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Beyond representation:
Possible uses of new media in architecture

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Abstract

This article begins reviewing representation in the context of architecture, distinguishing between representation in architecture (architecture that represents meanings) and representation of architecture (design separated from construction work and use). Then it shows how the perspectivist paradigm, originated in the Renaissance, was consolidated in the modern era, thus establishing the prevalence of conceived space over lived space. The perspectivist paradigm was expected to be surpassed with the advent of the informational culture, which has not happened because the capitalist mode of production of space has not changed. That is, even if it were possible to reverse the loss of dimensions caused by representation, the paradigm change would only shift if there were a radical change in the mode of production. Thus, the promise of replacing the perspectivist paradigm by the informational paradigm is discussed in the light of three current trends in using computers in architecture, focusing on the prevalence of the logic of representation at the expense of a real development of the process of production of architecture that promotes lived space over conceived space. The article concludes by pointing out the possibility of architecture as an interface to overcome the perspectivist paradigm, shifting the focus from representation to interactivity.

Keywords: representation; new media; interactivity; interface.

Introduction

Re:pre:sent, the theme of V!RUS 8, has a very broad definition, as proposed in the journal's call for contributions:

> The word comes from the Latin repraesentare and contains two prefixes. The first is re-, which means 'backwards', suggesting a reiteration of something, and the second is prae-, which means 'ahead', 'before then', and refers to something that would still be to come. The two prefixes are linked to the verb sedere, meaning 'to seat', 'to sit', designating what is established, defined. From this standpoint, RE:PRE:SENT involves at the same time a gesture related to a pre-existence, to what had or to what has already been (re-), associates it with a look at what is not yet, to what might be (pre-), and transforms the act of definition, of settlement, of permanence (sedere) (V!RUS, 2012, n.p.).

In the context of conventional architecture production, it can be said that *re:pre:sentar* reiterates something conceived previously (design), refers to something that has yet to come into being (built space), and establishes a state of permanence (ready, finished architecture). However, this process must be questioned, since it is possible to imagine a type of architecture that does not remain the same and whose production is not ruled by reiteration of conceived space with it's clear separation from construction and use. The emphasis on lived space escapes representation. New media – especially physical computing (analogic-digital) – indicate the possibility of overcoming representation in the process of production of architecture. However, to surpass representation is no easy task. The history of the relationship between representation and architecture shall not be ignored, but understood in order to enable us to overcome its limitations and envisage possibilities of appropriation of new media beyond the reproduction of the conventional design process based on the perspectivic representation. By understanding the representation *in* and *of* architecture it is possible to question what has been seen as a paradigm shift in the information era and to point to real opportunities for a paradigm shift in the production of architecture. Embarking on this critical path of representation and new media, interactivity becomes important due to the possibility of thinking about architecture as an interface, a process that goes on during use, and not architecture as representation or conceived, ready, finished space.

On the representation *in* and *of* architecture

According to Roland Barthes (1991, p.228), the term representation has two meanings: "Representation designates a copy, an ilusion, an analogical figure, a resemblance-product; but in the etimologycal meaning, representation is merely the return of what has been presented". Hence, representation can be understood, in a combined sense, as something that presents the object again via its product-likeness, not just presenting the very object again, but presenting it in other medium. Thus follow representation *in* architecture and representation *of* architecture.

In the case of representation *in* architecture, it is architecture that should represent. In an analogy to language, architecture would be the discourse, dwelling that depends on representation. For Alberto Pérez-Gómez and Louise Pelletier (1992, n.p.),

> 'A symbolic architecture is one that represents, one that can be recognized as part of our collective dreams, as a place of full inhabitation. (...)Thus, creation as representation must

be the ultimate objective of architectural work if our profession is to have any social meaning at all.'

According to these authors, architecture elements must express the symbolism they represent. Architecture is laden with meaning because it represents an intention, a character, beyond socio-cultural references. Architecture is, therefore, the means by which several relationships are represented symbolically. "Traditional architecture constructs representation" (Peixoto, 1993, p.362).

In the passage from the Middle Ages to the Renaissance, with the advent of the Gutenberg press, the role of architecture was first disputed as a means to represent meaning. Victor Hugo wrote that printing would kill architecture (Hugo, 1993 [1831], p.148). However, his fear proved to be unfounded, for not only has printing not killed architecture, but architecture has reinvented different ways to represent meaning throughout the modern age. In postmodernism, for example, Robert Venturi reached the limit by exalting commercial buildings as literally representing the products they sell, such as the hot dog kiosk that reproduces everything including the mustard on its façade (Figure 1).

Figure 1. Tail o' the Pup, hot dog kiosk originally built in 1945, on Beverly Boulevard, in Hollywood. Designed by the architect Milton Black in 1938. Source: Los Angeles Times blog.

However, representation of architecture prevails in the discussion about representation and architecture, that is, the perceptive dimension of architectural objects is reduced for it be given to reading. Architectural drawings are considered to be architecture's representation, as also photographs, videos, models, in short, everything that has an appearance relationship with the

object, but that make it be seen as a representation of a phenomenon and not as the phenomenon itself. (Heidegger, 1990)

In an analogy between architecture and language, representation of architecture is writing, and its language, its code; it is grounded on the perspectivist paradigm, as pointed out by José dos Santos Cabral Filho (1996, p.26):

> 'Perspective not only influenced architecture and the artistic disciplines, but also gave rise to modern scientific thinking. The perspective technique was a conceptual tool to approach the world. The perspective apparatus frames the world and renders it as an environment passive, of an acurate description, a truthful representation and therefore open to scientific analysis. Perspective becomes a paradigm for certainty, rationality and objective knowledge.'

Perspective has been considered the paradigm of representation since the Renaissance, when its use began. Perspective emerges historically in the Renaissance, although several authors claim that Vitruvius had already presented the principles of perspective in his treatise on architecture (Pérez-Gómez and Pelletier 1992, 1997)[1]. However, it is during the Renaissance that representation of architecture started to be debated, which also prompted discussion on "the difficulties involved in conceiving a work of architecture in terms of a two-dimensional set of projections" (Pérez-Gómez and Pelletier, 1992, n.p.). The process of production of architecture began to change with the possibility of representation and the creation of the architect profession to do so. Hence, architectural practice has begun to undergo change from the advent of the perspectivist paradigm during the Renaissance.

Medieval architecture did not manage drawings the way we do today, and builders did not conceive buildings in their entirety; it was an *in loco* collective process that usually lasted more than a generation, i.e., those who started the work were no longer alive when it was finally completed. Before the Renaissance, architecture was unaware of graphic scale, which only gained importance when representation became possible, because of the need for accuracy in reduction, for designing architecture before building it.

Despite the Renaissance being the major milestone of change in the mode of production of architecture, it may be characterized as a transition between pre-Renaissance architectural solutions and architecture from modernism onward. Renaissance architecture itself does not express many of the advantages of architectural representation over *in loco* production. Perspective was still understood as optical science, as transmission of light rays.

> 'The pyramid of vision, the notion on which the Renaissance idea of the image as a window on the world was based, was inherited from the euclidean notion of the visual cone. (...)It was impossible for the Renaissance architect to conceive that the truth of the world could be reduced to its visual representation, a two-dimensionall diaphanous section of the pyramid of vision' (Pérez-Gómez and Pelletier, 1992, n.p.)

In fact, the perpectivist representation of architecture was more often found in the fifteenth century paintings, which sought to represent the environment more accurately. In spite of the painters making use of perspective (Figure 2), there was no geometric systematization. Leon

[1] Pérez-Gómez and Pelletier (1997) pointed to the controversy surrounding the translation of Vitruvius' treatise, concluding that he did not refer to perspective in it.

Battista Alberti introduced, in his treatise *Della Pictura*, perspective as the basis for artistic drawing. The perspectivist method began to be delimited, reducing the binocular vision to a single viewpoint, which by analogy would be the apex of the cone of vision. A plane intercepted the cone and, as a result, there was a cone projection on a plane. However, there was still no systematic consideration of depth, as illustrated by Albrecth Dürer depicting the method described by Alberti (Figure 3).

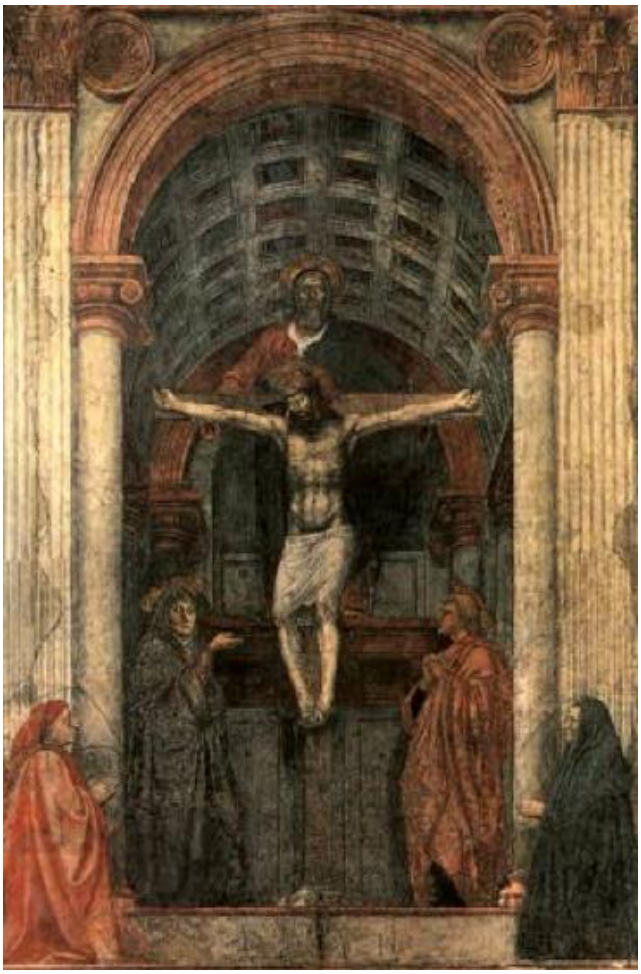

Figure 2. Section of the fresco "The Trinity, the Virgin, St. John and donors," Masaccio, Santa Maria Novella, Florence, painted around 1427. Source: personal archive.

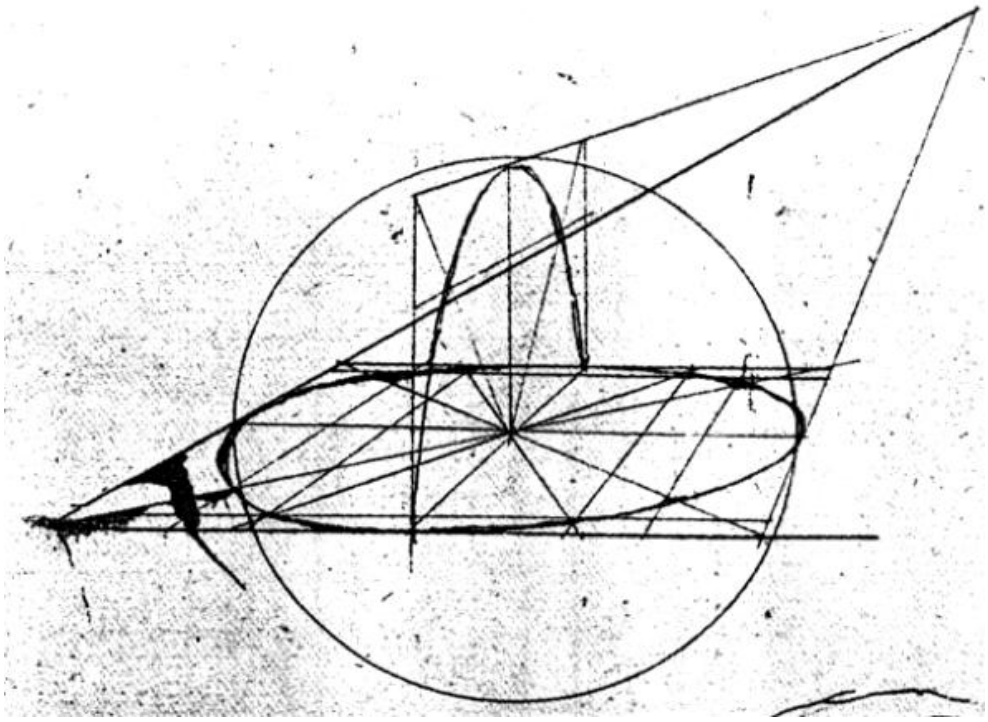

Figure 3. Illustration by Albrecht Dürer depicting the cone projection method described by in Della Pictura. Source: Pérez-Gómez and Pelletier, 1992.

Only in the 16th century did treatises on perspective begin to systematize the empirical method. Vignola established the distance point method by introducing a second observer in the horizon line at the same distance from the focal point, enabling the representation of depth (Pérez-Gómez and Pelletier, 1997). Dürer made use of perspectivist equipments that entailed a rigorous method for representing objects; Desargues established the point at infinity as the meeting of two parallel lines, unlike his ancestors, who believed that the vertex of the cone of vision was the convergence point of two parallel lines. This made possible to systematize the perspectivist method as a geometric system analogous to that of competing lines, thus establishing his theory, the basis for descriptive geometry developed in the late eighteenth century by Gaspar Monge. So was the perspectivist representation systematized, gradually establishing the possibility of using geometry, two-dimensionality, and orthogonal projections in architecture conception.

For a long time, perhaps until modernism, architectural representation was not taken to its limit; it has not taken full advantage of its potential:

> 'Renaissance drawings are not simply the same as modern drawings in their relationship to the built place. Plans and elevations were not yet systematically coordinated within the framework of descriptive geometry. These drawings were not instrumental and remained much more autonomous from the building than those that result from typical contemporary practise' (Pérez-Gómez and Pelletier, 1992, n.p.).

The Modern Movement, which promoted objectivity and rationalization, maximized the use of architectural representation by rationalizing spaces, designing optimal solutions for

architectural possibilities, often neglecting construction knowledge. As pointed by Pérez-Gómez and Pelletier (1997, pp.220-221), the separation between design and construction is enshrined in the 18th century, its emblematic architect being Jean-Laurent Legeay (1710-1786), who "advocated the virtuosity of an idea over its buildable potential" (Pérez-Gómez and Pelletier, 1997, p.220). The tradition beginning at that point in time was that of predominance of the whole image of the building for its visualization, made possible by perspective. "It suggested implicitly that knowledge of construction was not the responsibility of the architect" (Pérez-Gómez and Pelletier, 1997, p.221). Modernism, in a way, crowned the production of architecture via representation and perpetuated this process of separation between design and construction that had already been incorporated into architectural practice.

The greatest contribution of the perspectivist paradigm to architecture was the establishment of representation, which completely altered its process of production. Representation enabled prediction in architecture by allowing the reduction of architectural objects to the two-dimensionality of the medium used to depict them. Akin to perspective, other ways to represent the object arose – e.g., photography, invented in 1839, and video, invented more recently – based on the same principle of a single viewpoint within the same paradigm. "When an artist employs geometrical perspective he does not draw what he sees - he represents his retinal image" (Gregory, 1990, p.174). The image formed in the retina is the one ultimately interpreted by the brain. The retina is a two-dimensional medium through which the apprehended image is represented, and the brain interprets the images provided by both retinas, blending them into a sole new dimension. Perspectivist representation promotes the loss of the dimensional depth that exists in images of the world, as we perceive them.

Pérez-Gómez (1994) argued that depth was the first dimension before the prevalence of the perspectivist paradigm. Later the other two dimensions – length and width – made depth become merely one among the three dimensions. Reducing the importance of depth affected the space/time relation by causing the image – the image we see, the way we perceive the world – to lose value. Both photography and video, considered to be equivalent to perspectivist representation[2], as well as perspective itself, are not enough to experience architecture, since they ignore depth; they just represent it, thereby contributing to the loss of space/time relationship.

When we stand before perspectivist representations, we are not the ones who see the world, but the eyes of others. The image that reaches us is the image from another person's eyes. We no longer have a reference point of the moment as a possibility of spatial and temporal apprehension; we cannot even speak of duration as lived space and time. What we have is an image, an absolute image, cloistered in a window out of its space-time context. This window no longer opens to the world; it just represents a moment of the world to which it has

[2] Gregory (1990) argued that the camera reproduces the object as a geometric perspective, but we do not see the world as a perspectivist image, which makes perspectivist photographs and drawings seem wrong. Some cultures that have no knowledge of perspective, e.g., the Zulus, understand a perspective as a two-dimensional composition.

oppened. An engraving by Dürer, “The painter studying draft laws through wires and a frame” (Gombrich, 1988, p.276) (Figure 4), shows the simplification imposed on the object by perspective. All of the object’s depth lines are reduced to a planned scheme of points in a framed window.

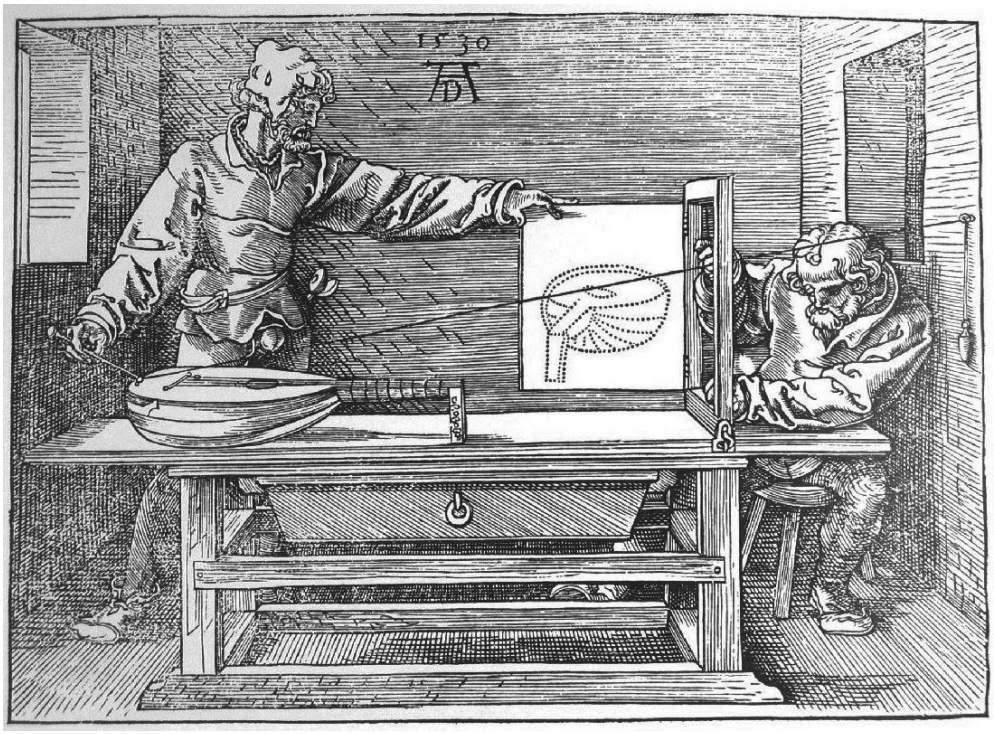

Figure 4. The painter studying draft laws through wires and a frame, Dürer, 1525, woodcut. Source: Dürer, 1532.

Perspective has been viewed as the "possibility of accurately representing a 3 dimensional environment into a 2 dimensional plan" (Cabral Filho, 1996, p.26). By observing Dürer’s engraving, one can raise doubts about this purported accuracy. The picture illustrates several perceptual concessions that are made to adjust the scene to its representation. The observer is reduced to a single eye, his position is fixed, and the object is static. Perspectivist accuracy is the precision of science, of mathematics, which transforms reality into models that can be analyzed. Thus, it is possible to scientifically envisage an achievable accuracy of perspective and descriptive geometry, as they make possible to assess the represented object and the method limitations are known to scientists. Nonetheless, in the same way that mathematical models are not grasped by those who do not know their inherent method, perspectivist or geometric representation is not understood by those who do not know the perspectivist method. Hence, the accuracy of perspective is only valid in light of one’s capability to imagine hypothetical depth, which is represented by lengths and distances.

The process of representation boils down to reducing the three-dimensional object to a two-dimensional medium that allows its re-presentation. In the case of representation of architecture, it is not just about presenting a three-dimensional object by means of a two-dimensional medium. The gap between architecture and its two-dimensional representation is not just of one dimension. We cannot take architecture as a three-dimensional object; we can be certain of at least two more dimensions – time and behavior – and, therefore, perspectivist representation is three dimensions behind architecture.

Depth is the first dimension lost in perspectivist representation. The way we perceive the world, stereoscopically, is reduced to two dimensions: length and width. The second lost dimension is time. Like writing, perspective is the search to register a discourse, remaining as a fragment of the event (occurrence) registered outside of time. Representation is an absolute image that can be read at any time and does not carry the object temporality. It requires some time to be read, in spite of not having any temporal relationship with the discourse. The third lost dimension is the behavior that allows interaction. Perspective, as inscription, is no longer an event, and the significance of architecture is not revealed in the act of inhabiting (enjoyment), but is restricted to the possibility of interpreting the fragment – an absolute image – that has been registered. There is no interaction; space and time are not experienced.

Aimed at overcoming the gap between the phenomenon and the representation of the phenomenon, we must understand the limitation of the perspectivist paradigm and envision the possibility of new alternatives.

> 'Even though most enlightened architects would recognize the limitations of tools of projection such as plans, sections, and elevations and predictive planning in relation to the actual meaning of their building work, no alternatives are seriously considered outside the domain of modern perspectivism, which has deeply conditioned our knowledge and perception' (Pérez-Gómez and Pelletier, 1992, n.p.)

Currently, in the context of informational culture, perspective is still the paradigm for architecture and its representation. In order to change the paradigm it is not enough to recover the lost dimensions or undertake any other kind of reformist strategy concerning the design process. In addition to the abovementioned problems, the perspectivist paradigm is fundamentally perverse as it promotes the capitalist mode of production of space, which implies the reproduction of the social relations of production, the separation between intellectual and manual labor, the resulting separation between design, construction, and use, and the transformation of space into commodity emphasizing its exchange value over its use value. It is necessary to change the mode of production because, as stated by Sergio Ferro, the design process based on representation via drawings exists and reaches us as ready-to-use, because according to the capitalist logic the construction site must be heteronomous. The architectural drawing becomes the obligatory form for the extraction of surplus value, thereby being an instrument of domination that aims at the production of goods (Ferro, 2006, p.108). The use of computers in architecture has not escaped the perspectivist paradigm; instead of promoting the use value with emphasis on lived space, computers contribute to enhance the production of goods with emphasis on conceived space.

On the use of new media in architecture and the false paradigm shift

It is necessary to understand how computers enter architecture – through its back door – in order to understand its almost unchallenged nexus with the perspectivist paradigm. According to Robert Bruegmann (1989, p.139), some architectural offices in the United States in the 1950s were already using computers to produce spreadsheets to assist in structural calculations. However, an interactive graphic interface to aid in design only appeared in the mid-1960s. In the early 1970s, computers seemed promising, but software limitations and the prospect of generating extremely rational products eventually gave rise to fierce critique of rationalization as proposed by modernism itself, which could be taken to extremes with the help of computers. Only in the late 1980s, with CAD (computer-aided design), did architecture finally welcome computers, which was consolidated in the 90s as an indispensable tool in the conventional design process. It is in the 1990s, with the almost worldwide computerization of architecture offices and schools, mainly in Europe and North America, that began to emerge several discussions about the introduction of a new paradigm in architecture. This paradigm would be informational, but in spite of being a real promise, it has not yet come true. Even with BIM (Building Information Modeling) and the potential of parametric design in the 21st century, the representational paradigm still prevails. The process of production of architecture is still heavily based on conceived space, with information technology still in service of representation and not directed toward lived space, for continuity of design and construction during use. Interestingly, the title of Bruegmann's article – The pencil and the electronic sketchboard – written in the late 1980s already indicated the reproduction of the same representationalist process via electronic medium.

Three computer trends can be identified in the field of architecture: the use of traditional CAD programs (predominantly AUTOCAD for representation and REVIT for parameterization of elements represented and compatibilization of representations of so-called complementary projects); research and use of artificial intelligence to generate two- and three-dimensional drawings (Shape Grammar and Genetic Algorithms) and parameterization for digital manufacturing; and a third trend that might be called cybernetics, proactive, responsive or interactive architecture, in which the computer is part of the space and not just a design tool (facilitated by physical computing).

In most cases there prevails what Pérez-Gómez and Pelletier (1997) called perspectival paradigm, in which there is indeed no change in the conventional design process or product. Although its products are formally (or volumetrically) different from those of architectures of yesteryears, the purpose of the design process is still predominantly the production of other finished products, or as Lebbeus Woods (1996, p.279) put it, "a means of controlling human behaviour, and of maintaining this control into the future."

This conventional design process adopted by architects and taught in schools is, again, based on the perspectivist paradigm established in the Renaissance and presupposes the separation

between subject and space (regarded as an object to be represented visually). According to Pérez-Gómez (1983), the representation that was introduced in the Renaissance was quite distinct from that which was used in medieval construction sites. Despite the fact that drawings were also used in the Middle Ages, they were never intended for representing the entire building; they only served as a means of communicating relevant information about the construction process to its diverse participants and of developing constructive solutions.

The basic difference between the two processes of production of space can be summarized by the distinction between a medieval process, based on what Henri Lefebvre (1991) called the lived space, and the Renaissance process, based on what the author called conceived space (or representation of space). This distinction leads to questioning the process of production initiated in the Renaissance. According to Sérgio Ferro (2006, p.194-195), Brunelleschi radically changed the relations of production in building sites by introducing a hierarchical practice, systematizing the separation between intellectual work (design via coded drawings) and manual work (construction via alienated labor), and exploiting work to extract surplus value. Alberti theorized that practice in his treatise. Obviously, from the Renaissance to the present day, design and construction processes have not remained unchanged, as shown by Pérez-Gómez and Pelletier (1997). However, the fundamentals remain the same: design process based on representation and separation between design, construction, and use.

This perspectivist paradigm also serves as the basis for the three computer trends in architecture outlined above. The structural logic of CAD programs reproduces the Renaissance perspectivist construction process (Figure 5). Although they do so much more quickly and make real-time manipulation possible (as can easily be done in SketchUp, for instance), there is no change in the logic of representation. The programs end up being more likely to aid representation (CAR – Computer Aided Representation) than design (CAD – Computer Aided Design). The project, generally speaking, remains the same, following the Renaissance logic of a fragmented process that aims at a finished product that will be fully built in the image and likeness of representation, to then be used.

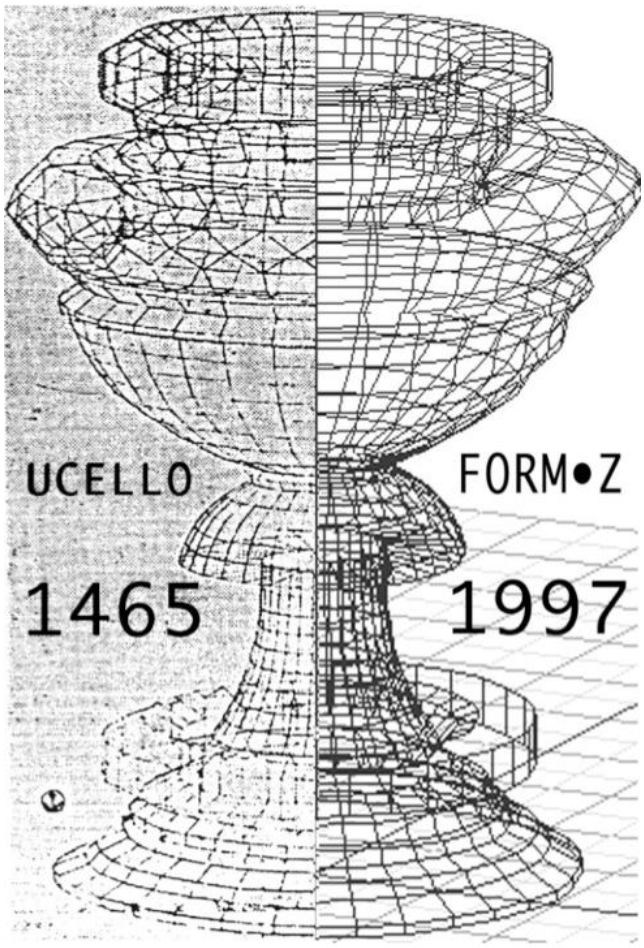

Figure 5. Perspective of a chalice, Paolo Uccello, 1450-1465, as opposed to the modeling of the same chalice by means of Form.Z, 1997. Source: Lagear archive.

Although applications like REVIT allow parameterization and point to possibilities beyond the reproduction of the conventional design logic, their use is still restricted to aiding conventional representation. Even if possibilities of compatibility of complementary projects, for example, are maximized, nothing is changed as regards the Renaissance separation between design, construction, and use. In the case of parameterization for digital manufacturing, there is indeed a movement in the direction of strengthening the relationship between design and construction, particularly with respect to the properties of materials and formal possibilities.

Notwithstanding, the focus on formal representation maintains the separation between design, construction, and use, albeit differently from conventional processes. Most of the time parameterization is used to determine the potential of the material in a predetermined shape, but construction remains an industrialized process maybe more alienated than that of conventional construction. Those who work in construction (or assembly) have even fewer opportunities to intervene creatively in the process than those doing conventional work. While there is great potential for production of mobile, flexible, and adaptable structures through parameterization, this is little explored and its use remains estranged from the design and construction process. The logic of perspectivist structuration prevails.

Although applications that make use of artificial intelligence (Shape Grammar and Genetic Algorithms, among others) do not exactly work with perspectivist structuring because they use outside rules to generate form, they also lead to products that reproduce the same logic as that of the conventional process, since their main use has been precisely to reproduce architects' process of formal composition and do it faster and provide both customers and architects with a greater range of options for decision-making. The separation between design, construction, and use is also indisputably present in these processes.

Interactive architecture has begun to propose some changes, albeit modest, in the conventional process. The main one being the use of computers – or new media such as physical computing – no longer to represent the project, but integrated in the space. This suggests a possible change in the design process, no longer directed to a final, prescriptive, and finished product, but to an open process that relies on user interaction for temporary completion. I call this open process "interface", and argue that one of the goals of architecture and urbanism education should be to produce interfaces, not finished spaces. It is noteworthy that not all the current production of interactive architectures follows the logic of interface production. Conventional spaces are often produced (by means of conventional processes) and appended with apparatuses for interactive manipulation of images or sounds, or even sensors and actuators, which prescribe user actions.

Interfaces as possibilities beyond the representational paradigm

Although interface production may sound like an approach to replace the conventional process, we must be careful with such simplification. As they follow two distinct types of logic, they are not analogous. While the conventional design process is based on defining and solving problems, the architecture-as-interface approach aims at problematizing situations, leaving it open for users to give continuity. There is no clear separation between design, construction, and use, but the proposition of an interactive repertoire, which can either be a combination of physical parts, digital or hybrid interfaces, or a set of rules. The process of production of interfaces obviously uses drawings, but there is a shift in representation of its central, paradigmatic role and an emphasis on interactivity. However, representation and interactivity do not belong to the same category; it is, therefore, impossible to imagine one being replaced by the other.

Álvaro Siza Vieira summarized the role of architects as representing the interests of their customers by resorting to another representation, which is architecture (Bandeirinha, 2010, p.75). In this case representation of architecture would be in service of representation in architecture, explaining the contemporary design tradition. Returning to the initial discussion, it is possible to envision interfaces as the possibility for overcoming both representation processes. From the standpoint of representation in architecture, this leads to what Cedric Price (1996, p.483) calls "value-free architecture", i.e., a type of architecture open enough for

users to give meaning to it while completing it temporarily. On the other hand, from the standpoint of representation of architecture, this means letting go of the Renaissance emphasis, i.e., representation ceases to be an instrument of domination, division of labor, and separation between design, construction, and use. In both cases one cannot forget that representation is a valuable tool and should not be excluded from the production of architecture as interface, but it should be seen as a tool, not as a paradigm.

Currently physical computing (microcontrollers, sensors, actuators, etc.) points to the possibility of a cybernetic process of production of space, in which there is continuity and feedback between design, construction, and use. Unlike the representational role that Siza Vieira attributes to architects, it is possible to envision the architect as a producer of interfaces that provide users with opportunities to configure their spaces. The production of architecture as interface suggests a possible paradigm shift, from the perspectivist (or representational) paradigm to the informational paradigm, maximizing both the process of production based on lived space (not conceived space) and the actual development of information technology, which is, according to John Thackara (2000), currently more focused on its own development than on adding value to people's lives.

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References

Bandeirina, J. A., 2010. 'Verfremdung' vs. 'Mimicry' The SAAL and some of its reflections in the current day". In: D. Sardo (Ed.). *Let's talk about houses: between north and south.* Lisbon: Athena/Babel, pp.59–79.

Barthes, R., 1991. *The responsibility of forms: critical essays on music, art, and representation.* Berkeley/Los Angeles: University of California Press.

Los Angeles Times Blog. [ONLINE] Available at: <http://latimesblogs.latimes.com/lanow/2010/04/tail-o-the-pup-the-landmark-la-hot-dog-stand-still-homeless-.html> [Accessed 02 September 2012].

Bruegmann, R., 1989. The pencil and the electronic sketchboard: architectural representation and the computer. In: E. Blau and E. Kaufman (Ed.). *Architecture and its image*. Cambridge: MIT Press, pp.139–55.

Cabral Filho, J. S., 1996. *Formal games and interactive design.* Ph.D. Sheffield University.

Dürer, A., 1532. *Institutiones geometricae.* Translated by Joachim Camerarius. Paris: Christian Wechel.

Ferro, S., 2006. *Arquitetura e trabalho livre.* São Paulo: Cosac Naify.

Gombrich, E. H., 1988. *A História da arte.* Rio de Janeiro: Guanabara.

Gregory, R. L., 1990. *Eye and brain: the psychology of seeing.* New York: Oxford University Press.

Heidegger, M., 1990. *Being and time.* Oxford: Basil Blackwell.

Hugo, V., 1993. *The hunchback of Notre-Dame.* Ware: Wordsworth. 1st ed. 1831.

Lefebvre, H., 1991. *The production of space.* London: Blackwell.

Peixoto, N. B., 1993. O olhar do estrangeiro. In: A. Novaes (Org.). *O olhar*. São Paulo: Companhia das Letras.

Pérez-Gómez, A., 1994. The Space of architecture: meaning as presence and representation. In: S. Holl, J. Pallasma and A. Pérez-Gómez. Questions of perception: phenomenology of architecture. *Architectural and Urbanism*, July, 7. Special Issue.

Pérez-Gómez, A., 1983. *Architecture and the crisis of modern science.* Cambridge/London: MIT Press.

Pérez-Gómez, A.; Pelletier, L., 1992. Architectural representation beyond perspectivism. *Perspecta*, 27.

Pérez-Gómez, A.; Pelletier, L., 1997. *Architectural representation and the perspective hinge.* Cambridge: MIT Pres.

Price, C., 1966. Life-conditioning. *Architectural Design*, October, 36, p.483.

THACKARA, J., 2000. The design challenge of pervasive computing. In: *CHI (Computer Human Interaction Congress)*, 2000, The Hague. Keynote lecture. Available at: <http://www.doorsofperception.com/archives/2000/04/the_design_chal.php> [Accessed 02 September 2012].

V!RUS, 2012. Call for contributions. *V!RUS*, 7. Available at: <http://www.nomads.usp.br/virus/virus07/?sec=11&item=1&lang=en>. [Accessed 03 September 2012].

Woods, L., 1996. The question of space. In: S. Aronowitz, et al. (Ed.). *Technoscience and cyberculture*. New York: Routledge, pp. 279–92.