Space-non-Space and the Role of Computational Design

Mahnaz Shah
Cardiff School of Art and Design, Cardiff Metropolitan University, Wales, United Kingdom
http://cardiff-school-of-art-and-design.org
mshah@cardiffmet.ac.uk

Abstract. This paper questions the context and meaning of space or the ‘spatial’ within the current architectural and urban rhetoric as suggested by Vidler (2011) in his essay Transparency and Utopia: Constructing the void from Pascal to Foucault. As a case in point this paper further introduces the context of ‘non-space’ as supposedly introduced by Le Corbusier in his Potato Building typology studies conducted during the early 1960s. In both the above instances the concept of ‘enlightenment space’ or a geometrical, rational gridded and above all transparent space is contrived and skewed to accommodate alternate determinates – space in this instance, according to Vidler; no longer operates as an instrument of monumental construction but rather as an agent of monumental dissolution. Given the above definition, the paper critically evaluates the role of computational design within this spatial decomposition.

Keywords. Spatial; non-space; geometry; computational design; architectural constructs.

INTRODUCTION
This paper questions the context and meaning of space or the ‘spatial’ within the current architectural and urban rhetoric as suggested by Vidler (2011) in his essay Transparency and Utopia: Constructing the void from Pascal to Foucault. As a case in point this paper further introduces the context of ‘non-space’ as supposedly introduced by Le Corbusier in his Potato Building typology studies conducted during the early 1960s (see Acknowledgments). In both the above instances the concept of ‘enlightenment space’ or a geometrical, rational gridded and above all transparent space is contrived and skewed to accommodate alternate determinates – space in this instance, according to Vidler; no longer operates as an instrument of monumental construction but rather as an agent of monumental dissolution. Given the above definition, the paper critically evaluates the role of computational design within this spatial decomposition.

For the sake of clarity, the paper is divided into four main sections. The first section will attempt an expanded discussion of the relationship of space and non-space and geometry as it seems that geometry has become the de facto design representation in digital design through the dominance of geometric focused digital tools whereas space is difficult to capture in descriptive geometric terms.

The second section will provide a critical evaluation of Vidler’s definition of the spatial within architectural and urban context. The third section further specifies this urban and architectural context within the proposed typology as introduced by Le Corbusier during the early 1960s. The final section hopes to then re-contextualize the above analogy within the computational design research and its applicability or rather feasibility as a possible alternate mode of architectural and urban design perception.
SPACE-NON-SPACE AND GEOMETRY

In a sense the exercise of defining the concept of the ‘spatial’ and thereafter ‘non-space’ borders around the famous paradox in Plato’s Meno; in which the protagonist asks Socrates how it is ever possible to attain new knowledge [in my case non-space]... If you know what you are looking for, he suggests, it will not really be new to you if you find it [space]. But if you don’t know what you are looking for, if you can’t put forth something definite as the subject of inquiry, you will have absolutely no way of ever knowing that you have found it, and the search will never terminate (Mitchell, 2011).

I may argue that the research in the current context can be a case of identifying ‘relative space’ within the realm of ‘absolute space’. However that does not seem to justify the inherent flux within non-space that I would like to analyse and determine. Maudlin (2012) in his excellent treatise on the Philosophy of Physics, defines both absolute and relative space within the context of ‘absolute’ time.

In this paper I hope to elucidate the concept of non-space through the definition put forward by Maudlin to identify this element of absolute time: Absolute, true, and mathematical time of itself, and from its own nature, flows equably without relation to anything external, and by another name is called duration: relative, apparent, and common time, is some sensible and external (whether accurate or unequal) measure of duration by the means of motion, which is commonly used instead of true time; such as an hour, a day, a month, a year.

The above definition within the context of geometry can initially be translated as ‘trans-temporal’ geometry, i.e., geometrical structure among events at different times. According to Maudlin; for Newton, this trans-temporal structure was secured by the persistence of points of absolute space in time. This space-time construct thereby introduces a topology along with an affine or inertial structure. Within this construct, absolute time is made up of instants or moments, each of which contains infinitely many events that happen simultaneously. (Maudlin, 2012)

The distinguishing characteristic of non-space then it can be argued, is its focus on dynamic processes within the structural contents rather than on the physical form itself - in a sense it then places geometry beyond the object and hence the spatial constructs.

**Geometry and the spatial constructs**

In the Critique of Pure Reason 1781, Kant argues that the mind possess, independently of experience, the forms of space and time. He refers to these forms as ‘intuition, suggesting that the intellect does not so much discover laws from nature as impose its laws on nature. His analysis of knowledge from sensible intuition led to a distinction between what he termed the matter and the form of sense-intuition. Objects affecting sense give the matter if sensible intuition but these objects also appear to be ordered in definite relationships: the form of sense-intuition. This form is not grounded in sensation; it is what he calls ‘pure intuition’. Thereby, space and time are not actual things, but are what make existence possible for spacio-temporal [constructs] things. Things presuppose space and time, nor are space and time mere relationships between things, for spatial and temporal relationships exist only where space and time are presupposed. Kant in this instance, over-turns both Newton’s theory of absolute space and Leibniz’s theory of space and time based on the relationship between things. But while space and time are, in Kant’s constructions, the foundation which makes it possible for a world of senses to be, mathematics (based on ‘pure intuition’) remains the basis of its assessment. Kant wrote; Geometry is a science which determines the properties of space synthetically yet a priori (Bury, 2011).

Bury further argues that objects and systems from the Kantian viewpoint, are not so much constructed by use of geometry; geometry is the necessary intuitive context in which objects and systems can be conceived. If that is indeed the case, then the role of architecture is of dual nature, and hence its applicability and presence in both the spatial and the non-space.

In Architecture after Geometry, Davidson and
Bates (1997) had postulated that geometry’s role has been to provide the armature of substantiation for architecture, but by a profound circumstance to do so within two broad domains. Architecture’s desire for geometry is for substantiation by both a material and sensory discourse, and at the same time by an abstract and cognitive formation. In the first instance geometry provides the measure and image of a sensate world. For the second instance, geometry is the conceptual ordering which affirms its relevance in spite of the sensory world, as it locates and makes plausible the paradoxes of mathematics through the relation of line to number. In Lines of Thoughts Lacour (1996) details the success of Descartes in achieving this paradoxical linkage: Descartes first and most conspicuous contribution to modernization of mathematics in the Géométrie was his resolution of the problem dating from the Pythagoreans of Greek mathematics conceived of numbers as natural or rational integers, discrete units whose relations to one another in analogous ratio was thought to express the spatial proportion of the natural world. The physical world was viewed on the model of geometrical forms, and the discovery that the relationships of magnitudes of two commonplace line segments given in geometry - the side and the diagonal of a square - could not be expressed in a ratio of integers, no matter how small the unit of measure applied, contradicted the ancient tenet of the numerical order of nature, setting off a mathematical and philosophical crises of an order matched in modern times by the development of non-Euclidean geometry, or by the methodological paradoxes identified at the origin of quantum physics.

For architecture, geometry is measure, eidetic image and ordered system. Geometry is both ideal image and abstract order, which is given a reciprocal embodiment in architecture through constructed image and material form (Davidson, 1997). In both the above instances architecture remains the order of geometrical spatial constructs and compositions, I would like to argue that within computational design, there is a distinct possibility of moving onto an alternate spatial order - that borders towards a formal decomposition.

SPACE-NON-SPACE CONSTRUCTS

Vidler (2011) in his essay observes that; ….the spatial is rather a dimension that incipiently opposes the monumental: not only does it work to contextualize the individual monument into a general map of spatial forces that stretch from the building to the city and thence to entire territories – something recognized by the Situationists, and in another context, by Henri Lefebvre – it also operates, by way of the negative bodily projection… to absorb the monument. According to Vidler, here the concept of ‘space’ no longer operates as an instrument of monumental construction but rather as an agent of monumental dissolution. I believe that this ‘monumental dissolution’ remains a dynamic entity that Le Corbusier was exploring in his Potato Building Typology during the early 1960s and interpreted it in term of a sense of a flux between the urban and the built form. Thereby in some ways resonating Alex Wall’s (1995) suggestion on the effect of urbanization as multiple and complex: with a fundamental paradigm shift from viewing cities in formal terms to looking at them in dynamic ways. Hence, familiar urban typologies of square, park, district, etc., are of less significance than the infrastructures, network flows, ambiguous spaces and other polymorphous conditions that constitute the contemporary metropolis.

It seems to me that Le Corbusier was thinking along the same lines during the mid-nineteen sixties. The typology in a sense transgress from what essentially is defined by Giulio Carlo Argan’s types (1996), approximating archetypes; [that ]are regressed or reduced to a common ‘root form’, type here is more a principle allowing for variation, rather than a priori set of fixed entities – to that of an element of ‘mapping’ as introduced by James Corner (2002), where he argues that; as a creative practice, mapping precipitates its most productive effects through a finding that is also a founding; its agency lies in neither reproduction nor imposition but rather in uncovering realities previously unseen or unim-
agined, even across seemingly exhausted grounds. Thus mappings unfolds potential; it re-makes territory over and over again, each time with new and diverse consequences. Not all maps accomplish this, however; some simply reproduce what is already known. These are more ‘tracings’ than maps, delineating patterns but revealing nothing new. In describing and advocating more open-ended forms of creativity, philosophers Giles Deleuze and Felix Guattari (1996) declare: ‘Make a map not a tracing!’

The grid within the Potato Building typology acts as a dynamic field where the points and lines introduced by Le Corbusier become in a sense a series of markers that have the potential to remain inactive building blocks or active voids, in each instance an array of pinwheel systems can be used to present a dynamic centripetal or centrifugal, horizontal physical/virtual stratification as is documented in Figure 1 through Figure 4.

In a sense this design strategy resonates’ the concept of ‘mapping’ as provided by Deleuze and Guattari (1996), where they suggest that: What distinguishes the map from the tracing is that it is entirely oriented toward an experimentation in con-
tact with the real. The map does not reproduce an unconscious closed in upon itself; it constructs the unconscious. It fosters connection between fields... the map has to do with performance, whereas the tracing always involves an ‘alleged competence’.

As advocated by Deleuze and Guattari above, this ‘connection between fields, the act of performance’, is in a sense articulated in the above proposed typology through an element of centripetal and centrifugal forces or elements, that tend to structure and correlate within the pinwheel systems applied in the above cases – here the process takes precedence over the concept of form which remains infallible yet reciprocal to change. According to Corner (2002) multiple processes of urbanization in time are what produce ‘a distinctive mix of spatialized permanences in relation to one another; hence the urban project ought to be less about spatial determinism and more about reshaping those urbanization processes that are ‘fundamental to the construction of things that contain them’- Thereby providing essentially a condition of non-space that in a way correlates to Vidler’s definition of the space. I believe it is within this spatial dichotomy that the role of computational design and geometry can act as a point of critique. This point of critique, accord-
ing to Deleuze (1997), is not justification but a different way of feeling, another sensibility.

**COMPUTATIONAL DESIGN SENSIBILITY**

Kipnis (1997) in (architecture) after geometry - an anthology of mysteries, writes: Yet I am obsessed by a spatial sensibility that geometry in and of itself is inadequate to engender. What is the geometry of vast, hushed, viscous, deep space of the ocean, I wonder? For that is the space I desire - to make, of course, but more importantly to immerse myself in. I think others desire it as well. Some say so. Toyo Ito writes of ‘liquid space’, Bahram Shirdel of the ‘deep’, so too have Claire Robinson, The OCEAN Network and Amy Landesberg, though perhaps the latter has not realized how important the silence is. Some come at it covertly, obliquely, perhaps unknowingly. Mau, Lynn, Sejima, Kwinter, Reiser + Umemoto, Foreign Office Architects. In any case, I think it is true emergent sensibility, one that cuts across such vacant, marketplace taxonomies as New Minimalism and Neo-Expressionism... While working with Bahram Shirdel, the technique we tried most often to capture the space was to float incongruously large objects in a delimited void, like whales in the ocean. Of late however, I have become more interested in schools of fish: immense, composite, ephemeral, always in form, but always changing form. As I watch a school’s perpetual dynamics, see it change in an instant from opaque to transparent, knowing that its particular configuration at any moment is a contingent resolution of all the forces, influences and flows impinging on it at that moment, I feel I am in the presence of an avatar of liquid space.

It seems to me that Kipnis in his discourse highlights two spatial sensibilities yet pursues a single element - that of a morphological dynamic form/avatar - rather than the context of the ‘silence’ that defines and perhaps deforms this dynamic yet formal entity.

Stan Allen (1997) in his project for the Korean-American Museum of Art, discusses the element of ‘indeterminate interstitial spaces’ here: the typical figure-ground condition of the museum is reversed. Galleries form punctual figures within a generic field, while collective functions (lobby, café, lecture hall, bookshop) occupy the space between. The building mixes the large and the small, resolving the conflicts of the site through multiple scales...The art collection is housed in a discrete gallery volumes distributed throughout the main floor. These blank boxes maintain an appropriate degree of separation, control and autonomy for the works of art displayed, without dictating a rigid processional sequence.

In the above project and within its computational renderings, I feel that Allen has managed to remove the entire concept of negative space and hence has replaced it with more active positive spaces in relation to less active positive spaces. Despite the mention of interstitial spaces, there is an acute absence of the notion of the spatial ‘void’ - as put forward by Vidler above. Computational design at present continues to define the form within the context of morphogenesis and generative elements. What this paper hopes to present is the flux within and outside these formal studies: a space in this instance no longer operates as an instrument of monumental construction but rather as an agent of monumental dissolution. I believe it is here that the positive and negative, the relative and the absolute, are all affected by a spatial flux - the non-space.

Lynn (1997) in his essay entitled ‘an advancement of form’ does touch upon this sense of flux, he suggests that: rather than building fields, there is a useful distinction made between flows and the singularities that emerge within them. These large scale motion effect can then be used to shape discrete heterogeneous elements. In this way, it is possible to make a distinction between the architecturally discrete and the urbanistically continuous. This paper in a way question this distinction, and believes that is it this very distinction that diverts the current design discourses from the universal whole into segmented parts.

Architecture so far has been a study of spatial solutions, a series of constructs that address the things that may displease us in a sense. Leibniz in ‘A Resume of Metaphysics’ writes; so when something
in the series of things displease us, that arise from a defect of our understanding. For it is not possible that every mind should understand everything distinctly; and to those who observe only some parts rather than others, the harmony in the whole cannot appear.

ACKNOWLEDGMENTS
Le Corbusier’s Potato Building Typology (1962-1965) consists of a series of 13 draft sketches drawn by Le Corbusier during the last years of his life. The author was introduced to these drawings along with the term by the late Guillaume Jullian de la Fuente in 2007. The drawings and typology have since been analyzed and defined by the author with the support of RIBA Research Trust Award (2011-13).

REFERENCES
Kipnis, J. 1997, ‘(Architecture) After Geometry - An Anthology of Mysteries: Case Notes to the Mystery of the School of Fish’, Architecture Design: Architecture After Geometry, 67(5/6), p.43