

Beyond Representation: Drawing as a Generative Field

This paper is dedicated to the memory of the late Stavros Vergopoulos

Stavros Vergopoulos [1].

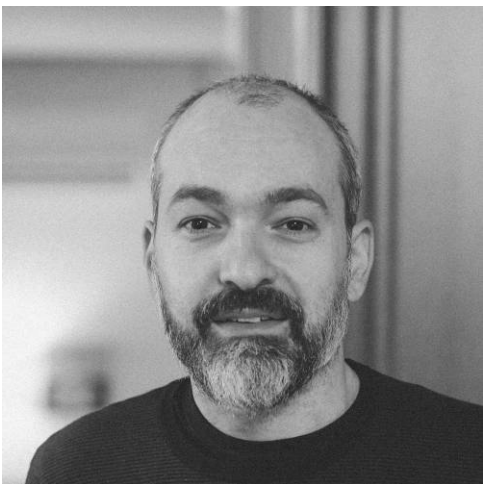
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Abstract

Architectural representation in the digital era was defined early on by the concept of photorealism. Fuelled by the much older desire to reproduce reality, to become able to double it within another medium, photorealism became both a means and an end. It also became the most obvious case of simulation in architecture and made relevant again the concept of the simulacrum. The 'definition of fake' for Plato, or the result of a hyper-reality detached from any real connection to the world for Baudrillard, the simulacrum describes how a photorealistic architectural rendering can be the ultimate reduction of the architectural drawing. A copy of a copy that becomes void of any meaningful purpose for the design process.

And yet there is a different way to understand the simulacrum: Through affirmation rather than negation it is transformed into a generative machine. It can be called again 'an architectural drawing', only that now it does not represent anymore. Instead it functions; as part of the design process itself.

1. The Quest for Photorealism

Digital technologies entered the field of architecture in a rather 'violent' way during the last 30 years, as they have penetrated and altered virtually any other aspect of our lives. The speed at which changes occurred, coupled with the ability of the computer to simulate with an ever-increasing efficiency the real world, blurred the limits between what is real and what is simulated, between what is physical and what digital, in essence between what exists and what doesn't. While this 'blurriness' extends to several different aspects of contemporary architectural practice, maybe one of the most obvious cases is the one of architectural representation. Our relatively newly acquired ability to produce life-like digital images has a profound impact on the ways we chose to represent our designs. In that context, photorealism becomes one of the main examples that illustrate how digital simulation can interfere with - and change our perception of what is - reality.

Photorealistic rendering has been for many years - from the very beginning of computer generated images - the 'holy grail' of computer graphics. Rendering, in computer graphics, is the process of creating a 2-dimensional image from a 3-dimensional digital model. That includes on one hand the projection of the geometry on a plane and on the other hand a process of representing the visual qualities of the model, namely color, lighting, shadows and textures.

While the geometrical part - the projection of the objects on a plane - is relatively easy to solve, the second part - the visual representation of those projected objects - proved to be a much more challenging task [2]. Programmers

realized soon enough that an accurate simulation of the way the light works in the physical world would be almost impossible, because of the computational power needed. Therefore they started looking at alternative methods that could create realistic looking images without having to calculate every single photon of light: From the pixel by pixel method of the scanline rendering, to ray-casting and all the way to ray tracing and today, with the increase in available computational power, to unbiased and real time rendering, the quest was always for more and more realistic effects. All this process, which involves a huge amount of effort, highly complex mathematical simulations, some of the most advanced programming algorithms and an endless line of Utah teapots, stems essentially from a very simple will: that of '*recreating*' reality. The doubling of what we perceive in the real world inside the computer. In other words, photorealistic rendering is yet another attempt of the - almost purely philosophical - desire *to double our world inside another medium*.

Behind that desire, hides another fundamental debate, that poses a question of an equally philosophical nature: that of whether computers are able to reach the operational level of humans.

In that sense, the course of the developments in computer graphics has many parallels with the developments in the field of artificial intelligence. In first years of research on AI the final aim was also to create computers able to operate at the same level with humans. In effect the fundamental concept is the same. In both cases we have on one hand something perceived as the 'real' - the human mind performing logical

operations in the case of artificial intelligence and the human mind again, perceiving in a specific way the physical world in the case of computer graphics - and on the other hand we have a digital simulation having as its final target to reach the level of its respective model. In the field of artificial intelligence the focus of the research has been reconsidered several times: where scientists were initially trying to simulate the function of the human mind, they ultimately shifted their approach and started to look at the ways according to which they can simulate the intelligence displayed by much more humble physical organisms, but in much higher numbers. Swarm intelligence - the way large flocks of relatively simple organisms like slime molds, ants or bees behave - proved to be a task where computers could perform much better [3]. And suddenly digital computers started displaying astonishing levels of intelligence; perhaps not human but intelligence all the same. A simple look at applications as diverse as Amazon's recommendation system or genetic programming is fairly convincing.

2. The Simulacrum

The parallel with artificial intelligence is important in order to understand that computer graphics are not operating on a different level or direction to other fields of computation. On the contrary, in several cases the fundamental motives stem from the same desires. In computer graphics though, the aim was never reestablished, while one could argue that today this aim is accomplished - or so it appears. As computational power was increasing and research was advancing, digitally generated photorealism started to reach new levels of accomplishment to

that an extent that today is quite common to encounter a situation where it is impossible to tell a digitally generated image from a photograph.

However, if we try to be accurate, a photograph is not 'reality itself'; instead it is already a copy of the physical world; already a representation. Fredric Jameson, commenting on photorealism in painting notes: "*There is here a striking parallel to the dynamics of so-called photorealism, which looked like a return to representation and figuration after the long hegemony of the aesthetics of abstraction, until it became clear that its objects were not to be found in the 'real world' either, but were themselves photographs of that real world, this last now transformed into images, of which the 'realism' of the photorealist painting is now the simulacrum*" [4]. In photorealism in the arts [5], a painting is created as a double of a photograph, already itself a copy of the real world. Therefore the painting in that case is a copy of a copy, in other words a *simulacrum*.

The concept of the simulacrum is hardly a new one. It has its roots in Plato's Sophist: Plato in this dialog, written during his late period, makes a distinction between two kinds of reproduction. He urges that a reproduction can be either a faithful one - that is one that doubles reality by being 'faithful' to it - or one that is intentionally distorted - that is one that alters on purpose some aspects of reality in order to achieve some aim other than the act of representation itself. While for Plato the former is what a representation should be, the latter should be avoided and is what he calls a simulacrum [6]. A notable example of the latter - of the simulacrum - are the 'optical refinements' applied in ancient Greece both in

sculpture and architecture. Statues for example would be intentionally crafted disproportionately larger towards the top so they would appear without the distortion imposed by perspective to someone that observes them from below. In the same line of thinking the steps of the Parthenon are slightly curved, but only in order to appear perfectly straight to the viewer that approaches the temple.

From Plato and onwards, simulacrum becomes a common philosophical theme for several thinkers, up to the point where Jean Baudrillard extends that thinking and distinguishes not two, but four types of representation, according which the image:

- (1) is the reflection of a basic reality,
- (2) masks and perverts a basic reality,
- (3) masks the absence of a basic reality and
- (4) bears no relation to any reality whatever: it is its own pure simulacrum.

Baudrillard further explains: "*In the first case, the image is a good appearance: the representation is of the order of sacrament. In the second, it is an evil appearance: of the order of malefice. In the third, it plays at being an appearance: it is of the order of sorcery. In the fourth, it is no longer in the order of appearance at all, but of simulation.*" [7] According to Baudrillard therefore, the simulacrum is a copy of a copy. A representation that while it resembles something real, it does not have any connections to any kind of objective reality. On the contrary, a simulacrum creates its own reality, which Baudrillard calls hyper-reality, and becomes totally independent of the 'real' model.

3. Architectural Simulacra

If we shift the discussion in the field of architectural representation, while computer graphics entered the picture quite late in relation to the timeline of the development of the concept of the simulacrum, the approach was similar. When computers started to be used extensively in the domain of architectural design, photorealism became initially one of the main challenges in terms of architectural representation. As software engineering was advancing, the creation of life-like images was becoming easier to accomplish and therefore photorealism became a standard tool in architectural representation. Today, photorealistic rendering is literary 'one click away', with advanced rendering software offering – through a user-friendly interface that abstracts all the 'unnecessary' technical information – the ability to produce photorealism to all their users. As a result, a vast amount of computer renderings is produced, where the limits between realized buildings and digital representations are blurred to the extent that in many cases photorealistic renderings are preferred over photographs of a realized project in order to describe and publish it.

The case seems to be identical with the case of photorealism in painting: The architectural rendering looks like, not the built object of course, but like a photograph of it. With one – important – difference: In photorealism in art, reality pre-exists, it is then doubled by the photograph, which is then doubled a second time by the photorealistic painting. In architecture that sequence is inversed: in most cases the rendering comes *before* the building itself, and it therefore tries to model a hypothetical

photograph of an imagined building. The actual building follows and one is tempted to say that the built object becomes a copy of the rendering – it is of no surprise then that several new built edifices are photographed in such a way that the photographs resemble computer renderings [8].

Returning to Baudrillard, it is interesting to note that he opens his book with a reference to Borges' short story 'On Exactitude in Science'. There, in the length of one paragraph, Borges describes an Empire where the art of cartography attained such perfection that the map of the empire that the cartographers created, ended to have the same size as the Empire itself. The following generations lost appreciation in cartography and the map was abandoned to the elements, becoming eventually a ruin. Baudrillard comments: "*Abstraction today is no longer that of the map, the double, the mirror or the concept. Simulation is no longer that of a territory, a referential being or a substance. It is the generation by models of a real without origin or reality: a hyperreal. The territory no longer precedes the map, nor survives it. Henceforth, it is the map that precedes the territory - precession of simulacra - it is the map that engenders the territory and if we were to revive the fable today, it would be the territory whose shreds are slowly rotting across the map.*" [9]

For Baudrillard therefore, today it is no longer the map that is left in ruins, but the territory itself, because "*the map precedes the territory*". Such is the case with computer generated, photorealistic, architectural renderings: they become a simulacrum, they create a hyper-reality out of nothing and they even force us to

perceive built objects as 'realized' renderings – in a way, turning the actual buildings into copies. So the photorealistic rendering is not just a hyper-fake image, "*the commercial illustration and depiction of architecture, that in all its sophistication and accuracy is not particularly intended to convey any theoretical, strategic or spatial properties*" [10]. It also becomes the model for the actual, built object. It is therefore apparent that the questions arising are far surpassing the limited area that concerns architectural drawing and representation; they affect fundamentally the way we create and perceive architecture.

4. A Generative Simulacrum

In the light of the above observations, it is rather fortunate that digital rendering techniques have reached a high level of efficiency. Because this overproduction of photorealistic architectural images leads inevitably to a downgrading of the importance of the medium: since photorealism is not anymore the product of a – digital – virtuosity, its value is questioned and new directions for the digital architectural drawing need to be sought after. Therefore, before we ascribe the creation of an 'architectural hyper-reality' to computer graphics and we abandon digital tools as the means to create architectural drawings, it might be useful to consider a different approach to the idea of the simulacrum.

It is true that Baudrillard's conception of the simulacrum describes the situation created by photorealism in architectural representation adequately and efficiently. Computer generated images create indeed a type of hyper-reality. But his

approach is clearly a negative one; and at the same time, it is an approach not void of a certain nostalgia for what is perceived as an ideal 'real'. Gilles Deleuze on the other hand is offering a different approach on the concept of the simulacrum: "*If we say of the simulacrum that it is a copy of a copy [...] we miss the essential point: the difference in nature between simulacrum and copy [...]. The copy is an image endowed with resemblance, the simulacrum is an image without resemblance.*" [11] Deleuze here, contrary to Baudrillard, tries to define the simulacrum in a positive way. The simulacrum, not as something that imitates, but rather as something that creates. "*The simulacrum is less a copy twice removed than a phenomenon of a different nature altogether: it undermines the very distinction between copy and model*" [12].

It is the difference between the simulacrum and the model that becomes of importance and it is the same difference that becomes a generative force. Again, we can find a relative example from the history of art: During the Renaissance a faithful representation of 'reality' became the focus of the artists. Around 1520 however and as the painters had truly mastered their technique, they started to add details in their paintings that were diverging from faithful representation towards a more personal approach. Consequently, mannerism emerged – and finally led to the Baroque. A very illustrative example is El Greco's '*The Burial of the Count of Orgaz*'. The painting is clearly divided in two parts. The lower part, depicting the funeral on earth, is closer to a realistic representation. We recognize human forms as faithful representations of actual humans. The upper part of the painting

however, depicting the acceptance of the deceased count in the heavens, starts to distort the forms, change the analogies and our perception of space. The painting is transformed, from bottom to top, from a 'copy' to a simulacrum. Only that the simulacrum here, is no longer understood as a 'detached' hyper-reality but instead as a new element in a series of transformations that start from a model – in our case the physical world – and move toward new perceptions and new 'species' that are as real as the actual model of the 'representation'.

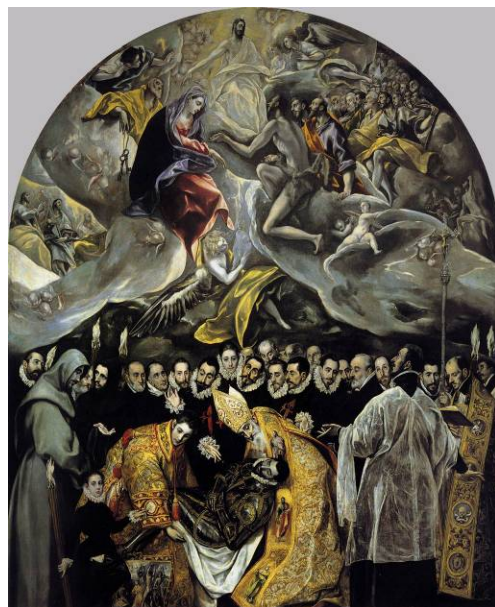
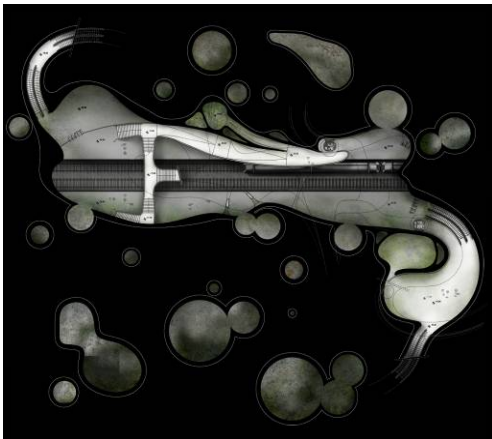


Figure 1: El Greco, *The Burial of the Count of Orgaz* (1586–1588, oil on canvas, 480 x 360 cm, Santo Tomé, Toledo)

5. Beyond Representation

In essence however, what Deleuze asks for, or what is needed in order to change our understanding of the simulacrum from a negative to positive one, is to

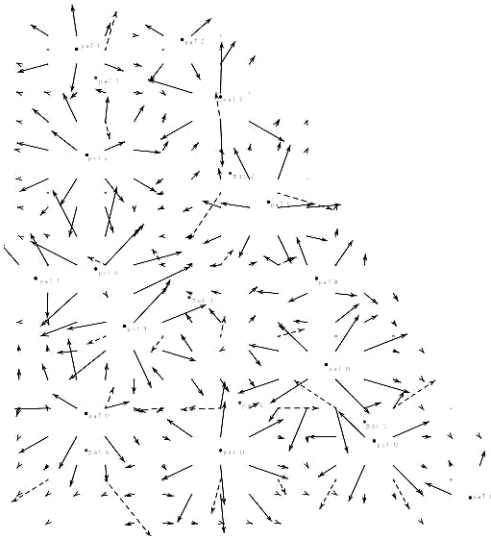
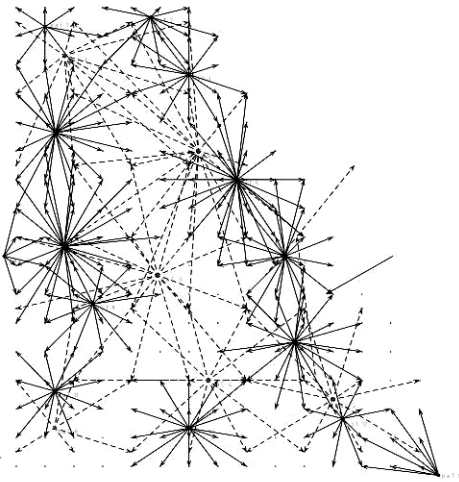
move away from the concept of representation. A painting, or an architectural drawing, does not necessarily represent something else; it can also generate something new. Deleuze, this time in his book on the paintings of Francis Bacon, proposes the concept of 'sensation' as the means for the figurative arts to escape representation. He suggests "that there are two general routes through which modern painting escaped the clichés of representation and attempted to attain "sensation" directly: either by moving towards abstraction, or by moving towards what Lyotard has termed the figural." [13]



Design for a metro station. Degree Project, School of Architecture, ATh. 2009. Students: Maria Chiou, Dimitra Koroni. Supervisors: Stavros Vergopoulos, Dimitris Gourdoukis.

We might be able to find two similar ways for digital architectural drawings, in order for them to escape representation and hyper-reality. The first, in accordance to abstraction, might be the (re)use of line drawing; while a very old mode of drawing, digital tools are offering the

means to use lines in new ways and create drawings that are not simple plans or sections but rather series of transformations. That way abstraction happens not by removing details but by removing some aspects of the image, like lighting, shadows or textures: "*abstraction of visual representation means exaggeration of certain aspects on the cost of others*" [14] as Birger Sevaldson notes. In addition to that – somewhat more traditional – conception of abstraction, we can think of lines that do not represent anymore a border, a dividing line, but instead a vector. We can think therefore of a line with a direction and a magnitude that is able to represent flows and movement. And while a simple vector might not carry enough information, several of them, locally differentiated, become a field, able through its transformations to generate new forms or organizations. At the same time the drawings do not represent anymore – as a plan represents a specific view of a building – but *they function*. In that sense, an architectural drawing is part of the design process. It is a drawing that does not convey meaning by referring to something else but functions as a tool that will generate the next step in that process: The drawing as the design process and not the representation of it. Similarly, line drawings can be used in order to 'dissect', analyze and essentially understand 3-dimensional models created in the computer. The abstraction imposed by the lines on a 3-dimentional model provides the means to focus on those properties that are more important each time, while shifts our understanding from a clearly defined object to a field that is virtually infinite and ever-changing.

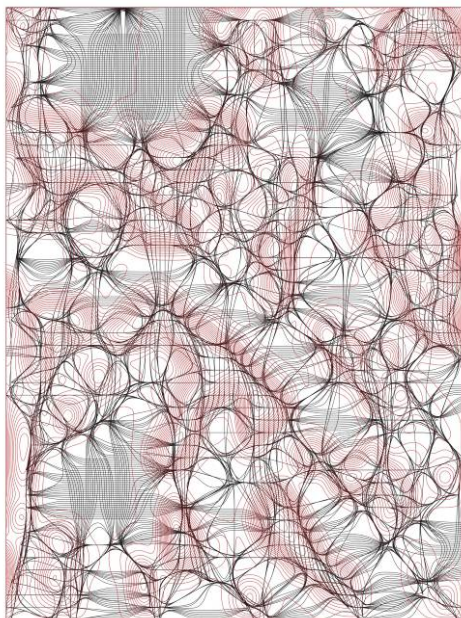


Shaping a plan through vectors. Degree Project, School of Architecture, ATh. 2010. Student: Vasilis Papakonstantinou. Supervisors: Stavros Vergopoulos, Dimitris Gourdoukis.

Equally, the second way, the of moving towards the figural, would be to distance ourselves from the visual aspects of what is drawn. That means using visual means to communicate information concerning an atmosphere, a situation or a condition.

Such a drawing therefore focuses not only on the visual qualities of an architectural object, but also on those that would be understood in the physical world through all human sensors, while impact is valued over meaning and sensation over interpretation. Again, we are moving from a visual object towards a visual field where, while the means are not new; it is their coupling with the digital computer and simulation that offers new possibilities.

In both cases, either through abstraction or through the figural, architectural drawing transcends its role as a representational tool and incorporates both the intentions of its creator and a field of possibilities in relation to what could emerge out of it. Each drawing becomes a new step in a series that through the differences of its elements and through constant modulation becomes the generative force of design. That difference is exploited by the designer – both creator and spectator of his own drawings – in order to set the design process in motion: “*The simulacrum includes within itself the differential point of view, and the spectator is made part of the simulacrum, which is transformed and deformed according to his point of view*” [15]. As with the approaches of Baudrillard and Deleuze in the case of the simulacrum - the first one based on negation, the second arising through affirmation - we can trace a similar dichotomy for the 'blurriness' that digital tools bring in the limits between real and not-real: We can negate it and fight it as something that obstructs our ability to tell what is real and what not; or we can embrace it as the means to produce new kinds of reality.



Generative drawing. Toolpaths for a CNC milling machine. Fabrication Protocols / Digital Crafting. School of Architecture, Washington University in St. Louis. Student: Jeffrey Glad, instructor: Dimitris Gourdoukis

6. Notes and References

[1] Stavros Vergopoulos, professor at the School of Architecture of the Aristotle University of Thessaloniki passed away in August 2020. The present paper was written by the authors in 2010 but

remained unpublished until now. It outlined however the basic principles followed by the authors when teaching both representation and design courses and therefore – in a certain sense – accomplished its intentions. The paper therefore is presented finally here – with only minor changes and updates – as a tribute to Stavros and the legacy that he left at the School of Architecture in the Aristotle University of Thessaloniki. A last paper on the two subjects that he mostly worked with: architectural representation and digital design tools. A small addition to his contribution to the field. He will be greatly missed as a researcher, educator, and above all, as a friend.

[2] The projection of the objects on the plane and the calculation of light and shadow, are not necessarily two separate processes. However, for the scope of this article is safe to consider the later as the main focus of research in the field of computer rendering.

[3] John Haugeland, *Artificial Intelligence: The Very Idea* (Boston MA: MIT Press, 1989).

[4] Fredric Jameson, *Postmodernism, or, The Cultural Logic of Late Capitalism* (London: Verso, 1991).

[5] Photorealism in painting is an art movement of the late 1960s and early 1970s that was developed mainly in the USA. Key figures of the movement include Richard Estes, Ralph Goings and Chuck Close.

[6] Πλάτων, Πλάτωνος Σοφιστής (Εν Αθήναις: Εκδοτικός οίκος Γ.Φεξη, 1910).

[7] Jean Baudrillard, *Simulacra and Simulation*, trans. Sheila Faria Glaser (Minneapolis: University of Michigan Press, 1995), 6.

[8] On that subject, see a very interesting article posted by Lebbeus Woods on his blog, concerning the photographs for Zaha Hadid's Guangzhou Opera House. Woods closes his post writing: "*This appraisal is not simply about images, but about buildings, even masterpieces of architecture regarded as an extension of an architectural history of masterpieces, that are utterly oblivious to the uncertain and conflicted human condition of today, which is unprecedented in history.*" Lebbeus Woods, "Zaha's Way", n.d., <http://lebbeuswoods.wordpress.com/2011/03/27/zahas-way/>.

[9] Jean Baudrillard, Simulacra and Simulation, p1.

[10] Marjan Colletti, "Ornamental Pornamentation, The Abstract and the Exuberant Body of Ornamentation" (n.d.). Marjan Colletti, ed., Exuberance: New Virtuosity in Contemporary Architecture: Architectural Design, 1st ed. (London: Wiley, 2010).

[11] Gilles Deleuze, "Plato and the Simulacrum" in October, no. 27 (winter 1983), p 48.

[12] Brian Massumi, "Realer than Real: The Simulacrum According to Deleuze and Guattari", n.d., http://www.anu.edu.au/hrc/first_and_last/works/realer.htm.

[13] Daniel W. Smith "Translator's Introduction" in Gilles Deleuze, Francis Bacon: The Logic of Sensation, 1st ed. (Minneapolis: Univ Of Minnesota Press, 2005).

[14] Birger Sevaldson "Computer aided design techniques", n.d., <http://www.birger-sevaldson.no/phd/Computer%20aided%20design%20techniques.pdf>.

[15] Gilles Deleuze, "Plato and the Simulacrum", p49.