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Articles

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6-9 July 2020, Athens, Greece

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Architecture as Ornament: Louis Sullivan's Late Work

By Michael O'Brien[*]

It would be hard to assert that one can understand an entire building by looking at a part so small as a piece of ornament, but after constructing through drawing, a number of these pieces of ornament, and doing the same for Sullivan's late commissions, I believe that it can now be asserted that Sullivan was designing buildings that were architectural ornament at a large scale. Sullivan's belief in his own creative will, fueled by the power of nature, learned from the lectures of Asa Grey, the poetry of Whitman, the drama of Richard Wagner's music Nietzsche's "Übermensch," Goethe's "Urpflanze" and his utopian ideal of Chicago seems to have been the key to the visceral power of his architectural ornamental that can only be described as fantastic and a career achievement. But Sullivan went farther than the design of ornament according to the formal methods documented his last publication, "A System of Architectural Ornament according to Man's Powers." Most of his last series of architectural commissions show evidence that he was attempting to construct whole buildings according to the same formal methods used in making the ornament. This paper will present an overview of Sullivan's principles of ornament and the primary ornament types he employed across his fifty-year career, and will focus on the medallion type of ornament and its role in the development of Sullivan's commissions following his break from Dankmar Adler in 1895 and its pivotal role during his last period of practice, 1907- 1919 in transforming inert buildings into vibrant containers of human energy.

Introduction

The role of nature in architectural ornament has been actively questioned since architectural surfaces were used by Egyptians to record history. If we accept Alois Riegl's analysis, the change from accurate depiction to artistic interpretation of botanical species occurred as early as the Egyptian Middle Kingdom, 2040 B.C. Riegl bases this assertion on the presence of droplet-elements added to the historically recognized volute-calyx form of the Lotus ornament. He proposes that the droplet additions are an artistic rather than representational response to a judgement made by the artist that the filling the space was more important than accurately representing the Lotus.[1]

Gottfried Semper had offered material as the underlying driver of ornamental form which Riegl countered with an example (of several materialist refutations) of a prow ornament from a Maori canoe. The paired spiral ornament was produced using the chip-carving method, making the form and method not "natural" to each

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1. A. Riegl, *The Problems of Style: Foundations for a History of Ornament* (ed.) David Castriota (Princeton, NJ: Princeton University Press, 1993), 65.

other in wood.[2] In place of material and technique, Riegl proposes that the will and ingenuity of the artist drives the adaptation of natural forms to the specific design context in order to construct ornamental form solving the visual problems of field filling and asymmetry while maintaining visual unity.

The premise of the artist as the origin for form in ornamental design is implicit in the title of Sullivan's 1924 publication "A System of Architectural Ornament According with a Philosophy of Man's Powers". In Sullivan's view, "Man's Powers" were the ability to perceive and transform the inorganic into the organic, to sympathize, to "enter into communion with living and lifeless things."[3] To see stone, iron or clay transformed into organic form was the same as seeing the building transformed into a living organism for Sullivan, and his ornament was the key to presenting this organism to all who entered.

"A System of Architectural Ornament According with a Philosophy of Man's Powers" was Sullivan's only graphic essay explaining the principles and processes, underlying what is held by many in architecture and material culture to be the most significant development in architectural ornament ever achieved. "A System" is Sullivan's only written instruction for how to transform lifeless matter into forms of life. In "A System" Sullivan suggests only two references to the reader, "Gray's School and Field Book of Botany" (1857) by Asa Gray and Edmund Wilson's (1896) "The Cell in Development and Heredity". Sullivan cites Asa Gray in the context of his education in Moses Woolson's classes at the English high school. In "The Autobiography of an Idea" Sullivan recalls "After recess came nature study with open book. Chief among them Gray's 'School and Field Book of Botany' - Louis's playground; then came a closing lecture by the Master."[4]

Sullivan continues, "It was in the nature studies, and in these closing lectures, particularly those in which he dwelt upon the great out-of-doors, and upon the glories of English literature, that the deep enthusiasms of the man's nature came forth undisguised and unrestrained, rising often to the heights of impassioned eloquence, and beauteous awakening imagery. In a sense, Moses Woolson's school room partook of the nature of a university - quite impressively so when Professor Asa Gray of Harvard came occasionally to talk botany to the boys."[5]

Moses Woolson and Asa Gray are two of the three teachers Sullivan mentions favorably in "An Autobiography." Clearly these teachers were instrumental in engaging Sullivan's intuitive love of nature. This paper proposes Asa Gray's textbook "Gray's School and Field Book of Botany," published in 1857, was an enduring source of insight and artistic inspiration for Sullivan, extending deep into Sullivan's career and directly informing his medallion type ornament.

Gray was a professor of natural history at Harvard from 1842 to 1873 and the leading American Botanist. His life work, "The Flora of North America" was published in 1838. Gray was one of the leading American advocates for Darwin's

2. M. R. Olin, *Forms of Representation in Alois Riegl's Theory of Art* (Penn State University Press, 1992), 68-69.

3. L. Sullivan, *A System of Architectural Ornament according with a Philosophy of Man's Powers* (New York: Eakins Press, 1967), 2.

4. Sullivan, *The Autobiography of an Idea* (New York: Dover Publications, 1956), 165.

5. Ibid, 166.

theory of natural selection, and is credited with doing more to unify North American taxonometric knowledge than any other naturalist.[6]

"Gray's School and Field Book of Botany" is an introductory text on the subject of Botany and is structured as a series of thirty-four lessons. The lessons proceed from the general context of Botany within the larger field of Natural History, through basic growth stages of plants from seeds to buds, branches and into the morphology of roots, and leaves. Unlike the representational basis of books like Ruprich-Roberts and Owen Jones, Gray's Botany sought to present the inner structures and inner workings of plants, from rootlet to sepal, not simply appearances but analysis of stages of growth, associated structure and reproduction. Gray's book is simply illustrated with line-art engravings of both pictorial and analytical diagrams pertaining to the subject under discussion. This relative simplicity is appropriate to the clinical approach to flora and stands in contrast to the stylized fully-rendered illustrations in other publications thought to be critical sources for Sullivan's ornament such as "Flore Ornamentale" by Victor Ruprich-Robert, or "The Grammar of Ornament" by Owen Jones. By comparison, the other text referenced by Sullivan in "A System", Edmund Wilson's book, has few illustrations and is written for the advanced student of cellular biology and genetics.

One wonders what Sullivan saw in these books. Asa Gray's book would have been a long-standing companion, familiar since his attendance at English High School. This familiarity makes Gray's book a more likely influence for Sullivan during the formation of his thoughts and execution of major commissions than Wilson's book (1896), which wouldn't be published for another thirty-nine years. Though Wilson's lectures, the basis for his book, were first publicly presented in 1892, his books 1896 publication date places it after the Auditorium, Stock Exchange, Wainwright and Guaranty buildings were completed. This publication date rules out "The Cell in Development and Heredity" as a key source for the origin of Sullivan's ornament, leaving it perhaps as an affirmation of the inter-relationship between inorganic, geometric forms with strict axis and perimeter rules, and the organic, which during cell division become geometric. Perhaps this is what Sullivan is alluding to when he writes on Plate 5 of "A System", "The Advanced Student who wishes to investigate the power that antedates the seed-germ (which in reality is a sort of embryo) is referred to that remarkable work by Professor Wilson "The Cell in Development and Heredity"."

Sullivan's Ornamental Form Types

Sullivan employed a limited set of ornamental forms across his almost-fifty years of practice. This can be attributed largely to the limited number of locational conditions presented by design and building practices between 1883 and 1924. These conditions are generally described as:

6. A. H. Dupree, *Asa Gray 1810-1888* (Cambridge, MA: Harvard University Press, 1959), 386.

- The incremental articulation of a line.
- Punctuation of a either the beginning or end of a line.
- The construction of a frame.
- The construction of a surface.
- The punctuation of a point on a surface.

Given this limited set of design conditions, Sullivan employed three basic forms of ornament (Figure 1):

- The Medallion or geometrically (biaxiallysymmetric) structured type (Figure 1).
- The "Urpflanze" proto-plant or Root-Stem-Bloom, an axially structured type[7] (Figure 2).
- The Still-life type or "Arabesque" as Riegl calls it, a space-filling type (Figure 3).

Figure 1. (Left to Right) *Medallion Type, Urpflanze Type, and Arabesque Type Ornament*
Source: Author.

The medallion type is characterized by its symmetrical rotation about a center. After 1888 this seems to be Sullivan's view of the plant in plan view, the same view Riegl refers to as frontal view. The medallion type seems to mature during the auditorium theatre, and is present as the spiraling leaf ceiling panel found in the main lobby, the panel also used by Frank Lloyd Wright as the in the corners of the living room ceiling at his Oak Park house in 1888.

7. Sullivan, *The Autobiography of an Idea*, 1956, 207. Sullivan himself describes this form-type as a building-as-ornament proposition in this passage from "The Tall Building Artistically Considered" addressing the tripartite composition of the tall building: "They quote the suitable flower with its bunch of leaves at the earth, its long graceful stem, carrying the gorgeous single flower. They point to the pine-tree, its massy roots, its lithe, uninterrupted trunk, its tuft of green high in the air. Thus, they say, should be the design of the tall office building: again in three parts vertically."

Figure 2. *Auditorium Lobby Medallion Type*
Source: Author.

The root-stem-bloom or axially organized type, is characterized by the relation of the ornament parts to a vertical axis and is often botanically accurate with root mass at the bottom, stem structure in the middle, and bloom structure(s) in the upper portion. This is similar to the "primal plant" or "Urpflanze" proposed by Goethe[8] (Figure 3). These root-stem-bloom or axially organized ornaments often articulate anatomical components from botanical sources. The articulation of root, stem and bloom structures makes this ornament, Sullivan's view of the plant in elevation view, referred to by Riegl as the profile view. These ornaments originate with the root structures and the cotyledon or "seed germ" as Sullivan called it in "A System." Leaf, bud, and axillary bloom structures are arranged on either side of the stem/axis and a terminal bloom is frequently placed at the upper terminus of the axis. This ornament type does not appear to play a role in the conversion of ornamental structure to architectural works for Sullivan who's

8. J. W. von Goethe, *Versuch die Metamorphose der Pflanzen zu Erklären* (Gotha: Ettinger, 1790).

works seem more focused on the medallion type later in his life, Frank Lloyd Wright however, seems to exploit this ornamental type as the basis for many of his "Prairie" houses from 1909 until his "Usonian" houses of the 1920's.[9] (Figure 4).

Figure 3. (Left) *Goethe's "Urpflanze" Proto-Plant Sullivan,* (Right) *Jeweler's Root-Stem-Bloom*
Source: (Left) Wikimedia Commons (Right) Author.

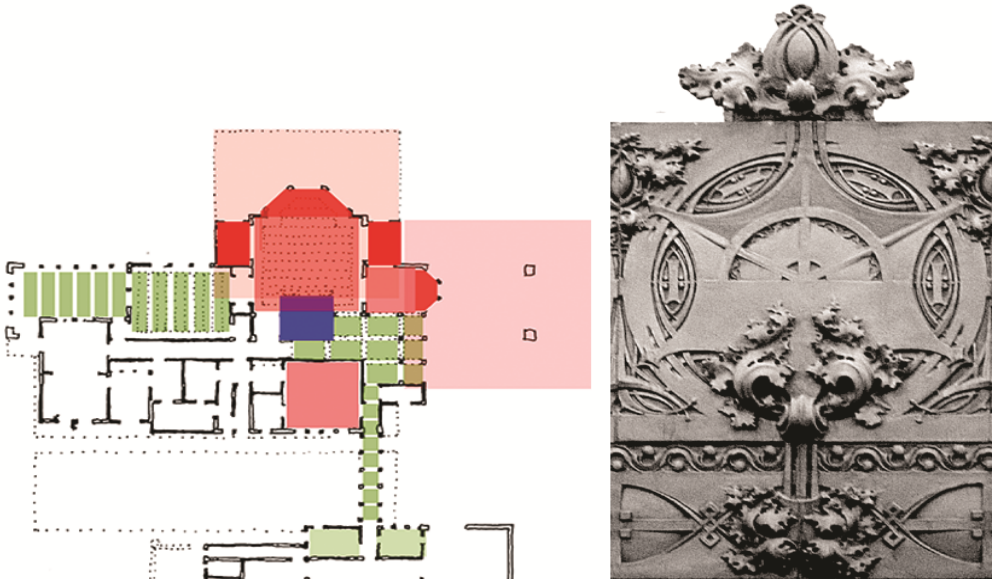

Figure 4. (Left) *Frank Lloyd Wright's Bradley House (1900) Plan* (Right) *Sullivan, Sullivan's Merchants National Bank, Grinnell*
Source: Author.

The still-life type is characterized by carefully composed writhing organic elements structured by their enclosing frame. The term "still life" has been used in painting to describe an arrangement of objects since the 15th century BCE. Like the still life in painting, which emerged as a recognized genre in the 17th century,

9. M. O'Brien, "After the Starchitect," *Athens Journal of Architecture* 5, no. 3 (2019).

Sullivan's still life is carefully composed arrangement of natural objects/ motifs.[10] Riegl's term for this is "The Arabesque"[9] and explanation of the development of the vegetal tendril in early Islamic art offers important insight into this most complex of Sullivan's ornamental forms. Riegl proposes that the development from representational sculpture to artistic interpretation of nature occurs at the moment that the line is employed to describe the edges of the sculpture.[11] He proposes this is the moment of birth for the line, and from this point forward, the line becomes the primary problem-solving tool of the artist constructing ornament. The complex overlay of tendril, leaf, and bud forms in Sullivan's still-life ornament serves to carry the eye across the surface, rising, falling, pausing, moving counter to the primary direction often until our eyes return to the point of entry. Examples of these still-life floral arrangements can be seen throughout Sullivan's projects beginning as early as 1882 in the Hammond Library gable ornament. The still-life is frequently found in places where the irregular surface spaces required ornamental development. Some examples would be, in console shaped brackets (Figure 5) concealing asymmetrical gussets, lunettes, chimney panels and spandrels. The still-life may have been the ornament most frequently designed by Sullivan himself as the more-simple medallion and root-stem-bloom types can be substantially constructed with mechanical means and don't seem to require the consummate judgement of rhythm, line, balance and tension required by the still-life.

Figure 5. *The Still-Life Type, the Arabesque*
Source: Author.

10. J. Hawkins and S. Le Roux, *The Oxford Reference Dictionary* (Clarendon Press, 1986).
11. Riegl, *The Problems of Style: Foundations for a History of Ornament*, 1993, 29-30.

The still-life is one ornamental form that Sullivan may not have entrusted even to the accomplished Frank Lloyd Wright in his role as Sullivan's apprentice. Perhaps the only apprentice to approach Sullivan's genius with the still-life is George Elmslie. Even with Elmslie's accomplished skills, the still-life ornament attributed to him by Paul Sprague often favor the powerful tendril, overcoming the other elements and not achieving the delicate movement, pause, counterpoint and balance present in the still-life ornament designed by Sullivan's own hand.

The medallion and root-stem-bloom ornament types were used as both isolated figural ornaments, and in parallel patterns articulating mass edges such as cornices, arch intrados, and stringcourses.

A Closer Consideration of Sullivan's Medallion Ornament Type

Because Sullivan's medallion-type ornament seems to play an essential role in the translation of scale from object to the building scale in Wright's and also in Sullivan's later works, this section will consider the type in greater detail.[12]

The medallion ornament type is distinguished from the root-stem-bloom and still-life types by a strong visual reinforcement of the center and elements rotated about that center in a radial arrangement resulting in biaxial symmetry.

The medallion form type of ornament is the example used by Sullivan uses to present the morphological development of ornament in "A System of Architectural Ornament." The circle, square, octagon, hexagon, pentagon and triangle are presented, as Sullivan has termed, the "containers of energy"[13] - flower pots into which the seed germ (cotyledon) is placed at the very center. The seed develops according to its laws of plant morphology (as described by Asa Grey), but the seeds growth follows along the lines of the major and minor axis of the container's geometry, with the axis acting as a geometric trellis. As the organic energy grows along the axis, it breaches the container's perimeter at the point where the axis crosses the perimeter. At the site of this breach, the organic energy (implicitly contained in the geometric container) bursts outward, depositing itself on the surface of the geometric container as vegetal efflorescence (Figure 6).

In labeling this explosion of energy 'efflorescence' - that which is within, deposited on the surface, Sullivan proposes, without words, that the inert, or crystalline nature of geometric forms contain within them great quantities of a vital organic energy. Not a fractal similarity where a square contains the energy of more small squares, but contains the opposite. Geometry, rationality contains the organic, the emotional.

12. T. H. Beeby, "The Grammar of Ornament/Ornament as Grammar," in *Ornament* (ed) Stephen Kieran (Philadelphia: Graduate School of Fine Arts, University of Pennsylvania, 1977): 26.

13. Sullivan, "A System of Architectural Ornament according with a Philosophy of Man's Powers," 1924.

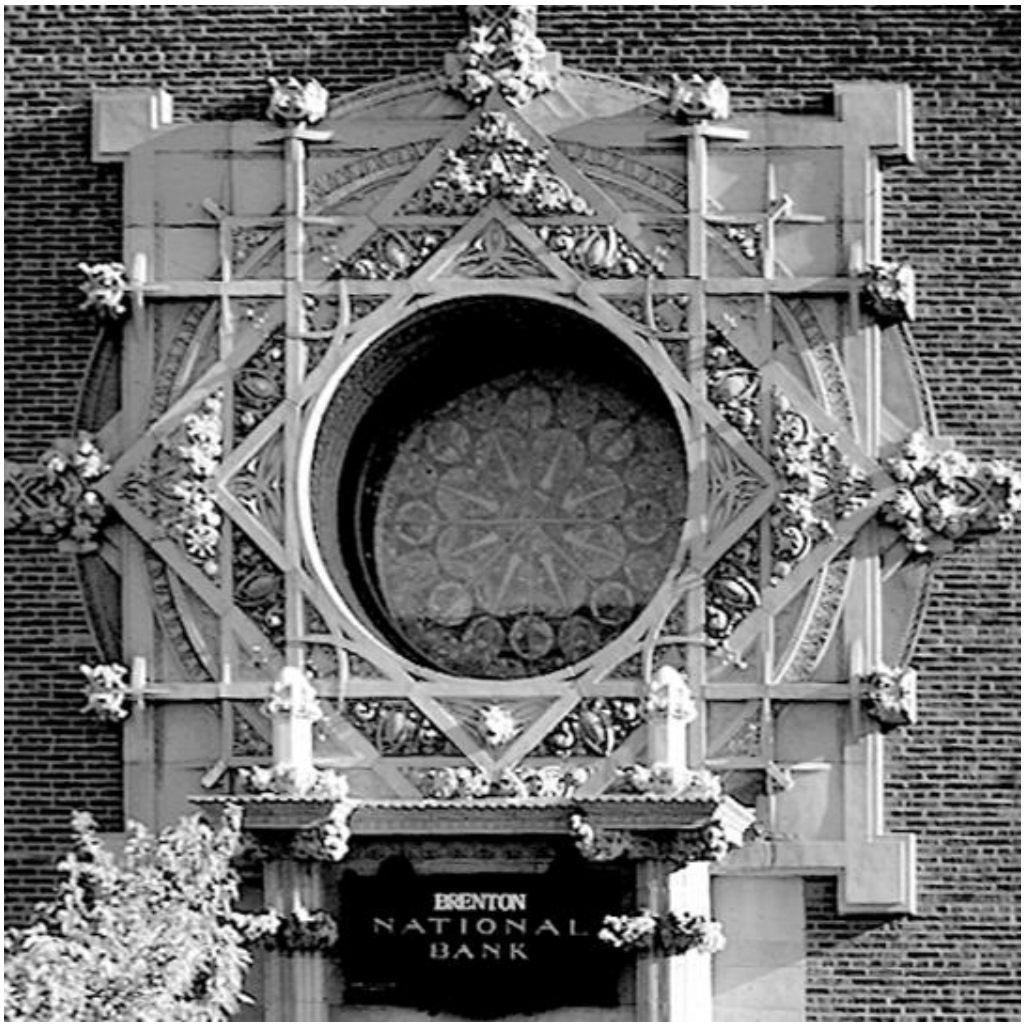

Figure 6. *Efflorescent Bursts at Axial/Geometric Intersections. Powishiek County Bank*
Source: Author.

These organic bursts of efflorescence are described by Sullivan as sub-centers of energy. These sub-centers effectively bind the concentric overlays of geometry together weaving over and under each geometric layer and ultimately reaching beyond the ornamental frame to bind the ornamental element to its background.

In "A System" Sullivan also refers the reader to "Grays School and Field book of Botany"[14] by Asa Gray, as his definitive source for scientific information on plant physiology and growth morphology. Gray provides a morphological explanation of the anatomy of various types of plants and flowers following the stages of growth. Sullivan's ornament seems to depend upon a few key anatomical parts, the seed germ with its nourishing cotyledon leaves, the stem, with its

14. A. Gray and A. Gray, *Gray's School and Field Book of Botany: Consisting of "Lessons in Botany," and "Field, Forest and Garden Botany*" (New York: Ivison, Blakeman, Taylor & Co., 1874).

terminal and axillary buds, and the calyx or flower cup below the bloom and the corolla, or the bloom itself.

Gray illustrates these anatomical parts in plan, section, and elevation views. Upon close review Sullivan's (1891) Schiller theatre proscenium medallion, the "Star Pod" reveals five to six concentric forms originating in the medallion center.

The first (1) is an undulating line of varying thickness that closely follows the radially arranged seed pods. This undulating line overlaps a hexagon (2) and is raised a very slight amount above it. The undulating line is unusual in that it is made up of broad areas of undeveloped surface similar to the next three concentric elements (3,4,5). The lack of surface articulation, the close mapping of the undulations with the seed pods, and the additional concentric layers possess a striking similarity to Gray's illustration of a Linden calyx from figure 223 on page 109 the radial arrangement of the seed pods around the central axis (placenta) is also similar to the cutaway of a St. John's Wort calyx shown in figure 256 on page 118 of Gray's text. Grays figure 256 shows this radial arrangement in a partial cut-away that confirms this is a plan view cut through a calyx. The undulating lines are the enclosing tube of the calyx surrounding the seeds. A similar relation between undulating line and seeds arrayed around an axis can be observed by making a horizontal cut in a green or bell pepper (Figure 7).

Gray also presents the spiral as nature's way of packing leaves within buds, vernation. The paired and single spirals are presented using Carl Linneaus's original figures 153, 154, 155 on page 76. The spiral in the context of vernation within buds is a strong symbol of potential energy during the unfolding of the leaf upon the bud's opening and is often used by Sullivan in the early period to energize the ornament. In the second and third period medallion types, the spiral becomes a secondary and tertiary concern as the integration with geometry stabilizes many of the ornamental compositions. In what I am calling the "still life" and "root-stem-bloom" ornament types, the spiral is frequently used near the perimeter and ends of lines to continue the impression of energized growth.

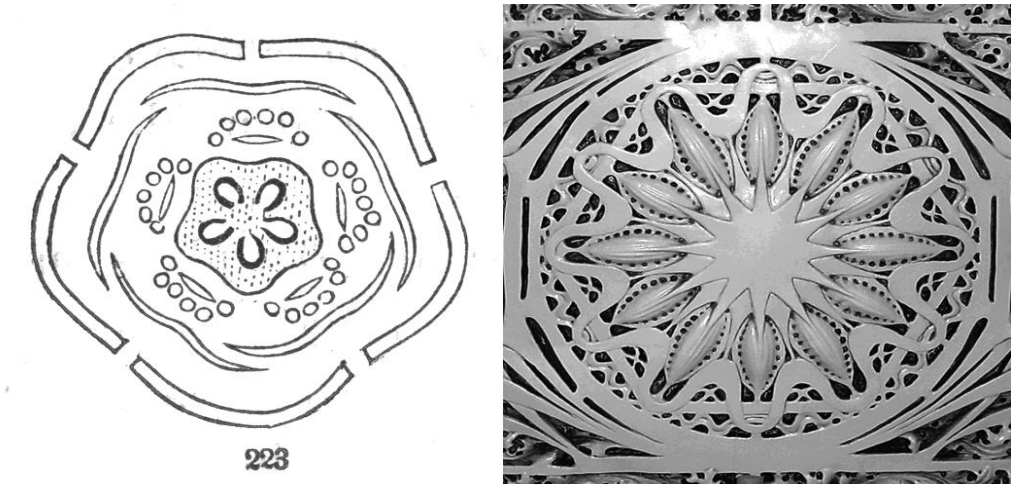

Figure 7. (Left) *Asa Gray's Illustration of the Seed Pod Cut Horizontally*, (Right) *Sullivan's Schiller/Garrick Theater "Star Pod" Ornament*
Source: (Left) Figure 223 from Asa Grays 1880 publication "Grays School and Field Book of Botany" (Right) Author.

The close correspondence of ornamental parts with plant anatomy suggest that the increasing naturalism cited by Sprague was due in some part to Sullivan's close reading of Asa Gray's 1880 publication "Gray's School and Field Book of Botany."[15]

Energizing Strategies

Conceptually, one might consider Sullivan's medallion-type to be very similar to the classical rosette as an ornamental form. In Early works, such as the Halstad Flats, (1884) Sullivan employs the lotus flower as a singular element and as a definition of the geometric center of a larger ornamental field. This more visually "static" medallion falls out of use in Sullivan's medallions by the mid-1880's. From the mid-1880's on, Sullivan seems to be exploring various approaches to increase the visual energy of the medallion. I categorize these approaches as follows:

- Energized emanations
- Spiral rotation
- Wind Swept
- The Pulsar
- Ready-to-burst

Each approach seems to have been favored by Sullivan for various lengths of time. Perhaps this is an indication of his satisfaction with the success of the energizing strategy, or of its potential for development. The number of medallion-type artifacts available for study in either as physical or photographic form is small enough that these categories cannot be considered the full extent of Sullivan's approaches.

Energized Emanations

The chimney panel from the 1884 Reuben Rubel residence (Figure 8) combines two forms of tendrils to enforce the energized center of the panel. The uppermost layer of tendrils emanate in sinuous curves across the major spiral below. This is one of the only examples of an energized tendril emanating from the center used by Sullivan. The tendril itself is un-natural in appearance, originating from an impossibly narrow taper on the surface of the low-domical form at panel center, then contorting through seven undulations and terminating with a narrow taper very similar to the tendril's origin. This "narrow origin to narrow terminus" may have been seen by Sullivan as an unsatisfactory signifier of the reservoir of energy at the panel's center.

15. P. E. Sprague, *The Architectural Ornament of Louis Sullivan and his Chief Draftsmen.* Doctoral Dissertation (Princeton, NJ: Princeton University, 1969).

Figure 8. *Rubel House Panel*
Source: Author, by permission of the Louis Sullivan Collection at Southern Illinois University.

Wind Swept

As if the base spiral, corner spirals and emanating tendrils in the Rueben panel were not enough, Sullivan adds a field of wind-swept palmette-leaves at the bottom of the panel that confirm this is an elevation-view of the energy-center. These leaves sweep up and towards the center of the major spiral but originate at the bottom of the panel, competing with the center itself as the source of energy. Like the previously discussed approach, the wind-swept energizing approach appears to have been short-lived in Sullivan's work.

Spiral Rotation

In this early period, 1873 - 1890 Sullivan employs the spiral as a form of vernation in an effort to infuse life into the ornament by suggesting the spiral's uncoiling. From 1890 through 1905 the spiral becomes a minor structure, used to fill small areas. Geometric elements dominate the medallion structure during this

period. This is interesting as the circle, square, octagon and hexagon are forms that have a strong sense of visual stability, inherently lacking the dynamism of the spiral.

The Rubel house is characteristic of the early period of Sullivan's ornament in that the spiral is a frequent subject of the ornament. Beneath the emanating tendrils discussed above lies a large spiral, articulated with a series of spirally concentric segments. In nature, one might find this form common to the fiddleneck fern, so named for its similarity of appearance when emerging from the ground to the neck of a violin. The spiral presents the appearance of potential energy, just as a coiled spring does. The Rubel panel has four symmetrically arranged spirals spinning out from beneath the center spiral bringing energy to the corners of the panel, and a tension to the static masonry elements framing the panel edges.The spiral structures in the 1886 Eda Holzheimer ceiling escutcheon (Figure 9) are more deeply integrated into the structure of the whole than the Rubel panel. This may be related to this escutcheon having been designed to be viewed from below, rather than from the side. The fixture held the escutcheon center, and the four corner spirals spin off from a tendril that attaches itself, not quite tangent to the center. Each corner spiral has a pair of smaller serpent-like tendrils on its surface, emanating from the corner spiral's center itself. Filling between the corner spirals on the orthogonal axis of the escutcheon are spiral palmettes whose origins are unclear. They seem to emerge from the plaster ceiling itself, between a tangle of minor tendrils filling the field between corner spiral and center; whatever their origin is, three segments of these spiral palmettes terminate emphatically in spherical objects. Overall, the similarity in size between the center, the spirals falling at the corners and those falling on the orthogonal centerlines of the escutcheon eliminate the chance for a simple hierarchical reading of the escutcheon. The overall impression is a dense mass of energy generally originating at the point (the leak) where the light fixture pierces the plaster ceiling, an approach to efflorescence not seen again until the design of the Farmers and Merchants Bank at Owatonna twenty-one years later.

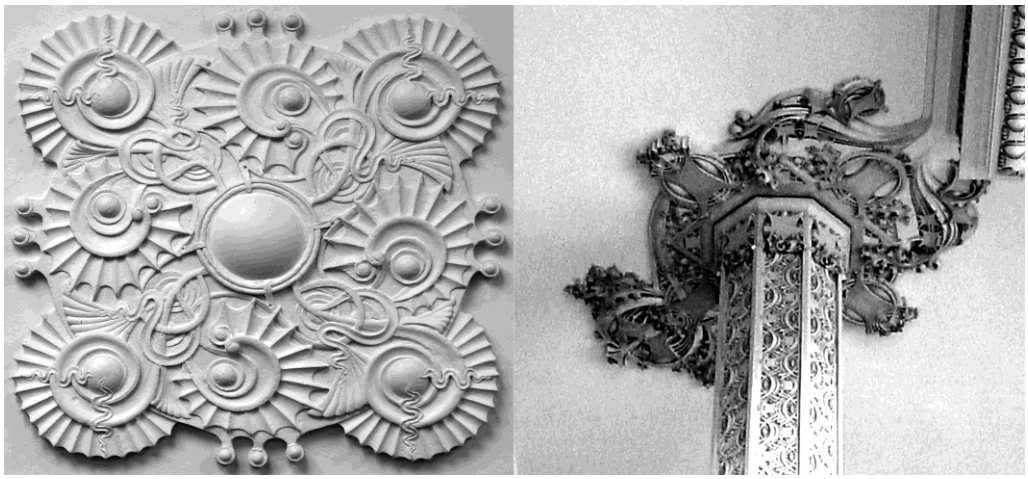

Figure 9. (Left) *Edith Holzheimer Ceiling Escutcheon* (Right) *Farmers and Merchants Lightolier Escutcheon*
Source: Author.

The spiral structure appears again in the door panel for the 1885 Samuel Stern Residence. Like the panel at the Rubel Residence, this is intended to be seen in elevation. In this door panel, the spiral is not apparent as a form, rather it appears as a structure in the left-hand bud overlap on the leaves. Were it not for these volute-shaped bud structures, the leaves located on and favoring the diagonal axis would propose a static composition. Below the leaves and emanating directly from the lotus flower in the center are frond structures that meet the flower off-axis to suggest another spiral direction. The significance of this door panel lies in its being the earliest example of Sullivan employing a spiral structure without making the spiral fiddleneck fern.

The surviving physical and photographic record of Sullivan's ornament suggests that Sullivan seldom used the spiral as a major ornamental subject following their role Auditorium Theatre as ceiling panels. These panels were intended to be viewed from below and like the Holzheimer ceiling escutcheon are likely to have been escutcheons for light fixtures meant to be viewed from below. The spiral is clearly presented by sweeping tendrils and leaf-structures from the tangent of the center out away from the center to unfurl at the corners of the panel.

This approach to bringing the energy from the center to the corner, then ending it with unfurled leaves is the most successful of the spiral medallion series as it presents energy and reinforces the center with a single tendril developed in high relief, and with great detail that assists one's eye in travel from the corner edges around the spiral to the center. The orthogonal centerline/edge intersections are present, but with low relief, thin tendrils, clearly conceding the stability of the panel to the center to corner spiral. The panel is bordered with stable orthogonal cruciform shapes visual stabilizers of the edge which are frequently overlaid by both the low-relief spirals and leaf elements from the high-relief tendrils. Thus, the resolution of the tension between the stability of the square panel, and the dynamism of the spiral is further decided in favor of the spiral.

It is interesting to note the context of the disappearance of the spiral as a primary figure in Sullivan's approach to energizing the appearance of the medallion-type ornament. The completion of the Auditorium building in 1889 seems to mark a significant decline, virtual disappearance, of the primary spiral in Sullivan's ornament. The spiral did not re-emerge again until 1907 in the office annex for the Farmers and Merchants Bank in Owatonna Minnesota. This was George Elmislie's last project with Sullivan, and in letters to the Bank's owner, Carl Bennett, Elmslie clearly stated his primary role in the design of the bank and its details.[16] If this late re-appearance of the spiral is credited to Elmslie one could conclude that the disappearance of the spiral from the "ornament record" after the Auditorium reflects some disappointment or some perceived shortcoming of the spiral by Sullivan to adequately reflect the energy within a building.

16. L. Millett, *Curve of the Arch: The Story of Louis Sullivan's Owatonna Bank* (St. Paul, MN: Minnesota Historical Society Press, 1985), 56.

The Pulsar

In the 1890 Getty Tomb (Figure 10), Sullivan stretches a fabric of octagons across the face of the tomb, providing a scalar measuring unit to preserve the whole. The octagon is present as a geometric container. Within its perimeter, lines of spheres extend along the orthogonal and diagonal axis from the center to the octagons eight flat sides. The spheres diminish in dimension from center to edge, reinforced at the center with a solid mass and increased depth of the relief. The scale change in the diameter of the spheres provides a diminishing incremental scale for our eyes reading of the distance between center and perimeter. The scale increment makes the overall perception a series of concentric pulses emanating from the center. These pulses end at a low-relief inner bordering octagon inscribed within the high relief perimeter of the octagon. The only dynamism in this ornament is found in this concentric pulsing from center to edge.

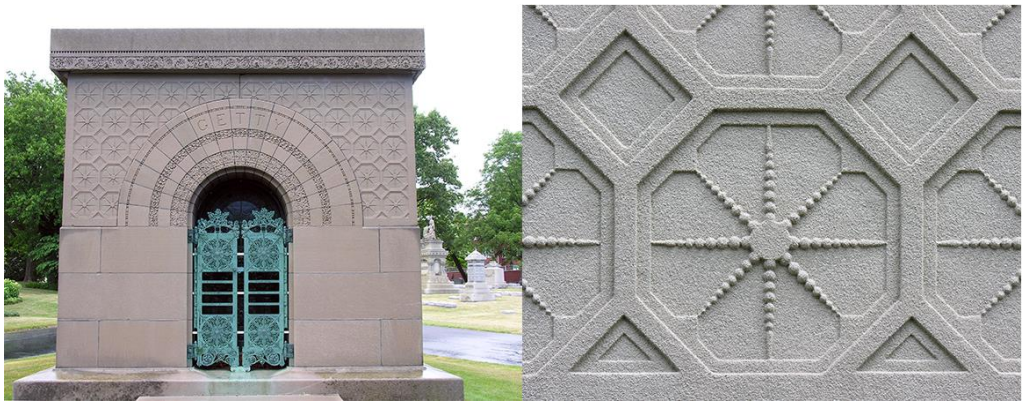

Figure 10. (Left) *Getty Tomb 1890* (Right) *Pulsar Ornament from the Getty Tomb*
Source: Author.

The Pulsar and the Analytical Plan

During this same time period (1892-1895) anatomical elements and structures themselves appear as the symbol of nature's dynamism in medallion-form ornament from the St. Nicholas Hotel, Schiller Theatre, and Guaranty Building. Asa Gray's text[17] seems to be an important source during this period, as neither Ruprich-Robert, Owen Jones, or Christopher Dresser penetrates the surface appearance of their plant subjects to reveal the anatomical structure of the plant.

Gray's text goes so far as to title lesson 13 as "The plan of the flower" and proceeds to illustrate the seed pod much as an architect might, cutting plans-horizontal sections through the seed pod to present the relationship of the seed clusters to the central axis and to the surrounding enclosure of the pod (calyx) itself.

The previously discussed Schiller Theatre Proscenium ornament, (Figure 7) referred to as the "Star Pod" is a prime example and is perhaps the most literal

17. Gray and Gray, *Gray's School and Field Book of Botany: Consisting of "Lessons in Botany", and "Field, Forest and Garden Botany"* 1874.

reference to the plant cut in an architects plan view. If Gray's Botany is discounted, this clinical dissection of a seed pod seems to be an unprecedented ornamental subject. More importantly, is this act of presenting what was within the plant, not its outward appearance an affirmation of a principle that values what is within, equally with the outward appearance of things? Critics of Jordy's stature[18] approached this question, but made their critique expecting the substance "within" to be the constructive means of the building. Their critique adequately identifies the shortcomings of such an approach based on false pilasters, exterior columns disappearing as they approached the earth, etc. But if the "within" was the collected energy of the spirit of the building filled with people then the outward appearance would be more focused on presenting this energy rather than the constructive means of the building. The analytical plan of the plant, as ornament seems to be completely unique to Sullivan, and may be the key to the parallel between his ornament and buildings.

"The Cell in Development and Heredity" by Edmund Wilson, 1896 was the only other book recommended by Sullivan in "A System of Architectural Ornament." Wilson's book was considered the standard text for its time in the rapidly emerging field of cellular biology. But beyond the facts and principles related to cell development and genetics, what was Sullivan's interest here? Certainly, this microscopic scale of nature was not easily observed by Sullivan, though the confirmation of an internal intelligence held at the cellular level in chromosomes must have been interesting to Sullivan.[19] But what does Wilson contribute to form, structure, and order, Sullivan's core questions?

I propose that the geometric clarity that emerges during cellular division as illustrated by Wilson is one such contribution. The fusion of the geometric and the organic is only possible at that moment when the organic submits to a geometric order, during cellular mitosis.[20] Conceptually, this may have been equal to the "rule having no exception" stated by Sullivan's mathematics tutor in Paris, Monsieur Clopet dramatically recalled by Sullivan in "An Autobiography of an Idea."[21]

Wilson's diagram of the protoplasmic cell-connections, circular nuclei embedded in the center of hexagons in a matrix held together by "fine bridges" that connect the nuclei to nuclei is a compelling prospect as a source for Sullivan's ornament (Figure 11).

Had Wilson's book been published prior to 1896, one would be tempted to propose that Sullivan had been inspired by this diagram in making the hexagonal pulsar-network across the surfaces of the Getty Tomb. It would even be tempting to consider that somehow Sullivan had heard Wilson's lectures in 1892 perhaps accompanied by sketches or diagrams and been inspired to the Getty ornament.

18. W. Jordy, *American Buildings and their Architects: Progressive and Academic Ideals at the Turn of the Twentieth Century (*New York: Anchor Books, 1972), 83-179.

19. E. Wilson, *The Cell in Development and Heredity (*New York: MacMillen Company, 1896).

20. Ibid, 249.

21. Sullivan, *The Autobiography of an Idea,* 1956, 165, 220-221.

The facts do not allow for such speculation however, as the Getty tomb predates even Wilson's lectures by two years.

Wilson's book and illustrations must have been a strong affirmation in Sullivan's rule-having-no-exception, the inter-relationship between the organic and inorganic (being the symmetries that occur during cellular division) for him to have cited it in "A System" but there is no evidence in his ornament to support its role as precedent.

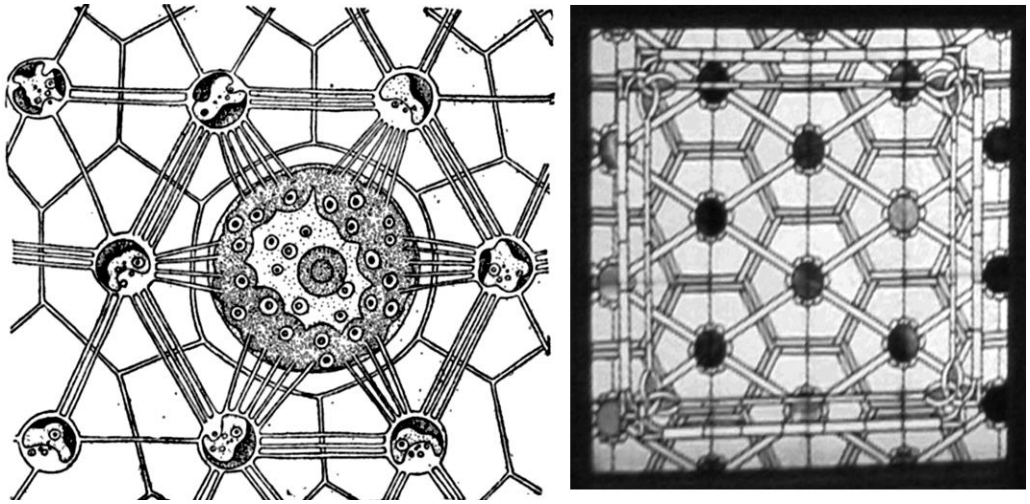

Figure 11. (Left) *Edmund Wilson, Cell Development and Heredity* (Right) *Stained Glass Soffit Pattern, Stock Exchange Trading Room by Sullivan*
Source: (Left) Edmund Wilson's 1896 Cell Development and Heredity (Right) Author.

Ready-to-Burst

Discovery of the correspondence between biaxial symmetry during cellular division and his own observations of nature's process for ripening and releasing seeds from spent flowers seems to merge in the next set of Sullivan's medallion-type ornament dating between 1890 and 1893.

In the "Curve of the Arch: The Story of Louis Sullivan's Owatonna Bank" Author Larry Millett noted *"His best buildings seem almost to pulsate as the ornament dances along the surface, bringing the block to life. And yet the ornament is always contained within the larger framework of his buildings. This quality of barely contained energy, which Sullivan described as "mobile serenity," is the hallmark of his ornamental style."*[22] In this passage, Millett describes the purpose of the ready-to-burst approach to energizing medallion type ornament, to barely contain energy as though it would burst out of its terra-cotta and iron container into a burst of efflorescent growth at any moment.

Beginning with the medallion from the elevator enclosure at the Chicago Stock Exchange (1890) (Figure 12), one can observe that the vegetal elements of the ornament project from its surface in a roughly circular field. These projecting elements fill arc sections between the perimeter circle and the inner square

22. Millett, *Curve of the Arch: The Story of Louis Sullivan's Owatonna Bank,* 1985, 78.

providing the impression that the circle is actually spherical and is pushing through and around the square. To emphasize the immanence of the sphere's bursting, Sullivan restates the square, this time rotating it within the inner square. Within the rotated square is an element defining a circular field. Arcs tracing oval shapes fill the circular field are oriented along the primary (orthogonal) axis of the circle. The effect is suggestive of a sphere, emerging from the inner square, a sphere, ripe with seeds that is beginning to crack (oval shapes) to release its seeds. In this process of being deformed, the square is transformed from the inorganic form of the crystal to an organic membrane on the verge of rupture by an irrepressible life force behind it. This form, (the square, deformed to the brink of rupture by the life-force) found as both a square-origin and a rectangular-origin is, as Millett suggests, a representation of the linking of the organic and inorganic.[23]

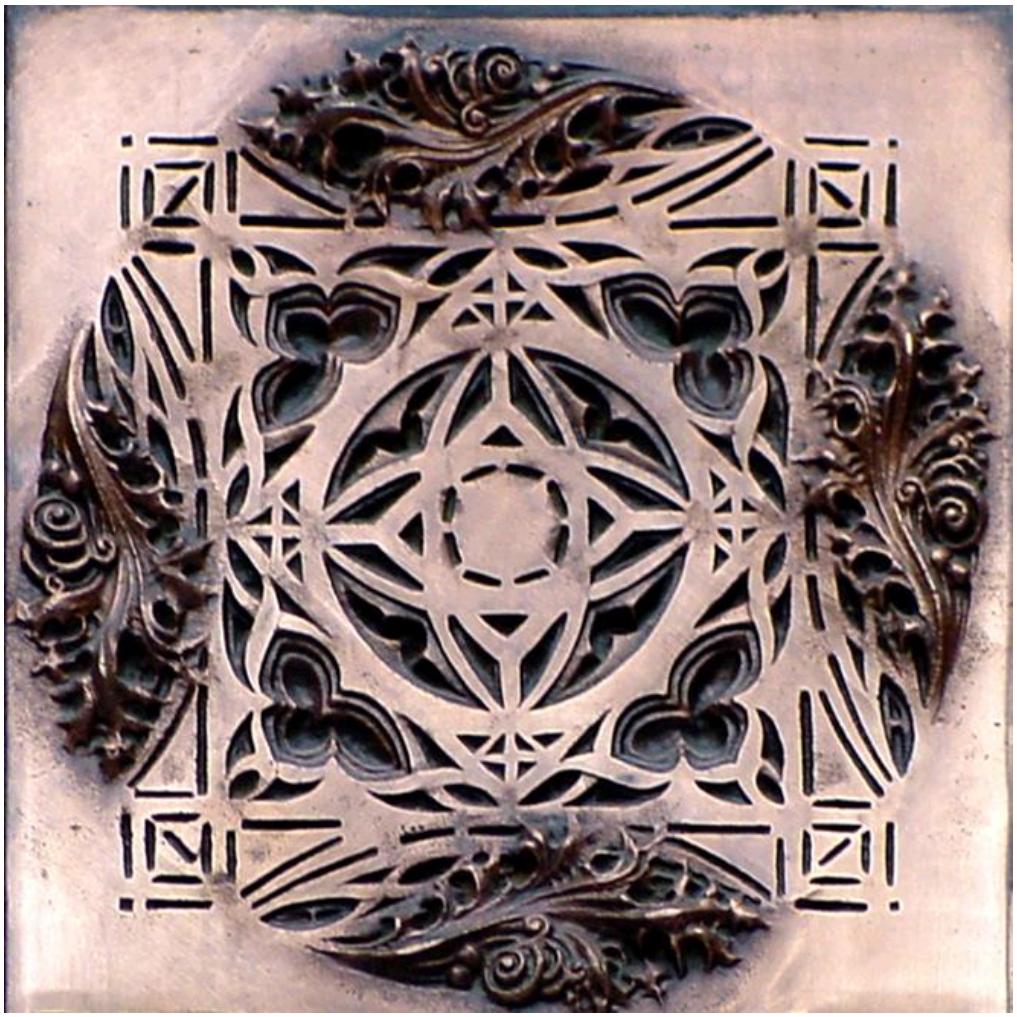

Figure 12. *Portion of the Elevator Surround, Stock Exchange*
Source: Author.

23. Ibid, 82.

The ornament from the corner columns of the Meyer Building (1893) similar deformed square element in the major ornament. This ornament is actually a partial sphere projecting from the surface of the square vegetal field. The sphere is cracked open like a ripe seed pod along the lines of arcs forming overlapping squares with corners extended into spurs (or Wilsons "fine-bridges") making what Sprague has called these deformed squares, "shield-like" forms. The spurs can be seen two ways, one, as strong points of attachment for the square that is being distorted by a force behind it, trying to push through the center of the square, so the spurs are merely corners distorted by the strong force behind the square. Another possible reading is that the square is growing on the center axis, and is itself reaching with its corners to ultimately cover the organic elements of the ornament. The arcs made between a fibroblast cell's anchor points are very similar to the curved lines used to suggest spherical shapes in drawings.[24]

The idea that the building was alive, producing buds, seeds in pods ready to burst required Sullivan to "enter into communion with living and lifeless things."[25] This belief, stated by Sullivan in "A System" is the next step forward from the anthropometric treatment of the facade at the Auditorium.

Methodology: Comparative and Figural Analysis

After drawing the plans and sections of the following case study projects, chosen for their identical banking typology these Sullivan designed commissions, dating from 1907 to 1914 Sullivan's last set of commissions, a geometric and axial analysis was conducted to find correspondences with the generative principles of ornamental design articulated by Louis Sullivan in his 1924 publication "A System of Architectural Ornament According with a Philosophy of Man's Powers.

Mapping those correspondences with color upon plans and sections revealed both a relationship to the "Plate 1 Development of the Blank Block" from "A System" and to the primal plant in frontal view, the Urpflanze or Root-Stem-Bloom structure employed by Sullivan from his earliest to his latest works.

Numerous publications authored by Sullivan himself, architectural critics and architectural historians informed the likelihood of correspondences which have been heretofore undocumented in the Sullivan literature.

Rules for the Medallion-Type, Plate 1, A System of Architectural Ornament according with a Philosophy of Man's Powers

It is the thesis of this paper that Plate 1 of "A System" is the closest exemplar of Sullivan's process for the conversion of ornament into building. Plate 1 graphically describes eleven steps to transform a square "blank block" into a fully

24. Sprague, *The Architectural Ornament of Louis Sullivan and his Chief Draftsmen,* 1969, 182.

25. Sullivan, *A System of Architectural Ornament According with a Philosophy of Man's Powers*, 1967, 2.

developed ornament. These steps are not described by Sullivan in the text or captions, but will be generalized here to aid in the analysis of the building plans. Sullivan's steps proceed to develop both the organism and the supporting axial trellis's guiding its growth. The trellis development proceeds from the perimeter toward the center, while the organism develops from the center toward the perimeter. Sullivan shows eleven steps towards the completion of the medallion. Completion appears to be a state of balance between articulation of the supporting geometric trellis, and the organisms' full utilization of the same.

The development of the square to a fully effloresced ornament is generalized as follows (Figure 13):

Step 1: The blank square block.
Step 2: A concentric square is developed at the perimeter.
Step 3: The primary (orthogonal) and secondary (diagonal) axis appear and distort a second concentric square with an inflection at the primary axis intersection, tapering toward the center.
Step 4: A third concentric square, very close to the second is developed, the space between the second and third concentric square is depressed slightly as to "float" this third square.
Step 5: This third concentric square is anchored to the corners of the second by lines extending from the corners (forming squares themselves) to the inside perimeter of the second square.
Step 6: A rotated square is developed, with sufficient dimension as to have the four corners extend slightly under the axial distortions developed in Step 3.
Step 7: The perimeter of the third concentric square is raised so that the corner lines developed in Step 5 extend fully around this third concentric square. Another rotated square appears, slightly smaller and on the surface of the rotated square developed in Step 6.
Step 8: Diagonal axis are developed by a "bow-tie" element which is effectively a rectangular membrane, pinned at the corners, and pushed with a spherical object from behind, a variant on the "stressed" square membrane in the "ready-to-burst" medallion type. The "bow-tie" is positioned between the raised perimeter of the third concentric square and the lower rotated square developed in Step 6. The "bow-tie" is connected back towards the center with a line.
Step 9: A fourth concentric square is developed. It is positioned between the first and second concentric squares developed in Step 1 and 2. This square is effectively a pair of thin lines, anchored at the corners with square holes. The border around the third concentric square developed in step 7 is raised, and the inside edge of the second concentric square are stepped deeper into the base block.
Step 10: A circle is developed, subtracting mass from the second rotated square. The axial distortions developed in Step 3 are raised above the surface of the raised perimeter of the third concentric square and above the surface of both rotated squares. The effect is to make these axial distortions the "clasps" that hold the third concentric and both rotated squares to the surface while the

tapering-toward-center form of these distortions focuses one's eye on the center circle. A border of square holes is developed in the width of the fourth concentric square developed in Step 9.

Step 11: This step is captioned by Sullivan "No. 11 represents No. 10 developed with increasing freedom, but still largely in the mechanical mode. Beginning Appearance of the imaginative Element." (punctuation added).

Step 11 can be generally described as infilling and elaborating the void spaces between the concentric and rotated squares. The border of square holes in the fourth concentric square described in Step 10 disappears, and is replaced by the fourth concentric square developing as a frame profile, raised above the surface of all the elements, including the blank block from Step 1. The corner developments are a miniature whole ornament with two concentric squares, a central circle subtraction, diagonal "bow-tie" elements oriented with their long axis parallel to the diagonal and acting as the clasps holding all the geometries together. The center is developed as four oval shapes arranged in a cruciform with their long axis parallel to the primary (orthogonal) axis of the larger whole.

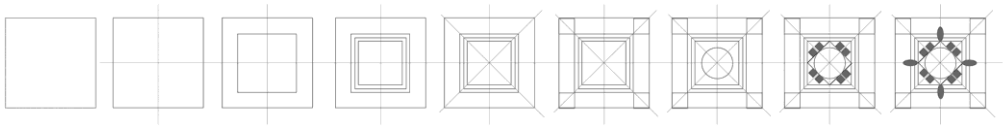

Figure 13. *Illustration of Steps 1 through 11, Plate 1 of "A System"*
Source: Author.

To study the building as ornament speculation, Sullivan's eleven-step process has been simplified to the following:

Step 1: Establish the base block, the primary geometric container as the exterior perimeter of the dominant building mass. Draw the primary (orthogonal) and secondary (diagonal) axis.

Step 2: Overlay the secondary and tertiary concentric geometric containers. As defined by the building mass, teller wickets, light fixtures, skylights or other architectural elements.

Step 3: Where the primary (orthogonal) axis intersects the geometric containers (primary, secondary, or tertiary) identify the architectural elements holding the place of efflorescent bursts. These may be ornamental wickets, vaults, entry portals, murals, art glass windows or skylights.

Step 4: Where the secondary (diagonal) axis intersects the geometric containers (primary, secondary, or tertiary) identify the programmatic elements holding the place of efflorescent bursts. These may be the president's office, the men's exchange office, the women's exchange office, the book vault, safe deposit booths, secure stairs to lower levels.

Building as Ornament: Three Case Studies

Considering the methods and morphological stages described in Plate 1 of "A System" one can propose a rational/mechanical development of Sullivan's ornament, and thus a foothold for developing a building plan and section according to similar morphology. Consider, for purposes of this proposition, the development of the plans and sections for three commissions from Sullivan's late period: The National Farmers Bank at Owatonna Minnesota, completed in 1907, The Merchants National Bank in Grinnell, Iowa, completed in 1914, and the Farmers and Merchants Union Bank in Columbus, Wisconsin completed in 1919.

While these case studies are all of the same typology, the rural bank, and are all rectangular or square in planform, the plan form is not given by the site in the case of the National Farmers bank, as a small office space was also constructed on the site, but site geometry was a primary factor in the plan form of The Merchants National Bank, and the Farmers and Merchants Union Bank, where lot size and geometry constrained Sullivan's choice of footprint.

Similarly, the rural bank as a typology did not impose a plan form per se upon Sullivan. The functional needs for the rural bank, teller line, vault, lobby and officers' spaces were the same as in most small town banks, but Sullivan's deployment and treatment of these functions was not limited by established typological norms.

The plan geometries themselves, while being reducible to similar subdivisions and unitized proportions as those seen in J.N.L. Durand's "*Précis of the lectures on architecture*"[26] have been developed by Sullivan with his unique attention to both the geometry of the primary enclosure and the development of sub-geometrical elements within, in both plan and section. An approach to geometries uniquely applied by Sullivan and his assistants.

A more exhaustive analysis could include all of Sullivan's commissions. Indeed, Jordy's diagrams of the primary facades of the high rises and banks tempt a speculation that at some point in time, Sullivan perceived the two scenarios for the building as an organism.[27] In one scenario, the base of the building is considered to be a planter, the seed-germ is planted at the center of the planter, just below the surface, and the building above is considered the stem and blossom growing through a trellis-framework of steel columns and beams. In this scenario the first two floors, as the planter are filled with fine roots, delicate ornament, while the upper stories are made up of more coarse stems, shoots, leaves, buds and seeds (columns, spandrels and cornice).

In scenario two, Sullivan proposes that the basement is the planter and the seed germ is planted below grade. The stems emerge, climb to their maximum height and have a more uniform scale of surface refinement. The buildings constructed by Sullivan in scenario two are more fully integrated, have less contrast in scale, form, material, and color between the bottom and the top. Jordy

26. J.-N.-L. Durand and J.-N.-L. Durand, *Précis of the Lectures on Architecture, with, Graphic Portion of the Lectures on Architecture* (trans.) David Britt (Getty Research Institute, 2000).

27. Jordy, *American Buildings and their Architects: Progressive and Academic Ideals at the Turn of the Twentieth Century*, 1972, 152.

comes close to making similar speculation, but stops short, perhaps a victim of his own expectations for Sullivan's work.

A preliminary grouping of buildings in each scenario may be:

Scenario One buildings:	Scenario Two buildings:
Schlesinger-Mayer	Wainwright
Guaranty	HomeBuilding Association
Van Allen Store	Merchants National Bank
Peoples Savings & Loan	
National Farmers Bank	
Peoples Savings Bank	
Farmers and Merchants Union Bank	
Gage Group	
Bayard	
Union Trust	
Meyer Building	
Getty Tomb	

In each scenario, the upper portion of the building represents a life-force emerging from the seed-germ planted somewhere below as explained by Sullivan in "The Tall Building Artistically Considered."

Case #1: Farmers and Merchants National Bank, Owatonna, Minnesota 1907

The sixty-eight-foot square footprint of the outside dimension of the primary banking mass of the bank provides a "blank block" point of beginning for the plan (Figure 14). It is important to note that the actual site dimension is greater along Broadway, almost one hundred and thirty feet, so the sixty-eight-foot square dimension can be understood as an intentional act on the part of Sullivan and conceivably, his longtime associate, George Elmslie. Variations in wall thickness between the exterior walls facing the street, and the party walls make an initial disruption in the formal clarity of the plan-as-ornament. Two additional rectilinear, almost within square, (18 to 20 inches) geometric containers of energy are developed concentric to and within the primary container, the building enclosure. The secondary container is the main banking room. It corresponds to the space defined by the walls of the farmers exchange, women's banking room, savings department teller's enclosure and bank officer's desks.

The tertiary container, within the main banking room is the space defined by the art-glass skylight. It defines the center of the main banking room and can be considered to be the efflorescent burst occurring when the vertical axis intersects the building envelope.

The Primary (orthogonal) axis center on the sixty-eight-foot exterior dimension. Major architectural elements are located at the points of intersection between the axis and the primary, secondary, and tertiary geometric containers. The burst of efflorescence that occurs at the site of an axial rupture of, what in Plate 4 of "A System," Sullivan called a container of energy is developed as four

great arches. The arches falling on the intersection between the horizontal and vertical axis at the party walls contain murals, while those falling on the intersection between the axis and street-fronting walls contain art-glass windows. The walls of the primary enclosure are recessed slightly within a larger edge frame, separating one wall from the other. The arches are further developed with an additional stepped chamfer, which magnifies the architectural presence of the arch in the wall.

Where primary axis ruptures the secondary enclosure, the perimeter of the main banking space, with organic energy growing from the center outward, efflorescent bursts can be found in the form of the heavily ornamented tellers' wickets and vault enclosure and as the heavily ornamented entry portal.

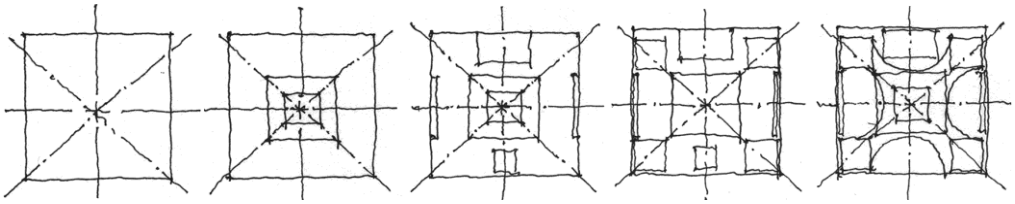

Figure 14. *Development of Farmers and Merchants Bank Floorplan according to Axis/Container Method used by Sullivan in "A System"*
Source: Author.

In this, most of his other buildings, the diagonal axis plays a secondary role organizing functions, not quite as important as those falling on primary axis, vault, main banking space, and entry, but more important than those occurring in the annex and basement level. In this bank, those functions falling at the street-front adjacent to the entrance are almost square in form. The functions falling on the diagonals may be indicators of stage of developmental accomplishment and problems faced by Sullivan (or Elmlie) as they continued the development of building as ornament. In the National Farmers Bank, the pragmatics of spatial function are seldom sacrificed by the architects in favor of achieving formal clarity. A notable exception to the prosaic role of the diagonal axis in this building can be found where the diagonal intersects the square skylight. At the site where the diagonal axis intersects the tertiary container of energy described by the skylight, four cast-iron electroliers burst down from the ceiling plane. A wisp of plater ornament is found at the site of each electrolier's penetration of the ceiling, a clear indication that the architect's considered the building's fabric to be filled with organic energy, waiting to burst forth.

In Plate 1 of "A System," (Figure 13) Sullivan begins with the container of energy, develops a trellis made from orthogonal and diagonal axis, then plants the seed germ. If the sixty-eight-foot square planform is the container of energy, and if the seed is planted in the plan center, where is the seed germ in section?

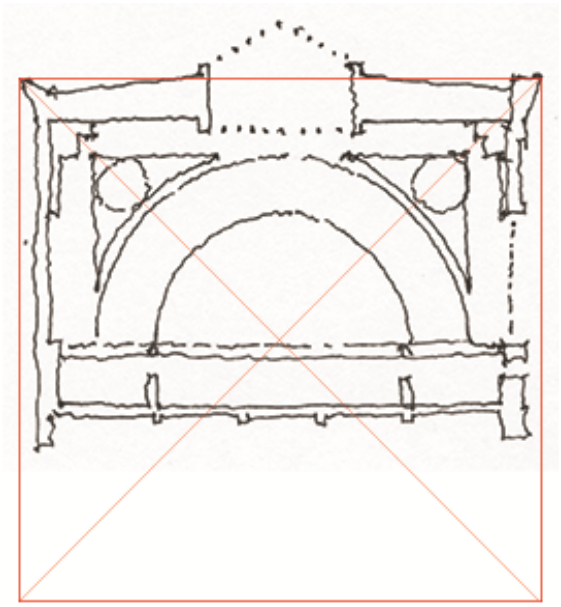

Figure 15. *Farmers and Merchants Bank Section Showing the Center (Seed Germ) Located at the Horizon between the Pragmatic (Lower) Banking Functions and the Ideal (Upper) Ornamented Volume*
Source: Author.

The bank is forty-nine feet high overall, if we draw a square, aligned with the cornice top, we find the horizontal centerline of the square falls precisely at the top of the green terra-cotta band that is the cornice for the president's office and the upward limit, the horizon, for all of the banking floor functions, and the is the elevation where Sullivan, or more likely Elmslie planted the seed germ (Figure 15). This horizon recognized the formal rules of the sixty-eight-foot square plan, but not the essential act of the bank, the transaction, the moment when the customers trust was extended to the teller by passing their hard-earned money to the teller across the countertop deal plate.

Case #2: Peoples Savings Bank, Cedar Rapids, Iowa, 1911

The building is a rectangle 90 feet long and 56 feet wide. It appears that the program required filling most of the available lot length and width, perhaps an initial limitation of Sullivan's choices for the formal clarity of the perimeter geometry.

This ungainly 1:1.6 site-driven building footprint may have provoked Sullivan's development of the geometric containers from center to perimeter, rather than the perimeter to center approach used at the Farmers and Merchants Bank in Owatonna. This difference of approach was detected after numerous attempts to construct diagonals, squares, collections of squares from the perimeter rectangle and find consequential alignments with edges of spaces, major architectural elements, and major functional elements.

The primary elements of this building are its distinctive four chimney-pier elements and setback clerestory mass. In the plan, the chimney-piers carry through

the main banking floor and define the corners of the main banking space. The vault falls on the center axis between the chimney piers and the entry portal falls on the opposite end of the axis. Three ornamented light fixtures also fall on the central axis (Figure 16).

The concentric rectangular spaces defined by the inside and outside edges of the masonry chimney-piers (as is the case with Frank Lloyd Wright's use of masonry piers) are considered the primary and secondary geometric containers respectively. This conclusion is supported by the correspondence of the setback mass of the art-glass clerestory above. Given this, the location of the vault and entry portal can be considered as efflorescent bursts occurring where the axis ruptures the primary and secondary geometric containers.

Three ornamented columns fall on either side of the central axis making four equal spaces between the chimney-piers. Two additional columns fall just inside the entry portal and support an ornamented drop beam that traces the ceiling line of the higher art-glass clerestory above. Three ornamented light fixtures fall on these column lines where they cross the central axis.

The chimney piers themselves are efflorescent bursts from the rupture of the innermost geometric container by the diagonal axis. while the rupture of the secondary geometric container falling at the back-face of the piers produces the square spaces on either side of the vault, the safety deposit desks and the book-vault/stair. At the building front, flanking the entry portal, the square-space efflorescent bursts are the men's and women's exchange spaces.

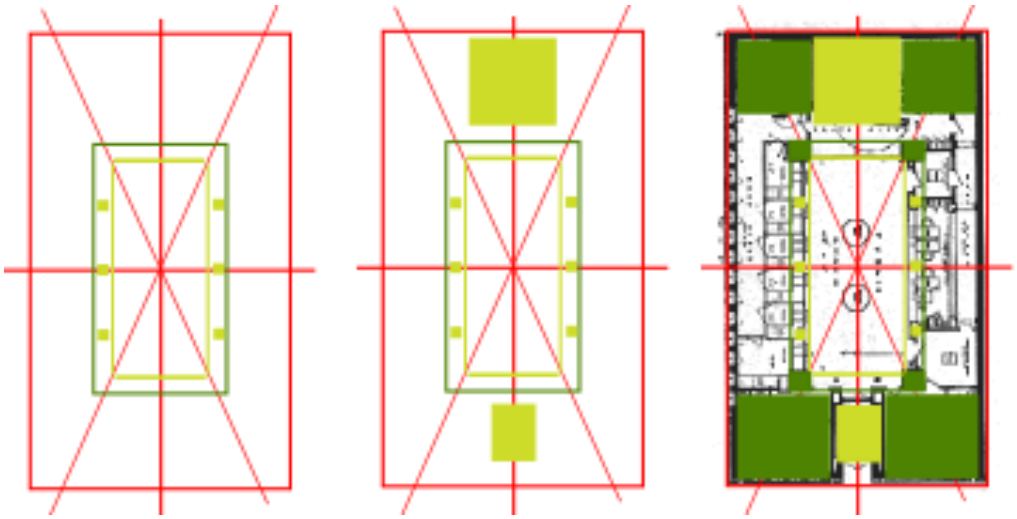

Figure 16. *Peoples Savings Bank, Developed according to the Axis/Container Approach Used by Sullivan in Plate 1 of "A System"*
Source: Author.

Because most of the main floor architectural elements fall upon or are located in response to the central axis, vault, lights, check stands, entry portal, column and chimney-piers, this main floor plan is more strongly related to the root-stem-bloom ornament (frontal view of the primal flower/Urpflanze) type. In this formulation, the root is identified with the men's and women's exchange rooms, the stem with the entry portal, columns, light fixtures and clerestory, and the bloom with the

vault. These correspondences of elements to axis, do not explain the exterior massing decisions made by Sullivan. The extreme verticality of the chimney-piers and visually clumsy proportion between the setback art-glass clerestory and the habitable base of the bank are not explained by the root-stem-bloom axis.

An extended speculation would be that this root-stem-bloom structure is simply the base layer, the operational/pragmatic layer and that the four corner piers are so strongly stated with the setback clerestory because this upper, uninhabitable space is an additional layer. If true it would be, similar to the upper portion of the Farmers and Merchants Bank, a more ideal zone where the formal clarity of the elements is unimpeded by pragmatic functions. If this is the case, these small bank commissions would have a stronger link to the lineage of the Schlesinger - Meyer and Gage Building with their root-bound flower pots as the first floors, and their foliage developing unhindered on their steel trellises. The center, the place where the seed germ is planted in Plate 1 of "A System," of a square between the corners of the chimney piers, aligned with the top of the ceiling falls at the base of the teller wicket, at countertop height. (Figure 17) The distinction between this bank at Cedar Rapids and the Bank at Owatonna is that the height where the seed germ is planted at Cedar Rapids falls precisely at the height of the deal plate, the countertop where the exchange between the customer and teller takes place. A functional center, not a formal center.

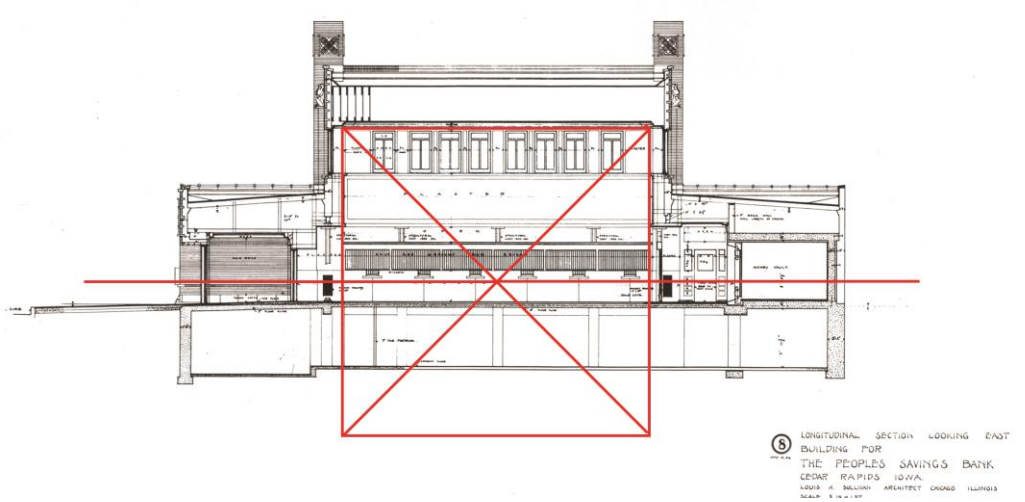

Figure 17. *Section through Peoples Savings Bank, Showing Square Geometry Bound by Inner Faces of Piers and Ceiling, and Center Falling on the "Deal Plate" or Place of Exchange with the Bank Tellers*

Source: Author's diagram overlay on the Peoples Savings Bank Section presented in People's Savings Bank in Cedar Rapids, Iowa, by Louis Sullivan – 1911, as retrieved from: http://pc.blogspot.com/2017/01/peoples-savings-bank-in-cedar-rapids.html.

Case #3: The Merchants National Bank (1914)

This building is approximately 40 feet wide at main facade by 72 feet long by 35 feet tall. The public banking space between tellers is 15 feet wide by 34 feet

long by 24 feet tall. From basement floor to roof is almost 44 feet. The skylight itself is 45 feet long and 13 feet wide

The Merchants National Bank in Grinnell, Iowa is similar to the Farmers and Merchants Bank in Owatonna, and the Peoples Savings Bank in Cedar Rapids in that it is a one-story-plus-basement building. Like these other banks, the Merchants National Banks main banking space is a double height space. As one enters the space, the main architectural elements are the ornamented cornice flanked by two piers with terra-cotta planters at the safe deposit teller and vault, the art-glass skylight, the art-glass window on the right side and six suspended electric lightoliers, three on each side of the skylight. Within the public banking space, the circular window over the entry portal, the clock in an ornamental ceramic surround, and the projecting entry portal itself are the major architectural elements.

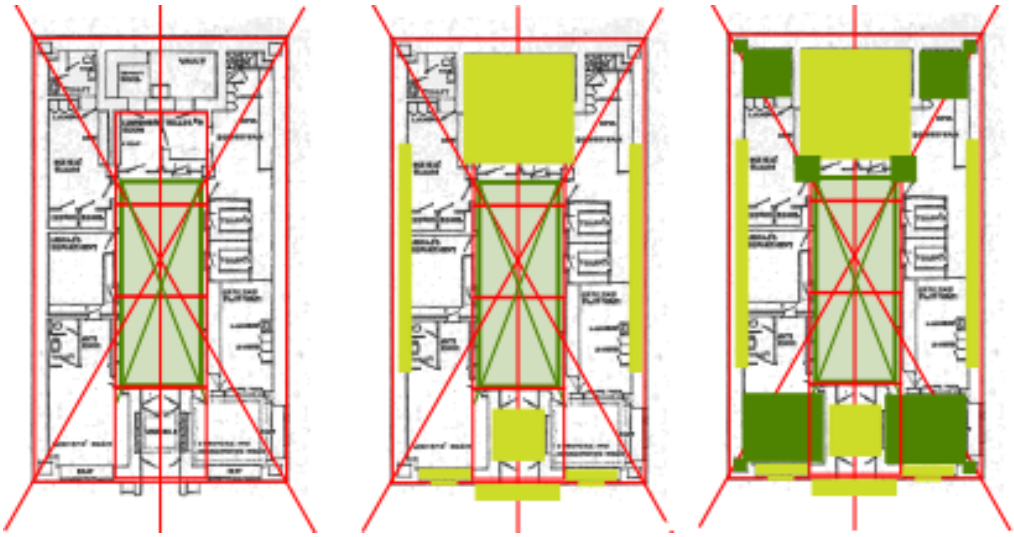

Figure 18. *Peoples Savings Bank, Developed according to the Axis/Container Approach Used by Sullivan in Plate 1 of "A System"*
Source: Author's diagram overlay on the Peoples Savings Bank Plan presented in the authors copy of the western architect v.23 1916.

Like the Peoples Savings Bank, major architectural elements are arranged along the long axis extending from the entry portal to the vault. The cross axis is only presented by the art-glass windows facing the side street. The piers with terra-cotta planters flanking the ornamented vault cornice reinforce the termination of the public banking space. One can see the structure of this axis and termination being a root-stem-bloom form-type with the entry portal again playing the role of the efflorescent burst as root, the public banking space articulated by both the art-glass skylight and the six suspended lightoliers as the stem, and the ornamented cornice-pier combination as the efflorescent burst at the end of the interior axis as the bloom. Where this axis punctures the perimeter, the exterior entry ornament stands as a major deposit of efflorescence on the surface of the exterior container of energy. The diagonal axis holds four corner spaces that are secondary or supporting spaces to banking activity. The upper left diagonal efflorescence is a toilet. The upper right is a stair from the bookkeeper's space to the basement, the

lower left diagonal efflorescence is the women's room, and the lower right diagonal efflorescence is the directors and consulting room (Figure 18).

All three of these case study banks considered to this point both make strong distinctions between what has been called the "zone of the pragmatic" where people inhabit the space and what has been called the "zone of the ideal," located above this inhabited functional space populated with architectural elements such as light fixtures, skylights, and murals all located according to Sullivan's principles as described in Plate 1 of "A System" The Merchants National Bank (1914) is different in that the distinction between the upper and lower zone is not readily apparent on the exterior. Unlike the bank in Cedar Rapids, that makes the distinction with a significant massing articulation, or the bank in Owatonna that makes the distinction with a color, texture, scale, and material change, The Merchants National Bank only distinguishes the upper from the lower zone with the window head at the director's office and the window sill of the art glass window facing the side street. Because of this one could consider the design more unified than the previous examples.

Were it not for the strong articulation of an interior cornice at approximately nine feet above the banking floor one could assert Sullivan is making a new proposition about the whole-ness of the Merchants National Bank. Testing the section to find the height of the seed-germ above the floor one finds there is no corresponding square aligning with the ceiling height as there was in the Cedar Rapids bank. The extreme length of the skylight seems to disrupt the interior ordering of both the formal logic of the section and insofar as the skylight corners extend one panel beyond the location of the lightoliers, it disrupts the formal structure of the zone of the ideal as well.

The two squares that can be made in the section between the edges of the underside of the art-glass and the surface of the floor overlap an equal amount as the two larger squares that can be drawn by extending forty-five-degree diagonals from the building enclosure towards the center. That these squares below the skylight appear to have no other architectural consequence makes them insignificant at best, and at worst they weaken the formal structure of the whole.

Forty-five-degree diagonal lines extended from the corners of the building perimeter align with the corners of the skylight. Extended to the perimeter wall, these diagonals intersect at the centerline of the overall building perimeter. If the suspended lightoliers had fallen at the corners of the art-glass skylight, they might have been considered efflorescent bursts of the seed germ growing from the center of the skylight along the diagonal axis of the skylight. As the six lightoliers fall slightly within the length of the skylight they must be considered either markers of another structure, or more likely indicators of the pragmatic necessity to distribute electric light equally across the banking room. If this is the case, it would stand as a corruption of the zone of the ideal and as such, might serve to further strengthen the assertion by Morrison, Andrews and Jordy who cite a reduction of Sullivan's powers during this time period.

Results

These observations on Sullivan's medallion-type of ornament revealed a partial set of the strategies being used to infuse inert material with an irrepressible life-force.[28] The role of analytical representations of botanical anatomy by Gray has shown that "plan" "section" and "elevation" were not terms simply reserved for design and construction of buildings, but could be applied to living organisms in order to better understand the complex inner workings of things we know primarily by their exterior appearance. The incorporation of geometrical forms and gridlines into Sullivan's terra-cotta herbarium gave, or was, a set of miniatures that allowed him to develop the relationship between the rational means of building and the celebration of the energy expended in service of a larger enterprise by the people within. These low-risk experiments began to expand in scale in the Wainwright and Guaranty buildings as expressions of vertical growth and internal vitality, not as expressions of the skeletal means of construction. The tall buildings designed by Sullivan were simply planters with a cage of vertical, horizontal and diagonal trellis supports within.[29]

But ultimately, how important was it that the buildings conform to the formal methods used by Sullivan to develop ornament? Did the buildings have to meet the rule with a level of precision that may have compromised convenient use of the bank?

These three brief studies of the Farmers and Merchants Bank, the Peoples Savings Bank, and the Merchants National Bank have provided the opportunity to speculate that Sullivan was indeed following the principles for ornament described in "A System" when he designing the plan and section for these buildings. These studies have also made it possible to speculate, that like the burst of efflorescence at the entrance to the Merchants National Bank, Sullivan may have been working with the principle of layers as found in the ornament. A mediating layer in plan or section made up the difference between dimensional needs for specialized activity or the limitations imposed by lot proportion and more idealized proportions for the "containers of energy" that were typically arranged as concentric forms originating in the public banking space. These mediation layers seem to be always separated vertically from an upper zone of the section by a defined interior cornice line or horizon that was frequently emphasized on the buildings' exterior with massing or material changes or the alignment of window heads and sills. In this way the whole of the public banking floor could be considered, in section, to be a mediating element of the ornament whose purpose is to meet the program and prepare the ground for the seed-germ. The horizon where the seed germ was planted seems to vary, and this may be the key weakness of the "building-as-ornament" proposition.

It seems clear that Sullivan (or equally likely, Elmslie) distinguished between the lower and upper space in the Farmers and Merchants Bank on the basis of the formal geometric aspects of the building. (68-foot square plan, 34-foot upper zone,

28. L. Sullivan and I. Athey, *Kindergarten Chats (Revised 1918) and Other Writings* (New York: Wittenborn, Schultz, 1947), 206-208.

29. Ibid, 208.

half the cube) It also seems clear that at the Peoples Savings Bank, Sullivan positioned the interior horizon at the deal plate - plane of exchange between teller and customer, but the exterior massing suggests the upper zone only encompasses the clerestory. In both these banks, the presence of the murals, idealized representations of the countryside and the values promoted by the banks (orderliness, industriousness, tranquility) and the relatively few functional expectations for the upper zone supports the speculation that these upper portions of the space were the place of the ideal, while the banking spaces below the horizon of the interior cornice lines were places for more pragmatic concerns. The combination of these two zones as an integrated whole would seem to epitomize Sullivan's declared ultimate goal of architecture, the fusion of opposites through the interplay of organic and inorganic elements.

It seems clear that as long as Sullivan could consider the building envelope and the perimeter of the public space as inorganic containers of energy, and that at each axial puncture of a container a burst of vegetal ornament could be made, he could build ornament at the scale of building.

But the break with principle at the Merchants National Bank weakens this argument. It seems that had the skylight been one panel shorter at each end, the light fixtures would have taken their logical place as bursts of efflorescence at the end of the diagonal axis extending through the skylight corners. But they don't. Was this an error, compromise or was Sullivan just enjoying the ornament without the baggage of perfecting the whole?

These observations categorized the development of Sullivan's approach to expressing what he called "LIFE"[30] in the medallion-type of ornament as the spiral, energized emanations, wind-swept, the pulsar and ready-to-burst. These observations conclude with the role played by the ready-to-burst approach to the medallion-type and the root-stem-bloom form type in some of his later projects.

These three case-study projects succeed in mapping functions and architectural elements as major and minor bursts of efflorescence according to the principles of development articulated by Sullivan in Plate One of "A System." But ultimately Sullivan was unable to fully translate the organic element of his ornament to the scale of building. This and the relatively modest scale of his last commissions prevented even the full development of formal clarity in the inorganic elements when scaled-up to the building as a whole. In the struggle between the inorganic and the simply pragmatic, the pragmatic governed, often to the detriment of the clarity of the whole building scheme.

Conclusions

Still, Sullivan's efforts to "enter into communion" with and express the life within his buildings designed between 1890 and 1922 remain as critical examples of, as Sprague describes, an architecture both rational and vital.[31] His work remains as the prototype of "building-as-organism" that underpinned the most

30. Sullivan, *The Autobiography of an Idea*, 1956, 235.

31. Sprague, *The Architectural Ornament of Louis Sullivan and his Chief Draftsmen*, 1969, 5-8.

significant revolution in space and form in American Architecture to date, the Prairie Houses of Frank Lloyd Wright.[32]

Bibliography

Beeby, T. H. "The Grammar of Ornament/Ornament as Grammar." In *Ornament*. Edited by Stephen Kieran. Philadelphia: Graduate School of Fine Arts, University of Pennsylvania, 1977.

Dupree, A. H. *Asa Gray 1810-1888*. Cambridge, MA: Harvard University Press, 1959.

Durand, J.-N.-L. and J.-N.-L. Durand. *Précis of the Lectures on Architecture, with, Graphic Portion of the Lectures on Architecture*. Translated by David Britt. Getty Research Institute, 2000.

Gray, A. and A. Gray. *Gray's School and Field Book of Botany: Consisting of "Lessons in Botany," and "Field, Forest and Garden Botany.*" New York: Ivison, Blakeman, Taylor & Co., 1874.

Hawkins, J. and S. Le Roux. *The Oxford Reference Dictionary*. Clarendon Press, 1986.

Jordy, W. *American Buildings and their Architects: Progressive and Academic Ideals at the Turn of the Twentieth Century.* New York: Anchor Books, 1972.

Millett, L. *Curve of the Arch: The Story of Louis Sullivan's Owatonna Bank.* St. Paul, MN: Minnesota Historical Society Press, 1985.

O'Brien, M. "After the Starchitect." *Athens Journal of Architecture* 5, no. 3 (2019): 301-318.

____. "Learning from Lost Wages: The Necessity of Design Research…A Historical Account of Frank Lloyd Wright's Search for Voice." *ARCC 2019 Poster*.

Olin, M. R. *Forms of Representation in Alois Riegl's Theory of Art*. Penn State University Press, 1992.

Riegl, A. *The Problems of Style: Foundations for a History of Ornament*. Edited by David Castriota. Princeton, NJ: Princeton University Press, 1993.

Sprague, P. E. *The Architectural Ornament of Louis Sullivan and his Chief Draftsmen.* Doctoral Dissertation. Princeton, NJ: Princeton University, 1969.

Sullivan, L. *A System of Architectural Ornament according with a Philosophy of Man's Powers.* Press of the American Institute of Architects, inc, 1924.

____. *The Autobiography of an Idea.* New York: Dover Publications, 1956.

____. *A System of Architectural Ornament according with a Philosophy of Man's Powers. New York:* Eakins Press, 1967.

Sullivan, L. and I. Athey. *Kindergarten Chats (Revised 1918) and Other Writings*. New York: Wittenborn, Schultz, 1947.

von Goethe, J. W. *Versuch die Metamorphose der Pflanzen zu Erklären* [Attempt to Explain the Metamorphosis of the Plants.] Gotha: Ettinger, 1790.

Wilson, E. *The Cell in Development and Heredity.* New York: MacMillen Company, 1896.

32. O'Brien, "Learning from Lost Wages: The Necessity of Design Research…A Historical Account of Frank Lloyd Wright's Search for Voice," *ARCC 2019 Poster*.

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The Aesthetic Ideas in Furttenbach's Treatise Architectura Civilis (1628)

*By Vladimir Mako**

Discussion developed in this paper aims to reflect on a particularly important appearance of aesthetic ideas on architecture in the seventeenth century German culture. It seems that in that process one of the leading figures was Joseph Furttenbach, which treatise Architectura Civilis was published in Ulm in 1628. Based on the legacy of the contemporary Italian architecture, it was one of the most important works of this kind written by a German author. The main subject of the treatise—private and public architecture—was discussed in a practical manner, concerning mainly the functional aspects of the art of building. However, in the treatise one can indicate existence of important terms and notions regarding ideas of architectural aesthetics, related to characters and characteristics of the fifteenth, sixteenth and seventeenth century thinking in that field.

Introduction

At the beginning of the sixteenth century, German culture was under the growing influence of the Italian Renaissance. In the field of architecture, Walter Rivius prepared the first Latin edition of the Vitruvius' treatise in 1543, and he translated it into German in 1548. In 1542, the fourth book by Sebastiano Serlio was also translated. Following the first efforts that brought the examples of the Italian Renaissance close to German readers, the treatise *Architectura Civilis* by Joseph Furttenbach was published in Ulm in 1628. Residing in Italy somewhere between 1607 and 1617, as a young student of commerce, Furttenbach collected a large number of architectural drawings and plans of contemporary buildings, mainly of palaces and villas. During this period, he probably became familiar with Italian architectural literature and went on to meet some of the important architects of that time. A part of this collection, which chiefly consisted of variations of real buildings adapted by Furttenbach to his own understanding of good architecture, was published in his *Italian Itinerary* in 1627.[1] A number of collected and adapted examples, mainly found in Genoa, served Furttenbach as a basis for his ideal view on art of building in *Architectura Civilis*.[2]

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1. J. Furttenbach, *Newes Itinerarium Italiae* (Hildesheim-New York: Georg Olms Verlag, 1971).

2. Furttenbach, *Architectura Civilis* (Ulm, 1628); for architectural influences on Furttenbach see: H. Rott, *Rubens: Palazzi di Genova: Architectural Drawings and Engravings* 1 Text and Catalogue, Corpus Rubenianum, Ludwig Burchard, Part XXII, Frans Boudouin and Arnout Balis (Ed. Harvey Miller Publishers, 2002), 81,82.

Undoubtedly, the sixteenth- and seventeenth-century German ideas on architecture developed under complex cultural influences. In his general comment on German architectural treatises of the period, Kruft attempted to investigate the importance and position of Furttenbach's writings in that process. He emphasized that the ideas developed by Furttenbach were mostly concerned with the exalted use of Greco-Roman orders, missing a serious analytical approach to the basic principles of architectural creativity.[3] At the same time, he placed Furttenbach among the theoreticians who developed a systematic idea on architecture.[4] Kruft also drew attention to Furttenbach's use of Italian examples as a model for building practice in Central Europe. Kruft recognized the relationship between Furttenbach and Pierre Le Muet, a French theoretician, in the analytical approach to functional aspects of architecture.[5] Apparently, being under the influence of Serlio's treatise, Le Muet indirectly transferred some of the Italian Renaissance views to his German colleague.[6]

Another opinion on Furttenbach's treatise and its importance for the development of German architectural theories in the seventeenth century was proposed by Dora Wiebenson, who remarked that his was the first among the works generating from chapters in Italian books regarding civil architecture, such as those by Serlio, Palladio or Scamozi.[7] An interesting suggestion came from Paul Zucker,[8] who placed Furttenbach beside Serlio and Sabatini as one of the most important pioneers of stage design.[9] Similarly, Foramitti pointed out the influence that Giulio Parigi, the eminent Florentine architect, had on developing Furttenbach's interest in stagecraft.[10] However, Foramitti's analysis did not reveal other possible influences on Furttenbach's attitudes in this field. Above all, Furttenbach seems to have been particularly interested in the parts of Serlio's treatise that were concerned with stagecraft and perspective.

Aesthetic Ideas

At the beginning of our discussion it is important to emphasize that those esthetic notions and terms which appear in Furttenbach's treatise, are not presented through a systematically developed philosophical theory. They are mainly reflecting on terms and meanings, which become familiar to Furttenbach in his study on Italian renaissance and mannerist architecture. In that context, as in any

3. H. W. Kruft, *A History of Architectural Theories from Vitruvius to the Present* (Zwemmer, Princeton Architectural Press, 1994), 166-171.

4. Ibid, 172.

5. Ibid, 173.

6. D. Wiebenson, *Architectural Theory and Practice from Alberti to Ledoux* (Architectural Publications Inc., 1982), III-D-2.

7. Ibid, III-D-4.

8. P. Zucker, "The Renaissance Stage. Documents of Serlio, Sabbattini and Furttenbach by Barnard Hewitt," in *The Journal of Aesthetics and Art Criticism* 18, no. 3 (1960), 398.

9. B. Hewitt, *The Renaissance Stage. Documents of Serlio, Sabbattini and Furttenbach* (Coral Gables, Fla., University of Miami Press, 1958), 256.

10. H. Foramitti, "Introduction," (Op. Cit.) in Furttenbach *Newes Itinerarium Italiae*, vi, ix.

analysis of aesthetic ideas developed before the appearance of systematic philosophical aesthetic thinking established by Baumgarten , we can extract those ideas only from the author's broader sense what good architecture and to it related perception and experience could be. However, as those ideas mainly correspond to the general cultural environment and its influence, consequently a comparative analysis of similar contemporary use of aesthetic terms by other authors should be established.

To understand the use of aesthetic terms and positions applied in Furttenbach's treatise, it is important to emphasize that, generally speaking, in the sixteenth and seventeenth century, at least in German speaking region, the way in which a book on architecture was conceptualized defines also the aesthetic concept of the author. Although almost all architectural treatises writhen in these two centuries in German and Dutch language have been calling upon the authority of Vitruvius and, to his work affiliated Italian Renaissance tradition, one can find a substantial difference in the judgment on that which important aspects of good and beautiful architecture should be selected and presented in the work.

We can differentiate two main groups of treatises in regard to the previously mentioned selective approach.

The first group of works has been based on the understanding that the most important aspects of architecture, its beauty and value, derives almost solely from understanding and individual interpretation of the five ancient Greco-Roman orders. This approach belongs to the Mannerist understanding of how tradition should be studied and used in the process of inventing new forms and values in contemporary architecture. From the treatise of Pieter Coecke van Aelst, through the works of Hans Blum, Johannes Vredeman Vriesae, Ihon Shute, Meyer Daniel, Krammer Gabriel, Rotgerus Kaseman, and in the late seventeenth century Johan Hofmann, it is evident that the Vitruvian and Italian Renaissance tradition has been used as an inspiration for the most subjective and fantastic decorative and picturesque inventions in presenting architectural facades and their supporting details.[11] Highly metaphorical in their approach these inventions still stand without any structural ideas for what the whole of a building should be.

The second group of architectural treatises was conceptualized according to the belief that the art of building involve the structural understanding in which firmness, function, and the overall unification of parts within the whole should be achieved, without the appearance of a good and beautiful building cannot be possible. This understanding was guided by the sense of harmony between all the

11. P. C. Aelst, *Die Inventie der Colommen met Haren Coronementen Ende Maten* (Antverpia, 1539); H. Blum, *Ein Kunstreych Buch von Allerley Antiquiteten, so zum Verstand der Funf Seulen der Architectur Gehorend* (Zurich, 1560); I Shute, *The First and Chief and Crovndes of Architecture* (London, 1563); J. V. Vriesae, *Architectura, Oder Bauung der Antiquen aus dem Vitruuius* (Antverpium, 1577); G. Krammer, *Schweiff Buchlein Mancherley Schweiff* (Collen, 1611); Krammer, *Eygentlicher Bericht der Funf Seulen …* (Nurnberg, 1626); Krammer, *Architectura von den Funf Seulen Sambt iren Ornamenten und Zierdenals…* (Colln, 1646); D. Meyer, J. T. de Bry, J. I. de Bry, *Architectura…*(Franckfurt am Mayn, 1609); R. Kaseman, *Architectura Lehr Seiulen Bochg* (Collen, 1615); R. Kassmann, *Architectur Nach Antiquitetischer Lehr und Geometrischer Ausstheilung…*(Colln, 1653); J. Hofmann, *Seulen Buch, Oder Gruendlicher Bericht von den Funf Ordnungen der Architectur Kunst…*(Nurnberg, 1672).

parts and aspects of a building, which develops far from the notion of picturesque and decorative nature of facades which was emphasized in the works belonging to the first group of examples. Behind the notion of rationality regarding construction, building material, measure and modus, all these treatises are developing a psychological sense by which the observer, or user, should experience the technological, social, and aesthetic complexity of architecture. Through the work of Salomon de Bray, Joseph Furttenbach, Georg Andreas Bockler, and in some parts trough the mainly technical work of Johann Wilhelm and Daniel Hartman, we can understand the effort which these authors made to present the theoretical and practical complexity of the art of building.[12]

In that context and by its approach to the essential issues of architecture and building in general, Furttenbach's *Architectura Civilis* can be defined as pragmatic, emphasizing utility as the primary aspect and the goal in the field of practice. However, besides its main approach, Furttenbach's treatise provides an important perspective on theoretical determination of architectural concerns in general and aesthetic questions in particular. Despite the elementary theoretical sensibility shown in Furttenbach's work, a careful analysis of the text reveals the use of terms and definitions that can lead to a reasonable understanding of the most important aspects of the creative process, and of the making of good and beautiful architecture. Moreover, he also establishes the concept for its aesthetic evaluation.

Notions regarding Aesthetic Experience

Research of the issues presented above can begin in the parts of Furttenbach's text in which he discusses general categories and principles of experiencing a building. Thus, the important terms and notions were used and developed in the introduction of his treatise.

In his comment on Italian buildings, given on page six of the introductory review of architecture, Furttenbach uses four terms, which in his opinion can define the exceptional value of the examples discussed. He states that some of the buildings are the *most precious, richest in art, most sincere and firmest.*[13] These terms are highly significant for this analysis because Furttenbach uses them to define the quality of an architectural work influencing our aesthetic perception and experience.

The term *most precious* can be read as *excellent*, and it determines the quality and value of the building material. By using it, Furttenbach highly evaluates the material quality as a component of the total aesthetic value of architecture. It is interesting that for now, in the seventeenth century Germany there is one indicated

12. S. Bray, *Architectura Moderna Ofte Bouwinge van Onsen Tyt* (Amstelredam: Danckertsz, Cornelis, 1631); G. A. Bockler, *Compendium Architecturae Civilis* (Franckfurt am Mayn, 1648); G. A. Bockler, *Architectura Civilis, Nova & Antique, Das ist Von den Funf Saulen yu der Baukunst Gehorig* (Franckfurt am Mayn, 1668); J. Wilhelm, *Architectura Civilis* (Franckfurt am Mayn, 1649); D. Hartmann, *Burgerliche Wohnungs Baw-Kunst* (Basel, 1672).

13. (Op. Cit.) Furttenbach, *Architectura Civilis*, vi.

similar understanding of the value of material as noted in Furttenbach's work. In Wilhelm's treatise from 1649, we can read that a form derives, among other, from a good material, probably reflecting on the notion *proper* in a more complex sense.[14] Nevertheless, in the context of Furttenbach's general understanding of architecture, the term is probably also used to indicate the mechanical properties of the building material, and not only to highlight its beauty in a pure perceptive sense. Thus, the quality of the building material, also expressed through its market price, would be in accordance with the logic of building construction, not only an element pleasing to the eye.

By using the term *richest in art*, that is, *most skillful*, Furttenbach brings on the evaluation of the craftsman's practical skill, by which he implies that the material should be used and worked out in a way adequate to the function it needed to perform.[15] This way, the artistic skill is equalized with the notion of practical logic that evaluates the quality of the used material and its treatment through the level of its functional optimization.

The same context could apply to the term *most sincere*, as an aspect that determines two notions mentioned earlier. Thus, the term links to the principle of the ethical ideal, reflecting the harmony between the beautiful, the good and the useful. It brings equilibrium into the relationship between the quality of the building material and the artistic approach and creative intention of the craftsman, while utility reflects the adequate use of material for a proper function.[16]

The term *staerckeste - the most firm* complements the general definition of the building quality and the properly established building structure; it is probably related to the term *firmitas*, used by Alberti in his treatise, and with terms *venustas* and *utilitas* is reflecting on the Vitruvian tradition when defining good architecture.[17] Furttenbach's use of the term *the most firm*, alongside with just analyzed other notions, seems to be of a particular interest in our discussion. Comparing it to the similar term *staerck*, used by Vriesae in the seventies of the sixteenth century, we can understand the essential difference in meaning by which Furttenbach determined the word *firm*.[18] Dutch writer was linking the term *firm* to the visual effect of the Doric order, guided by decorative and metaphorical purposes, without any regard to the building as a whole, which was the priority in Furttenbach's understanding. Closer to Furttenbach's idea is the context in which the term *firm* was used by Johan Jacob Bodmer, in the introduction for the second edition of the treatise of Hans Blum, published in 1627.[19] He was reflecting on the structural property of the visual whole that can be achieved by using the Doric order which makes the proportion and the relationship between parts of the façade stronger, and by that it gives them a beautiful look and appearance. However, after Furttenbach used the term *firm* to emphasize the structural property of the whole

14. (Op.Cit.) Wilhelm, *Architectura Civilis*, 4.

15. (Op.Cit.) Furttenbach, *Architectura Civilis*, vi.

16. Ibid, vi.

17. L. B. Alberti, *On the Art of Building in Ten Books* (The MIT Press, Cambridge Mass, 1997), 9.

18. (Op.Cit.) Vriesae, *Architectura, Oder Bauung der Antiquen aus dem Vitruuius*, 5.

19. Blum, *V Columae: Das ist, Beschreibung unnd Gebrauch der V Saulen…*(Zurich, 1627), 1.

building, it was repeated, as it seems, only by Bockler in the same context and meaning.[20] For our latter discussion it is important to emphasize that Bockler's treatise in many parts and statements proves similarities with those presented by Furttenbach twenty years before.

The analyzed terms define the objective aspects of the good, beautiful and useful building based on a rational approach to the structure development. In this context, the ideal notion of beauty is secondary; however, one can sense a strong presence of the ethical component in the determination of this important notion. Therefore, the building idea is guided by rational, concrete tasks and goals, while its aesthetical and ethical aspects develop through objective perception and evaluation.

Proceeding with his discussion of aesthetic issues, Furttenbach expands on the given terms on the same page.[21] In his view, these terms incite *high thoughts, diligent beautification,* and *heroic effectuation,* for which Italians are distinguished in town building. Although this is the only passage in the treatise where Furttenbach mentions town planning, he obviously uses these terms to refer to the whole practice of building. It is important for the present analysis that these terms match another group of notions, such as *most useful, most charming,* and *glorious*, defining meaning of the entire aesthetic system. Thus, through the notion of *most useful*, the expression *high thoughts* determine the categories of the rational approach to building. In this context, *diligent beautification* leads to the expression of *charming* as the most appreciated aesthetic notion in the whole system, while the notion of *heroic effectuation* can be presumed to convey complex social meanings.

A more thorough analysis of the notion *heroic effectuation* seems to be important for the present discussion, as it is believed to determine the principles of aesthetic appreciation of architectural quality by the society in general. In this context, *heroic* seems to be the key word, used eleven times in Furttenbach's treatise.[22] Interestingly, this notion is usually linked with other terms such as *firm, rustic, skillfully decorated, suitable for use, valuable* and *striking*. When used alone, *heroic* defines the general context of a rustic or a monumental effect, in which context it was used once more in the late seventeenth century Germany by Hofmann.[23] In addition, *heroic* was used by Furttenbach twice with reference to the effects of color and light provided by architectural elements covered in copper, as an expression close to the notion of *monumental*.[24]

The possibility that the term *heroic* determines a higher artistic effect supplementing the rational, functional and structural approaches to building can be found in the description of a courtyard, given through complementary pairs of notions. Describing how the wall was build, Furttenbach composes the first pair using the terms *rustic* and *heroic,* and the second pair of expressions, which

20. (Op.Cit.) Bockler, *Compendium,* 4.

21. (Op.Cit.) Furttenbach, *Architectura Civilis*, vi.

22. (Op.Cit.) Furttenbach, *Architectura Civilis*, 2, 3, 5, 6, 8, 19, 26, 33, 40, 50, 62.

23. (Op.Cit.) Hofmann, *Seulen Buch, Oder Gruendlicher Bericht von den Funf Ordnungen der Architectur Kunst,…*, 19, 20.

24. (Op.Cit.) Furttenbach, *Architectura Civilis*, 6, 40.

correspond to the first in meaning, *firm in lustrous blocks* and *artistic stone carving*.[25] In another example, *heroic appearance* can be achieved by *firm and skillful ornamentation*.[26] These examples can be used to define the essential meaning of the notion of *heroic* as one of the two segments of a harmoniously projected building. Besides stability and functionality, Furttenbach calls for the existence of an artistic effect (Figure 1).

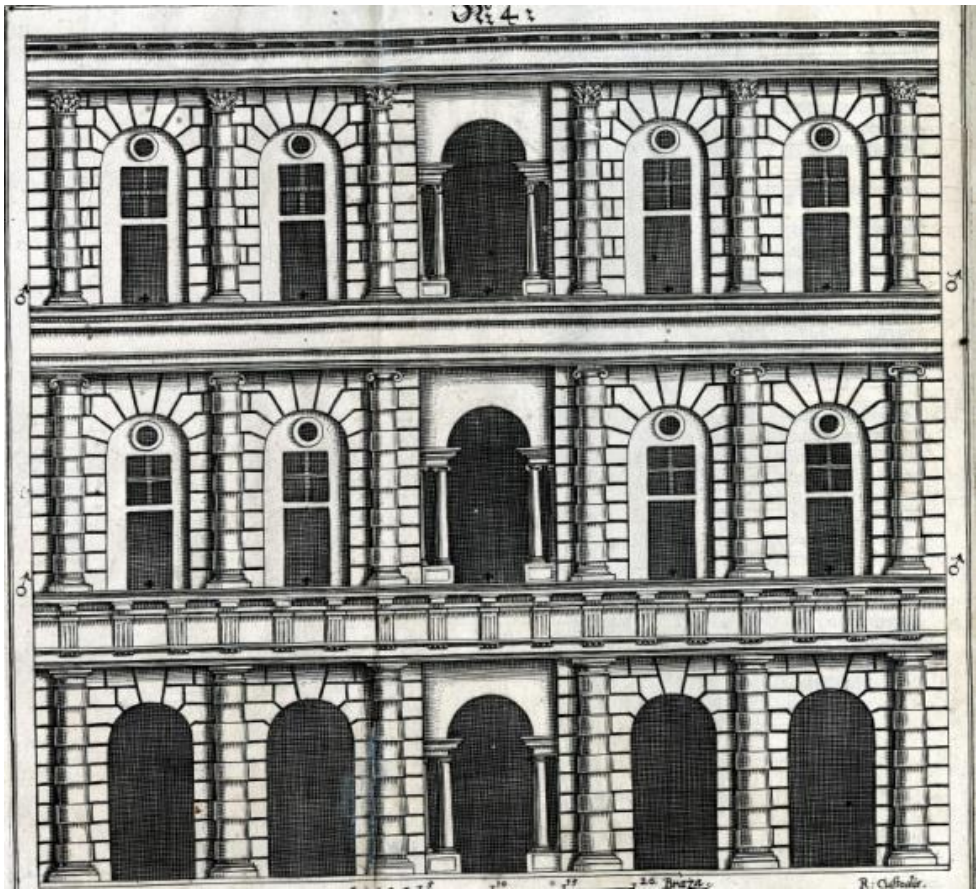

Figure 1. *The Courtyard Wall*
Source: Architectura Civilis, engraving 4.

Furthermore, the term *heroic* conveys the meaning of a particular structure consisting of a logical coordination of the inner disposition of rooms and the façade windows, as can be seen in another example.[27] Along with the previously mentioned notions, such as *skillful*, *artistic*, and *monumental*, the term *heroic* corresponds to the principle of the logical totality of a building. This Furttenbach's position can be discerned through his use of the term *esse* in the same example. Generally defining the philosophical essence of a phenomenon, the term *esse* is used as a determination of the regularity and harmonious unity of parts in a whole. If this unity is achieved, the façade *exists*; in other words, it has a *heroic*

25. Ibid, 3.
26. Ibid, 8.
27. Ibid, 19.

appearance. Thus, the term *heroic* can be considered as a definition of a perfect visual and functional whole (Figures 2 and 3).

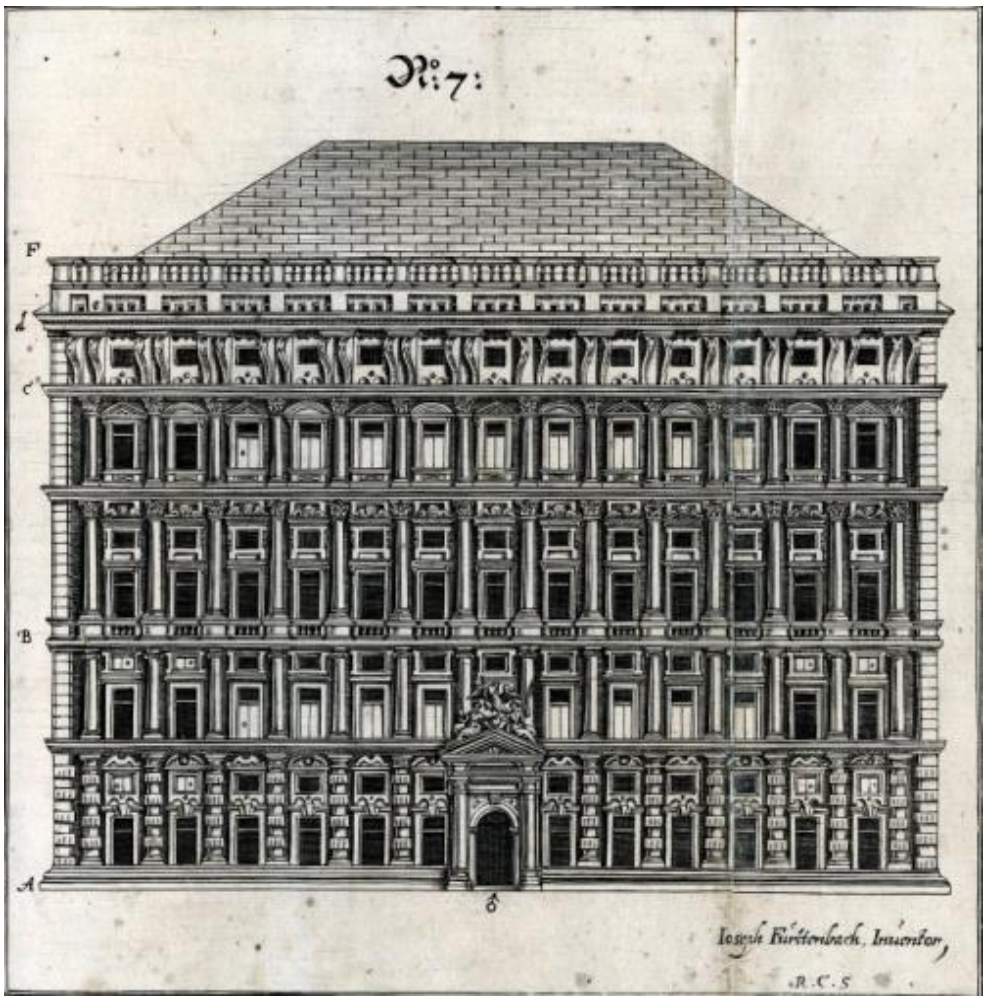

Figure 2. *Façade of a Palace*
Source: Architectura Civilis, engraving 7.

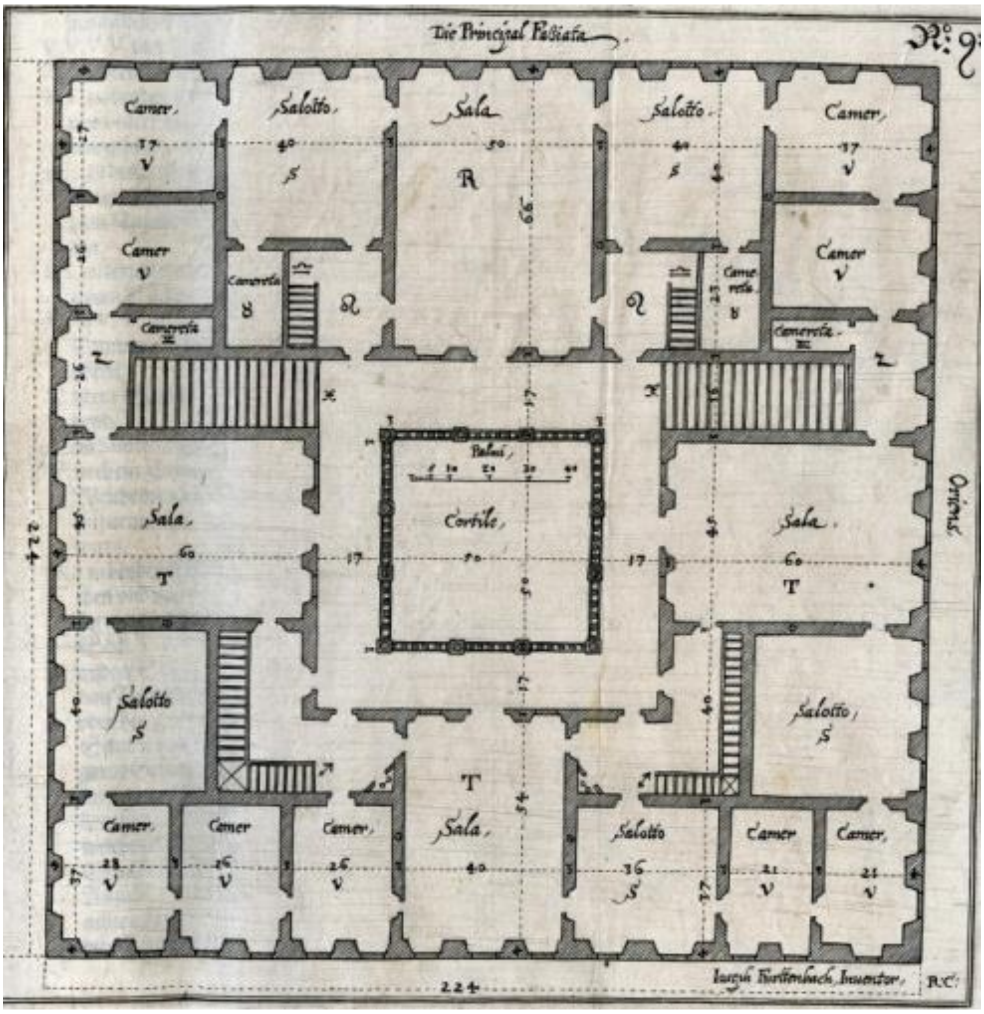

Figure 3. *Disposition of Rooms and Windows*
Source: Architectura Civilis, engraving 9.

The meaning of *heroic* help the understanding of Furttenbach's aesthetic attitude when he uses the expression *heroic effectuation*; in this context, skillful, artistic, monumental and structurally logical piece of architecture achieves *glorious* appearance. In this way, the notion of *effectuation* perceptually conveys the values that the notion of *heroic* comprises. However, it seems that in this context the harmonious relationship between *high thoughts* and *diligent beautification* leads to *heroic effectuation*. Thus established as a category of a building idea in its complete appearance, the expression *heroic effectuation* can be also thought of as a foundation for general aesthetic evaluation of a work of architecture as *glorious*, which in this context becomes an example for future generations. In this sense, evaluation of a glorious edifice is established on two principles: first, on its perceptive effect, and second, on the structural and logical unity of all components of which a building consists. Accordingly, it seems that the notion *heroic*, as established and used by Furttenbach, appears to reflect a

more complex idea in architecture than it was shown by Kruft.[28] Although one should acknowledge a certain unsystematic approach in the theoretical meaning of the word, the term *heroic* can be considered an aesthetic category, mainly when it was used in comparison with other notions.

It is important to emphasize that reflection on this Furttenbach's standpoint regarding the unification of all parts of a building into a visual, functional and meaningful whole, one can sense in a few ideas expressed by Bockler twenty years after. Speaking generally about the essential value of any art, he emphasizes that they exist "trough their meaning", and "that they must appear trough the understanding of that meaning".[29] Reflecting on the art of building he particularly defines that one of the most important aspects, functionality and proper use, can be obtained through the process of proportioning in which all the inner and external parts should be unified.[30] In that way, Furttenbach's idea has been confirmed as the essential value of the appearance of a building.

Our understanding of Furttenbach's aesthetic approach to architecture can be completed by the consideration of a term Furttenbach uses twice in his treatise.[31] Derived from the Italian *discretio*, in German the term is *discreter*, which can be translated into English as *discreet* or *discretely*, in Robert Klein's interpretation, the importance of this term results from the meaning that reflects man's particular capability for differentiating between notions, similar to the aesthetic evaluation that stands between the senses and the intellect.[32] Interestingly, Furttenbach uses this term exactly in this sense. First, the term *discreet* is used to designate a person who makes aesthetic evaluation through the description of architecture that involves particular reflections on the quality and the meticulous approach to the process of evaluation. Further, Furttenbach uses this term to determine the direct evaluation of categories required to achieve an aesthetic effect. This implies that Furttenbach was at least partly familiar with unique Italian sixteenth-century aesthetic terminology, and its proper use. In Italian Renaissance Serlio also uses this term in similar context. In the second book of his treatise on architecture, he says that some decisions regarding the representation of architecture in perspective, or creation of its overall impression should be at the discretion of the man of judgement.[33] The Furttenbach's conclusion can be supported by the fact that the term *discreet* has been used in a similar sense before Furttenbach by Vriesae, who was particularly well educated in Italian Renaissance terminology, and who understood the delicate finesse of that notion and its meaning.[34]

28. (Op.Cit.) Kruft, *A History of Architectural Theories from Vitruvius to the Present*, 173.

29. (Op.Cit.) Bockler, *Compendium Architecturae Civilis*, 1.

30. Ibid, 4.

31. (Op.Cit.) Furttenbach, *Architectura Civilis*, vi, xi.

32. R. Klein, "Judgment and Taste in Cinquecento Art Theory," in *Form and Meaning: Essays on the Renaissance and Modern Art* (New York: The Viking Press: 1979), 161-169.

33. S. Serlio, *On Architecture* Book II (18v) (New Havan and London: Yale University Press, 1996), 37.

34. (Op.Cit.) Vriesae, *Architectura, Oder Bauung der Antiquen aus dem Vitruuius*, 8.

Aesthetic Principles of Good Architecture

Continuing with general remarks on architecture, Furttenbach introduces more terms to define the quality of a building,[35] giving a succession of terms that indicate the existence of a more sophisticated level of aesthetic quality, such as *agreeable*, *pleasant*, *ornament* and *solicitous*. These terms usually supplement expressions such as *well-established* and *artistically arranged* as the primal categories of valuable architecture. At the end of the same paragraph, Furttenbach summarizes the previous discussion, emphasizing that a work of architecture as a whole and in detail should be *firm, strong, healthy, complete* and *attractive*. Defined in this way, these categories of evaluation of an architectural work seem to follow the Vitruvian–Renaissance tradition. Nevertheless, their universality and lasting value can be confirmed by the author's statement that it should be expected that such an established *structure* would be used by successors in the time to come and be useful to them. In this sense, Furttenbach establishes the principles of good architecture without discussing architectural orders, which he calls the *arrangement of beautifying with columns in five ways*.[36] In his direct use of the terms *agreeable*, *scale*, and *structure*, as three principles on which every building should be based, Furttenbach is closer to Alberti's definition of architectural structure than to the later discussion on Greco-Roman architectural orders.[37]

Further, in the description of one of the palaces, Furttenbach analyzes in detail what good architecture should comprise.[38] From his textual description we can summarize six developed principles as following points: 1. firm construction; 2. regular rhythm of openings as a prerequisite for correct ornamentation; 3. good vertical communication via stairways; 4. the existence of a grand hall as the social center for a broader society; 5. well-proportionate, symmetrically and linearly arranged rooms, establishing inner prospects and, perceived from outside, a regular disposition of windows; 6. good floor communications and a number of functions providing pleasant and relaxing atmosphere.

This description may best define Furttenbach's attitude to the aesthetic principles of architecture. Mainly, the principles are related to structural and functional elements. However, the points 2, 4, and 5 emphasize important components that supplement pure construction and function, particularly the principle presented in point 4. The idea that the palace should have a hall as the centre of social life broadens the context in which the term *function* is used elsewhere. The function of the palace is not only to provide content and pleasantness to its residents, but it is also highly recommended to have a social role as the centre of political and social meetings. For Furttenbach, architecture also expresses socio-political aspects of functionality.

On the other hand, the principles expressed in points 2 and 5 could be linked to define a rule for achieving a complete and regular building structure. In this

35. (Op.Cit.) Furttenbach, *Architectura Civilis*, vii.

36. Ibid, xii; (Op.Cit.) Kruft, *A History of Architectural Theories from Vitruvius to the Present*, 173.

37. (Op.Cit.) Furttenbach, *Architectura Civilis*, 9.

38. Ibid, 8.

context, a symmetrical and well-proportioned inner structure is necessarily reflected on the façade in the regular disposition of doors and windows.[39] This complex structural concept can be found in Palladio's attitude to architecture defined by the term *commodo*, as a category that refers to regular vertical and horizontal disposition of openings.[40] Such a disposition of building components was considered a prerequisite for beauty and elegance,[41] similar to the idea expressed by Furttenbach.

Aesthetic Notions of Individuality in Architectural Design

Generally, Furttenbach considers architectural structure as a complex system that requires a particularly serious approach to design. It seems that in Furttenbach's opinion this complexity brings about different architectural expressions, which he terms *different sentences*.[42] It is interesting that Furttenbach compares these *sentences* with different general impressions that people have when they observe and describe architectural works. This means that he accepts the existence of different personal attitudes to aesthetic values of architectural works and consequently, the subjective aesthetic evaluation as a legitimate act. On a few occasions, Furttenbach emphasizes the opinion that a personal position of an architect is acceptable even in the choice of the decorative elements necessary for beautifying particular parts of architecture.[43] He remarks that there is only a strict requirement for establishing a regular structure of a building, but all other activities undertaken to provide an impression of beauty can be left to each architect's *personal satisfaction*.[44] Hence, Furttenbach can be presumed to understand that beauty rests on individual and subjective evaluation although it must answer to building logic through applying reasonable decisions. It seems that in this respect, Furttenbach follows certain Italian sixteenth-century ideas, such as Castiglione's, to whom *differentiation of manners corresponds to individual temperaments*.[45] In addition, Furttenbach, influenced by the thought of previous centuries, believes that man's ability to create beauty is God's gift of *innate reasoning*.[46] Therefore, the creative power of beauty consists of two components: logic and individual attitude; in its essence, it is sublime, because it is a gift from the divine Creator.

These Furttenbach's statements are generally following the main ideas on individual ingenuity developed in the sixteenth and seventeenth German writers on architecture. This refers particularly to those authors which attitude towards art of building has been developed through the primacy of the research on five Greco-Roman orders. Almost all of them implied the idea that on the base of regular

39. Furtenbah also makes this evaluation on p. 19 of the quoted work.

40. A. Palladio, *The Four Books on Architecture* (Cambridge Mass. & London: The MIT Press, 1997), 60.

41. Ibid, 78.

42. (Op.Cit.) Furttenbach, *Architectura Civilis*, viii.

43. Ibid, 27.

44. Ibid, 30.

45. B. Castiglione, *The Book of the Courtier* (London: J.M. Dent & Sons, Ltd., 1944), 164.

46. (Op.Cit.) Furttenbach, *Architectura Civilis*, 36.

proportional rules exposed by these orders, the contemporary architect should investigate the possibility of inventing and applying a new concept, or manner, which is adequate to the spirit of the epoch, and the conditions given by the climate and national differences. This generally known attitude, accepted also by Furttenbach, was probably the reason why he avoided any discussion on orders in his treatise. He obviously thought that nothing new in this sense can be expressed, and therefore concentrated on aesthetic aspects regarding the structural logic of architecture, which in his opinion, has not been discussed in detail before.

Developing further ideas related to creativity, Furttenbach comments on the logic of what he calls the *modus* of thinking. He considers that a process through which a personal statement on architecture originates from another personal statement can be misleading in the apprehension of the true values of a building. However, this can be superseded by following the steps of an accurate designing procedure. In this context, Furttenbach emphasizes the importance of model making which provides "a complete, suitable and artistic composition and preparation".[47] However, it seems that the notion of the *genuinely permanent* values in architecture is not rooted in an idealistic philosophy, but rests on the material, functional, structural and skillful components of building. In Furttenbach's opinion, such values can be learned by researching the existing examples of good architecture, and from interviews with distinguished architects. The pragmatic nature of direct studying and following the existing experience is of a higher value than speculative training in idealistic and theoretical concepts. Practice leads towards the development of experience and thus generates new ideas and solutions.[48] However, the process cannot be seen as unsophisticated automatism because only the "spirit of free will and patience" will produce a good, creative architect.[49] Patient research and talent led by the logic of practice are the components necessary for high-quality building. This is the main logic underlying Furttenbach's entire system of thinking.

Besides the analyzed aesthetic aspects that are important for our understanding of Furttenbach's opinion on what good architecture can be, the treatise also contains a few interesting statements regarding particular functional issues. Thus, Furttenbach seems to maintain that the differences in living habits among nations play an important role in establishing the proper function of residential architecture. In describing one of the projects for residential purposes, he says that in the process of its design he has mixed "Italian with German habits and customs".[50] By doing so, Furttenbach establishes the Italian model as having general importance for the conceptualization of good architecture, and yet shows full understanding of the particularities of lifestyle and climate in Germany that necessitate transformations of this highly desirable ideal (Figure 4).

47. Ibid, x.

48. Ibid, 48.

49. Ibid.

50. Ibid; (Op.Cit.) Kruft, *A History of Architectural Theories from Vitruvius to the Present*, 173.

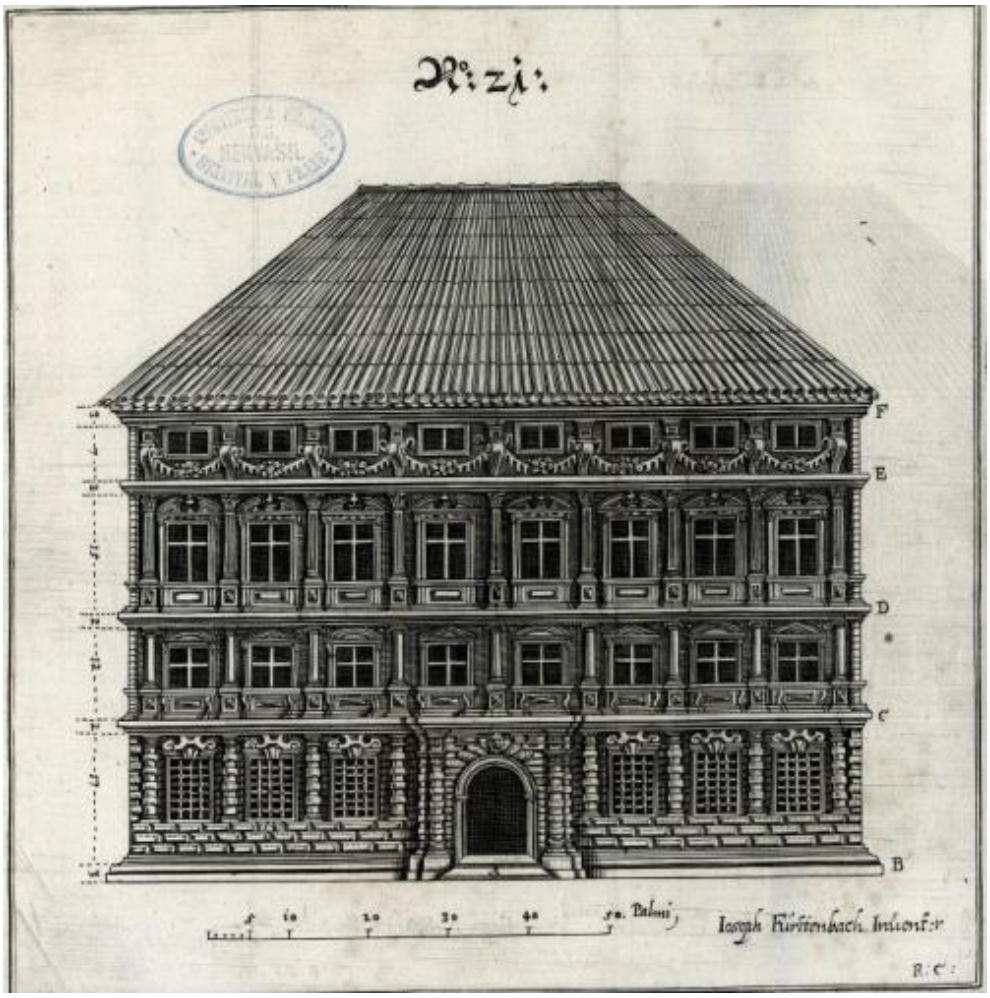

Figure 4. *Façade of a Palace Adapted to German Customs*
Source: Architectura Civilis, engraving 21.

That this approach is deliberate is proved by several similar comments in the text, which indicate that the necessity of transformation of the Italian architectural model is caused by the "manner of the country", in other words, by its habits and customs.[51] These comments confirm Furttenbach's essentially rational approach to building. Despite his fascination with Italian architectural rules and models, Furttenbach's structural logic reflects the real habits and climatic particularities, which prevail over the unquestioning pursuit of ideals. In this way, he follows almost in detail the idea which has been already defined by de Bray in his treatise on modern architecture.[52]

For our understanding of all important aesthetic aspects developed by Furttenbach, we should analyze another interesting example. Continuing with his comments on the functional solutions of buildings, Furttenbach pays particular attention to the character of the person for whom the building is designed.[53] By

51. (Op.Cit.) Furttenbach, *Architectura Civilis*, 49, 50, 56.
52. (Op.Cit.) Bray, *Architectura Moderna ofte Bouwinge van Onsen Tyt*, 11.
53. (Op.Cit.) Furttenbach, *Architectura* Civilis, 49.

doing so, he implicates the important influences that the personal demands of the investor, his character, and profession—that is, the psychological aspects—have in the process of design. The importance of this issue derives from a similar context in which de Bray was analyzing a few projects of architectural portals made by Hendrick de Keyser. In these comments, de Bray was emphasizing how the architectural function has been reflected through the character of the applied design, and how according to that quality, the architect managed to become diligent and attentive in art.[54] In this context, Furttenbach's idea reached a higher level of understanding what importance the characterization of architecture can bring into the designing process.

The notion of the beautiful is not extensively discussed in the treatise; however, Furttenbach's views can be found in a few passages. Usually, the beautiful is linked to the fascination with the diversity of *charming* effects.[55] It seems that for Furttenbach the feeling or experience of a beautiful site results from the variety and multitude of its contents, curiosities and surprises. However, the treatise also offers views of beauty that are more complex. For Furttenbach, an *outstandingly beautiful hall* is the one that was structuralized by *elegant modulation*, by bringing its breadth, length and height into proportional harmony.[56] This is close to the opinion expressed by Palladio although there is no certainty of its origin in Furttenbach's work. However, Furttenbach's idea which links beauty of a building and structural proportions, was again expressed by Bockler, but now more explicitly as one of the essential requirements in the art of building[57] (Figure 5).

54. Ibid,14ff.

55. Ibid, 3, 32.

56. Ibid, 4. From Furttenbach's accompanying designs, it can be concluded that the proportions of large halls vary from case to case, and thereby build ratios such as 9:14, 1:2, 9:12:17. Smaller halls are usually proportioned as cubes 1:1:1. It is particularly obvious in Engravings Nos. 3, 9, and 10.

57. (Op.Cit.) Bockler, *Compendium Architecturae Civilis*, 5.

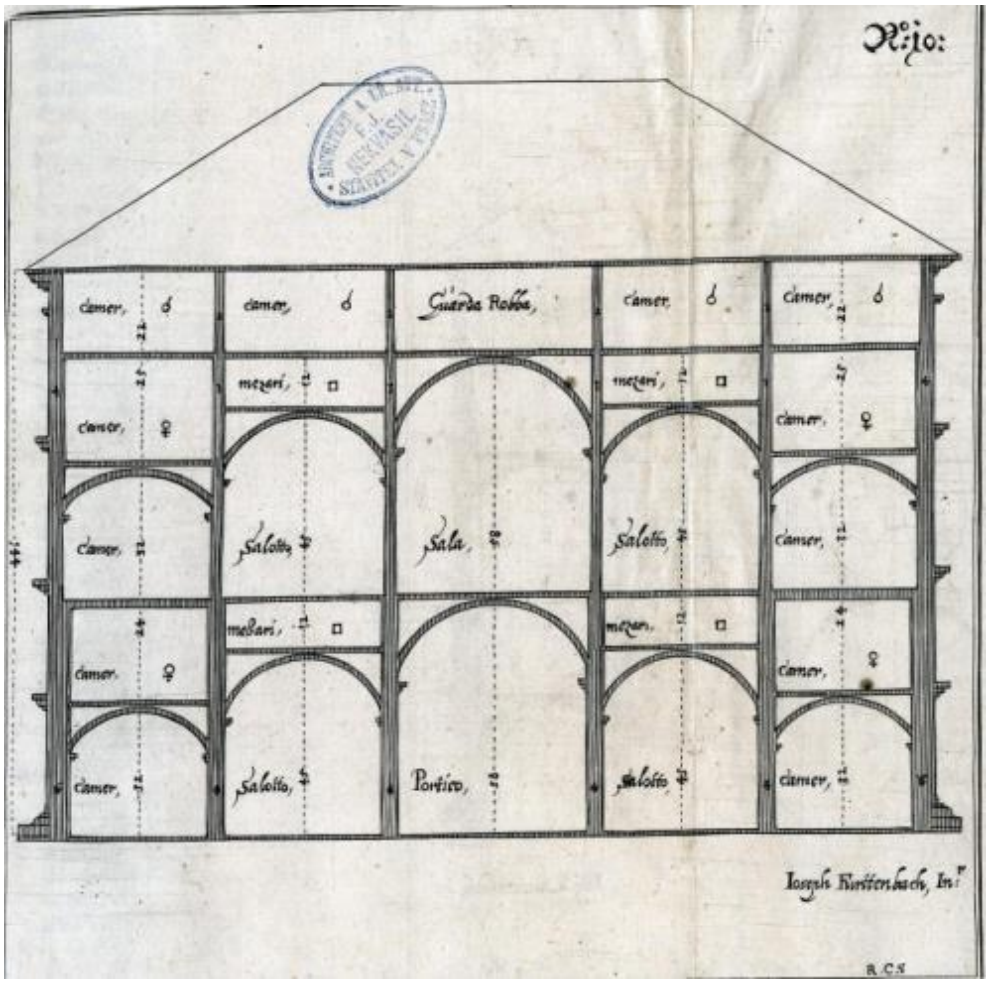

Figure 5. *The Cross Section showing the Proportions of the Inner Structure*
Source: Architectura Civilis, engraving 10.

Additionally, a building achieves a *beautiful appearance* if its rooms are comfortable, and according to that, even the feelings of pleasantness, joy or amusement, more or less individual, can be considered as sources of beauty.[58] Thus, the structures providing the feeling of leisure and cheerfulness are beautiful.[59] The sense of beauty also comes from the skill and complexity of performing a work of art, the brightness of light,[60] the sheen of the materials used and their variety.[61] This is similar to a theater play, which is beautiful when it pleases the spectator's sight and hearing, providing a complete sense of *charm.*[62] Beautiful work should always create a pleasant feeling even after it has been observed for a long time. In order to produce this effect, the performance skill

58. (Op.Cit.) Furttenbach, *Architectura Civilis*, 9, 42.
59. Ibid, 26.
60. Ibid, 28.
61. Ibid, 32.
62. Ibid, 30.

should be complemented with various materials and colors, because a "longer exposure to them…does not provoke a boring impression".[63]

However, it seems that sometimes his attitude to the subject of beauty leads to a more complex notion of levels of its perception. In a few examples, Furttenbach emphasizes that the garden statues "do not only help to decorate…but they also generate other pleasant artistic thoughts, with which the spirit can be joyful…"[64]; sometimes this joy is so strong that the observer "forgets himself completely".[65] In this way, Furttenbach indicates the psychological power of beauty, especially when he uses the expression *stirring beauty*,[66] explaining how the space of the *sepultura santa* of the church of St. Lorenzo in Genoa produces the effect of monumentality and perspective guidance for observers.[67] As in other case studies and examples, it is considered necessary for a visual mark to be seen at a distant point in order to build such an effect.[68]

Further development of the idea that beauty affects the observer psychologically can be seen in Furttenbach's explanation of the notion of atmosphere as an important aspect of perception of a piece of work. Darkness of a grotto is necessary because then its content can be experienced "with greater passion and deeper purpose".[69] Yet, whatever the level of complexity that the expression of beauty can reach, it is always related to the sense of usefulness. When Furttenbach speaks of the process of *contemplation of beauty* of a building or its part, he usually complements it with a description of its well-established function.[70] A useful building is a source of joy and happiness and therefore it supplements the feeling of beauty, creating a complete aesthetic sensation.

Conclusions

It seems that our discussion indicates that in his treatise Furttenbach established important unity between aspects regarding the quality of architecture and to it related human emotional experience, both creative and perceptual. Moreover, one can think of an appearance of a more or less systematically developed aesthetic concept in its essential sense. However, our analysis of Furttenbach's use of potential aesthetic terms and their meanings regarding the quality of architectural expression shows that his understanding of esthetic perception and experience develops more in the realm of practice than as a philosophical speculation. In that sense, his interpretation of emotional responds to architecture reflects more on basic psychological principles of human behavior and satisfaction, than on profound spiritual contemplation on deeper cultural

63. Ibid, 62.
64. Ibid, 32.
65. Ibid, 35.
66. Ibid, 63.
67. The original representation of the space is given in Engraving No. 15. In: (Op.Cit.) Furttenbach, *Newes Itinerarium Italiae*.
68. (Op.Cit.) Furttenbach, *Architectura Civilis*, 33.
69. Ibid, 37.
70. Ibid, 9, 26, 59.

meanings. Nevertheless, the way in which Furttenbach emphasizes the necessity of establishing German manner in architecture out from Italian models, indicates his standpoint that aesthetic expression can be formed by a deeper cultural need and influence.

Research and scientific examination of Joseph Furttenbach's use of aesthetic notions in his treatise *Architectura Civilis* would not be so significant in itself that it not influenced the spreading of Italian architecture and individual aesthetic attitudes over German lands in the seventeenth and eighteenth centuries. In this process, his treatise occupies an especially important place because it is a work that not only informed the German reader about a new scope of Italian art of architecture, but it also contained and conveyed the ideas arising from the relationship between subjective and universal creative thinking, principles of good architecture, and aesthetics.

In this sense, Furttenbach's treatise can be considered as the germ of the further development of German theoretical treatises on architecture, which tended to follow the most eminent minds of the rest of Europe, and at the same time to distinguish the specific features and needs of their own region. The study of ideas, designs, theoretical statements, and aesthetical considerations collected in *Architectura Civilis* can be regarded to have lasting significance for understanding how the thoughts on architecture and the principles of its materialization were shaped at the time it was created, as well as in the centuries that followed. The analysis of Furttenbach's theoretical assumptions, many of which are yet unexplored, suggests that his treatise on architecture aroused special interest for the *classical* in architecture in German scholars of a later date.

Bibliography

Aelst, P. C. *Die Inventie der Colommen met Haren Coronementen Ende Maten.* [The Investment of the Columns with Her Coronements and Sizes.] Antverpia, 1539.

Alberti, L. B. *On the Art of Building in Ten Books.* The MIT Press, Cambridge Mass, 1997, 9.

Blum, H. *Ein Kunstreych Buch von Allerley Antiquiteten, so zum Verstand der Funf Seulen der Architectur Gehorend*. [An Art-Literary Book of All-Antiquities, thus Belonging to the Mind of 5 Pillars of the Architecture.] Zurich, 1560.

Blum, H. *V Columae: Das ist, Beschreibung und Gebrauch der V Saulen,…*[V Columae: That's the Description and Use of the V Columns,…] Zurich, 1627.

Bockler, G. A. *Compendium Architecturae Civilis*. [Brief Civil Architecture.] Franckfurt am Mayn, 1648.

Bockler, G. A. *Architectura Civilis, Nova & Antique, Das ist Von den Funf Saulen yu der Baukunst Gehorig*. [Civi Architecture, New & Old, This is heard from the Five Sauls and the Architecture.] Frankfurt am Mayn, 1668.

Bray, S. *Architectura Moderna ofte Bouwinge van Onsen Tyt*. Amstelredam: Danckertsz, Cornelis, 1631.

Castiglione, B. *The Book of the Courtier.* London: J.M. Dent & Sons, Ltd., 1944.

Furttenbach, J. *Architectura Civilis.* [Civil Architecture.] Ulm, 1628.

Furttenbach, J. *Newes Itinerarium Italiae*. [News from Italian Itinerary]. Hildesheim-New York: Georg Olms Verlag, 1971.

Hartmann, D. *Burgerliche Wohnungs Baw-Kunst*. [Bourgeois Housing Baw Art.] Basel, 1672.

Hewitt, B. *The Renaissance Stage. Documents of Serlio, Sabbattini and Furttenbach*. Coral Gables, Fla., University of Miami Press, 1958.

Hofmann, J. *Seulen Buch, Oder Gruendlicher Bericht von den Funf Ordnungen der Architectur Kunst,…*[Book or thorough Review of the 5 Orders of Architectural Art.] Nurnberg, 1672.

Kaseman, R. *Architectura Lehr Seiulen Bochg*, Collen, 1615.

Kassmann, R. *Architectur Nach Antiquitetischer Lehr und Geometrischer Ausstheilung*, Colln, 1653.

Klein, R. "Judgment and Taste in Cinquecento Art Theory." In *Form and Meaning: Essays on the Renaissance and Modern Art*. New York: The Viking Press: 1979.

Krammer, G. *Schweiff Buchlein Mancherley Schweiff*, Collen, 1611.

Krammer, G. *Eygentlicher Bericht der funf Seulen …*, Nurnberg, 1626.

Krammer, G. *Architectura von den Funf Seulen sambt iren Ornamenten und Zierdenals*. Colln, 1646.

Kruft, H. W. *A History of Architectural Theories from Vitruvius to the Present*. Zwemmer, Princeton Architectural Press, 1994.

Meyer, D., de Bry, J. T., de Bry, J. I. *Architectura…* [Architecture…] Franckfurt am Mayn, 1609.

Palladio, A. *The Four Books on Architecture*. Cambridge Mass. & London: The MIT Press, 1997.

Rott, H. *Rubens: Palazzi di Genova: Architectural Drawings and Engravings* 1 Text and Catalogue, Corpus Rubenianum, Ludwig Burchard, Part XXII, Frans Boudouin and Arnout Balis, Ed. Harvey Miller Publishers, 2002.

Serlio, S. *On Architecture*. Book II (18v). New Havan and London: Yale University Press, 1996.

Shute, I. *The First and Chief and Crovndes of Architecture*, London, 1563.

Vriesae, J. V. *Architectura, Oder Bauung der Antiquen aus dem Vitruuius*. [Architecture, or Construction of the Antiquities from the Vitruvius.] Antverpium, 1577.

Wiebenson, D. *Architectural Theory and Practice from Alberti to Ledoux*, Architectural Publications Inc, 1982.

Wilhelm, J. *Architectura Civilis*. [Civil Architecture.] Franckfurt am Mayn, 1649.

Zucker, P. "The Renaissance Stage. Documents of Serlio, Sabbattini and Furttenbach by Barnard Hewitt." In *The Journal of Aesthetics and Art Criticism* 18, no. 3 (1960).

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From Royaumont to Caxinas: Fernando Távora and the Response to the Complexity of Reality

By Rui Seco[*]

Returning from the Royaumont Team 10 meeting, in 1962, Portuguese architect Fernando Távora published in the journal 'Arquitectura' his testimony, as observer in the encounter, reporting the impossibility of consensus between the participants. With somewhat disappointment, Távora related the big difference from the Charte d'Athénes era, three decades earlier, and expressed that "a formal conclusion, similar to that remarkable document, is absolutely impossible, almost foolish". Although he considered indispensable to achieve operative ideas that could synthesize and guide architectural practice, he stated that "times and dimensions have changed... Reality is more diverse (...) Knowledge about mankind has increased, societies phenomena are beginning to be understood, and simultaneously everything gets more complicated. It is a time of doubt and research, of drama and mystery (...), not a time to conclusions." These questions permeated throughout the intense program of the meeting. As Candilis presented his 25,000 dwellings masterplan for Toulouse, Coderch objected that for a single house he required six months to develop a project, moment that, according to Fernando Távora, synthesized the zeitgeist of the meeting. One decade later, Álvaro Siza, a former disciple of Távora, developed his plan for a small group of houses in Caxinas. A number of critics and historians state that there is a radical transformation in Portuguese city in the early 1970s. One of these authors, Paulo Varela Gomes, sustains that Caxinas is the turning point in that transformation. This article intends to perceive this change and to identify how the absence of references and absolute certainties, in that time of doubt and research, led to a new way of thinking and designing the city. Could this be read as an answer to Távora's concerns about the lack of a conclusion in Royaumont?

Introduction

In the turning of the 1960s, modern architecture was facing new issues and challenges, posed by a changing society. Three decades after the first CIAM meetings and declarations, in a deeply transformed world, modernist ideas were being questioned, as the results of its put in practice in many European cities' reconstruction after the II World War, creating new neighbourhoods and cities, were being criticized.

This paper intends to perceive the profound context change that occurred in that period, from the reading of a 1962 text by Fernando Távora in the Portuguese

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journal '*Arquitectura*,'[1] reporting his presence in the Royaumont Team 10 meeting.[2]

It contextualizes this text in Távora's path and at the time it was produced, and relates it with the profound transformation of the Portuguese city that would take place in the following years.

Fernando Távora (1923-2005) was a Portuguese architect, born in Porto, that in addition to his design practice for more than 50 years, also taught and wrote about architecture, being strongly influential in the Portuguese context of the second half of the 20th century. He had a central role in the establishing of the '*Escola do Porto*', an approach that developed a distinctive way of intervening in the territory, by valorising pre-existing structures and the history of places - Kenneth Frampton called it critical regionalism, Portuguese critics named it a third way, a synthesis between modern and tradition.[3]

From the considerations of Távora, with direct influence in his architecture, to the development of a collective awareness revealed in the rethinking and reutilization of design instruments from the pre-modernist urbanism, a single decade later, there was an important evolution of the Portuguese urban design, with notable expression in some specific examples.

Álvaro Siza, a former disciple of Távora, was one of the architects that created urban fabric with renewed design principles. His plan for a small group of houses in Caxinas, Vila do Conde, was highlighted by Paulo Varela Gomes, one of the Portuguese main critics and historians of this period, as a turning point in the Portuguese city transformation.[4]

The analysis of this intervention and of the design approaches and city concepts that were used in it and in other notable Portuguese urban projects of the period is here conducted with the intent to perceive this change and to identify how the absence of references and absolute certainties, in that time of doubt and research, led to a new way of thinking and designing the city. Could this be read as an answer to Távora's concerns about the lack of a conclusion at Royaumont?

Framework and Background

In order to understand the questions presented it is important to perceive the context in which Fernando Távora writes the text about the Royaumont meeting and its relation with the framework of his professional and personal path and his production. Three main bibliographic threads are important for this contextualisation.

1. The journal '*Arquitectura*' was the main platform for divulgation and debate on architecture in Portugal, along with '*Binário*', the other Portuguese architecture journal of the time. For an insight at the approach on the city on these journals, see: R. Seco, "Antes do Recomeço: a Cidade nas Revistas Arquitectura e Binário" *Cidades, Comunidades e Territórios* 32 (2016): 133-143.

2. F. Távora, "O Encontro de Royaumont," *Arquitectura* 79 (1963): 1.

3. K. Frampton, *Modern Architecture: A Critical History* (London: Thames & Hudson, 2007), 313-327.

4. P. Varela Gomes, "Arquitectura, os Ultimos Vinte e Cinco Anos," in *História da Arte Portuguesa* (ed.) Paulo Pereira (Lisbon: Círculo de Leitores, 1995), 547-577.

Firstly, the analysis of Fernando Távora's work, held by numerous authors, due to his importance in Portuguese contemporary architecture, both as a practitioner and as an influencer.

Daniele Vitale, Max Risselada, William Curtis and César Portela, among others, within an international scope, wrote about Távora, relating his architecture with the specificities of Portuguese isolation, culture and ancient values, addressing his international relations and his interactions within Team 10, and emphasizing his role in the definition and establishment of the '*Escola do Porto*' movement and his relation with figures like Carlos Ramos, Álvaro Siza, Sérgio Fernandez and Eduardo Souto de Moura.[5]

Several Portuguese authors wrote about Távora's work and influence as well, creating a solid documentary base on the theme, notably Alexandre Alves Costa, Bernardo Ferrão, José António Bandeirinha, Francisco Barata, Manuel Mendes, Gonçalo Byrne and Eduardo Fernandes, who analyzed multiple aspects of his architecture, writings and principles, and the evolution of his perspective throughout his life and career.[6]

Secondly, it is of major relevance the thinking of Fernando Távora himself, whom, from his early years, reflected on the context in which he worked, the confrontation between a radical modernity and an everlasting rurality, between an open and varied world and a country closed upon itself, between a solid and stable knowledge about construction and the quick development of new techniques.

His architecture is the result of his perception of the contradictions and conflicts of the complex world he lived in, which he also registered in his writings. '*O Problema da Casa Portuguesa (The Problem of the Portuguese House)*' and '*Da Organização do Espaço (The Organization of Space)*' are particularly

5. D. Vitale, "Fernando Távora: Correspondences and Fictions," in *Fernando Távora Permanent Modernity* (ed.) José António Bandeirinha (Guimarães: Associação Casa da Arquitectura, 2012); M. Risselada, "Fernando Távora in the context of Team10," in *Fernando Távora Permanent Modernity* (ed.) José António Bandeirinha (Guimarães: Associação Casa da Arquitectura, 2012); W. J. R. Curtis "Memória e Criação: O Parque e o Pavilhão de Ténis de Fernando Távora na Quinta da Conceição 1956-60," in *Fernando Távora Permanent Modernity* (ed.) José António Bandeirinha (Guimarães: Associação Casa da Arquitectura, 2012), 26-37; C. Portela, *"Perfil de Fernando Távora" DPA Departament de Projectes Arquitectònics UPC* 14 (1998): 14-17.

6. A. A. Costa, "Caption for a Drawing by Nadir Afonso," in *Fernando Távora* (ed.) Luiz Trigueiros (Lisbon: Editorial Blau, 1993); B. Ferrão, "Tradition and Modernity in Fernando Távora's work 1947/1987," in *Fernando Távora* (ed.) Luiz Trigueiros (Lisbon: Editorial Blau, 1993); J. A. Bandeirinha, "Fernando Távora: Permanent Modernity," in *Fernando Távora Permanent Modernity* (ed.) José António Bandeirinha (Guimarães: Associação Casa da Arquitectura, 2012); F. Barata, "La Regla y la Excepción. Dos Proyectos de Távora para Porto," *DPA Departament de Projectes Arquitectònics UPC* 14 (1998): 54-63; E. Fernandes, "The Tectonic Shift in Fernando Távora's Work in the Post-CIAM Years," in *Revisiting Post-Ciam Generation: Debates, Proposals and Intellectual Framework. Proceedings* (ed.) Nuno Correia, Maria H. Maia and Rute Figueiredo (Porto: CEAA/ESAP-CESAP, 2019), 120-134; J. B. Távora, "Tradição e Modernidade na Obra de Fernando Távora 1947/1987," in *Fernando Távora* (ed.) Luiz Trigueiros (Lisbon: Editorial Blau, 1993); M. Mendes, "Fernando Távora: O meu caso," in *Fernando Távora Permanent Modernity* (ed.) José António Bandeirinha (Guimarães: Associação Casa da Arquitectura, 2012); E. Fernandes, *A Escolha do Porto: Contributos para a Actualização de uma Ideia de Escola*. PhD Thesis (Portugal: University of Minho, 2011).

significant texts, as well, naturally, as '*O encontro de Royaumont (The Royaumont meeting)*', the central subject of this paper.[7]

A third bibliographic thread, also important for this thematic, is the study of Portuguese urban development in the period under consideration.

In this field, several historians and critics have analysed and written about the Portuguese city, like Nuno Portas, on his own and together with Manuel Mendes, who described the evolution of the 1960's and 1970's, both in the disciplinary ground and in the non-formal, *casual*, urban growth, mainly focused in the two metropolitan areas of Lisbon and Porto.[8]

As other authors like Paulo Varela Gomes, José Manuel Fernandes and José Lamas, they identified the development of new ways of designing urban fabric by a generation of skilled and well-informed architects, such as Álvaro Siza, Nuno Teotónio Pereira, Vítor Figueiredo, Manuel Salgado, José Charters Monteiro and Manuel Vicente, among others, in some cases in association with foreign colleagues, like Vittorio Gregotti and Aldo Rossi.[9] Their propositions reviewed modernist urban models and solutions and their focus in the implantation of isolated buildings, rehabilitating the shaping of urban form and the reuse of urban elements like the street, the square and the city block.

These main bibliographic contributions enable a perception of the context in which the report about the Royaumont meeting by Fernando Távora was published – taking in fact active part in it -, with the loss of the previously solid references that supported urban design in the post-war period, and frames the subsequent developments that took place in Portugal in the following years.

From this comprehensive perception, the paper develops a detailed reading of Távora's text, basing not only on his description and observations about the meeting but also on the findings and insights that he advances and the over-all sense which crosses through his writing.

Távora's perceptiveness is here the base point for an interpretation of those fundamental changes in Portuguese city, the following and final stride of this study, in which are analysed noteworthy case studies.

7. F. Távora, "O Problema da Casa Portuguesa," in *Cadernos de Arquitectura* #1 (Lisbon: Editorial Organizações, 1947); F. Távora, *Da Organização do Espaço* (Porto: FAUP Publicações, 1996).

8. N. Portas, "A Arquitectura da Habitação no Século XX Português," in *Arquitectura do Século XX: Portugal* (ed.) Annette Becker, Ana Tostões and Wilfried Wang (Lisbon: Prestel, 1997); Portas and M. Mendes, *Arquitectura Portuguesa Contemporânea: Anos Sessenta/ Anos Oitenta* (Porto: Fundação de Serralves, 1991); Portas and Mendes, *Portugal: Architecture 1965-1990* (Paris: Editions du Moniteur, 1992).

9. Op. Cit.; J. R. G. Lamas, *Morfologia Urbana e Desenho da Cidade* (Lisbon: F.C. Gulbenkian/J.N.I.C.T., 1993).

'The Royaumont Meeting' Report

In July 1963, the '*Arquitectura*' journal published a report about the Royaumont Team 10 meeting by the Portuguese architect Fernando Távora (Figure 1), classifying it as a testimony.[10]

Figure 1. *Cover of 'Arquitectura' and "The Royaumont Meeting" Report*
Source: Arquitectura #79.

It was a single page text, with no images, titled '*The Royaumont meeting*' in which Fernando Távora expressed his ideas about the meeting and the impossibility of obtaining conclusions or gathering consensus between the participants.

Although having already previously participated in other CIAM meetings, Távora wrote that he considered himself a mere observer in this encounter, looking from outside to the work presented and the discussions that took place, and being in this position he reflected about the differences between then and the time of the Athens Charter, three decades earlier, when "*it was possible for a group of men to reach clear, lucid, schematized conclusions*", indicating "*paths where uncertainty does not exist*".

For Távora, and despite the relatively short time that since then had elapsed, circumstances had evolved in such a way that reaching *"a formal conclusion, similar to that remarkable document, is absolutely impossible, almost foolish*".

In his words, "*times and dimensions have changed... Reality is more diverse, richer, more variegated. It isn't possible, for now, to give prescriptions, to classify with certainty. The world presents to our eyes as complex, disturbing, unsettling.*

10. Távora, "O Encontro de Royaumont," 1963, 1.

Mankind is better known, societies' phenomena are beginning to be understood, and simultaneously everything gets more complicated. (...) One feels that it is a time of search and doubt, of reconnection, of drama and mystery. How, therefore, to conclude clearly?"[11]

This perception, though, did not make him consider the situation pessimistic or sceptical: "*In my view, one should not try to classify such a statement but only check whether it is true. I don't think it is a disgrace that a group of well-intentioned men, driven by frankness and sincerity, can come to such a conclusion. Would it not be less honest to do otherwise?*"

Távora valued the efforts of the *Athens' men*, the heroic generation, and their significance, their thoughts and their achievements, as the men of Royaumont also did, all signing a letter to them, or more specifically to Le Corbusier, stating "*nous continuons*".

To continue in that innovative spirit, to persevere without relaxing or copying their solutions, was their understanding of their relationship with the older generation.

This was not, however, a simple and consensual path to follow, as Fernando Távora expresses, reporting one episode that, in his view, could synthesize the spirit of the meeting.

When Georges Candilis presented his 25,000 dwellings masterplan for Toulouse-le-Mirail, Coderch objected that he needed six months to develop the project for a single small house, in a strong contrast that Távora felt gave the dimension of the problems that architects faced: "*I think the truth was in both sides, simply the awareness of the phenomenon, no longer as utopia but as a tangible reality, now appears in its fullness.*" (…) "*It's the need for a synthesis between the number 1 and the number 25,000 that starts to present to our spirit as indispensable. Whatever is the meaning, the significance or the extension that one could give to this contrast, it will turn out to exist all over our world.*"

Architects responsibility was a thematic that arose at the meeting as a consequence of these questions, in face of the absence of a concrete, clear, accurate truth, and the need to make options, real or symbolic.

With somewhat disappointment for this impasse, Távora considered that achieving a synthesis would be indispensable in the future, and stated that the awareness of the problem was already a step towards it, which should be transformed in a cry of hope.

"*Life is continually reborn from itself*", ends Távora his testimony.

As an Observer, Looking from the Outside

In 1962 Fernando Távora was no longer a young architect. At the Royaumont meeting, he had turned 39 years old and was an already experienced practitioner, with several and diversified built work, some of it of considerable scale, like the Ramalde housing neighbourhood (Figure 2). He was a teacher in the Porto Faculty

11. Op. Cit.

of Architecture for twelve years, and he had published significant architecture writings, like "*O Problema da Casa Portuguesa*" (1945).[12]

He also had already attended the CIAM congresses in Hoddesdon, in 1951, in Aix-en-Provence, in 1953, in Dubrovnik, in 1956, and in Otterlo, in 1959.[13] In Dubrovnik, he presented collectively, with Viana de Lima, João Andresen, Arnaldo Araújo and Octávio Lixa Filgueiras the project for a rural community, and in Otterlo, two of his most recent projects, the Vila da Feira market and the House in Ofir,[14] that were positively appraised in both situations.[15]

Figure 2. *Ramalde Housing Neighbourhood*
Source: Rui Seco, 2009.

For these reasons, it is somehow surprising the statement Távora makes in his report that he could not consider himself exactly a participant in the Royaumont meeting, "*given that, not having presented any work, a certain natural shyness prevented me from speaking in public*", having then remained taking part as an observer, which "*permitted me to look from the outside the significance of the debate and the presented work.*"[16]

This purely honest and transparent, slightly disconcerting, statement, undoubtedly also reflected other circumstances of Távora's singular path.

12. Távora, Op. Cit (1947).

13. As reported Ferrão in "Tradition and Modernity in Fernando Távora's work 1947/1987," in *Fernando Távora* (ed.) Luiz Trigueiros (Lisbon: Editorial Blau, 1993).

14. Bandeirinha, "Fernando Távora: Permanent Modernity," in *Fernando Távora Permanent Modernity* (ed.) Bandeirinha (Guimarães: Associação Casa da Arquitectura, 2012).

15. The positive impact of these projects among the young generation in the meeting is described by Risselada in "Fernando Távora in the context of Team10," 2012.

16. Távora, Op. Cit.

From the mid 1950's, Távora had participated in the '*Inquérito à Arquitectura Popular em Portugal*', an architectural survey carried out in Portugal by the Architects' Association in the search for a true Portuguese architecture, in which he recognized rural architecture of the northwest region of the country, gaining a deep knowledge of the popular building types, techniques and materials, and of the relation between settlements, orography and the natural conditions of the territory.[17]

This was an important experience for the architect, guiding him in the response to both collective and individual questions, that he had formulated since '*O Problema da Casa Portuguesa*', and triggering new developments in his practice, such as the two buildings he presented in Otterlo and others like the Tennis Pavilion in Quinta da Conceição, in Matosinhos, and the Seia Gas Station, projects in which he explored the reuse of modern materials and new construction technologies, developing a sense of synthesis with the ancient modes of building that redefined his architecture and its grammar.[18]

Another important stage for Fernando Távora was his extensive trip through the United States, Central America and Asia, in 1960, months after the Otterlo meeting and the declaration of the end of the CIAM. Backed by a scholarship, this expedition had the purpose to visit the main North-American architecture schools, where Távora contacted important professors such as Louis Khan, Paul Rudolph or Kevin Lynch, and enabled him to visit architecture, which he does thoroughly all over his route – Mies, Gropius, Khan, S.O.M., Lloyd Wright -, describing and registering his impressions in a travel journal. From the U.S., he heads to Mexico, crosses the Pacific and heads to Japan, to attend the World Design Conference in Tokyo, returns through the Middle East, Egypt and Greece.[19] Frank Lloyd Wright particularly impresses him, more than other modernist masters, but he also observes traditional architecture and the distinct ways of living, ancient and contemporary, of people in diverse parts of the world, recognizing and reflecting upon the differences.

The contact with these distant and contrasting realities will shape Távora's vision, changing his perception of the Portuguese context, in which he develops his work, and of the complexity of reality - as he puts it in his text - in a broader sense.

His architectural work of the following years reflects these experiences, with the development of an approach based on the context - the particular characteristics of each situation - and a rich cultural knowledge, leading to the development of specific, unique, design solutions.

17. The "Inquérito à Arquitectura Popular em Portugal" was performed between 1955 and 1960. Fernando Távora coordinated Rui Pimentel and António Menéres in the team that surveyed Minho, the northeastern area of Portugal.

18. Projects presented in L. Trigueiros (ed.) *Fernando Távora* (Lisbon: Editorial Blau, 1993).

19. About the 1960 World Design Conference in Tokyo, see: T. Iguchi, "Reconsideration of the World Design Conference 1960 in Tokyo and the World Industrial Design Conference 1973 in Kyoto: Transformation of design theory," in *5th International Congress of International Association of Societies of Design Research* (Tokyo Kouto-ku: Sibaura Institute of Technology, 2013). Projects presented by: Trigueiros, *Fernando Távora*, 1993.

Távora seeks his path that he follows on his own. As for his presence with Team X, he does not return to the several meetings that take place in the following years.[20]

Responding through Practice

In the report about the Royaumont meeting, Távora stated that he found deeply significant the lack of an attempt to obtain conclusions.

This shows in fact a new context, a different framework that architects faced at the time and that would endure. Modernity would not take a unique course, heading to the development of common answers for all situations, people and geographies, it would pursue different paths, and that began to be perceived and acknowledged. That was the deep significance that Távora realized.

His practice would reflect his perspective, "*from a deep and vital immersion in reality*" as Alexandre Alves Costa wrote, "*without producing new models, each work represent[ing] a course of reflexion which from the site includes the whole city and on the site establishes the form, each form*".[21] With this perspective, integrating architecture in a broader order of the world, as part of a process immersed by cultural awareness, Távora created masterpieces of architecture, like the Santa Marinha Hotel, in Guimarães, or the Rua Nova House, also in Guimarães, the Law School Auditorium, in Coimbra, and the Casa dos 24, in Porto, among other work.

He also took a prominent role in redefining the way of intervening in Portuguese historic city centres. His work in Barredo, a degraded neighbourhood in Porto, from 1969 onwards, preventing an intervention that would impose a radical transformation through the demolition of the urban fabric to create wider public spaces and new buildings, and promoting the rehabilitation of the existing constructions and the permanence of the residents, was fundamental for developing a paradigm shift, towards the valorisation of the ancient city and its structures, the importance of inhabitants and of their sense of belonging and community.

This methodology would be replicated, under his guidance, in Guimarães, a few years later, resulting in a well-succeeded restoration of the old city urban fabric that constituted a reference in Portuguese urban intervention and had a positive influence in the practises used in the whole country, such as the creation of local technical offices, integrating architects, social workers and other technicians, who maintained direct contact with the inhabitants involving them in regeneration processes based on continuity and rehabilitation.

20. Until 1977, fourteen meetings would take place, seven of them still in the 1960s: Risselada and D. Van den Heuvel, *Team 10 Meetings: List of CIAM Congresses (1947-1959) and Team 10 Meetings (1960-1981)*, 2006.

21. A. A. Costa, *Dissertação para Concurso de Habilitação para Obtenção do Título de Professor Agregado (…) Memórias do Cárcere, Desastre de Sofia ou Memórias de um Burro* (Porto: ESBAP, 1982).

New urban extension was not a field of work which Távora explored in this period as much as architecture and rehabilitation of historic centres. For lack of interest or opportunity, he did not pursue the development of new urban solutions created from scratch. He designed a study for Castelo do Queijo, in Porto, in 1960, and ten years later a study plan for Matosinhos, both of them not implemented, and not as innovative as his other work of the time.

Creating all-new solutions, all-new city, was not the first interest of Fernando Távora, whose vision and methodology were shaped by the idea of "*maintaining an architectonic order with universal value"* integrating "*the particular and circumstantial architectonic object and (…) its immediate relationships*", using again Alves Costa's interpretation.[22]

A Turning Point in Portuguese City

In the European context, Portugal had a late industrialization process, mainly from the 1950's on, which quickly changed the country's economy and demography, concentrating the population in the industrialized cities of the coastal strip, which was not matched by the urban development and the construction of housing. This generated a severe lack of dwelling in the major cities, estimated in several thousands of houses in the 1960's and 1970's.

In a time when in other European countries the post-war reconstruction had already been accomplished and the adopted modernist urban models were criticised and no longer considered an optimal answer to urban growth, this scarcity was one of the most serious problems of Portuguese society. Contrarily to their European colleagues, Portuguese architects had to respond to this absolute necessity and to create housing and new urban fabric, facing the lack of valid models, without conclusions, in "*a time of search and doubt*", and in a "*complex, disturbing, unsettling world"*, recovering Távora's words in his Royaumont testimony.[23]

In this context of uncertainty, a series of new urban design experiences was developed in Portugal, producing solutions for new city extensions which a number of historians and critics that analysed this period, like Paulo Varela Gomes, José Manuel Fernandes and José Lamas consider to be examples of a new urbanism, based on the return to the city, reinventing urban spaces considered more suitable to promote social interactions between residents, like the street, the square, the block, the boulevard, the '*ilha*', the '*vila operária*' and the patio.[24]

In the mid 1970's, after the 25th April 1974 Revolution, a large number of neighbourhoods and collective housing settlements was developed all over the

22. Costa, Op. Cit.

23. Távora, Op. Cit.

24. From these experiences José Manuel Fernandes emphasizes the "return to the city" (J. M. Fernandes, "Da Afirmação da Geração Moderna aos Novos Territórios da Intervenção Arquitectónica 1958-74," in *Portugal Contemporâneo* (ed.) António Reis (Lisbon: Publicações Alfa, 1990)); José Lamas highlights the social purpose in the reinvention of urban spaces (Lamas, Op. Cit., 1993).

country, especially in the metropolitan areas of Lisbon and Porto, involving a significant pool of teams of architects, working directly with the residents on housing programmes that sought to respond quickly and straightforwardly to the massive housing problems.[25]

Before this overall shift of methodology and design approaches, some neighbourhoods had already showed a distinctive conception, a possibility of *a synthesis*, as Távora put it, on urban design after the drop of the modernist models. The Alto do Restelo neighbourhood, by Nuno Teotónio Pereira, Nuno Portas, Pedro Viana Botelho and João Paciência and the Telheiras housing settlement, by Pedro Vieira de Almeida with Augusto Pita, both in Lisbon, are two relevant examples of new conceptualizations of urban space.[26]

According to the architecture historian Paulo Varela Gomes, however, Álvaro Siza was the first architect to develop a new concept of city design, which turned the page to a new decade, in a small group of houses in Caxinas, Vila do Conde.[27]

From Porto as Fernando Távora and ten years younger, Álvaro Siza had been his pupil in the School of Fine Arts, where he studied architecture, and then had worked in his studio for three years, developing a strong relation with him, both personal and professional, that remained for life.[28] Siza's early works, like Quinta da Conceição and the Boa-Nova tea house, were clearly influenced by Távora, whose perspective and methodology would permanently influence him.

The project for Caxinas, developed by Álvaro Siza with António Madureira, Francisco Guedes de Carvalho, Francisco Lucena and Adalberto Dias from 1970 to 1972 (Figure 3), was the first of a set of small neighborhoods that Álvaro Siza designed in the beginning of the 1970s, developing distinct lay-outs and space conceptions for each one.

Caxinas replaced "*the obsession with internal space and building materials*" by the "*concern with the shape of urban space, in the manner of street and (small) square*."[29]

25. A specific housing program was created by the new government to rapidly answer to the lack of dwelling, the SAAL (Serviço Ambulatório de Apoio Local) giving origin to new settlements all over the country: Bandeirinha, *O Processo SAAL e a Arquitectura no 25 de Abril de 1974*, 2007).

26. Alto do Restelo (1972-75) and Telheiras (1973-74) were promoted by Lisbon Municipality through EPUL (Empresa Pública de Urbanização de Lisboa), a public housing company.

27. As stated by Gomes, "Arquitectura, os Ultimos Vinte e Cinco Anos," 1995, 547-577.

28. Álvaro Siza Vieira, born in 1933 in Matosinhos, near Porto, studied architecture at Escola Superior de Belas-Artes do Porto [School of Fine Arts of Porto], where Fernando Távora taught, from 1949 to 1955, being his student. From 1955 to 1958 Siza worked in Távora's studio, where he began the project for the Boa-Nova tea house that he would carry on developing on his own. Their friendship would develop, being colleagues in architecture teaching, travelling, working and thinking on architecture, their role in society and as professionals. In the 1990s, they joined their studios, along with a few other colleagues, in the same building, designed by Siza in Aleixo street, in Porto area of ancient Foz.

29. Varela Gomes, Op. Cit.

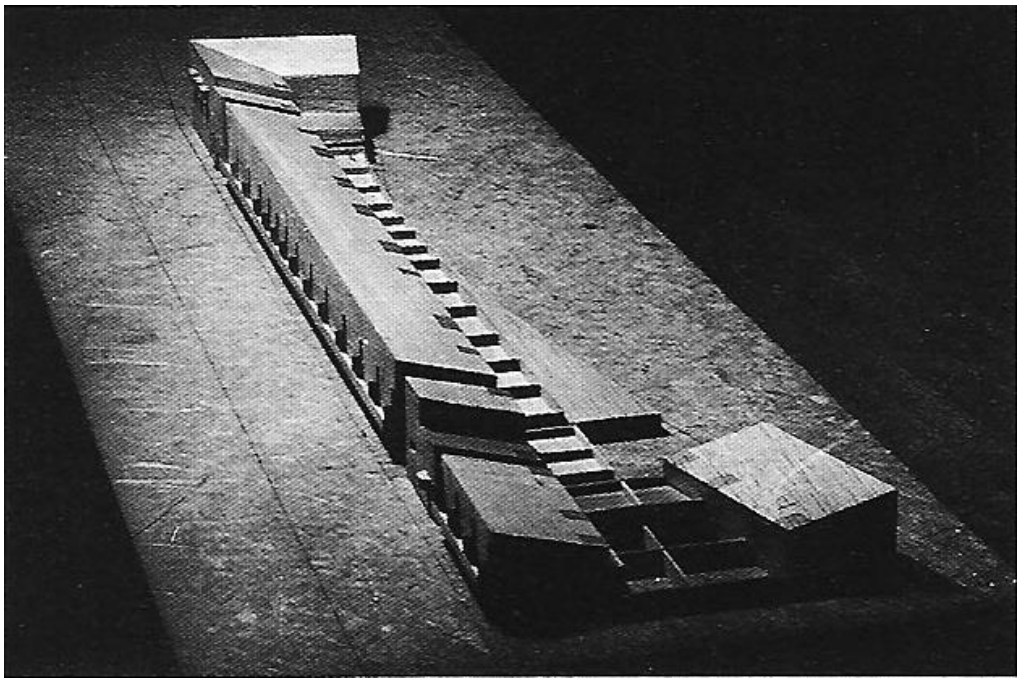

Figure 3. *Caxinas Model*
Source: Álvaro Siza`s Archive, 1970.

Under the inspiration of Robert Venturi's 'Complexity and Contradiction in Architecture', Siza defines a "*new way of looking at the relationship between architecture and urban space*" and "*a radical architectural grammar revolution*", sustains Varela Gomes.[30]

The rethinking and reutilization of the cities' traditional urban space and typologies is fundamental in that new focus on urban shape. In Caxinas, Siza designs a single quarter, which relates directly with the streets, accompanying the space with the buildings façades, creating continuity in mass, and the whole shape of the block, somewhat organic and complex, culminates in the front that faces a small square on the top south (Figure 4).

The street, the block and the square are employed as the basic elements for composing urban fabric, and the buildings are implanted along, in order to format public space, instead of isolated and freely oriented, as modernism advocated. It's the morphology of urban space that prevails, and no longer the hygienist's concern for the sun, the air and the greenery.

30. Varela Gomes, Op. Cit.: In an international meeting in Barcelona, Álvaro Siza contacted with the ideas of Robert Venturi (and his recently published "Complexity and Contraction in Architecture". R. Venturi, *Complexity and Contradiction in Architecture* (New York: The Museum of Modern Art, 1966)), which influenced his following architecture work, according to: D. Tavares, *Da Rua Formosa à Firmeza* (Porto: FAUP Publicações, 1985).

Figure 4. *View from the Top South of the Caxinas Quarter*
Source: Rui Seco, 2010.

Inspired by many characteristics and qualities of the ancient, pre-modernist city, this shift was not a mere and simple reutilization of old concepts, but a reassessment informed by the contemporary standards and the knowledge about the advances of the modernist period and of its architectonic and social achievements. Each of the elements inherited from the traditional city was reconsidered and redesigned from its foundation.

Siza goes even beyond that and, in Caxinas - as in his following projects like Bouça or São Vítor, in Porto, and Malagueira, in Évora - has major attention to the specific characteristics of the location, the contact with the surrounding urban fabric, orography, landmarks and significant elements, from his own understanding and interpretation of the territory.[31]

The scale of the urban public space and of the buildings conceived in the intervention is one of the major qualities of Siza's urban design. The Caxinas plan

31. The plans for Bouça (Porto, 1973-77, with António Madureira, Francisco Guedes de Carvalho, Adalberto Dias, Miguel Guedes de Carvalho, Eduardo Souto de Moura, Maria Manuela Sambade, Nuno Ribeiro Lopes and José Paulo dos Santos) and S. Vítor (Porto, 1974-77, with Domingos Tavares and Francisco Guedes de Carvalho, Adalberto Dias, Eduardo Souto de Moura, Maria Manuela Sambade, Edgar Castro, Graça Nieto, Teresa Fonseca) were developed within the existing city and only partially built. Malagueira (Évora, 1977-95, with Nuno Ribeiro Lopes, Adalberto Dias, Miguel Guedes de Carvalho, Eduardo Souto de Moura, Maria Manuela Sambade, Bruno Marchand, José Paulo dos Santos, Jean Gèrard Giorla, Chantal Meysman, Luiza Brandão, Luiza Penha and José Luís Carvalho Gomes) was a new urban expansion, creating a much more extensive area of urban fabric, planned and completed. Projects presented by: Trigueiros, *Álvaro Siza: 1954-1976* (Lisbon: Editorial Blau, 1997). See also: E. Molteni, *Álvaro Siza: Barrio de la Malagueira, Évora* (Barcelona: Edicions UPC, 1997). And: J. Rodrigues, *Álvaro Siza: Obra e Método* (Porto: Livraria Civilização Editora, 1992).

adapts to the site, does not impose itself in it, it creates an urban space that suits the semi-rural nature of a fishermen's village in the context of the early 1970's northern Portugal. It is in fact based in this perception, formed with a deep knowledge of reality, and in the intention to establish continuity, in space and in time.

In that sense, it is in its essence anti-modernist, as it does not intend to create a new reality, but to produce permanence and connection. It does not reject, however, the modernist legacy, from which inspires its architectural grammar. It absorbs and assimilates all cultural elements, ancient and contemporary as also local and global, to produce a complex and integrated design.

This approach that Álvaro Siza develops in Caxinas and pursues in his following plans can be correlated to the manner Fernando Távora developed his practice in the years that followed his presence at Royaumont: a strong attention to the context and the specific characteristics of each location and circumstance, backed by a solid cultural awareness, that assists the creation of architectonic solutions conscious of its transience, as transformations of the territory that superimpose each other continuously over time. Siza transposes this methodology to the urban scale, accepting its complexity and lack of universality, of general synthesis.

From each site, he creates a design that matches the circumstances, in accordance to its environment, but simultaneously produces order and regulation, not only in the buildings but also in urban space. Balance and adequacy of scale in the composition of urban fabric are major achievements of Siza's urban design.

Other neighbourhoods designed from the 1970s on were also significant in the transition of the Portuguese city breaking away from modernism. The SAAL process, a housing programme conducted by the Portuguese new government after the 1974 revolution was a laboratory for the construction of dwelling, experimenting innovative solutions of urban organization, throughout the country.[32]

Organized in a decentralised and unbureaucratic basis, it put architects, students and other technicians directly in contact with local residents, organized in neighbourhood committees, listening to their expectations and requirements and presenting them directly their projects for housing. This type of organization, implemented with the guidance of architect Nuno Portas, Secretary of State for Housing, is similar to the one that Fernando Távora created in Barredo a few years before.

Many of the neighbourhoods created in the SAAL programme were interesting experiences in the creation of urban tissue, though being very different from each other in their design, scale and urban principles. Architects like Raul

32. During the post-revolutionary period (PREC) the SAAL (acronym for 'Serviço Ambulatório de Apoio Local' - Local Mobile Support Service) was a housing programme that, from 1974 to 1976, implemented all over the Portuguese country dozens of housing settlements. It had an abrupt ending, due to the sudden political and governmental changes, leaving the construction of most of the housing complexes incomplete. About this program, see: Bandeirinha, Op. Cit (2002); Portas, "O Processo SAAL, entre o Estado e o Poder Local," in *Revista Crítica de Ciências Sociais* 18/19/20 (1986): 636-644; M. Coelho, "Uma Experiência de Transformação no Sector Habitacional do Estado: SAAL 1974-76," in *Revista Crítica de Ciências Sociais* 18/19/20 (1986): 619-634.

Hestnes, Manuel Vicente, Gonçalo Byrne, Manuel Taínha, Artur Rosa, Pedro Ramalho, Sérgio Fernandez or Fernando Távora himself designed some of these neighbourhoods.

Other programmes like the Fundo de Fomento da Habitação (FFH) also developed noteworthy solutions for housing settlements following the SAAL example, adopting more direct and practical methods than the centralised and heavy planning processes they used in the period before the Revolution. Vítor Figueiredo, José Charters Monteiro, Bartolomeu Costa Cabral, Maurício Vasconcelos or Justino Morais were some of the architects involved in several housing projects for different parts of the country, notably in the most industrialized cities.[33]

These urban housing complexes constituted, in many different ways, a turnaround in the Portuguese city. A more direct and inclusive approach to the planning process, involving inhabitants and local planning units, a new strategy in the relation with the existing city and the testing of innovative design solutions for the urban fabric were significant advances from the sluggish previous response in dwelling construction and urban planning processes.

Multiple Synthesis: A Conclusion

Returning from Royaumont, Fernando Távora called for a future synthesis, as he realized the fundamental shifts that affected the context of architectural and city production.

In the following years, no such response would be presented, and the idea of a consensus about the future of city and architecture faded away. CIAM ended, the Team 10 would focus on specific issues and research ideas, distant from common practice, and distinct generations of architects and urban planners would remain orphans of references and common ground in which to develop their practice. A new wave of writings would analyse the city, demonstrating its diversity and complexity, by the hand of authors like Aldo Rossi, Jane Jacobs, Christopher Alexander or Kevin Lynch, among others, widening the theoretical field about architecture and the city, and connecting it with other fields of knowledge and with the society, for whom they are destined.[34]

33. The Portuguese government programme (Fundo de Fomento da Habitação – FFH) was before the democratic Revolution a cumbersome process with few tangible results; the example of the SAAL programme led the FFH to change its methodology and swiftly develop new housing settlements in several urban áreas, such as Lisbon, Almada, Setúbal and Aveiro. See: Seco, "Requiring City: FFH and SAAL in Portuguese Revolutionary Period," in *74-14 SAAL and Architecture* (ed.) Bandeirinha, Sardo and Moniz (Coimbra: Edarq CES Fundação de Serralves, 2015).

34. A. Rossi, *L'Architettura della Città* (Venezia: Marsilio Editori, 1966); J. Jacobs, *The Death and Life of Great American Cities* (New York: Random House, 1961); C. Alexander, "A City is Not a Tree," *Architectural Forum* 122, no. 1 (April/May 1965); K. Lynch, *The Image of the City* (Cambridge: MIT Press, 1960).

These evolutions did not set a context favourable to the attainment of the synthesis that Távora called for, but to the individual maturation of ideas that supported the work of each professional.

Five years before, Vítor Figueiredo, another Portuguese architect that actively worked on housing and urban complexes in the same period,[35] wrote that "*To serve reality is not to wholly reject the undeniable contribution of rationalism and the real asceticism it represents for architecture; it is to take a courageous searching position; disconcerting in the acceptance that each theme has its own character, its own specific problems, its own expression; it is to consider man within its human completeness."*[36] This declaration corroborates and complements Távora's perspective and methodology, anchored in the assimilation and incorporation of multiple inputs into architecture, accepting History and the superposition of periods in time, the modernist period as the ones before, part of the continuous transformation of reality.[37]

"*For today's architect only an 'experience criterion' is rightful; a criterion that does not refuse the inherent nature of the real – which, in fact exists but only as subject for essays, searches that more or less oriented but never towards aprioristic solutions and necessarily abstract – trying to serve and orient it, humbly but with the certainty of not having mistaken the course taken."* further writes Vítor Figueiredo. As Távora, he focuses on reality and its conditions as the foundations to the work of the architect, informed by his own culture, sensibility and awareness. The 'experience criterion' can here be understood as the openness and attention to the multiple factors that inform the specific problem that the architect is called to cope with in the particular experience of a project. The physical aspects, like orography, sun exposure, positioning in the urban fabric, area and volumetry, as also history, from an eclectic perspective, tradition, popular know-how and erudition, and even the social and anthropological values of architecture, are part of this experience.

Far from an idea of a conclusion similar to the one of the *Charte d'Athénes* era, as Távora envisaged, these findings conducted to the development of different responses, through practice, specific to each case, without the aspiration to create universal solutions.

The difficulty of establishing a synthesis opens up the perspective that architecture is not aimed at creating a universal solution to common problems, but rather an individual response, the best possible response, to the specific conditions of the project and its particular situation.

The methodology that Távora adopted reflected all this insight, that he carried into his architecture with utmost coherency, accepting the doubt and search of the time in which he worked.

35. Vítor Figueiredo, six years younger than Fernando Távora, also completed his architecture studies in Porto; he worked in numerous housing projects in the 1960s and 1970s, mainly in the Lisbon metropolitan area.

36. Vítor Figueiredo in 1957 (V. Figueiredo, *Memória Descritiva do Concurso para Obtenção de Diploma de Arquitecto*, in *RA* 0 (Porto: FAUP publicações, 1987)), quoted by Costa (Op. Cit., 1993).

37. Vítor Figueiredo, Id.

Álvaro Siza transposed to the city this approach, embedding his plans with his own interpretation about urban setting, landscape, legacy, community and architecture, and the complexity and contradictions inherent to the practice in a period of uncertainty. Focusing in the site and its characteristics, integrating with acute sensitivity the fundamental morphological elements of the ancient city, the 'asceticism' inherited from rationalism, a 'radical architectural grammar' and the emphasis in the public space shape, with a notable sense of balance.

From Távora, Siza retained the value of continuity in the process of improvement and renovation of the environment and the importance of involving users and residents, but he furthermore inherited the sense of need for the maximum coherence in each new action towards the renewal of reality.

As Álvaro Siza, other Portuguese architects also developed relevant contributions for the city and the revision of modernist urban models and ideas, such as Nuno Teotónio, Pedro Vieira de Almeida, Raul Hestnes, Vítor Figueiredo, José Charters Monteiro, among others, coping with the absence of major references and the immense task of creating dwelling for hundreds of thousands of families. Their different design solutions, created according to their influences, culture and experience, and to site-specific conditions that they were sensitive to, are consistent with Távora's realization that a single conclusion was unachievable for architecture in face of a deeply complex world.

As Távora did in his own work, each architect created specific syntheses, using their knowledge and principles to inform the projects, new layers in the transformation of reality. Modernity trailed different paths, allowing itself to be contaminated by reality, and no longer aspired to produce an egalitarian and idealized world.

Returning to the request for a synthesis, it can therefore be understood that the answer to Távora, in terms of city, emerged through practice, not by the elaboration of a new synthesis but the development of multiple syntheses, each one informed by the specific conditions of its context.

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Bibliography

Alexander, C. "A City is not a Tree." *Architectural Forum* 122, no. 1 (April/May 1965): 58-62.

Bandeirinha, J. A. *O Processo SAAL e a Arquitectura no 25 de Abril de 1974* [The SAAL Process and Architecture on 25 April 1974.] Coimbra: Imprensa da Universidade de Coimbra, 2007.

____. "Fernando Távora: Permanent Modernity." In *Fernando Távora Permanent Modernity*. Edited by José António Bandeirinha. Guimarães: Associação Casa da Arquitectura, 2012.

Barata, F. "La Regla y la Excepción. Dos Proyectos de Távora para Porto" [The Rule and the Exception. Two Távora Projects for Porto.] *DPA Departament de Projectes Arquitectònics UPC* 14 (1998): 54-63.

Coelho, M. "Uma Experiência de Transformação no Sector Habitacional do Estado: SAAL 1974-76" [An Experience of Transformation in the Public Housing Sector: SAAL 1974-76.] *Revista Crítica de Ciências Sociais* 18/19/20 (1986): 619-634.

Costa, A. A. *Dissertação para Concurso de Habilitação para Obtenção do Título de Professor Agregado (…) Memórias do Cárcere, Desastre de Sofia ou Memórias de um Burro* [Dissertation for Qualification Contest for Obtaining the Title of Aggregate Professor (...) Memoirs of Prison, Sophie's Troubles or Memoirs of a Donkey]. Porto: ESBAP, 1982.

____. "Caption for a Drawing by Nadir Afonso." In *Fernando Távora*. Edited by Luiz Trigueiros. Lisbon: Editorial Blau, 1993.

Curtis, W. J. R. "Memória e Criação: O Parque e o Pavilhão de Ténis de Fernando Távora na Quinta da Conceição 1956-60" [Memory and Creation: Fernando Távora's Tennis Park and Pavilion at Quinta da Conceição 1956-60.] In *Fernando Távora Permanent Modernity*. Edited by José António Bandeirinha. Guimarães: Associação Casa da Arquitectura, 2012: 26-37.

Fernandes, E. *A Escolha do Porto: Contributos para a Actualização de uma Ideia de Escola*. [The Choice of Oporto: Contributions to Update the Idea of a School.] PhD Thesis. Portugal: University of Minho, 2011.

____. "The Tectonic Shift in Fernando Távora's Work in the Post-CIAM Years." In *Revisiting Post-Ciam Generation: Debates, Proposals and Intellectual Framework Proceedings.* Edited by Nuno Correia, Maria H. Maia and Rute Figueiredo. Porto: CEAA/ESAP-CESAP, 2019: 120-134.

Fernandes, J. M. "Da Afirmação da Geração Moderna aos Novos Territórios da Intervenção Arquitectónica 1958-74" [From the Establishment of the Modern Generation to the New Territories of Architectural Intervention 1958-74.] In *Portugal Contemporâneo*. Edited by António Reis. Lisbon: Publicações Alfa, 1990.

Ferrão, B. "Tradition and Modernity in Fernando Távora's Work 1947/1987." In *Fernando Távora*. Edited by Luiz Trigueiros. Lisbon: Editorial Blau, 1993.

Figueiredo, V. *Memória Descritiva do Concurso para Obtenção de Diploma de Arquitecto* [Explanatory Note for the Obtainment of Graduation in Architecture.] In *RA* #0. Porto: FAUP Publicações, 1987.

Frampton, K. *Modern Architecture: A Critical History*. London: Thames & Hudson, 2007, 313-327.

Iguchi, T. "Reconsideration of the World Design Conference 1960 in Tokyo and the World Industrial Design Conference 1973 in Kyoto: Transformation of Design Theory." In *5th International Congress of International Association of Societies of Design Research*. Tokyo Kouto-ku: Sibaura Institute of Technology, 2013. DOI: https://bit.ly/2qGJDjs.

Jacobs, J. *The Death and Life of Great American Cities*. New York: Random House, 1961.

Lamas, J. R. G. *Morfologia Urbana e Desenho da Cidade* [Urban Morphology and City Design.] Lisbon: F.C.Gulbenkian/J.N.I.C.T., 1993.

Lynch, K. *The Image of the City*. Cambridge: MIT Press, 1960.

Mendes, M. "Fernando Távora: O meu caso" [Fernando Távora: My Case.] In *Fernando Távora Permanent Modernity*. Edited by José António Bandeirinha. Guimarães: Associação Casa da Arquitectura, 2012.

Molteni, E. *Álvaro Siza: Barrio de la Malagueira, Évora* [Álvaro Siza: Malagueira Neighbourhood, Évora.] Barcelona: Edicions UPC, 1997.

Portas, N. "O Processo SAAL, entre o Estado e o Poder Local" [The SAAL Process, between the State and Local Government.] *Revista Crítica de Ciências Sociais* 18/19/20 (1986): 636-644.

____. "A Arquitectura da Habitação no Século XX Português" [The Architecture of Dwelling in Portuguese 20th Century.] In *Arquitectura do Século XX: Portugal*. Edited by Annette Becker, Ana Tostões and Wilfried Wang. Lisbon: Prestel, 1997.

Portas, N. and M. Mendes. *Arquitectura Portuguesa Contemporânea: Anos Sessenta/Anos Oitenta* [Portuguese Contemporary Architecture 1960s/1980s.] Porto: Fundação de Serralves, 1991.

____. *Portugal: Architecture 1965-1990*. Paris: Editions du Moniteur, 1992.

Portela, C. "Perfil de Fernando Távora" [Profile of Fernando Távora.] *DPA Departament de Projectes Arquitectònics UPC* 14 (1998): 14-17.

Risselada, M. "Fernando Távora in the context of Team10." In *Fernando Távora Permanent Modernity*. Edited by José António Bandeirinha. Guimarães: Associação Casa da Arquitectura, 2012.

Risselada, M. and D. Van den Heuvel. *Team 10 Meetings: List of CIAM Congresses (1947-1959) and Team 10 Meetings (1960-1981),* 2006. DOI: http://www.team10 online.org/.

Rodrigues, J. *Álvaro Siza: Obra e Método* [Álvaro Siza: Work and Method]. Porto: Livraria Civilização Editora, 1992.

Rossi, A. *L'Architettura della Città* [The Architecture of the City.] Venezia: Marsilio Editori, 1966.

Seco, R. "Antes do Recomeço: a Cidade nas Revistas Arquitectura e Binário" [Before a New Beginning: City and in the Journals *Arquitectura* and *Binário.*] *Cidades, Comunidades e Territórios* 32 (2016): 133-143.

____. "Requiring City: FFH and SAAL in Portuguese Revolutionary Period." In *74-14 SAAL and Architecture*. Edited by J. A. Bandeirinha, D. Sardo, G. C. Moniz. Coimbra: Edarq CES Fundação de Serralves, 2015.

Tavares, D. *Da Rua Formosa à Firmeza* [From Formosa Street to Firmeza]. Porto: FAUP Publicações, 1985.

Távora, F. "O Problema da Casa Portuguesa" [The Problem of the Portuguese House.] *Cadernos de Arquitectura* #1. Lisbon: Editorial Organizações, 1947.

____. "O Encontro de Royaumont" [The Royaumont Meeting.] *Arquitectura* 79 (1963): 1.

____. *Da Organização do Espaço* [The Organization of Space.] Porto: FAUP Publicações, 1996.

Távora, J. B. "Tradição e Modernidade na Obra de Fernando Távora 1947/1987." In *Fernando Távora*. Edited by Luiz Trigueiros. Lisbon: Editorial Blau, 1993.

Trigueiros, L. *Fernando Távora*. Lisbon: Editorial Blau, 1993.

____. *Álvaro Siza: 1954-1976*. Lisbon: Editorial Blau, 1997.

Varela Gomes, P. "Arquitectura, os Ultimos Vinte e Cinco Anos" [Architecture, the Last Twenty Five Years.] In *História da Arte Portuguesa*. Edited by Paulo Pereira. Lisbon: Círculo de Leitores, 1995, 547-577.

Venturi, R. *Complexity and Contradiction in Architecture*. New York: The Museum of Modern Art, 1966.

Vitale, D. "Fernando Távora: Correspondences and Fictions." In *Fernando Távora Permanent Modernity*. Edited by José António Bandeirinha. Guimarães: Associação Casa da Arquitectura, 2012.

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An Empirical Validation to a Process-based Model for Teaching Architectural Design, with Reference to Design Studio One

By Sherif Elfiki[*]

It is widely agreed that 'Design Studio' is central to architectural education. Therefore, many process-based models have been developed for teaching architectural design. One of these models was developed by the Author.[1] *Its main challenge was to regulate the amount of information students need to handle in their first studio, yet within a sound integrated design process. The model is described in two phases. The first phase comprises six steps that set the medium for gradual and cumulative learning about the principles of architectural design. The second phase comes in four steps, which aim at introducing students to a systematic design process that they can pursue in their future work. The above model has been in use for several years now, the present paper is meant to be one step towards its empirical validation. To realise this objective, the study employs a purpose-designed questionnaire survey, which involves a sample (113 participants) of former 'Design I' students and co-tutors – who took part in the application of this model. The questionnaire examines the extent to which every step in the model has responded to the aforementioned challenges. Then, descriptive analyses and analyses of variance are applied to the data gathered using SPSS ver. 22,*[2] *to identify the points of strength as well as the areas of potential improvement in the studied model, as addressed by different respondent groups. It is hoped that the findings of this study would contribute to further students' development, hence promote better architectural education and practice.*

Introduction

Schools of architecture around the world lay special emphases on 'design' studios. This is probably because the studio is where students are expected to put together the outcome of all their architectural education; i.e. functional, climatic, structural, aesthetic and symbolic constraints.[3]

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1. S. Elfiki, "Towards a Process-based Model for Teaching Architectural Design, with Reference to Design Studio One," *The International Journal of Engineering Education* 29, no. 4 (2013): 1037-1064.

2. Statistical Package for Social Sciences – Version 22.

3. M. Bunch, *Core Curriculum in Architectural Education* (San Francisco: Mellen Research University Press, 1993); O. Demirbas and H. Demirkan, "Privacy Dimensions: A Case Study in the Interior Architecture Design Studio," *Journal of Environmental Psychology* 20, no. 1 (2000): 53-63; Demirbas and Demirkan, "Focus on Architectural Design Process through Learning Styles," *Design Studies* 24, no. 5 (2003): 437-456; N. Teymur, Architectural Education: Issues in Educational Practice and Policy (London: Question Press, 1992); B. Uluoglu, "Design Knowledge Communicated in Studio Critiques," *Design Studies* 21, no. 1 (2000): 35-58.

Amongst other design challenges, the multiplicity and simultaneity of these forces make it quite challenging for students in their very first design experience; i.e. 'design studio one'. Therefore, tutors need to devise means for realising the studio objectives within strict academic timeframes, yet without overwhelming students with an unmanageable amount of information – with all the negative consequences this might entail.[4]

Towards this objective, a process-based model for teaching 'Architectural Design I' was developed earlier by the Author. The model was meant to realise two principal aims: first, regulating the amount of information delivered to students about architectural design principles in reasonable yet integrated chunks, not to overlook their holistic interdependence; and second, undertaking a systematic design process to learn about the sequence they may follow in their future work.[5]

Since the model is being in-application for several years in the Department of Architectural Engineering and Environmental Design – Arab Academy for Science, Technology and Maritime Transport in Cairo, Egypt, it is important to find out about its points of strength as well as the areas of potential improvement. Therefore, the present study is meant to be a step towards the empirical validation of this model.

Methodology

The present study is meant to be an empirical validation to a process-based model for teaching 'Architectural Design 1'. Therefore, it is based on two main pillars. The first part introduces the model in-study briefly, together with its theoretical backgrounds. Then the empirical part starts by explaining the process of questionnaire design, sampling, pilot testing, means of communication and methods for quantitative statistical analyses. The outcome of the survey analyses is then discussed in the light of preceding literature to learn about the points of strength and the areas of potential development in the studied model.

4. H. Butcher, *Meeting Managers' Information Needs* (London: ASLIB, 1998); P. Herbig and H. Kramer, "The Effect of Information Overload on the Innovation Choice," *Journal of Consumer* 11, no. 2 (1994): 45-54; G. Miller, "The Magical Number Seven, Plus or Minus Two: Some Limits on our Capacity for Processing Information," *Psychological Review*, 63, no. 2 (1956): 81-97; A. Rajabzadeh, F. Nejadirani, R. Soroodian, R. Kermani, "Informational Overload; Roots and Consequences," *Australian Journal of Basic & Applied Sciences* 5, no. 12 (2011): 353-359; A. Stanley and P. Clipsham, "Information Overload - Myth or Reality," *IEEE Colloquium Digest* 97, no. 340 (1997): 1-4; O. Tzeng, "Amount of Information and Intralist Similarity in Paired-associates Learning," *Journal of Experimental Psychology* 91, no. 2 (1971): 227-232; J. Ruff, *Information Overload: Causes, Symptoms and Solutions* (Harvard Graduate School of Education, 2002), 1-13.

5. Ruff, *Information Overload: Causes, Symptoms and Solutions*, 2002, 1.

The Model

The course under investigation is taught following a 'project-based studio' approach that is widely commended in literature.[6] It complies with Dewey's 'experiential learning' philosophy[7] that emphasises experience, experimentation and purposeful learning towards the acquisition of cumulative knowledge. It is also a reflection to 'learning by doing' pedagogy.[8]

The model in-study is described in two phases. The first phase comprises six steps that aim at the gradual learning of architectural design principles. The second four-step phase aims at introducing students to a systematic design process. Figure 1 graphically represents the studied model, showing the relationship between the constituent steps of its two phases.

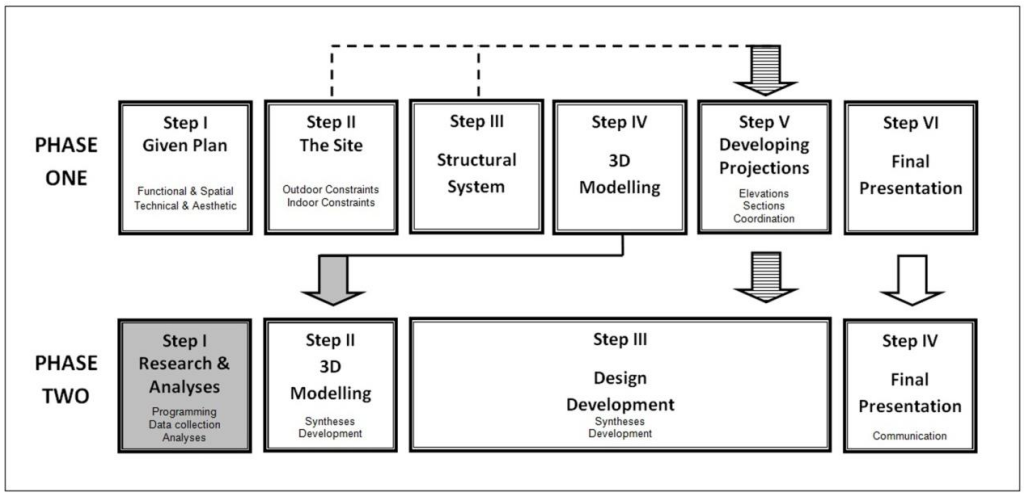


Figure 1. *The Studied Model*
Source: Elfiki, 2013.

Phase One

As per the AASTMT curriculum, the first objective of 'Architectural Design I' is introducing students to the principles of architectural design at a basic level. These principles include: function and circulation; desirable orientation and climatic treatments; natural lighting and ventilation; spatial qualities and structural stability; site constraints and contextual regards; geometric relationships and aesthetic proportions; facade compositions and cross-sectional potentials – all at

6. Akalin and I. Sezal, "The Importance of Conceptual and Concrete Modelling," *Journal of Art and Design Education* 28, no. 1(2009): 14-24; A. Cunningham, "Notes on Education and Research around Architecture," *Journal of Architecture* 10, no. 4 (2005): 415-41.

7. Dewey, *Experience and Education* (New York: Collier Books, 1963).

8. Cıkış and Cil, "Problematization of Assessment in the Architectural Design Education: First Year as a Case Study," *Procedia Social and Behavioral Sciences* 1, no. 1 (2009): 2103-2110; S. Kurt, "An Analytic Study on the Traditional Studio Environments and the Use of the Constructivist Studio in the Architectural Design Education," *Procedia Social and Behavioral Sciences* 1, no. 1 (2009): 401-408.

their very elementary level, yet in three-dimensional interrelation and holistic integration. The proposed model aims at realising this goal in the six steps of 'Phase One' through gradual and cumulative learning, as seen in the following discussion.

Step I: Changing a Given Plan

The general theme of the studio builds on the 'learning by doing' pedagogy, being a common practice in architectural academia.[9] It integrates theoretical lecturing with design projects.[10] In this step of Phase One, students are given a plan of a residential building [by an anonymous designer], which encompasses a few intentional shortcomings, to set a 'beginning' for the dialogue with tutors.[11] They are then lectured about spatial and functional requirements in residential spaces before being assigned to furnish the given plan. This is when they discover that they need to modify the physical dimensions of the given spaces to suit the required functions. At this point, they are also challenged by realising aesthetic geometric relations and sound material connections.

Step II: The Constraints Entailed by Site upon Outdoor and Indoor Design

The significance of site to architecture is widely addressed in literature, to the extent that some authors suggest that we cannot talk about 'real architecture' without a 'real site.'[12] Therefore, the subsequent step introduces students to a designated plot, with full dimensions, north direction, and surrounding context, to amend the indoor and outdoor spaces in accordance with these constraints.

They are taught here to design small-scale site-plans in relation to vehicular and pedestrian movements, street/entrance relationship, vegetation placement, form and position of water features, and favourable views. At the same step, students are also taught about the optimal orientations in relation to natural lighting and ventilation, together with the appropriate fenestration treatments for different ordinal directions.

9. Kurt, "An Analytic Study on the Traditional Studio Environments and the Use of the Constructivist Studio in the Architectural Design Education," 2009.

10. R. Anderson and J. Puckett, "Assessing Students' Problem-solving Assignments," *New Directions for Teaching and Learning*, no. 95 (2003): 81-87; H. Nabih, "Process-based Learning: Towards Theoretical and Lecture-based Coursework in Studio Style," *International Journal of Architectural Research* 4, no. 2-3 (2010), 90-106; N. Spanbroek, "Strategic Teaching: Student Learning through Working the Process," *International Journal of Art & Design Education* 29, no. 2 (2010): 111-120.

11. J. Ochsner, "Behind the Mask: A Psychoanalytic Perspective on Interaction in the Design Studio," *Journal of Architectural Education* 53, no. 4 (2000): 194-206.

12. N. Cagler and Z. Uludag, "Architectural Design Education: Designing a Library, Public Communication and Information Centre in the Manufacturing Zone of Central Eskisehir Turkey, A Case Study," *Journal of Art and Design Education* 25, no. 2 (2006): 231-40; R. Moneo, "The Murmur of the Site," in *Anywhere* (ed.) B. Cynthia (New York: Rizzoli International, 1992), 46-53.

This step usually witnesses radical change in plans. The entrance is relocated in accordance with its relation to the main street, while other elements are moved to make better use of surrounding views, wind directions and sun-path.

Step III: Structural System

In this step, students are introduced to one very simple structural system; i.e. post and beam. After receiving a lecture about the topic, and refreshing their knowledge of the subject (being previously taught in other courses), students are challenged by positioning posts at reasonable spans, aligning walls and posts on an appropriate grid, and realising the role of beams in space definition. Obviously, this shall entail another layer of amendment in plans, which will accordingly reflect to the layout and site design.

Step IV: Three-Dimensional Modelling

The benefits of modelling as a format for the articulation of ideas, a medium for communicating a designer's idea to himself/herself and to others, a means to enrich imaginative faculties, test validity and stimulate thinking are well outlined by many authors.[13]

This phase is devised to promote students understanding of three-dimensional relations and help them develop their designs. They first make very basic undetailed study-models which give height their present mass-plan. Then, they get to try developing it by introducing different heights, rotation, addition and subtraction to realise more plausible proportions. Again, this will require changes in plans and layouts. This improves their ability to develop three-dimensional masses and proportions and to think of the wholeness of their projects, rather than dealing with isolated two-dimensional projections. This is assisted with one general lecture as well as repeated one-to-one feedback sessions.

Step V: Developing Architectural Projections [Elevations and Sections]

After students have broadly comprehended three-dimensional relationships in the previous step, this step involves them in an added layer of details that need to be addressed in other architectural projections.

Being their first encounter with elevation design, students are taught how to deal with three aspects, namely: masses, details [i.e. fenestrations and environmental treatments] and textures. While in cross-sections, they are introduced to internal and external heights towards improved spatial relationships and indoor environmental settings. Such changes are then reflected to model, layout, plans and elevations.

13. Moneo, "The Murmur of the Site," 1992, 16; T. Davies and R. Elmer, "Learning in Design and Technology: The Impact of Social and Cultural Influences on Modelling," *Journal of Technology and Design Education* 11, no. 2 (2001): 163-80; K. McAllister, "The Design Process – Making it Relevant for Students," *International Journal of Architectural Research* 4, no. 2-3 (2010): 76-89.

Step VI: Final Presentation

This step sets the syntheses of developing all previous steps. It encourages students to use simple, yet concrete, architectural presentation techniques to communicate their ideas in accordance with their skills and abilities. They are shown a sample of previous students' work, to learn about strengths, weaknesses and expected deliverables. The final product usually comes in A0 boards, representing site plans, floor plans, elevations, sections and three-dimensional study-models.

By the end of this project [Phase One], students are expected to have gradually and cumulatively learned about design principles at an elementary level. This is accomplished with regard to the reciprocity and integration between these design elements, as applied to floor plans, site plans, elevations, cross-sections and above all to three-dimensional models.

Phase Two

The other objective in teaching 'Architectural Design 1' aims at introducing students to a systematic 'design process'. In this sense, the model in-study builds on the behaviourist approach to creative problem-solving. This approach advocates that problem-solving processes can be explained in observable measurable and replicable patterns of physical behaviour, being described in a sequence of distinctly identifiable activities, which occur in a logical order.[14]

Towards this goal, the study adopts Archer's operational model, and its subsequent developments, which described creative problem-solving process in programming, data collection, analyses, syntheses, development and communi-cation. This sequence is further empowered by the idea of feed-back loops to bridge any emerging gaps.[15] Thus, the second phase of the model in-study is structured in the following four steps.

Step I: Research and Analyses [Programming + Data Collection + Analyses]

After students are given a specific site, they are assigned to design a simple building for a particular client / product of their choice [e.g. a celebrity's house, a theme restaurant, a specialised exhibition ...].

The first required step is primarily about extended data collection [architectural standards, relationship diagrams, client/product characteristics, and precedent experiences], as well as the analyses of environmental settings [climatic, topographic and contextual] and the social constraints [users and activities].

14. B. Lawson, *How Designers Think: The Design Process Demystified* (Oxford: Architectural Press, 1999); P. Rowe, *Design Thinking* (Massachusetts: MIT Press, 1992).

15. B. Archer, "Viewpoint: Design, Innovation, Agility," *Design Studies* 20, no. 6 (1999): 565-571; P. Roberts, B. Archer, K. Baynes, *Modelling: The Language of Designing*. Design Occasional Paper (Loughborough University Department of Design & Technology, 1992); C. Swann, "Action Research and the Practice of Design," *Design Issues* 18, no. 1 (1992): 49-61.

This step starts with an extended lecture about design process, research requirements, significance of analogies, and concept generation. It is supposed to conclude to an elaborate program, broad knowledge of the functional relationships which will guide their forthcoming design steps and a concept statement which distils symbolic analogies from the nature of product or client.

Step II: Three-Dimensional Modelling [Syntheses + Development]

Developing symbolic analogies in architectural design requires interpreting sensed data into constructed physical representation (Roberts et al 1992). Yet, students start, at this point, to materialise their abstract design concepts into simple physical three-dimensional study-models; i.e. they generate forms that will guide their solutions in the subsequent step.

Step III: Developing Architectural Projections [Syntheses + Development]

In this step, students are expected to put together the findings of previous steps. They apply the functional relationships to the abstract forms they generated bearing in mind all the functional, climatic, and structural regards they have learned about. This is developed in terms of two-dimensional projections. No particular priority is given to start with either projection. Such decision is primarily made on individual bases, in relation to design concept and nature of project. The necessary thing is constantly keeping all projections in parallel development and coordination.

Step IV: Final Presentation [Communication]

As in 'Phase One', this step concludes all previous steps. Simple architectural presentation is promoted, in accordance with student skills and abilities. In addition to the first project requirements, students are required to introduce their analytical-study sketches, main concept statement and three-dimensional drawings.

Questionnaire Design

Questionnaires are widely accepted for collecting comparable data from particular populations. Such comparison can be best achieved by the employment of pre-set choices of answers to each question.[16]

Following the structure of the model in-study, the purpose-designed questionnaire survey was structured in relation to its main phases and steps. First, a brief introduction to the survey, its objectives and privacy policy was addressed to prospect respondents. Then, in order to maintain privacy of participants, and to encourage them give their full free opinions, the questionnaire did not require them to write their names. The required personal information

16. M. Denscombe, *The Good Research Guide for Small-scale Research Projects* (Philadelphia: Open University Press, 2000).

was merely limited to the relation to the course in study, i.e. former student / tutor. After identifying the applicants relationship to the course, informants are requested to rate the six steps of Phase One in relation to how easily they find it to manage the amount of information delivered in every step. Then they rate the same steps in how helpful they are in learning about the design principles. Afterwards, they rate the overall sequence of Phase One in relation to the gradual learning of design principles. Likewise, participants were asked to rate the four steps of Phase Two in how helpful they are in introducing the sequence of a systematic design process. This is followed by two questions to rate the phase then the overall model. An open-ended question comes at the end of the survey to give room for respondents to add comments they may have.

Pilot Testing

A pilot study is an initial small-scale test to the feasibility of procedures that are intended to be applied to a larger scale.[17] In the present research, a pilot study took place prior to the questionnaire distribution. It was carried out by 7 randomly chosen respondents, who are not part of the main sample. The questions showed to be clear, and the average answering time was 3.5 minutes. This confirmed the feasibility of the survey to extract worthwhile information for additional statistical analyses.

The Sample

The present study undertakes stratified sampling. It adheres to randomness for that every member in the population has equal opportunity to take part in the survey. However, it only applies randomness within the boundaries of a particular identity, to guarantee that crucial groups are involved.[18]

In the present study, the target population is meant to involve two main groups, namely students and tutors [including professors and teaching assistants] in the Arab Academy for Science, Technology and Maritime Transport, Cairo – who had previous experience with the aforementioned model. The model under study has been regularly applied in AASTMT since 2007. This makes the overall target population near 1100 students and faculty members. The present sample involves 113 participants [about 10% of the target population], comprising 78 students and 35 tutors of different genders and spans of association with the course, to get a statistically representative sample. This was primarily following the principle of occurrence, where the number of students is obviously larger than that of tutors.

17. L. Groat and D. Wang, *Architectural Research Methods* (Hoboken: Wiley, 2013).
18. Denscombe, *The Good Research Guide for Small-scale Research Projects*, 2000.

Means of Communication

Online surveys are known to provide meaningful information from reasonably-sized samples over a relatively short time-span.[19]

The survey took place in May/June 2018. It was published digitally in a self-administered Google form.[20] The web-link was announced to students and faculty in-class. It was also published in the Department's face-book page. Furthermore, course faculty were addressed in person, by emails and short phone messages.

Data Analyses Method

The adopted method relates to quantitative paradigm. It involves a deductive process that depends on measuring a particular phenomenon numerically and objectively, assuming the researcher's independence from the subject in inquiry.[21] The deduced data was analysed using Statistical Package for Social Sciences 22 (SPSS). First, descriptive statistics (frequencies and mean values) were used to summarize the deduced data, as per the overall sample. The same was applied to both groups separately. Mean values inform the research about central tendency, i.e. what most participants have in mind.[22] Such analyses are undertaken to find out how participants have rated the different steps and phases of the model.

Afterwards, one-way ANOVA test (analyses of variance) was applied to examine any significant difference between the ratings of both participant groups. This test analyses the variation within and between groups or categories of data using comparison of mean values. When the significance factor is less than one in twenty $p \leq 0.05$, this indicates that there is a meaningful difference in the perceptions of both groups.[23]

Findings and Discussion

The following section introduces a discussion to the survey findings in the light of preceding literature. It first addresses the ratings given to the six steps of Phase One in terms of regulating the amount of information delivered in each. Afterwards, it addresses the same steps in relation to learning about design principles. Likewise, the four steps of Phase Two are discussed in relation to learning about design process. These sections conclude with a general assessment to Phase One, Phase Two and the whole model in realising the model objectives generally.

19. Ibid.

20.https://docs.google.com/forms/d/1QeeyKjvP0r4gp43nP-tmUzo4CNZOy0HBYOWPwPgybM4/viewform?edit_requested=true.

21. Groat and Wang, *Architectural Research Methods*, 2013.

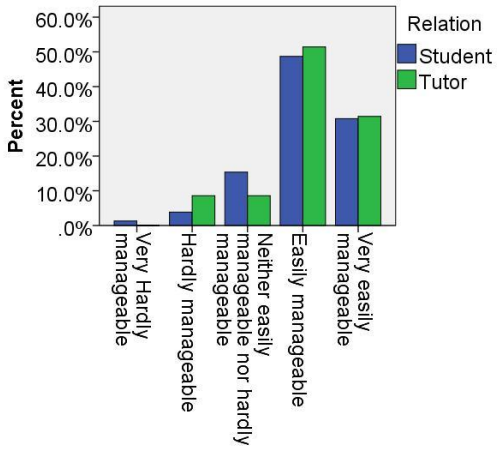
22. Denscombe, *The Good Research Guide for Small-scale Research Projects*, 2000

23. Ibid.

Phase One Steps and Regulating the Amount of Information

After the first question that identifies the respondents' relation to the course in-study (student/tutor), the subsequent section investigated participants' rating to the amount of information delivered in the six steps in Phase One. A five-point scale was used for rating the manageability of Phase One steps [section 2a in the questionnaire]. It and ranged from (1) very hardly manageable to (5) very easily manageable. In Step I: changing a given plan, 31% of the overall sample thought it was very easily manageable and 49.6% believed it was easily manageable (see Figure 2). The mean value there was 4.04. Being that close to 5 strongly suggests that this step has contributed positively to regulating the amount of information delivered to students in reasonable chunks. After splitting the sample into students and tutors, the findings showed pretty similar results: 30.8% very easily manageable and 48.7% easily manageable for students, and 31.4% very easily manageable and 51.4% easily manageable for tutors. The analyses of variance concluded to a significance factor of p = 0.91 which implies no significant difference between both groups.

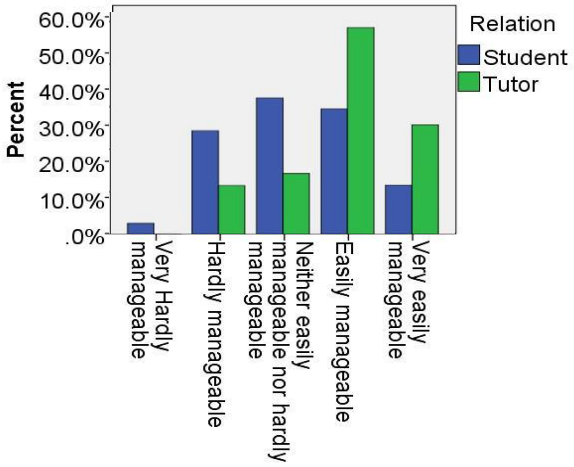
Figure 2. *Percentage of Responses per Students/Tutors for the Amount of Information Delivered in Step I – Phase One*



The following variable was about the amount of information delivered in Step II: constraints entailed by site upon outdoor and indoor design. The highest frequency was 'easily manageable' at 39.8% of the sample (see Figure 3). It had a mean value of 3.92. This indicates that the amount of information delivered in this step is slightly harder to manage when compared to Step I. This is expected for that students are required to handle indoor and outdoor design issues. However, its mean value is still near the preferred side of the scale. It lies somewhere between 'easily manageable' and 'neither easily nor hardly manageable'. Taking a closer look at the responses of both sub-groups, the students seemed to be less approving to this step, with their higher percentages around the middle point of the scale. However, the mean value for students was 3.98, while it was 3.77 for tutors. This might be interpreted in the sense that students showed to be generally capable of handling the information delivered in this step more easily than tutors

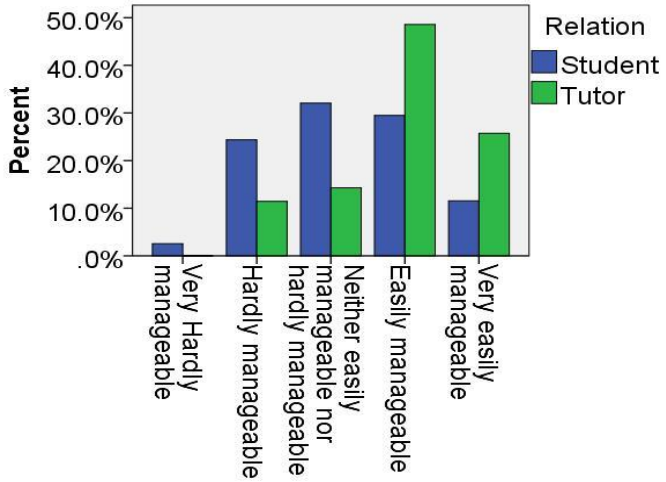
thought. Yet, with both mean values lying in the same region between 'easily manageable' and 'neither easily nor hardly manageable', and with the ANOVA significance factor of p = 0.25 – there seem to be no significant difference between both groups.

Figure 3. *Percentage of Responses per Students/Tutors for the Amount of Information Delivered in Step II – Phase One*



Afterwards, Step III: structural system was examined for the amount of information it addresses. This seems to be close to a critical zone. An interesting jump took place towards the undesirable end of the scale. 26.5% found 'neither easily nor hardly manageable' and 20.4% thought it was 'hardly manageable'. This is far higher than the two previous variables which recorded 5.3% and 6.2% respectively for the 'hardly manageable'. Taking this one more step towards detailed results, 24.4% of involved students thought it was 'hardly manageable' while only 14.3% of the tutors thought it was so (see Figure 4). The analyses of variance confirm a significant difference between both groups with a significance factor of p = 0.002.

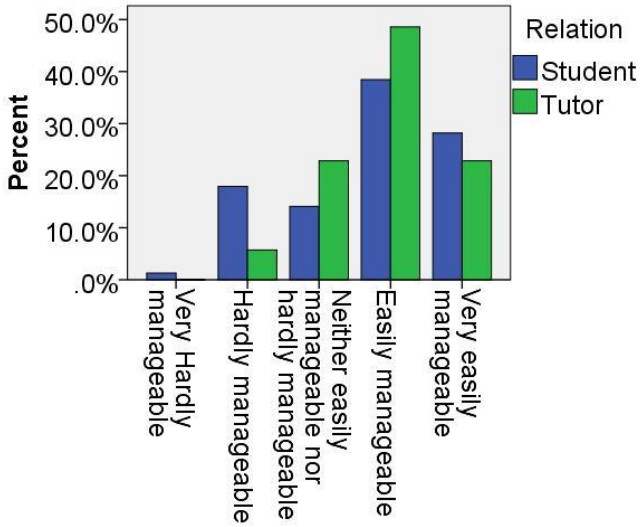
Figure 4. *Percentage of Responses per Students/Tutors for the Amount of Information Delivered in Step III – Phase One*



With this difference in perception, it might not be a problem the amount of information – 48.6% of tutors think it is 'easily manageable'. Therefore, it might be important to try different means of communicating the required information in this step to students, especially, with the mean value for the overall sample of 3.43 being closer to the approving end of the scale.

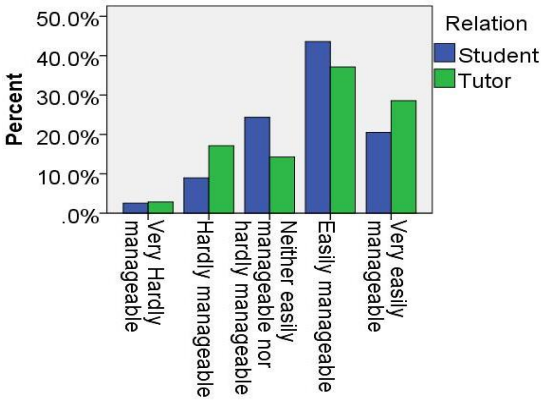
Step IV: three-dimensional modelling was then tested. Again, 41.6% of the overall sample found this step 'easily manageable'. This comes from 48.6% by tutors and 38.5% by students. It is not surprising that tutors perceive the management of this information easier than students do (see Figure 5). The overall mean value for this step was 3.78, reasonably placed in a favoured zone. Despite the apparent graphic difference, the ANOVA test showed no significant difference between both groups, with a significance factor of p = 0.49.

Figure 5. *Percentage of Responses per Students/Tutors for the Amount of Information Delivered in Step IV – Phase One*



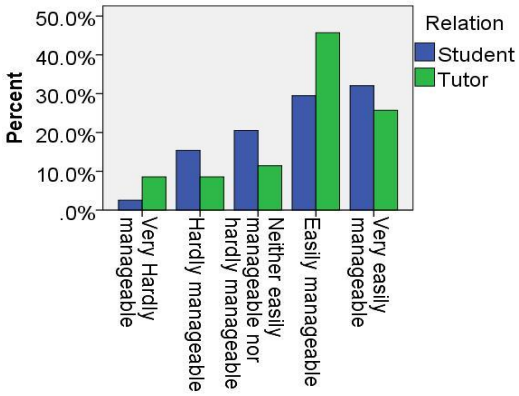
The study then examined Step V: developing architectural projections. Its overall mean value was 3.70 – well placed towards the approving end. While students' answers mostly ranged between 'easily manageable' 43.6% and 'neither easily nor hardly manageable' 24.4%, most tutors' answers spanned between 'easily manageable' 37.1% and 'very easily manageable' 28.6% (as seen in Figure 6). This complies with the overall pattern of tutors perceiving the content of most steps some easier than students. However, this difference is still out of the significance zone, with an ANOVA significance factor of p = 0.96.

Figure 6. *Percentage of Responses per Students/Tutors for the Amount of Students Information Delivered in Step V – Phase One*



The very last step in Phase One is Step VI: final presentation. It is quite interesting that 32.1% of the students rated this step as 'very easily manageable'. This was even higher than tutors, out of whom only 25.7% thought it was of the same level of ease (see Figure 7). This is further confirmed by comparing both mean values: 3.73 for students, that is slightly higher than the 3.71 for tutors. This can be referred to students' prior presentation experience developed in 'Architectural Drawing' course they studied as a pre-requisite to 'Architectural Design 1'.

Figure 7. *Percentage of Responses per Students/Tutors for the Amount of Information Delivered in Step VI – Phase One*



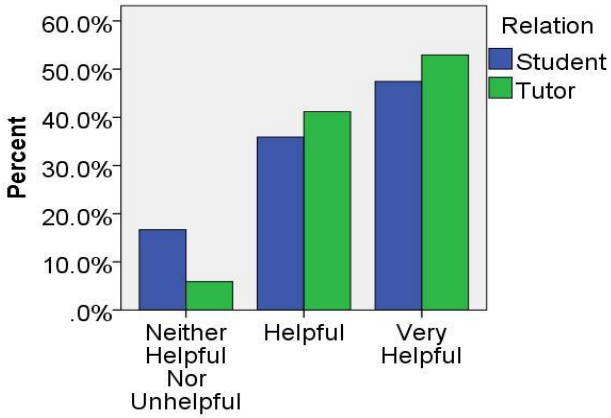
Phase One Steps vs. Design Principles

As done with the first objective of the model, the same examination was applied to all six steps of Phase One, but in relation to the second objective, i.e. how helpful they are in learning about design principles.

It is most interesting that all ratings given to Step 1: changing a given plan spanned between 'very helpful' and 'neither helpful nor unhelpful', with no single disapproving response. The five-point scale spanned between (1) very unhelpful and (5) very helpful. The mean value for all responses was 4.35, which is closer to 'very helpful'. The same was observed with students and tutors, with mean values

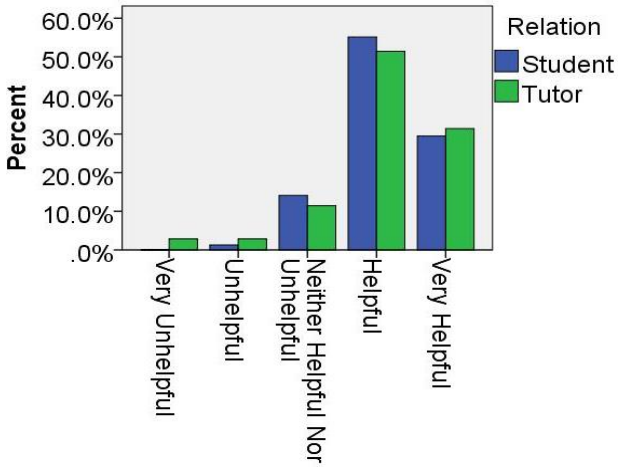
of 4.30 and 4.47 respectively (see Figure 8). It is also interesting that a majority in both groups rated 'very helpful' 47.4% for students and 51.4% for tutors. This similarity was confirmed by the ANOVA test showing no significant difference between both groups with a p = 0.26 significance factor. Figure 8 below shows these frequencies.

Figure 8. *Percentage of Responses per Students/Tutors for Learning Design Principles in Step I – Phase One*



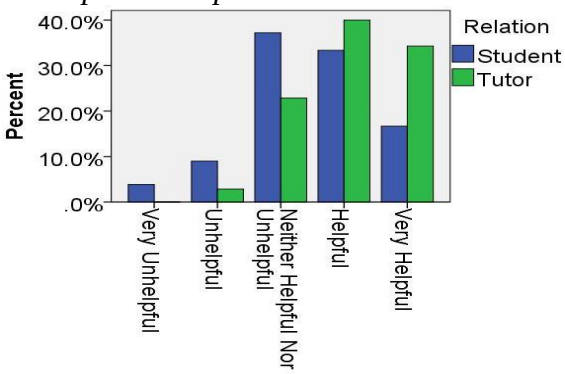
Likewise, Step II: the constraints entailed by site upon outdoor and indoor design had a high mean value of 4.10 for the overall sample. This was confirmed by both groups separately. Students rated this step with a mean value of 4.12 and tutors 4.05. With all values between 4 and 5, this suggests a high degree of approval. This came as a natural result to the frequencies given to 'very helpful' and 'helpful' ratings. These values were respectively 29.5% and 55.1% for students; and 31.4% and 51.4% for tutors (see Figure 9). The p = 0.64 significance factor concluded by the analyses of variance fully complies with the apparent similarity between both groups.

Figure 9. *Percentage of Responses per Students/Tutors for Learning Design Principles in Step II – Phase One*



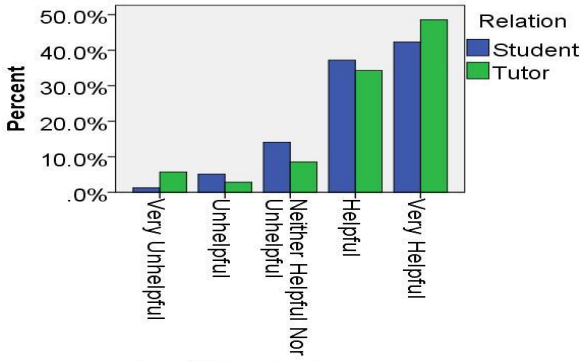
After the previous section highlighted an alarming result for Step III: structural system, it looked of particular importance to see how this step was rated in terms of learning design principles. For the second time there seem to be a significant difference in the opinions of both groups (ANOVA significance p = 0.005). Despite the fact that both groups assessed this step within the approval zone, but the acceptability was slightly different amongst the first three points on the scale. Students rated them as 16.7%, 33.3% and 37.2% respectively. This explains why the mean value was placed between 'helpful' and 'neither helpful nor unhelpful – at 3.50. On the other hand, tutors rated them as 34.3%, 40.0% and 22.9% respectively (as shown in Figure 10). This has placed their mean value at 4.05 between being 'very helpful' and 'helpful'. This seconds the previous recommendation about devising more student-friendly methods for handling this step.

Figure 10. *Percentage of Responses per Students/Tutors for Learning Design Principles in Step III – Phase One*



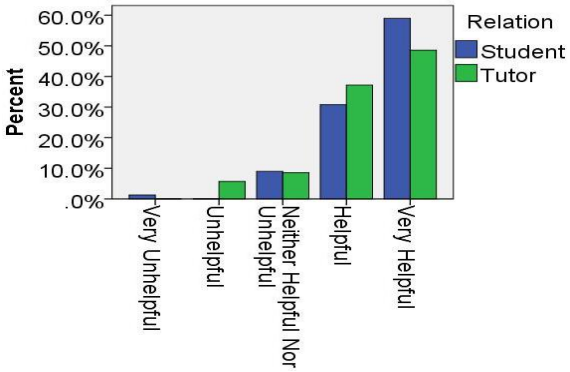
Both groups shared very similar opinions about Step IV: three-dimensional modelling, with a relatively high significance factor of p = 0.88. Even the mean values for both groups were pretty close – students 4.14 and tutors 4.17. However, their highest ratings were given to 'very helpful' and 'helpful': students 42.3% and 37.2%; teachers 48.6% and 34.3% respectively (see Figure 11). The 4.15 overall mean value indicates that this step plays an important role in learning about design principles.

Figure 11. *Percentage of Responses per Students/Tutors for Learning Design Principles in Step IV – Phase One*



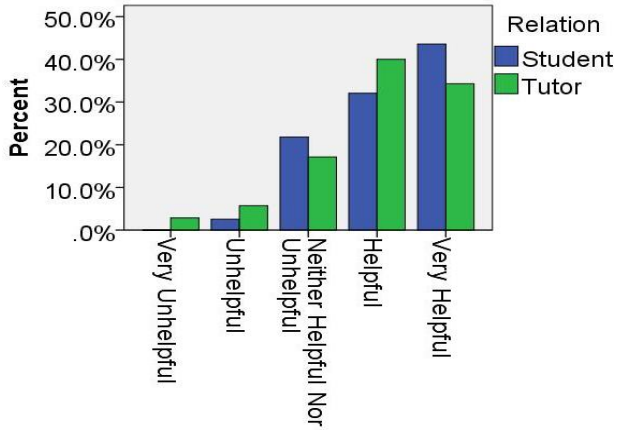
Step V: developing architectural projections received high approval from both groups. It is interesting that students rated 'very helpful' at a higher percentage of 59.0% than tutors 48.6%. However, 'high' was rated 37.1% by tutors, higher than the 30.8% of students (see Figure 12). The overall mean value was 4.40. Both groups had their mean value in the same region, i.e. 4.46 for students and 4.28 for tutors – obviously with no significant difference (ANOVA significance factor p = 0.28).

Figure 12. *Percentage of Responses per Students/Tutors for Learning Design Principles in Step V – Phase One*



As seen in Figure 13, Step VI: final presentation was rated with high approval from both groups. 40.7% of the whole sample rated it as 'very helpful', 34.5% as 'helpful' and 20.4% were neutral about it. Similar ranges were given by students 43.6%, 32.1% and 21.8%. It is interesting that only 34.3% of the tutors rated this step as 'very helpful'. This is probably because they believed that students have learned about presentation in previous experiences. However, students' higher rating suggests that it was probably taught in a way that is well-linked to their designs so that the emphases and techniques would best communicate their individual ideas. Despite this apparent difference, the p = 0.29 ANOVA significance factor implies no significant variance between both groups. Figure 13 above represents these findings graphically.

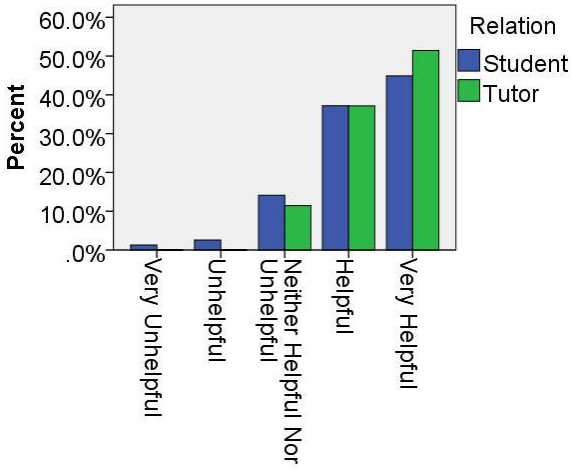
Figure 13. *Percentage of Responses per Students/Tutors for Learning Design Principles in Step VI – Phase One*



Phase Two Steps vs. Design Process

In this phase, four steps are examined for their help in introducing students to the sequence of a systematic design process. All four steps were rated on a five-point scale, whose least value (1) denoted very unhelpful, and highest value (5) meant very helpful. The first step was research and analyses [programming + data collection + analyses]. With 46.9% of the overall sample rating it as 'very helpful' and 37.2% as 'helpful', it is pretty logic that the overall mean value of this variable was 4.2. However, the p = 0.28 ANOVA significance factor suggests no big difference in the opinions of both groups. 44.9% of students rated it as 'very helpful' and 37.2% as 'helpful', whereas 51.4% of the tutors rated it as 'very helpful' and 37.1% as 'helpful. This is shown in Figure 14.

Figure 14. *Percentage of Responses per Students/Tutors for Learning Design Process in Step I – Phase Two*



Step II: concept generation and 3D modelling seemed quite satisfying in terms of introducing the design process. 49.6% of the overall population thought it was 'helpful' and 38.9% thought it was 'very helpful'. This placed the mean value within the most approving region. Similar results were noted by the individual groups. Though, students' appreciation to this step as 'helpful' was by 55.1%, and 'very helpful' by 35.9%. This order was altered by tutors, where 37.1% thought it was 'helpful' and 45.7% believed it was 'very helpful'. The ANOVA significance factor was p = 0.86 revealing no serious difference between both groups, particularly with students' mean value of 4.23 and tutors' 4.25. This can be seen on Figure 15.

Figure 15. *Percentage of Responses per Students/Tutors for Learning Design Process in Step II – Phase Two*

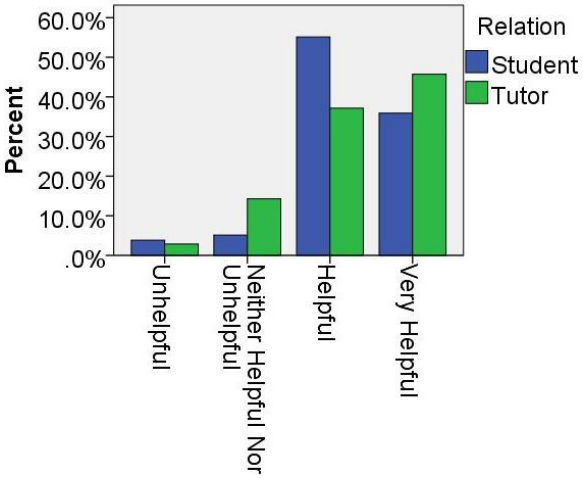
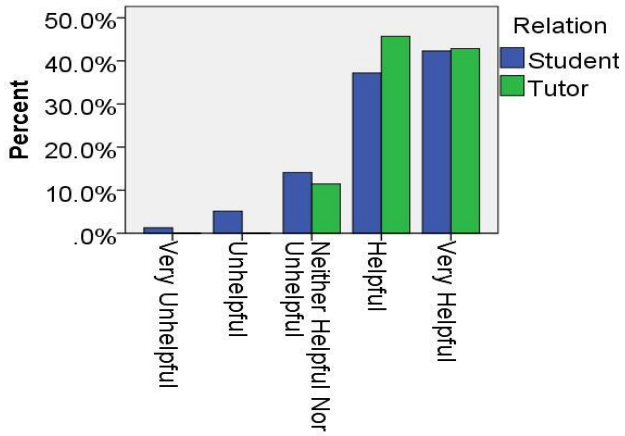


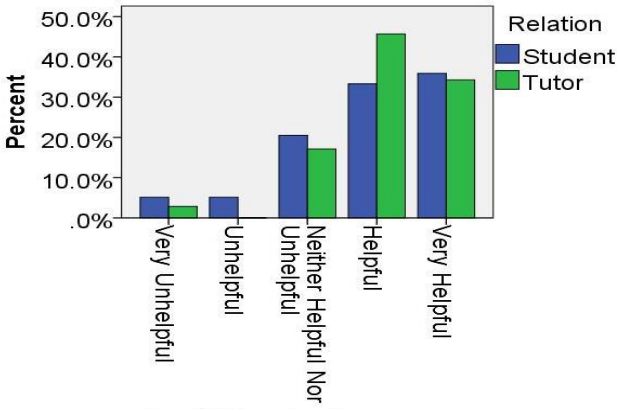
Figure 16 represents the findings of Step III: developing architectural projections. An almost typical rating of 42.3% students and 42.9% tutors believed it was 'very helpful'. On the other hand, there was an apparent difference in the population that rated it as 'helpful' amongst both groups – 37.2% for students and 45.7% for tutors. However this difference was refuted by the high ANOVA significance factor of p = 0.32.

Figure 16. *Percentage of Responses per Students/Tutors for Learning Design Process in Step III – Phase Two*



The last step in this phase is Step IV: final presentation, which is common with Phase One. Both students (35.9%) and tutors (34.3%) shared the same opinion about this step being 'very helpful'. However, these percentages shifted slightly in 'helpful', with 33.3% for students and 45.7% for tutors (see Figure 17). The p = 0.37 ANOVA significance factor meant no significant difference between both participant groups. It is also interesting to see how 'presentation' acted in Phase One. The same order was realised in relation to learning about principles, though it was twisted for tutors when it came to the amount of information delivered.

Figure 17. *Percentage of Responses per Students/Tutors for Learning Design Process in Step IV – Phase Two*

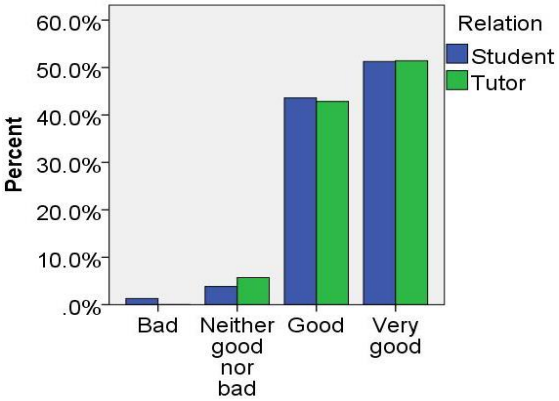


Overall Model and Phases

This section discusses the results of assessing both phases individually, as well as the overall model – in terms of realising the objectives of the model outlined above in the theoretical part of this paper. Again, they were all rated on a five-point scale ranging from (1) very bad to (5) very good.

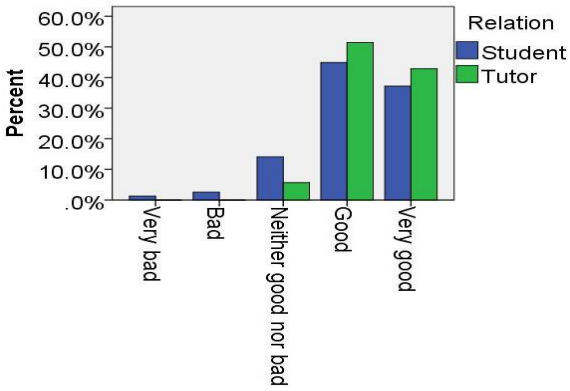
When participants were asked how they rate the overall sequence of Phase One in terms of the gradual learning of design principles, the mean value for the overall population was 4.45 – that is between 'very good' and 'good'. This was confirmed by the mean value scored by both groups, i.e. 4.44 for students and 4.45 for tutors. As for the percentage of responses, about 95% of the whole population ranged between 'very good' 51.3% and 'good' 43.4%. The same happened after splitting the sample into student/tutor categories. 51.3% of the students chose 'very good' and 43.6% chose 'good', while 51.4% of the tutors chose 'very good' and 42.9% chose 'good' (see Figure 18). The analyses of variance did not add a lot with the p = 0.94 significance factor. This reflects a general satisfaction with Phase One of the model for the whole population and for both individual groups.

Figure 18. *Percentage of Responses per Students/Tutors for Gradual Learning of Design Principles in Phase One*



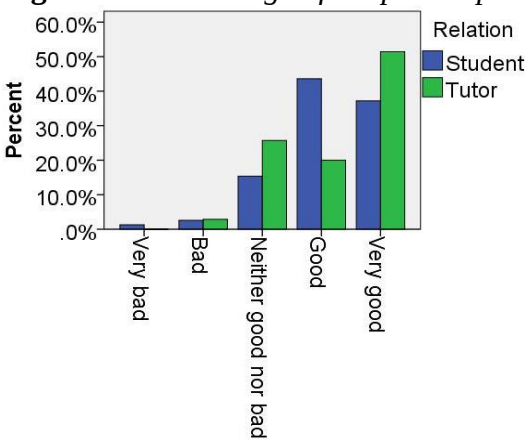
Likewise, participants were asked to rate the overall sequence of Phase Two on how helpful it was in introducing systematic design process. Showing a high degree of approval, the mean value for the overall sample came 4.21. Almost one half of the sample (46.9%) rated this phase as 'good' – 44.9% students and 51.4% tutors. The 'very good' rating came at a lower percentage, i.e. 37.2% for students and 42.9% for tutors (see Figure 19). However, the mean value was closer to 'good' than to 'very good' in both groups – 4.14 for students and 4.37 for tutors. However, the p = 0.15 factor detected no significant variance.

Figure 19. *Percentage of Responses per Students/Tutors for Learning Design Process in Phase Two*



At last, participants were asked to rate the overall model. The mean value of the overall sample was well-placed in the 'very good'/'good' region. It was 4.12 for students, 4.20 for tutors and 4.15 for the overall sample. 37.2% of the students chose 'very good' and 43.6% chose 'good'. Yet, it looked interesting that the order was twisted and the gap between 'very good' and 'good' was broader amongst tutors. 51.4% thought it was 'very good' and 20.0% found it 'good'. It is also remarkable that 25.7% of tutors believed it was 'neither good nor bad', where only 15.4% of the students thought so (see Figure 20). Despite this confusing pattern, ANOVA significance factor was p = 0.69, which suggests that such variance is of no significance.

Figure 20. *Percentage of Responses per Students/Tutors for the Overall Model*



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Open-Ended Comments

The last question in the survey was meant to give space to participants for expressing any comments that might not have been addressed by the questionnaire. Although most respondents left this section blank, the issue of tight timeline was repeatedly mentioned as a major inconvenience. Likewise, the direct relationship with teaching assistants, together with their teaching experience and communication skills were mentioned by a large segment of students who responded to this last question. When it came to presentation, the need for improving verbal presentation skills was highlighted.

However, it was pretty interesting to receive comments like the ones quoted by some students hereunder:

"Overall, the course helped me develop the primary design skills required, as this is one of the biggest steps in becoming an architect"

"The way this course is taught was interesting. I wish similar creative teaching methods are applied to other 'boring' courses".

Conclusions

The present study was meant to be an empirical validation to the process-based model developed earlier by the Author[24] for teaching Architectural Design 1 in the Arab Academy for Science, Technology and Maritime Transport – Cairo, Egypt. First, the model in-study was introduced briefly together with its theoretical backgrounds. The empirical research design was then outlined to pave the way for the subsequent analyses and discussions.

Statistical analyses of the purpose-designed questionnaire showed that the overall model is widely approved amongst the involved sample. The overall mean value for the whole model was 4.15, being placed between 'very good' and 'good'. It is also believed to be a strength that Phase One, dealing with gradual learning about design principles, had a higher mean value of 4.45, i.e. well-placed in the same most approving region. Likewise, Phase Two, which was

24. Elfiki, "Towards a Process-based Model for Teaching Architectural Design, with Reference to Design Studio One," 2013.

meant with learning design process, was located in the same zone of approval with a mean value of 4.21. This complies with the answers quoted by some students in the open-ended section of the survey, as shown above.

No fixed pattern was detected on whether students' choice of the less favourable side of the scale was always higher than tutors, or if tutors choice of the more preferable side of the scale was higher than students. This complies with the findings of ANOVA test, showing no significant difference between both groups in most variables.

The highest mean value for gradual learning (4.04) was given to Step I in Phase One: changing a given plan, being one characteristic feature of the proposed model. The highest mean value for learning about design principles (4.40) was given to Step V in Phase One: Developing architectural projections, for that it is probably the step where students' first see their own projects being fully realised. The highest mean value for learning about systematic design process (4.27) was given to Step I in Phase Two: research and analyses. This could be a result of it being notably different from some other teaching approaches that jump into developing projections at a very early stage. It is also noteworthy that Step I of Phase One: changing a given plan had no single negative response in learning design principles, which suggests that it is a major point of strength in the model. However, it is believed that the mean values closer to 'easily manageable' than to 'very easily manageable' may indicate a more appropriate dose of information, particularly with the major proportion of the sample being students. This discussion puts a conclusion to the most appreciated steps in the model.

On the other hand, the least mean value for gradual learning (3.43) was given to Step III in Phase One: structural system. The least mean value for learning about design principles (3.67) was also given to the same step. It is also interesting that Step III in Phase One: structural system had a significant variance between both groups ($p = 0.002$), where the mean value for student responses was placed between 'helpful' and 'neither helpful nor unhelpful' – at 3.50, unlike tutors mean value of 4.05 between being 'very helpful' and 'helpful'. This calls for further investigation to the underlying reasons to allow for devising more student-friendly teaching methods to handle this step.

It is also interesting that responses to the open-ended section of the survey highlighted the need for improving verbal presentation skills. This could explain why Step IV in Phase Two: final presentation had the least mean value (3.95) amongst all examined steps. It would be good to lay more emphasis on promoting this skill for students.

All in all, the study could identify several points of strength as well as some areas for potential improvement in the studied model. It is hoped that the findings of this study would contribute to the promotion of a better architectural education.

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Bibliography

Akalin, A. and I. Sezal. "The Importance of Conceptual and Concrete Modelling." *Journal of Art and Design Education* 28, no. 1(2009): 14-24.

Anderson, R. and J. Puckett. "Assessing Students' Problem-solving Assignments." *New Directions for Teaching and Learning*, no. 95 (2003): 81-87.

Archer, B. "Viewpoint: Design, Innovation, Agility." *Design Studies* 20, no. 6 (1999): 565-571.

Bunch, M. *Core Curriculum in Architectural Education.* San Francisco: Mellen Research University Press, 1993.

Butcher, H. *Meeting Managers' Information Needs*. London: ASLIB, 1998.

Cagler, N. and Z. Uludag. "Architectural Design Education: Designing a Library, Public Communication and Information Centre in the Manufacturing Zone of Central Eskisehir Turkey, A Case Study." *Journal of Art and Design Education* 25, no. 2 (2006): 231-40.

Cıkış, S. and E. Cil. "Problematization of Assessment in the Architectural Design Education: First Year as a Case Study." *Procedia Social and Behavioral Sciences* 1, no. 1 (2009): 2103-2110.

Cunningham, A. "Notes on Education and Research around Architecture." *Journal of Architecture* 10, no. 4 (2005): 415-41.

Davies, T. and R. Elmer. "Learning in Design and Technology: The Impact of Social and Cultural Influences on Modelling." *Journal of Technology and Design Education* 11, no. 2 (2001): 163-80.

Demirbas, O. and H. Demirkan. "Privacy Dimensions: A Case Study in the Interior Architecture Design Studio." *Journal of Environmental Psychology* 20, no. 1 (2000): 53-63.

____. "Focus on Architectural Design Process through Learning Styles." *Design Studies* 24, no. 5 (2003): 437-456.

Denscombe, M. *The Good Research Guide for Small-scale Research Projects*. Philadelphia: Open University Press, 2000.

Dewey, J. *Experience and Education*. New York: Collier Books, 1963.

Elfiki, S. "Towards a Process-based Model for Teaching Architectural Design, with Reference to Design Studio One." *The International Journal of Engineering Education* 29, no. 4 (2013): 1037-1064.

Groat, L. and D. Wang. *Architectural Research Methods*. Hoboken: Wiley, 2013.

Herbig, P. and H. Kramer. "The Effect of Information Overload on the Innovation Choice." *Journal of Consumer* 11, no. 2 (1994): 45-54.

Kurt, S. "An Analytic Study on the Traditional Studio Environments and the Use of the Constructivist Studio in the Architectural Design Education." *Procedia Social and Behavioral Sciences* 1, no. 1 (2009): 401-408.

Lawson, B. *How Designers Think: The Design Process Demystified*. Oxford: Architectural Press, 1999.

McAllister, K. "The Design Process – Making it Relevant for Students." *International Journal of Architectural Research* 4, no. 2-3 (2010): 76-89.

Miller, G. "The Magical Number Seven, Plus or Minus Two: Some Limits on our Capacity for Processing Information." *Psychological Review*, 63, no. 2 (1956): 81-97.

Moneo, R. "The Murmur of the Site." In *Anywhere*. Edited by B. Cynthia. New York: Rizzoli International, 1992, 46-53.

Nabih, H. "Process-based Learning: Towards Theoretical and Lecture-based Coursework in Studio Style." *International Journal of Architectural Research* 4, no. 2-3 (2010): 90-106.

Ochsner, J. "Behind the Mask: A Psychoanalytic Perspective on Interaction in the Design Studio." *Journal of Architectural Education* 53, no. 4 (2000): 194-206.

Rajabzadeh, A., F. Nejadirani, R. Soroodian, R. Kermani. "Informational Overload; Roots and Consequences." *Australian Journal of Basic & Applied Sciences* 5, no. 12 (2011): 353-359.

Roberts, P., B. Archer, K. Baynes. *Modelling: The Language of Designing*. Design Occasional Paper. Loughborough University Department of Design & Technology, 1992.

Rowe, P. *Design Thinking*. Massachusetts: MIT Press, 1992.

Ruff, J. *Information Overload: Causes, Symptoms and Solutions*. Harvard Graduate School of Education, 2002, 1-13.

Spanbroek, N. "Strategic Teaching: Student Learning through Working the Process." *International Journal of Art & Design Education* 29, no. 2 (2010): 111-120.

Stanley, A. and P. Clipsham. "Information Overload - Myth or Reality." *IEEE Colloquium Digest* 97, no. 340 (1997): 1-4.

Swann, C. "Action Research and the Practice of Design." *Design Issues* 18, no. 1 (1992): 49-61.

Teymur, N. Architectural Education: Issues in Educational Practice and Policy. London: Question Press, 1992.

Tzeng, O. "Amount of Information and Intralist Similarity in Paired-associates Learning." *Journal of Experimental Psychology* 91, no. 2 (1971): 227-232.

Uluoglu, B. "Design Knowledge Communicated in Studio Critiques." *Design Studies* 21, no. 1 (2000): 35-58.