Towards the Tectonic: A Critique of the Idea of Space in Architectural Education

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INTRODUCTION

This essay attempts to lay out a basis for questioning the influence that the idea of space has had and continues to have in architectural education. The strategy adopted is to first consider the idea of space in the setting of modern architectural historiography and in the context of design studio education. For the purposes of laying out a critique Bruno Zevi's *Architecture as Space* and Bernard Hoesli's pedagogical ideas developed at the ETH will serve as characteristic and influential examples of the spatial tendency. This approach will serve to ground the position adopted in the latter half of the essay which will offer the tectonic as a viable alternative to that of space.

THE SPATIAL TENDENCY IN MODERN ARCHITECTURAL HISTORY

Zevi's *Architecture as Space*

Despite the critical importance of Giedion and Paul Frankl[1] towards raising the spatial emphasis[2] for the purposes of this analysis it is perhaps Bruno Zevi that has been the single most influential historian in this regard. His widely read *Architecture as Space: How To Look at Architecture* (1957) put forth an argument for an architectural history, criticism and education in which an idea of space was the primary influence. As the subtitle indicates, there was *a way* to look at architecture, an approach in which the essential attribute of architecture would be revealed, one that all other interpretations of architecture would be subordinate.' Zevi divided his book into three major parts: the setting up of the spatial frame from which to understand architecture, the problem of how to represent space in architectural drawings (particularly in plan) and a chronologically organized photographic catalogue of spatial conceptions in the major periods of Western architectural history.

In Chapter 2 "Space — Protagonist of Architecture," Zevi proposes that space is the essence of architecture, the history of architecture being understood as the history of space. This idea is a somewhat reduced version to that already put forth by August Schmarsow[4] (1853-1936). To conclude this section Zevi writes:

> (E)ven if the other arts contribute to architecture, it is interior space, the space which surrounds and includes us, which is the basis for our judgement of a building, which determines the "yea" or "nay" of esthetic pronouncement on architecture. All the rest is important or perhaps we should say can be important, but always subordinate to the spatial idea.[5]

For Zevi architectural space is synonymous with the idea of a void — that which is contained by walls, floors and roof. His emphasis is on the interior space, although he notes that there are two kinds of space, internal and external (or urban) space. He writes that "...no work lacking interior space can be considered architecture."[6] While acknowledging that space alone does not fully define architecture it becomes for Zevi its characteristic quality. Space is the essential attribute that is enclosed by an architectural container. The container must be subservient to that which is contained, which for Zevi is architectural space. The space that is determined is more significant than that which delimits and bounds it.

Zevi writes that after the decline of nineteenth-century eclecticism European architects enthusiastically embraced volumetric and spatial values. Hitchcock and Johnson had previously documented this trend in their book, *The International Style* (1932). This understandable enthusiasm shared by many historians and architects for a new architecture would become to a large extent the origin of the difficulty in critically and objectively assessing the value of the idea of architectural space in terms of the education of an architect.

"The Representation of Space" is perhaps Zevi's most significant chapter. Here he raises issues of architectural education that are related to his spatial conception of architectural history. He begins with a criticism of the numerous reproductions of Bonanni's plan of St. Peter's found in architectural literature. He writes:

> ... this plan shows an abundance of details, a minute marking of every pilaster and every curve, all of which may be useful in a later stage of critical commentary

(when it becomes our concem to ascertain whether the spatial theme is given a consistent elaboration in the decoration and plastic treatment of the walls), but which is confusing, at this point, when all our efforts should be directed towards illustrating the spatial basis of the architectural work.'

Zevi's concem is with how the beginning student in architecture can detect through the observation and study of architectural plans a sense of the complexity of a building's spaces. He concludes that the traditional plan as it is typically drawn hides and obscures its own spatiality. He shows alternative analytic drawings of the plan of St. Peter's specifically made to raise and graphically emphasize the spatial values implicit in the plan. He writes: "(T)he element which should be underlined in presenting the plan of a building does not lie in the material limitation placed on spatial freedom but in the way space is organized into meaningful form through this process of limitation.[8]

The discussion of space by some historians of the modem period is often rooted in a basic empiricism relative to architectural history and architecture. This perhaps necessarily empiricist stance is reflected in Eiler Rasmussen's widely read ***Experiencing Architecture*** (1959). As Zevi defined how to ***look*** at architecture, Rausmussen defined how to ***experience*** it. In this context, it is problematic for a student to directly experience a building that they have never been to, which is the case when a student is designing a building. One can question the efficacy of adopting such historical and empirical models for education, which is in essence occupied with finding principles of knowledge rather than demonstrations. ***A*** design project ***is*** a building the student has never been to before. Experience stressed over knowledge can be detrimental to students attempting to design and develop something that they have no experience with.

TEACHING SPACE
Hoesli at the ETH

Bernhard Hoesli (1923-1984) used architectural space as a main emphasis in the basic course (Grundkurs) at the Eidgenossische Technische Hochschule (ETH) in Zurich, which he directed from 1959 to 1981. The ETH with its strong initial connections to architectural education in the United States through individuals such as Wemer Seligmann at Syracuse, Colin Rowe at Cornell and John Hedjuk at Cooper Union can be considered a characteristic example of the attention paid to space.[9]

Hoesli has written that the introduction to architectural design at the ETH was based on Modem architecture and that the basis of Modem architecture is space, what he termed "the continuity of the spatial or continuous space". In an effort to tie together the work of the three main players of the Modem movement -- Wright, Mies and Corbusier -- Hoesli saw the idea of space as the common point of contact. He writes:

In the middle of the 50's my certainty was confirmed, that this common basis was to be seen in the spatial concept which lay at the root of the Modem movement. This concept, of the continuity of the spatial, was created and elaborated on by the painters of Cubism between 1908 and 1914. The notion of the continuity of space in architecture perceives architectural space conceptually as a continuous medium which contains mass and void between the masses as complimentary manifestations of formed space, even though they are differently constituted. Solid and void are similarly constituted in the overall spatial continuum. Space within a building and space between buildings are parts of the same medium, the same totality. This dualistic spatial concept of a figure-ground continuum in which building and space are complimentary manifestations of an entirety, is -- as every planned or built example shows -- the modern space concept.[10]

For Hoesli, Wright's ***Martin House*** (1904) is the conclusive point of the empirical development of the concept of continuous space. Space becomes the material of architecture, "the medium in which and through which architecture existed and through which above all else it was endowed with significance."[11] Architectural elements such as piers and walls become "space defining elements". These ideas were the basis for a group of exercises given to beginning students at the ETH. The intention of an early exercise, "Forming Space," is described as follows:

"With the first exercise, a single space had to be set up. Space defining elements (slabs, L-shaped and U-shaped elements) were provided, as well as a principle of joints and the condition that the elements should not touch each other at the comer....They determine the positional relationship of the elements and then make their form clear. Further they should recognize that with the help of these elements, architectural space, as part of a spatial continuum, can be perceived as not as something opposed but rather as something interrelated."[12]

The subsequent problems issued used similar sets of given elements and added new considerations such as the making of a space on a surface with low vertical elements (the height of which was given), establishing the relativity of the distinctions of up and down and right and left, and the giving of existing boundary conditions within which elements must be arranged.

CHASING THE ARABESQUE OF SHAPE
Observations on the Teaching of Space

The exercises developed by Hoesli can be seen as serving to limit the particularization of architectural construction and expression and promote a more generalized reductive notion of architectural form. In addition, this spatial emphasis makes the positional considerations between elements more

important than the elements themselves. Since the educational direction of the ETH was based so profoundly on the Modem Movement, the main characteristic as they interpreted it, space, figured strongly in the school's introductory design courses. At a certain point it becomes difficult if not impossible to separate Modern architecture from an idea of space. Space then enters teaching as soon as the Modem Movement is accepted as a model with space as its basis. These are connections that perhaps can be reflected upon more than has previously been the case. One wonders if Modem architecture can positively and intelligently be taught about outside of ideas such as space?

On the desks of students in the design studio, future rooms and buildings change their shape daily. It appears that it is space itself that is being designed and that the building is merely a sign for spatial invention. An indication of this is the tendency for students to come up with a series of different shapes for their building designs. Behind this may be the consideration that if enough shapes are studied, an optimum outline can be found. Design then becomes the search for shape rather than form. A further difficulty emerges due to the proliferation of alternatives in that it becomes difficult for a student to select one to be developed. The alternatives at the level of spatial study tend to be equalized. At this point drawing and modeling remain at a diagrammatic level, and the reductive language of point, line and plane ameliorates tectonic and expressive development. The activity of spatial shaping is selected and sometimes unwittingly encouraged by teachers as an object of design study over the inner intelligible determinants of constructional form.

This loss of tectonic development has further repercussions in terms of lessening the importance of descriptive architectural language and the capacity of language to name the distinct parts that make up architectural elements. For example how is it possible to design a door which is devoid of the traditional vocabulary which indicate its parts? In elevation it is simply a rectangle that is accepted without further consideration. Even in their most reduced state architectural elements have within themselves unique distinctions and parts that have specific names which are reflected both visually and in language. The tectonic provides what can be described as a visual architectural elocution.[13] This elocution is related to the subtle distinctions that occur within architectural elements and their expression. Rarely is an architectural element inarticulate in terms of being purely continuous and homogenous as one may find in sculpture.

The focus on space as the essential architectural problem has the capacity to hinder architectural progress in a student. Space, if continually emphasized, can call attention away from the considered development of architectural elements such as floor, wall, column, beam, window, stair, ceiling and roof. The making of elements and the study and development of architectural conditions is generally overwhelmed by an interest in space. The reduction of architecture as space may deny the existence and expansion of architecture as a specific thing with a specific character. As a teaching strategy this may call for the redirecting of attention away from overall configuration towards more tangible haptic searches. In this way a student could be led to a fruitful discovery and consideration of the qualities of bounding surfaces and the craft which physically lies beneath and supports these surfaces, what could be termed a tectonics of elevation. The development of the tectonics of architectural form may be a more operational focus in the studio than exercises on space.

THE TECTONIC TENDENCY IN MODERN ARCHITECTURAL HISTORY

Frampton's Tracing of the Modern Tectonic

Kenneth Frampton's reappraisal of the history of Modem architecture based on an idea of the tectonic rather than that of space is representative of the a-spatial or tectonic tendency that resides within modem architectural history. The tectonic is a kind of visual teleology of architecture or an architectural entelechy.[14] It indicates the bounds of the problematic in architecture from the principle of a buildings structure and means of establishing a spanned covering to a building and the expression of its' elements. It is a sense or feeling that we have for the unseen thickness' of construction inherent in buildings, a kind ofpsychology of construction. This sentient dimension of the tectonic has been eloquently stated by the engineer Eduardo Torroja in his, Philosophy of Structures in which he writes about viewing the cupola of St. Peters and imagining the thicknesses that are hidden from sight. The tectonic is then not fully disclosed by what we can see of a finished condition but is that sense we have of its architectural totality in relation to what we can see.

The origins of a tectonic reading of modern architectural history have been laid out by Frampton.[15] His detection of the significance of the tectonic sterns from Germanic thinkers such as Botticher and Semper and includes the French structural rationalists such as Viollet-le-Duc and Henri Labrouste. In Frampton's thought the formulation of the history of modern architecture as the history of the changing conceptions of the sense of space is re-directed to that of the changing conceptions of the sense of tectonics. His approach is in contradistinction to Norberg-Schulz's influential existential reading of architectural history which remains to a certain extent somewhat distant from an engagement with the architectural object itself. Frampton's rehabilitation of the importance of the tectonic in Modem architectural historiography will have a major impact on the direction of architectural education.

Frampton's shift from a spatial history of architecture to a tectonic history is based in part on the differences between painting and architecture. In an essay entitled "Rappel L'Ordre: The Case for the Tectonic," Frampton writes:

> While it is disconcerting to have to recognize that there may well be a fundamental break between the figurative origins of abstract art and the constructional basis of tectonic form, it is, at the same time, liberating to the extent that it affords a point from which to challenge

spatial invention as an end in itself: a pressure to which modem architecture has been unduly subject.[16]

The architect Bruno Taut expressed similar sentiments to those of Frampton in a criticism of Corbusier who he thought confused the issues of architecture with those of painting.'' One might add that modem architectural education has also been 'unduly subject' to these same, at times, undermining forces and that rarely have the consequences of spatial invention been assessed within architectural education and in the design studio.

TEACHING THE TECTONIC
Provisional Thoughts for the Design Studio

Studio exercises could be developed that attempt to specifically raise the idea of the tectonic. For example, a group of students could be given the same "space" with specific dimensions of length, height and breadth. The charge would be to develop the existence of architectural elements and conditions that maintain the given configuration. All students would start with the same programmatic given -a space. With the spatial outlines set in a diagrammatic fashion, the study of the considered development of the qualities and character of a room's bounding surfaces could take place. By isolating the commonality[1]* of space one could discover the particularization and differentiation that architectural form calls for.[19] Along with Hegel's admonition for the importance of the idea of the ***character*** of an architectural space is Croce who shifted the idea of art away from considerations of space and time towards its expressive and individual physiognomic aspects.[20]

Such exercises could place the idea of section in a more fundamental position in the design of a building. The section is uniquely capable of showing the scope of the tectonic in both its inner and outer aspects and its relation to place. It is the drawing that best links an awareness of gravity with a consciousness of construction. At the starting point of a project sections could be drawn not to serve as technical drawings but as fundamental moments of an emerging design. The activity of plan drawing which can tend towards unmitigated variations in shape and composition would be held temporarily in check by a sectional discipline and may later arise out of the initial section studies. This could serve to raise an awareness of construction as it relates to design and show how constructional considerations temper shape in architecture. The section as a generator of architectural form could be the primary investigation as opposed to the plan. A misunderstanding of Corbusier's idea of the plan as the generator may have caused an over emphasis on the compositional qualities of architectural plans and a devaluation of constructional qualities that plans contain. It should be pointed out that the plan should also be taught as a tectonic phenomenon, that it is a tectonic composition which is intrinsically related to the roof and the foundation.

An emphasis on the roof or covering of a building may serve to focus an awareness of tectonics in architecture. It may be possible to structure exercises in the studio in which a roof is designed first which then determines the foundation. In this way one could go from the tectonic or aerial aspect of architecture to the stereotomic or from the roof to the foundation. How often in architecture studios does one see a project without a roof? In this case the roof can only be a additive gesture, put on like a hat or a lid. The main reason for the difficulties that architectural students have with roofs may be due to not fully grasping the constructive aspects of their plans. The plan is viewed as a graphic which in most cases is rushed by direct extrusion into walls that abruptly stop. Encouraging a student to remain with the first few feet or even inches of a plan may be a way to minimize the tendency to quickly extrude a plan upwards. This may lead to some incomplete formations but at least these partial pieces may assist in developing a stronger tectonic understanding of architecture.

The idea of a building's foundation is rarely studied in the studio as an act of design. It is generally relegated to either a pure technical or structural concern. It may be possible to periodically call attention to the telluric dimension of building design. Foundation studies could be made which may lead to a better understanding and rethinlung of the plans of the building which lay above. Tadao Ando has produced such a model for an early stage of his Rokko Housing which places the foundation in context of its topography. In this way the connection of the foundation and the topographic aspects of place can be studied.

CONCLUSION
History and Education

The inevitability of the sense of space for architectural historians should not pass uncritically into architectural education. One could propose holding the effort of thinking about space in abeyance while attempting to work on more attainable goals that upon closer inspection may be more beneficial in an educational setting. When can history (in this case in the guise of architectural space) obscure learning? If spatial organization has been emphasized over tectonics in modern architectural education[2]' this is deserving of much attention and study, which could lead to a reassessment of what were the foundations of modem architectural education. The less meritorious effects of this emphasis remain relatively undetected and undiscussed. Although we may be in a period of post-modem architectural education there appears to be a value in reassessing the modem period both historigraphically and educationally.

Used in its most positive sense, as in the writings of August Scharmsow and Henri Focillon, the idea of space is part of an a-posteriori analysis and criticism of works of architecture and art, not part of the regulative basis of architectural production and the teaching of that production. The teaching of architecture has been confused and at times overridden by the necessary and rigorous historic understanding of architecture after the fact. Invoking space as an

educational concern confuses an a-posteriori method of analysis with that which is necessary to teach and learn the design of architecture. The historical imperative of architectural space is at odds with the educational freedom of the tectonic. The term freedom is here used in an architectural way rather than existentially.

Ultimately the idea of tectonics in its historical dimensions is not immune to the same criticism as that of space. It may be that *both* the idea of architectural space and tectonics fall within the historical and stylistic analysis of architecture and ultimately are judgements about built works of architecture. The ideas of architectural space and tectonics arise out of the tradition of German aestheticians which began in the early 1800's and who wrote with great subtlety about the idea of the "psychology of style."[22] In this tradition one can see a fully mature discussion of space and tectonics in architectural history in which space and tectonics are seen as sub-questions of the primary question of style and its "psychology." Both the ideas of architectural space and tectonics were imbued with an animate psychic reading. This came in a period that lead to the advent of the next new style, the International Style, which introduced spatial and tectonic development.

Neither the ideas of space nor tectonics can be taken directly into an educational setting. They very well may be historical ideas not educational ideas. To make them educational one must learn how to teach them. They should not be considered directly transferable in their modes of historical existence to their modes of educational existence. The understanding that we have regarding the differences and relations between the ideas of architectural history with those of architectural education needs to be developed to a far greater extent than has previously been the case.

Perhaps the Italian philosopher Benedetto Croce(1866-1952) has given a direction for continued inquiry. In his *Aesthetic* (1902) he made the distinction between history and art (although both are forms of what he calls intuition or expression) as that between the actual, what is, and the possible, what may be.[23] An historian must deal with the actual in terms of what happened whereas an educator attempts to put a student in the best position to make something happen. The possibility of expression which is art is very much akin to the promotion of the ethically possible an educator makes available to a student. We teach the architecturally possible which can find great support in but not be fully determined by the actual, for this would take away the freedom of a student.

NOTES

[1] Precursors to the work of these historians are the writings of August Schmarsow(1853-1936), Alois Riegl(1858-1905) and Heinrich Wolfflin(1864-1965). Frankl's, *Principles of Architectural History* (1914) is dedicated to Wolfflin and Giedion cites Wolfflin as a mentor. Following Giedion would be the writings of Colin Rowe and Robert Stultzky who attempted to expand and make more precise a pedagogic vocabulary of space.

[2] See, Cornelius van de Ven, *Space in Architecture: The Evolution of a New Idea in the Theory and History of the Modern Movements* (The Netherlands: Van Gorcum, 1987, third edition). See also his entry *"The theory of space in architecture,"* in, Ben Farmer and Hentie Louw, editors, *Companion To Contemporary Architectural Thought* (London and New York: Routledge, 1994), pp.357 -360.

[3] Bruno Zevi, *Architecture as Space: How to Look at Architecture*, trans. Milton Gendel(New York: Horizon Press, 1957). See Chapter 5.

[4] See, *Empathy, Form and Space: Problems in German Aesthetics, 1873 -1893*, trans. Harry Francis Mallgrave and Eleftherios Ikonomou (Santa Monica, CA: Getty Center For The History Of Art And Humanities, 1994), pp.281-297. This is a translation of Schmarsow's lecture entitled, "The Essence of Architectural Creation,"(1893). In this lecture he states that the; "...history of architecture is the history of the sense of space, and thus consciously or unconsciously it is a basic constituent in the history of worldviews."

[5] Zevi, p. 32.

[6] Ibid, p. 28.

[7] Ibid, p. 47-48.

[8] Ibid, p. 49.

[9] See, Werner Seligmann, "The Texas Years and the Beginning at the ETH Zurich, 1956-1961," *Teaching Architecture: Bernhard Hoesli at the Department of Architecture at the ETH Zurich* (Eidgenossische Technische Hochschule Zurich, Institute fur Geschichte und Theorie der Architektur), pp. 7-13.

[10] Ibid., p. 33.

[11] Ibid., p. 35.

[12] Ibid., p. 53.

[13] *Empathy, Form and Space*, p.54.

[14] If architecture exhibits purposesiveness and a mode of actualization perhaps the tectonic is an avenue to these and other philosophical ends.

[15] The most important writings are, "Towards a Critical Regionalism: Six Points for an Architecture of Resistance," *The Anti-Aesthetic: Essays on Postmodern Culture*, ed. Hal Foster (Port Townsend,Wash.: Bay Press, 1985), pp. 16-30; "Rappel a' L'Ordre: The Case for the Tectonic," New Architecture: The New Modems & The Super Modems, *Architectural Design* 60, no. 3-4 (1990), pp. 19-25. See also his recently published *Studies in Tectonic Culture*.

[16] Frampton, "Rappel a' L"Ordre: The Case for the Tectonic," p.20.

[17] Peter Collins, *Changing Ideals in Modern Architecture: 1750-1950* (Montreal: McGill-Queens University Press, 1965), p. 284.

[18] John P. O'Neill, ed., *Barnett Newman: Selected Writings and Interviews*, (Berkeley: University of California Press, 1992), p. 175.

[19] See, G.W.F. Hegel, *Lectures on Fine Art*, trans. T. M. Knox, vol. 2, (Oxford: Claredon Press, 1975), p. 686.

[20] Benedetto Croce, *The Aesthetic as the Science of Expression and of the Linguistic in General*, trans. Colin Lyas (Cambridge: Cambridge University Press, 1992), p.5.

[21] Bernard Hoesli has remarked on the change instituted by Heinz Ronner(1924-1992) at the ETH in Zurich toward the idea of construction. Hoesli viewed this as a new and promising possibility quite distinct from his spatial approach. Despite Ronner's considerable efforts his approach to the tectonic was fundamentally technical in nature. Mies van der Rohe's influence at IIT should be mentioned as having a decidedly tectonic and more poetic emphasis.

[22] See, Whilhelm Worringer, *Abstraction and Empathy: A Contribution to the Psychology of Style* (1908) and Heinrich Wofflin's dissertation, "Prologemena to a psychology of architecture,"(1886), translated in, *Empathy, Form and Space*.

[23] Benedetto Croce, Op. cit. , p. 33.

This essay is dedicated to the memory of Professor Olivio Ferrari.