Borrowing Architectural Theory: Fissures In The Simulation Of Coherence

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ABSTRACT

An investigation of the translation and application of theoretical ideas from deconstruction, molecular, biology, and fractal geometry in Peter Eisenman's Frankfurt Biology Laboratories project as a case study to assess possible difficulties in such borrowing. Each borrowed concept is considered in both its original and architectural context. Alternative critical views toward the possibilities and role of borrowing in architecture are proposed and discussed.

INTRODUCTION:
BORROWING AS A PHENOMENON

Borrowing, appropriation, recontextualization, and displacement[1] might each be employed, depending upon one's perspective, to describe the shifting of mature schemes of thought developed in one disciplinary context to another. As a coherent body of thought, the borrowed scheme often brings with it its own vocabulary, adherents, and critics. Tension often develops between the initiates and those previously unaware of the new position and its terminology. The confusion, excitement, and opportunity generated by the recent introduction in architecture of ideas associated with the philosophic movement known as deconstruction make this a particularly appropriate moment to review the circumstances of borrowing.

This study will focus upon one un-built project, the Biology Laboratories for the J.W. Goethe University in Frankfurt, by Peter Eisenman, in which links to deconstruction, microbiological processes, and fractal geometry are all explicitly acknowledged in a detailed descriptive text, as a vehicle for this exploration. Eisenman proposed a double articulation interpreting both biological and architectural conditions geometrically, in the process "deconstructing" the conventional assumptions surrounding them to create "a project that is neither simply architectural nor simply biological, but one suspended between the two."[2] The references to deconstruction, molecular biology and the geometric operations will each be considered in the contexts of both their source and their architectural manifestations. The evidence thus gathered will be considered in its impact upon the possible evolution of attitudes toward borrowing in architecture.

WHAT IS DECONSTRUCTION?

Is it a style, a theory, or a method? In the view of its foremost proponent, Jacques Derrida, deconstruction is none of these: "Deconstruction is not a method and cannot be transformed into one."[3] It is rather to be considered a condition, a practice, a sensibility, a habit of looking for the ways in which formal structures undo themselves through the oppositions of their constituent and essential elements. It is a continuous process of framing and re-framing events. It derives from the traditions of semiotic analysis of meaning and represents a break with the practice of structural analysis (in fact some would say that deconstruction and poststructuralism are synonymous). Terry Eagleton has concisely described its tenets:

"Deconstruction...has grasped the point that the binary oppositions with which classical structuralism tends to work represents a way of seeing typical of ideologies. Ideologies like to draw rigid boundaries between what is acceptable and what is not, between self and non-self, truth and falsity,...reason and madness, central and marginal.... Such metaphysical thinking...cannot be simply eluded: we cannot catapult ourselves beyond this binary habit of thought into an ultra-metaphysical realm. But by a certain way of operating upon texts -- whether 'literary' or 'philosophical' -- we may begin to unravel these oppositions a little, demonstrate how one term of an antithesis secretly inheres within the other. Structuralism was generally satisfied if it could carve up a text into binary oppositions (high/low... Nature/Culture and so on) and expose the logic of their working. Deconstruction tries to show how such oppositions, in order to hold themselves in place, are sometimes betrayed into inverting or collapsing themselves, or need to banish to the text's margins certain niggling details which can be made to return and plague them. The tactic of deconstructive criticisms ...is to show how texts come to embarrass their own ruling systems of logic; and deconstruction shows this by fastening on the 'symptomatic' points, the aporia or impasses of meaning, where texts get

into trouble, come unstuck, offer to contradict themselves..."

"There is a continual flickering, spilling, and defusing of meaning ...which cannot be easily contained within the categories of the text's structure, or within the categories of a conventional critical approach to it. Writing, like any process of language, works by difference; but difference is not itself a concept, is not something that can be thought. A text may 'show' us something about the nature of meaning and signification which it is not able to formulate as a propositions, All language, for Derrida, displays this 'surplus' over exact meaning, is always threatening to outrun and escape the sense which tries to contain it ...The advent of the concept of writing, then is a challenge to the very ideal of structure: for a structure always presumes a center, a fixed principle, a hierarchy of meanings and a solid foundation, and it just these notions which the endless differing and deferring of writing throws into question."[4]

Deconstruction thus throws into question the assumptions of originary authority upon which, ultimately, our entire culture appears to rest. Another definition, this time from a critic of deconstruction, Richard Rorty, further probes both its tactics and apparent differences from previous forms of analysis:

"It takes a lot of hard work to produce such special effects as 'presence is just a special case of absence' or 'use is but a special case of mentioning.' Nothing except ingenuity stands in the way of any such recontextualization, but there is no method involved, if a method is a procedure which can be taught by reference to rules. Deconstruction is not a novel procedure made possible by a recent philosophical discovery. Recontextualization in general, and inverting hierarchies in particular, has been going on for a long time."
"But why does it sound so shockingly different when Derrida does it, if it is just dialectical inversion all over again? Simply because Derrida makes use of the 'accidental' material features of words, whereas Hegel,...still stuck to the rule that you cannot put any weight on words' sounds and shapes."[5]

Deconstruction and architecture could thus be expected to have an intense relationship, of interest to persons in both fields. Why? Because architecture, of all the arts, is a continuous tangible presence in the world, one which is of necessity constantly being recontextualized in many ways simultaneously both by our perception and by the processes of building and altering the environment. Architecture also has multiple systems of meaning, including both patterns of use and associational imagery. The Frankfurt Laboratory was designed and described in pursuit of this relationship.

FRANKFURT LABORATORIES:
DECONSTRUCTIVE REPRESENTATION

In his description of how his architectural process is influenced by deconstruction, published after the Lab project, Eisenman makes an astoundingly un-Derridian claim of authority for deconstruction:

"...it is possible to propose an architecture that embraces the instabilities and dislocations that are today in fact the truth, not merely a dream of a lost truth."[6]

This unvarnished zeitgeist argument is an inauspicious starting point for the application of a theory which undermines the very idea of truth. It does reveal (perhaps, inadvertently) the rhetorical technique of dismissal by means of a straw man. In this case the rest of architecture is dismissed as concerned with a search for the "lost truth".

That this project was widely understood by others as concerned with deconstruction is further demonstrated by its presence in the MOMA exhibition "Deconstructivist Architecture" and in Mark Wigley's comment about it: "the Frankfurt Project similarly attempts to undermine presence..."[7] Wigley reveals implicitly the deconstructive aesthetic project: to design an object which demands to be categorized, and simultaneously resists that categorization and therefore throws any foundation or assumption upon which it might appear to be based into question.[8]

Eisenman's claims for the project itself are epitomized in the following:

"As biology today dislocates the traditions of science, so the architecture of the biology center dislocates the traditions of architecture."[9]

The implicit symmetry raises several problems. Is a "dislocating" architecture only appropriate for a "dislocating" science? What then of other sciences, or non-dislocating activities, if there are any? The tendency toward iso-morphism is

both clear and un-apologetic. If we assume that this is merely an excess of rhetorical zeal, and that we can indeed build "deconstructive" buildings for other than dislocating sciences, the statement is still problematic. Which traditions are dislocated? Some? All? Deconstruction comes from a tradition of thought that is traced to Hegel by virtually all of its proponents, presumably that tradition is privileged. Deconstruction is indeed concerned with the dominance of one term of an opposition at the expense of the other. It often seeks to find and rehabilitate the suppressed element, the "other," but also to avoid the trap of simply reversing the roles of dominance and suppression.

The focus upon the translation of biological and architectural ideas to geometric analogues is both central to Eisenman's project and the problems it creates.

FRANKFURT LABORATORIES: BIOLOGICAL REPRESENTATION

The geometric interpretation of biological process is described by the architect:

"While architecture's role is traditionally seen to be that of accommodating and representing function, this project does not do that. Rather than simply accommodating the methods by which research into the biological processes is carried out, it articulates those processes themselves." [10]

To suggest that the project neither accommodates nor represents function surprises on two levels. First, it appears to be untrue with respect to accommodation, and second, it seems to be unaware semiological thought which tells us that meaning is inescapable. Rather than describing that which the project "does", it appears to reveal the architect's intent, which is quite another matter. The commentary attempts to deny the representational aspect of architecture by referring, instead to an "articulation". But what then of articulation which is commonly understood even as a demonstration and clarification (as in the articulation of a joint), even an exaggeration of the thing articulated? This is perilously close to representation. A disturbing equivalence has been implied between deconstruction as a method of dislocation, and the process of DNA replication, which is, of course, despite the possibilities of gene splicing and recombinant development, the primary means by which biological order is maintained.

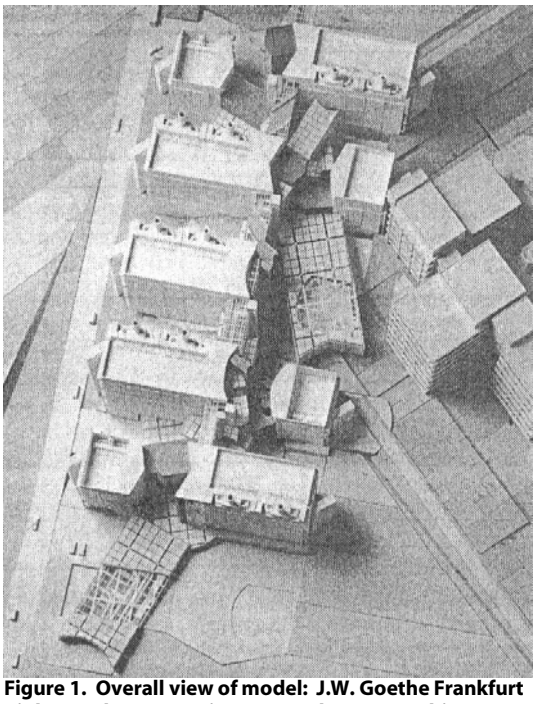


Figure 1. Overall view of model: J.W. Goethe Frankfurt Biology Laboratory, Eisenman Robertson Architects, 1987. Note the "lock and key" shapes of the laboratory blocks. See figures 3-6 for parallels between architectural translation and biological notations.

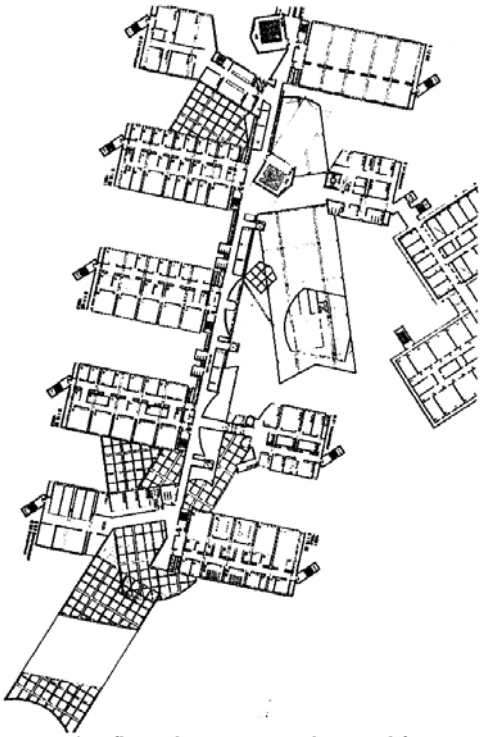


Figure 2. First floor plan: J. W. Goethe, Frankfurt Biology Laboratory. Note "lock and key" shapes at three different scales, demonstrating self-similarity.

Figure 3. J.W. Goethe Biology Laboratory: Diagrammatic drawing illustrating "lock and key" elements prior to shifting.

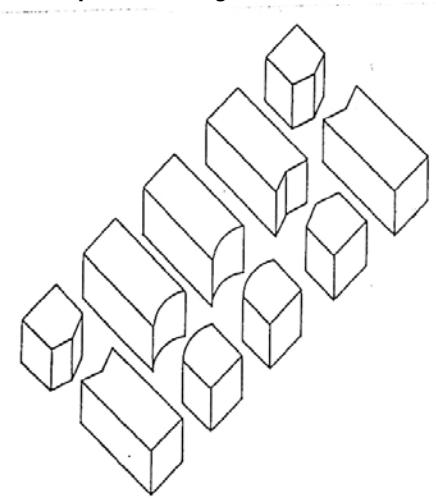
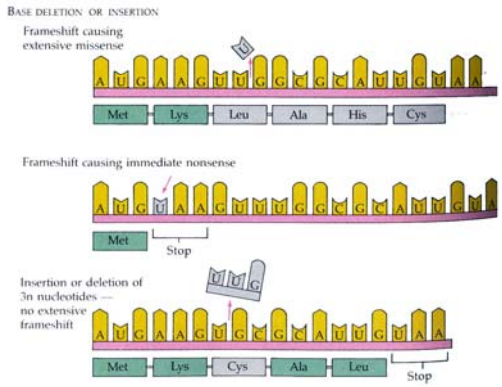


Figure 4. DNA Process Diagram from College Level Biology Text. Note use of language evocative of formal relations: "frameshift", "missense", "nonsense".



The peculiarity of the visual/procedural metaphor between DNA and the building form can be further revealed through exploration of the representational techniques currently employed in molecular biology. The processes of DNA replication, transcription, and repair are often represented through the use of a key and lock metaphor, showing how the DNA strand elements will only accept their reciprocals. (See figures 3, 4, 5, and 6. compare concave, convex and triangular surfaces) The actual process involves three dimensional molecules, and does not "look" like the two dimensional lock and key graphic which is in itself a simplified version of a simple mechanical concept. This aspect of the composition of the project is thus based upon the adaptation by an architect of a two dimensional diagrammatic representation derived from the depiction of a simple mechanism which has been adapted by biologists for the two dimensional representation of a three dimensional (and microscopic) process.

Examination of representation in the field of the molecular biology reveals a tremendous emphasis on three dimensional form. (Advanced 3D computer graphics equipment is often used to create such representations). The language is filled with provocative formal descriptions of molecular structures and process s replete with such terms as "jellyroll"[11], "Greek key beta-barrel structural motif"[12], and "supercoiling"[13]. Since many formal principles exist in molecular biology, how would one choose a particular architectural association?

The choice must be a matter of judgment, a selection from among many available representational motifs. It therefore has within it both the risks and the rewards of the exercise of aesthetic judgment (taste).

FRANKFURT LABORATORY:
FRACTAL REPRESENTATION

Eisenman described the role of fractal geometry in the process of double articulation:
"To accomplish this we first departed from the traditional representation of biology by making an architectural reading of the biological concepts of DNA processes by interpreting them in terms of geometrical process. At the same time, we departed from the traditional representation of architecture by abandoning the classical Euclidean geometry on which the discipline is based in favor of a fractal geometry."[14]

The redundant adjective "classical" leaves the reader in no doubt as to Eisenman's opinion of Euclidean geometry. An astounding statement follows in which architecture is said to be based upon "classical Euclidean geometry". Here again the straw man technique is employed to dismiss the entire profession as focused upon the realization of pure Euclidean solids. There is a sliding of meaning here which is most curious and somewhat casual with respect to both mathematics and geometry.
Fractal geometry concerns itself with geometric descriptions of the complex fragmentations of edges, as in clouds, mountains, coastlines, etc. Their key property is self-similarity, or invariance with respect to scale, and they are considered to be different from the Euclidean solids.[15] As in the case of

biological reproduction, there is a tremendous range of fractal exploration, a significant portion of which is directed toward the exploration of methods of representing complex three-dimensional natural forms through the use of mathematically generated graphics. The issue of choice and taste is again unavoidable.

Thus no built project, not even Frankfurt, can escape the Euclidean world, which is defined as "geometry based on the three-dimensional space of experience".[16] The strange demands placed upon fractal geometry are better understood when considered in the context of the deconstructive intentions of this project, particularly the undermining of "presence".

The use of fractal geometry as a system to define complex and fragmentary forms is problematic in the light of both deconstruction which warns us to suspect the origin of any system, and in light of extremely complex forms found, for example, in vernacular architecture or urban plans both of which continue to be well documented in the "geometry of experience". The aspect missing in these examples and supplied by fractal geometry is the generative. It appears that fractal geometry not only describes the undermining of presence, but is also the generator of it!

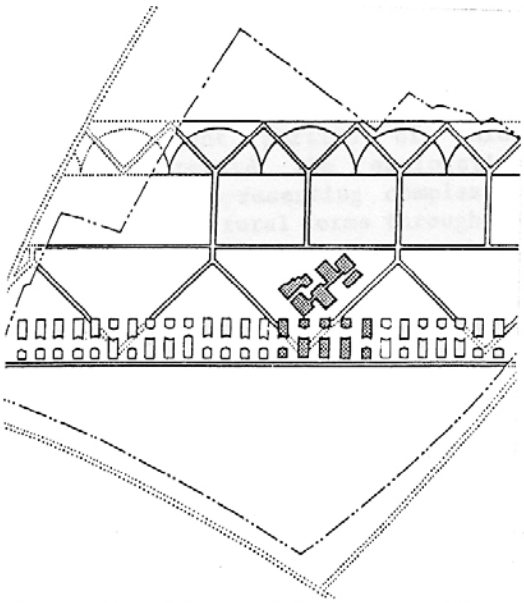


Figure 5. Biology Laboratory. Site and Master Plan. Note use of DNA representation.

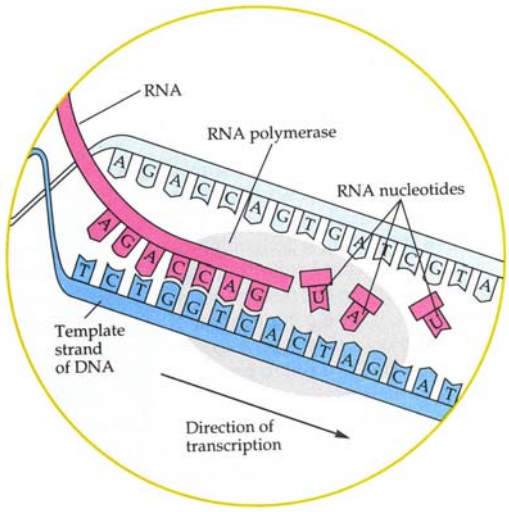


Figure 6. DNA/RNA Transcription Process. Illustration from College Biology Text. Note "Lock and key" representation and random characterization of RNA nucleotides.

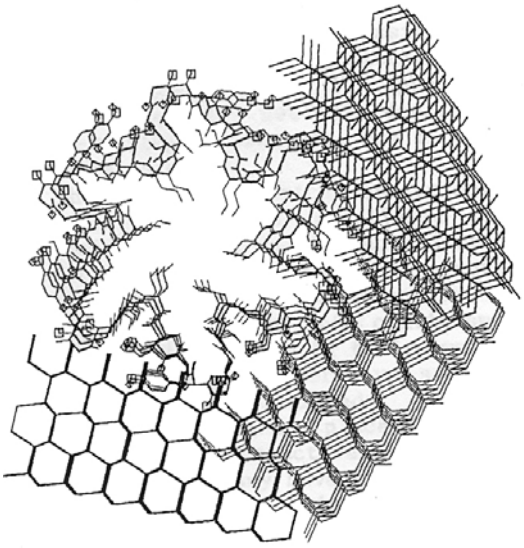


Figure 7. Computer-aided biological illustration. Ice-nucleation protein. Note: Complex formal characteristics.

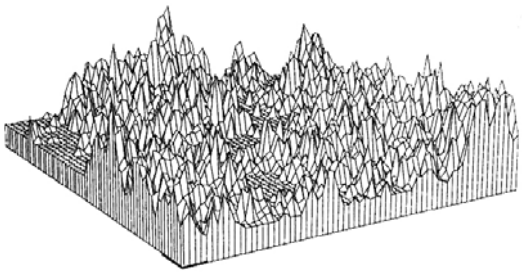


Figure 8. Fractal development of mountain topography. Note: Complex and random quality.

The use of geometrical operations as a source of form is paralleled in the consideration of deconstruction not as a critical structure, but as a generative structure. Some deconstructors would advise that works of criticism are creative enterprises in their own right, and the critical /generative split is a false one, designed to "keep deconstruction in its place." Certainly works of deconstructive criticism are creative, and many have their own strong character, but the process of deconstruction demands the existence of elements whose flaws it can then demonstrate. How are these elements to be produced?

Eisenman's answer is that these elements are to be geometricized representations of programmatic or associational meaning. The limitations of this approach to either architecture or the application principles from deconstruction are obvious. Although all architecture is reducible to geometric descriptions of its physicality, geometric variation, particularly of a systematic nature, does not necessarily produce architectural meaning. It is hard not to conclude that Eisenman has associated presence in architecture with the conventional geometry of building and therefore feels that presence can be undermined by the altering of this geometry.

If geometry is again the generator, as it was the Renaissance, what then becomes of other circumstances of meaning which might invite deconstructive analysis? Use, historical association, and cultural meaning do not lend themselves to primarily geometric analysis. Nor do complex interactions which blend the geometric and the perceptual such the qualities of edges, or the orchestration of movement lend themselves to diagrammatic (and largely two-dimensional) geometric transformation. Beneath the deconstructive intent of the Frankfurt laboratories lies a purification of the non-geometric from architecture.

Compare the thrust of these propositions with Wittkower's explication of the intentions of Renaissance architecture:

"The conviction that architecture is a science, and that each part of building, inside as well as outside, has to be integrated into one and the same system of mathematical ratios, may be called the basic axiom of Renaissance architects ....As man is the image of God and the proportions of his body are produced by divine will, so the proportions in architecture have to embrace and express the cosmic order. [emphasis added] But what are the laws of this cosmic order, what are the mathematical ratio that determine the harmony in macrocosm and microcosm?"[17]

Could the methodology of the design for the biology laboratory be described by the following rewrite of the emphasized phrase: "So the proportions of architecture have to embrace and express the fragmented order of society today?" or: "So the proportions of architecture have to embrace and express the dissolution of simple forms representing molecular biology through the use of fractal geometry?"

ATTITUDES TOWARD BORROWING

Peter Collins articulated the traditional view of the academic profession on the linkage of architecture and literature in 1965, and the tenor of much conservative academic criticism of deconstruction in architecture has taken on a similar character:

"The influence of the allied arts on architectural design raises ethical problems of considerable gravity, for what this influence can bring about, and undoubtedly has brought about, certain benefits, it can also vitiate the nature of architectural creativity by leading to the production of forms which are not strictly architectural [emphasis added] at all.... But it seems nevertheless fair to say that when the allied arts have exerted an excessive or even predominant influence on architectural design, the result has often been pseudoarchitecture, in the sense that it is difficult in such instances to tell where the genuine tectonic virtues [emphasis added] of the work are to be found... But if the artistic merit of a building depends mainly on literary romantic allusions, ... it may be reasonably argued that such buildings are not architecture at all but whimsically conceived constructions disguised in the borrowed aesthetic trappings of another art."[18]

From a deconstructive point of view, Collins's text is dripping with ties to assumed metaphysical authority. He refers, without definition or clarification, to "forms which are not strictly architectural". Clearly there is an assumed, and privileged condition of "being architectural," which the particular production he is criticizing is outside. This is an effort to draw a boundary, but, funny to say, the words

do not define one, rather forcing us to assume it through our own interpretation of the word "architectural".

Reference is also made to "genuine tectonic virtues". Here the quest for authority has run into a little difficulty, surely indicated by the appeal to the moral value of truth implied in the word "genuine". What are the implicit alternatives. necessary for this statement to carry meaning? What is a non-genuine tectonic virtue? What is a genuine, non-tectonic virtue? Each of these realms is necessarily an implicit creation of the original statement, and the understanding of each is necessary for the original statement to have meaning. Collins is here aligning himself with many other critics including, Quatremere de Quincy[19], Demetri Porphyrios[20], and Kenneth Frampton[21] in defining the natural or distinctive system of architecture as the tectonic.

It should thus be apparent that Collins's view of borrowing does not provide an adequately secure base from which to criticize deconstruction in architecture.

ASSESSMENT

If architecture is at all a system grounded in any "reality" of experience and nature, then a deconstruction of its language cannot proceed from an assumption of total arbitrariness. This is the issue which the deconstructionists take up with respect to phenomenology. At the same time, if architecture is a totally arbitrary system of meaning, then it should be possible to eliminate all natural or quasi-natural elements from it. The implications of these two positions may indeed be the very attraction architecture presents to Derrida and an explanation of his interest in working on architectural projects with Peter Eisenman and Bernard Tschumi. (Indeed, Derrida's interest in issues of geometry is evident in that his first published work was a new "Introduction" to Husserl's "On the Origins of Geometry."[22] His ambiguous relations with phenomenology are well known) It would further explain Peter Eisenman's fierce efforts to undermine both function and natural structure in architecture, essential preconditions for any effort to privilege the arbitrary.

If the borrowing of deconstruction in architecture examined herein and the traditional modernist's critique of borrowing are both suspect, where does one turn for clarification? Could it be that something is being missed in the conceptualization of architecture which would illuminate this impasse? Alan Colquhoun has proposed a view of architecture analogous to music in which he sees architecture as both a natural and an arbitrary system:

"The application of the linguistic model to the arts resulted in a certain confusion, for it could be interpreted in one of two ways: as a syntactics that was 'empty' or as a semantics that was 'full'. Neither of these interpretations contradicts the notion of the arbitrariness of the signs. Nor do they necessarily exclude each other, since one is concerned with the signifier and the other with the sign (signifier + signified) as an object of attention. But, I would argue, it is the second of these two interpretations that applies to architecture, a position best justified by Levi-Strauss in his discussion of ...music. ...In music, meaning (that is, 'musical' meaning) is only imaginable if the sonic material has already been given a structure; no meanings can only emerge as modifications of an inherited structure. Now in music the basis for any such cultural structuration already exists in the natural degrees of dissonance. I would argue that a similar basis exists in architecture and that, therefore, architecture, like music, is both a natural and an arbitrary system."[23]

Deconstructive thinking would thus be most useful in any part of architecture concerned with arbitrary systemic forms of meaning. This limitation would of course be resisted by most deconstructors as the establishment of a "protected" natural system of meaning. Is there a way to get beyond this second impasse?

The anthropologist Clifford Geertz, writing about art as a cultural system, expressed the magnitude of the task in the following:

"...the notion that the mechanics of art generate its meaning, cannot produce a science of signs or of anything else, only an empty virtuosity of verbal analysis.
If we are to have a semiotics of art (or for that matter, of any sign system not axiomatically self-contained), we are going to have to engage in a kind of natural history of signs and symbols, an ethnography of the vehicles of meaning."[24]

In architecture these vehicles of meaning might include complex associations between "natural" and "arbitrary" elements; associations which would of course be time dependent and

subject to many forms of variation. A continuing difficulty in the culture of architecture is its resistance to any deepening of the ethnography of its elements of meaning through its continuing focus upon superficial aspects of architectural experience. Such an ethnography would enrich the condition of borrowing and would be able to define contexts of meaning beyond the geometric.

And finally, what then of the original question of borrowing? The interaction of mutually distant modes of thought is, or should be, a feature of intellectual life. The problem cannot be the existence of borrowed ideas. As John Griffiths points out, borrowing creates unique conditions which do not jibe with either the source or destination discipline when he writes of deconstruction in architecture:

"Almost every interested party will find fault with any account of the concept and its history with respect to the visual arts. That, in a way, is as it should be. Works of art often have the oddest relations to the ideas which they cite, manipulate, and even proclaim as their origin and goal. Measured by the yardstick of loyalty to the supposed originating philosophic, theological, or political system, artworks which a number of people agree are very worthwhile are usually cheap heresies. Strange to say, however, they often would not exist, or exist in precisely that appealing way, without the impetus and sometimes correct but usually mistaken quotation of the ideological system which is their apparent structuring principle."[25]

Borrowing is thus not the problem so much as is the lack of attention to the interactions between the borrowed ideas and the natural language of architecture. In the Frankfurt project the borrowed processes have been geometricized and in the excitement of the borrowing are seen to be new when they are in fact quite limited by and derived from traditional architectural motivations. In this project, each of the borrowed fields: deconstruction, biology, and fractal geometry has alternative and potentially richer architectural linkages. The rapid translation of concepts into representations of themselves limits their architectural resonance. In trying to do this with deconstruction, Peter Eisenman may have finally hit upon the impossible borrowing, one that deconstructs any attempt to grant it privilege.

NOTES

[1] Borrowing used by Peter Collins, Changing Ideals in Modern Architecture 1750-1950 (Montreal: McGill-Queens, 1965) 32. Appropriation used by Hal Forster, Recodings (Seattle: Bay Press, 1985) 168-80. Recontextualization used by Richard Rorty, Contingency, Irony, and Solidarity (Cambridge: Cambridge UP, 1989) 134. Displacement used by Mark Wigley, "The Displacement of Structure and Ornament in the Frankfurt Project: An Interview," Assemblage 5 February 1988: 51.

[2] Peter Eisenman, "Biology Center for the J.W. Goethe University of Frankfurt, Frankfurt am Main, 1987," Assemblage 5, February 1988: 30.

[3] Jacques Derrida, "Letter to a Japanese Friend," Derrida and Difference, ed. David Wood (Evanston: Northwestern UP, 1988) 3. The letter is dated 10 July 1983 .

[4] Terry Eagleton, Literary Theory (Minneapolis: U of Minnesota P, 1983) 134.

[5] Rorty, 134.

[6] Peter Eisenman, "Blue Line Text," Deconstruction: Omnibus Volume, Andreas Papadakis et al. eds. (New York: Rizzoli, 1989) 150.

[7] Wigley 52.

[8] For this particular formulation I am grateful to Professor Amir Ameri.

[9] Peter Eisenman, "Biology Center for the J.W. Goethe University of Frankfurt, Frankfurt am Main, 1987," Assemblage 5, February 1988: 29.

[10] Eisenman, Assemblage 5 29.

[11] Toby Gibson and Patrick Argos, "Protruding Domain of Tomato Bush Stunt Virus Coat Protein is a Hitherto Unrecognized Class of Jellyroll Conformation," Journal of Molecular Biology 212 (1990): 7.

[12] Elizabeth Getzoff et al., "Evolution of CuZn Superoxide Dismutase and the Greek Key Beta-Barrel Structural Motif," Proteins: Structure, Function, and Genetics 5 (1989): 322.

[13] Maxim D. Frank-Kamenetskii, "DNA Supercoiling and Unusual Structures," DNA Topology and its Biological Effects, Nicholas R. Cozzarelli and James Wang eds. (Cold Spring Harbor, NY: Cold Spring Harbor Laboratory P, 1990) 185.

[14] Eisenman, Assemblage 5 30.

[15] "Fractals," McGraw-Hill Encyclopedia of Science and Technology (New York: McGraw-Hill, 1987) 391.

[16] McGraw-Hill Encyclopedia... 634.

[17] Rudolf Wittkower, Architectural Principles in the Age of Humanism (New York: Random House, 1965) 101.

[18] Collins 243.

[19] Quatremere de Quincy as quoted by Demetri Porphyrios, "Building & Architecture," Architectural Design 54.5-6 (1984) 8.
"...one art, by trenching on the properties of another, loses its own, and by aiming to be both, becomes neither."

[20] Porphyrios 30. "Consequently each art imitates reality by means of a limited range of means, materials and techniques ...architecture by means of tectonics."

[21] Kenneth Frampton, "Towards a Critical Regionalism," The Anti-Aesthetic, Hal Foster ed. (Port Townsend: Bay Press, 1983) 27 "The primary principle of architectural autonomy , lies in the tectonic..."

[22] Jacques Derrida, "Introduction" in Edmund Husserl's L'Origine de la Geometire (Paris: PUF, 1962) English translation by John P. Leavy, Edmund Husserl's Origin of Geometry: An Introduction (New York: Nicolas Hays, 1978)

[23] Alan Colquhoun, "Postmodernism and Structuralism: A Retrospective Glance," Assemblage 5 February 1988: 10

[24] Clifford Geertz, Local Knowledge (New York: Basic Books, 1983) 118. See also Tom F. Peters, "An American Culture of Construction," Perspecta 25 (1989) 158 n3.

[25] John Griffiths, "Deconstruction Deconstructed," Deconstruction: Omnibus Volume 93.

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ILLUSTRATION CREDITS

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Figure 6: Kenneth R. Miller, illustrator, Biology, Campbell 342. Permission requested.

Figure 7: Hiroshige Mizuno, "Prediction of the Conformation of Ice-Nucleation Protein by Conformational Energy Calculation," Proteins: Structure, Function, and Genetics 5 (1989) 57. Permission requested.

Figure 8: Dietmar Saupe, "Algorithms for random fractals," The Science of Fractal Images, Heinz-Otto Peitgen and Dietmar Saupe, eds. (Berlin: Springer Verlag, 1988) 99. Permission requested.