Beyond Phenomenal or Literal Transparency: Physical Digitality

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Abstract. The interesting distinction established by Collin Rowe and Robert Slutzky regarding the concept of transparency in modern architecture can be further enriched in relation to digital architecture and the new ways in which architects may address the design of material limits. The polarity between materiality and virtuality, between being and appearance is challenged with the concept of eversion and could lead to what we have referred to as virtual transparency. The intricate performative latticed skins designed and fabricated thanks to C.A.D./C.A.M. techniques have produced different states of transparent visual effects that either conceal or partially suggest silhouettes producing latticed transparencies. Finally, the development of next generation liquid crystal displays may introduce highly responsive transparent membranes in architecture allowing a one step further virtual transparency that could be described as translucent transparency.

Keywords. Phenomenal transparency; eversion; virtual transparency; latticed transparency; translucent transparency.

INTRODUCTION

One of the most characteristic achievements of architectural modernism is the avoidance of bearing walls. Most of Le Corbusier’s modernist principles (Le Corbusier, 1926) derive from that starting point and, to a great extent; modern architectural language is indebted to them. Provided architectural space is borne in the very act of delimitation (Mendelsohn, 1924, p.3), such a contrastive change with architectural tradition did imply a complete shift in architecture’s language itself. Confronted to the fact with regard to the liberation of walls from their load bearing requirements architects began to explore different ways in which to depict such emancipated condition, especially on façades.

Without taking into account XIX century glasshouses, it is generally agreed that Meyer and Gropius inaugurated the glassed-in façade at the Fagus factory in 1911, turning the glass skin around the corners to highlight the radical change introduced then by an embryonic modernism. Mies in his 1920 high-rise unbuilt design for Berlin’s Friedrich Strasse envisaged the curtain wall as a way to substantiate the extreme inversion: walls were to be hanged instead of used as supporting structures; a scheme massively adopted for skyscrapers some decades later. In a domestic scale, Mies’s Farnsworth house made an equivalent effort to epitomize the dematerialization of the wall maximizing the transparency and there-
fore the intimation between exterior and interior. The transparency inherent to a continuous glass skin around the perimeter offered a literal reading of visual transparency based on the material qualities of the enclosure itself. Le Corbusier, on the other hand, developed the fenêtre en longueur making evident the increased opening span that allowed both the appropriation of the visual horizon within the interior of the room and an increased lighting of interior architectural space, thus proposing a different grammar in relation to the emancipation from bearing wall restraints and the traditional vertical rhythmic patterns of narrow openings in such walls. However, not only did he invert the traditional vertical compositional stress on the façade to a horizontal one; he would also involve varied compositional elements in different planes suggesting a compressed perception of forms on an almost pictorial space with a similar strategy to Synthetic Cubism or Purism. In doing so he also addressed a different kind of transparency, one that would some years later be coined as phenomenal.

Rowe and Slutzky (1963) in their memorable essay, Transparency: Literal and Phenomenal, extrapolated to architecture the findings of Giorgy Kepes (1944) in relation to avant-garde painting and transparency. Unlike Kepes or Giedion (1954), they proposed an alternative way to consider transparency in the realm of architecture rather than through a simplistic literal transparency approach solely indebted to physical qualities of certain materials.

After the historic postmodernist trend was abandoned—with its anachronistic return to a grammar of massive walls untrue to a reinforced concrete or steel columned constructive system— the idea of transparency was newly exploited. Buildings began to develop complex multilayered façades where the use of glassed-in skins was tempered with louvers, perforated panels, translucent materials, etc. Thus, transparency became more sophisticated as architects became more aware of the thermal consequences the indiscriminate use of curtain glass walls entailed in certain latitudes. External lighting control became an issue in itself and technology could play a role to ensure it.

Nouvel’s famous south façade for the Institut du Monde Arabe in Paris was a remarkable example of the new role technology could play in architecture. The changing conditions of the limit addressed a new issue and a new way to understand transparency. The use of multidiaphragmed panels capable of dimming external light introduced the use of responsive membranes in architecture but it also proposed a changing appearance of the architectural limit. Toyo Ito’s wind Tower, also built in the mid eighties, produced sharp night visual effects through the interposition of computer controlled lighting between the existing cylindrical tank and the aluminium light membrane that encircled the whole design.
Recent digital architecture has explored different ways to deal with technology. Digital billboards and video displays fostered by architecture first as mere advertisement later became architecture themselves, allowing illusory images to be projected on architectural limits unrelated with their enclosing physical condition. Moreover, the displayed images not only could show a filmed image; they could also depict a virtual reality. Eversion, as it is known, produced an extraordinary link between the virtual and the real. The displays would then become windows open to an illusory imaging of reality or to a virtually created one being in both cases transparent in a certain sense.

Parametric design has developed new ways to address transparency with latticed façades. The irregularity and mass customized elements achievable simultaneously through the use of parametric design and digital fabrication (Iwamoto 2009) allow the production of intricate geometries unmatched in the history of the discipline. Amongst the geometrically complex parameterized designs façades or enclosures occupy a relevant position. Thus, latticed façades that either partially allow transparency or partially conceal interior from exterior could be referred to as transparent but probably not in a conventional sense (figure 3).

Both approaches characteristic of digital architecture, the design of a limit that is an enclosure defining an architectural space and, at the same time, a display of an image completely different from its materiality, as well as the latticed customized parametric façade designs defy the definition of literal or phenomenal transparency as stated by Rowe and Sultzky (1963) in their memorable essay. It is worth to precisely bring about their discourse to understand what we intend to state in this paper. That is, an understanding of transparency in relation to technological membranes and augmented reality, eversion and the intricacy to be found in recent parametric façade designs (Picon, 2009) beyond literal or phenomenal interpretations.
LITERAL AND PHENOMENAL TRANSPARENCY

Kepes interprets transparency in a work of art as the overlapping of figures which would apparently contradict spatial dimensions in as much as they share a common area while still being able to be perceived isolated through their own contours. Consequently, only the attribute of transparency can solve such contradiction. Transparency is then showing an ambiguous quality that contrasts with the clarity we identify physical transparency with, that is to say, the visual permeability as a physical quality of certain materials such as glass. The wise understanding of pictorial transparency is based on an analogy of the attribute of physical transparency on the first place but not only; in Kepes own words: "Transparency however implies more than an optical characteristic; it implies a broader spatial order. Transparency means a simultaneous perception of different spatial locations" (op.cit., p.77).

Rowe and Slutzky (1963, p. 48) note the difference between literal and phenomenal transparency being the first "associated with the trompe l’oeil effect of a translucent object in deep, naturalistic space" in contrast to the latter, which is to be found in "the articulated presentation of frontally displayed objects in a shallow, abstracted space". As it often happens when criticism tools are borrowed from a different discipline the results may be uncertain or in the worst case they might lead to confusion. That is the suggested reason that lead Kepes and Giedion to understand the overlapping of planes in architecture as a consequence of the use of transparent materials and therefore, according to the stated distinction, the transparency thus achieved could only be literal. The problem here is in the very extrapolation from painting to architecture and considering transparency solely in terms of inherent visual quality of certain transparent or translucent materials rather than, or alternatively as, an operational device derived from the spatial organization of elements of a given composition whether it may be pictorial, sculptural or architectural.

Figurative painting evolved from a conceptual approach to an illusionistic one as the technique and the understanding of perspective view improved. For five centuries painters addressed this issue trying to achieve an illusory representation of material reality just as it is perceived by us through our vision. Cubism tumbled down such conventionalized language (Cooper, 1970). Although Cubism was the luminous spark for XX century painting and definitely lead to abstraction, in itself it could not be referred to as abstract painting in none of the different periods it underwent (Leighten, 1988, p. 269). Picasso, quite intentionally, never crossed the border of figurative painting and once he had set the conditions for a non-illusionistic procedure to depict reality he abandoned Cubism though used its mechanisms all throughout his career. Hardly any traces of figurativism may be found in his or Braque’s paintings corresponding to the analytical period; however, small
details dispersed over the canvas keep persuading the observer to establish some kind of relation between the depiction and the depicted object, between the painting and reality. To be precise, Cubism is not abstract but rather non-illusionistic. Rowe and Slutzky (op.cit., p. 46) commented on the pictorial attributes of this period as follows: “Frontality, suppression of depth, contracting of space, definition of light sources, tipping forward of objects, restricted palette, oblique rectilinear grids, and propensities toward peripheric development are all characteristics of analytical cubism” (fig. 5).

Two were the basic mechanisms by which Cubism questioned illusionistic painting and its implicit narrative of space (of figures in space). The suppression of a single privileged point of view (unity of perspective) and the avoidance of the chiaroscuro (contrasting use of light and shadow to produce three dimensional appearance of objects). One of the obvious consequences of abstraction was the claim of painting as a true bi-dimensional reality once the perspective had been avoided. There remained, however, a latent evoking of spatial relationships between the objects and geometrical shapes that colonized the painters’ canvases after Cubism. The natural figure-ground relation of any graphical manifestation implied a front plane and a ground plane, an order of visualization in an extraordinarily compressed space which could be enriched by the overlapping of more than just two figures (Figure 6).

A certain idea of transparency as a result of the decomposition in different planes characteristic of the analytical period of Cubism led to the use of the collage technique. Although used much earlier in Japanese art and during the XIX century, this technique was popularised by Picasso in the Cubist era. The intention however was much more radical: defying the boundaries of representation in painting, Picasso envisaged the possibility to use a fragment of a chair’s meshed seat instead of depicting it on the canvas. In doing so he continued to question to the utmost the very limits of representation in painting, in accordance with the radically novel approach to painting that he and Braque had initiated in their previous work. Thus, the fragment stood as a compositional element within the painting but it was also a part of reality. The depicted object became now part of the depiction itself; the representation was in fact a presentation of the object that was ambiguously transparent between reality and its depiction, between space and time, bridging the gap between the painter and the spectator. Picasso suggested an awareness of the essence of painting comparable to Velazquez’s magnificent Meninas, though certainly not in an illusionistic register. The decontextualized chair’s fragment fixed to Picasso’s canvas was all of that, but it was also a turning point in the history of art -Duchamp’s readymades and the like, even if these could be rooted in ancient Chinese and Japanese rock art.

Cubism’s synthetic period explored overlapping different materials, being the shapes of the abstracted figures and their contours a central issue. That is
the reason why the objects and figures depicted in this period dwelled a flattened space, a space extraordinarily compressed. However, unlike the de-composition of objects in different planes characteristic of the analytical period, the introduction of the collage technique would end up in a decantation of superimposed planes that implied spatial relationships from foreground to background including, if so desired, several middleground figures (fig. 6). Consequently the colour palette scarcely chromatic and self-contained characteristic of the analytical period was greatly enriched and contrasts exploited to enhance the differentiation of shapes through the interaction of their contours. It was an evident result of the collage technique imposed by means of contrasting different textures.

As many other painters of the time Le Corbusier together with Ozenfant painted in the 1920’s similarly to cubist synthetic period in what they would refer to as Purism. The objects of their still natures, although more figurative than those found in Cubism also inhabited a flatland within the canvas. The positional relations between the objects were displayed following a similar compositional strategy as could be found in Le Corbusier’s architectural plans. This is probably the origin of the phenomenal transparency to which Rowe and Slutzky refer to when they analyze Ville Stein. Instead of fixing a literal interpretation of the visual relations of the overlapping of different figures through a glazed plane they infer a series of relations between some physical planes and an implicit compositional one which establish an analogous relation of superimposition that, nonetheless, does not visually destroy one another: phenomenal transparency.

But their first essay regarding the notion of transparency would be rejected by many architecture journals even though the authors would embark themselves in a sequel of their first study, and even a third one never published, just after finishing the first manuscript (1955); apparently some of its content regarding Gropius’s Bauhaus building was considered irreverent to the well doings of the Silver Prince or at least to his editorial followers (“As for the first (article), we sent it to all important architectural journals in the USA and abroad…I distinctly remember AR sending us a reply to the effect that if we would consent to remove certain rather unfavourable reference to Gropius it would see print! (N. Pevsner??)” - letter from Slutzky to Hoesli March 12, 1968, cit. by Oechslin, 1997, p.17), and would have to await till it was published slightly abridged in 1963 by Perspecta (Hoesli, 1997, p. 7)

In the second part published again in Perspecta in 1971 (over 15 years after it was written), a complete review of their initial ideas on transparency, they try to demonstrate that phenomenal transparency is not really a consequence of the cubist mechanisms or a XXth zeitgeist traversing science and culture including the revolutionary notion of space-time. Their main conclusion, after in depth analysis of examples of phenomenal transparency to be found in the architectural work of Vignola or Michelangelo, is that it is a problem of perceptual origin. The multiple reading of varied latent structures in cubist paintings, modern or mannerist architectural façades is a consequence of visual perception; the figure-ground phenomenon observed in all the cases “may be said to be the essential prerequisite of [phenomenal] transparency” (Rowe and Slutzky, 1971, p.299). However, the core issue of phenomenal transparency and of visual ambiguity in the case of overlapping figures sharing common areas without an optical destruction of each other beyond literal transparency, still remains. And it brings about, as both authors point out, perceptual issues studied by Gestalt psychology: human perception not understood as a passive attitude but a sensorial activity which inevitably produces a reaction in ourselves and positions our conscience with regard to our previous experience and, therefore, with our knowledge.

Probably one of the most lucid commentaries made to the distinction established by Rowe and Slutzky regarding transparency and architecture are the following lines by Hoesli (1997): “Exactly defined, this twin concept of actual and apparent transparency appears above all to be a precise tool for the study of
architecture. It distinguishes between essence and appearance in the concept of transparency, and refers to the relationship between content and form in architecture—and to the still enormous question of whether a building is, or whether it means:"

VIRTUAL, LATTICED AND TRANSLUCENT TRANSPARENCIES

However, new technologies enable new ways of understanding material limits and their visual appearance; consequently new kinds of transparencies are achieved. Phenomenological façades and other display membranes have allowed coining the term eversion. Virtual images are projected onto a skin whose materiality remains unchanged while its appearance is in perpetual flow. Such visually changing processes are a step beyond the limit of dematerialization found in the curtain wall provided that the image displayed on these membranes is virtual and not real or, if it is, the image displayed on the screen refers to a reality different from the material reality of the screen itself. Very much the same relation as we find in illusionistic painting where the image painted on the canvas depicts something completely unrelated to the canvas’ own materiality. However, architectural spaces are defined by material limits. If these limits display images on themselves a visual contradiction appears: these limits defining an architectural space are also the support where virtual images are displayed. Thus the observer is confronted with the material existence of the limit and a visual appearance that does not correspond to its material nature.

Spanish XX philosopher, Ortega y Gasset (1914), wrote on the idea of surface as a double reality regarding the image displayed and its own materiality -the appearance and its being- on the following terms:

“Depth dimension, be it in space or in time, whether visual or auditory, is always presented on a surface. This surface has in fact two different values: the first, when we take it for what it is physically; the second, when we see it in its virtual second life. In the latter case, the surface, without ceasing to be, expands itself in a deep sense.”

It is not difficult to find the suitability of this remarks in relation to eversion. The materiality of the architectural limits is questioned as the phenomenology perceived on these membranes does not depend on the conventional relation between the material object and the perceiving subject. The images that reach our retina are virtual recreations, lighting effects or projected images that may be either virtual or real. Nonetheless, time creeps into

Figure 7 (left).

Figure 8 (right)
Fatehpur Sikri (Agra), 1571-1585. Stone carved lattice.
the architectural space through these hyper membranes bombarding us with illusory images. What we see is not what it seems, and the nature of the image breaks up the real geometry of space in time. It is quite obvious that there is an overlapping of two different figures: the physical limit with its own materiality and the image displayed on it. Neither literal nor phenomenal transparency seem suitable to describe this kind of transparency; thus, what may be called virtual transparency is achieved.

Toyo Ito’s work often reflects his preoccupation to merge the physical and the virtual considering the double condition of human perception: “The real body which is linked with the real world by the fluids flowing inside it, and the virtual body linked with the world by the flow of electrons.” (Ito 2002). His digital wall (exhibition Toyo Ito Architetto, Vicenza, 2001, fig. 7) is a good example of this double condition found in his design and the kind of transparency between the virtual and the real where the curved screen defines and architectural space while it displays a virtual imaginary.

In the case of the intricate parametric designed façades we have become familiar with in the past decade a different kind of transparency is obtained. There is visual permeability but if the size of the openings is comparatively small to the size of the façade the overall image of the building is that of a rather opaque façade with darkened small openings. This effect has been used in architecture with latticed façades for centuries. An exceptional example is the latticed façade of the Hawa Mahal (Palace of the Winds) at Jaipur which allowed the royal ladies to see the street through it without being seen, following a diffractive physical principle. Similar extraordinary stone carved lattices can be found at Fatehpur Sikri. Conceived to conceal interior from exterior, the transparency effect we refer to can be easily seen in fig. 8, were a human figure –my wife- can be perceived as can be the lattice frame in the...
front plane. The ambivalence of the image - its ambiguity - changes depending on the light of the exterior and the interior producing varied densities of transparency.

It can be easily inferred that this latticed transparency, although not new in architecture, differs to a great extent from literal or virtual transparency. The ambiguity of the images perceived could be more easily paralleled to phenomenal transparency, although the multiplicity of readings is much more dependent on the light circumstances at every moment. Ellen Alderman [1] has used the term phenomenal translucency to describe the relation of Toyo Ito’s T-House translucent glass façade and the various readings it triggers trying to establish a connection between the material quality of the translucent glassed-in façade and the concept of phenomenal transparency.

Complexity is a characteristic of parametric design due to the mass customized elements that can only be achieved through C.A.D./C.A.M. techniques used in these cases. The performative designs obtained may address new ways to control the external lighting in the interior but they are likely to get latticed transparency effects allowing seeing without being seen. Thom Faulders has addressed this latticed transparency effect in his Airspace design for a multifamily house in Tokio built on a site “previously wrapped by a layer of dense vegetation” (Iwamoto 2009, p. 54). This pre-existent condition was reinterpreted by means of an organic multilayered skin latticed façade (figs. 9 and 9 bis). Thus, the exterior building skin parametrically designed creating an irregular pattern evoked the tree-canopy effect that recalled a former site condition from the inside of the building, serving at the same time to modulate the different privacy needs of the interiors.

Depending on the scale of the openings different effects can be attained. A meshy effect will provide light permeability but the overall effect will be that of a translucent material such as can be seen in the Spanish pavilion at Shangai’s Expo 2010 (see fig. 1) by Benedetta Tagliabue (EMBT Architects). A greater transparency will be obtained if the openings are enlarged, such as happens in Airspace. However, the ambivalence between visual permeability gazing in both directions persists: seeing from the interior outwards and concealing sight on the opposite direction.

What is most remarkable about the effect of light diffraction is the possibility to build tiny perforated skins surrounding the building and the effect will invariably remain. Such type of perforated façade was designed by Thom Mayne (Morphosis) for the enlargement of the Cooper Union in New York. The day/night effects interchange the transparent appearance (see figures 4, 10 and 10 bis).

As can be seen in the images (taken at different hours of the day during the ACADIA 2010 Conference) the aspect of the skin of the building and its visual appearance varies as the sun develops its everyday course, and the concealed interior may completely change at night or at dusk allowing those images of latticed or diffracted transparency.

Even now new materials are being developed challenging conventional physical transparency. Transparent next generation liquid crystal displays developed at Corning have inverted the idea of literal transparency: though being physically transparent they serve as a support for image display accomplishing remarkable augmented reality effects. This may revolutionize architecture and the possibility of designing responsive skins that will be easy to interact with through touch-screen technologies. The design possibilities with flexible liquid crystal displays which allow bending (ultra-slim flexible glass, Corning) are increased with even less geometrical restraints in their application to architectural
design. The augmented reality achieved through these new technologies is simply superb. Obviously, economic limitations make nowadays this kind of membranes of translucent transparency something more likely to experiment with rather than a near future in commercial architecture. However this kind of extremely illusory translucent transparency could well become part of our daily lives in the future.

REFERENCES