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Tectonics in the Twenty-first Century: The Expanded Notion of Structure and Its Perception in Architecture

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Tectonics in the Twenty-first Century

The Expanded Notion of Structure and Its Perception in Architecture

A Thesis submitted to the
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Abstract

This thesis is an exploration of the meaning of tectonics in contemporary architecture. The topic of tectonics can be approached as a relationship of an architectural structural concept with space/form, assembly, and surface. Recently, however, architectural historians and theorists such as Kenneth Frampton, with his 1990 essay, "Rappel à l'Ordre, the Case for the Tectonic," and his 2006 book *Studies in Tectonic Culture: the Poetics of Construction in Nineteenth and Twentieth Century Architecture*, have questioned the capacity of contemporary architectural design culture to fully integrate the notion of tectonics, which calls for a highly expressive relationship between structural force and form, into today's built projects. Is the notion of tectonic architecture fading? Or, is the view of tectonics held by Frampton and his followers incomplete, rendering them a partial understanding of tectonic presence in contemporary architecture? Or, lastly, is the notion of tectonics no longer relevant considering the vast, rapid changes during the recent half-century in the creation and perception of architecture? This thesis hopes to address these questions with a survey of the meaning of "tectonic" that considers the challenges to its understanding in current architectural discourse and practice. It aims to grasp the strengths and weaknesses of Frampton's position. Further, opportunities to expand the definition of tectonics are sought, so that it may be shown to be relevant to changing values, design sensibilities, and technologies. In addition, a series of case studies will be presented that merit a new (or, in some cases, renewed) notion of tectonics. These case studies are selected based on the premise that they stand for a position that offers a relationship between form, space, surface, and assembly to the poetics of construction, but also that addresses the conditions that Frampton feared would render tectonic culture's demise. The conclusive message urges architectural discourse to seek out tectonic expression as a means to convey forces beyond the statical, such as cultural, economic, and technological.

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Introduction

This thesis is an exploration of the meaning of tectonics in contemporary architecture. The topic of tectonics can be approached as a relationship of an architectural structural concept with space/form, assembly, and surface. Recently, however, architectural historians and theorists such as Kenneth Frampton, with his 1990 essay, "Rappel à l'Ordre, the Case for the Tectonic," and his 2006 book *Studies in Tectonic Culture: the Poetics of Construction in Nineteenth and Twentieth Century Architecture*, have questioned the capacity of contemporary architectural design culture to fully integrate the notion of tectonics, which calls for a highly expressive relationship between structural force and form, into today's built projects. Is the notion of tectonic architecture fading? Or, is the view of tectonics held by Frampton and his followers incomplete, rendering them a partial understanding of tectonic presence in contemporary architecture? Or, lastly, is the notion of tectonics no longer relevant considering the vast, rapid changes during the recent half-century in the creation and perception of architecture? This thesis hopes to address these three questions with a survey of the meaning of "tectonic" that considers the challenges to its understanding in current architectural discourse and practice. It aims to grasp the strengths and weaknesses of Frampton's position. Further, opportunities to expand the definition of tectonics are sought, so that it may be shown to be relevant to changing values, design sensibilities, and technologies. In addition, a series of case studies will be presented that merit a new (or, in some cases, renewed) notion of tectonics. These case studies are selected based on the premise that they stand for a position that offers a relationship between form, space,

surface, and assembly to the poetics of construction, but also that addresses the conditions that Frampton feared would render tectonic culture's demise.

Frampton sees a market-driven priority of expediency, economy, and fashion in architecture as well as technological changes that impact the process and construction of architectural design as threats to the existence of tectonics in contemporary architecture. With the market conditions of late capitalism comes a tendency to value the building for its scenographic qualities, thus devaluing its possible meaning as a constructed object. In addition, digital culture further deemphasizes the material and structural presence in architecture, distancing a perception of meaning from the physical, tectonic elements. While Frampton proposes a strong opposition to these forces, an alternative solution may be to engage them as challenges within the design profession. This alternative approach seeks to address these issues directly by recognizing their impact on tectonic expression, and the reciprocal impact tectonics may have in its different manifestations.

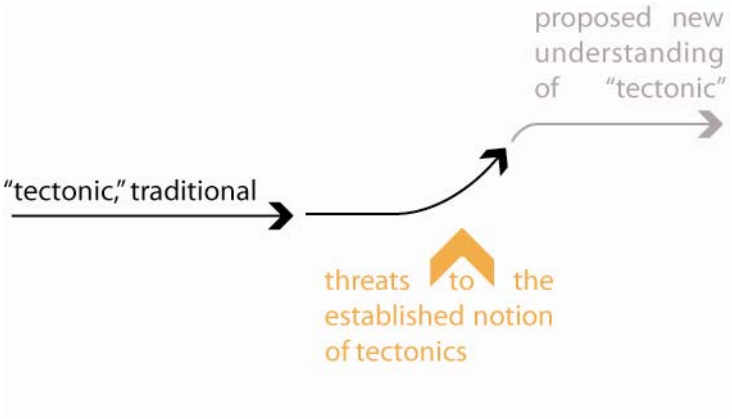

Figure 1: Threats to the established notion of tectonics. The new understanding of tectonics runs parallel to the traditional one. Diagram by author.

Form and space are elements of architecture that may be dependent on tectonics but have become altered due to the changes in digital technology, constructional processes, and media-driven forces linked with commodification that Frampton strictly opposes. Form that is only expressive of its own tactility denies the existence of these forces altogether. Thus, while the notion of tectonics, both traditionally and currently, must always acknowledge a work of architecture's physicality, it must also respond to the cultural forces at play. Thus form is generated by a convergence of these vectors.

Historically, theorists Karl Bötticher (1806-1889) and Gottfried Semper (1803-1879) saw a conceptual connection between the "core form" and the "outside world" as mediated by the "art form." However, twentieth century movements have changed the way these entities are viewed. For instance, postmodernism put a weighty emphasis on the qualities of surface, thus obscuring this connection and prioritizing the external wrapper of a building as the primary venue for the communication of meaning. Tectonics in contemporary architecture may be a means to reconfigure the paths of communication among cultural forces, architecture, and surface. This situates architecture within a multi-dimensional network of influences, forces, and meanings, rendering a singular transmitted meaning impossible. Tectonics may be presented thus as a participant in the conversation among these various cultural forces and the structural forces of architecture.

Among all theoretical writings on tectonics, there is a consensus about the importance of the architectural joint. The discussion of exactly what is being joined, however, varies. While the array of matter that may be joined has the possibility to be infinite, ranging from a building's transition to its site to material connection details, an understanding of the approach to joining is

key to the comprehension of the decisions made in its design process. Thus, one is compelled to look at the changes within the building process in the recent half-century to find a network of professionals and workers playing a prominent role in a building's design-life. This network harbors innovation on all technological fronts: material, constructional, and digital. Yet, the form of this network might perform best through a non-hierarchical arrangement, wherein each role brings its own specialty as a craft. This idea prompts the architectural community to reevaluate how the varied participants in the design network engage constructional joining, and what imbued meaning results from these unions. An engagement of this network is required to carry tectonics and the principles of joining through to future designs.

Within the modern evolution of the meaning of "tectonic," architecture has experienced an influx of new technologies and met a great deal of rapidly-changing, complex societal issues. In order to adapt to these changing factors and influences, it becomes important to adopt a definition of tectonics that possesses the agility to engage shifts in influential forces while still maintaining a reliance on the expressive potential of the physical form of architecture.

The expanded definition of tectonics does not deny the importance or relevance of the traditional notion of tectonics. This honors the architectural meaning within structural logic and the constructional components of a piece of architecture. Tectonics in its expanded, contemporary conception recognizes the multitude of influences that come with technology and an image-rich society, and urges form, surface, and assembly to acknowledge and engage these forces. This idea is manifest in a dialogue of these formal elements with the design network, a building's audiences, art-form, and core-form.

Thus, as the architectural community reflects on the relationship among these elements, it may find that there is little utility in trying to return to a previous notion of tectonics, serving only to deny the important shifts of architectural influence. Instead, the expanded definition seeks to engage these challenges. This includes an exploration into the possibility that tectonics may be an expression of cultural forces as well as material characteristics and statical forces. Further, this new notion seeks to move beyond the postmodern critique that reacts to the surface as a dominant factor in order to incorporate it as part of a layered, multi-faceted architectural experience. Lastly, it recognizes that while the modern mode of production inhibits a return to a nostalgic, traditional notion of craft, the process of design may employ a "dispersed craft." This idea hopes to recognize the art and articulation which the different professions may bring to the process of assembly through a non-hierarchical network of exchange. The ultimate goal is to bring to the surface of architectural discussion the powerful potential of tectonic expression, and expand its definition to encompass issues relevant to architecture today.

[1]

Tectonics: Past, Present, Future

"Building construction artistically considered,"[1] is the simple phrase Kenneth Frampton uses to describe the term "tectonic" in the most general sense. His seminal 1990 essay, "Rappel à l'Ordre, the Case for the Tectonic,"[2] summoned architects to "return to" this definition in order to regain expressive potential in an age that has an increasing tendency to use media of expression that exclude physical contact. Yet perhaps the suggestion that architecture has departed from his specific definition indicates that it is not only architecture that needs reevaluation, but the definition of "tectonic" itself. In order to understand the relevance of the tectonic in contemporary architecture, one must first evaluate the merits of this notion and how they can evolve to pertain to building construction and its relationship to cultural expression. Then, a look at the current notion of tectonics and architecture in light of recent changes proposes to expand this definition to encompass the cultural and technological shifts that affect the processes and products of architectural design today.

In Search of Tectonics: Architects in the Nineteenth Century

Architectural debates in nineteenth century Germany aimed to define abstract concepts such as "style" and "beauty." A byproduct of these discussions was the introduction of the term

[1] Kenneth Frampton, "Between Earthwork and Roofwork: Reflections on the Future of the Tectonic Form," *Lotus International*, no. 99 (1998), 24.

[2] Kenneth Frampton, "Rappel à l'Ordre, the Case for the Tectonic," *Architectural Design* 60, no. 3-4 (1990), 19-25.

"tectonic" into modern architectural discourse. This spawned a meta-discussion around the German "style" debates, ran a thematic undercurrent throughout modernism and the twentieth century, and has continued to appear in various forms in the present discourse.[3]

Arthur Schopenhauer was one of the first of these German theorists to explore the representational relationship between force and form. His book *The World as Will and Representation* was highly influential in the nineteenth century. In this book he admired the "aesthetic effect" that he perceived in Greek architecture's articulation of column and entablature. To Schopenhauer, this separated the load-bearing from the load, what he termed *Stutze* and *Last*,[4] respectively. In this exploration, however, he did not employ the term "tectonic."

While the roots of the term "tectonic" can be traced to Greek roots for "carpentry" and "poetry," their first use in architecture was in 1830, in Karl Otfried Müller's *Handbook of the Archaeology of Art*. Here "*tektonische*" includes

> utensils, vases, dwellings, and meeting places of men, which surely form and develop on the one hand due to their application and on the other due to their conformity to sentiments and notions of art. We call this string of mixed activities tectonic; their peak is architecture, which mostly through necessity rises high and can be a powerful representation of the deepest feelings. [5]

[3] This historical survey of the meaning of "tectonic" follows the history of the German debate on "style" closely. This follows the model of Kenneth Frampton's survey in *Studies in Tectonic Culture: the Poetics of Construction in Nineteenth and Twentieth Century Architecture*, which highlights the German debate mainly due to this discussion's relationship to the word "tectonic." The ideas behind this topic, however, were not particular to Germany. For example, discussions on the relationship of structural force and form are topics that were thoroughly studied by Viollet-le-Duc in France, and the British debate on arts and crafts highlights similar attitudes towards industry.

[4] Arthur Schopenhauer, *The World as Will and Representation* [Welt als Wille und Vorstellung. English.], trans. E. F. J. Payne (Indian Hills, Col.: Falcon's Wing Press, 1958), 411-418.

[5] Karl Otfried Müller, *Handbuch der Archäologie der Kunst*, (Breslau: J. Max, 1830), quoted in Kenneth Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture,* ed. John Cava (Cambridge, Mass: The MIT Press, 1995), 4.

This "string of mixed activities" later evolved to refer to an abstract quality, but in this early context the key themes are the act of making and a deep connection to culture in that tectonics reflects the feelings of an unnamed group. In Müller's definition a duality can be seen: on the one hand these artifacts and edifices have value in their use, yet on the other hand their artful reference to the intangible makes them a symbol which has the primary function of reference to a collective sentiment.

Among the voices in the German debates about style was an archeologist, Karl Bötticher. Bötticher, writing in 1846, professed great appreciation for the "tectonics" of Greek architecture. Central to his notion of tectonics were the dual notions of *Kernform* (core-form) and *Kunstform* (art-form). In his view, the primary task of architecture was to enclose and organize space. The articulation of this enclosure came forth as structure and its decoration, both conceived by the designer with intent, yet different in their realms of communication. The core-form referred to the structural system, and it alone, in Bötticher's view, did not have the capacity to fully express both itself and its cultural context. This expression was the task of the art-form, the "explanatory layer"[6] that establishes the meaning imbued in a work of architecture. "The structural system itself is an invented form without model in the outside world; the art-forms, though they are too mental creations, are taken from what exists in the outside world," Bötticher declared in his essay "The Principles of the Hellenic and Germanic Ways of Building with Regard to Their Application to Our Present Way of Building."[7] Michael Schwarzer summarized Bötticher's

[6] Karl Bötticher, "The Principles of the Hellenic and Germanic Ways of Building with Regard to their Application to our Present Way of Building" In *In what Style should we Build?: The German Debate on Architectural Style*, ed. Heinrich HübschSanta Monica, CA : Getty Center for the History of Art and the Humanities, 1992), 163.

[7] Ibid., 202.

concept of this relationship in his article "Ontology and Representation in Karl Bötticher's Theory of Tectonics" as "a harmony between building and human culture brought about by the mediation of artistic ornament."[8] Here we see the art-form as a crucial link between a building and its visitor.

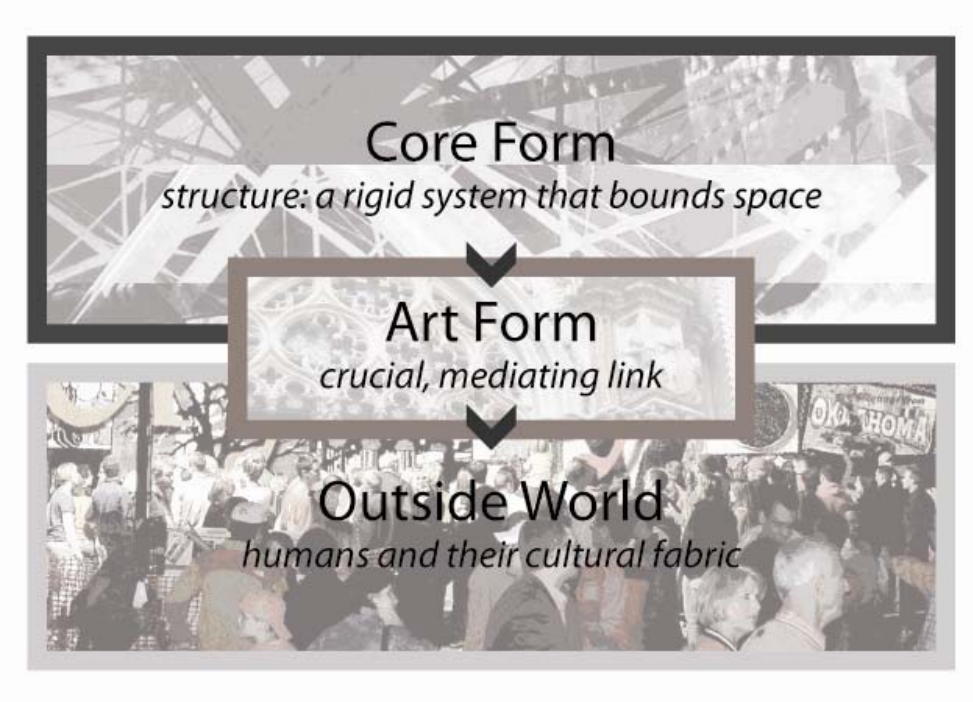

Figure 2: Botticher's relationship of the art-form as a mediator between core-form and cultural aspects. Diagram by author.

In Bötticher's view this gave architecture a task similar to pictoral art. Once a piece of architecture fulfilled its initial task of enclosing space, it had the capacity to represent something beyond itself. In other words, it could carry symbolism: "The essence of pictoral art and its relation to nature rests in this interaction between concept and object, between invention and

[8] Mitchell Schwarzer, "Ontology and Representation in Karl Botticher's Theory of Tectonics," *The Journal of the Society of Architectural Historians* 52, no. 3 (Sep., 1993), 267-280, http://www.jstor.org.proxy.libraries.uc.edu/stable/990835 (accessed February 12, 2009).

imitation."[9] This can be seen as an evolution of the dualism seen in Müller's definition of tectonic. As described by Müller, the dual task of tectonics satisfies a structural requirement as well as a cultural one; Bötticher simply gave them a name.

Figure 2 shows art-form as the link between core-form and the outside world. To Bötticher, the line between art-form and core-form should not be blurred. By his description art-forms adorn the structure to breathe life into the lifeless building components. Yet, in the end the two are to be "conceived as a single whole."[10] Despite this last statement, Bötticher's view of the relationship between art-form and core-form is prevalently referred to as an insistence on the perceptual separation between these two elements.[11]

Deeply rooted in the notions of art-form and core-form, Bötticher's definition of tectonics was expressed simply as "activity having to do with building and furnishing."[12] But the expectations of such a building were high: they included a spatial organization and a subsequent expression that visually respected both the underlying structure and its outer context.

Perhaps this concept is best illustrated in Bötticher's example of Greek construction and ornament. The entablature on Greek temples artfully references the structure behind the panel. By Bötticher's definition, the beams themselves demonstrate the core form, while the triglyphs

[9] Bötticher, *The Principles of the Hellenic and Germanic Ways of Building with Regard to their Application to our Present Way of Building*, 202.

[10] Ibid., 163.

[11] One of Gottfried Semper's main sources of criticism on Bötticher concerned this understanding of art-form and core-form as completely separate.

[12] Wolfgang Herrmann, *Gottfried Semper : In Search of Architecture* (Cambridge, Mass.: MIT Press, 1984), 151.

on the entablature represent beam ends in a culturally-enriched way, thus demonstrating the art form.[13]

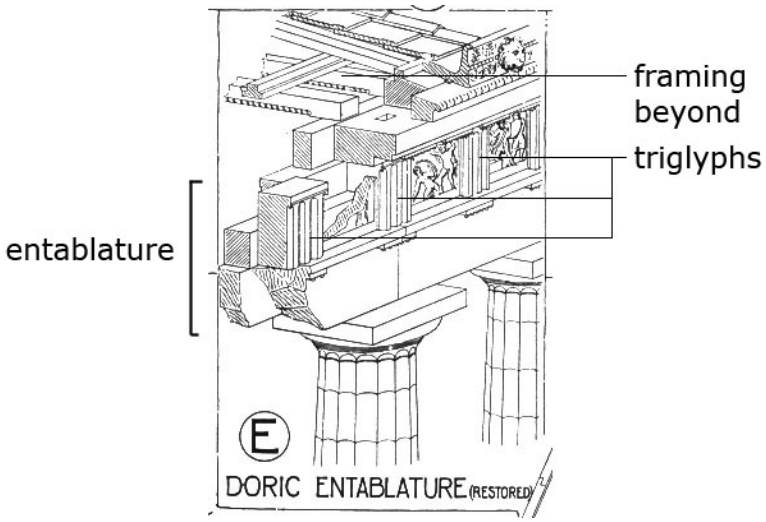

Figure 2: Illustration of Greek construction. The beams themselves serve as the core-form of tectonics, while the triglyphs serve as the art-form so much as they acknowledge the presence of beam ends. (Image source: Sir Banister Fletcher. *A History of Architecture*, 110.) Labels by author.

This belief in a dual-purpose of architectural structure and form carried through to Gottfried Semper's terms *structural-technical* and *structural-symbolic*. These two terms are closely related to Bötticher's *Kernform* and *Kunstform*, as they refer to what Semper identifies as the two purposes of tectonic components: structural members and those members that best represent the structural concepts. (In the twentieth century Frampton would relate these to his own terms: ontological and representational.) Semper went on in his later theory to elaborate on the concept of *Bekleidung*, literally "dressing," to refer to the outer appearance of a work of architecture. Also similar to Bötticher's concept of art-form, this outer cloak was any piece of

[13] Karl Bötticher, *Die Tektonik der Hellenen* (Potsdam: Riegal, 1844), analogy used in Kenneth Frampton, *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture,* ed. John Cava (Cambridge, Mass: The MIT Press, 1995), 4-5.

architecture's key to elevating meaning beyond the immediate form and materials. He stated: "The work does not as it were parade the form before us as a finished product according to the lessons of aesthetic ideality, but lets us see the artistic form and the high idea that dwells within it."[14]

Semper's *Bekleidung* theory was rooted in his conviction that architecture as a trade emerged out of the making of textiles. His writings go to great lengths to prove that carpets, not masonry, were the initial separators of space within a home, and load-bearing walls were covered with cloth as well. He even went so far as to say that this outer covering was the primary architectural concern, and the wall itself was secondary.[15]

This is not to say that the dressing was to be independent of its inner form. On the contrary, Semper believed that the characteristics of the covering (which included all forms of adornment and decoration – not just textiles) grew out of the core structure. In this, he said, one could find the "true essence of architecture …. *both the art-form and decoration are so intimately bound together by this influence of the principle of surface dressing that an isolated look at either is impossible*."[16] Thus it was essential for the goals of this duality to be in tandem.

This sentiment is also reflected in a frequently-quoted footnote in Semper's *Four Elements of Architecture*: "masking does not help, however, when behind the mask is false or the mask is no good." [17] In this case the cladding is the "mask." The connotation behind this is not

[14] Gottfried Semper, *The Four Elements of Architecture and Other Writings* (Cambridge England ; New York: Cambridge University Press, 1989), 249.

[15] Herrmann, *Gottfried Semper : In Search of Architecture*, 206.

[16] Semper, *The Four Elements of Architecture and Other Writings*, 252-53. (Italics by Semper.)

[17] Gottfried Semper and others, *Style in the Technical and Tectonic Arts, Or, Practical Aesthetics* [Stil in den technischen und tektonischen Künsten, oder, Praktische Äesthetik.] (Los Angeles: Getty Research Institute, 2004), 551.

negative, however; as Frampton clarifies: "By masking Semper did not intend falsehood, but rather the creation of a tectonic veil through which and by which it would be possible to perceive the spiritual significance of the structural form, as it lay suspended, as it were, between the pragmatic world of fact and the symbolic world of value."[18] Semper believed the monumentality of architecture has roots in ritual and festivities, wherein reality is exaggerated, elaborated, suspended, or saturated with symbolism in order to evoke meaning. In this sense, the materiality of an object will disappear when the core and its dressing are successful. When an architect is knowledgeable of the material, it will be formed and adorned in such a way that its representation is seen and not its nature as humble components. This is the meaning behind Semper's declaration that a "material must be mastered before it is destroyed."[19]

Also taking root in Semper's *Bekleidung* theory is an emphasis on joining. The knot is the basic unit of the textile, and Semper extrapolates this essential element to apply to all built form.

[18] Kenneth Frampton, "Botticher, Semper and the Tectonic: Core Form and Art Form" In *What is Architecture?* (London ; New York: Routledge, 2002), 151.

[19] Semper and others, *Style in the Technical and Tectonic Arts, Or, Practical Aesthetics*, 551.

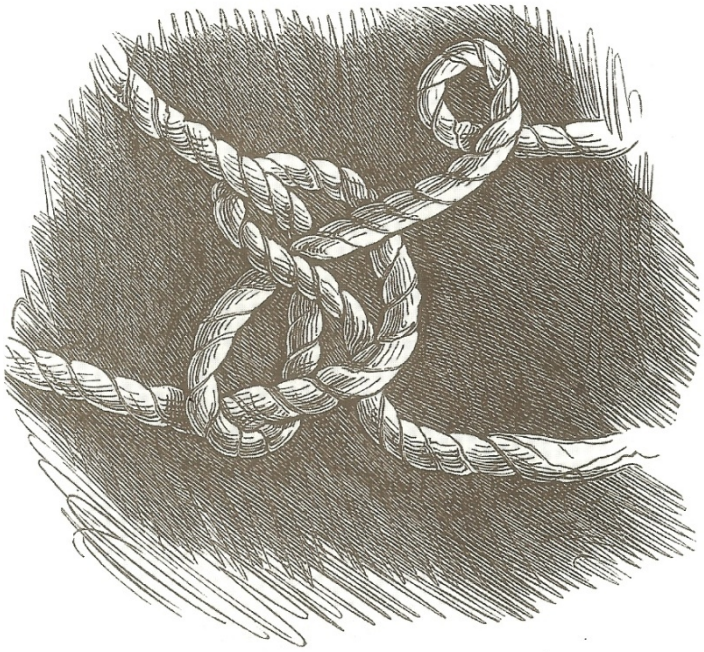

Figure 3: Knots. (Image source: *Style, Or, Practical Aesthetics,* 1860.)

Semper deviated from Vitruvius's triad, "*Firmitas*, *Utilitas*, *Venustas*," to conceive instead four irreducible elements of architecture: the hearth, the earthwork, the framework, and the enclosing membrane. The intersections among these, he believed, were of limitless importance. This belief has been the cause for modern-day theorists to praise the connection detail, for instance, Kahn's poetic declaration: "…the joint inspires ornament, its celebration. The detail is the adoration of nature."[20] This excerpt shows Kahn poetically equating the detail with the concept of joining. While the detail-scale is the most easily understood manifestation of joining, Semper's notion of the joint applies to all scales, such as the essential desire to join a piece of architecture with its site.

[20] Accademia Olimpica, *Carlo Scarpa* (Vicenza: 1974), 1. Quoted in Marco Frascari, "The Tell-the-Tale Detail," *Theorizing a New Agenda for Architecture*, 506.

While Semper's notion of structural core and cladding parallel Bötticher's terms "art-form" and "core-form," subtle differences exist. In Semper's view, the core rises out of necessity, and has only an indirect relationship to spatial enclosure. Bötticher, however, sees the core- and art-form as being conceived simultaneously, always separate but interdependent. In both cases, the primary point remains: the relationship between structure and its outer shell is essential to a piece of architecture. Both contain an *a priori* notion that the goal of all architecture must be to unify its parts into a harmonious whole by expressing a structural concept through the presented form.

For Semper, tectonics was closely tied to the "industrial arts" – crafts and hand-made artifacts. The idea of making and expression through craft was essential, as evidenced in his definition: "Tectonics deals with the product of human artistic skill, not with its utilitarian aspect but solely with that part that reveals a conscious attempt by the artisan to express cosmic laws and cosmic order when molding the material."[21] Also, tectonics by Semper's definition concerned his four primary areas: the hearth (related to metallurgy and ceramics), the earthwork (related to masonry), the framework/roof (related to carpentry), and the enclosing membrane (related to textiles.) Semper's writings indicate a view that "structure" is a system and not a collective word for supportive components. He elaborates on its expressive quality:

> The whole of this supported mass may thrust down to the extent that is necessary to make the supporting parts seem active, giving them the opportunity to engage their energy and their living, independent, intrinsic powers of resistance. Anything above or below disturbs the absolute harmony, but the gradations of this interplay between dead load and living support are the principal means to achieve the finer characteristics or expression of which monumental forms are capable.[22]

[21] Herrmann, *Gottfried Semper : In Search of Architecture*, 151.

[22] Semper and others, *Style in the Technical and Tectonic Arts, Or, Practical Aesthetics*, 646.

In projecting into the future of tectonics and architecture, Semper feared for a "crisis" in the arts. He wrote in 1852 that this crisis was being brought on by three primary factors: alienation of arts from their original motifs, devaluation of material and labor, and loss of the ability of the art form to exercise a specific function in relation to the historical monument.[23] This fear is interesting to view from our perspective more than 150 years into the future, as we have seen similar anxieties expressed by theorists up to the present day, notably Frampton's doubt that the tectonic can survive the "maximizing thrust of capitalism."[24] In this way, we see the relevance of Semper as continually pertinent in the discourse of architecture.

The art and architectural historian Heinrich Wölfflin concluded that tectonics was a primary means for architecture to communicate empathy, the projected feelings of the one who experiences art onto the art itself. It was thus the most effective means of expression. Wölfflin, writing in 1886, affirmed the nineteenth-century tectonic mantra: "*The opposition between matter and force of form*…is the principal theme of architecture."[25]

Early Twentieth Century Insistence on Layered Construction

The theories of Semper weighed on the minds of architects as they adjusted to the changes in society and building technology in the late nineteenth and early twentieth centuries.

[23] Gottfried Semper, "Science, Industry, and Art" In *The Theory of Decorative Art : An Anthology of European & American Writings, 1750-1940*, ed. Isabelle Frank (New Haven Conn.: Published for the Bard Graduate Center for Studies in the Decorative Arts, New York, by Yale University Press, 2000), 162-168. Original essay written in 1852.

[24] Kenneth Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, ed. John Cava (Cambridge, Mass.: MIT Press, 1995), 377.

[25] Heinrich Wölfflin, "Prolegomena to a Psychology of Architecture" In *Empathy, Form, and Space : Problems in German Aesthetics, 1873-1893*, eds. Robert Vischer, Harry Francis Mallgrave and Eleftherios Ikonomou (Santa Monica, CA; Chicago, Ill.: Getty Center for the History of Art and the Humanities; Distributed by the University of Chicago Press, 1994), 159.

Eduard R. Ford, architectural historian and author of *The Details of Modern Architecture*, notes the date of 1875 as a turning point. Past this point, new priorities and challenges took center stage. Changes, according to Ford, included the development of the skeletal frame, an increase in the quantity and sophistication of mechanical equipment, the development of layered construction, the development of specialized components, the specialization of labor, the development of independent building systems, and the development of new building typologies.[26] These changes had a significant impact on modern architecture.

The principles that emerged from these changes are elaborated upon briefly below, and reflect a shifting attitude to the nature of building construction as a catalyst for modern architectural thought. The evident impact this has on the evolution of the understanding of tectonics can shows how the basic Semperian categories may take on new form in the face of expanding technology.

The development of layered construction: Early twentieth century architecture sought to emphasize the separation of outer layer and inner matter within architecture. Ford reminds us that this condition is not new; veneers and face material existed before modern times, and architecture for a long time had been thought about in constructional terms beyond monolithic. However, in the modern era developments came about to exploit this fact, adding waterproofing and thermal systems within the envelope. This approach seems in some ways to build on the theory of Semper, yet in other ways to discredit it. That is to say, Semper's *Bekleidung* theory can be seen as a tenet of layered construction, yet the ushering in of several, varied systems moves the perception of the building envelope beyond a simple dual notion of core-form and art-form.

[26] Edward R. Ford, *The Details of Modern Architecture: Volume 2: 1928 to 1988*, illustrated edition ed.The MIT Press, 2003).

The development of specialized components: This condition supplements that of layered construction. The architectural approach of modernism sought a material or element to perform each task. These components bundled together are the elements of layered construction.

The specialization of labor: With each component, comes an individual installer, or, to use traditional terms, a craftsman. Ford goes on to note that modern construction came to include a regulated degree of accuracy and precision through specifications and codes, thus ensuring the ability of this multitude of assemblers to yield a constructed building. Within this category Ford does not include a summary of the possible ramifications of such a division of labor. Frampton, however, laments these events, discussing a loss of craft – a subject that will be covered in depth later.

The development of independent building systems: Along with specialized components and labor, independent building systems led to a further fragmentation in the design process that increased in the modern era, and continues to increase in the present day.

As architecture adapted to these changes, Semper's influence can be seen in that architects were taking sincere stock of how structural force may be related to the form and assembly of architecture. During the early years of the twentieth century amidst this added complexity, layering, and specialization, the word "tectonic" was used less, although the principles of Semper had lasting impact on the architecture that was produced, and writers such as Adolf Loos and Otto Wagner enthusiastically engaged Semper's *Bekleidung* theory.[27]

[27] Examples of built projects exhibiting a quality of the tectonic in Modern architecture are given as case studies in Frampton's *Studies in Tectonic Culture*, Chapters 4-9.

In *Moderne Architektur*,[28] Wagner proclaimed that Semper stopped short by calling for a mere symbolism of the core-form by means of the exterior layer. This reading obviously does not give Semper's notion of tectonic the credit it deserves in reference to the relationship of core-form and art-form. Wagner believed, "construction always precedes, for no art-form can arise without it, and the task of art, which is to idealize the existing, is impossible without the existence of the object."[29] One may recall, however, Semper criticized Bötticher on the same terms: "I admit that decorative symbols have no real static function, but it is wrong to conclude that they are applied and added from the outside."[30] As theorists, Semper and Wagner are quite close on the matter of *Bekleidung*. One merit of Semper's writing that Wagner receptively embraced was the belief that new technology should be used to generate a new style. Wagner urged architects to explore the merits of steel and to take full advantage of the rapidly-changing building technology of the day.

Adolf Loos's view on cladding was filled with apprehension. His anxiety rested in the dishonesty that could occur in veneers. Yet he was not against cladding; like Semper, he believed in the expressive capabilities of a building's exterior layer, and fully subscribed to Semper's idea of its textile roots. Loos's desire for an "honest" expressive mode led him to formulate the "law of cladding," which declared, "We must work in such a way that the

[28] Otto Wagner, *Modern Architecture : A Guidebook for His Students to this Field of Art* [Moderne Architektur.] (Santa Monica, Calif.: Getty Center for the History of Art and the Humanities, 1988).

[29] Ibid., 93.

[30] Herrmann, *Gottfried Semper : In Search of Architecture*, 141.

confusion of the material clad with its cladding is impossible. That means, for example, that wood may be painted any color except one: the color of wood…."[31]

According to Ford, the interest these two architect-theorists place on cladding was part of a larger movement in building technology that saw the envelope of a building as a series of layers. The realization that resulted from this was the "recognition that structure and the perception of structure are different things."[32] While this idea has echoes of Bötticher and Semper, as the twentieth century progressed, architects began accepting this difference between the actual and perceived.

Throughout the mid-twentieth century, writings on the topic of tectonics were scarce. However, as shown by Ford's case studies in *The Details of Modern Architecture* and Frampton's in *Studies in Tectonic Culture*, a tectonic tradition was kept alive in building. Architects such as Frank Lloyd Wright, Louis Kahn, and Carlo Scarpa had a comprehensive philosophy about the expression of force, form, and assembly, as evidenced through their work.

Sekler's 1965 article, "Structure, Construction, Tectonics,"[33] seeks to clarify the distinctions among the title's three terms. The distinction between the first two is explained simply by the revelation that construction as a noun is a result of an act (its verb form), while structure is the underlying concept or strategy of an arrangement or organization. To use Sekler's example, post and lintel is a structure, while the way in which the elements are joined together is a property of their construction. He goes on to define the tectonic:

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[31] Adolf Loos, *Spoken into the Void : Collected Essays, 1897-1900* (Cambridge, Mass.: Published for the Graham Foundation for Advanced Studies in the Fine Arts, Chicago, Ill. and the Institute for Architecture and Urban Studies, New York, N.Y., by MIT Press, 1982), 67.

[32] Ford, *The Details of Modern Architecture: Volume 2: 1928 to 1988*, 7.

[33] Eduard Sekler, "Structure, Construction, Tectonics" In *Structure in Art and in Science* (New York: G. Braziller, 1965), 89-95.

> When a structural concept has found its implementation through construction, the visual result will affect us through certain expressive qualities which clearly have something to do with the play of forces and corresponding arrangement of parts in the building, yet cannot be described in terms of construction and structure alone. For these qualities, which are expressive of a relation of form to force, the term tectonic should be reserved.[34]

It is the word "expressive" in this definition that makes the tectonic more than a simple element that can be measured, applied, and discussed in certain terms that are applicable to all works of architecture. The tectonic takes the abstract idea of structure as defined by Sekler, combines it with the architectural components and their assembly, known as construction, and relates it to some kind of experiential or perceptual notion of the observer. This introduction of human character into our definition brings the realization that tectonics is less about how structure and construction are treated in architectural form, and more about how that relationship is expressed to those who experience architecture.

Sekler expands upon this by a relation of Heinrich Wölfflin's definition of the term and its necessity to visual arts. Thus, this notion of the relationship of structure, construction, and experience that can be found in tectonics is reiterated:

> Through tectonics the architect may make visible, in a strong statement, that intensified kind of experience of reality which is the artist's domain – in our case the experience of forces related to forms in a building. Thus structure, the intangible concept, is realized through construction and given visual expression through tectonics.[35]

While Sekler's definition focuses mostly on the issue of form, tectonics can also be expanded in a similar way in terms of surface and detail. However, his essay came at a time that many architectural historians might view as the last days of tectonic architecture. As can be seen by the Frampton's examples in *Tectonic Culture*, there is a prevalent belief that this notion did not survive the era of postmodernism in architecture, ushered in by Robert Venturi and still

[34] Ibid., 95.

[35] Ibid., 92.

weaving through our current architectural culture in remnants. As will be seen in the next section, Frampton and his followers call for a return to tectonics despite the forces that seem to be acting against it.

Late Twentieth Century Threats to Established Tectonic Culture

Frampton quotes the current dictionary definition of tectonic as "pertaining to building or construction in general; constructional, constructive used especially in reference to architecture and the kindred arts," but he posits an addendum to this explanation in order to illuminate its full meaning: "the formal amplification of [the structural component's] presence in relation to the assembly of which it is apart."[36] Further, he believes the tectonic to be "a potentially poetic manifestation of structure in the original Greek sense of the word *poesis* as an act of making and revealing."[37] Frampton places a priority on structure, not to deny the expressive potential of other design value perspectives, but to place the act of construction and its corresponding structural concept in a position of primary importance.

In addition to this general definition, Frampton uses the term "tectonic" to refer to light, skeleton frame as opposed to a heavy, stereotomic mass. Paradoxically, he also notes that this term can be expanded to include "stereotomic" mass, in which case the term refers more to the relationship created by these mass-articulated forms. The word "tectonic" can refer also to a manner of joinery or material usage. While these definitions seem to muddy a precise clarity of the term, they actually illuminate the general concerns of the concept of tectonics in that attention is turned to the relationship of structural load, construction, and perception.

[36] Frampton, *Rappel à l'Ordre, the Case for the Tectonic*, 19-25.

[37] Ibid.

This conception of tectonics undoubtedly evolved from Semper's nineteenth-century writings. However, in Frampton's view, the physicality of building takes on a greater significance. Whereas Semper was concerned with how the appearance of a piece of architecture mediated ontological meaning symbolically, Frampton's definition is much more concerned with the components and structural system as an expression. Although all definitions are parallel, one might be able to think of Frampton's as being closer to Bötticher's position, wherein the core- and art-forms are conceived simultaneously, and Semper tended to think of the clothing or *Bekleidung* as growing from the core as a final manifestation of symbolic meaning.[38]

Conditions for the tectonic are not satisfied by simply expressing structural members. Frampton recognizes two separate manifestations of the tectonic: the representational and the ontological.[39] The latter is "a member shaped to emphasize its static role" while the former is "representation of a structural element that is present but hidden." These relate to the terms "symbolic" and "technical" of Gottfried Semper, as well as Bötticher's "art-form" and "core-form."

Frampton believes this primacy of tectonic thought and its poetic potential are endangered due to the "tendency today … to reduce all architectural expression to the status of commodity culture."[40] He cites Gehry among "many other late modern architects who are clearly tempted by the media and by the prestige of art to go beyond the limitations of

[38] Perhaps this speaks of a desire in Frampton to remove "masks" in architecture; while this was a seminal term in Semper's work, it is scarcely talked of in the contemporary discussions on tectonics. Possibly, the definition of tectonics has steered away from the idea of masking due to a complex array of cultural factors that any hypothetical mask might respond to, and thus cannot carry these responses and the task of tectonic expression.

[39] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 16-19.

[40] Frampton, "Rappel à l'Ordre, the Case for the Tectonic," 518.

architecture as circumscribed by the lifeworld."[41] His ultimate call to architects is a resistance to the forces of late capitalism, as he is convinced of its "total destitution."[42] His fears lie in the possible scenario of an architecture reduced to scenographic images, relying on appearance as opposed to tactility and physicality.

As illustrated by the choice of his case studies in *Studies in Tectonic Culture: The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, Frampton believes the trend to move away from an architecture of the tectonic has occurred to a crucial degree in the recent decades, citing what he calls "the two primary pitfalls of the second half of the twentieth century, pastiche historicism on the one hand and reductive functionalism on the other."[43] While stylistically architecture has moved away from these types of expression today, Frampton believes the causes and effects of architecture today still follow this trend, although it takes different aesthetic forms. His call is "to resist the ubiquitous tendency to reduce architecture to one more spectacular commodity masquerading as art."[44]

A phenomenological perspective is threaded through Frampton's discussion on the conception and consequent expression of tectonic form. For instance, he insists on the presence of a "corporeal metaphor." Elaborating on this notion, Frampton sheds light on the power of a body acting within space by becoming conscious of itself. Architecture prompts this consciousness by a certain vividness of tactile articulation, and a capacity to engage the senses.

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[41] Frampton, "Between Earthwork and Roofwork: Reflections on the Future of the Tectonic Form," 31.

[42] Frampton, "Rappel à l'Ordre, the Case for the Tectonic," 518.

[43] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 157.

[44] Frampton, "Between Earthwork and Roofwork: Reflections on the Future of the Tectonic Form," 31.

To build his argument, Frampton also refers to Heidegger's critique of modern technology. While the extent of Heidegger's theory is beyond the scope of our discussion here, these views include the idea that modern technology reduces all entities to the status of mere "standing reserve," thus diminishing or hiding their intrinsic nature and blocking our ability to engage then more meaningfully. While this critique may lead one back, for example, to Semper's pre-modern categories of earthwork, framework, hearth, and membrane; however, prospects of current technology and innovation may clash with these phenomenological calls to attend to vivid bodily tactile engagement or the more primordial experiences of things. Phenomenology's reliance on the tactile and physical has created an apprehension in the face of digital technology's role in architecture. It is a task of architects today to reconcile tectonic thought and this issue.[45]

In his 1991 essay "From *Techne* to Tectonics" Demetri Porphyrios warns against an overdependence on the Heideggerian notion of architecture to derive a theory of tectonics. He notes that while Heidegger brought to the surface a significant etymological connection between building and dwelling, he "at the same time suppressed… a whole other group of words for building which reflect the activity, skill, or knowledge of constructing."[46] Porhyrios then stresses the expression of building as an activity through tectonics, naming it the "highest fulfillment of construction,"[47] wherein the ontology of this activity is revealed. Porhyrios sidesteps the seeming conflict between phenomenology and technology in the context of

[45] Some contemporary theorists such as Reiser and Umemoto, Neil Leach, and Manuel Delanda have opted to take a more Deleuzian view of tectonics, which incorporates the prospects of technology with more facility. This approach will be discussed later in depth.

[46] Demetri Porphyrios, "From *Techne* to Tectonics" In *What is Architecture?* (London ; New York: Routledge, 2002), 133.

[47] Ibid., 136.

tectonics by declaring technology and tectonics to be synonymous. However, within this context he never seems to imply any technology beyond constructional, such as digital media.

To Frampton, tectonic expression is about heightened, poetically-charged experience, and as most architectural phenomenologists advocate, an effective space will engage a visitor's experience best by an appeal to the senses.[48] He illustrates this by describing Avlar Aalto's Saynatsalo Town Hall, praising the "tactility of the brick" and other "nonretinal sensations."[49] Within this discussion, the body of the visitor is the site of affect for the tectonics of a building. This filters away current culture and relies solely on an innate relationship between the architectural object and human sensory experience.

Figure 4: Saynatsalo Town Hall. (Image source: *Studies in Tectonic Culture*, 12.)

[48] The interest of the intersection of architecture and phenomenology has been explored by theorists and designers such as Steven Holl, Juhani Pallasmaa, and Peter Zumthor.

[49] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 12.

Keeping within this viewpoint, Frampton comes to his main concern for tectonics in today's architecture:

> It is undeniable that over the course of this past century the tectonic has assumed many different forms, and it is equally clear that its significance has varied greatly from one situation to the next. Yet one thing persists throughout this entire trajectory, namely, that the presentation and representation of the built as constructed thing has invariably proved essential to the phenomenological presence of an architectural work and its literal embodiment in form.[50]

In Frampton's view, media forces and commodity culture inhibit architecture from assuming this stance; the notion of the building as a "constructed thing" is fading.

Frampton's fear of media and commodity culture's erosion of the relationship between tectonics and architecture dominates the closing remarks of *Tectonic Culture*, yet the book actually opens by criticizing the twentieth century's primacy on space as a factor contributing to the fall of tectonics. While Frampton does not discredit any claims that emphasize space, he does add that it is not the sole player in the expression of architecture. Instead, he posits "an interplay of three converging vectors, the topos, the typos, and the tectonic."[51]

[50] Ibid., 375.

[51] Ibid., 2.

Figure 5: A primacy on space is named by Frampton as an architectural focus that has distracted from the tectonic. (Image source: Libeskind's Jewish Contemporary Museum in San Francisco, photo by author.)

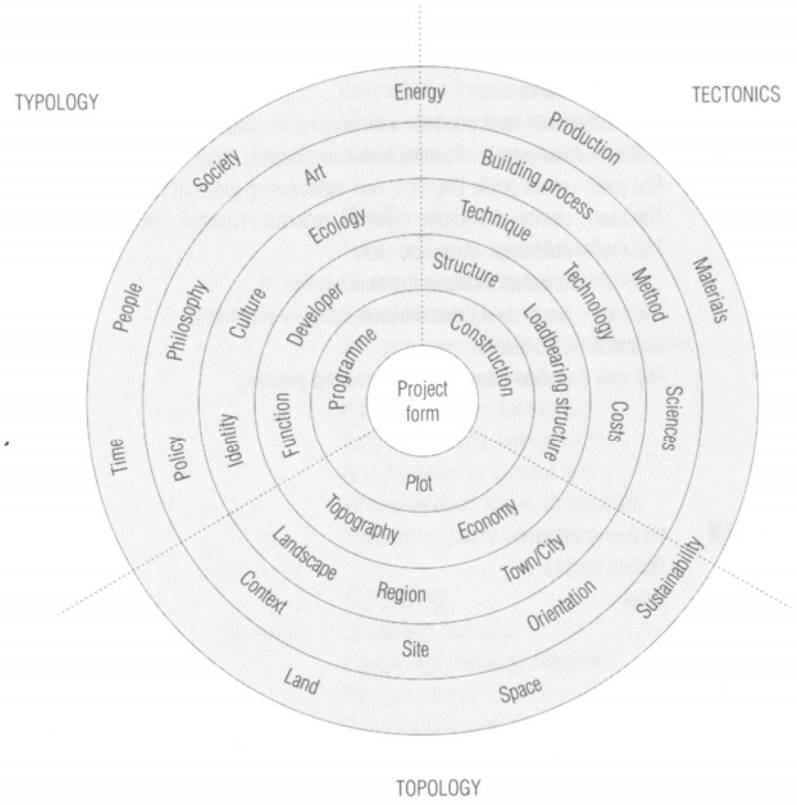
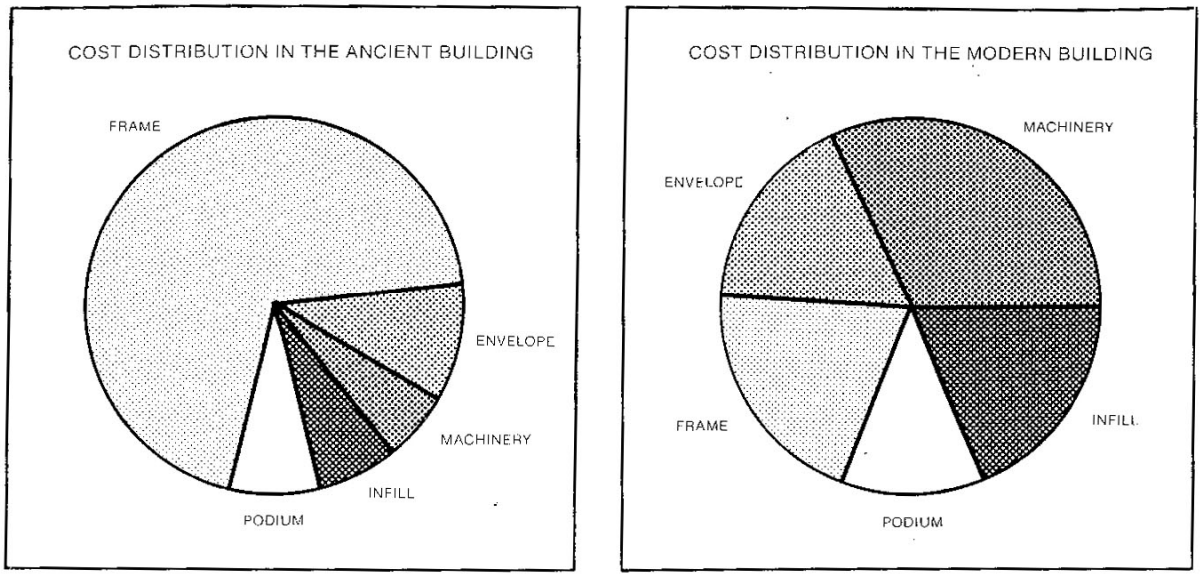


Fig. 1: Form-finding or form-developing processes

Figure 6: Converging vectors of Typos, Topos, and Tectonic. (Image source:Andrea Deplazes. *Constructing Architecture: Materials, Processes, Structures, a Handbook*, 2.)

Another downfall of the modern continuation of tectonics is a primacy on comfort. Frampton laments the current shift of intellectual and financial resources to the building services for the sake of human climatic comfort. In summarizing R. Gregory Turner's study *Construction Economics and Building Design: A Historical Approach*, Frampton concludes:

> …mechanical services have risen to consume some 35 percent since the late nineteenth century. At the same time with the transition from load-bearing wall to skeleton frame construction, the amount devoted to the basic structure has dropped from around 80 percent in former times to some 20 percent today.[52]



P-1. Cost Distribution in the Ancient Building.

P-2. Cost Distribution in the Modern Building.

Figure 7: Turner's study on shifts in building cost. (Image source: Turner, *Construction Economics and Building Design: A Historical Approach*, 10.)

This shift has thus left no room for any priority to be placed on the tectonic expression, resulting in a shift to "simulation." Frampton elaborates:

[52] Ibid., 381.

> Implicit critique of our misguided aspirations for achieving a perfect fit of form and function that can only be of relevance in the most extreme survival situations….modern obsession with comfort is a self-indulgence that, over the last half-century, has only furthered the commodification of architecture.[53]

Thus, in the warning tone of Frampton's epilogue the reader finds little hope for the survival of tectonic culture. The building envelope is reduced to an object of fashion. He posits the question of "…how to maintain the tectonic trajectory in the face of a postindustrial civilization that seeks nothing less than the reduction of the entire world to one vast commodity."[54] Further, he notes:

> …indicators suggest that [architects] will only be able to [resist or mediate the forces of the thrust of development, escalating rates of change, and special interests] in a sporadic and interstitial way since late capitalism displays an indifference toward tectonic culture at many different levels, from its disdain for the physical and historical continuity of civic form to its latent disregard for the wholesale entropy of the built environment as it presently exists.[55]

[53] Frampton, "Between Earthwork and Roofwork: Reflections on the Future of the Tectonic Form," 153.

[54] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 375.

[55] Ibid., 386.

Figure 8: Architecture's close association with commodity forces is also named by Frampton as a reason the decline of tectonics in architecure. (Image source: *Architectural Record*, January 2009. Vol. 197, No.1. (McGraw-Hill Companies))

The consequences of late capitalism – the loss of physicality and the increase in viewing the world as a commodity (or standing reserve) – are not concerns of Frampton alone. These symptoms were earlier articulated by Fredric Jameson in his 1991 book *Postmodernism, or the Cultural Logic of Late Capitalism*,[56] which he in turn built on previous theorists such as Marx, Horkheimer, Adorno and Benjamin. The result of these conditions is an intertwining of aesthetic production and commodity production. Jameson elaborates, describing a society dependent on imagery for the way it defines itself and what is should be.

[56] Fredric Jameson, *Postmodernism, Or, the Cultural Logic of Late Capitalism* (1991; reprint, Durham: Duke University Press, 1999).

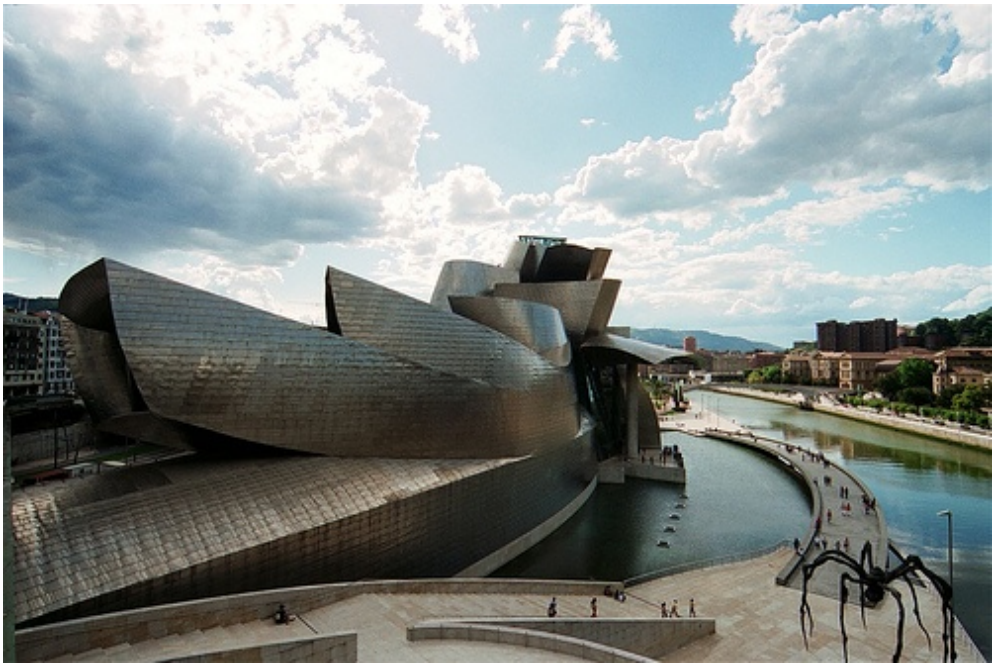


Figure 9: Guggenheim, Bilbao. The work of Frank Gehry has been named by Frampton as architecture driven by the image as opposed to revealing tectonic forces. (Image source: Flickr Creative Commons photo, http://www.flickr.com/photos/cincinnato/536189587/sizes/m/. Accessed April 7, 2009.)

The writings of Jameson very much describe a "postmodern" cultural condition, which should not be confused with the related term used in architecture and art to refer to the stylistic trend popular in the 1980's. However, just as Jameson insinuates that the broad cultural characteristics of this condition were present before acquiring this title, they also still persist to a large extent into present day. This continuing condition is what Frampton is responding to in his signature essay and epilogue, in which he calls for architects to resist the influence of commodity culture. Giving a connection to the stylistic practices, he cites a "triumph of Robert Venturi's decorated shed; that all too prevalent syndrome in which shelter is packaged like a giant commodity."[57] Although stylistic practices of today no longer align with Venturi's aesthetic, an emphasis on surface imagery has pervaded the process of architectural design, wherein the art-

[57] Frampton, "Rappel à l'Ordre, the Case for the Tectonic," 19.

form and core-form have no apparent expressive relationship. In reaction to this, Frampton posits that "a 'rearguard' posture would seem to be an appropriate posture to adopt rather than the dubious assumption that it is possible to continue with the perpetuation of avant guardism."[58]

Bringing Tectonics into the Twenty-first Century

Perhaps, however, the forces of technology and media within commodity culture do not necessarily exclude the expression of statical forces in architecture. It is possible that architecture does not need to "return to" some established notion of tectonics, as Frampton suggests, but rather amend this notion so that it can be propelled forward with our current conceptions of built structure.

While the phenomenological viewpoint of tectonics as set forth by Frampton has profound poetic potential, it has certain limits. Among these is the tendency to view an entity (such as a work of architecture) as the mediator from which mankind can come to understand the concept of *being*, understood primarily through an individual's experience of existential meanings within the everyday lifeworld. Although this experience inevitably results in part from tectonic expression, this viewpoint can inhibit an ongoing dialogue of structure, form, and society by ignoring the possibility that forces beyond the embodied lifeworld experience can emerge through a work of architecture.

This tendency to base the concept of *being* on past experience does give focus to the anticipation of the emergence of ideas in the future, which has been noted by Deleuze and Guittari, who claim that for Heidegger,

[58] Ibid., 20-21.

> history [is] a form of interiority in which the concept necessarily develops or unveils its destiny. The necessity rests on the abstraction of the historical element rendered circular. The unforeseeable creation of concepts is thus poorly understood.[59]

Within a dialogue of influences, a reciprocal network of forces includes but is not limited to space, tectonics, the architect, visitors and inhabitants of a building, and even media and capital. The limitations of a phenomenological viewpoint constrict the full potential of this network, seeking instead to isolate the spatial experience between a work of architecture and an operation of the senses.

In a return to Bötticher's ideas of art-form and core-form and Semper's notion of theatricality, contemporary theorist Gevork Hartoonian attempts to grapple with how these may engage technological changes of innovation and the formal impact of commodification:

> The architecture of theatricality communicates through the tectonic of the art-from and core-form that has the capacity to retain that which is immanent to architecture; meaning that architecture is not a direct product of construction, and yet the core-form, the physical material of building, inevitably puts architecture on the track of technological transformations and scientific innovations. The same might be said about the art-form; in suspending the romantic idea of genius, the art-form remains the only means by which architecture is charged with aesthetic sensibilities that, interestingly enough, are informed both by the perceptual horizons offered by the world of technology, and by the tactile and spatial sensibilities deeply rooted in the disciplinary history of architecture. Therefore, while the core-form assures architecture's rapport with the many changes taking place in the *technique* of construction, the art-form remains the sole domain where the architect might choose to imbue the core-form with those aspects of the culture of building that might sidetrack the formal and aesthetic consequences of commodification essential to the cultural production of late capitalism, and yet embrace the latest technological developments.[60]

Hartoonian acknowledges that meaning does not arise from construction alone, but can be gleaned by appropriate symbolism within the relationship of art-form, core-form, and user.

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[59] Gilles Deleuze and Félix Guattari, *What is Philosophy?* [Qu'est-ce que la philosophie?] (New York: Columbia University Press, 1994), 95.

[60] Gevork Hartoonian, *Crisis of the Object : The Architecture of Theatricality* (London ; New York: Routledge, 2006), 26.

Further, he is addressing the specific question of how to respond to technological innovations, naming the core-form as the primary venue of these innovations. However, Hartoonian also notes the "perceptual horizons" affecting art-form, suggesting that technology not only changes the consistency of our built environment, but how we view it. The traditional language of architecture, "spatial and tactile sensibilities," also plays a part in the communication of architectural meaning by means of the art-form. Based on these conclusions about tectonic relationships, Hartoonian arrives at a fundamental shift in our understanding of these forces: they can now be understood as a dialogue. The suggestion that the art-form "imbue the core-form" with societal responses is a turn from Semper's notion of the core-form giving birth to the art-form and thus passing a singular expression on to the visitor. An exchange is thus forged: the art-form mediates in several directions, and the path of exchange evolves from a linear progression to a network of influences.

A collection of writers within architectural discourse is beginning to emerge that recognizes this fundamental shift from a linear tectonic relationship of force and form to an expansion of the traditional definition of tectonics. Among these is Neil Leach, an author who once spoke out against a solely visual and media-driven basis for architecture in his work *The Anaesthetics of Architecture*, and as a key contributor and editor to the volume *Digital Tectonics* is seeking a future direction. His work takes the stance that a "rearguard position" to digital technology is at the point of collapse and instead embraces the dialogue that this technology opens up between architecture and engineering. Leach states,

> What we are beginning to witness is a 'structural turn' within architectural culture. It is clear that a significant number of progressive architects are seeking to step beyond a

> certain Postmodern sensibility which celebrates scenographic properties and surface effects, and focus instead on the structural integrity of buildings.[61]

The contributions in this volume do not denote a clear direction – indeed some of them embrace digital technology so voraciously that they neglect to address what becomes of tectonic expression – yet, they do open the reader's mind to a new stance that may be taken in the face of the cultural and technological "threats" named by Frampton. This new stance is not one of total resistance, but one that looks at how to engage these issues in an intellectual way through a dialogue of tectonics and digital technology.

How this expanded definition of tectonics may be manifested in contemporary architecture is the main goal of this thesis. The aim is not to eradicate the traditional notion of "tectonics," but to supplement its understanding in light of current societal conditions, mainly the forces of capitalism and technology, as they are the primary factors brought forth by Frampton as obstacles to the survival of tectonics. The case studies of this work were chosen for their capacity to engage both tectonics and these supposedly opposing forces. While the case studies are not perfect in this endeavor, their successes and failures in the engagement of this dialogue will be discussed. The hope is not to prove that the traditional notion of tectonics exists presently in some pure form, but to redefine what form this notion may take. This stance is not antithetical to the position of the first authors of architectural tectonic thought, who long ago understood that tectonics is an appropriate response to grappling with a changing cultural and technological climate.

[61] Neil Leach, David Turnbull and Chris Williams, *Digital Tectonics* (Chichester, West Sussex, U.K. ; Hoboken, NJ: Wiley-Academy, 2004), 4.

Semper	“Tectonics deals with the product of human artistic skill, not with its utilitarian aspect but solely with that part that reveals a conscious attempt by the artisan to express cosmic laws and cosmic order when molding the material.”[62]
	An art that models itself on the uniformity and rules of nature; created “in space and manifested in shape and color”[63]
Botticher	"any activity having to do with building and furnishing"
	“a complete system binding all the parts of the Greek temple into a single whole, including the framed presence of relief sculpture in all its multifarious forms”[64]
	"not just to the activity of making the materially requisite construction that answers certain needs, but rather the activity that raises this construction to an art form."[65]
Sekler	A structural concept implemented through construction that has a resulting visual expression of a relationship between form and force
Porphyrios	The "highest fulfillment of construction," wherein the ontology of construction is revealed
Frampton	“Building construction artistically considered”
	The light, tensile skeleton frame
	More general, including ‘stereotomic' - heavy, compressive load
	The manner of working and joining the material in question
	'atectonic' - (opposite) deliberately-mannered, opposing principle in which the structural logic of a work is suppressed
Leach	Digital tectonics - a new turn in the understanding of the relationship with computer technologies, architecture, and engineering, wherein a hybrid role emerges that combines the principles of all three
Hartoonian	“how the revealed poetics of construction becomes part of a larger cultural milieu while architecture appropriates available technical means and concepts developed in the realm of aesthetics”[66]

Table 1: Evolution of the definitions of "tectonic" in the 19th, 20th, and 21st centuries.

[62] Herrmann, *Gottfried Semper : In Search of Architecture*, 151.

[63] Ibid., 219.

[64] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 4.

[65] Karl Bötticher, *Die Tektonik Der Hellenen* (Potsdam: Riegel, 1844).

[66] Hartoonian, *Crisis of the Object : The Architecture of Theatricality*, 32.

[2]

Tectonic Confrontations: "Late Capitalism" and the Bonaventure

Assessing the possibilities for tectonic culture in contemporary architecture requires a complete review of the cultural forces that Frampton sees as threats to its survival, and a study of their possible outcomes. "Late capitalism" as described by Fredric Jameson includes these forces. Jameson describes these causes and their effects in relation to several aspects of culture, including architecture. Frampton specifically relates these conditions to tectonic culture, noting their "indifference" to the tenets of the traditional tectonic definition.

This chapter discusses a work of architecture that can be seen as the realization of Frampton's apprehensions of the effects of technology and commodity culture: Portman's Bonaventure Hotel in Los Angeles, California. Elements of form, surface, and assembly are averse to tectonic expression. Yet, this building is only one response to the "late capitalist" conditions, and subsequent chapters aim to demonstrate a much different, tectonically engaging response.

Jameson's interpretation of the Bonaventure Hotel in Los Angeles, California seems to affirm many of the concerns set forth by Frampton in that it is more representative of market forces than it is of statical structural forces.[1] This building, designed by architect-entrepreneur John Portman, was cited by Jameson as being an architectural example of the effects brought on

[1] This assessment of the Bonaventure is found in Jameson, *Postmodernism, Or, the Cultural Logic of Late Capitalism*, 38-45.

by "late capitalism," a term that will be covered in more depth shortly. Jameson's famous article on this building brought much response from theorists, and can now be used in this context as the physical and conceptual manifestation of Frampton's fears.

In addition to this interpretation, Ian Buchanan's response to Jameson's Bonaventure article is examined. Buchanan's article, "Ian Buchanan and Fredric Jameson"[2] gives insight into a possible shortcoming in Jameson's methodology: his approach to postmodern space from a modernist viewpoint. According to Buchanan, postmodern space cannot be fully grasped from this perspective, but that does not mean it cannot be grasped at all. This opens up a possibile critique of Frampton on the same grounds: perhaps his sense that tectonic culture cannot be properly engaged while operating under the forces of late capitalism points to a limitation of his frame of reference, as established in the previous chapter.

The key to understanding Fredric Jameson's "postmodernism" is to view it as an overarching set of epistemic conditions, not a style. Other terms given by Jameson for this "cultural dominant" include "'late capitalism'…'spectacle or image society,' 'multi-national capitalism,' 'media capitalism,' [and] 'the world system.'"[3] He pointed to "shifts and irrevocable changes in the representation of things and the way they change."[4] Economic principles are at the heart of this logic, as Jameson believes capitalism subsumes all aspects of

[2] Ian Buchanan, "Ian Buchanan and Fredric Jameson" In *Architecture Theory : A Reader in Philosophy and Culture*, ed. Andrew Ballantyne (London ; New York: Continuum, 2005), 272-300.

[3] Jameson, *Postmodernism, Or, the Cultural Logic of Late Capitalism*, xviii. The interchangeability of these words is discussed by Jameson as a response to the critiques of the term "late capitalism."

[4] Ibid., ix.

culture. He believed it to be useful to discuss architecture in this context, as it is the form of expression that is most closely tied to the capital market.

For this reason the Bonaventure stands for a separate, although related, idea than "postmodernism" in the terminology of an architectural style – the meaning as coined and promoted by critic Charles Jencks.[5] "Postmodernism" as a logic, is elaborated upon by Jameson in a broader cultural context, and Jameson's reaction to the Bonaventure inspired him to draw conclusions about the cultural forces he saw as exerting influence on it. Thus the Bonaventure is offered as a symptom of general conditions termed by Jameson as postmodernism, and encompassing much the same forces that Frampton is reacting to as being a threat to contemporary architecture.

The conditions of "late capitalism" as explained by Fredric Jameson are centered on the multi-national nature of the contemporary market. They also include "international division of labor … new forms of media interrelationship … computers and automation, production in the third world, the crisis of traditional labor…and gentrification on a now-global scale."[6] These listed effects are broad and far-reaching; Jameson proceeds to cover topics beyond architecture – video, film, music, literature, and culture in general. For the purposes of this discussion, it is useful to note the parallels to Frampton's argument: media and technological innovations are certainly common themes in the writings of the two theorists. Frampton sees this within architecture as a degeneration, and Jameson points to similar symptoms, claiming that the

[5] Charles Jencks, *The Language of Post-Modern Architecture* (New York: Rizzoli, 1977).

[6] Jameson, *Postmodernism, Or, the Cultural Logic of Late Capitalism*, xix.

superficiality of late capitalism as the root of this problem. Frampton elaborates on this cultural dilemma in relation to architecture:

> As privatization extends its inroads into the public realm, the institutional legacy of the bourgeois world becomes increasingly undermined by technical change and the all-pervasive thrust of the market. Victor Hugo's *ceci tuera cela*, "this will kill that," said of the printed word in respect of architecture, now assumes a disturbing cast under the emerging hegemony of cybernetics, telemarketing, and the general scale of electromedia manipulation.[7]

A further effect of the conditions of late capitalism as described by Jameson is commodification – specifically, the treatment of every produced object as a marketable good. Within the realm of architecture, buildings are judged on economy and fashion, washing over traditional notions of space and permanence. The role of imagery reaches new significance, as items are abbreviated into logos and brands. Instant recognition is valued, as evidenced in Jameson's observation:

> the image culture of postmodernism is postperceptual, turning on imaginary rather than on material consumption. The analysis of image culture... can thus only be meaningful if it leads us to rethink the 'image' itself in some nontraditional and nonphenomenological way.[8]

When seen as an image, architecture loses its capability for tectonic expression. In such an image society, objects in the built environment tend to be seen as billboards for other ideas or concepts, and the impact on how an individual communicates with these structures is profound. Aesthetics become a selling point for architecture, which is seen as a commodity, and the expectations for built space are altered. This "new depthlessness" translates into our buildings as an architecture of surface. Architecture, viewed as an image, is separated from the space of the

[7] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 382.

[8] Jameson, *Postmodernism, Or, the Cultural Logic of Late Capitalism*, 144.

observer, wherein any dialogue that was to exist between the poetics of the built environment and the experience of the visitor is replaced by the consumption of an image where no exchange is present.

As digital technologies of the second half of the twentieth century replaced their mechanical precedents, the representative forms associated with innovation shifted as well. Jameson notes this in a comparison of modern architecture with the impossibility, in his opinion, of expressing digital technology:

> It is immediately obvious that the technology of our own moment no longer possesses this same capacity for representation: not the turbine, nor even Sheeler's grain elevators or smokestacks, not the baroque elaboration of pipes and conveyer belts, nor even the streamlined profile of the railroad train – all vehicles of speed still concentrated at rest – but rather the computer, whose outer shell has no emblematic or visual power, or even the casings of the various media themselves, as with that home appliance called television which articulates nothing but rather implodes, carrying its flattened image surface within itself.[9]

This concern was expressed by Jameson in 1991, and since that time the exponential rate of digital evolution has offered more virtual imagery, expounding the effects of media representation, furthering the consumption of cultural representation from tangible forms.

[9]Ibid., 36.

Figure 10: Sheeler: Ford Plant, River Rouge, Criss-Crossed Conveyors, 1927.

Edward R. Ford, writing in 2003, also noted this shift from the modern vessels of "presentation" to the later technology of "representation." Ford wrote: "[objects admired by the early modernists] produced and continue to produce 'style,' something that solar energy, systems analysis, green architecture, computers, and fax machines have failed to do."[10] While Ford's scope is a bit wider than Jameson's, the meaning behind it is similar: the lack of physicality of current technology lacks the tangibility in comparison to the modernist machines. Thus, expression through such media is weak, they both claim.

[10] Ford, *The Details of Modern Architecture: Volume 2: 1928 to 1988*, 422.

Jameson posits that the reflective glass surfaces of architecture common in the 1980's are one response to this technological shift: choosing to render a reproduced image of their context by means of reflection. In contrast, within the current architectural discourse, the contributors to *Digital Tectonics* respond to this dilemma quite differently, seeking to integrate technology as a process rather than as only a tool for representation.

Figure 11: Reflective glass in architecture. Photo by author.

The Bonaventure and Surface

To turn attention now to an example of this lack of tectonic connectedness, Jameson's interpretation of the Bonaventure may demonstrate the qualities of late capitalism that parallel the present-day issues of tectonic culture presented by Frampton. Later case studies in this text aim to show alternative reactions to these cultural conditions, but the famous Portman-designed hotel serves presently as a validation of Frampton's urgent call for taking up a "rearguard position" against our image society.

The Bonaventure's exterior surface of reflective glass can be seen as a repellant to its surroundings; no one can look in, yet those inside look out onto a city that itself has been turned into an image through this device. The distorted images of the surroundings mirrored in the glass give the hotel the quality of being a device for reproduction as opposed to production. Much like the technology of the time, television and the computer, the process behind production, or in this case design, is invisible and mute, and only the products are reproduced images, delivered on a flat surface.

Figure 12: The Bonaventure, Los Angeles. (Image source: GA 57: John Portman and Associates.)

One important connection between these notions and architecture is the concept of *pastiche*. Jameson describes this practice as

> …compatible with addiction – with a whole historically original consumers' appetite for a world transformed into sheer images of itself and for pseudo-events and 'spectacles'. It is for such objects that we may reserve Plato's conception of the simulacrum, the identical copy for which no original ever existed.[11]

In the architecture of the time of Jameson's essay, it was in use as imitation of past elements combined into a new composition, so that the new representation was vaguely familiar, but the referent had been erased. Pastiche in more general terms can be brought back to the concept of the image; ideas and style are communicated by some surface element, not infused into the spatial and tactile properties of architecture.

[11]Jameson, *Postmodernism, Or, the Cultural Logic of Late Capitalism*, 18. Jameson uses the term 'spectacles' in quotes, as he acknowledges Guy Debord and Situationalist writings as a partial model for this idea.

These conditions as described by Jameson have little concern for the tectonic. With the reproducible image as the dominant aspect, works of architecture no longer encourage the perception of spatial and constructional qualities, not to mention the embedded process that links a work of architecture to its conceptual origin.

The Bonaventure, Form and Space

While Jameson puts forth many reasons for this building's nomination above others to demonstrate the workings of postmodernism in built space, the argument relating to circulation can be extracted as it parallels the building's logic of structural systems. Issues related to circulation include building approach, architectural promenade, and cognitive mapping.

As for circulation within the hotel, Jameson points to the massive mechanized elevators and escalators as replacements for the traditional notion of an architectural promenade. Instead of measured footsteps of the active visitor, these "emblems of movement proper"[12] transport hotel guests from spaces within the lobby to their private rooms. According to Jameson, this "autoreferentiality of all modern culture … tends to turn upon itself and designate its own cultural production as its content."[13] Further, the movement animates the lobby, creating a kind of mechanized activity. This can be seen as a replacement for, or a turn away from, the perceived movement of structural forces as described by Frampton: "a tectonic syntax in which gravitational force passes from purlin to truss, to pad stone, to corbel, to arch, to pier, and to abutment."[14] Tectonic perception in the Bonaventure has been displaced by a sort of auto-

[12] Ibid., 42.
[13] Ibid., 42.

[14] Frampton, *Rappel à l'Ordre, the Case for the Tectonic*, 19-25.

motion – buried beneath layers of surface effects, comparable to Semper's definition of a "false mask."

Jameson contrasts the populist claims of the Bonaventure with Le Corbusier's Unité d'Habitation, but notes they are both equally disdainful of their context.[15] By analyzing both buildings diagrammatically (*Figure 13*), one can see a shift from the earlier to the later building in how the volumes went from being elevated above the city fabric to resting within it. However, as Jameson points out, the entrance is not easily located, nor is there any other aspect that makes the Bonaventure lobby inviting , or in any sense woven into this fabric. The relationship of interior and exterior is all but severed, where the latter serves as a spectacle for the former as viewed through outwardly reflective glass. Further, this volume shift to the base level emphasizes the estrangement of the individual hotel rooms in the tower.

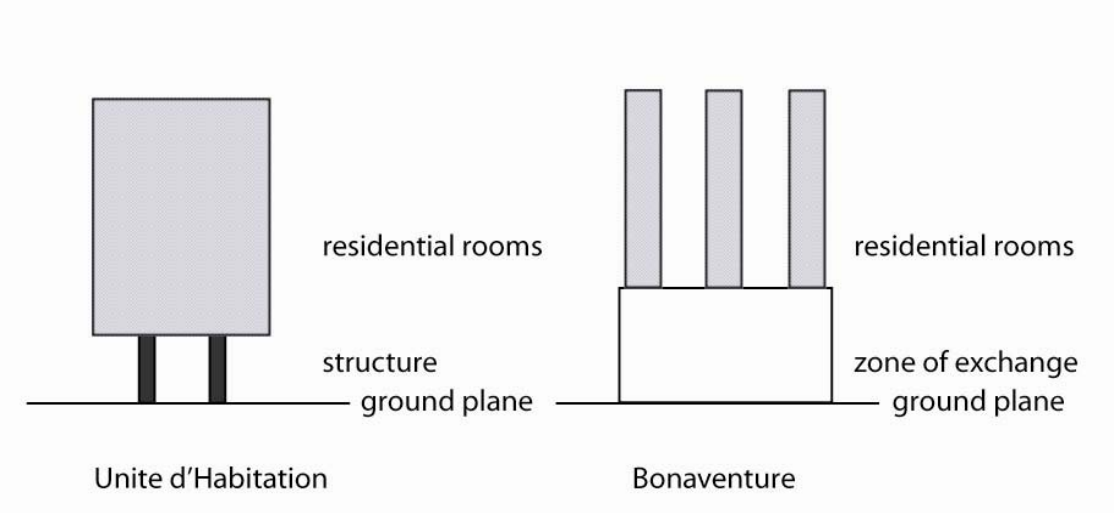


Figure 13: Diagrams of Unite d'Habitation and the Hotel Bonaventure, respectively. While the postmodern Bonaventure makes populist claims, both buildings' residential quarters do not provide an engaging diagrammatical exchange with their surroundings. Diagram by author.

[15] Jameson, *Postmodernism, Or, the Cultural Logic of Late Capitalism*, 41-42.

The hotel rooms themselves are described by Jameson as small and unremarkable.[16] In the Bonaventure the zone of social interaction for hotel guests is not common rooms or the populated adjacent street. Instead, the space for human interaction is synonymous with the space for purchasing; in other words, the shops in the multiple levels that surround the lobby atrium. This exhibits the decoding forces of capitalism that Frampton warned would interfere with structural expressivity. His concern was that in the shift of focus to market forces, statical building forces would lose their place in the perception of built space. In Frampton's view, the building designed as a response to market forces cannot be expressed as a constructed object, expressing components as part of a greater whole that relates visitor activity to built form. Instead, it is simply a means of containing the various shops and restaurants which have taken on the role of primary destinations within the atrium.

This mini-city, as Jameson calls it, of the Bonaventure severs itself from the outside, positioning itself as a replacement for urban experience. Within this space, Jameson assesses a complete stimulation of the senses, while simultaneously noting that there is nothing distinctly remarkable or defined within the atrium space. He describes the "emptiness" as "absolutely packed."[17] He further finds himself unable to cognitively map his environment – to conceive a mental image of navigation. Jameson states,

> …this latest mutation of space – postmodern hyperspace – has finally succeeded in transcending the capacities of the individual human body to locate itself, to organize its

[16] Ibid., 43.

[17] Ibid., 43

> immediate surroundings perceptually, and cognitively to map its position in a mappable external world.[18]

He further relates this issue to a broader problem:

> this disjunction…[stands] as the symbol and analogon of that even sharper dilemma which is the incapacity of our minds, at least at present, to map the great global multinational and decentered communicational network in which we find ourselves caught as individual subjects.[19]

Frampton has a similar perspective, relating to the problem of tectonics in contemporary architecture: "The perpetual amelioration of the human condition is a vision that is difficult to sustain in a world in which the rate of technological change has escalated beyond our capacity to assimilate it."[20]

The Bonaventure and Assembly

As can be seen by an examination of structural logic, it is quite possible that architectural elements and their associated activities in this "hyperspace," as Jameson calls it, excludes the perception of architectural tectonics. The architectural design approach by the architect favors a series of disjointed activities, and the attitude toward structural systems is not integrated into a fluid experience. Further, the structural system can be seen as two systems (grid at base levels and tower) that cohabitate around the spaces, but are not integrated with these spaces or each other. As shown in *Figure 14*, the structural logic seems dualistic, as a system for supporting the towers is super-imposed on a structural grid. The two have no coordination; in the zones of

[18] Ibid., 44.

[19] Ibid., 44.

[20] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 380.

overlap the framing for the towers assumes dominance. This serves as a metaphor for the disjointed experience throughout the building: disconnects occur between hotel guests and sidewalk pedestrians, between the hyper-activity of the lobby and the estrangement of the individual hotel rooms, and among the four towers themselves, which connect only to the elevator core, and not each other. This lack of fluidity in experience is reflected in the conception of structure's role as well. Tectonic elements are incorporated in an inarticulate, unimaginative manner. The absence of integration of these elements into the substance of architectural experience prevents the Bonaventure from possessing meaningful tectonic expression.

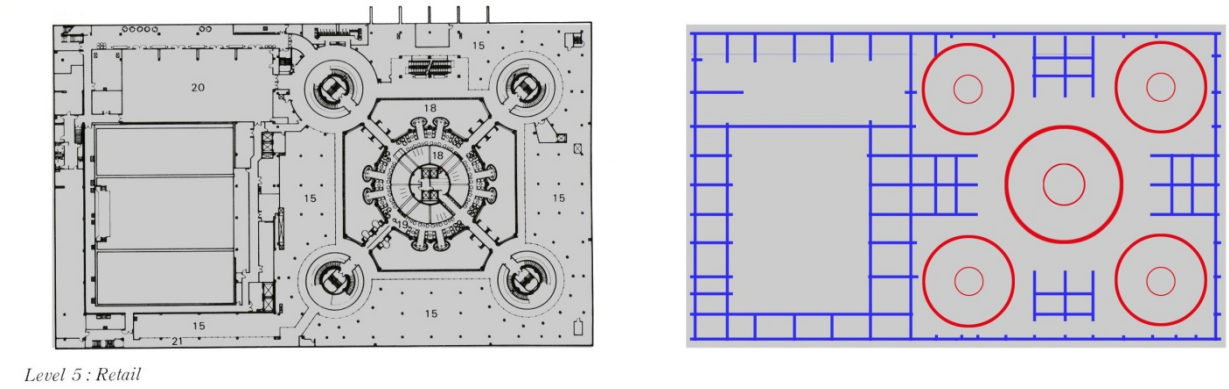


Figure 14: diagram of lobby level floor. Blue represents the grid system of columns to carry gravitational loads. The red is designates the structural system of the towers that is superimposed over the grid system. (Plan from *GA 57: John Portman and Associates,* appendix.) Diagram by author.

Such disconnects and distancing from the unity of structural components and architectural experience is the exact issue that Frampton's argument opposes. Both he and Jameson agree that this "hyperspace" is a mutation that has transformed faster than human

understanding. Frampton proclaims a solution found in opposition: "Against this prospect of cultural degeneration, we may turn to certain rearguard positions, in order to recover a basis from which to resist."[21]

The Bonaventure and Responses to the "Postmodern Condition"

Among the various theoretical articles written in response to Jameson's interpretation of the Bonaventure, Ian Buchanan's offers a future-oriented stance from which a parallel argument for tectonics may be drawn. Buchanan notes that the overwhelming complexity that Jameson sensed upon his visit to the Bonaventure is owed to the fact that his sensibilities and approach came from the previous modern era. Thus, his methodology possesses an "incapacity to cope with postmodern space stem[ming] from [a] constitutional lack of preparedness for its characteristic features"[22] Is it possible that Frampton's viewpoint inhibits him from conceiving a future path for tectonics, in much the same way?

Certainly, Frampton's conclusion and subsequent call to resist outright any forces that may be brought about by late capitalism gives little hope in the face of this "cultural dominant." Yet, to meet this issue with resistance alone does not recognize the possibilities that may open up when we learn to work within this new language. Just as Buchanan suggests that viewing postmodern space requires us to "grow new perceptual organs," Neil Leach urges digital culture to be confronted in the same manner. In his introduction to *Digital Tectonics*, he writes:

[21] Frampton, "Rappel à l'Ordre, the Case for the Tectonic," 19-25.

[22] Buchanan, "Ian Buchanan and Fredric Jameson," 283.

> This volume, then, marks a particular moment in the history of architecture when the old opposition between the digital and the tectonic has begun to collapse, and the digital is beginning to be used increasingly in the service of the tectonic.[23]

Surely this position can be extrapolated to the remainder of Frampton's issues with the conditions of late capitalism in order to begin approaching an architecture which these conditions can be intellectually engaged through tectonics.

Frampton's argument has merit in its polemical value, but a proposal for architecture to reverse the effects of commodity culture seems like an insurmountable task. Perhaps more utility can be found in an incorporation of the tectonic into the substance of contemporary expression. Such an effort can bring forth a renewed interest in physicality, while giving it the opportunity to reciprocally respond to culture.

[23] Leach, Turnbull and Williams, *Digital Tectonics*, 1.

[3]

Space, Form, and Flow: Tectonics and the Mercedes-Benz Museum

"I hope to have shown that architectural technology is no more objective or subjective than architectural design, and that an architect's relationship to the building conventions of his time usually mirrors his relationship to the rest of society." – Eduard R. Ford, introduction to *The Details of Modern Architecture, v.I*

It is said that postmodernism yielded the final blow to reduce the discipline of architecture to a series of scenographic images with no relation to tactility, spatial sense, or materiality. So asserted Kenneth Frampton in his essay, "Rappel a l'Ordre," calling architects to resist the influences of commodity culture that is so based on the image, and return to an architecture based on the tectonic, where structural forces are understood through the constructional elements, thus returning architecture to some physicality that society has supposedly forgotten. Frampton rejected the suggestion that architectural form may reinforce the physical while still participating in the commodity culture that is brought about by the conditions of late capitalism. This chapter explores the possibility for one to exist alongside the other – integrated as a system instead of dueling opposites. Such a system recognizes the presence of networks as an underlying structure of architecture and society. It does so by using the Mercedes-Benz Museum by UN Studio as a case study, a building whose architects proclaim as a goal to be a store as well as a commemoration of culture; a building that addresses the adjacent motorway as much as the pedestrian visitor; a building whose exhibits merge history and product

until their conception is inseparable. Yet, this building cannot be described as anything but tactile and engaging, as well as a creative endeavor in architectural engineering.

Although a study of the Bonaventure examined in the previous chapter might confirm Frampton's position that tectonics no longer plays a part in architecture in the late twentieth and early twenty-first centuries, the Mercedes-Benz Museum can be seen as a contradicting response. The manner in which an intelligent, engaging structural solution was pursued and the priority that solution took in the conception and built expression within the building shows the great depth of the architects' faith in the expressive potential of constructive components. Yet, its ties to the market are unapologetically evident, and it shares several characteristics with the Bonaventure Hotel. While these qualities alone are not a cause to discredit Frampton's position, they do compel the community of architectural discourse to rethink how his definition of tectonics might be expanded to apply to contemporary structures and to a more complex network of cultural and technical forces.

Form and space in architectural thought may be seen as mutually dependent opposites – two elements of a figure-ground, with tectonics as a sub-set of form. While this may be a valid explanation of the relationship between these two elements, when they are seen within a network of forces and expression this simplistic dichotomy seems inadequate. An understanding of such a network realizes the reciprocal relationship of form and space as a small piece of a complex and intricate web of forces, including but not limited to social, economic, and historical forces.

This placement of architectural form and its cultural relationship is expressed by Semper:

> We should not forget the metal ornaments, gilding, tapestry-like draperies, baldachins, curtains, and movable implements. From the beginning the monuments were designed with all these things in mind, even for the surroundings – the crowds of people, priests,

> and the processions. The monuments were the scaffolding intended to bring together these elements on a common stage.[1]

This metaphor of theater reminds the reader that architectural elements are mutually dependent with the life and activities that occur within space, just as a stage and its players exist for one another. But how can tectonics benefit this relationship? As Henry Francis Mallgrave points out in his introduction to *Practical Aesthetics: Style in the Technical Arts*, Semper's two published editions of this work deal with internal influences of building from a historical-technical standpoint.[2] However, his unfinished third volume was intended to establish a historical-cultural basis for a relationship between tectonic thought and its context in society. Had this volume been completed, the evolution of tectonic thought in relation to culture may have developed quite differently. The survey that follows of the history of form and space within the discourse of architecture shows that recent writings have deemphasized the presence of cultural factors of influence in tectonic theory. Yet, as evidenced by the case study in this chapter, this relationship of tectonics to its socio-cultural context can be fused by these categories.

Form and Space: a Historical Viewpoint

According to Karl Bötticher, "architecture in all its different manners and forms emanates from the artistic consciousness of the generation that created it and is like every fine art only a mute manifestation of that consciousness…"[3] This statement articulates Bötticher's belief in the

[1] Semper and others, *Style in the Technical and Tectonic Arts, Or, Practical Aesthetics*, 59.

[2] Henry Francis Mallgrave, introduction to Semper, *Style in the Technical and Tectonic Arts, Or, Practical Aesthetics*, 20.

[3] Bötticher, "The Principles of the Hellenic and Germanic Ways of Building with Regard to their Application to our Present Way of Building," 162.

fundamental link to cultural expression that architectural forms may carry. He goes on to state the primary concern of these "manners" to be the enclosure and organization of space. Further he discusses the art-form's intention "to symbolize [spatial structure] and to make visible the concept of structure and space that in its purely structural state cannot be perceived."[4] As the highly-important relevance of the concept of art-form to tectonics has already been established, we can further read this statement to see that structure itself is not all that is being represented with this element: space and its relationship to the conceptual perception of structure are important. In Bötticher's view one cannot talk about tectonics without linking structure and space.

In reference to space and the forms it is bound by, Semper states:

> the correct relation of the enclosure to the enclosed should, moreover, be apparent in the fact that the former (in all its formal properties and colors) forcefully emphasizes and supports the effect of the latter. The enclosed should present itself unmistakably as the principal theme and be placed upon a suitably chosen background.[5]

However, he goes on to leave the conceptual development of the spatial-formal relationship undeveloped within this text, opting to write instead of the surface characteristics of spatial enclosure. This is typical of Semper's approach to this topic – a seemingly hesitant stance in the development of a spatial-formal concept. One may notice that Semper's four categories of hearth, earthwork, framework, and membrane do not mention space as a primary component of architectural creation. In his later years Semper remarked on the admirable qualities of Roman spatiality, and predicted them to be the "future of architecture." Commentary on this topic has been greatly overshadowed by subsequent critics' readiness to take on Semper's *Bekleidung*

[4] Ibid., 163.

[5] Semper and others, *Style in the Technical and Tectonic Arts, Or, Practical Aesthetics*, 127.

theory, leaving the engagement of Semper's attitude on form and space as sparse as his own comments on the topic. Yet, he did have a cogent idea of the nature of this relationship, perhaps best understood in his commentary on the Roman vault, which he called "that most magnificent *symphony* of mass and space toward which [architecture] had probably been striving since the earliest times."[6] Here we see in Semper's championing of the vault the disposition that heralds spatial conception in conjunction with structural forms. While Frampton claims modern architecture's primacy of space has detracted from the development of tectonics, this insight into Semper shows that perhaps the modern discourse of the tectonic's primacy on assembly has detracted from the relationship of form and space in the "poetics of construction."

Eduard Sekler speaks of tectonics as a linear relationship of form and force. This position does not fully address the network of forces beyond the statical that can be expressed through tectonic elements. In such a network model form and statical force cannot be isolated to represent the only aspects of tectonic expression. Sekler becomes conscious of this in the final paragraph of his signature essay:

> Accordingly, in architectural criticism tectonics would seem to deserve as much consideration as some of the other elements which have been singled out for special discussion, chief among them space. It will be important however to remember that whatever is singled out, is isolated by a deliberate act of the critic for purposes of analysis; to speak of architecture in terms of tectonics alone would be as one-sided as to speak of it in terms of space alone … architectural criticism has to move in the direction of interpreting architectural experience as a totality.[7]

Here Sekler does two things. First, he recognizes the interdependence of architectural elements, as if to seek forgiveness for suggesting that form and force work in isolation. He is in some way implying acceptance of a network model, although he does not expand upon it. Second, he

[6] Ibid., 754.

[7] Sekler, "Structure, Construction, Tectonics," 95.

sentences space and tectonics to be spoken of as separate categories, negating any implication that in some instances one may be an operation or complement of the other. In talking of "architectural experience," the extent that this "totality" might encompass remains unclear.

At several points throughout his writings, Frampton emphasizes the Heideggerian duality of tectonic form as relating to earth and sky as a function of Semper's four elements. He reminds the reader of the opposing definitions of *tectonic* and *stereotomic* and their primordial role in tectonic expression. His phenomenological approach, tending to emphasize the human level of perception (preconscious, pre-linguistic, and pre-cultural), can be seen as overly denying the possibility that social-cultural influences are part of the "totality" of architectural experience. Frampton, like Sekler, nominates space as crucial to architectural conception, but doesn't see it in direct coordination with tectonic form or with the social forces that influence it.

A comparison of these twentieth century positions to the nineteenth century ideas of Bötticher and Semper suggests that the concept of "tectonics" has lost something: its relationship with culture and its ability to possess spatial characteristics, both of which were emphasized by the earlier writers. Further, new notions of natural dynamics suggest a more complex viewpoint may need to be adapted to acknowledge the complexity of the patterns and networks within which our contemporary thought is structured, a notion that will be elaborated upon shortly.

Gevork Hartoonian seems to be trying to expand on this nineteenth century notion of tectonics when he sets a goal to define the tectonic as "how the revealed poetics of construction becomes part of a larger cultural milieu while architecture appropriates available technical means and concepts developed in the realm of aesthetics."[8] Here one may see a widening of the scope

[8] Hartoonian, *Crisis of the Object : The Architecture of Theatricality*, 32.

of what may be included in tectonic thought, as it is seen within the aspects of cultural production.

Flow and the Exchange of Forces

Expanding the scope of tectonics includes broadening one's view of the conceptual context of its expressive realm to recognize it as part of a network of cultural and technical conditions. This is suggested by contemporary theorists such as Neil Leach and Manuel DeLanda with their Deleuzian approach to the nature of tectonics.

In addition to this, Ian Buchanan's perspective of flow in the Bonaventure (elaborated upon shortly) shows how such a methodology may be structured in relation to architecture, opening notions of form and space to relate to a network of influences. It can be seen that while the modernist quest for clarity lends itself to categorizations and separations, this alternative point of view thrives on zones of overlap and interdependency.

"Swarm Tectonics" as proposed by Leach draws parallels between studies of complex patterns in nature generated by simple rules and the relationship of architecture and digital technology.[9] The key to the notion of "swarm behavior" is the flexibility of these rules, elsewhere called "emergence," which:

> …looks to patterns of behavior, but not those which freeze into one single expression, but rather those which are premised on dynamic adaption. Constantly mutating, emergent systems are intelligent systems, based on interaction, informational feedback loops, pattern recognition and indirect control.[10]

[9] Neil Leach, "Swarm Tectonics" In *Digital Tectonics*, ed. Neil Leach, David Turnbull, Chris Williams (Chichester, West Sussex, U.K. ; Hoboken, NJ: Wiley-Academy, 2004), 70-77.

[10] Ibid., 72.

One conclusion to be drawn from this is that operation within a network may yield a set of properties whose sum is more valuable than the individual. It is the proposition of this thesis and Leach's essay that this notion can be extrapolated beyond a relationship with digital technology to apply to a myriad of other forces in contemporary society.

Leach's hypothesis of "swarm tectonics" relies heavily on Deleuze and Guattari's idea of smooth space as a venue for networks and flows, as does Buchanan's reading of the Bonaventure. As discussed in the previous chapter, Buchanan attempts to expand the understanding of this hotel's lobby beyond the perception posited by Fredric Jameson.[11] To further utilize this example, one may look at circulation patterns in relation to Deleuze's notion of flow: not only is the movement of people characterized by a layered complexity, but so is the flow of money. Buchanan states, "…one might argue that rather than turn its back on the city, it actually taps into the inherent verticality of the new downtown, making it an active response to changes in the movement of people."[12] As seen in this view, the levels of the Bonaventure that Jameson found dizzying seem appropriate to diagrams of flow.

[11] Buchanan, "Ian Buchanan and Fredric Jameson," 272-300.

[12] Ibid., 277.

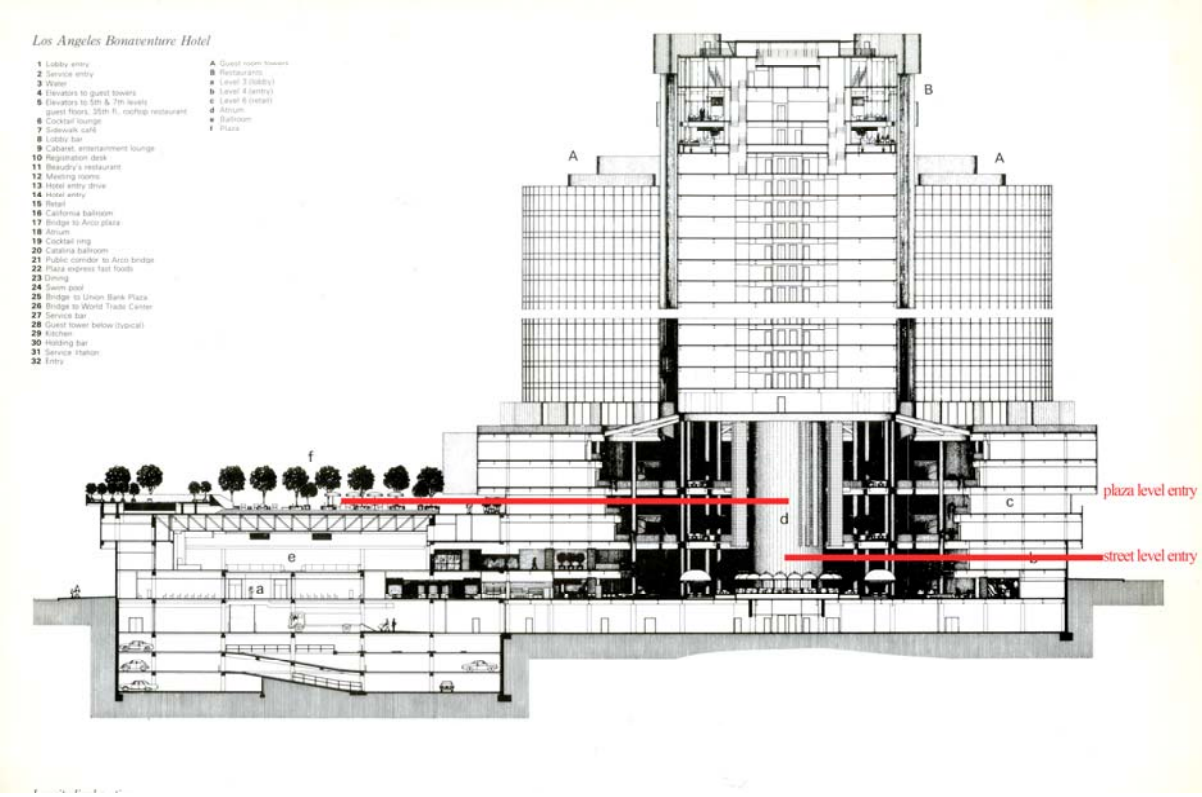


Figure 15: The lobby of the Bonaventure is characterized by multiple layers, including entrances on separate levels. These levels also include retail, check-in desk, and lounge space. (Image source: *GA 57: John Portman and Associates.* Red highlighting of entry levels by author.)

This by no means redeems the Bonaventure Hotel on a tectonic basis, but rather draws our attention to the complexity and the re-readings that can arise from the view of a network of issues pertaining to changing cultural conditions and a concern for architectural form. It remains then to address these issues tectonically, bringing to bear what Gevork Hartoonian calls a "culture of building" within this web of influences.

UN Studio: Mercedes-Benz Museum

The philosophy of UN Studio strives to maximize collaboration within a design project. In describing the design process for the Mercedes-Benz Museum, UN Studio proposes a broad source of cooperation among different collaborators, as opposed to a narrowly-defined team:

> the architectural project needed to be reformulated in a broader way…we now see projects as public constructions and have organized ourselves as a flexible platform organization, in which we fulfill the role of public 'scientists'. Much of the content of our work derives from these re-definitions.[13]

This "flexible platform organization" mirrors the way partners Berkel and Bos see their architecture in a cultural context: as a venue for interaction between people and their culture. Tectonically the structural forces play a part in this interaction, as their expression is woven into this network.

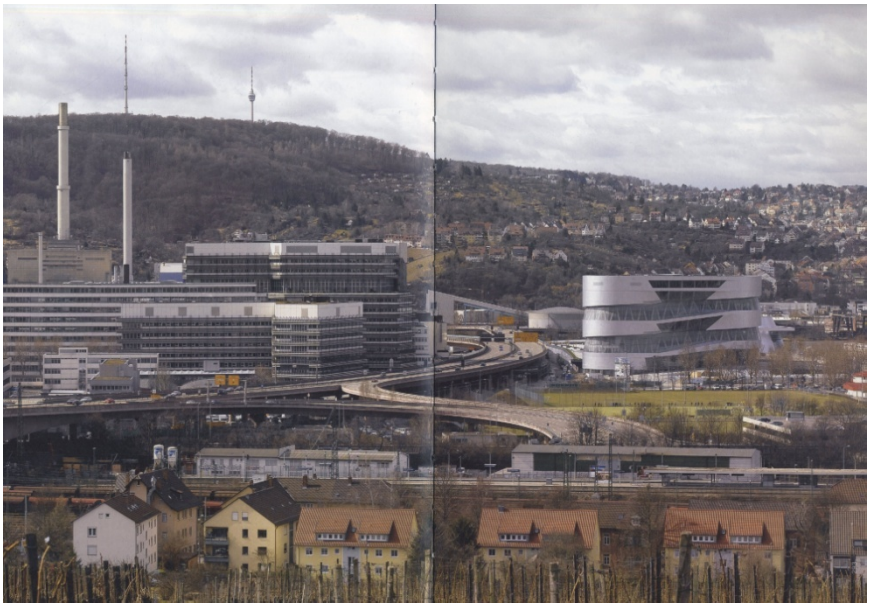


Figure 16: Mercedes-Benz and the landscape of Stuttgart. (Image source: *Buy Me a Mercedes Benz*, 292.)

[13] Berkel, Ben Van and Caroline Bos, "Live-It/Love-it" In *Digital Tectonics*, ed. Neil Leach, David Turnbull, Chris Williams (Chichester, West Sussex, U.K. ; Hoboken, NJ: Wiley-Academy, 2004), 135.

Like the Bonaventure Hotel, the Mercedes-Benz Museum is not overwhelmingly outreaching to the pedestrian. It is located in an industrial field, positioned adjacent to a bustling motorway which serves as a one-way spectacle for those within the museum. This intentional placement of the museum by the architects prioritizes the relationship to vehicular transportation as opposed to the pedestrian.

Approaching the museum, the visitor encounters a smooth plaza with pockets of landscaping and seating. Unfortunately, this space is less successful in incorporating tectonic elements than the museum interior. The plaza concept was based on the form of the museum: flowing and uninterrupted, characteristics of the interior design. Yet, the vastness of the plaza combined with the lack of features that would encourage people to linger leaves it feeling a bit desolate. In the interior space, the smooth, flowing form wraps around the spaces of the exhibit, but in the plaza it consists of only the ground plane, a flattened interpretation of the interior.

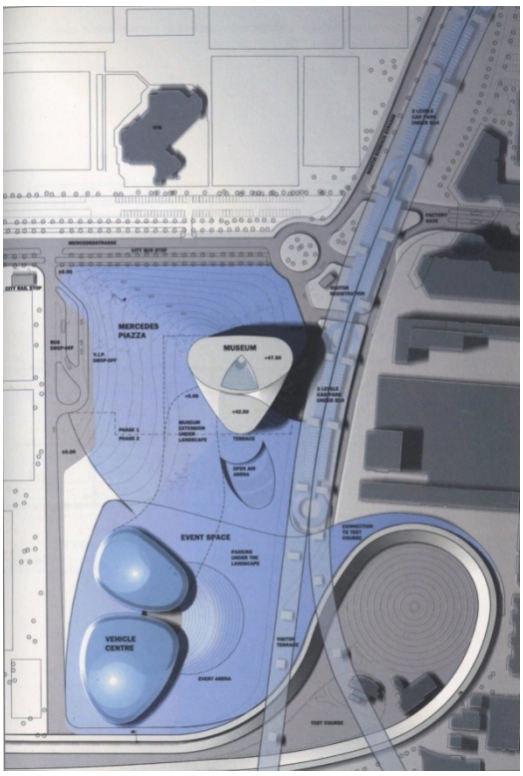


Figure 17: Site diagram showing the museum's adjacency to the motorway. (Image source: *Buy Me a Mercedes Benz*, 79.)

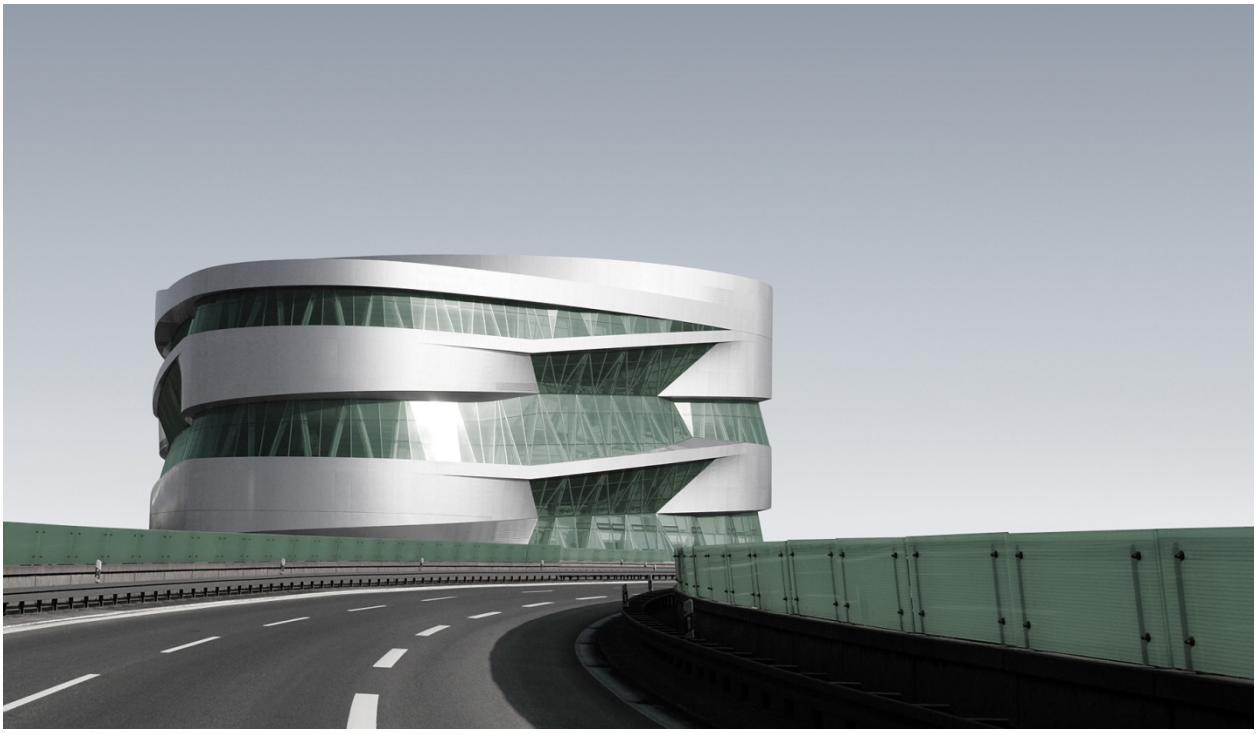


Figure 18: UN Studio rendering of the museum as seen from adjacent motorway. (Image source: www.unstudio.com, accessed November 23, 2008.)

Within the lobby, the visitors' focus shifts to individual experience. The museum levels spiral around this large volume. Like the Bonaventure, elevators animate the space, as do video wall projections previewing the exhibit's history of Mercedes-Benz. The effect is animated, immersive, and self-referential. However, unlike the Bonaventure, the experience from ground to top floor is continuous. As the elevator ascends, one gets a brief view into each level, while simultaneously the silent video follows the path of the car on the opposite wall.

Figure 19: Video projected on opposite wall of elevator. As the elevator ascends, the movie follows its path. (Image source: *Buy Me a Mercedes Benz*, 333.)

From the top level, visitors follow the interwoven exhibit sequences by means of ramps, which spiral in a fashion similar to a double-helix. One spiral, arranged chronologically, contains the "Legend" series. The other spiral, arranged thematically, contains the "Collection" series. Through the descending ramps that follow these spirals, the form of the museum allows gravity to assist in the visitor's active promenade. The geometry acts in coordination with the structure, which performs in a manner similar to highway bridging elements. These ramps widen and narrow to respond to the need for spacious exhibitions and simple transition spaces. Visitors have the opportunity to circulate from one spiral to another by intermediate staircases that link the two paths.

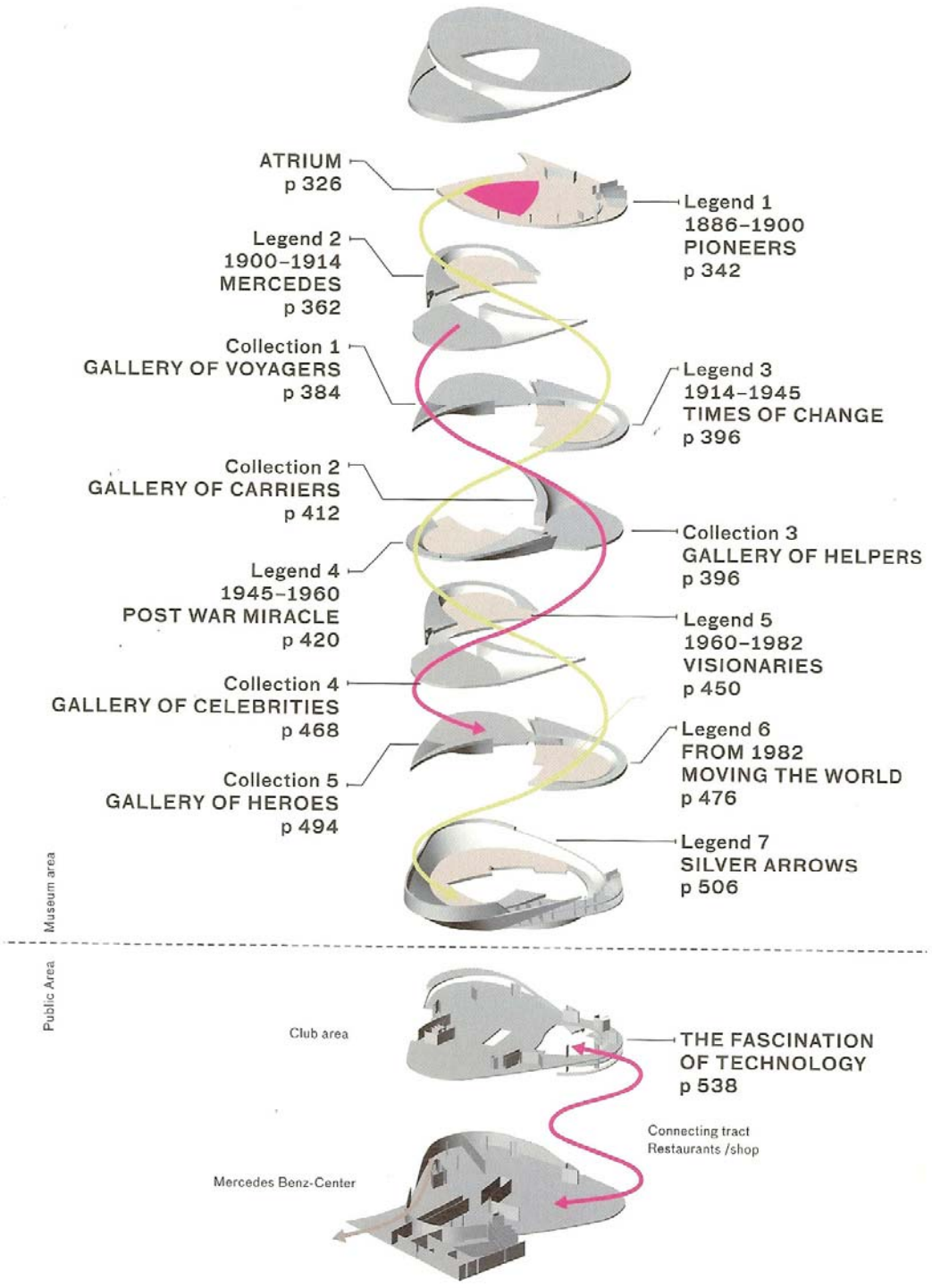


Figure 20: Exhibit sequence and double-helix organization. (Image source: *Buy Me a Mercedes-Benz*, 308.)

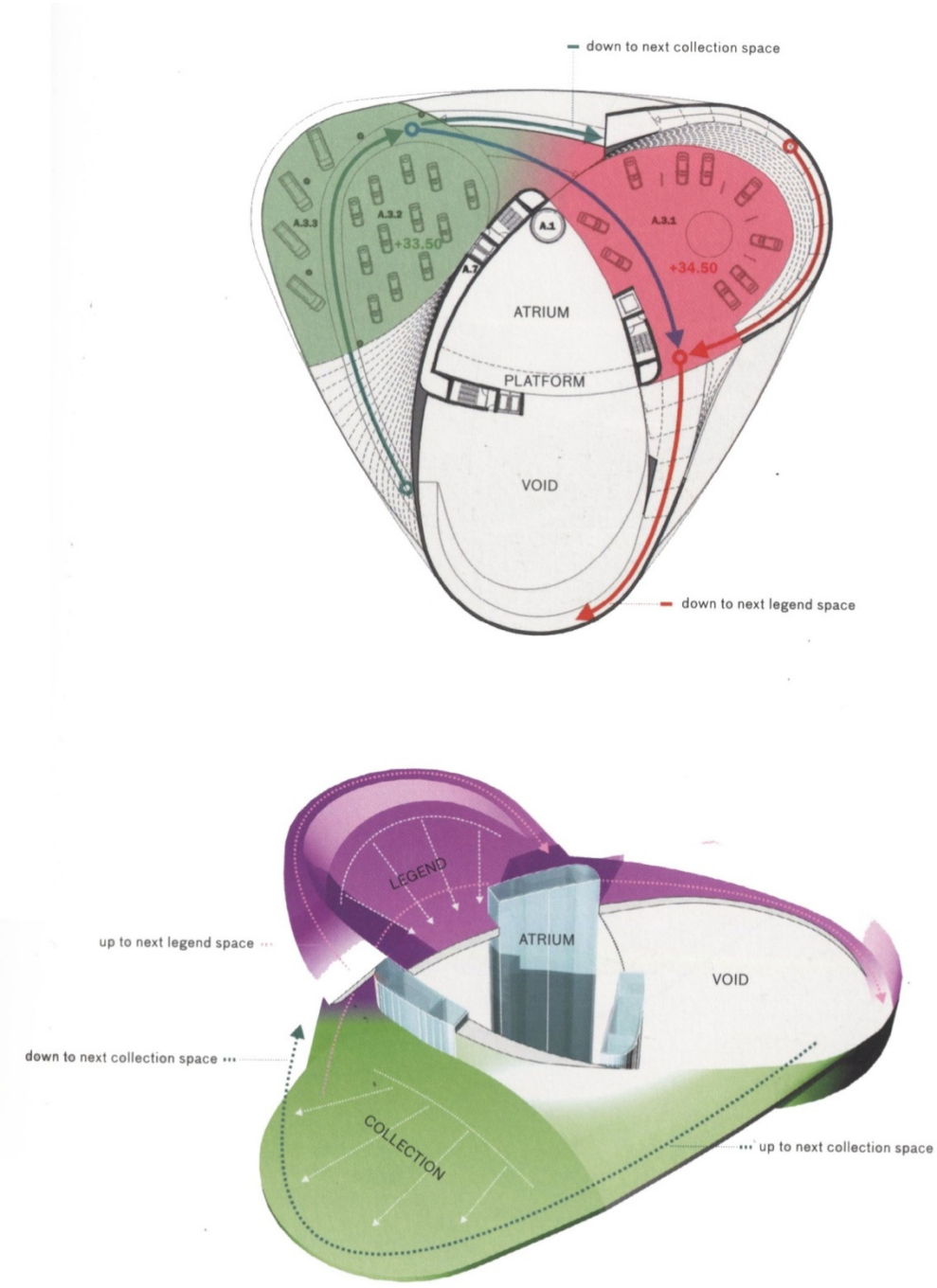
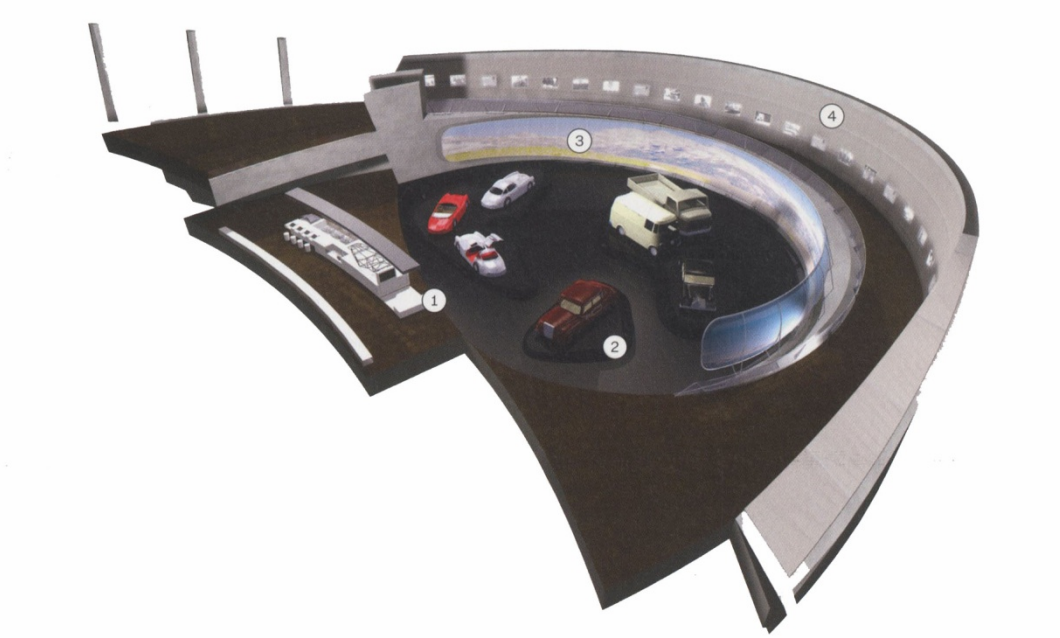
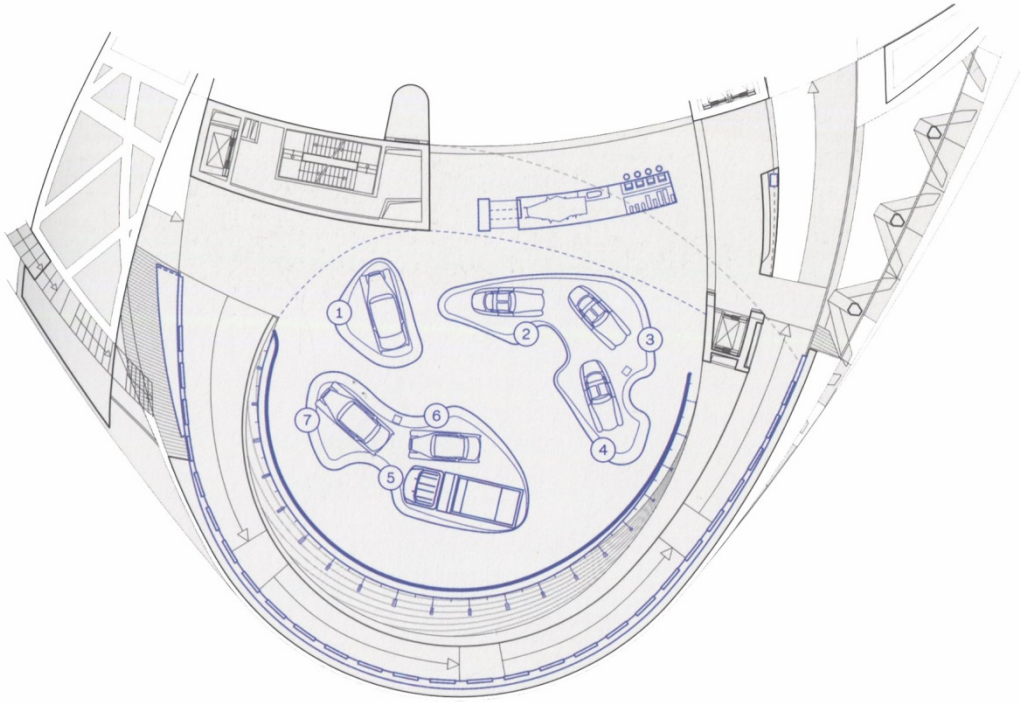


Figure 21: Circulation and zoning within the Mercedes-Benz Museum. (Image source: Buy *Me a Mercedes-Benz*, 67.)



1 Workbench 2 Platform 3 Screens 4 Illustrated History



1 Mercedes-Benz 300 S 2 Mercedes-Benz 300 SL coupe 3 Mercedes-Benz 300 SL roadster 4 Mercedes-Benz 300 SLR "Uhlenhaut coupe" 5 Mercedes-Benz LK 338 dump truck 6 Mercedes-Benz 180 7 Mercedes-Benz 300

Figure 22: Ramps and exhibition space. (Image source: *Buy Me a Mercedes-Benz*, 427.)

Tectonically, the museum form expresses structural forces along with the network of circulation. UN Studio notes:

> the structure enables the individual, dreamlike wandering that makes any museum visit so attractive and inspiring, but at the same time encourages the visitor to interact more consciously and dynamically with the displays by showing the items from unusual angles, perspectives, and backgrounds. Thus, the strategies of display afforded by the split-level Trefoil organization stimulate change and flexibility.[14]

The "structure" referred to in this passage refers to both the organizational structure and the system to resist statical forces, as they take the same form in the museum. This can be seen as a sharp contrast to the Bonaventure, where two structural systems are super-imposed on one another.

[14] Ibid., 141.

Figure 23: The structural logic takes the same form as the circulation logic. This gives the opportunity for tectonic elements to be responsive to and integral in the museum experience. (Image source: *Buy Me a Mercedes-Benz*, 122.)

As Aaron Betsky states in his contribution to UN Studio's book, motion is central to the concept of this museum. Thus, the ramps and bridging elements seem fitting. He elaborates:

> In a world inundated by the flows of people, goods and data, where all that is solid melts into motion and only congeals, for a moment, into plastic, malleable forms, in an era where time is of the essence, all places flow into each other, and even personalities are fluid, an era in which it behooves you to have a vessel appropriate for your condition, in that time and place UN Studio has designed a monument to flow.[15]

As this movement through the helixes progresses, the story of Mercedes-Benz is continually linked to world history by the exhibit content. Here a definite link to commodity culture is present: a purchase of this product seems to affirm a place in history. UN Studio does not deny this connection. They claim this in the introduction of their book: "Our museological ambition is to make the objects in the museum look as good as the merchandise in the greatest shops in the world, so that they fascinate and evoke the same amount of admiration and longing."[16] Such a disintegration of boundaries between narrative and advertisement was pointed to by Jameson as a direct cultural impact of late capitalism:

> In the gradual disappearance of the physical marketplace, of course, and the tendential identification of the commodity with its image (brand name or logo), another, more intimate, symbiosis between the market and the media is effectuated, in which boundaries are washed over … and indifferentiation of levels gradually takes the place of an older separation between thing and concept (or indeed, economics and culture, base and superstructure).[17]

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[15] Aaron Betsky, "Automotion: The Mercedes-Benz Museum," in Berkel, *Buy me a Mercedes-Benz: The Book of the Museum,* 10.

[16] Ben van Berkel and Caroline Bos, "The Museum of the Twenty-First Century," in *Buy me a Mercedes-Benz : The Book of the Museum,* ed. by Ben van Berkel, UN Studio, and Caroline Bos (Barcelona: Actar, 2006), 4.

[17] Jameson, Fredric. *Postmodernism, or, the Cultural Logic of Late Capitalism*, (1991; repr., Durham: Duke University Press, 2005), 275.

The architectural structure works along with this goal. Betsky called the bridging elements "structure turned into a logo turned into space."[18] Also, speaking of the museum's structural innovation nicknamed "the twist" Betsky further links the structure as an essential part of the perception of this form: "Here the infrastructure, usually something one only sees in the background, becomes a sculptural object that one sees as a heroic form in space, but also understands as what is holding the space one is occupying together."[19] This idea can be directly linked to Semper's statement on Roman vaulting – the merging of form and space yield meaningful tectonic expression.

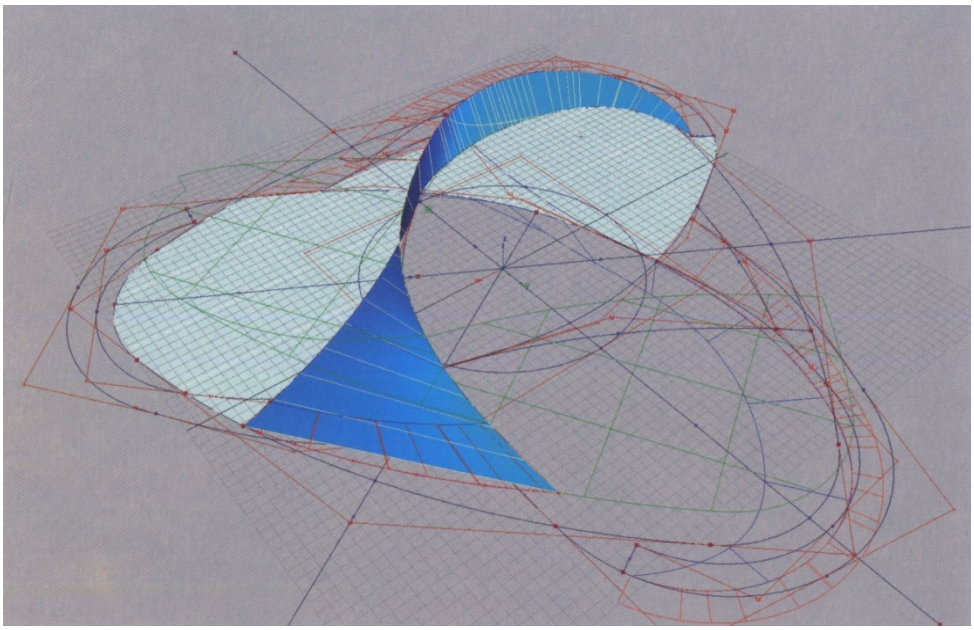

Figure 24: "The twist" diagram. (Image source: *Buy Me a Mercedes-Benz*, 148.)

[18] Aaron Betsky, "Automotion: The Mercedes-Benz Museum," in Berkel, *Buy me a Mercedes-Benz: The Book of the Museum,* 17.

[19] Ibid, 17.

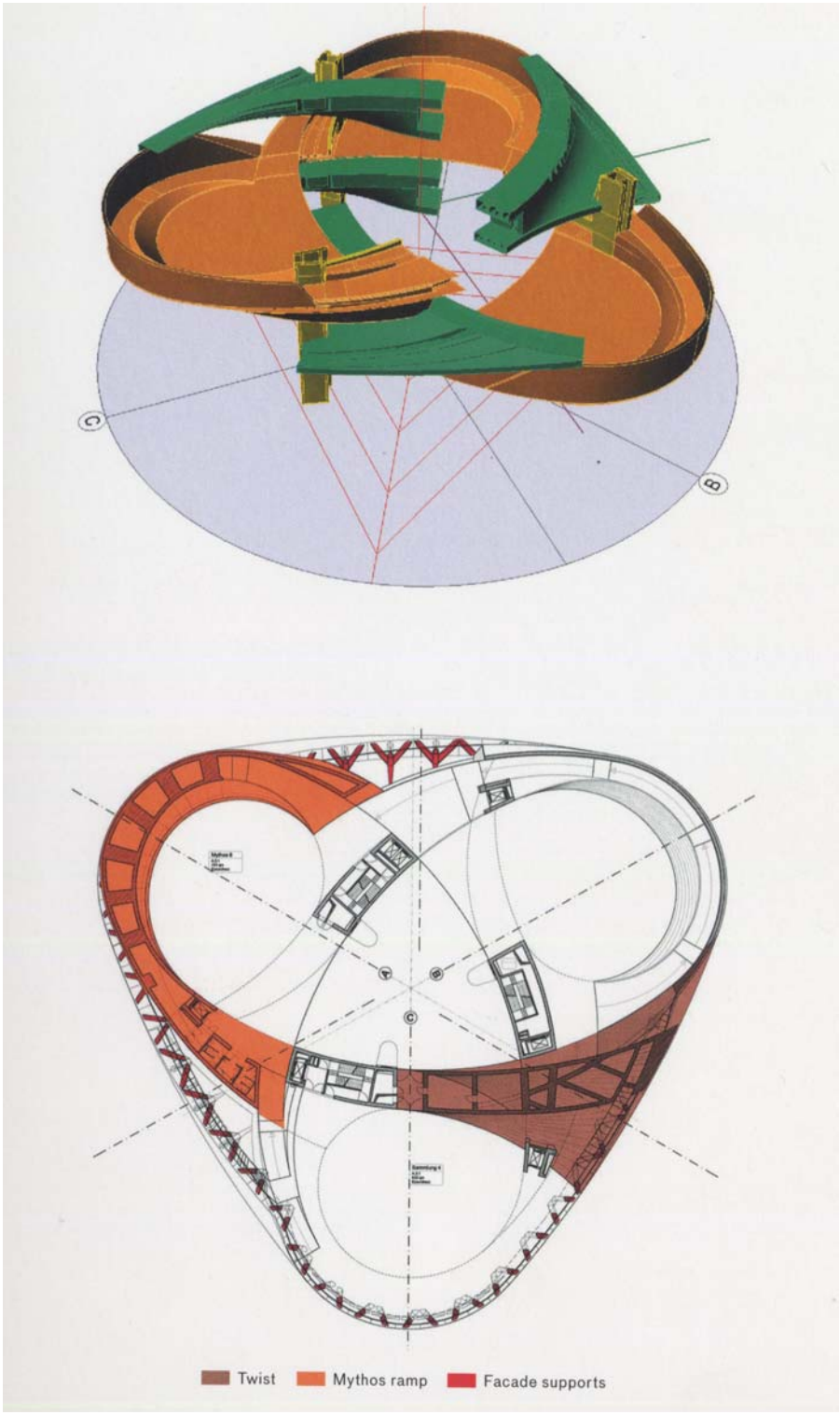

Figure25: Structural zoning. (Image source: *Buy Me a Mercedes Benz*, 149.)

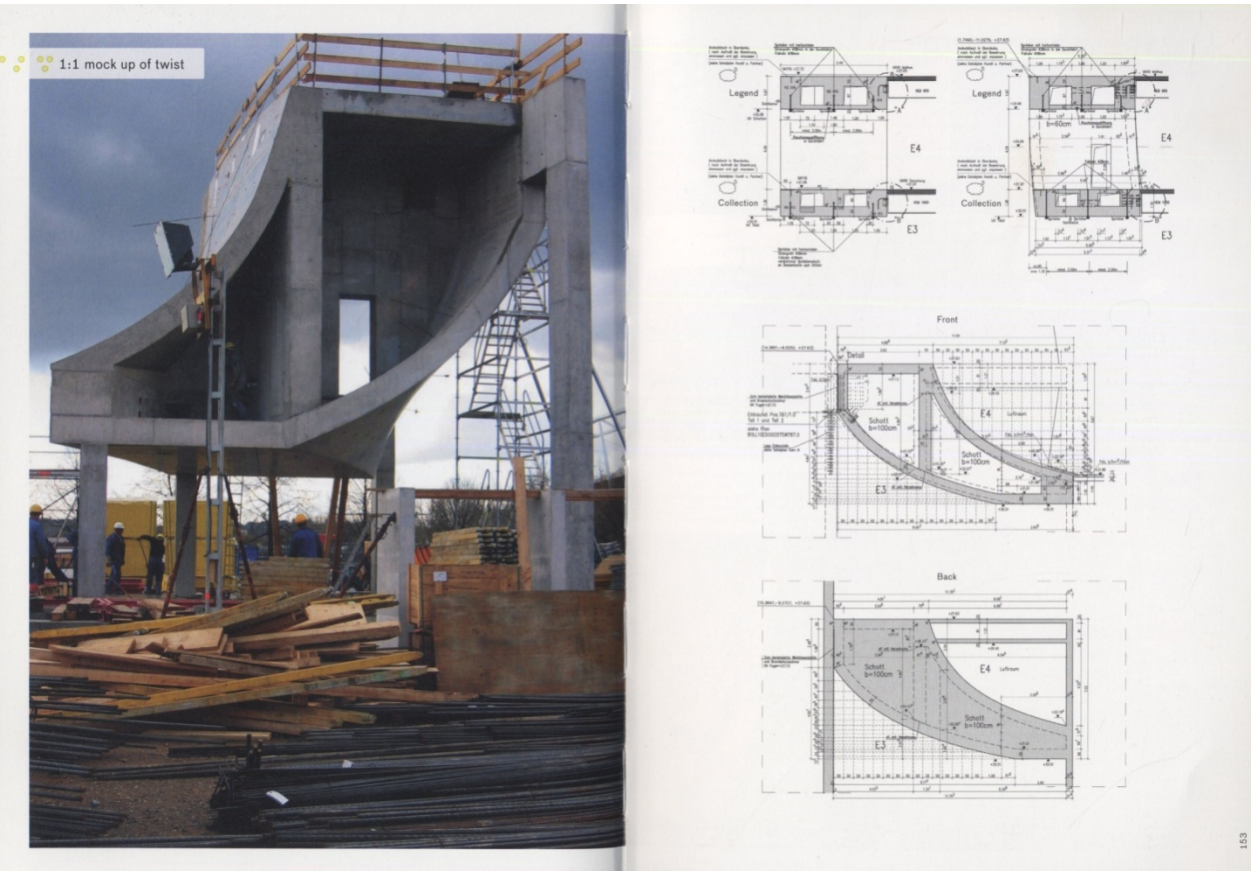

Figure 26: "The twist" physical mock-up and drawings. (Image source: *Buy Me a Mercedes Benz*, 152.)

Just as the boundary between narrative and advertisement dissolves, so does the traditional boundary between floor levels. There are no breaks or disconnects, only shifting points of focus. UN Studio created in the museum a new language for cognitive mapping. Each exhibit area has a level number as well as a number in one of the exhibit sequences, "Myths and Legends" or "Collection." This nomenclature seems to suggest that one's placement in the narrative is equally important as his or her vertical placement in the spatial arrangement of the museum.

Figure 27: Wayfinding designation in the Mercedes-Benz Museum. Photo by author.

While the path is more or less determined, the nomenclature of wayfinding attempts to break apart the system of mapping by means of vertical orientation only. "It will certainly require several visits to figure the building out. At any point, it is difficult to know one's precise location. … The building keeps unfolding, keeps surprising you. But you cannot lose your way,"[20] UN Studio's Ben van Berkel states. In this way, UN Studio is taking the same position as Ian Buchanan, who criticized Jameson's position that "hyperspace" is disorienting and thus uncomfortable. In Buchanan's view, this type of interchange and activity may be disorientating, but it is delightful in its bewilderment.[21] One can also recall the changed "perceptual horizons" mentioned by Gevork Hartoonian. As technologies such as digital interfaces become familiar to our daily life, the way we understand architecture changes as well.

[20] Ben van Berkel and Caroline Bos, "The Museum of the Twenty-First Century," in *Buy me a Mercedes-Benz : The Book of the Museum,* ed. by Ben van Berkel, UN Studio, and Caroline Bos (Barcelona: Actar, 2006), 9.

[21] Ian Buchanan, "Ian Buchanan and Fredric Jameson," in *Architecture Theory: A Reader in Philosophy and Culture*, ed. Andrew Ballantyne, 272-300 (London: Continuum International Publishing Group, 2005).

As suggested, the Mercedes-Benz Museum's structure is incorporated into the form of the museum. Unlike Frampton's stance, which states that the "structural unit is the irreducible essence of architectural form,"[22] the disposition to structural components by UN Studio is not reductive, but additive. Instead of trying to reduce form to a simple, poetic expression of structure, UN Studio has attempted to incorporate all aspects of architectural influence, including but not limited to structure, consumer culture, and circulation, into the expression of architectural form. Yet the role of tectonic elements in the conception of form and exhibit is crucial. What once was considered a "path" that yielded opportunity for the architectural promenade is now replaced with a network of motion. Concepts of culture, structure, and path are diffuse in this network. To compare it with the earlier diagrams in Chapter 2 of modernism and postmodernism, the latest model is most comparable to a *system*, not an object or product.

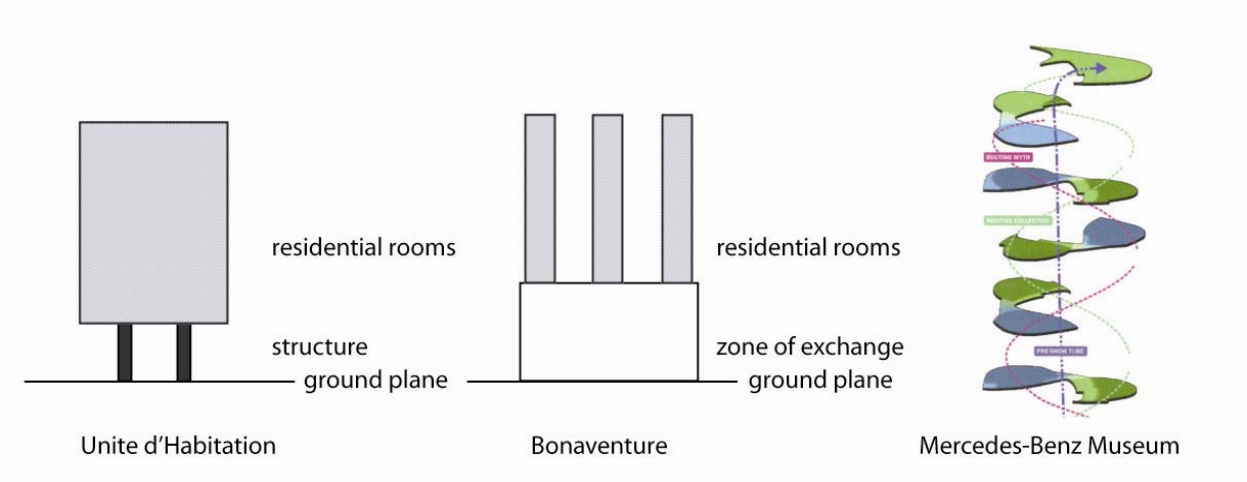

Figure 28: Three discussed buildings as viewed in their evolution from object to product to process. Diagram by author. (Image source for Mercedes-Benz Museum: *Buy Me a Mercedes Benz,* 71.)

[22]Frampton, "Rappel à l'Ordre, the Case for the Tectonic," 19-25.

The Mercedes-Benz Museum recalls the idea of emergence mentioned in Leach's "Swarm Tectonics" in that it aims to leave the exhibit sequence somewhat open-ended, allowing different circulation patterns to emerge. Visitors transition between the two spirals, exploring this "folded space." The form is responsive to this fold tectonically, as the static forces are seemingly incorporated into the substance of this network of vectors.

As this Stuttgart landmark is a museum by typology, its exhibits inevitably address cultural forces. Yet, UN Studio takes this further, pushing the formal and spatial properties of the architecture to also be responsive to these factors. Flow within the space is a product, and indeed a generator as well, of cultural and static forces. In this way it recalls the early modern definition of tectonics as reflecting both the statical and cultural forces at work. Yet in light of recent explorations in emergence, the contemporary notion of tectonics expands by looking to the dynamic creation of patterns within a space.

[4]

Surface: the Layered Experience and the de Young Museum

In a world that is changing every second, we should not simplify and reduce to authenticity, but we need to work with systems, processes, mechanisms of evolution that allow us to join all information and processing it into a complex piece of architecture. In this sense, architecture becomes the context where technological advances and social needs meet without any filters, appearing as a multi-layered object.

– Susanna Cross in "authenticity" in the *Metapolis Dictionary of Advanced Architecture*

The idea of the tectonic as described by Frampton seems averse to an architecture that gives priority to surface. Further, forces of postmodernism placed an increasing emphasis on surface qualities, treating this outer layer as a building's only opportunity to communicate to culture but leaving behind an expression of the internal core of the building. For this reason Frampton's essay "Rappel a l'Ordre" calls for a notion of the tectonic that turns away from a language of the surface. Yet, the concepts of "art-form" and "core-form" introduced by Bötticher and later developed in Semper's *Bekleidung* theory do not exclude surface from the relationships within tectonic expression. Thus, an exploration of how surface may be incorporated into contemporary tectonics may be useful, mindful of but not submissive to the notions of surface and image that the postmodern has brought into our way of viewing architecture. As a case study, the de Young Museum by Herzog & de Meuron is used to put to work the concepts of image and surface in the contemporary architectural context and show the role that architectural structure can play in this context. The conclusive concept states that the perceptual intersection of structure and surface found in the de Young creates a new perception of *Bekleidung* as a function of tectonics.

In his epilogue to *Tectonic Culture*, Frampton expresses his dismay at contemporary architecture's "cultural devaluation of the tectonic and to a state of affairs in which simulation rather than presentation and representation becomes the main expressive mode."[1] He further goes on to quote D. Andrew Vernooy:

> The exterior wall of the thin-walled building is composed of several layers that are internally expressive, but concealed in such a manner that they remain externally mute about the condition of their configuration. These layers are covered by machine-produced veneers which are fashioned to imply forms developed honestly by earlier methods of construction. Thus, the material investment of the architectural image has been devalued for the sake of expediency and performance. This dislocation of material meaning is an understandable concomitant of a media society that accepts readily devalued imagery of all types…the envelope has ceased to be a reflection of cultural operations that include evidence of the production of material and the production of device. It has become instead a reflection of cultural fashion.[2]

As typical of Frampton's epilogue, this shows the hesitancy to reconcile his tectonic viewpoint with the technological advances and media-driven nature that he considers problematic in contemporary architecture. In relation to discussions of surface, Frampton's belief is that this exterior layer often has little role in the production of tectonic expression. Such worries come from his criticism of the lasting effects of Jameson's postmodern logic in the realm of architectural design.

The problem of surface and its assessment as an obscuration of the tectonic should be evaluated within the concepts of art-form and core-form introduced by Bötticher. Semper's

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[1] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 381.

[2] D. Andrew Vernooy, "Crisis of Figuration in Contemporary Architecture" In *The Final Decade : Architectural Issues for the 1990s and Beyond*, ed. University of Texas at Austin. Center for American Architecture and Design, Vol. 7 (Austin, Tex.; New York, N.Y.: Center for American Architecture and Design, School of Architecture, University of Texas at Austin; Distributed by Rizzoli International Publications, 1992), 94-96. Quoted in Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*.

Bekleidung theory also noted this dual-nature of the tectonic, expressed as structural-symbolic and structural-technical. Frampton later builds upon these topics, calling them "representational" and "ontological". This chapter evaluates the evolution of these concepts in tectonic thought in relation to the idea of surface in architecture to find that a complete separation of the seemingly-opposing elements of surface and tectonics might be lacking in expressive potential. As a case-study for contemporary architecture, the de Young Museum by architects Herzog & de Meuron is explored.

The overarching goal of this chapter is to explore how the idea of surface in architecture can move beyond a postmodern/scenographic sensibility yet still be seen as a valid part of a network of architectural elements that communicate meaning within a given architectural experience. It will be shown that this position is not far from the original relationship of core- and art- form as posited by Bötticher, though recent architectural discourse has been hesitant to fully embrace the surface as capable of tectonic expression. This hesitancy is part of the criticism of postmodernism and the image. However, when the surface is not the dominant mode of expression but instead part of a network of expressive elements that constitute and architectural experience, architects might be able to move past the postmodern logic of surface and think of the outer skin of a piece of architecture as it may be employed for tectonic expression.

Surface: a History of Representational and Ontological Components

Semper and Bötticher both wrote of the substance of a work of architecture and its relationship to its surface effects. While their thoughts on tectonics have much overlap, the

theorists differed on their view of how the art-form and core-form developed in relationship to each other. Bötticher believed they were conceived simultaneously, and Semper believed that the core-form was "not conceived but arises out of necessity"[3] and later served as the basis for the art-form. This fundamental difference underlines the separate views of Semper and Bötticher in terms of the relationship between art-form and core-form.

Explicit in the work of both theorists is the dual-nature of tectonic expression. This dual notion can be seen as rooted in Schopenhauer, and then applied to the term "tectonic" with Karl O. Müller. The dichotomous relationship between the structural core and the decorative expression has carried through each conceptual development of the tectonic.

Theorist	**Dual Components of Tectonic Expression**	
Schopenhauer	*Stutze*	*Last*
Müller	"application" and "necessity"	"art" and "representation of deepest feelings"
Bötticher	*Kernform*	*Kunstform*
Semper	Structural-technical	Structural-symbolic (Bekleidung)
Loos	Underlying material	Cladding
Ford	Structure	The representation of structure
Sekler	Structure as intangible concept	Visual expression of structure
Frampton	Ontological	Representational
Hartoonian	Core-form as related to technology and science	Art-form as related to perception and tactile sensibilities

Table 2: The dual nature of tectonic relationships and its terminology through time. Table by author.

[3] Herrmann, *Gottfried Semper : In Search of Architecture*, 141.

According to Bötticher, the art-form and core-form are closely related from the very beginning of architectural design: "[the art-form] arises at the same moment that the mechanical scheme of the part [i.e., the core-form] is conceived; the two are thought of as a unity and are born simultaneously."[4] Bötticher believed that one cannot change without the other: "each must be a primary element born simultaneously with the whole."[5] In this sense, the two elements inform one another as a form comes to realization. This can be understood as a continually evolving exchange.

Bötticher's position on tectonic expressivity may be summarized by his example of a Greek column. With its slight curvature, the entasis of a column subtly expresses the weight that it bears. As Bötticher describes the Greek temple as a whole he concludes:

> [In Hellenic tectonics] the intention is not to characterize the stone as dead stone but, on the contrary, to let the dead substance of the stone fade away … As soon as the stone is covered by a form analogous to its idea [i.e. an art-form], the concept of the stone has disappeared and that of the analogue takes its place.[6]

In Bötticher's analysis, the form of the cyma behaves similarly to the column: its subtle curvature is a relationship to the load that it is subjected to.

[4] Ibid., 143. Original text in German: Bötticher, *Die Tektonik Der Hellenen*, xv

[5] Herrmann, *Gottfried Semper : In Search of Architecture*, 143-44. Original text in German: Bötticher, *Die Tektonik Der Hellenen*, 35.

[6] Herrmann, *Gottfried Semper : In Search of Architecture*, 143. Original text in German: Bötticher, *Die Tektonik Der Hellenen*, 29, vol 2.

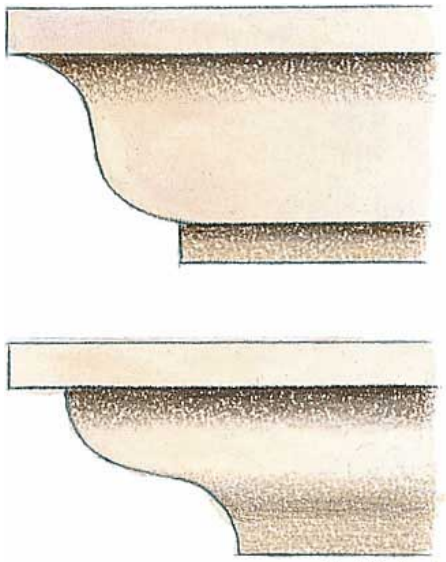

Figure 29: Greek cyma. (Image source: The American Heritage® Dictionary of the English Language. Boston: Houghton Mifflin, 2007. s.v. "cyma," http://www.credoreference.com/entry/hmdictenglang/cyma (accessed May 20, 2009.))

Semper's position was similar to Bötticher's, yet differed in its understanding of how these dual parts evolved in relation to each other. In Semper's view, the nature of the development of core-form and art-form was much more linear: "[Greek temples] are not structures adorned by having floral and animal forms attached to them; their forms are like those that organic forces call forth when striving against mass and weight"[7] In a later lecture, Semper stated: "Greek ornaments are emanations of the constructive forms and in [sic] the same time, they are symbols of the dynamical functions of the parts to which they belong."[8]

Like Bötticher, Semper's position could be clearly illustrated by his examination of columns. He looked at the articulation of the Greek column as the perfect expressivity of its function: "The Greeks… enshrouded their solid columns with these decorative forms – the forms

[7] Herrmann, *Gottfried Semper : In Search of Architecture*, 142.

[8] Ibid., 144.

becoming, in effect, artistic symbols articulating and *masking* the column's static role, while also denying its material basis."[9] He believed the "masking" to be the ideal result of harmony between core- and art-form.

Semper's *Bekleidung* theory evolved out of this discussion. This idea became a central part of his writings and ultimately his legacy to architectural discourse. In this notion, the "dressing" of a building could be understood by this harmony of the outer-layer in relationship to its inner, structural component. Semper emphasizes that these two elements are closely linked, remarking that "the mask is no good if what it is concealing is false."

Tectonics and the Skin: the Struggle of Twentieth-Century Architecture

Although Eduard R. Ford points out the tendential pull of modern architecture toward layered construction, he notes that this as a concept is not new:

> The idea that walls in ancient or medieval architecture were monolithic was largely an illusion. Marbles have always been veneered, interiors have always been plastered, and even in a simple stone wall the quality stone was always placed on the faces.[10]

Ford went on to clarify the distinction that modern construction brought to this layered practice: in traditional construction, all the functions of the wall such as insulation, vapor barrier, and outer surface were performed by a minimal amount of materials and installed by a small number of laborers. The trend in modern constructions increased the layering of elements and specialized the labor associated with their installation.

[9] Henry F. Mallgrave, introduction to Semper, *The Four Elements of Architecture and Other Writings*, 39.

[10] Edward R. Ford, *The Details of Modern Architecture: Volume 1*, illustrated edition ed.The MIT Press, 1990), 352..

Frampton's criticism rests not on this facet of modern architecture, but rather the repercussions of its practice. His issue concerns the postmodern preoccupation with the outer-most layer: surface. In Frampton's opinion, much of architecture today interprets surface as wholly independent not only of its core-form, but also other forms of expression (art-forms other than surface), the process of construction, and the space that is bounded by this envelope. Frampton comments on this purely scenographic basis of architectural value as the "seductive but corrosive aestheticism."[11] In addition to this he warns of the far-reaching cultural consequences in Turner's assessment that "Design now consists of an architect devising an envelope and infill that will conceal the work of structural, mechanical, electrical, and plumbing engineers."[12]

To recall the Bonaventure, its outer wrapper served only to alienate the interior space from the Los Angeles street. Further, its reflective exterior negated a production of its own image in favor of a distorted replica of its surroundings. Jameson states "it is not even an exterior, inasmuch as when you seek to look at the hotel's outer walls you cannot see the hotel itself but only the distorted images of everything that surrounds it."[13] This serves to illustrate the lack of tectonic and experiential engagement that can be produced from an overemphasis of surface in architectural design.

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[11] Kenneth Frampton and Paulo Martins Barata, "Kenneth Frampton Apropos Tectonic: On the Highwire of a Definition [Interview]," *Architectural Research Quarterly* 3, no. 2 (1999, 1999), 145..

[12] R. Gregory Turner, *Construction Economics and Building Design : A Historical Approach* (New York: Van Nostrand Reinhold, 1986).

[13] Jameson, *Postmodernism, Or, the Cultural Logic of Late Capitalism*, 42.

Beyond the issue of the building surface itself, Frampton sees the entire formal perception of building as being supplanted by the affects of imagery.

> The ambivalent role played by the culture industry in late modern society also emerges here in that, as I have already intimated, architecture is no more immune to the impact of the media than any other field… And yet unlike the other plastic arts, architecture cannot even be nominally represented by a single photographic image, although this is often the mode in which it is disseminated for professional and lay public alike. Seen in this light building appears to be imagistic and perspectival rather than tactile and spatial.[14]

This can be seen as related to Jameson's description of postmodern pastiche driven by "a world transformed into sheer images of itself."[15] This threat of the image reduces the whole of a building to a flat image, impacting the nature of how its spatial depth is perceived within its experience.

Along with media, technical innovations have brought over-emphasis to the building skin. Frampton elaborates:

> one has nonetheless to recognize the critical impact that countless technical innovations have had upon the character of the built environment; innovations that since the end of the 18th century have brought about the progressive dematerialization of built form, together with the all too literal mechanization and electrification of its fabric.[16]

Frampton's concerns are certainly not unfounded – the hegemony of technology and the image have undeniably shifted the focus of architecture to place an over-emphasis on the surface. Framption, however, seems reactionary to this point to the extent that he suppresses any relevance that the notion of surface may have to the expression of tectonics. In *Tectonic Culture*,

[14] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 378.

[15] Jameson, *Postmodernism, Or, the Cultural Logic of Late Capitalism*.

[16] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 380.

Frampton rarely mentions Semper's *Bekleidung* theory, instead choosing to highlight the Semperian categories of earthwork, hearth, framework/roofwork, and enclosing membrane. He is aligned with the critique, based in the writings of theorist August Schmarsow, that the *Belkleidung* thesis constitutes a split in Semper's theory, and places "undue emphasis on the representational façade."[17]

Although he recognizes his "representational" and "ontological" categories as related to the earlier notions of art-form and core-form, these notions as described by Frampton do not necessarily work in coordination with each other, but are in opposition. In speaking of Schinkel's *Architektonisches Lehrbuch* he writes: "these sketches are ontological rather than representational in character, that is to say the tectonic system itself is emphasized rather than the cladding of its form…the *Kernform* rather than the *Kunstform* predominates."[18] While this may be true of the particular sketches, this shows Frampton's tendency to separate the dual-roles as opposites, one celebrating tectonic nature and the other obscuring it. Yet, this is opposed to the traditional notion that stresses the role of the surface art-form as a mediator between the outside world and structural necessity.

Although Frampton's praise of tectonic culture suppresses the role of the surface, this element traditionally plays a part in tectonic expression within the traditional dialogue of core-form and art-form. To move past the dominance of the surface in the postmodern sensibility, architects must once again realize it as part of a multitude of means to convey tectonic expression. Surface is thus a singular component working within a network of expressions, whose sum total to an architectural experience.

[17] Ibid., 89.

[18] Ibid., 70-71.

Contemporary Wrappers and the Layered Experience

An expanded definition of tectonics does not deny the expressive potential that the surface may offer. The postmodern perspective of surface as an autonomous billboard for an architectural brand recalls Semper's warning that "masking does not help… when behind the mask is false or the mask is no good."[19] This statement condones the use of a mask, but warns that it must correspond to the network of tectonic elements including core-form and other art-forms. However, simply returning to the nineteenth century understanding of this relationship denies the fact that culture and its means of looking at architecture have changed within the past century, and now include the impact of media and technological changes. Thus, architects must look for new ways to incorporate surface, not merely as an dominant image, but within an integrated architectural experience of tectonic expression. The expanded notion of tectonics positions architecture as the venue for a multi-faceted experience, where the encounters that take place reference the complex, layered nature of everyday life.

Gevork Hartoonian recalls Semper's definition of 'dressing' in order to differentiate this from what he calls the 'dressed up' – a characteristic comparable Jameson's description of pastiche. "Semper's theory of dressing, in contrast, is primarily concerned with the artistic articulation of the material of the exterior clothing in relation to the load-bearing elements."[20] The key notion in this statement is "relation". When seen as a relationship, the art-form is not

[19] Semper, *The Four Elements of Architecture and Other Writings*, 257.

[20] Hartoonian, *Crisis of the Object : The Architecture of Theatricality*, 135.

obscuring the core-form, but rather forming a dialectical relationship between the two elements and the architectural experience.

As Hartoonian closes his book *The Crisis of the Object*, he notes the conceptual utility of the discussion on surface:

> the return of 'surface' to the main scene of contemporary architecture should be seen as useful: it sheds a different light on Semper's theory of cladding, and provides an opportunity to underline the essentiality for the tectonic of roofing and wrapping, in spite of architecture's entanglement with a culture that is totally commodified. What this means is that criticism should discuss the work itself; how architecture addresses the culture of building in rapport with the objective and subjective situation of late capitalism.[21]

To bring this "theory of cladding," which is indebted just as much to Bötticher as it is Semper, into the twenty-first century, architects must recognize that cultural and technological shifts inhibit their abilities to merely recycle this notion into a new form that is nothing more than a replica of the older version. As technology is named by Frampton as a threat to tectonic culture, its postmodern understanding as a representative tool must be rethought to be incorporated as a part of the process of design. Further, a layered construction technique cannot be thought of as oppositional to tectonic principles, instead the nature of architectural experience itself can be seen as layered and varied, thus paralleling the constructive nature of building.

Herzog & de Meuron: De Young Museum

When thinking of surface as part of an experiential dialogue, the work of Herzog and de Meuron certainly shows a continual reevaluation of the role that this element may play. Their first widely publicized work, the SBB Signal Box in Basel, has a surface that seems to

[21] Ibid., 156.

dematerialize as it departs from the corners. Herzog & de Meuron have also experimented with silkscreen on concrete and glass, as seen in the Eberswalde Library. Their 2003 Prada Shop incorporates structure into the surface of the small building by using the monocoque structural technique.

Figure 30: Signal box, Basel. (Image source: *The de Young in the 21st Century*, 60.)

Figure 31: Eberswalde Library. (Image source: *The De Young in the 21st Century*,73.)

Figure 32: Prada Shop and Offices, Tokyo. (Image source: *The de Young in the 21st Century,* 81.)

Herzog & de Meuron recognize that the postmodern stance toward surface has ceased to move the dialogue of architecture forward. Though they clearly use reference and decoration, it is not in pastiche form. "Postmodernism was not on our agenda,"[22] Jacques Herzog has clearly stated. The firm is clearly aware of their susceptibility to be compared to Venturi. However, they differentiate their use of skin by claiming that they do not set out to communicate one idea to a mass audience by means of surface. Instead, they are simply interested in the different ways to articulate a building's outer layer. Nor is their compositional approach infused with deliberate irony and complexity, as was Venturi's.

Like Berkel and Bos of UN studio, discussed in the previous chapter, Herzog and de Meuron recognize that their work engages in the synthesis of cultural production through networks of economic and social forces. When asked about the difference their firm sees in designing a museum that is symbolic of "general cultural meaning" and something for the marketplace, Jaques Herzog comments:

> Marketplace and 'general cultural meaning' don't necessarily exclude one another, do they? Every great museum builds its own marketplace around which it gathers a growing community of patrons, donors, and supporters of all generations…A museum is a kind of cultural marketplace.[23]

The analysis that follows examines how surface may be utilized as part of the architectural experience, beyond the stance of a "decorated shed."

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[22] Philip Ursprung, Centre canadien d'architecture and Herzog & de Meuron, *Herzog & De Meuron : Natural History* (Montréal: Canadian Centre for Architecture, 2002), 294.

[23] Diana Ketcham and others, *The De Young in the 21st Century : A Museum by Herzog & De Meuron* (London: Thames & Hudson ; Fine Arts Museums of San Francisco, 2005), 152.

Figure 33: view of the de Young with twisting tower on right and cantilever on left. Photo by author.

San Francisco's de Young Museum provides insight as to how this can be done. The notion of tectonics defined by Bötticher possesses a relationship between the core-form and the visitor by means of the art-form, or similarly Semper's term, *Bekleidung*. In the case of the de Young, its entire exterior is clothed in a copper wrapper that has derived its pattern from a pixilated image of the surrounding greenery. However, this skin cannot be seen as a simplistic, image-obsessed reproduction. Rather, it is an interpretive, yet distorted image of the museum's own surroundings; understood as a texture, made from a material that shows age in hopes that this surface will integrate itself in the setting of the park. This skin is not representative of the ironically allusive image treatments of 1980's postmodernism, for certain, but it is in some way a descendent, borrowing some language from its precedents, yet making a separate statement. The wrapper's reference to the image of surrounding trees follows the logic of "the image" – yet its distortions and pixilation seem to be an attempt to incorporate process into this substance. Further, it takes on a tactile quality, beckoning visitors to run their hands along its outward face.

Figure 34: The de Young's tactile copper skin. Photo by author.

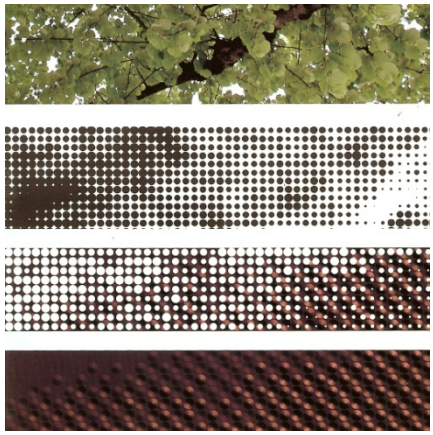

Figure 35: The process embedded in the De Young's skin. (Image source: *The de Young in the 21st Century*, 106.)

Yet, reflective of Herzog's comment about the museum's participation in the marketplace, the copper skin is also part of the building's brand. The skin creates a signature identitiy, immediately recognizable as symbolic of the greater building. And indeed there is a great deal of monetary exchange as well as cultural exchange involved in the business of museums: memberships, admissions, gift shops, and space event rental, upon all of which their very survival as cultural institutions now depends.

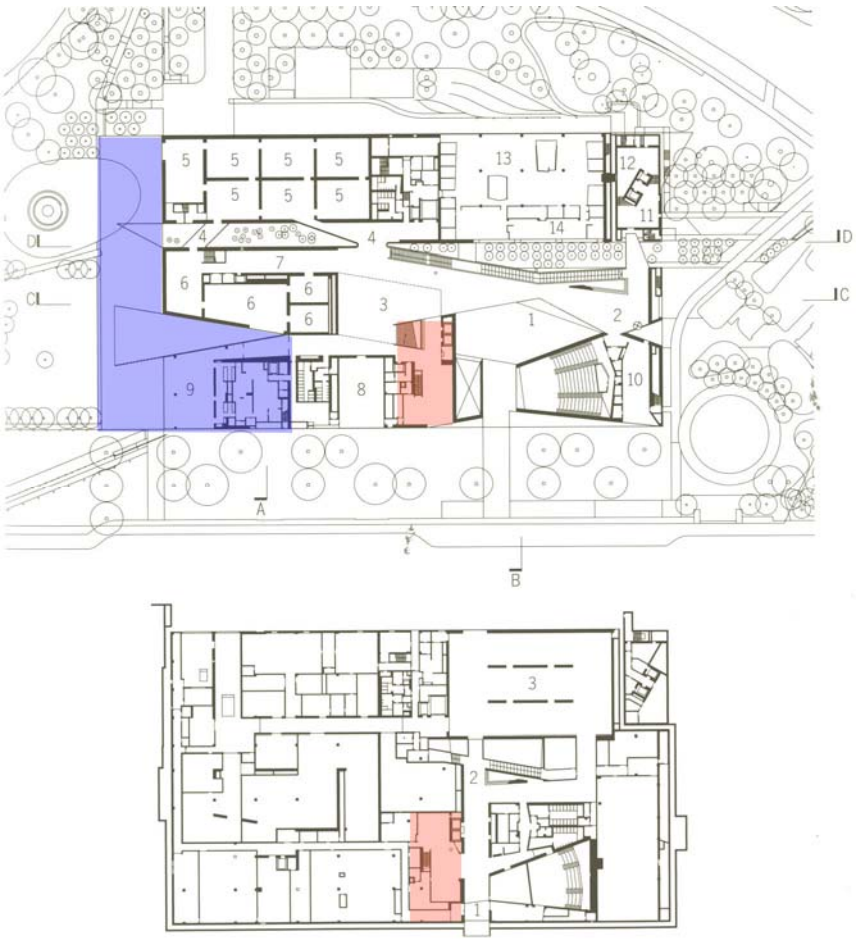

Figure 36: Functions of the de Young Museum that directly generate capital: the gift shop (pink) and the café (blue). In addition to this, memberships are sold and members are able to rent entire galleries and portions of the garden. (Image source: Rob Gregory, *Key Contemporary Buildings: Plans, Sections, and Elevations*, 173. Color shading by author.)

The analysis of de Young does not stop at the copper wrapper. An examination of the experience of the building reveals fascinating parallels between the devices of image and surface, and their new uses in this contemporary setting. For example, Herzog and de Meuron use reflections to engage the visitor. On several glass surfaces in the museum, the visitor can see through to the park, where he or she has just been, his or her own reflection, and the next destination. These surfaces create a heightened awareness of the space and its setting. Of this

experience, Herzog notes, "The building should stress that moment of real encounter. This has always been a fact, and it has become even more crucial today in a world dominated by digital info and technology. It's the only true asset left for architecture."[24] Here Herzog acknowledges these forces of influence on our perception of built space, but unlike the reflective glass of the Bonaventure, the de Young reinterprets the use of reflection in a new way to engage the visitor at close range. It is important to note, however, that reflection remains within the vocabulary of reproduced images on flat surfaces. Architects can now recognize this language as a communicative tool of architecture, yet not the extent of their repertoire.

Figure 37: Reflections. (Image source: Flickr public photo, michale, http://www.flickr.com/photos/michale/47571052/, accessed on May 17, 2008.)

[24] Ibid., 152.

Figure 38: Reflections and park views. (Image source: Flickr public photo, munzz, http://www.flickr.com/photos/high_hopes/2311073133/, accessed on May 17, 2008.)

The language of a frame is no stranger to architecture, nor is it out of context in a museum. The use of frames in the de Young museum, however, deliberately calls our attention their embedded meaning. Certain galleries are kept column-free so that architectural frames are given full communicative reign. Project architect Ascan Mergenthaler states,

> Since the windows in the galleries are so important, we mimicked the shape of these windows in the display cases. When you look into the cases, are you looking inward or outward to the park? We wanted to encourage this type of confusion in the mind of the viewer. Are you looking at the object, or is the object looking at you?[25]

[25] Ibid., 93-95.

Figure 39: Large frames inside gallery, (Image source: *The de Young in the 21st Century*, 94.)

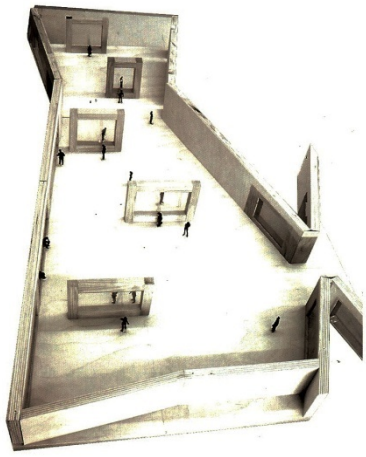

Figure 40: Model of gallery space (Image source: *The de Young in the 21st Century*, 187.)

While Herzog & de Meuron reject postmodernism as a motivation for their design, and intentionally do not use historical style, the use of the frame does refer to a familiar language. As noted by Semper: "the frame is one of the most basic forms used in art; no enclosed image without a frame, no scale without it."[26]

[26] Semper and others, *Style in the Technical and Tectonic Arts, Or, Practical Aesthetics*, 86.

In this gesture can be seen the evolution of the frame: the viewport for art, the window, the television, and the computer screen: understood now more than ever as something to view and be viewed through. When layered within three dimensions of a space, the lines of spectacle and spectator are clearly dissolved, and all visitors become participaants along with the space itself. Since the language of the frame is also part of the building substance, not merely an additive element, we see the lines between furnished elements and constructional components being blurred as well.

The de Young Museum shows a use of structural solutions through its design. These include the unobstructed views in the galleries employed to manage views through frames. Also, the twisting tower is an unprecedented form, and the dialogue of structural forces with formal and surface effects was a key consideration in achieving the distinctive form of this element.

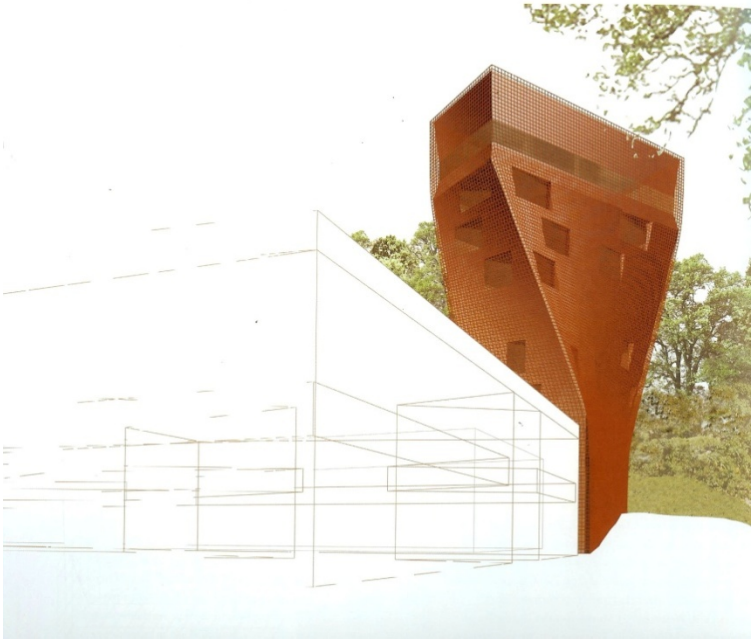

Figure 41: The de Young's twisting tower, architect's rendering. (Image source: *The de Young in the 21st Century*, 102.)

Figure 42: Tower under construction. (Image source: *The de Young in the 21st Century*, 127.)

Figure 43: The de Young's twisting tower. (Image source: Susan Glasgow, personal photo.)

Also demonstrating a feat of engineering, the huge cantilever on the southwest end of the museum defines the space of the dining terrace. This unoccupiable extension of the building

form is immediately recognized as relating to both the bulk of the building mass and the open space that exists underneath it. Though the copper skin is the most visually accessible feature of this element, it clearly possesses an intent beyond surface.

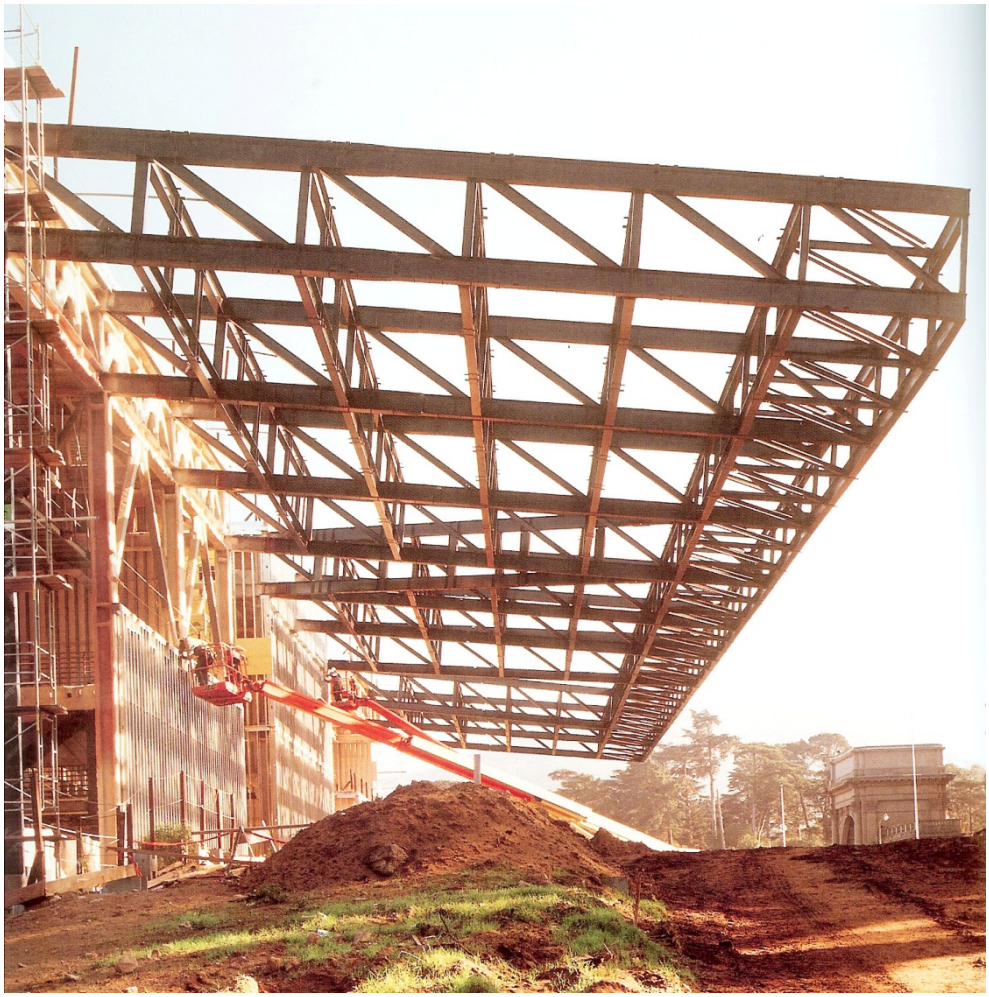

Figure 44: The de Young's canopy inner-structure. (Image source: *The de Young in the 21st Century,* 124.)

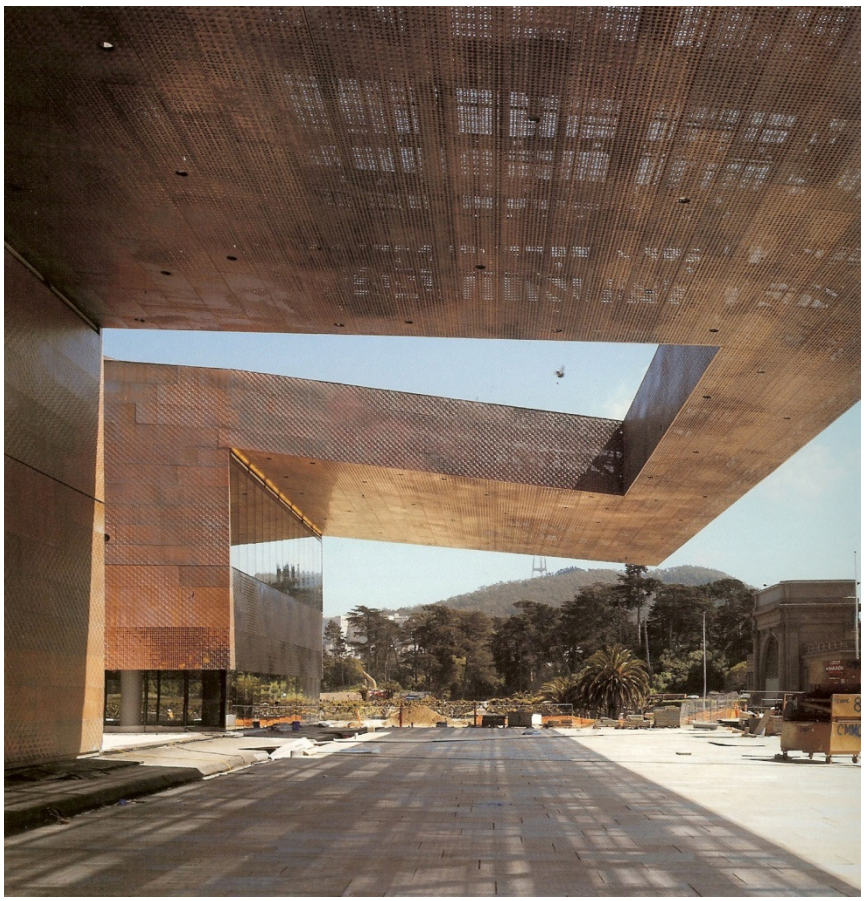

Figure 45: The canopy with copper skin. (Image source: *The de Young in the 21st Century*, 111.)

Hartoonian comments on a similar roof form in two buildings by Jean Nouvel: "Nouvel's tectonic restores the archaic purpose of the roof, rendering it as the foremost architectonic element of monumentality."[27] The last part of this statement pits Nouvel's roof form as a contemporary reference to the Semperian category of roofwork. A similar observation could be made for the de Young canopy.

[27] Hartoonian, *Crisis of the Object : The Architecture of Theatricality*, 147.

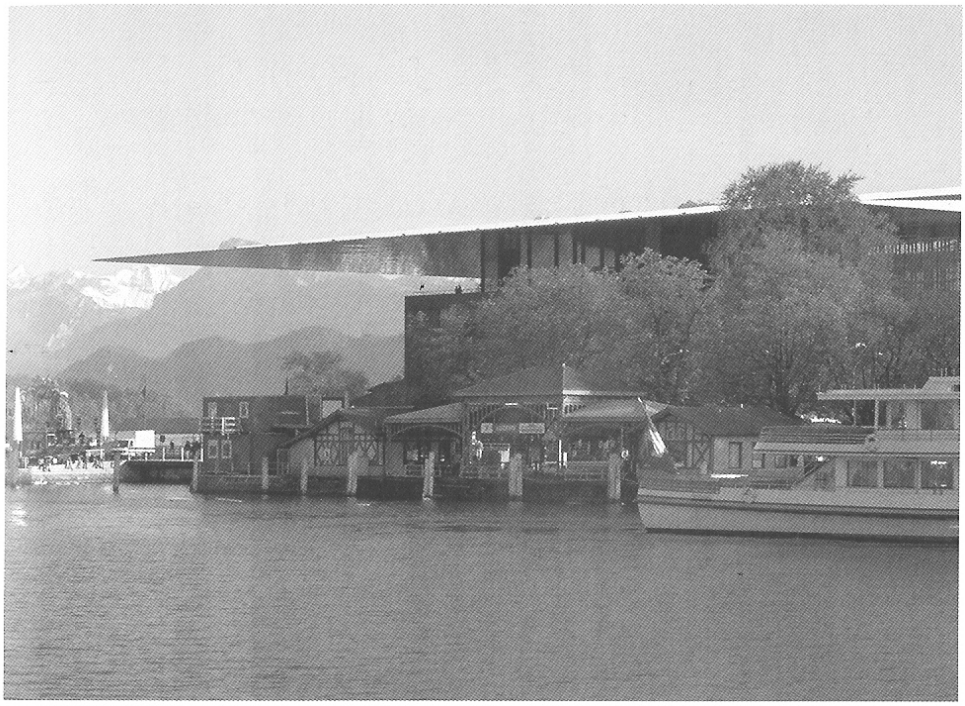

Figure 46: Jean Nouvel's Conference Center at Lucerne, Switzerland. The sheltering roof can be compared to the de Young's canopy, and references on of Semper's basic elements of architecture: the roofwork (Image source: Gevork Hartoonian, *Crisis of the Object*, 147.)

Although the outer envelope of the de Young canopy is covered by the copper skin, the presence of structure and space is not mute. The union of surface and structure is actually what is on display here. Designating it as skin inaccurately depicts it as having a primarily scenographic affect – just because it is the most visually accessible feature does not mean it is the only element that is perceived.

In fact, a closer examination of the cantilever shows that structural forces and their expression are recognized within the form. A slight bend can be perceived at the location that the cantilever departs from the stable mass. This is reminiscent of the entasis of a Greek Doric column, Bötticher's example of form tectonically expressing the latent forces within it. In this cantilever we can see the essence of the entire museum design's attitude toward structure: while

the structural elements themselves are visually absorbed by the wrapper, the museum is tectonically more powerful than a "decorated shed." The impact of the underlying structure molds its *Bekleidung* and flows into its spaces; diversifying the vocabulary of the powerful language with which the de Young engages the visitor.

Figure 47: Photo of canopy and front facade of building. (Photo by author.)

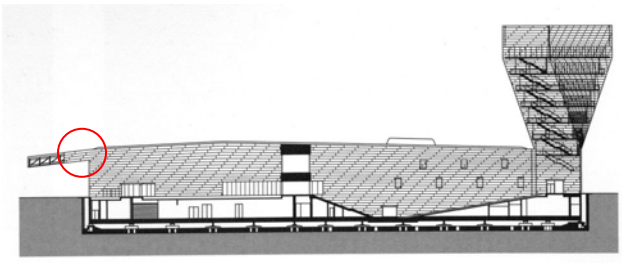

Figure 48: Section of the de Young. A slight bend can be seen at the left side of the image where the canopy meets the building mass. (Image source: Rob Gregory, *Key Contemporary Buildings: Plans, Sections, and Elevations*, 173.) Circle highlighting bend in canopy by author.

In this sense, we see Bötticher's emphasis on the art-form's and core-form's simultaneous conception more pertinent today than Semper's proposal that one grows from the other. With Bötticher's hypothesis, the art-form and core-forms are engaged in a dialogue, wherein the art-form may take the role of informing the nature of the core-form. This can be further perceived as steeped within an entire network of expression. The surface then is not the only means of communication; it is perceived in conjunction with a layered experience of what Jacques Herzog calls architectural "moment[s] of encounter."

In the case of the de Young, the attitude towards structure is not a question of expression; tectonic components become part of the image, where the perception of one without the other is not conceivable. In this way skin becomes a sub-category of structure, expressing its place in the perception of a tectonic composition.

At the heart of tectonics is the desire to communicate a work of architecture as a constructed space, filled with an intention that is mediated by the art form between the core form and the visitor. The core form in this instance takes on a new relationship with the visitor; although visually obscured, it is ever-present. One cannot return to the classic position of 'concealed vs. expressed' structure; those principles are not applicable here.

The copper skin is equally the fabric of the museum as the structural elements that it hides. This and the reflective surfaces create an experience that not simply rejects the notion of architecture as pure surface, but uses the devices of this notion to engage the individual within the architecture. When seen from this viewpoint, the question in design becomes how to employ surface in a way that is meaningful and engaging. In this setting, tectonics, or "building construction artfully considered," uses a new medium.

[5]

Assembly in Tectonics: Dispersed Craft and Office dA

The sacred knot is chaos itself: a complex, elaborate, self-devouring tangle of serpents from which arise all 'structurally active' ornamental forms, and into which the irrevocably return after the cycle of civilization has been completed. – Gottfried Semper, *Style in the Technical and Tectonic Arts, or, Practical Aesthetics*

It is undeniable that building technology after the Industrial Revolution drastically affected the conception of building design and led to an erosion of artisan craft in architecture. It does not follow, however, that attention to assembly and material vanished as well. Like the other categories tied to tectonics, the definition of joinery and materiality needs expansion. By asking the question, "What is being joined?" one finds that while theorists of tectonics overwhelmingly agree that joining plays a significant role in tectonic expression, they are often referring to different scales and types of joining. This new assessment of assembly in tectonics includes a look at the change in the roles of articulation at all scales, and also seeks to define how technology may redefine this process. As allied professions emerge, the building process departs further from the model of artisan craft and the design process becomes more layered and multi-dimensional. To look at this process through the Deleuzian notion of smooth space may open possibilities for technology and specialized professions to participate by means of a network that yields a "dispersed craft." This chapter proposes that fabrication may be a part of the design process, not simply a technological mean to a final design. When this process is evaluated, one can begin to re-think the genesis of the building detail as being crafted along with the conception of the form and structure.

This chapter explores the topic of assembly and the actions and roles associated with its derived meaning in tectonics. The latent question that surfaces through this history is that of *matter* and *method*: which joined elements are essential to the notion of craft and what is the significance behind the method by which they are joined? One may quickly see that while theorists throughout history have agreed on the importance of joining, their positions on this question vary. A more pertinent question may include an exploration of the approach to joining, and what form that may take. An interactive network of design professionals, fabricators, and laborers that disperses the notion of craft throughout the process may be seen as one contemporary response. Finally, two projects by Office dA are given as examples of possible forms that a renewed definition of joinery and materiality may take.

Constructing and Construing: a Historical Look at Assembly in Tectonics

Gottfried Semper believed the knot to be the basic unit of all architecture. This belief can be traced back to his emphasis on the role of textiles in architecture, and the knot being the elemental component in these rugs, tapestries, and fabrics. Semper believed this "oldest tectonic, cosmogonic symbol"[1] would later translate into the architectural joint.

The relation of knot to textile also serves as an analogy for how Semper and Bötticher viewed the role of architectural joints, connecting various components to form a unified whole. Bötticher "imagined a reciprocally expressive joint… symbolic components of an expressive system."[2] He called these joints *Korperbilden*, literally "body-form" and believed that they had

[1] Frampton, "Botticher, Semper and the Tectonic: Core Form and Art Form," 145.

[2] Ibid., 139.

the capacity for symbolism. Semper's belief that the joint was indispensible reveals the disposition that it is more than just a transitional link; it was an element in and of itself, and the conception of a unified piece of architecture was impossible without it. Frampton echoed this sentiment in his phenomenological perspective, emphasizing that the joint allows the building to "be articulated as a presence in itself."[3]

Semper traced the notion of articulation to the practice of adornment, and linked it to the urge to connect with the essence of existence. Semper wrote: "where man adorns, all he does more or less consciously is to make the law of nature evident in the object he adorns." In Semper's mind, this "law of nature" is what elevated tectonics to a high form of expression:

> Tectonics is an art that takes nature as a model - not nature's concrete phenomena but the uniformity and the rules by which she exists and creates. Because of these qualities nature seems to us who exist in her to be the quintessence of perfection and reason. The sphere of tectonics is the world of phenomena; what it creates exists in space and manifests itself through shape and color.[4]

The history of twentieth century architecture can be seen as a story of architects grappling with this shift in responsibility and the advancement in building techniques that accompanied it. Ford explains that these questions of craftsmanship

> …predated the industrialization of building that took place between 1875 and 1920, and were based on the analysis of buildings constructed by archaic means. However, the ideas behind them were not abandoned when the processes of building changed….The technological history of Modernism and of Traditionalism in the modern era is a history that is no less utopian in its technology than in its imagery.[5]

[3] Frampton, "Rappel à l'Ordre, the Case for the Tectonic," 19-25.

[4] Herrmann, *Gottfried Semper : In Search of Architecture*, 219.

[5] Ford, *The Details of Modern Architecture: Volume 1*, 13.

Hartoonian's article, "In What Style Could They Have Built," reflects on this struggle in modernism: "Throughout modernity a concern for labor would remain a conscious reaction against the devaluation of handcraftsmanship imposed by the mechanization of production processes."[6]

This interest in the expression of joining led tectonics throughout the nineteenth and twentieth century, from Sempter to Auguste Perret to Marco Frascari. The last of these figures, Frascari, places intense emphasis on the meaning that can be diffused through joinery, a sentiment that recalls Bötticher's stress on the symbolic capacity of joints. Frascari states:

> Architecture is an art because it is interested not only in the original need of shelter but also in putting together spaces and materials in a meaningful manner. This occurs through formal and actual joints. The joint, that is the fertile detail, is the place where both the construction and the construing of architecture take place.[7]

The essence of this, Frascari believed, was a relationship between construction and construing. That is to say, the assembly and transmitted meaning of architecture are found within the joint. In Frascari's opinion, the drawings and work of Carlo Scarpa are bound by this duality, communicating construction technique and visitor encounters. Edward R. Ford would later conjure the same conclusion of imbued architectural meaning:

> If architecture communicates pathos, tragedy, humor, or faith, it does so by the way in which it communicates gravity, stress, compression, tension, and craft - the way in which it communicates weight or the absence of weight, connection and the absence of connection.[8]

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[6] Gevork Hartoonian, "In what Style could they have Built?" *Fabrications* 17, no. 2 (Dec., 2007), 79.

[7] Marco Frascari, "The Tell-the-Tale Detail" In *Theorizing a New Agenda for Architecture: An Anthology of Architectural Theory 1965-1995*, ed. Kate Nesbitt, 1st ed. (New York: Princeton Architectural Press, 1996), 511.

[8] Ford, *The Details of Modern Architecture: Volume 2: 1928 to 1988*, 422.

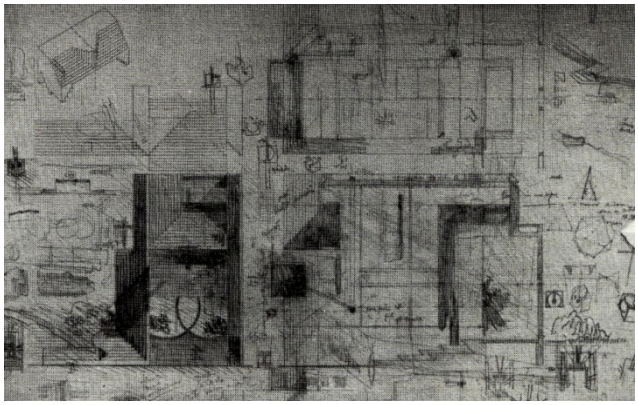

Figure 49: Drawing by Scarpa. (Image source: Flickr public photo, "Carlo Scarpa, Cimitero Brion, San Vito di Altivole (1970/75)," Uploaded on December 17, 2007 by superfici_di_architettu ra, http://www.flickr.com/photos/21158327@N05/2116951887/)

Figure 50: Brion tombs, architect: Carlo Scarpa. (Image source: Flickr Creative Commons License, "Entrance," Uploaded on August 24, 2005 by Hobo pd, http://www.flickr.com/photos/hobo_pd/36786588/)

In the writings of Louis Kahn one may find another definition for joining, also inspired by Scarpa. Kahn writes: "the detail is the adoration of nature." In this sentiment one can see two possible meanings for "nature": natural settings that are not made by humans, and the related but separate "nature" of ontology, implying an aspiration for some kind of authenticity through form. In either case, we see Kahn's admiration of Scarpa's work as examples of a poetic expression of something very genuine.

For some theorists, such as Demetri Porphyrios, the joint brings attention to the word "tectonic" in its original sense: its roots in carpentry. Tectonics as a symbol for making and artisan skill is part of its traditional concept. However, although Porphyrios expressed this sentiment in the late twentieth century, he avoided engaging the topic of how this notion of artisan skill artisan skill might be changed in the face of new technologies and changes to the building process. Thus, his praise of assembly in tectonics rings with a nostalgia that does not aid in advancing the notion of tectonics into the twenty-first century.

While the detail has in some theorists' minds become the ultimate expression of joinery, we are reminded by Frascari, and elsewhere by Frampton, of the various scales at which the articulation of the joint may be expressed: Frascari differentiates between "material" and "formal" joints. An example of the former is a column capital, which makes the transition between constructional components, such as between carried and carrier; while an example of the latter would be a porch, which makes the connection between outside and inside.

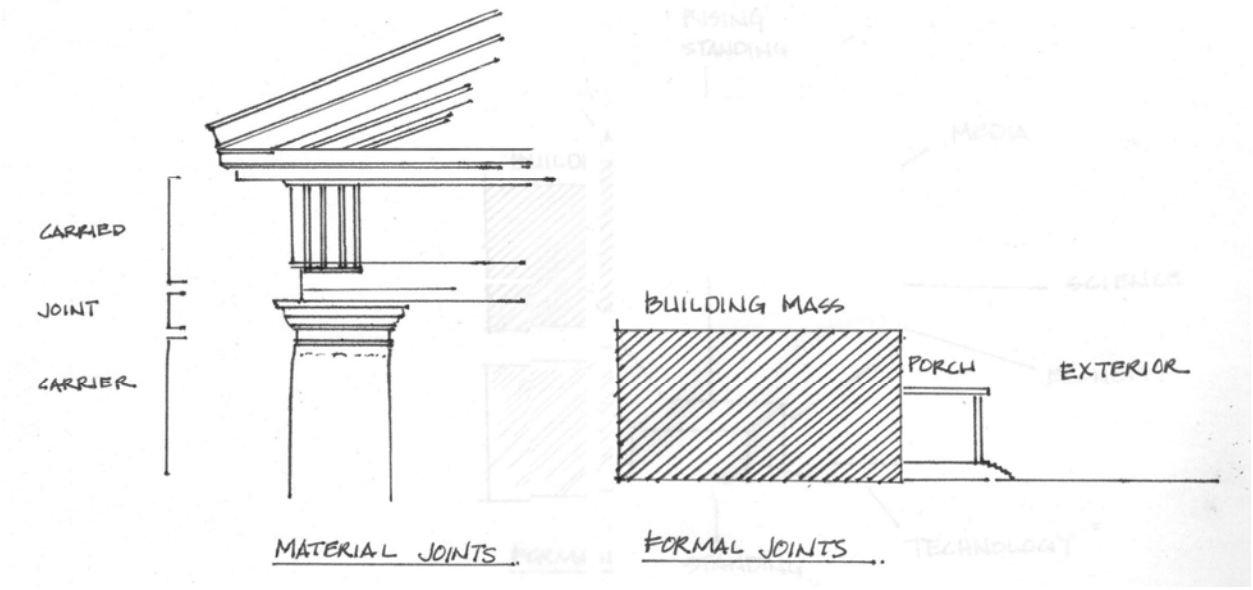

Figure 51: Material and Formal joints as described by Frascari. Sketches by author.

Frampton emphasizes the symbolic relationship in the joining of a building and its site. He declares this transition between base and frame, artfully executed, is the essence of architecture.

> As we have already indicated, the tectonic lies suspended between a series of opposites, above all the ontological and representational. However, other dialogical conditions are involved in the articulation of the tectonic form, particularly the contrast between the culture of the heavy stereotomics and the culture of the light tectonics… it can be claimed that the poetics of construction arise, in part, out of the inflection and positioning of the tectonic object.[9]

He elaborates on the importance of this relationship, as well as a current tendency to disregard it:

> It is characteristic of our secular age that we should overlook the cosmic associations evoked by these dialogically opposed modes of construction; that is to say the affinity of

[9] Frampton, "Rappel à l'Ordre, the Case for the Tectonic," 25.

> the frame for the immateriality of sky and the propensity of mass form not only to gravitate toward the earth but also to dissolve its substance.[10]

Frampton's concern for this relationship and its transitional articulation arise from his reading of Heidegger, who writes in "The Origin of the Work of Art,"[11] of a Greek temple as simultaneously "standing" and "rising," and in other of his late essays, of the "fourfold" that encompasses "earth, sky, mortals, and divinities. In this evocation of earth and sky, the temple brings significance to the air and rock in the conscious awareness of the presence of these elements.

The viewpoint of the simultaneous "standing" and "rising" sets architecture as the joint between the solid earth and the immaterial sky. However, this attitude toward tectonic expression does not address the merging vectors that might also be acknowledged, such as the topics discussed in Chapter 3. Thus, for tectonics to take on a position in contemporary architecture that addresses issues that are, in Semper's terms, "extrinsic coefficients that modify the embodiment of the theme in a work of art,"[12] architectural discourse must move past these seemingly fundamental themes.

Within Frampton's issue with contemporary architecture and its supposed failure to adequately address tectonics, he uses the question of *tectonic* to *stereotomic* articulation as a means to challenge the imagistic forces at play in contemporary architecture:

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[10] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 7.

[11] Martin Heidegger, "The Origin of the Work of Art" In *Rethinking Architecture : A Reader in Cultural Theory*, ed. Neil Leach (London ; New York: Routledge, 1997), 119-121.

[12] Gottfried Semper, "The Attributes of Formal Beauty," quoted in Henry Francis Mallgrave's Introduction to Semper and others, *Style in the Technical and Tectonic Arts, Or, Practical Aesthetics*.

> … giving primacy to the earthwork means to take a stand against the cult of the building as a free-standing aesthetic object. To put a major emphasis on the layering of a building into its site and on the mediated extension of its structure into the ground, means to take a stand against the recent tendency to reduce architecture to fine art as we find this, say, in the work of Frank Gehry…[13]

Thus for Frampton, this relationship of building to site becomes exceedingly important. Frampton's emphasis on this connection is a critique of what he feels is a tendency of contemporary architecture to conceptually distance a building design from its site and physical context.

As the process of design changed through history, Hartoonian notes a fundamental shift in the relationship between design and construction. This change is a shift from *techne* to "technology." *Techne*, in the Greek sense of the word, "did not signify means, but the unity of means and end."[14] Technology, on the other hand, has a focus on the means – fabrication and construction advances, and parses this stage as separate from the conceptual formation of design. As this portion of the process gained significance, the process may be compared to a series of phases. However, Hartoonian notes that even this issue surfaced within the theory of Semper, identifying a motto for Semperian tectonics: "How to change old forms, consecrated by necessity and tradition, according to new means of fabrication."[15]

Among the contemporary theoretical responses to the growing presence of new technology and allied design professions, is Hartoonian's position of montage in relation to

[13] Frampton, "Between Earthwork and Roofwork: Reflections on the Future of the Tectonic Form," 24-31.

[14] Gevork Hartoonian, *Ontology of Construction : On Nihilism of Technology in Theories of Modern Architecture* (Cambridge ; New York: Cambridge University Press, 1994), 11.

[15] Ibid., 14.

joining and assembly in architecture. This process and associated products celebrates the fragmented nature of design, creating but not concealing a collection of "disjoints." A useful analogy is to quilting: pieces are combined into a whole by means of a seam; the seam has a nature of its own and takes on the duties of both joining and adornment. Hartoonian explains:

> Montage reveals its tectonic form in the "disjoint"…, a weak form that distances sign from signifier. Traditionally, the function of the joint was to cover the anomalies of construction and to create the illusion of an aesthetic unity. The "disjoint" in contrast, integrates material and detailing in such a way that the final form, somewhat like a well-crafted movie, does not completely hide the fragmented process of its production.[16]

Hartoonian recognizes that the part-whole relationship so crucial to Semper's and Botticher's understanding of tectonics is destabilized:

> the whole arises out of the juxtaposition of fragments and by the act of montage itself, and therein lies the dialectic between intention and construction… In this understanding of the whole, the coherent totality of architectural form is weakened, and montage plays a significant role in generating a tectonic form.[17]

This reaction to the phased process of design has earlier roots. Semper's belief in architecture's emergence from the industrial arts carries with it a social division of labor resulting in a singular form. Later, in the early twentieth century, Wagner saw the division of labor as an opportunity to streamline the construction process. He saw the introduction of new construction techniques and material as exciting opportunities from which new forms and structures would arise, the aesthetics of which would fall into place. So, while the phased building process was foreseen as a key development as early as the writings of Semper,

[16] Ibid., 27.

[17] Ibid., 27.

Hartoonian's notion of montage emphasizes fragmentation and thus is a departure from Semper's belief in a unified part and whole.

Within this survey of the historical architectural discourse concerning joining, a curious discord is found among the resonance: although an overwhelming consensus resides in the importance of the joint, the elements that are joined include an array of different elements. These elements as discussed are summarized as *matter* on *Table 2*, and can be seen to have both functional and symbolic roles. It would follow that among these various types of matter, a designer may choose and combine elements by a variety of methods of joining, thus multiplying the possibilities for discussion. Perhaps a better ground for discussion is thus not "what is joined in what manner?" but "how is the act of joining approached?" In other words, the attitude toward assembly may apply to the several scales and forms joints may take.

Matter Joined/Role of Joint	Description/Character of Joint
Load type	Carried/carrier, as in Schopenhaur's *Stutze*/*Last*, or Scarpa's column example
Formal	Scarpa's porch example; joint between in/out, public/private
Phenomenological joint	Earth/sky, standing/rising of Heidegger and later Frampton
Montage	Emphasize fragmented nature of elements joined and design process, as described by Gevork Hartoonian
Material detail	One building material to another, as in Kahn's "detail"
Tectonic carpentry	Symbolic of the act of construction
Element created at the intersection of two other elements	Symbolic of textile roots, Semper's belief of the know as the basis of architecture
Critical regionalist joint	Symbolic of cultural roots

Table 2: Matter of Joining: summary of the various types of joints as described by theorists of tectonics. While there is overwhelming agreement that assembly is a key component of tectonics, these theorists are often writing about different types of matter. Thus, the *approach* to assembly becomes an important point.

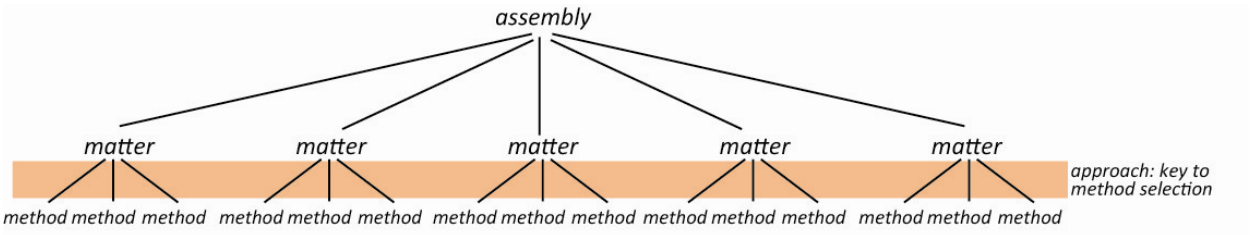

Figure 52: Since *Table 2* establishes that there are different types of matter, or elements that are joined, the discussion of assembly must include these topics. Different matter may also be joined by means of various methods; for instance, the formal joint of a porch may take various forms. Thus, it is more fruitful to discuss the approach to joining, which may address the relationship of these matters and their possible methods of assembly.

Shifting Roles: Construing Within a Network

Our times are marked by changing roles, and thus new and different approaches, within the design process. A piece of architecture can no longer be viewed as an interpretation of client needs and current culture by the sole individual architect. Neither can architects understand Scarpa's direct transfer of construing to construction by means of an architect in relationship with a craftsman. With technology and enhanced communication, the design changes hands many times before its physical realization. To add to this, "technology" and its associated tools and skills are advancing on three separate fronts: material technology, construction technology, and the technology of computer interface within the design process – various software that are expanding the way a project is created. As the number of consultants and allied professions grows, the pre-life of a building from concept to constructed space comes to resemble a network. This can be seen in contrast to the traditional model, wherein the design logic was handed from an architect to a small group of skilled workers. This shift certainly is not new, but it increases exponentially as all of these technologies drive building design more and more.

A useful analogy of this transformation is expressed by Ignasi Solà-Morales Rubió in his contrast of the magician and the surgeon.[18] Where a magician seeks cure in an individual internal solution, a surgeon is employing a series of processes that are recognized as sourced beyond the scope of an individual. Thus, our current situation in architecture identifies more with the surgeon, and the source of new materials, building techniques, and design specifics may rest in a network of continuous exchange.

[18] Ignasi Solà-Morales Rubió, Sarah Whiting and Inc NetLibrary, *Differences* [Diferencias.] (Cambridge, Mass.: MIT Press, 1997), http://www.netlibrary.com/urlapi.asp?action=summary&v=1&bookid=457 (accessed February 27, 2009).

As new technology pervades the process of building, allied professions also add to the layering of the process from project conception to construction. To understand design as a network of "dispersed craft" aims to break away from the notion of this process as a series of distinct bounded phases. This condition has profound effects on the idea of joining in architecture. Sources of creativity and innovation are exchanged as opposed to compartmentalized, and thus Frascari's notion of "construing" is not directly translatable at a single, direct level, but bound to the actions within this network of individuals. In addition, Hartoonian's notion of montage is recognized but taken further – while several roles participate in the design process, their coordination is not fragmented, but overlapping. *Figure 53* explores this development of exchange from artisan craft to network model of dispersed craft.

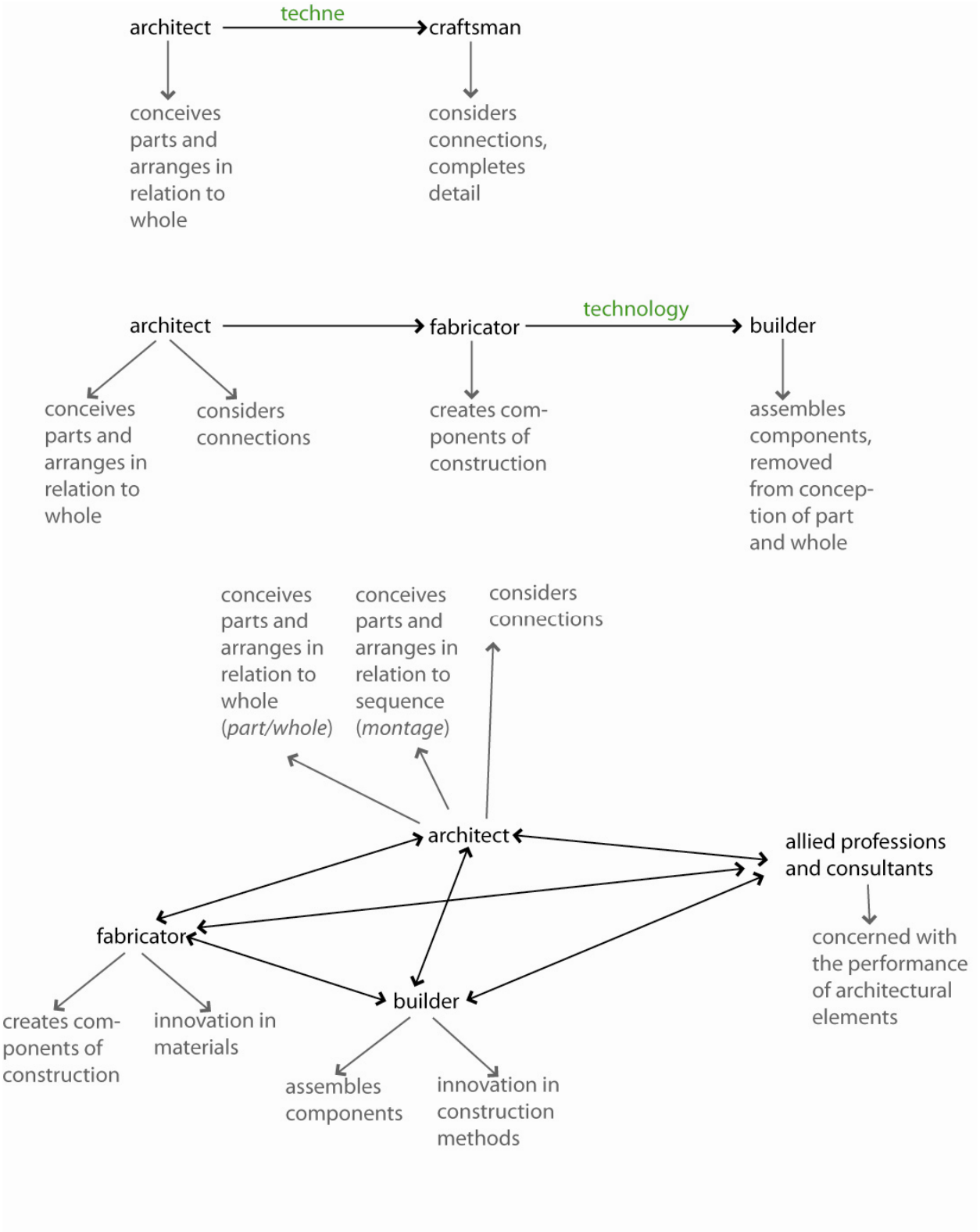

Figure 53: Evolution of roles within the design process and construction.

While Frampton speaks of material and construction technology as a culprit that is widening the gap between construing and construction, he does not explicitly touch on the digital interface and computer technology that impact the design process today. However, the latent worry in *Tectonic Culture* was cited by Neal Leach, in his introduction to *Digital Tectonics*, as a "polemic against the fast evolving digital culture."[19]

More explicit in Frampton's book, however, are the economic factors at play in the shift of roles within architectural design. His concerns lie in the treatment of architecture as a packaged commodity, wherein the optimization of costs is the principal factor and the architect is seen as the packaging agent of the 'goods.' He references Turner's *Construction Economics and Building Design* to make the point that components of the building are each contracted to separate roles.

Manuel DeLanda, a contributor to *Digital Tectonics* explores the relationship of the architect to that which is constructed form with a very different approach:

> We may now be in a position to think about the origin of form and structure, not as something imposed from the outside on an inert matter, not as a hierarchical command from above as in an assembly line, but as something that may come from within the materials, a form that we tease out of those materials as we allow them to have their say in the structures we create.[20]

In this scenario, DeLanda is addressing the affect the process of design has on its products. A non-hierarchical network model prompts each specialist to bring their expertise to the process of extracting meaning from the given project conditions.

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[19] Leach, Turnbull and Williams, *Digital Tectonics*.

[20] Manuel DeLanda, "Material Complexity" In *Digital Tectonics*, ed. Neil Leach, David Turnbull, Chris Williams (Chichester, West Sussex, U.K. ; Hoboken, NJ: Wiley-Academy, 2004), 21.

Just as new materials and construction techniques may open more possibilities for design, the structure of a network may expand the range of opportunity for architectural aspirations. Semper's concept of *Schoftweschl* describes the transitional shift from an older to newer material. Within this shift, constructional technique evolves with the new medium, yet keeps traces of its development. If we view the shift in design process the same way, the network could contain traces of traditional roles, but adapt to the web-structure of interaction.

Within this network, the phased nature of the design process is not met with resistance, but approached with an intention of engagement in an effort to create architecture that has meaning beyond the sum of its parts. In a sense, the architect takes the role of director:

> The contemporary architect is responsible not only for certain formal and technical decisions but also for putting a process in motion: one that is complex, articulate, and involves numerous operators who act directly on specific parts of the architectonic object. …the project resembles a film script - the document that must preestablish the field of action for the multiple technical agents deployed.[21]

The exchanges among the participant are key determinants to the stability and coherence of this network. Each point of intersection creates a role that brings with it its own craft: structural sensibility, lighting design, innovative material creation, etc. In this we find a new sense of craft that departs from the artisan: *dispersed craft*.

Dispersed Craft within a Network

Frampton's view of architects and their role adheres to a more linear model, and does not allow for this exchange. He praises Swiss construction: "the architect has traditionally

[21] Solà-Morales Rubió, Whiting and NetLibrary, *Differences*, 134-136.

organized the building process into its respective stages and further controlled the operation not only through strict site supervision but also through the direct selection of subcontractors."[22] While this may disperse tasks, it does not honor the contribution that these points of contact may make in the process of design, and is still essentially linear in nature. Therefore, it cannot hold the capacity for a dispersed craft.

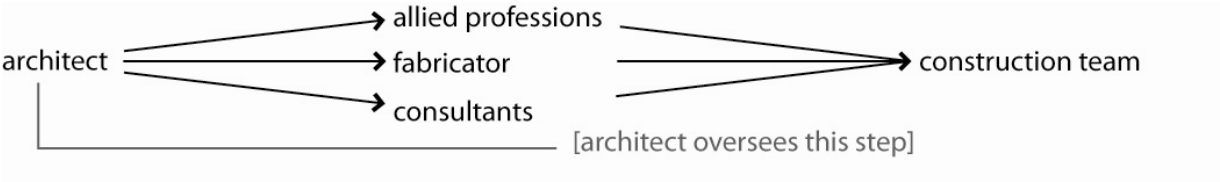

Figure 54: Frampton praises Swiss construction. He recognizes the increase in roles that is part of the present-day construction process, but sees the chain of action as fundamentally linear. (Diagram by author.)

As the profession learns to function adeptly within such a network, the lines of exchange may be strengthened. Within the linear chain of hierarchy, the architect is removed from the immediate link to physical assembly, making the shift from construing and construction less direct. The structure of a network, on the other hand, requires a frequent oscillation between these two modes. In a model of dispersed craft, this shift may be able to become quite frequent, so that the transition between the two modes is imperceptible, and the design process simultaneously construes and constructs both meaning and physical elements.

[22] Frampton, *Studies in Tectonic Culture : The Poetics of Construction in Nineteenth and Twentieth Century Architecture*, 379.

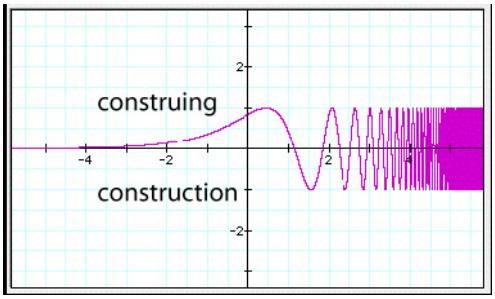

Figure 55: As the design network becomes more adept at oscillating from construing to construction, the shifts may become so frequent that they are imperceptible.

The idea of dispersed craft through a network of channels as opposed to a linear model may be compared to the Deleuzian idea of smooth space versus striated space. Smooth space is "one that is boundless … a space that is without border or distinction that would privilege one site or place over another."[23] This would be most comparable to the network model, while the phased, linear version of the design process may be compared to striated space, "space drawn and riddled with lines of divide and demarcation that name, measure, appropriate and distribute space according to inherited political designs, history or economic conflict."[24] Smooth space allows for flows in multiple directions where striated space allows flows only along certain predetermined lines, and may contain blockages. Understanding the network in these terms allows designers to think of tectonics in a new way, not as a mediator of a single meaning, but as an assembly of several meanings, joined in several capacities within a web of decisions and dispersed craft.

The network as understood within smooth space implies one final point: the structure of this organization is not static. Because smooth space allows for flow, new connections may emerge, or may be constructed and dissolved. Thus the active mind of the designer cannot

[23] Adrian Parr, *The Deleuze Dictionary* (New York: Columbia University Press, 2005), 258.

[24] Ibid., 258.

become comfortable with one pattern of design process, but rather will seek out the most effective and provocative interlaced chain of action.

Office dA: Engaging Technology and Assembly

In consideration of the potential for assembly in the current discourse of architecture, both the theoretical and professional world is confronted with the question of three technologies: material, constructional, and digital. The following analysis deals with the architecture of Office dA in an attempt to understand approaches that engage these problems.

Nader Tehrani, Office dA principal and co-founder, describes the firm's work as "tectonic" and "material."[25] This self-nomination as the representative for contemporary translation of this concept is not unfounded. The projects produced by the small office investigate joining and materials. Within the academic realm, Tehrani has led a Harvard studio exploring the link between textiles and architecture, showing obvious links to Gottfried Semper. The Office dA website states that within their work, "an investigation of the potentials of materials and construction techniques, often imported from fields outside of architecture, is the foundation for every design and assembly."[26]

[25] Vernon Mays, "Office dA," *Architect (Washington, D.C.)* 96, no. 7 (June, 2007), 70-77.

[26] Office dA, "office description," Office dA website, http://www.officeda.com/ (accessed March 4, 2009).

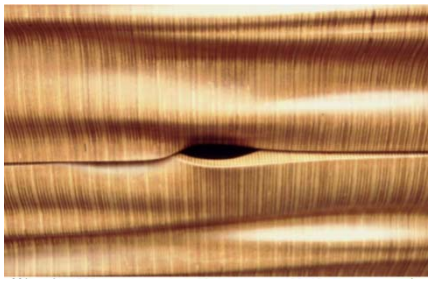

Figure 56: Cabinetry detail. (Image source: www.officeda.com)

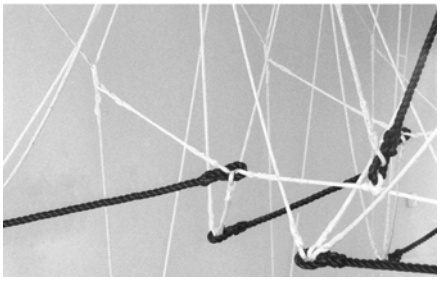

Figure 57: Knots. (Image source: www.officeda.com)

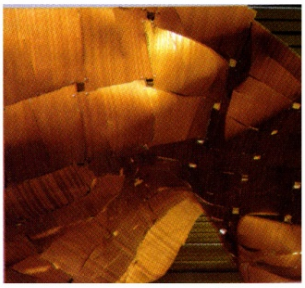

Figure 58: Harvard studio exhibition led by Tehrani exploring architecture and textiles. (Image source: Mays, "Office dA," *Architect* June 2007.)

While these statements and the produced work of Office dA show an obvious priority in assembly, the issues concerning the design process are also addressed. The role of the architect within the network of design is under evaluation; and principals Tehrani and Ponce de Leon prioritize the designer's relationship with the process of making: "Increasingly, what is

happening is that the architect is becoming distanced from the very means and methods that she or he needs to know."[27] It is their contention that digital techniques are one way of reclaiming influence. Thus, they are not calling for a return to a traditional process, but rather using the tools of technology to examine how the architect's role can be redefined.

Prefabrication is one method Office dA has used to merge technology and design. In the case of the addition to the Rhode Island School of Design (RISD) library, they used Computer Numerical Controlled (CNC) technology. This allowed them to fast-track the project, and to save money as well. However, while the idea of prefabrication may seem to focus on the stage of fabrication at the cost of deemphasizing the role of the designer, Office dA engaged the process itself in order to take advantage of what the technology could provide. This allowed the creation of desks of varying sizes to accommodate different body-types. The architects also explored ways to express the materiality of the Medium-Density Fiberboard (MDF) and its milling process. They drilled holes in the panels in an attempt to emphasize the "lightness" and "flatness" of the material. Also, planes of MDF were stacked and canted in order to give a "rippling effect." "By using new technologies, we've been able to bring back a level of craft that had mostly disappeared,"[28] Ponce de Leon explains. This "level of craft" is synonymous with the "dispersed craft" as discussed earlier.

[27] Ibid.

[28] Clifford A. Pearson, "Office dA Inserts a New Sensibility within a Historic Shell to Create the Fleet Library at RISD," *Architectural Record* 195, no. 6 (06, 2007), 84.

Figure 59: Main reading room of RISD library. (Image source: Mays, "Office dA," *Architect*, June 2007.)

Figure 60: Reading carrels. (Image source: Mays, "Office dA," Architect, June 2007.)

The Helios House in Los Angeles, California also takes advantage of pre-fabrication techniques. The faceted face of the surface structure was fabricated off-site. This decreased labor costs, and the carefully-planned geometry combined with prefabrication eliminated waste. 1,653 panels were assembled onsite in four weeks.

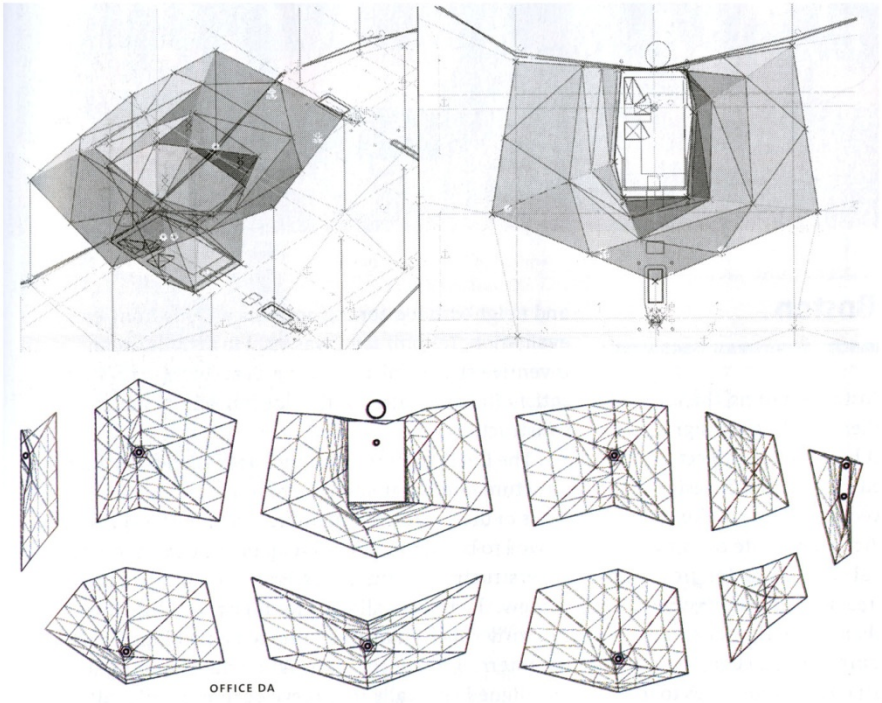

Figure 61: Geometry of Helios house panels. (Image source: Mays, "Office dA," Architect, June 2007.)

The Helios House also provided the opportunity to redefine the design team. Office dA worked closely with market experts and fabrication engineers to develop this gas station that prioritizes ecological issues. While these project goals may seem oxymoronic, the design team recognized the gas station as a reality in the American landscape and sought to address how it might function more responsibly. The team utilized two existing onsite billboards and the surface of the skin itself to communicate the various ecological strategies that the station performs. This exhibits architecture's link to branding, the identification of an object with an ideal, mediated by logo or sign. The image of Helios house becomes enmeshed with the brand, and the assembly of the structure is a part of this. The significance of this is twofold: Office dA is working within the complex network of the design process and reexamining how collaboration may work inside this web, and the result directly addresses the problem posited by Frampton of

architecture's connection with commodity by using branding and marketing techniques in conjunction with tectonic assembly.

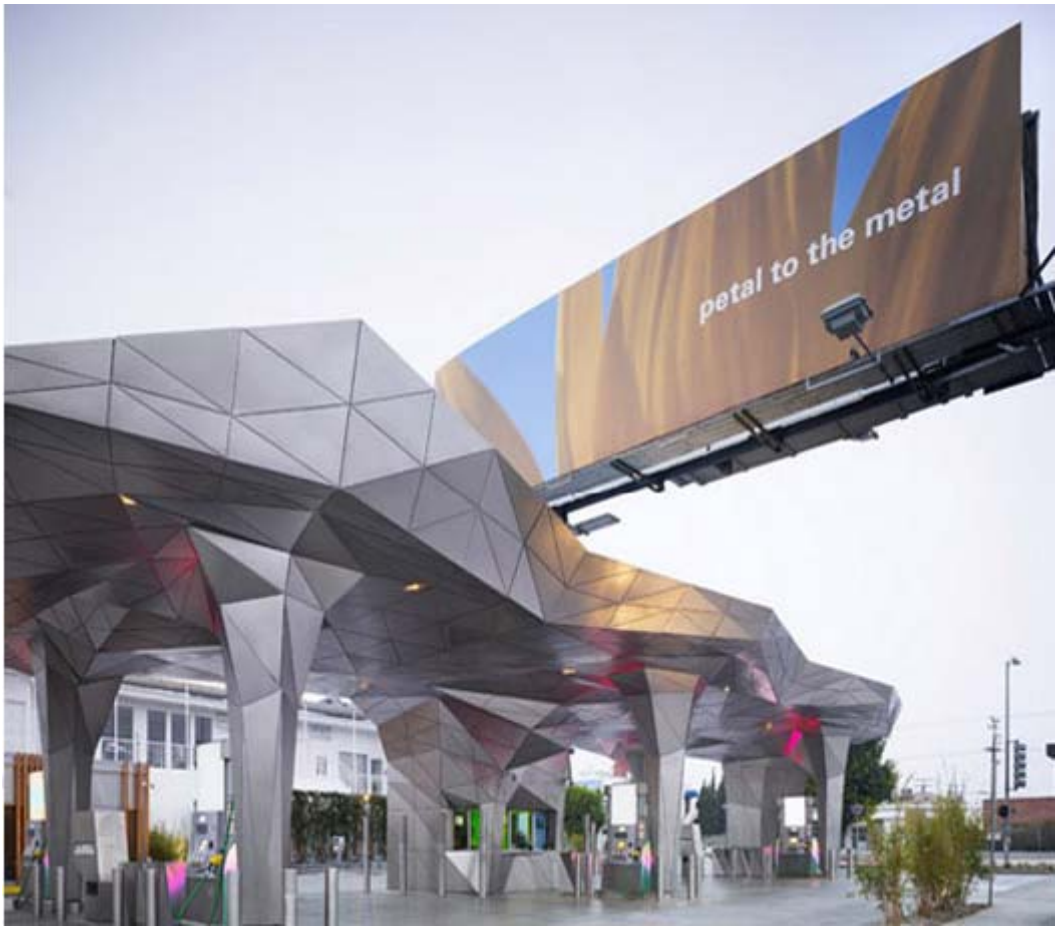

Figure 62: Helios house and billboard. (Image source: www.officeda.com)

Office dA's approach to the detail is also a key exploration in the discussion of assembly and joining. In the case of RISD library, the fabrication method allows the nature of assembly to be expressed, as seen in the computer stations whose individual points slide together. The joints in the surface of Helios House translate as folds in the exterior *Bekleidung*, and one is able to understand this as an assembly of pieces that reference their own processes of fabrication.

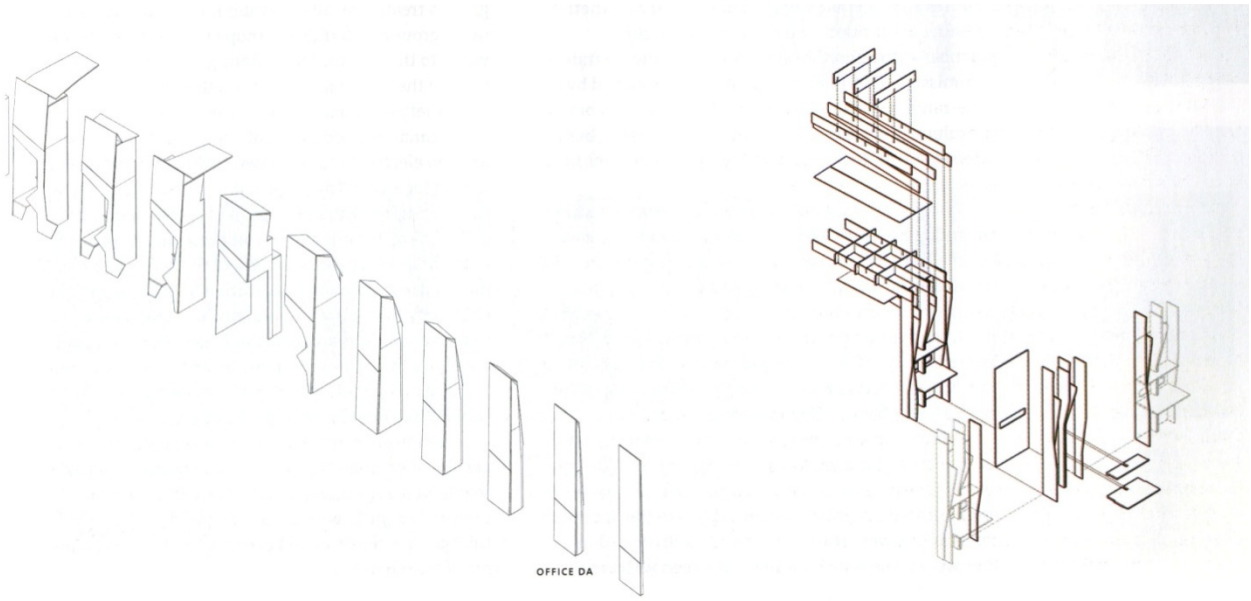

Figure 63: Computer desk assembly. (Image source Mays, "Office dA," *Architect*, June 2007.)

Figure 64: Computer carrels. (Image source: Mays, "Office dA," Architect June 2007.)

Figure 65: Circulation desk. (Image source: Mays, "Office dA," Architect June 2007.)

This view of Helios House and RISD library as an assembly of components recalls the various scales of joining. In the case of RISD, the addition is expressed as separate from the existing building, but the large atrium serves as a link, or *spatial joint*, between the two constructions. This allows the addition to coexist with the old, and their break (or what Hartoonian may term their "disjoint") serves to juxtapose them as separate events. Within the new network of the design process, a new interchange of ideas comes to life. The articulation of their joining rests in the architect, although their conception may not belong solely to him or her.

In *Digital Semper*,[29] Bernard Cache examines the Semperian categories and their applicability to new materials. Among these new materials is "information." Perhaps in the same sense, the new *network of design* processes can also be seen as a design material. Instead

[29] Bernard Cache, "Digital Semper" In *Rethinking Technology : A Reader in Architectural Theory*, eds. William W. Braham, Jonathan A. Hale and John Stanislav Sadar (London ; New York: Routledge, 2007), 396-406.

of a phased pre-life, a building may benefit from its designers engaging this network continually. Thus, as DeLanda suggest, we may “tease out” form and structure from this “material.”

Conclusion

Structure is a network of connectivity. An argument has structure, so has a building. From abstraction to concrete realization, structure joins discrete ideas or elements into a coherent entity. Structure is a skeleton or skin, points and lines, or fold contour. – Cecil Balmond in *The Metapolis Dictionary of Advanced Architecture*

The complexity of influential forces and emerging technology bestows complexity upon the nature of the design process and how a building is understood in its cultural context. While these factors may drastically alter the way architects look at "construction, artistically considered," they do not guarantee its demise. Within the expanded framework of a tectonic viewpoint, one must recognize the complexity that exists in the "culture of building" as it relates to the greater concept of culture. In other words, tectonics must address sources of influence such as technology and media influence brought on by commodification, and at the same time maintaining its inherent sense of physicality. The implications of this understanding place the constructional elements of architecture within the same dialogue as architecture's aesthetic and formal responses to societal forces; as astutely remarked by Edward R. Ford: "architectural technology is no more objective or subjective than architectural design, and… an architect's relationship to the building conventions of his time usually mirrors his relationship to the rest of society."[1] Efforts to compartmentalize the discussions of these topics only serve to deny their apparent, intrinsic relationship.

[1] Ford, *The Details of Modern Architecture: Volume 1*, vii.

Towards an Expanded Definition of Tectonics

The aim of this writing was to explore how the definition of "tectonic" may be expanded to engage the rapidly changing technology and economic forces. Neither the traditional or expanded definition of tectonics lends itself to an imagistic basis for architectural value, as tectonics at its core addresses issues of physicality, namely the expression of structural forces and the assembly of constructional components. Nor does either notion lend itself to a logic of architectural commodity, wherein architectural concepts are mutated into brands, effacing all meaning that could formerly be associated with the ontic substance of architecture. Yet, the position in response to these forces is quite different in the expanded definition to that of Frampton. While Frampton urges a complete resistance, the expanded definition explores how these influences may be addressed in a new way, showing a network of exchange within architectural process of design and the perception of its experience.

In his article "Ian Buchanan and Fredric Jameson," Buchanan observed Jameson's inability to reconcile the layout of the Bonaventure with any familiar wayfinding logic. Buchanan posits the need for new ways to perceive architecture and its influences by the "grow[th of] new perceptual organs."[2] Simarlarly, while the new realm of digital technology seems incompatible with the previous operational agenda of the tectonic, we only need to shift our viewpoint to the new mindset in order to come to terms with how it can operate. Although this is the same attitude that Buchanan adopts, the expanded definition of tectonics must move past his position on postmodernism to view it historically.

[2] Buchanan, "Ian Buchanan and Fredric Jameson," 283.

Such a shift in viewpoint is reminiscent of the nineteenth century debate from which the term "tectonic" emerged. This debate, over one hundred years ago, architects debated on the capacity of architecture to adapt iron technology. While Semper was never fully comfortable with the use of this material, Bötticher urged its acceptance, sensing that its mastery could bring about a new style in architecture. In many ways the modern debate casts the same roles, concerning digital technology. While Frampton hesitates to embrace this innovation, fearing that it further distances architectural design from the realm of the tactile, theorists such as Leach and DeLanda urge its use as a means of process with the end goal of extracting tectonic expression. It is, however, important to note that digital tectonics is only a fragment of the current scope of issues pertaining to this debate, just as the iron debate cannot be used to characterize the entire nineteenth century debate.

A notable shift in the position of tectonics is the attitude toward phenomenology. While Frampton's stance, and indeed many others,[3] is primarily phenomenological, the expanded definition recognizes the limitations of this stance and its inability to adapt to accommodate an exchange between architecture and its context. The phenomenological viewpoint envisions a work of architecture as having a singular representation that brings attention to the nature of its

[3] In Kate Nesbitt's compilation of late-twentieth century architectural theory essays, she introduces tectonics as pertaining to a phenomenological viewpoint: "In the postmodern critique, an interest in tectonics is common to divergent theoretical and stylistic components… The current significance of making...reflects a phenomenological interest in the 'thingness' of architecture." Kate Nesbitt, *Theorizing a New Agenda for Architecture : An Anthology of Architectural Theory 1965-1995*, 1st ed. (New York: Princeton Architectural Press, 1996), 494. Although the history of tectonics shows a separate development of tectonic culture and phenomenological thought, Nesbitt's characterization of the former as a subset of the latter shows that they were intertwined in the second half of the twentieth century.

existence through its transmitted meaning. The stance of the expanded definition, in contrast, explores the possibility that a piece of architecture cannot possess a singular static meaning.

The underlying messages of each of the three case studies rest on this notion in the discussion of networks. These structures were viewed at a variety of scales, concerning a variety of topics: cultural influences, perceived experience, and design process. These three categories were only separated in the chapters as a means to discuss a certain network operation. Invariably, there are areas of overlap; for instance, the network of design process will have effect on form and surface. This is most evident in the comparison of 'dispersed craft' as discussed in Chapter 5 and the 'deep planning' of UN Studio, seeking to recognize conceptual links via exchange within disciplines. Such an example only supports the characterization of networks as non-static and versatile by necessity – their ability to adapt to situations of varying complexity becomes essential to their capacity for affect.

Further exploration into this topic may find malleability and versatility to be a trend in contemporary architecture, as evidenced by Salvador Pérez Arroyo's definition of "structure" in *The Metapolis Dictionary for Advanced Architectural Studies*:

> Structure is traditionally understood as the skeleton of the building. Throughout history, we see how architecture either presents or hides structure… New engineering and new tech architecture use it again as a symbol and communication system… The change of meaning and feeling of stability is one of the characteristics of contemporary architecture. Therefore, contemporary meaning of structure is mobile and non-hierarchical. We are leaving Hooke's period of his elastic world interpretation and entering an era where nature comes in our help subsequently structure can be plastic, viscous, viscous-elastic, and pneumatic.
>
> We have grown up in a world of rigid containers, with scarce movements and deflections, while the natural universe is based upon flexibility and mutations. The bird's wings, the branches of trees, the natural elements of water and strong winds. We are surrounded by mobility and transformations. Structure and architecture will follow this reality. We will educate our sons in this universe, integrated with natural movements

> without scarce deflections and with understanding of transformability and structural mobility.[4]

The words "mobile and non-hierarchical" can be understood to characterize the structure of a network more so than a linear relationship of force to form, as posited by Sekler. Yet, Arroyo describes this relationship using nature as a touchstone. It has already been shown in previous pages (Chapter 5) that tectonic thought has formerly looked to nature as a model. Thus, the inspiration can be seen as consistent, but as we discover complexities in nature (swarm behavior, variable elements) the understanding of nature itself as related to structural expression may be reconsidered.

In a similar way, the relationship of core-form to art-form must be re-assessed. Semper's definition sees the art-form as evolving from the core-form to express what core cannot eloquently in itself. The expanded definition sees art- and core-form to evolve simultaneously as a combined response to their cultural context. The structural necessity of the core blurs with the cultural pertinence of the art form, as the articulation of components is the territory of both core- and art- form. An analogy can be used to express this shift in relationship. The traditional definition can be seen as similar to that of a painting and its canvas, wherein the art-form is the paint and the core-form is the canvas. The canvas exists initially alone, and a transmitted meaning is sought in the act of applying paint. This process does not alter the canvas in any way, only its perception.

[4] Manuel Gausa and Instituto Metápolis de Arquitectura Avanzada, *The Metapolis Dictionary of Advanced Architecture : City, Technology and Society in the Information Age* (Barcelona: Actar, 2003), 575.

Figure 66: Paint applied to canvas as an analogy of Semper's conception of the relationship between core-form and art-form. Text on image by author.

Within the expanded definition, however, the two components may be seen as represented by a plaza space as art form and plaza shape as core-form. This analogy takes advantage of the continually-evolving nature of a city space to illustrate the point that as art-form shifts to accommodate different needs for expression, it may impact the core-form in ways that were previously unforeseen. In fact, considering this analogy, moments could possibly exist wherein the traditional line between art-form and core-form is blurred, dissolving the perceptual dichotomy, described similarly by Hartoonian: "To go beyond the horizontal and vertical datum of the tectonic, architecture might enter into the world of plastic arts where the tension between the art-form and core-form, discussed by the nineteenth-century architect Karl Bötticher, evaporates."[5]

[5] Hartoonian, *Crisis of the Object : The Architecture of Theatricality*, 105.

Figure 67: The dynamic relationship between plaza shape and plaza space as an analogy for a proposed relationship between core-form and art-form. Photo and text by author.

The disposition of this thesis encourages a constant dialogue of formal elements, technological changes, media influences, economic factors, and constructional components. While this may occur already to some extent, as the case studies were intended to show, the profession of architecture has yet to be comfortable in this model to the end of fully utilizing its capabilities. To reach such a level requires an agility that comes with a thorough understanding

of what such a network can offer, and the continued expectancy for change within this structure. Thus room for continued research, evaluation, and implementation of these ideas remains open.

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