Ambient and Augmented Architectural Screens

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Abstract. *The paper investigates architectural screens as minimum yet definitive architectural elements: pop-up surfaces that produce ambient effects, outlining a sensorial envelope loaded with impactful environmental decorum.*

Keywords: architectural screens, pop-up surfaces, screen-façades

Introduction

In *The Architecture of Atmosphere* Mark Wigley (1998) appropriates Gottfried Semper's argument that the full force of architecture is to be found in the outer surface, the decorative layer through which the atmosphere seemingly percolates. Revisiting the theoretical tradition that architecture is never more than a theatrical effect, a stage full of sensous emissions, Wigley suggests that *'to construct architecture is simply to pop up a surface that produces an atmosphere'*.

I am particularly interested in the notion of surface as a minimum yet definitive act of architecture. As a research hypothesis and as a strategy for practice, pop-up surfaces producing an ambiance constitute in my opinion an architectural world of lightweight materiality, which integrates environmental sensitivity with human centric design discourses.

According to Semper (Semper) the origin of architecture is located in the primary craft of textiles. As a material system -whose attributes are pliability and suppleness, and basic objectives are to bind, to cover, to protect, and to enclose- the textile precedes, informs, and later becomes consolidated into architecture. In Semper's theory the emphasis is shifted from the wall as a load bareing element to the wall as a partition or screen (Asman 2002). This definition is etymologically evident in German. The structural entity *'Mauer'* is distinguished from the partition wall 'Wand' that is introduced by Semper through the notion of adornment *'Bekleidung'* as a surface ornament *'Ge-wand'*.

Intensive surface calibration as a primary artistic task has become well embedded in digitally driven architecture. Manifesting a formal regime of excessive patterning, it promotes the indispensable yet historically challenged relation of architecture and ornament. However this new kind of ornament -to use Farshid Moussavi's argument (Moussavi and Kubo, 2006) – is a necessary ornament as it emerges from the material substrate and expresses the embedded forces through processes of construction, assembly and growth as well as produces affects and resonance.

The screen as definitive architectural element

From the Arabic mashrabiya to the perforated brick walls of Mediterranean Modernist Slabs, from the Japanese shoji screen to interior partitions of the 1960's open plan spaces to the digitally generated and fabricated experimental spatial installations of the '00s, from acoustically regulating walls to dynamic responsive facades – architectural screens masterfully, fulfil the definition of surfaces that produce an atmosphere. As an architectural element, the screen amplifies the visual perception of space, making coherent its shape through enclosure. Deriving from the Semperian wall it is loaded with information – culturally significant ornamentation, sensorial stimuli – proving a prime interface of communication between architecture and the user. The ambient components of an architectural screen - the intangible effects generated by it, and which are specific to it- augment its architectural performance. The phenomenological impact of light, sound, texture and pattern contribute to a sense of place and authenticity.

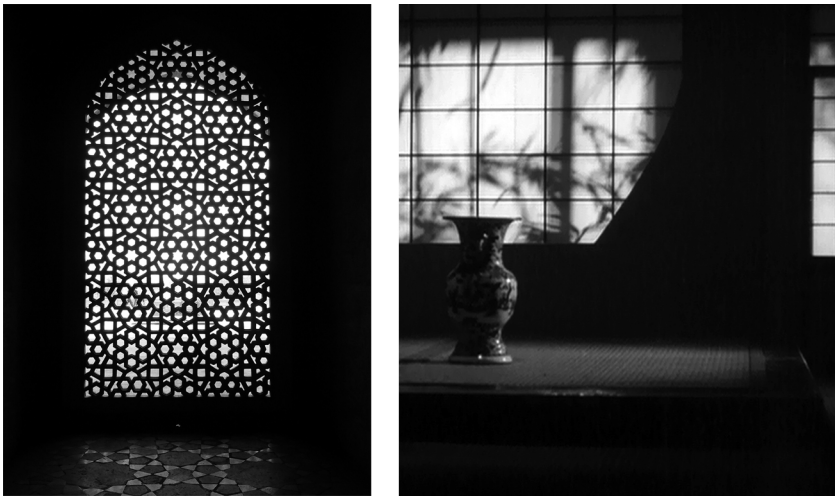

Figure 1. Perforated marble screen at the Humayun Tomb in New Delhi, photograph by Jonathan Freundlich (left) A *shōji* screen, Screenshot from Late Spring by a public domain Japanese motion picture (right)

In traditional Islamic Architecture, lavishly ornate latticed screens prevail, becoming its definitive architectural elements. Abstract ornamentation is intrinsic to Islamic culture asserting a communion with the divine. Perceived from within the perforated screen creates a negative space of shadow and light within which the absent deity of Allah can be sensed (Mack 2000). In traditional Japanese Architecture, sliding screens consisting of light frames of wood covered with paper have a special reference in its structural woodwork. These movable partitions are distinguished in two kinds: the *fusuma* screens forming partitions between rooms and the *shoji* that are placed on the outer sides of rooms next to the veranda forming the substitutes

for windows (Morse 1961). Japanese paper screens filter light producing a characteristic effect of translucency.
The screen as adorned surface lies in conflict with the modernist tradition that champions the purity of volume. Nevertheless, in its permeability and lightness, the architectural screen supports the Modernist emancipatory quest for dematerialisation of architecture through light and transparency (Buchanan 1998). The development of curtain wall facades and sophisticated cladding systems – apparently reconcile this conflict. According to Gerhard Mack (2000) in terms of function and imagery, the façade fulfils the role traditionally assigned to ornament and decoration, acquiring certain autonomy as an interface between the building and the outside world, comprising simultaneously a space and a surface. The interaction between the volume and the surface that conceals or reveals it is evident in many of the pioneering works of Hertzog & de Meuron where the façade functions as a "phenomenological structure" and as a "pictorial skin" (Mack 2000).

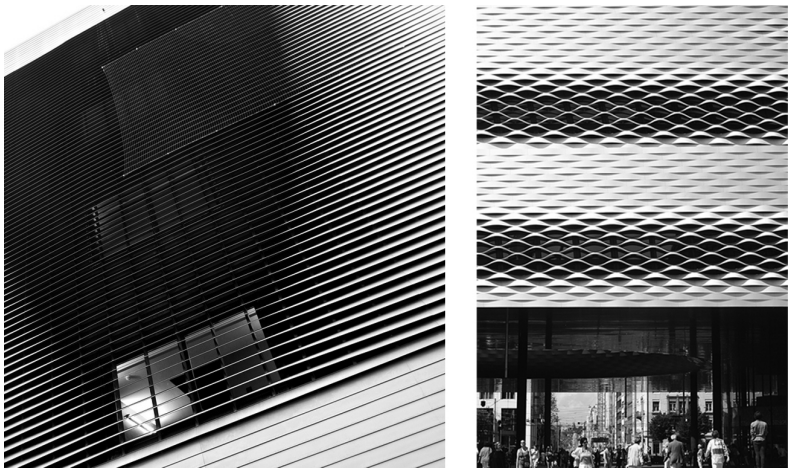

Figure 2. Screen façades by Hertzog & de Meuron in Basel: Central Signal Box, 1999, photograph by Theo Jones (left) New Hall of Messe 2013, photograph by Trevor Patt (right)

In the architectural production of the past twenty years, we register the advent of the screen façade. The functional mandate of screen facades is to regulate light and privacy providing an efficient calibration of environmental concerns concerning the thermal behaviour of the building. Furthermore, screen façades become active agents in an architectural shadow play that augments the visual experience of the building through transformations in conditions of semi-transparency. From the inside out: diffusing light rather than framing a view. From the outside in: gradual revelation of the buildings' content through masterfully patterned tectonic layers. The augmented performance of screen façades affects perception, primarily through the visual effects of geometry, optical filtering and manipulation of light.

Within current trends in digital design and fabrication, screens are evolving into a distinct field of practice. Traditionally weak and evoked as a mood rather than a

design generative parameter, the representation and manipulation of ambiance in architecture has drastically accentuated with the use of digital media in the design process as light, acoustic, and climatic behaviour of architectural form and fabric can be efficiently modelled, simulated and calculated. Dynamic façade systems are investigated in a cross disciplinary field between architecture, robotics, artificial intelligence, and structural engineering, highlighting the geometric and structural aspects of surface kinematics. Complementary, at the scale of the interior digital artisanship is expressed in machine intricate ornamentation of surfaces amplifying perceptual effects. This new kind of surface calibration that accentuates its responsiveness focuses upon a microscopic rearticulating of its texture revamps the relation between architecture and the primary craft of the textile. In fact, this cyclicality in the development of the surface paradigm in architecture re-assesses Gottfried Semper's theory of the origin of architecture in textiles.

Figure 3. Al Bahar Towers solar-responsive dynamic shading screen in Abu Dabbi: Grasshopper definition of folding patterns by Wissam Wahbeh (left) photograph by Still ePsiLoN (right)

Architectural screens as design research agenda

Comparing historic precedents with state of the art developments, I outlined a concise architectural genealogy of architectural screens. The aim of this genealogy is to understand the cross-fertilisation between distinct lineages from the culture specific cases to global paradigms. The genealogical classification system of screen façades and internal partitions ought to distinguish between materiality, ornamental disposition, form generating geometry, functional disposition and ambience modifying parameters. Cross-fertilisation between lineages through juxtaposition, comparison and hybridisation can contribute to the archaeology of the digital, making explicit some underlying principles of the abundant in the state of the art abstract, intricate, digitally crafted surfaces.

Investigating architectural screens as distinct architectural elements aims at making explicit novel aspects of a lightweight materiality that enhances their temporal and

transformable constitution. Finally, the genealogy of screen facades intends to produce a manifesto for a 'soft' architecture of the surface that integrates environmental consciousness with sensorial sensitivity.

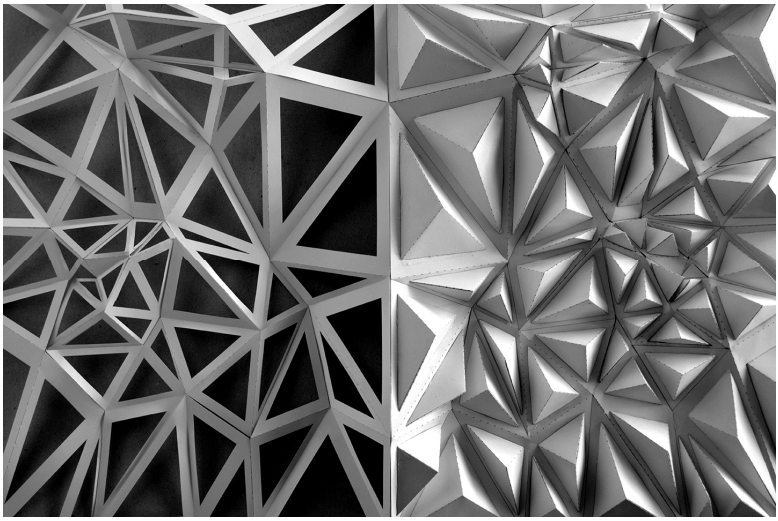

Figure 4. Light and sound diffusing paper screen prototype by Sophia Vyzoviti, Panayotis Tsiftsoglou, Xenia Kyvelidou and Eytyhis Eythimiou, Folding Architecture Laboratory, Department of Architecture, University of Thessaly, 2015

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