modeling tool because of its convenience for calculation, but it also corresponds to the types of geometrical mental images produced by humans which have pre-existed all types of representations, including computational design. Triangular surfaces are useful in modeling forms, and numerous computational design projects use the geometrical capacities of triangles. Research in cognitive science about the isomorphism of structure between body and geometry (through “empathy” according to Berthoz) is ongoing.

- 9 As with these examples from the past, development of complex geometries through new technologies could create affect and enable concept in the future, thus enabling innovation in the field of architecture. Berthoz’s research remains outside of any aesthetic reflection, but the philosophy of Deleuze and Guattari is, for example, a theoretical stepping stone towards aesthetics. For Deleuze and Guattari, “If there is a ‘primitive geometry’ (proto-geometry), it’s an operating geometry where figures are never separable from affections, as lines from their becoming, segments from segmentation²⁷.” They see “abstract machines²⁸” as “expressiveness-movement²⁹.” The complex machine is a “line of musicality, of picturality, of landscapeity, of faceity, of consciousness, passion³⁰.” Territory is “expressiveness of the rhythm³¹.” Some geometrical or topological experiments from avant-garde figures that transferred scientific knowledge or research into the arts are blurring this difference between simple bodily sensation and real affect linked to arts and aesthetics. For example, the applications of the Möbius strip, a discovery from 1858, are numerous and still inspire artists and architects today. It enables “shortcuts” between two sides of a surface. There is a coexistence between a topological experiment and the concept of reversing the inside and outside. Another less-known example, but one worth mentioning because of its

dynamic aspect, is: Paul Schatz's "*Umstülpung*" [fold-over] model. As it would reverse floors, walls and ceilings, it couldn't be easily applied in architecture. Sculptor and mathematician Paul Schatz (1898-1979), who settled down in the Dornach Goetheanum in 1927, invented structures in movement which were inspired by, or giving inspiration to Rudolf Steiner's theories. Certain experiments by Schatz exploring the link between shape and movement led to discoveries presented as useful today, such as Paul Schatz's oloid. His *Umstülpung* [fold-over] model is a reversible structure where inside becomes outside, a little bit like a reversed sock. It challenges our concept of architectural links between inside and outside and has been mainly presented as a curiosity up until today. But there is something conceptually important in the field of statuses of spaces (inside and outside) in relation to our bodily apprehension that is worth mentioning. Computational design methods could enhance, complexify and adapt these ideas to future projects.

The challenge to preserve critical thinking

- 10 Although the challenge of innovative thinking is to cross the boundary that has been defined between cognitive science and aesthetics, it has been blurred by computational design. By focusing on processes, tools, and their performative aspects in a development that can relate to natural processes, we tend to be disconnected from cultural and critical aspects. The positioning in this paper is that computational design needs to be discussed and considered in a critical way. This critical positioning is clearly inherited from the past, and criticality tends to be erased in the digital era. Manfredo Tafuri studied this shift in critical thinking and critical practice in numerous essays, such as his 1974 essay *L'architecture dans le boudoir: the language of criticism and the criticism of language*³². The passage from modernism to post-modernism raised similar questions. According to Antoine Picon,

"Tafuri early on perceived the importance of this turn and devoted an entire chapter of his 1973 book *Architecture and Utopia* to it. Contrary to cybernetic-oriented designers who generally attributed a natural origin to patterns, Tafuri saw computer-manipulated formal systems as 'artificial languages' preparing 'capital's complete domination over the universe of development'^{33, 34}" [There are] "dangers present in digitally-produced architecture with the temptation to focus on the satisfaction of the senses and the fulfilment of programs dictated by global capitalism without ever questioning their limitations. This allegedly realistic attitude, sometimes characterized as 'post-critical', has led many designers to relinquish political consciousness in order to fully embrace the conditions of their time. But can architecture live only in the present, oblivious of the past and indifferent to the promises of a different future? Can design survive deprived of memory and without the ambition to make the world a truly different place? The most pressing challenge awaiting digital architecture perhaps has to do with the need to overcome this attitude. The extended implications of sustainability already force designers to think in political and social terms again. Perhaps the time has come to reinvent memory and utopia, these forsaken architectural ideals³⁵."

- 11 An example shows the difficulty of the question: Through their radical autonomy³⁶, Some computer designed forms extremely disengage from the spatial and temporal context; but this criticality doesn't have the constructive aspect of real criticality as defined by Theodor Adorno or by Georg Lukács. In contrast, the global style for urban planning of

Patrick Schumacher seems to be non-critical, as it shows the whole context transformed by the same tools and creates a continuous landscape.

- 12 When engaging with the context in a way that may be carefully calculated and picking the adequate choice of parameters and algorithms, computational architecture can be critical. The contradictions between the submission to a global system as opposed to singular choices are in continuity with the historic contradictions in architecture, but are now more exacerbated due to the heightened complexity of computational tools. Antoine Picon stresses these remaining contradictions:

“In a world dominated by capitalism, the only way for architecture to escape the role of legitimization that was assigned to it by ruling powers was to be reflexive and critical. By the same token there was an implicit link between the computational and the critical perspectives. Such a link was not without contradictions, for the computational dimension in architecture pointed both at a purely performative attitude, like the one envisaged by Lyotard, and to its critical counterpart for which performance mattered less than reflexivity. How was one to reconcile these two seemingly irreconcilable objectives? Contemporary digital architecture is still confronted with this question³⁷.”

- 13 So, even with a computer resolved urbanism on the horizon, there still remain contradictions in real projects that create these critical aspects.

The example of New-territories' (R&Sie) work

- 14 New-territories is a French architectural practice which used to be called R&Sie. Francois Roche, Stephanie Lavaux and Jean Navarro are the primary architects, and the team varies depending on the project. Their work is mainly theoretical and has largely remained digital or only on paper, but, even so, there are a few projects that have been realised such as the *I'm lost in Paris* project in 2008, for which they had a retrospective called *eIlle Pr_FAIRE la FICTION* at Frac Centre in Orléans from 10/11/2016 to 26/03/2017. Of the projects spanning from 1993 until 2050(sic) presented during the exhibition, I've selected two that present a defined structure or structural development at the large scale. This large scale structural development is combined, or closely intertwined with small scale forms that seem to be natural expansions of matter. The first project is called *I've heard about*, from 2006-2009, 2012 and was done by the following team: Francois Roche, Stephanie Lavaux, Jean Navarro and Benoit Durandin. The second project is called *MMYST*, and was developed in 2015. Before analysing the first project, the manifesto of the architects is described as follows:

“I've heard about something that builds up only through multiple, heterogeneous and contradictory scenarios, something that rejects even the idea of a possible prediction about its form of growth or future typology. Something shapeless grafted onto existing tissue, something that needs no vanishing point to justify itself but instead welcomes a quivering existence immersed in a real-time vibratory state, here and now. Tangled, intertwined, it seems to be a city, or rather a fragment of a city. Its inhabitants are immunized because they are both vectors and protectors of this complexity. The multiplicity of its interwoven experiences and forms is matched by the apparent simplicity of its mechanisms. The urban form no longer depends on the arbitrary decisions or control over its emergence exercised by a few, but rather the ensemble of its individual contingencies. It simultaneously subsumes premises, consequences and the ensemble of induced perturbations, in a ceaseless interaction. Its laws are consubstantial with the place itself, with no work of memory. Many different stimuli have contributed to the emergence of *I've heard*

about, and they are continually reloaded. Its existence is inextricably linked to the end of the grand narratives, the objective recognition of climatic changes, a suspicion of all morality (even ecological), to the vibration of social phenomena and the urgent need to renew the democratic mechanisms. [...] Made of invaginations and knotted geometries, life forms are embedded within it. Its growth is artificial and synthetic, owing nothing to chaos and the formlessness of nature. It is based on very real processes that generate the raw materials and operating modes of its evolution. The public sphere is everywhere, like a pulsating organism driven by postulates that are mutually contradictory and nonetheless true [...]" (The whole text must be read on their website.)

- 15 The phenomena are induced by the ensemble of heterogeneous individual contingencies which can be contradictory. The growth is, according to the authors, not aligned with nature's formlessness. The principle of growth is thus similar. The way a bifurcation is defined in the structure is thus linked to the idea of emergence. We witness the nature-like phenomena of emergence in an artificial system. The question is then: would such an emergence rise if, as the authors state, no law or moral applies anymore to this community? The public sphere is everywhere, and thus nowhere. Public space and private space vanish, as well as, of course, their boundaries. So how can a membrane like the one we see on the renderings emerge? As an artistically-inclined, architectural manifesto, it is a valuable project because it raises these questions. Unlike a formless project that wouldn't have any aesthetic value, this project shows formal characteristics evolving in time that give it just that. This appreciation for the project is possible in only a Kantian perspective, that stays wide spread in aesthetic theory on the basis of a law. With law as the background of aesthetic judgement, it is highly probable that there is a law that serves as the background for the aesthetic development of this project by its authors. This law is maybe redefined implicitly in this manifesto. It seems that fluctuating norms (according to the functioning of the community) would coexist with a law that would enable aesthetic choices, especially in terms of structure and membranes.

- 16 The second project that shares the characteristic of clear structuring dynamics is called *MMYST*, developed in 2015 by Francois Roche, Vongsawat Wongkijjalard, and Benjamin Ennemoser.

MMYST is "An hybrid architecture (half for human and half for specific birds) on a tropical Land for only 10 years, corresponding to the time of the Pledges. As a backer, you can treat yourself to a stay in this architecture from one single night to a week per year during 10 years. This experimental 'ecosophical' and 'anthrosophical' lava emergence will be yours within this sharing, including the benefits of the breeding (bird nest soup). To make it possible, we involve architecture advanced technologies (for design and fabrication) with Robotics and Computation.

This experimental 'breeding-resort' with Swiftlets & Dwellers twisted together (a Human Shelter & an Artificial Bird Cave intertwined) is located in Krabi, middle of Thailand (see map pictures below)."

- 17 This project explicitly expresses a link between new technologies, parametric architecture and its application through robotics, and nature. In this case, animals are involved (birds), thus creating a continuous link between human, animal and vegetal realms. Similar reflections from the first project can be applied to this project in that there are aesthetic choices for the structure, but to a less important degree. The whole shape would relate more to a *mimesis* of nature (i.e. the hill behind), as the windows are quite classical and natural processes have precedence over creative phenomena that could occur from the functioning of the group of humans and birds. The space where

aesthetic choice occurs (even through new mechanisms of production and evolution of shapes) is vanishing with the practice of New-territories.

Mimesis of nature and disappearance of affect

- 18 When the development of computational design follows a linear and determined system of evolution or growth, it tends to merge with natural processes. The opposite would be a system based on chaotic functioning. With a computational system functioning guided by strict law, or its opposite of endless possibilities through the absence of any law, boundaries tend to disappear between human and nature. Homogeneity appears through repetition and order tends to prevail. The consequence is that boundaries between places of different aesthetic value and statuses, as defined by cultural and political functioning, are also disappearing. Thus, if we consider the requirements of psychoanalysis, the disappearance of boundaries in human society is a threat to human values. In the case of architecture, it is a threat to the expression of human freedom in an artistic way that creates affect. In Mehdi Belhaj Kacem's book, *Affect*³⁸, he analyses how two sets of pathologies are related to the absence of limits in two different ways: masochism and sadism. He describes the disappearance of affect in a system governed by law (sadism) and in a system governed by the absence of any law (masochism). By contrast, the possibility of affect and aesthetic judgement in architecture means that, with these two extremes, a distance is set. Affect can't exist in the case of masochism, where there is an absence of law. Pleasure is unreachable and, instead, an "Ultimate Good" is aimed to be reached. It is linked to the idea of virtual as "Universal Relation" or "Metaphysics of the Relation" (when any point in time and space has the same quality). Desire is considered as inconsistent, diffuse and infinite. In this case, the event is impossible. On the side relating to law and superego³⁹ otherwise known as sadism, sexual pleasure is repeated and reveals the impossibility of the event which stays only on the horizon. The real is inaccessible, as is the real of the "thing".
- 19 Freed from law, and referring to Alain Badiou's "matheme" as a necessary background concept, the possibility of affect is the possibility of an event and is thus presence itself. Mehdi Belhaj Kacem links it to considerations that anxiety and loss are main affects. The loss of loss is thus absence of affect. Far from the "Ultimate Good" and Law, the true affect can arise. Against the disappearance of aesthetic value in art and architecture, and against the disappearance of boundaries between public and private space, architecture is considered as the site of the event, or the "eventual site", "at the border-of-the-void". When architecture is excessively produced and controlled by technology, it loses its real presence and its aesthetic quality.

Preserving affect in preserving different statuses of space

- 20 Although in the animal realm there exist limits of territories with different functions, spaces of different statuses as well as public space and private space are a construct of human culture. Upholding these differences guarantees an experience of human culture and the creativity of a society against any tendency for homogenisation. The boundaries between spaces of different statuses can be mainly functional, but can easily have poetic characteristics. In architecture, the limits between inside and outside are considered places of creative expression, linked to affect and aesthetic value. In the history of

architecture, there are connections between the culture of the society and the links between inside and outside, public space and private space. The Art Nouveau style represents a key period of blurring the limits between inside and outside. New technologies of information are blurring the limits of the public and the private in our everyday lives and in the ways in which society and politics work. According to Beatriz Colomina, “modernity” is actually the publicity of the private. Modern architecture renegotiates the traditional relationship between public and private in a way that profoundly alters the experience of space. In her book *Privacy and publicity*⁴⁰, Colomina tracks this shift through the modern incarnations of the archive, the city, fashion, war, sexuality, advertising, the window, and the museum, finally concentrating on the domestic interior that constructs the modern subject. Innovations have followed the redefining of public and private fields. We must accept contemporary changes brought on by new technologies and new relationships between public and private, but, according to psychoanalysts, an excessive erasure of boundaries would be pathological for the functioning of our societies. Ever-changing boundaries can enhance freedom, but only an amoral freedom. Keeping the limits of private life enables each citizen to enjoy their liberty, while respecting the boundaries and limits set and discussed by the society. According to French philosopher Jacques Rancière, the debate of these limits defines contemporary political life. Each person should be able to discuss these boundaries and be able to play with them and act on them. New digital technologies enable designs of an unprecedented level of complexity. Through parametric methods and their technological realisation, an interaction with data coming from an individual, a group of people, or broader contexts becomes possible. The virtue of these technologies is an adaptation to changing needs, especially in the types of action and interaction we have with others in space. Without stopping the innovation processes around the plasticity of shapes of walls (and maybe also floors and ceilings) through parameters and algorithms, it is necessary to think about and control the design of these near future or utopian possibilities. The knowledge and experiences around permanence and adaptability of partitioning is the historical background of these innovations. The status of spaces and ways to maintain privacy (for example of an office space in an open plan project) have been researched extensively. We know how spatial characteristics affect human behaviour. A smart design for long-term, adequate partitioning has so far been the main aim of architecture. Even if there was a primary and a secondary structure that could evolve in a lapse of a few months or years, and even if there was a wall or furniture piece that could expand and retract according to their needs, the plasticity enabled by new technologies is now unprecedented. In a very short period of time (seconds), the transformations of partitioning in laboratory prototypes has enabled new characteristics that must be taken into account. For example, Omar Khan’s project *Design Innovation Garage* in Buffalo, NY⁴¹, is a design innovation centre modelled on open source concepts, using multiple communications options between black boxes including secure information networks, projections, visual reflections, opacities and transparencies, occupant conversations, overhearing and glancing.

Fig. 1: Omar Khan, *Design Innovation Garage*, Buffalo, NY

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- 21 Another tendency that must also be considered is that, according to Richard Sennett, capitalist society enhances the desire for persons and families to protect themselves behind the sealed boundaries of private place. He studied how, at the scale of the city, the intense and ever-changing transformations of society created a collection of enclosed family units and, with the decline of family values, a disparate and conflictual collection of individuals. As the city becomes a mosaic of individuals or micro-communities, public life and public space (as Jürgen Habermas made the link between these two concepts) no longer exist. The result in terms of living environment is neutral and sterile characteristics⁴². The rising speed of transportation makes this crisis of space even more acute. In a constructive positioning, Sennett develops concepts that can be guidelines for new working organisations under capitalism, such as “concentration without centralization”. On the basis of the concept of a working unit without centralised decision-makers, designers could propose new flexible boundaries of workplaces, for example.
- 22 On the basis of these two paradoxical movements (the publicity of the private, mostly developed through social media, and the withdrawal of the private self in a protection process), architectural disciplines need to reflect on fluctuating boundaries in order to create adequate flexible proposals for the future.
- 23 The creative play on the limits between public and private can only happen if we maintain these two ends of the spectrum. Maintaining public space is especially challenging, because it is a collective expression and thus political. Creativity and events enabled in public space are expressions of a society’s culture. If public space is over controlled due to functionalities, such as crowd circulation or because of its economic value, we lose the collective creative aspect and thus the possibility for an “event”. Control can easily be heightened through the use of electronic based logistics, and stimulated, if not caused by, the increasing ability to use them. While security and efficiency can be managed at a distance through cameras. However, public space is a space where no private person is controlling space, nor is a present physical person nor a distant person behind a screen. The public institution (State, city council) “owns” the

territory, but the public as a “we” auto-regulates itself in this space⁴³ while respecting common law. Repression can occur only when common law is not respected. Public space can be a space of expression of personal desires and affects that can be shared by a group and then lead to common expressions of desires and affects (cultural events, demonstrations, etc.)⁴⁴. In the case that some rules are excessive, then the “we” is being too much controlled by the institution that needs to be personified as the ruler. For example, if a part of public space is set in discontinuity of the main public space, and thus under the visual control of a private office building or a private residence, then it loses its public status. The challenge to keep public space protected from the influence of the private sector, and from the influence of an institution that would act like a private manager, is important.

- 24 From the opposite perspective, but keeping the same logic of different gradients of statuses of space, it is necessary to keep the other end of the spectrum: private space. Private space is a place of freedom from the control of the society and the primary place of expression of affects. There is a tendency to see private space disappear because personal behaviours and affects can be used as economic value. Through the presence of technology in interiors, data can be collected on our behaviours in private space. Of course, *Facebook* is a symbol of the way we share affects and behaviours with the public. The autoregulation of private space relies on a different set of dynamics, linked to a small community of people or an individual who, themselves, self-regulate, but these dynamics can't occur properly if they are under the gaze of the public sphere. The requirement to maintain the two ends of the public/private spectrum are a guarantee that the gradients between spaces of different statuses will remain.

Possibility of collective creativity

- 25 On the combined bases of:

- the possibilities for computational technologies to take into account a considerable amount of input data and parameters, and
- the key sociological aspect of boundaries between public and private space, and
- the political needs of community run practices in architecture and urban planning,

computational design could appear as both a threat and an unprecedented tool used for collective practice. As critical thinking in architecture is discussed in this article, the article itself can be seen as a critique on innovation possibilities in collective practice based on computational design tools. There is no doubt that creative architectural design could be developed using computational tools – the artistic value would be developed by the author – but what computational tools enable which creates a shift from traditional practice is the input by multiple participants. Is the addition of individual input capable of collective creativity?

- 26 The scale of community, small or big, is especially interesting to investigate in terms of transfers or sharing of power and decision making. Through the multiplicity of parameters and algorithms, power can be shared at different levels: between the ruler and a community, or between a community and an individual person⁴⁵. The use of these technologies by a community of people, with tensions being inherent to their functioning, could consequently result in the emergence of a creative configuration of the system. As the technological environment tends to mimic natural processes, collective

creativity could emerge on the model of “emergence” in the animal realm (Swarm Systems, Ant Colony, Termites Cathedrals, Slime-Mold Aggregation).

“Emergence is a concept that appears in the literature of many disciplines, and is strongly correlated to evolutionary biology, artificial intelligence, complexity theory, cybernetics and general systems theory. It is a word that is increasingly common in architectural discourse, where too often it is used to conjure complexity but without the attendant concepts and mathematical instruments of science. In the simplest commonly used definition, emergence is said to be the properties of a system that cannot be deduced from its components, something more than the sum of its parts.”

- 27 The theory of emergence posits that sometimes nature “jumps” from one state to another in sudden and unpredictable ways. This is something that modern science can neither anticipate nor account for⁴⁶. In architecture up until today, we could symbolically represent this phenomenon in architectural forms rather than witness it as something real. Charles Jencks⁴⁷ states that we can only create a presentation of emergence.

“In short, they do not pursue formlessness but emergent form, the matter emerging from matter. The intention may be the desire to get closer to the reality behind nature, the generative qualities behind both living and dead matter, that is, once again, the cosmogenic process which complexity theory has recently tried to explain. Representing emergence and creativity per se cannot be done, but it can be presented by an architecture that is as fresh and unlikely as one finds here.”

- 28 It is a utopian idea to imagine the emergence of singular events in architecture, but if René Thom is not contradicted, it is theoretically feasible through the level of complexity achieved by computational tools.

“René Thom affirmed an adequate relationship between mathematics and nature, a dynamic understanding of morphogenesis, where non-standard analysis was the tool, through the integration of infinite in the numbers to define the singularization of a form or a motive. The singularity, conceived as a bifurcation along the progression of an algorithm, opened the way to a full description of the physical world, to the full discretisation of reality. This qualitative science of interaction between attractors that define relations between differential varieties which was descriptive of physical manifestation became a tool of simulation applied in physics or in biology and extensively to ecological systems. Here again one finds the schematism of the continuous, which René Thom uses as a tool for interpreting mutations of life, those of embryogenesis, translating them geometrically as “salience” or “pregnancy”, a return to the relationship of the objectile and the subjectile, demonstrative of the movement to “singularization” and ‘individuation’^{48, 49}”

- 29 If this evolution is possible in nature, the hypothesis is that, with the level of data and complexity enabled by computers, it is also possible in artificial objects. What is possible today to demonstrate in laboratory experiences could become possible in displaying creative events in the functioning of computationally designed panels in the future. The possibility for architectural and living environments based on the theory of emergence that enables creative collective practice will remain utopian if it stays at a theoretical level.
- 30 If and when it is possible, it is necessary to set a frame to this practice in terms of rules or a priori concepts. Mehdi Belhaj Kacem defines Alain Badiou’s “matheme” as a priori principle for the existence of affects. Jacques Rancière mentions “common law” as a priori principle for the existence of events in public space. Without being conservative by setting up strict laws (which, as we saw, wouldn’t enable affect in architecture), the

background *a priori* principles are a guarantee of the possibility for creative practice. The fluctuation of the norms of computational architecture could function efficiently on this basis as a second layer of parameters and algorithms that would have affect at the scale of a community.

A model : measured “common law” as possibility of affect, superimposed with local fluctuating norms

- 31 On the functional level of a society or community of people, computational design could enable an adaptation of boundaries to a changing context and to changing needs. Instead of becoming obsolete, boundaries between spaces of different statuses could be adaptable in time. Forms vary, and parameters ensure a variability that is coherent with the aspirations of the society (especially in regards to permeability of boundaries between public and private space). Through the modelling of social norms into a multiple and finite number of parameters that are manageable and controllable by a community, the system can integrate tensions inherent to the functioning of the community. If we consider the statuses of places, the tensions in computational systems can relate to tensions inherent to public space in the definition given by Jacques Rancière⁵⁰. These tensions in computational systems (in relation to the political aspect of the above-mentioned tensions inherent to the functioning of the community) could find an expression in materialised architectural features that create affect and concept. The fluctuation of the norm that replaces the law could enable a dynamic of architectural features that would be in dialogue with dynamics and tensions of public space. Although the aspect of the loss of law initially seems threatening, it can actually serve at the scale of the community and even better the cause defended by Rancière. Fluctuating boundaries, in a measured way, could propose an adequate response to the political question of the statuses of places. Because the question of public space, private space and the transitions between public and private space are political questions, computational design can reactivate these debates. Computational tools can, for example, bring innovation into the conception of short-circuits between public and private space. The use of smart phones and social media are the wide-spread examples and symbols of this tendency to merge public and private life. If both radical autonomy of a computational system from the context or radical continuity with the context do not prevail as extremes and are kept at a distance, there are possibilities for computational design to develop new adequate functional and aesthetic architectural projects. These new thinking tools would enable the definition of new objective qualities (after the disappearance of classical objects for prevalence of surfaces and patterns), and a new resolution of tensions between objective qualities through momentary optima, materialized in the innovative configuration of computational systems. The way the gradients between spaces of different statuses remain and evolve through time creates the conditions for a wide range of experimentations. Computationally designed architectural elements could be an important factor for the redefinition or reinvention of boundaries between public and private space. Criticized (usually adequately) for creating either an architecture that is totally in continuity with the context, or, on the other side, a totally autonomous object, computational design can be a tool that would enable subtle, site-specific approaches. By choosing precise suitable parameters and algorithms, specificity could be explored in an unprecedented way. It would allow control to be maintained at the scale of a community and not let the ruler control a vast territory in its totality. The relative autonomy of the scale

of the community can be maintained without creating a radically closed system. Architecture linked with natural processes would create the possibility for the former to be in relative interaction with the context, like a plant in its environment. The new negotiation of spatial boundaries should be discussed and accepted by the group on the long term (to match structuring affects of habits) or in a short timeframe⁵¹. The plasticity of boundaries also raises ethical questions about who can act and how one can act on these transformations and control them. Parameters related to the “common law” of public space, and the “common law” for private space could be a frame for the possibility of events and creativity. Defining fixed parameters or algorithms that would define “common law” is, of course, a utopian project, but a draft of this “common law” that would be translated into a parameters and modelling is foreseeable. The possibility of events due to a “light control” of the system through common law could coexist with functioning and control of the system at the scale of the community. If a community is controlling the system, this collective intelligence would make this structure evolve in time. In the best-case scenario, through the phenomena of emergence described by René Thom and appropriated by designers like New territories (ex R&Sie), collective creative events could happen within the architectural framework. A singularity as event would happen at one point, and then disappear again before the next one arises. Thus, adapting the building to accidents and catastrophes can be imagined either on its surfaces, or maybe even at the larger scale of the structure (auto-fixing structure after an earthquake, or a movable structure that would occupy a more habitable place). The buildings and inhabitations would gain a relative autonomy from the control of the market. Through this relative autonomy of the system in space and time, politics could be in the making on a continuous basis.

- 32 The possibilities of computer calculation to set up a system that could achieve artistic collective action is still in debate today. Meanwhile, these possibilities of calculation enable a draft for this model (collective input and control at the scale of the community, relative autonomy from outside on the base of respect of “common law”). The utopian aspect of the theory of emergence applied to the artificial world of architecture displays real potentialities for the future, even if collective artistic creation is not achieved *per se*. Antoine Picon summons us not to forget memory and utopia if we want to build a better place for the future. Today, considering the capabilities of calculation of computers in a way that tends to this utopia could effectively create these better places of political community practice where “law” and “Ultimate Good” wouldn’t set the rules that govern our living environment. The collective body would be able to evolve in an environment that enhances events, affects and singular evolutions in time. It is a challenge for the architectural profession to develop constructive and progressive critical thinking on computational design.

BIBLIOGRAPHY

Achim Menges, Sean Ahlquist, *Computational design thinking*, Chichester, Wiley, 2011.

- Alain Berthoz, *La décision*, Paris, Odile Jacob, 2003.
- Alain Berthoz, *Le sens du mouvement*, Paris, Odile Jacob, 1997.
- Antoine Picon, *Digital Culture in Architecture: an Introduction for the Design Profession*, Basel, Birkhäuser, 2010.
- Beatriz Colomina, *Privacy and publicity – Modern architecture as mass media*, Cambridge, London, The MIT Press, 1994.
- Bernard Cache, *Terre meuble*, Orléans, HYX, 1997.
- Christopher Hight, Chris Perry, “Introduction to Collective Intelligence”, *Design AD*, Sept.-Oct. 2006.
- Frédéric Lordon, *La société des affects. Pour un structuralisme des passions*, Paris, Seuil, 2013.
- Frédéric Migayrou, “The Order of the Non-Standard: Towards a Critical Structuralism”, Rivka & Robert Oxman (eds), *Theories of the Digital in Architecture*, London, Routledge, 2014.
- Gilles Deleuze, Frédéric Guattari, *Capitalisme et Schizophrénie 2 : Mille plateaux*, Paris, Les éditions de Minuit, 1980.
- Gilles Deleuze, *Nietzsche et la philosophie*, Paris, PUF, 1973.
- Hannah Arendt, *The human condition*, Chicago, University of Chicago Press, 1958.
- Hank Haesler, *Chromatophoric Architecture: Designing for 3D Media Facades*, Berlin, Jovis, 2010.
- Jacques Rancière, *La Haine de la démocratie*, Paris, La Fabrique, 2005.
- Jacques Rancière, « Dix Thèses Sur La Politique », in *Aux bords du politique*, Paris, Gallimard, 1998.
- Jacques Rancière, *Aisthesis, Scènes du régime esthétique de l'art*, Paris, Galilée, 2011.
- K. Dovey, *Framing Places*, London, Routledge, 2008.
- Manfredo Tafuri, “L’architecture dans le boudoir : the language of criticism and the criticism of language”, Michael Hays (ed.), *Architecture Theory Since 1968*, Cambridge, London, MIT Press, 2000.
- Manfredo tafuri, *Architecture and Utopia : Design and capitalist development*, Cambridge, MIT Press, 1976.
- Mario Carpo, “Introduction Twenty Years of Digital Design”, *Digital Turn in Architecture 1992-2012*, Chichester, Wiley, 2013.
- Mehdi Belhaj Kacem, *L’affect*, Auch, Tristram, 2007.
- Meredith Michael et al. (eds.), *From Control to Design : Parametric/Algorithmic Architecture*, Barcelona, Actar, 2008.
- Neil Leach, “Parametrics Explained”, Neil Leach, Philip F. Yuan (eds.), *Scripting the Future*, Shanghai, Tongji UP, 2012.
- Nicholas Negroponte, *Being digital*, New York, Alfred A. Knopf, 1995.
- Omar Khan, “Black Boxes : glimpses at an autopoietic architecture”, Pablo Lorenzo-Eiroa, Aaron Sprecher (eds.), *Architecture in formation : on the nature of Information in digital architecture*, London, Taylor & Francis, 2013, pp. 124-129
- Pablo Lorenzo-Eiroa , “Form:in:form on the rlationship between digital signifiers and formal autonomy”, (Pablo Lorenzo-Eiroa ; Aaron Sprecher ed.), *Architecture in formation : on the nature of Information in digital architecture*, London, Taylor & Francis, 2013, pp. 11-21.

René Thom, « Saillance et prégnance », *Esquisse d'une sémiophysique*, Paris, Interditions, 1988, pp. 16-34.

Richard Sennett, *The corrosion of character. The personal consequences of work in the new capitalism*, New York, W. W. Norton & Company, 1998.

Richard Sennett, *The Fall of Public Man*, New York, Knopf, 1977.

Richard Sennett, *The Conscience of the Eye: The Design and Social Life of Cities*, New York, Norton, 1992.

William Mitchell, "A New Agenda for Computer-Aided Design", Achim Menges (ed.), *Computational Design Thinking*, Chichester, Wiley, 2011, pp. 86-93.

Zygmunt Bauman, *Postmodern Ethics*, Oxford, Blackwell, 1993.

NOTES

1. Antoine Picon, *Digital Culture in Architecture : an Introduction for the Design Profession*, Basel, Birkhäuser, 2010.
 2. Interview with Hank Haeusler, head of Computational design course, UNSW Sydney, April 2017.
 3. Migayrou, Frédéric, "The Order of the Non-Standard : Towards a Critical Structuralism," Rivka & Robert Oxman (eds.), *Theories of the Digital in Architecture*, London, Routledge, 2014, pp. 17-34.
 4. Pablo Lorenzo-Eiroa, "Form:in:form on the relationship between digital signifiers and formal autonomy", (Pablo Lorenzo-Eiroa; Aaron Sprecher ed.), *Architecture in formation: on the nature of Information in digital architecture*, London, Taylor & Francis, 2013, pp. 11-21. See especially the paragraph on: "A New Structuralism as a Continuity from Post-Structuralism".
 5. Meredith Michael et al (eds.), *From Control to Design : Parametric/Algorithmic Architecture*, Barcelona, Actar, 2008.
 6. Malcolm McCullough, « Scripting » (2006), Mario Carpo (dir.), *Digital Turn in Architecture 1992-2012*, Chichester, Wiley, 2013, p. 182.
 7. Nicholas Negroponte, *Being digital*, New York, Alfred A. Knopf, 1995. "For instance, to what extent is the contemporary digital tidal wave different from what happened before? In his 1995 essay, being digital, Nicholas Negroponte, the founder of the MIT Media Lab, opposed the age of information to the digital era. According to him, the first was about anonymous mass consumption, whereas the second gave precedence to individual preference." Antoine Picon, *Digital Culture in Architecture: an Introduction for the Design Profession*, Basel, Birkhäuser, 2010, p. 9.
 8. William Mitchell, "A New Agenda for Computer-Aided Design", Achim Menges (ed.), *Computational Design Thinking*, London, Wiley, 2011, pp.86-93. Neil Leach, "Parametrics Explained", Neil Leach, Philip F. Yuan (eds.), *Scripting the Future*, Shanghai, Tongji UP, 2012.
 9. Interview with Hank Haeusler, head of Computational design course, UNSW Sydney, April 2017.
 10. Interview with Hank Haeusler, head of Computational design course, UNSW Sydney, April 2017.
- William Mitchell, "A New Agenda for Computer-Aided Design", Achim Menges (ed.), *Computational Design Thinking*, London, Wiley, 2011, pp. 86-93.
- Neil Leach, "Parametrics Explained", Neil Leach, Philip F. Yuan (eds.), *Scripting the Future*, Shanghai, Tongji UP, 2012.

11. Hank Haeusler, *Chromatophoric Architecture: Designing for 3D Media Facades*, Berlin, Jovis, 2010.
12. Interview with Hank Haeusler, head of Computational design course, UNSW Sydney, April 2017.
13. « Versioning », Jo Ann Asher Thompson, Nancy Blossom (eds.), *The Handbook of Interior Design*, London, Wiley, 2015, p. 22.
14. Antoine Picon, *Digital Culture in Architecture: an Introduction for the Design Profession*, Basel, Birkhäuser, 2010, pp. 9-10.
15. Antoine Picon, *Digital Culture in Architecture : an Introduction for the Design Profession*, Basel, Birkhäuser, 2010, p. 11. Neil Leach, "Swarm tectonics", Neil Leach, David Turnbull, Chris Williams (eds.), *Digital tectonics*, London, Wiley-Academy, 2004, pp. 70-77. Cecil Balmond, *Informal*, Munich, Prestel, 2002.
16. Frédéric Migayrou, "The Order of the Non-Standard: Towards a Critical Structuralism", Rivka & Robert Oxman (eds), *Theories of the Digital in Architecture*, London, Routledge, 2014, p. 22.
17. Frédéric Migayrou, "The Order of the Non-Standard : Towards a Critical Structuralism", Rivka & Robert Oxman (eds), *Theories of the Digital in Architecture*, London, Routledge, 2014, p. 22.
18. Interview with Hank Haeusler, head of Computational design course, UNSW Sydney, April 2017.
19. Jacques Rancière, *Aisthesis, Scènes du régime esthétique de l'art*, Paris, Galilée, 2011.
20. Mehdi Belhaj Kacem, *L'affect*, Auch, Tristram, 2007.
21. In French : « virtuel comme écart fondateur de la présentation et de la représentation » ; « ce qui choit du forçage de la représentation dans la présentation ». Mehdi Belhaj Kacem, *L'affect*, Auch, Tristram, 2007, p. 179.
22. Alain Berthoz, *Le sens du mouvement*, Paris, Odile Jacob, 1997.
23. Alain Berthoz, *La décision*, Paris, Odile Jacob, 2003, p. 316.
24. Alain Berthoz, *Le sens du mouvement*, Paris, Odile Jacob, 1997, p. 247.
25. Alain Berthoz, *Idem*, p. 246.
26. At the date of publication of the article, the scientific proof had been made on rats, and the application to humans was a plausible hypothesis. Laurence Kimmel, « Le terminal portuaire de Yokohama par Foreign Office Architects à la lumière des sciences cognitives. Rappels historiques sur la danse et le lien à la structure triangulée chez Rudolf Steiner et Rudolf Laban » [The ferry terminal of Yokohama by Foreign Office Architects, in relation to cognitive sciences. Historical remarks on dance and its link to triangular structure in Rudolf Steiner and Rudolf Laban's works], Xavier Bonnaud, Chris Younes (ed.), *Architecture Perception Urbain*, Gollion, InFolio, 2014.
27. This geometry is in opposition with the State's geometry (from the Roman Empire, in reference to Paul Virilio). Gilles Deleuze, Félix Guattari, *Capitalisme et schizophrénie 2 – Mille plateaux*, Paris, Les éditions de Minuit, 1980, p. 258.
28. Gilles Deleuze, Félix Guattari, *Idem*, p. 636.
29. In the chapter « La géologie de la morale » [genealogy of moral], they also use a name linked with the idea of movement : « danse muette » [a mute dance]. Gilles Deleuze, Félix Guattari, *Idem*, p. 89.
30. Gilles Deleuze, Félix Guattari, *Idem*, p. 226.
31. In French : « Il [le territoire] est essentiellement marqué, par des « indices », et ces indices sont empruntés à des composantes de tous les milieux : des matériaux, des produits organiques, des états de membrane ou de peau, des sources d'énergie, des condensés perception-action. Précisément, il y a territoire dès que des composantes de milieux cessent d'être directionnelles pour devenir dimensionnelles, quand elles cessent d'être fonctionnelles pour devenir expressives. Il y a territoire dès qu'il y a expressivité du rythme. C'est l'émergence de matières

d'expression (qualités) qui va définir le territoire.» Gilles Deleuze, Félix Guattari, Idem, pp. 386-387

32. Manfredo Tafuri, "L'architecture dans le boudoir : the language of criticism and the criticism of language", Michael Hays (ed.), *Architecture Theory Since 1968*, Cambridge, London, MIT Press, 2000.

33. Manfredo Tafuri, *Architecture and Utopia : Design and capitalist development*, Cambridge, MIT Press, 1976, p. 152. Tafuri's analysis of the growing importance taken by 'artificial languages' in architecture was initially published in a 1969 issue of the journal *Contropiano*.

34. Antoine Picon, *Digital Culture in Architecture: an Introduction for the Design Profession*, Basel, Birkhäuser, 2010, p. 46.

35. Antoine Picon, Idem, p. 14.

36. Antoine Picon on autonomy and criticality : "A feature many of these researches and experiments shared was the emphasis put on the autonomy of the architectural discipline. Formalism met on that ground with the provocative experiments of radical architecture. In the eyes of many of its major proponents, from Italy to the United States, autonomy went with an ideal of criticality." » Antoine Picon, *Digital Culture in Architecture : an Introduction for the Design Profession*, Basel, Birkhäuser, 2010, p. 47.

37. Antoine Picon, Idem, p. 47.

38. Mehdi Belhaj Kacem, *L'affect*, Auch, Tristram, 2007.

39. Mehdi Belhaj Kacem, Idem, p. 184.

40. Beatriz Colomina, *Privacy and publicity – Modern architecture as mass media*, Cambridge, London, The MIT Press, 1994.

41. Omar Khan, "Black Boxes : glimpses at an autopoietic architecture", Pablo Lorenzo-Eiroa, Aaron Sprecher (eds.), *Architecture in formation : on the nature of Information in digital architecture*, London, Taylor & Francis, 2013, pp. 124-129.

42. Richard Sennett, *The Conscience of the Eye : The Design and Social Life of Cities*, New York, Norton, 1992.

43. Jacques Rancière, « Dix Thèses Sur La Politique », *Aux bords du politique*, Paris, Gallimard, 1998.

44. Hannah Arendt, *The human condition*, Chicago, University of Chicago Press, 1958.

Frédéric Lordon, *La société des affects – Pour un structuralisme des passions*, Paris, Seuil, 2013.

45. Christopher Hight, Chris Perry, "Introduction to Collective Intelligence", *Design AD*, September– October 2006.

46. Mario Carpo, "Introduction Twenty Years of Digital Design", *Digital Turn in Architecture 1992-2012*, Chichester, Wiley, 2013, p. 11.

47. Charles Jencks, « Landform Architecture : Emergent in the Nineties », *New Science = New Architecture*, AD Profile 129, AD 67, September– October 1997, pp. 15– 31.

48. René Thom, « Saillance et prégnance », *Esquisse d'une sémiophysique*, Paris, Interéditions, 1988, pp. 16-34.

49. Frédéric Migayrou, "The Order of the Non-Standard : Towards a Critical Structuralism", Rivka & Robert Oxman (eds.), *Theories of the Digital in Architecture*, London, Routledge, 2014, p. 19.

50. Jacques Rancière, *La Haine de la démocratie*, Paris, La Fabrique, 2005.

51. These transformations question our capabilities of adaptation, as a person and as a group or community. Let us not forget that habits have structuring effects that are important for individuals and groups. Richard Sennett, *The corrosion of character – The personal consequences of work in the new capitalism*, New York, W. W. Norton & Company, 1998.

ABSTRACTS

La conception par ordinateur permet de créer des surfaces transformatives complexes qui tendent à gommer les limites entre espaces de différents statuts. Cet article porte sur les possibilités de développer une pratique artistique et critique de la conception par ordinateur, permettant ainsi l'émergence d'événements dans le système en transformation, et donc de l'« affect ». La possibilité de jouer sur les limites entre espaces de différents statuts nécessite de maintenir les notions d'espace public et d'espace privé (les technologies et leurs capacités à connecter tout espace dans un même réseau économique tend à effacer ces différences) de manière à permettre un entrelacement créatif de ces derniers. La possibilité de transformer ces limites pose la question de l'entité légitime pour contrôler cette évolution. En maintenant une distance avec les extrêmes que sont la liberté totale tendant vers un soi-disant 'Bien ultime' d'un côté, et une liberté niée par une « loi » excessive de l'autre côté, l'article présente des manières dont une communauté pourrait reprendre le contrôle de son environnement grâce aux nouvelles technologies, tant qu'une « loi commune » pour la vie publique est respectée. La manière dont les paramètres et algorithmes pourraient être ajustés afin de fonctionner selon ce modèle est utopique mais théoriquement faisable dans le futur selon les théories de l'« émergence ». Le maintien de la possibilité d'événements et de singularités créatives dans le système maintient un espace pour la pensée critique en architecture, prenant en compte la mémoire et la volonté d'un futur meilleur.

Computational design technologies enable the shaping of complex transformative surfaces that tend to blur the limits between spaces of different statuses. This article focuses on the possibility of developing artistic and critical practices of computational design: enabling “event” in the evolving architectural system, thus creating “affect”. The possibility to play on boundaries within spaces of different statuses necessitates maintaining the notions of public and private space (as these differences tend to be erased by technologies and their capabilities to connect all space in the same economic network) in order to enable creative intertwining. The possibility of transforming boundaries raises the question of what and who controls them. By keeping a distance between the extremes of total freedom and reaching a so-called “ultimate good” on the one side and of restricted freedom through excessive “law” on the other, the article presents ways for communities to regain control of their environment through new technologies, as long as “common law” of public life is respected. The way parameters and algorithms could be set to function in this model is utopian, although, according to theories of “emergence”, theoretically feasible in the future. Safeguarding the possibility of events and creative singularities in the system upholds a space for critical thinking in architecture that takes into account memory and the will for a better future.

INDEX

Mots-clés: critique architecturale, architecture numérique, processus de conception, processus participatifs, qualification de l'espace, espace public

Keywords: architectural critique, computational architecture, design process, participative processes, status of space, public space

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