INFORMATION TO USERS

This manuscript has been reproduced from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

UMI
A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor MI 48106-1346 USA
313/761-4700 800/521-0600
Rice University

TOWARDS A COMPLEX MINIMAL ARCHITECTURE THROUGH TWENTIETH-CENTURY MUSIC

by

JAMES POWELL

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE
MASTER OF ARCHITECTURE

Approved, Thesis Committee

J. Casbarian, Director
Professor of Architecture

Anderson Todd
Wortham Professor of Architecture, Emeritus

Michael Bell
Assistant Professor of Architecture

Houston, Texas

April, 1996
ABSTRACT

TOWARDS A COMPLEX MINIMAL ARCHITECTURE THROUGH TWENTIETH-CENTURY MUSIC

by

JAMES POWELL

This thesis formulates a general theory of a complex minimal architecture, then achieves an initial manifestation by applying concepts and modulatory operations of twentieth-century music to the design of a concrete architectural object.

Complex minimalism involves the precise selection of a minimal number of concepts or forms, to which are applied a limited number of transformational processes in the service of generating a rich and meaningful architecture.

Starting with the fundamental notions of coalescence, the cloud, and comma, several sound-matter techniques of composition are analyzed, abstracted, and distilled. These notions, which include structure and ratio, are used in the selection of the materials and processes of the design project, resulting in a soft, translucent architecture of simplicity and spirit.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>THE ARGUMENT DISTILLED</td>
<td>1</td>
</tr>
<tr>
<td>Towards a General Theory of Complex Minimalism</td>
<td></td>
</tr>
<tr>
<td>Through Concepts and Operations of Twentieth-Century Music</td>
<td></td>
</tr>
<tr>
<td>To the Design of a Concrete Architectural Project</td>
<td></td>
</tr>
<tr>
<td>The Values of the New and Empathy</td>
<td></td>
</tr>
<tr>
<td>FUNDAMENTAL UNDERLYING CONCEPTS</td>
<td>4</td>
</tr>
<tr>
<td>Coalescence, or Coming Together Cloud, or Oscillation, Blurring Comma, or Gap, Interstice Contingency, or Accident, Chance</td>
<td></td>
</tr>
<tr>
<td>THE HISTORICITY OF THE SEARCH</td>
<td>19</td>
</tr>
<tr>
<td>Judgment Law Contingency and Pragmatism</td>
<td></td>
</tr>
<tr>
<td>ADDITIONAL IMPORTANT CONCEPTS WHICH HAVE INFORMED THE PROCESS</td>
<td>30</td>
</tr>
<tr>
<td>Structure and Order Clarity, Perceptibility, Transparency Spirit Scientific Images</td>
<td></td>
</tr>
<tr>
<td>TOWARDS COMPLEX MINIMALISM</td>
<td>39</td>
</tr>
<tr>
<td>Minimal Complexity</td>
<td></td>
</tr>
<tr>
<td>THROUGH TWENTIETH-CENTURY MUSIC</td>
<td>50</td>
</tr>
<tr>
<td>Concepts Common to Twentieth-Century Composition and Architecture</td>
<td></td>
</tr>
<tr>
<td>THE DESIGN PROJECT: ARCHITECTURAL QUALITIES</td>
<td>60</td>
</tr>
<tr>
<td>Proportion, Regulating Lines Translucency Opacity Glass Screen Loose Unconnectedness (Gap) Models and Digital Images</td>
<td></td>
</tr>
<tr>
<td>ENDNOTES</td>
<td>82</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
<td>87</td>
</tr>
</tbody>
</table>
ACKNOWLEDGMENTS

I would like to extend my thanks and appreciation to Professors Casbarian, Todd, and Bell, for their insightful critiques, their insistence on rigor, order, structure, and clarity, and for their encouragement and support in introducing this project into the discipline of architecture.

Deep and heartfelt gratitude is due Alex von Bidder for opening up to me the ability to visualize potentials in my mind's eye, and to accept responsibility as a consequence of decisions.

With greatest love I thank Sunday and Julian. The work of this endeavor and any successes resulting from it were made possible only through their incredible support and sacrifice.
This thesis formulates a general theory of a complex minimal architecture, then achieves a specific manifestation by applying concepts and modulatory operations of twentieth-century music to the design of a concrete architectural object.

A complex minimal approach is desirable because it resonates with, and has some relationship to, how we describe ourselves and our universe. We appreciate this architecture because we empathetically recognize in it something of the useful ways that we view humanity as well as recent discoveries concerning the operation of the natural world.

Several of these fundamental concepts which ground the thought of this work include: coalescence, cloud, comma, and contingency. These notions were derived from the initial questions of this investigation. This search for the answer to the question "How can one judge a work of architecture or a design decision?" led to a movement from an inquiry into the nature of
judgment and evaluation to that of the law and arrived at the notions of
contingency and pragmatism. Some other important concepts which inform
throughout the process of this thesis include: coalescence, cloud, and comma.

Complex minimalism involves the precise selection of an extremely
minimal number of concepts, forms, or materials. To these are applied a
select few and strictly limited number of transformational processes which
generate a complex, emergent rich, and ultimately meaningful architecture.

In this initial manifestation, a few general, conceptual qualities com-
mon to both architecture and music are identified, including structure, or-
der, proportion, and ratio. Then, as music can provide new ways about ma-
terializing notions also shared with architecture, potentially useful compo-
sitional techniques derived from analysis of twentieth-century music are
analyzed, abstracted and distilled. Such "sound-matter" instantiations, which
include the spatial cell, moiré interference patterns, and stochastic contin-
gency, have been used in the selection of both the specific concrete materials
and the architectural manipulative devices. These concepts and techniques
are then used along with the process of complex minimalism, to bring un-
predictable design to a first architectural project, with which to test the
theory/process. In a remarkably clear and even-tempered argument for the
self-conscious adoption of the "new" in architecture, John Rajchman draws
upon recent French thought to trace a line which proposes"...we may start
again the inventive task of constructing ourselves without arranging a mode
of living, the task of our freedom."¹ Architectural precedent and notions of proportion, translucency, glass, screen, and gap have been architectonically reified in the particular relationships, structures, spaces, materials, and transformational devices of the building.

The design component of this thesis stands as a material demonstration that when this method is applied to the generation/design of a concrete architectural design/project/object/form, both the structured, ordered, and rigorous, yet contingent, approximate, "soft" nature of the process and the emergent and rich order of space and forms will be clear and perceptible, in the service of a significant and meaningful architecture. This perception takes place in the realm of empathy, wherein formal structures of semblance are innately recognized across time and space:

All awareness or mental activity seems to involve the comparison of a sensed or thought pattern with a pre-existing one, a pattern formed in the brain's physical structure by biological inheritance and the imprint of experience. . . . aesthetic enjoyment is the result of the formation of a kind of moiré pattern between a newly sensed experience and the old; between the different parts of a sensed pattern transposed in space and in orientation and with variations in scale and time by the marvelous properties of the brain.²
FUNDAMENTAL UNDERLYING CONCEPTS

[We require concepts] with blurred edges... isn't the indistinct [concept] often exactly what we need?

Wittgenstein, Philosophical Investigations, §77.

The notion of a complex minimal architecture and its architectural instantiation through the techniques of musical composition has developed over a long period and is the result of a coming-together of a large number of notions and phenomena which have recently become seen as fundamental to the way (Western) humanity views itself and its role in the universe.

Although sometimes overlapping and necessarily ad-hoc, some of the theoretical observations of how human society operates and recent most useful descriptions of how the natural world operates which underlie and inform the thought of this thesis are the notions of coalescence, cloud, comma, and contingency.

COALESCENCE, OR COMING-TOGETHER

The notion of coalescence or coming-together is one of the underlying theoretical underpinnings which informs this thesis. The role of coinci-
ences, seemingly random occurrences which occur in nearby spaces and
times, and unexpected proximities of related events has come to have an
important significance. These juxtapositions are sufficient to allow events to
shape our lives, without necessarily predetermining any given outcome. This
view parallels the tendency in western thought at the end of the century to
move away from a universalistic approach. For example, one of the most
favored phrases adopted by the pragmatists is the phenomenon of "hanging
together."

"We see a complicated network of similarities intersecting and
overlapping one another - similarities large and small. I can
give no better characterization of these similarities than "family
resemblances"..." 6

Similarly, science is slowly replacing the Newtonian deterministic and
mechanistic description of the cosmos with one anchored in the irreversibil-
ity of time and the coalescence of events.
As an architectural designer, coalescence has been successfully used as a design strategy in an earlier project, in which the number ten reappeared with an unusually large frequency under a wide variety of unrelated circumstances throughout the design process. These occurrences, at once unplanned and yet "real" events, were allowed to be made thematic in the design process and the architectural form which resulted. Thus, a significant coalescence unexpectedly occurred as a unfolding of events in time, yet was consciously incorporated into the project by the designer.

Once such coalescences have been identified, it becomes one of the tasks of the architect to become sensitive to these which occur around him/her, as well as to responsibly make decisions as to which ones might allow
for those who come after to also derive meaning from them. There is thus a dual process that allows for both the randomness of existence in the world during the history of the process as well as the intent of the designer to identify and impart meaning.

The role of the coalescence throughout the conceptual work of this thesis can be seen in its reappearance throughout this investigation, including the theoretical importance of the related concept of contingency, as described below. Also, in legal philosophy, the corpus of law has been described by recent theorists as the adjudicative consequence of mutually exclusive legal values which come into conflict due to their simultaneous coalescence in society.

In musical composition, coalescences can be heard in the compositional techniques of the tone-cluster, the stochastic distribution of sound-events, and the phase shifts of overlapping tape loops, discussed in more
detail in the section on music, below. Recent discoveries in many scientific
disciplines, such as the phenomena of moiré interference patterns of light
and sonic waves, long-strand polymer formation, and the electron density
clouds which affect crystal lattice formation and growth, below, also indi-
cate the importance of the coming-together to the way we explain our world.
Finally, in the coalescence can be seen in the in the material result and the
crucial role of the accidental coincidence in the design process.

THE CLOUD, OR OSCILLATION, BLURRING

The cloud is hereby proposed as a state of existence with both iden-
tity and indeterminate boundary, as suggested by Herbert Damisch in his
Theorie du Nuages, wherein he relates the role of the cloud as that moment
which defines western perspective as a symbol of rational Cartesian thought.⁸
In all of these realms, the central element of importance is the possibility of a state of existence wherein entities can be seen as both having a definable identity and clear boundaries, and yet simultaneously having the edges of those limits gradually blur or slowly blend into the surrounding environment from which it seemingly distinguishes. Such a mode of existence points to a reconciliation between two perspectives formerly thought of as antithetical: the notion that objects are precisely definable and have strict limits which divide them from their contexts, and the view, pervasive in eastern thought, that all is one, that ultimately, it is more important that there is no distinction between things. Some disciplines which subscribe to
the first ontological view could be seen to include Cartesian and Kantian
based world-views, including Anglo-American analytic philosophy of the
first part of this century, the Linnean system of classification of natural phe-
nomena, the political, social psychological doctrines which hold that all in-
dividuals are self-actualizing, autonomous beings, and, more pertinent to
architecture, the framework for reading buildings, based on the Gestalt school
of psychology and physiology, in terms of a diametric opposition between
figure and ground.

The discipline of architecture itself has been defined as having cloud-
like limits:

. . . what we call architecture is commonly understood as a dis-
tinct discipline. That is to say, it is a practice with agreed upon
standards, techniques, and materials. It is commonly supposed
that the discipline of architecture has limits that are perceptible - if not distinguishable . . . But architecture's limits prove
elusive and theoretical attempts to understand architecture
inevitably appeal to the authority of disciplines perceived to
be more universal or nimble than architecture . . .

The shock characteristic of new forms of reproducible art is simply
the expression in our own world of Heidegger's Stoss, the essential oscilla-
tion and disorientation constitutive of the experience of art.
However, it is more important here to pursue the other problem, namely Heidegger’s approach to human existence in the technical world. In clarifying this problem we may uncover something of importance regarding the disorientation and oscillation intrinsic to aesthetic experience in late modernity, and this may help us to develop those elements in Benjamin’s proposals that have so far remained implicit. (In passing, we might note that both Heidegger and Benjamin draw on Georg Simmel’s description of human existence in the modern metropolis.) Gianni Vattimo, in commenting on the passages of *Identity and Difference* and *The Question Concerning Technology* reveals the vibrating nature of art:

> Art is constituted as much by the experience of ambiguity as it is by oscillation and disorientation. In the world of generalized communication, these are the only ways that art can (not *still*, but perhaps *finally*) take the form of creativity and freedom.¹²

Finally, twentieth-century music has been heard as “a dense cloud of
sonorous material in movement¹³

**COMMA, OR GAP, INTERSTICE**

The notion of the gap or interstice began as one of the major theoretical devices guiding the thinking of this work, and has come to permeate the spirit of the entire thesis, on a conceptual level, as a means of organizing the text, and throughout the design phase, being both a powerful design strategy as well as an important formal device in the built embodiment of the idea. The gap, as the third term in this series, can be seen on a conceptual level as an extension of the cloudlike nature of things when collected together under the phenomenon of coalescence. Things brought into juxtaposition cannot ever be made to perfectly "fit;" there cannot be seamless matches between concepts or objects. Disjunctions are a defining phenomenon of existence; entities either don't quite meet or else overlap a fraction (a "negative" gap). It is essential to acknowledge the significant importance of these
leftover voids.

Interstices are significant in that it is in those things which are not resolvable or able to be sewn up that are the most interesting and important. The extreme closeness of entities heightens awareness of the impossibility of resolving these leftover spaces. Throughout history, gaps in the form of absences and elisions have been used to intimate the sublime, the infinite, and the perfect, if not God itself. For example, even the absence of letters in YHWH (Jahway, Jehovah, "I am who I am") recalls the perfect. Similarly, in Islam, the prohibition on depiction of Allah emphasizes his Godhood. This importance has been eloquently captured in *The Unbearable Lightness of Being*:

There is always the small part that is unimaginable. . . . between the approximation of the idea and the precision of reality there was a small gap of the unimaginable, and it was this hiatus that gave him no rest. And then the pursuit of the unimaginable does not stop. . . .

The slight, uneradicable imperfection suggests perfection itself.
Within the architectural realm, the gap as physical embodiment of the transcendental resonates with one of Le Corbusier's famous definitions of architecture as "l'espace ineffable" (ineffable space). The interstice in architectural discourse has been investigated by several who have written on the inevitable struggles that take place between the conflicting demands of architectural discipline and practice. In a passage on gaps, praxis, and meaning, Mark Linder has stated:

"... greater force lies in juxtapositions and transitions, rather than structures or figures. ... structural skeletons or figurative elements. ... are treated as relatively inert, stable elements and materials, while the edifying architectural events happen in between. This architecture finds power in the transitions and difficulties, the problems and paradoxes and, because they escape representation and containment, they are powerful only so long as we are actively remaking and spanning their missing connections."\(^{15}\)

Further comment on the disjuncts within the discipline have become the subject of a study edited by Andrea Kahn, especially her article.\(^{16}\)
This general quality of the gap or interstice has come to be referred to by the locution *comma*. This notion was suggested by Ben Nicholson, who keenly noticed the “family resemblance” between the musical *comma of Pythagorias*, the eighty/eighty-one disjunct at Michelangelo’s Library at S. Lorenzo, and the open, loose-fitting details of the so-called “Schoenberg cell” model of this design project. The comma of Pythagorias refers to a phenomenon in the musical area of intonation. The Greek mathematician devised a system in which strings were tuned based on the pure length ratios of 1:2, 2:3, and 3:4, which were held to resonate with the mechanisms of the cosmos. However these “perfect” intervals, when extended separately over several octaves, came into conflict, causing the same note to be out of tune in the proportion of 7,153/524,288 (approximately one-quarter of a half-step interval), which led to several significant tonal problems. The difficulties, including transposition and “wolf/howling” intervals, were only resolved in the sixteenth-century by equal-, or well-tempering (hence, the added significance of Bach’s *Well-Tempered Clavier*). This difference, or comma, illustrates the incommensurabilities within all systems, especially “perfect” ones as well as the impossibility of reconciling pure mathematical ratios with material, natural events.17

The second occurrence of the comma noted by Nicholson sprang from his own research, in which he discovered two contradictory sets of tile patterns under the monks’ desks in the long room of the Laurentian Library.
Further investigation revealed that the number of tiles on one side of the aisle was eighty, on the other side, eighty-one. The significance of this is believed to lie in the ancient Greek lemma, a numerological diagram which depicted numbers based on the 1, 2, 4, \ldots series on one leg of an "open" triangle, and the series 1, 3, 9, \ldots on the other. In this manifestation of the comma, the incompatible symbolizes the infinite.

Lastly, Nicholson saw the openness of the slightly shifted platform frame as suggesting a reification of the comma. This coalescence of related manifestations provided meaning and force to the adoption of the term comma as particularly suited to this work.

Theorization the of cut, has been developed by the author in an earlier series of posted leaflets distributed under the pseudonym, je coupe (French, "I cut"). These early formulations operated under the general spirit of finding, or making, both surgically and crudely, cuts or disjuncts, in the existing quotidian architectural discourse around and about the School of Architecture.¹⁸ This thesis itself has developed within the interstices between certain main concepts: judgment, law, structure, contingency, and music.

In mathematics, especially as it bears upon architecture, the gap is expressed in the form of irrational numbers, or the way two competing systems, such as the metric and English systems, never quite meet. Likewise, in art, Leonardo's Vitruvian Man acknowledges the impossibility of squaring
the circle in the two tiny triangular spaces at the fingertips.

Musical commas include the aforementioned comma of Pythagoras, the dissonant Schoenberg chord, with its half-tone intervals, and a comment on the contemporary music of Darius Milhaud: "There was an imperceptible pause in the syncopation, a careless catch in the breath, a slight hiatus..." These musical interstices have been reified in the design component in the loosely apart detailing of the basic cell, the interstitial mass studies, and the close similarities of the eleven and twenty-two foot dimensions to the standard twelve foot module.
CONTINGENCY, OR ACCIDENT,

CHANCE

The role of contingency, although used in the extreme in mid-century musical compositions, has been refined to allow both the hand of the designer as well as remaining open to the visissites of chance. In this project, the repeated occurrences and multiple meanings of cell, cage, and Glass, glass, glas, have contributed significance to the project.
THE HISTORY OF THE SEARCH

Pragmatists...dissolve objects into functions, essences into momentary foci of attention, and knowing into success at reweaving a web of beliefs and desires into more supple and elegant folds.

Richard Rorty, "Philosophy Without Principles," in Against Theory

JUDGMENT AND VALUATION

One of the early inquiries driving thesis was a personal search for answer to the fundamental and seemingly simple question, "How does one judge an architectural design, both as one who perceives and experiences a building as finished object, and from within, as a decision-making designer?"

Since architecture is the great public art, experiences common to us all are the related queries: What makes good architecture? Why do I like some buildings and not others? and How does one know that this building is preferable to that? By extension of course, these questions can be seen as related to more general issues of valuation and judgment which confront us all. From the designers point of view, when one looks down at the immensely overwhelming potential of the blank sheet of white paper, how can one decide what to design? Once options are identified, is one better or worse than any other? How does one know whether any particular move is good or bad?
How can one attain the assurance of a Pierre de Montereau, who could declare during the Gothic era: "Par cy me le taille." (For me, cut it here.) Why cut the wall here and not there?

The traditional acculturation to the conventional architectural answers to such questions, while indispensable to the learning process, often leave one with the nagging suspicion that certain, more important questions and assumptions are, while not purposefully ignored, passed over undiscussed in the curriculum. Some of these conventional frameworks for judgment progress in complexity and sophistication, and their usefulness to understanding is essential. These typically include general criteria, such as straightforward description, exegesis and analysis in the traditional art-historical manner. Following this, the student learns to construct interpretive frameworks ("theory") and may further develop these by bringing in a questioning of implied values ("critical theory"). Additionally, conceptual philosophical systems may be introduced to further bring criteria for architectural evaluation into line with the main streams of Western thought (aesthetics).

Traditionally, architectural theory has tried to establish itself as a discipline with rules to determine the 'truth' of architecture, usually employing methods adapted from the traditions of philosophy or experimental science. Wishing to overrule the vagaries of beauty, taste, and style, architects instead proposed standards of truth, hoping to improve predictive capacity, as in science, and thus, to insure architectural success.

At this point the itinerant architect may often be left to question the relationship of these significant frameworks to even "larger" issues. In broad
terms, then, one of the implicit goals of this thesis is to continue this search for satisfactory choices of value judgments that relate the design and judgment of architecture to use in our daily life-world (ethics) and perhaps even metaphysical contemplation on one's relationship to the universe (spirit). In fact, as discussed below, some of the conclusions of a complex minimal practice reinforce that a personal ethical value system may not only be morally necessary as a tool with which to make architectural design decisions, but may also, in their working out reveal intimations of the sublime.

Furthermore, by keeping discussion of such issues within the realm of the discipline as traditionally defined, two other weaknesses exist: the inherent contradictions endemic to architecture would remain unresolved, and the conceptual strengths of other fields of study, which could be brought in to fruitfully buttress architectural discourse, would remain isolated. In this spirit of appreciation of the values of interdisciplinary inquiry, the questions of the selections of values and architectural judgment first turns to that discipline which maintains judgment at its very core: the law.
LAW

The search for judgmental frameworks can be greatly facilitated by an examination of law. Although a detailed investigation into the nature of legal judgment is obviously outside the scope of this work, a basis for architectural evaluation and decision-making can benefit from some of the notions developed in the legal realm.

In the first place (prima facie), it is important to know that although in quotidian practice, the law is a system of rules which attempt to govern and standardize behavior among many individuals, standing above individuals and institutions, in fact it is a human construction which is subject to theory,
ideology, and change over time and place. This aspect of Law’s performative function is drawn from Hart’s concept of Law as coercive acts. Although the state aspires to “a government of laws, and not men,” in fact, there are competing theories of law. Of course, for the law to be effective in legitimizing itself at all, it must appeal to greater or higher ideals and principles than the base self-interest of the social animal. the law must stand above, which implies a nature of purity, absoluteness, universality and timelessness, most vividly captured in the passing down of the two stone tablets directly from the hand of God. Systems of rule formulated by men, whether the case-by-case wisdom of Solomon’s rulings, or embodied in the Code of Hammurabi or the United States Constitution, appeal to universal standards, such as fairness, equality, justice, and mercy. For laws to be internally consistent and be capable regulators of societal behavior, they must not be seen as contaminated by the desires of individual men.

Similarly, in artistic judgment, frameworks for the evaluation of specific works or methods for decision-making in the design process are typically rooted in aesthetic principles, if not timeless metaphysical concepts. Architectural discourse has been permeated by such appeals, beginning with Vitruvius Ten Books, through the Scholastic arguments and form of the Gothic cathedrals, through the treatises of Alberti, Serlio, and Palladio, and, in our own day, the justification for functionalism bauhaus, and Le Corbusier’s Five Points, and even the appeal the golden section in the modulor. These
programs, and the myriad of others too numerous to mention, all share the interest similar to that of legal systems: to appeal to absolutes beyond the meddling touch of man.

It is in this interest that theories law have usually been conceptually grounded in some version of metaphysics or another. Ideas such as truth and fairness prove to be notoriously slippery to define in terms of daily practice; while most would agree that equality is a metaphysical good, specific versions of equality are not as easily agreed upon. It is for this reason that systems of metaphysics and appeals to universals have come into doubt during this century and especially with the rise of the neo-pragmatist movement, as heralded by Richard Rorty, in the past twenty years.

There necessarily resides in theories of Law the concept that it stands above the whim and caprice of the individual whom it governs. "Justice," "equality," and "Natural Law" are only some of the terms which hierarchically stand over the Law itself, and to which the Law must appeal to assert and maintain its ostensibly neutral authority over men. However, this is in contrast to the view of rules as considered by Wittgenstein to form a family resemblance, without perfectly defining limits.31

This paves the way for more recent thinking which holds that law is inextricably tied up with individual people and is merely the post-facto rationalization of almost purely subjective decision. Jerome Frank, in Law And The Modern Mind, holds that judicial reasoning is not the basis of decisions,
judges make up their mind, "reasons" are rationalizations, and judges may utilize their mastery to rule either way. These problems, inherent in the metaphysical nature of these constructs, have been elucidated in recent years by the Critical Legal Studies movement of Roberto Unger and his followers. In a similar vein, Judge Posner’s Law and Economics school offers insight into the nature of any judgment in a capital-based economic system and its affects upon society, as expressed in the following:

"The jurisprudential distinction between the decision in a case and the dictums (the wider arguments for the decision that have no standing as precedents) means that a ... judge can avoid writing an opinion of his own; he can simply concur in another judge’s vote without being bound, in a later case, buy the other’s detailed opinions."

Certain legal concepts do resonate with attempts at architectural judgement; long-standing common-law and statutory concepts including stare decisis (fr. Lat., "Let the decision stand," or precedent), ratio decidendi (the “reasoning for the decision”), and the problem of the dependence on context prove useful in an investigation of Architectural principles. This contingent relationship of architecture and law is eloquently stated by Elysabeth Gamard:

Law: “a judgment of authority imposed to safeguard property, morality, the tenets of aesthetics, taste, origins. . . . To speak of order and regulation (rhythm) is not to invoke reason or law. . . . On the contrary, order is as nature: rhythms of daily life, the genders, bodily functions. For architecture, order is realized in practice, in conventions of use, construction, the use of materials, structure."27
CONTINGENCY AND PRAGMATISM

A statement of principles for any discipline in the late twentieth century will inevitably take into account the contemporary crisis of absolutism versus relativism, which may turn out to be the hallmark of our age. The concept of Truth has become the central battleground of a bitter struggle, from the rarefied ether of academia all the way to the quotidian struggles of our man in the street as he attempts to make his way through his life in a secular, chaotic age.

A solution to the old diametrically opposed, polarized, dichotomous dialectic, has been opened up by the neo-pragmatists, most notably Richard Rorty. Fortunately, thinkers have engaged this problem for at least the last one hundred years of the post-Enlightenment era. One promising solution has been advanced by the neo-Pragmatists as led by Richard Rorty, which accepts the contingent nature of our environment (which is quickly becoming generally-accepted fact in the sciences), rejects appeals to universal, absolute, metaphysical truths as untenable, and yet, in the face of this, allows one to stand unflinchingly for one’s beliefs.
...the increase in possible information on the myriad forms of reality makes it increasingly difficult to conceive of a single reality. It may be that in the world of the mass media a 'prophecy' of Nietzsche's is fulfilled: in the end the true world becomes a fable. If we, in late modernity, have an idea of reality, it cannot be understood as the objective given lying beneath, or beyond, the images we receive of it. For us, reality is rather the result of the intersection and 'contamination' (in the Latin sense) of a multiplicity of images, interpretations and reconstructions circulated by the media in competition with one another and without any 'central' coordination.  

Truth only is what is agreed upon by a critical number of people at a certain place or in a certain constituency at a particular time; and pragmatist truth is inseparable from meaning and value. "Truth happens to an idea. It becomes true, it is made true by events."

One of the spiritual fathers of this school is Wittgenstein, who not only provides the method for "thinking around" these value-laden dilemmas, essentially by dropping them for another, more useful set of questions, but also brilliantly described the split between the usefulness of new and better language as a logical tool: "The meaning of a word is its use in lan-
and the realm of values about which we cannot speak. He is fol-
lowed by Rorty: “Vocabularies get discarded after looking bad in compar-
son with other vocabularies, not as a result of an appeal to overarching
metavocabularies in which criteria for vocabulary choice can be formu-
lated.”

Boulez has theorized the consequences of contingency in the musical
realm:

Without this provisory compass—“I am absolutely right”—he
would hesitate to venture into virgin territory. This is a sane
reflex, which allows him to reach the end of the unpredictable
periplus [voyage around; circumnavigation] which lies be-
tween him; and the completion of his work. Nevertheless, he
must be able to judge the distance he has covered along the
way, to keep track of his co-ordinates, in short, to make sure
that he does not stray from his path. I would not suggest that
the final result should be exactly identical with the initial in-
tention—what begins as a portrait may end up as a still-life.

The application of this approach to the discipline of Architecture is
critical. Linder’s formulation envisions that”
architectural theory would be understood as an activity with strong resemblances to the practice of architectural design. In other words, architectural theorists would ask what architects do, not what architecture is. The theorist would ask the same questions as the architect who designs a building. What is it for? Who is it for? How big is it? How long do we have to work on it?41

It brings a consciously thought-out approach out of the impotent and vaporous realm of inconsequential musings (except to the same handful of writers) and into the life-world of society as a larger whole. It accepts the Heisenbergian uncertainty of the environment while maintaining an ethical authority. Its hard-headed pragmatism is appropriate as Luce’s American Century both draws to a close and continues to adapt and spread. It provides a useful tool for the designer as he or she faces the impossible task of directing the built environment; allowing a defensible approach to building design decisions. Finally, it stands with its feet in the muddy clay of the real world, critical, yet recognizing the limits of its power to transform. Thus is the theoretical framework for a contingent Law proposed.
ADDITIONAL IMPORTANT CONCEPTS WHICH HAVE INFORMED THE PROCESS

Architecture depends on facts, but its real field of activity is in the realm of significance. . . . Architecture is the real battleground of the spirit
Mies, "Technology and Architecture"

STRUCTURE AND ORDER

One of the concepts which most obviously brings architecture, law, and music together into a family resemblance is that of structure. Not only does structure in the theoretical realm of some means of organizing disparate elements into some sort of framework permeate the literature in these disciplines, but obviously, the physical structure of material building elements is an irreducible component of architectural discourse.

Some of the most rigorous comments on structure in this century were formulated by Arnold Schoenberg during his search for the overcoming of the subject, which he resolved in the dodecaphonic system. In turn-of-the-century Vienna, he painstakingly worked out his compositional method guided by maxims such as, “Only within severe, almost crippling restraint do we find freedom.” The importance of structure to musical thought of our time is reinforced by this strikingly similar comment made by
Schoenberg’s diametric arch-rival in the musical community of the day, Igor Stravinsky: “The more art is controlled, limited, worked over, the more it is free.”

Similarly, in mid-century, both of the major reactionary schools in opposition to the then-established dominance of the twelve-tone technique made the problems of structure central to their projects. Pierre Boulez, the heir to twelve-tone methods, in rejecting the timidity of his forbears (“Schoenberg is Dead”), took their theories to the fullest implications. In Total Serialism, every conceivable aspect of the piece was compositionally “predetermined” according to some theoretical structure, as best exemplified in the aptly named “Structures” series.

The works of the writers of the complementary school, alternately referred to as Aleatoric, Chance, or Indeterminism were also grounded in structure. Its early member and “spiritual leader,” John Cage, has been obsessed with notions such as “truly empty rhythmic structures” throughout his seemingly dadaesque pieces. He continually emphasized this in koan-like aphorisms such as: “All sounds occur within the order of rhythmic structure. . . . a structure could encompass all sounds or no sounds at all” The purest example can be found in his seminal work, 4′33″, the score of which comprises three movements, in the most classical manner, but whose only direction reads “TACIT.” It is the ultimate example of pure “structure without content.” The music of Cage’s colleague, Iannis Xenakis, bears a simi-
lar reliance on the centrality of structure. By structuring his compositions on
the Indeterminism of stochastics, or the laws of large numbers / probability,
his sonorities have been described in the following terms: “The structure of
this music is not by any means readily apparent. It requires either a pro-
found knowledge of mathematical laws or a profound relaxed and detached
attitude on the part of the listener.”55

Architecturally, one of the guiding influences of this design project
has been perhaps the greatest proponent of structure in this century, Mies
van der Rohe. In the spirit of his own ascetic statements, the following aphi-
rorism will suffice: “The necessity for order. The regulating line is a guarantee
against willfulness.”56 The importance of structure and order for the design
project is manifested in the decision to use a defined spatial cell as the fun-
damental unit for deriving the whole, as well as the selection of a hybrid
platform-frame with glass shear panel construction system.

CLARITY, PERCEPTIBILITY, TRANSPARENCY

In a powerful distillation, three of the best thinkers on clarity are also
often the tersest. In this spirit is presented Wittgenstein’s “Whatever can be
stated at all, can be stated clearly”⁵⁷ seen as a counterpart to Schoenberg’s “Composition in twelve tones has no other aim than comprehensibility,”⁵⁸ and obviously given architectural consideration in “The office building is a house of work of organization of clarity of economy.”⁵⁹ of Mies.

SPIRIT

The realm of the spirit has hovered over this project, and, although it has consciously not been made an explicit theme, its domain has been touched upon by several of the more prevalent areas under this investigation. One traditional manifestation of the spirit is in the notion of silence, a famous and ultimate formulation of which is by the early Wittgenstein in his *Tractatus*: “One must be silent about that of which one cannot speak.”⁶⁰ The particular gift of the Viennese during this era in thematizing silence is be heard in the long, protracted absences of notes in the music of “Second Viennese School” member Anton Webern, who distilled music to the extreme. The “mute” architecture of Adolf Loos, also bears affinity to these qualities of silence, justifying his famous claim to Schoenberg, “You are me.” The spirituality of silence can be seen as far back as the era of Meister Eckhart, whose writing were not coincidentally an influence on both John Cage and Mies van der Rohe.⁶¹

Such conceptual silences are relevant to lifestyles of our era, where the “voluntary simplicity” movement and downshifting economies have
brought about renewed interest in a quiet existence. This *kenosis*, or self-emptying, is reminiscent of another great twentieth-century master of silence, John Cage, who achieved at once a “spiritual emptiness and abundance” through his adoption of Zen Buddhism in his life as well as his compositional choices. In the life-world also, quietude invokes the spiritual. One example of the incorporation of the consequences of these phenomena into the design project came in the selection of the retreat as the program for the building.

The Zen-like notion that the simultaneous co-existence of opposites symbolizes the numinous not only bears a close relationship to the ideas of the comma (in the sense of the ineradicability of overlaps) as discussed above, but also resonates with contemporary thinking on the role of creative endeavor, as posed by Massimo Cacciari:

The artistic act reveals an otherness, a conflict: But it does not resolve it, nor give consolation for it. On the contrary, it defines the space in which such conflict can emerge in all of its tones, in its most complex and at the same time, most comprehensible forms, beyond all styles, as tragedy.

Again, notions of the numinous as regards conflict recall the tragic nature of the work of Mies, whose spiritually-laden building principles of *beinahe nichts* and “less is more” served as an inspiration for the conceptualization of this thesis, even if not explicitly realized in the design component.
Moiré fringe patterns result from the conflict due to superimposition of two or more incompatible systems. The familiar optical moiré has analogues in the photography of crystalline cellular lattices, reminiscent of structural grids. The diagram of crystal deformation and screw growth patterns follows a similar form. X-ray interferometry creates these interference patterns in a manner formally related to optical building material flexion studies under stress. These inter-
acting patterns generate higher-order emergent structures, similar to the aural phenomenon of beats.
When two sonic frequencies are brought into juxtaposition, the aural results progress through a series of phase shifts, from perceptibility, through a critical band, on to indistinguishability, and then through a final period before reaching unison. This penultimate phase is marked by the presence of beats, which provide the sound analogue of the moire pattern, and which demonstrate the emergence of complex entities when even very similar structures interact.
Leibniz said that God chose a world which maximized the variety of phenomena while choosing the simplest laws. Exactly so: but the best way to maximize phenomena and have the simplest laws is to have the laws inconsistent with each other, each applying to this or that but none applying to all.

Ian Hacking, Representing and Intervening

Complex minimalism is an ad-hoc term that has come to best describe both a valid design process and a meaningful mode of ordered space. I believe it promises to be an important and significant design process because it is drawn from natural systems, while also philosophically acknowledging the impossibility of our actually copying nature or escaping from within our human state of being. As a design methodology, complex minimalism has developed from a long period of observance of similarities and relationships between natural growth processes, many of which have come to be seen as related in the past ten to twenty years, and the systems of development of human society and conventions.

In terms of a mode of structured space, it has been one of the aims of the design thesis (as well as with some earlier architectural works) to show how environments created in a complex minimal manner can simultaneously: be clearly perceived as one conceptual entity, serve useful functions which
may change radically through time, acquire meaning through daily use (in the Wittgensteinian sense), and provide satisfaction of the human spirit.

In simplest and most didactic terms, complex minimalism is minimal. A minimal number (perhaps 2, 3, or 4) of fundamental *elemental entities* are carefully chosen and precisely selected. Complex minimalism is then complex: minimal *transformational operations* (i.e., a strictly limited quantity of variables and parameters) are to be applied rigorously to the minimal initial entities, yielding a contingent, emergent, and complex product, whether this result is achieved in either the conceptual or material (and especially in this case, architectural) realms.

An overly-simple “equation” may be posited in the service of clarification:

\[
\text{minimal entities} \times \text{minimal transformational operations} \\
\Rightarrow \text{emergence of} \Rightarrow \\
\text{clear complexity, variety with order, and richness}
\]

**MINIMAL**

Regarding the development of the “minimal” side of the equation, the question of how many constitutes a minimum deserves attention. As intuition and design experience has shown, two, three, or four seem to be
roughly and generally the optimum number of elements or concepts with which to operate upon. There are several reasons for this, the first of which is the mathematical and perhaps aesthetic desire to strictly limit the amount of variables which one may modulate. Mathematically and practically, it is in the interest of narrowing the field of elements from the beginning that one can achieve at least three desirable goals.

The first is the preference of having the as yet unknown, but certainly complex, result be legible and clear, and not an unintelligible jumble. From the point of view of the human designer, by keeping the number of variables small, one can better gauge feedback from the operation during the ongoing design process, and thus retain the ability to tweak the parameters with at least a minimum of knowledge of the effects and future consequences. Furthermore, once a complex minimal composition is out of the hands of the author and is viewed and interpreted by a spectator, the critical elements under study will remain at least somewhat clear and understandable to that spectator. However, as Umberto Eco has shown us in his discussion of the hermeneutical intentio operis (the "intention of the work," as distinguished from the intentions of the author and the lectoris, or reader)\textsuperscript{64}, it should be remembered that this transparency as to the significant issues of the work does not necessarily close down the possibility of varying, and even conflicting interpretations of it; projects, like texts can remain "open."\textsuperscript{65}

The second pragmatic interest in carefully delimiting the original
entities is that of maintaining at least a certain minimum degree of control over the process. Although this amount of control may vary widely in successive trials and experiments, neither the extremes of total control nor complete abandonment are acceptable. One of the contributions of the experience of the twentieth-century is that the flaws in the idea of global, totalizing systems have been revealed. Demonstrations of the consequences of such universalizing tendencies have been theorized in Foucault's' accounts of the terror latent in epistemes of knowledge and control in the Panopticon. The political ramifications of central systems hardly needs mentioning, and in the built urban environment, open and flexible schemes have replaced the mid-century sterile spaces resulting from the tabula rasa approach.

On the opposite extreme, the strategies of abandoning decisions to chance have proven equally undesirable. During this same mid-century period, experiments in many discourses in the presumed "Death of the Author," to use Barthes' formulation, are long abandoned, such as the totally aleatoric music of Cage, determined by the chance operations of the i ching. It seems that without any control, not only do artifacts lose their relationship to humanity, denying them the empathetic power necessary for interest, but also, there are moral implications in evading responsibilities for the consequences of our acts.

A third value in maintaining only a minimal number of initial elements is the practical mathematical consideration that when even a few sys-
tems are forced into interaction, the resulting effects increase logarithmically, thus inhibiting a cogent response to feedback and hampering the ability to effectively tweak the parameters.

As mentioned, the entities selected may of equal value be drawn from the theoretical, "real world," or manipulative realms. Thus, several philosophical concepts might be brought into juxtaposition and therefore conflict. Musically, the well-known jazz polyrhythmic phenomena of opposing triple-meter schemes to four-beat measures, or the harmonic results of simultaneous overlapping chord progressions are sonic examples. Architecturally, several contradictory manipulatory, transformative systems may be brought to bear on a composition; a material example is the architectonic detailing of conflicts in actual materials of the various building systems, which when brought together, may be resolved in a number of different ways.

One value implied in these examples of superposed systems is that pure, totalizing minimalism is itself not completely satisfactory. The experi-
ments of artists such as Rothko, Ryman, and LeWitt, and composers like Reich and Glass, offer the lesson that some other element is necessary to provide a lasting satisfaction; this requirement is met by complexity.

""You may say it's just an accident, this masterpiece, and so it is! But then, so is the 23rd Psalm. Every birth is miraculous—and inspired. What appears now before my eyes is the result of innumerable mistakes, withdrawals, erasure, hesitations; it is also the result of certitude... the world of real and counterfeit is behind us. Out of the tangible we have invented the intangible. 'It is important to make sure that all the forks, twists and turns are integrated into the context; the momentary adoption of a result cannot be justified simply by its immediacy or by well chosen placing. On the contrary the result may obscure the true solution or break the internal cohesion, undoing the logic of co-ordination by refusing to be integrated with the whole. There is sometimes a deep-rooted antinomy between global and partial structures; even though the latter may have been 'foreseen as subordinates of the former, they acquire, through their own particular lay-out, an autonomy of existence, a true centrifugal force.'\(^5\)

**COMPLEXITY**

Complexity gives a kind of life to a project as growth occurs when interaction between the various elements, due in part to their internal au-
tonomous properties, and well as the role of accidents and contingencies, give rise to new structures of space at various scales. To describe the intended process simply, when a small number of entities interact, and especially are forced to have their structures come into conflict, an amazing amount of new and unplanned possibilities emerge. Several of the important phenomena to understand in greater detail include strife, exponential growth, emergent properties, and the essentiality of the unpredictable event.

Regarding strife, it is one of the central tenets of complex minimalism that control of decisions, especially regarding the initial realm of conflict, be maintained and acknowledged by the designer, while at the same time allowing for freedom and new potentials. This value is intended to be promulgated by the setting into motion of a few conflicting systems. By definition, once these entities are forced to interact in any given milieu, new and unpredictable forms of organization will almost spontaneously develop, based on the unique structures of the components, but at new and divergent scales and types. These unplanned levels of order and structure which self-organize may seem chaotic at some levels, and can be made more or less comprehensible by the designer through manipulation of the parameters. Certain areas of friction, or unresolved conflict will become apparent; it is at this point that the designer can intervene to give meaning and sense to the result of this otherwise mostly automatic process. The decisions for which the architect takes responsibility become significant due to the choice of where
and when to intervene in the unfolding process.

A second property of this resulting complexity is the exponential nature of its growth. Among the types of growth (addition, geometric, and logarithmic), the laws of permutation and combination describe how even three structures interacting very rapidly increase from three to nine to eighty-one links of relationships among relationships. As discussed above, it is for this reason that the mind and hand of the designer must intervene to insure a clear significance of the product.
The quality of emergence is one of the most interesting, as it has been a topic of great study across many scientific disciplines in the past twenty years. Related to “Chaos” and “Complexity” theory, emergence describes the phenomenon wherein higher level structures seem to spontaneously generate from the interaction of two or more simpler systems. A few well known examples include the Belusov-Zhabotinsky reaction, in which spiral patterns of organization arise from the arranged combination of a diffusion and a reaction process, or the more familiar self-organization of currents and
bubbling during the phase change of water to steam, involving Brownian motion. In the method of complex minimalism as in these processes, an architecture is "grown," partially by its being seeded by the human agent, and partially of its own "organic" internal logic of autonomous development, based on the original forms and structures.

The importance of the unpredictability of the complex event may be set down. Closely related to the central concept of contingency/accident, the conditions for freedom and growth, whether natural, political, or architectural, have been ingeniously plotted by John Rajchman. He forms a coalescence starting with Foucault's conceptual "events" and "singularity," which provide the necessary conditions for forming logically unpredictable and therefor new ways of thinking. This is linked to Derrida's "architecture of the event," which rethinks habitation in terms of "the other" which "cannot yet be named." Deleuze's concept of the "virtual," as something not yet
thinkable, "... the undefined work of our freedom" brings the political di-
mension to the cloud. The argument for the architectural new is that it

is an architecture. ... of another idea of the new. ... the altogether-
other of our invention, the surprise of what is not yet possible. ... of
which we do not yet have the concept or which we cannot
yet name. Of such novelty we are not the masters and possess-
ors. ... we can never find ourselves anywhere: our place is yet
to come, our time is yet to take place. And the question of what
is new in architecture thus becomes the question; n of having
to inhabit this other time, this other place.\textsuperscript{67}

These implications for architecture of complex minimalism have al-
ready been posited by Fumihiko Maki under the rubric "Group-Form:"

A form which evolves from a system of generative elements in
space. ... The elements and the system are reciprocal, both in
design and in operation. The elements suggest a system, and
that, in turn, demands further development of the elements. ... (authors' italics)\textsuperscript{68}

In the design of this thesis
the complex minimal ideal of re-
peating something several times,
just a little bit off, has been effected
in an attempt to yield a rich form,
full of the potential for meaning.
When certain characteristics have a very precise structure, they can be ‘blurred’ by the superposition of other structures which do not coincide with them; the technique of ‘fading’ thus occurs, which will be invaluable in making link-passages more supple: blurred zones will occur, in which the form is caused to change direction.

Pierre Boulez, Boulez on Music Today

The intimate relationships at the most fundamental and conceptual levels between architectural design and musical composition are so remarkable in their similarity (mathematical ratios, structure), so different in other characteristics (the role of “function”), and even maintain territorial struggles regarding certain phenomena, such as the “rights” to time and space. It is for this reason that the architectural designer interested in opening up new spatial/formal possibilities will certainly benefit from learning how composers reify basic concepts such as proportion, structure, etc. Music and architecture share concepts, which (although they are for the most part necessarily made differently), still retain similarity in the higher, metaphysical, realm of pure thought. These ideas common to music and architecture have been worked out in certain ways by musicians that can be studied and adapted by architects as potential models for the making of creative spaces.
and buildings.

The discipline of music is where these seeming conflicts of order and structure versus contingency and fluidity have been reified for centuries. The nature of musical space, compositional structure, the experience of rhythm and time, and timbre/texture are rich fields which, although not being a perfect parallel or direct translation of Architecture, can provide Architects with extremely valuable tools for creating rich and meaningful buildings. Musical space has been explored in ways that Architecture has not. Some concepts common to both disciplines which have already been explored include the often-cited genre of jazz, where strict chord arrangements of old standards provide the framework for individual improvisation, but also fiercely structured classical music from Bach through Schoenberg and Cage which makes use of harmonic dissonance. Such compositions set up their own contingent yet closely-held “laws,” which, when worked out in composition and/or material performance, yield astonishing and unpredictable results.

The relationships between the discourses of architecture and music have of course often been commented upon, most notably in that both disci-
Disciplines, as carriers of culture, are named "arts," and also in their intricate involvements with a long list of complex phenomena such as structure, mathematics (ratio and proportion), and texture. Perhaps the most well-known of these connections, Goethe's "Architecture is frozen music," only begins to lead one to more precisely formulate these relationships. Moreover, the continued persistence of music and sound as a basis for architectural design can be seen in contemporary publications, such as *Architecture as a Translation of Music,* which catalogue a wide variety of approaches to the two disciplines.

![Musical notation](image)

However, an interest in the intersections of architecture and music in the service of formulating a design strategy faces the well-known potential trap of using sound composition as the base for a mere one-to-one transfer into the built realm. There are numerous ways in which this has been attempted, including lifting individual scores notes or rhythms, making use of the stunning graphic qualities of many twentieth-century compositions (known derogatorily as *augenmusik* [German for "eye-music"]) as a basis for plans and elevations, and mimicking methods of musical composition. The dangers, of course, are several. The first is that many of these investigations tend to be superficial, never going beyond or developing the initial music-
to-building design move. Also, the "one-liner" aspects of such attempts, while promising, leave the viewer with the stronger impression of hollowness, unexplored potential. More problematic is the phenomena wherein the translation is "bad," revealing an incomplete understanding of the musical work by the designer. These potentially ruinous shortcomings seem to caution against the use of music to inform architectural design.

Two contemporary projects can serve to illustrate some of these issues. "Musical Notation," an investigation by Bernard Tschumi, is compelling in its ability to take the graphic forms and lines of scores and reinterpret them in the idiom of the architectural drawing. It is in this strength that weakness is revealed however: by only transferring to the reproducible, and thus easily commodifiable, medium of the precious presentation drawing (a Protech Gallery special), the potentials and implications for building detail and human experience are conspicuously ignored.
Steven Holl's "Stretto House" is perhaps a more successful interpretation. The design concept is based on *Music for Strings, Percussion, and Celesta*, by Béla Bartók. The basic massing of the house is derived from the form of the piece, a series of four movements which alternate in intensity. Here, the designer moves beyond this initial analogy in using Bartók's compositional contrasts of light and heavy/dark, as well as using the golden section as a proportioning system throughout the structure, a technique for which Bartók is well known. Even this more sophisticated and refined approach, however, still leaves one asking the question: What does the reproduction of *Music for Strings, Percussion, and Celesta* have to do with a luxury house in Dallas? Why not the *Sonata for Two Pianos and Percussion*?
Given the existence of such seeming pitfalls, it was one of the early goals of this thesis to give conceptual form to the strongly held intuitive position that since music and architecture do, in fact, share many similarities, that some form of interchange between the two would prove fruitful. The reformulation of the task in this manner allowed the opportunity to rethink and redefine the relationships between the two disciplines, to get around or through existing roadblocks. One breakthrough came with the revelation that there exist a certain number of “overarching umbrella” concepts common to both fields. While these areas remained the familiar ones (e.g.: proportion, structure, rhythm, etc.), it was by recognizing that these notions only shared commonalities in the theoretical realm that promise of a meaningful interaction became possible. Once these phenomena (ratio, meter, etc.) were placed into ideal categories, the logical consequence was the realization that the material manifestations within each discipline, for example the specific individual score or built artifact, were necessarily distinct, as a result of the reification and bringing into the world of the same ideas in separate media. This recognition was not only a more realistic description of the relationships between architecture and music, but also gave way to the possibility of using ideas common to both sets of discourses, but materializ-
ing them in distinct manners. Making explicit the distinction between concepts and discursive manifestations allows one to utilize the conceptual commonalties while avoiding the banalities of direct translation form one to the other. This has already been formulated in the famous dictum: "Kraus = Loos = Wittgenstein." 69

Thus, a fundamental methodology adopted was a process that moved from: analyzing a musical composition, extracting some important conceptual idea instantiated in the work, and then scrutinizing and finding the essence of the relationship between the general concept and the specific manifestation. Then, a subsequent set of moves could be put into play which: further investigated the relationship between idea and its musical actualization, and then sought for similar relationships between the idea (known) and possible architectural embodiments, which were as yet unknown, but could be created using clues from the musical. By this method, the architectural designer would be working with a group of ideas, some of which were
As a prelude, it should be made explicit here that one of the most important concepts common to both musical and architectural composition is a conviction in the processes of modulation and transformation as design techniques. Although these ideas are not made particularly thematic in the design, the approach to this project holds that architectural design is a process of changing and transforming some set of initial conditions and forms, similar to the familiar modulatory techniques used in musical composition, such as harmonic progression, transposition, inversion, etc.

Relationships, order, rhythm, proportion, and ratio have permeated both disciplines since ancient times. The centrality of structure was succinctly put by Philip Glass to the author in a personal communication: “What architects don’t have is time; what architects and composers have in common is structure.” The intervallic cell as relationship can also inform material manifestations in both sound and stone.
Boulez' comments on "Global and local structuration" address questions of order and the artists role:

Referential hierarchy is required to define any given work, but ought not remain only reference in course of composition. Each original object development organized according to intrinsic qualities. Sub-ensembles; "deployment" of local structures supplants thematic development. Selective operations concerning only the one structure are directly involved. Partial local structures with their own independence and retain filiation with the global structure. Global structure creates a cascade of local structures. Specific developments are linked to larger basic structure continually being developed. Thus, an organized world is capable-without exterior intervention, or non-intrinsic activation, of assuring the coherence of the text, however far removed it may be from the fixed or determinate; nevertheless, indeterminacy or determinacy are produced in an ensemble of precisely established liaisons. A justified freedom is achieved, the essential decisions being lift to the momentary initiative of the composer. His imagination is free too work on the concrete object which arises in the course of composition, and to so this in terms of the object itself.\textsuperscript{70}
Lastly alternate concepts such as pitch frequency, musical space, temperament and texture could also inform architectural design.
THE DESIGN PROJECT: ARCHITECTURAL QUALITIES

Only after repeated hearings, after painstaking analysis... that total, meaningful impressions of the music are gained. What seemed to be complete chaos is now understood as an intensely organized pattern.

Peter Hansen, on the music of Anton Webern

As outlined above, this written thesis attempts to create a path, from the need for a "law" governing design and value judgments, clearing a way through the relativist's dilemma, and arriving at a pragmatist approach to Law in a contingent age. The thinking through of these issues provides the conceptual constructed ground, upon which the design component of the thesis is based. These grounds comprise such coalescing clouds as ratio, scale, and composition. As it remains true that one can't "write a building," a careful disjunct is maintained between the two parts; writing is not to be confused for baukunst (the building art). It is at this interstice that music can be explored for ways to rethink the components that it traditionally shares with Architecture in the building design process.
The fundamental minimal unit of basic proportions
The unit is transformed into another set of simple ratios, in this case, the Pythagorean 3 - 4 - 5.

The manipulations are marked according to the series of the transformation process, resulting in a second system and a new set of interrelationships which blur the first.
The resulting cell

An early cell, repeated three times; translated a certain amount
The Pythagorean Cell, repeated in translation, to a large degree.

The Cell, reified in the graduating visual translucency of a screen moire pattern.
Repetition and simultaneity; Indeterminate dimensions
The multiplicities inherent in simple forms
The first instantiation of the "Schoenberg Cell," based on dissonant intervals; manifested in platform frame dimensions and glass shear planes.
The fundamental intervallic cell, repeated and translated a certain amount. Emergence of the comma
A study in the "growth" of the basic cell

The material language
Wireframe perspective of the structure

The individual cell for contemplation; Public and private defined through varying opacities of screens and light
Translucency and refraction in the cell
Additon of the cell based on its intrinsic nature as stochastically translated

Varying opacity at a maro scale

Complexity and the intuition of the swerve
Emergence of the comma and the stochastic growth of the whole
The statistically distributed cell in the pure ratio frame
External reflection and transparency

Mass defining the interior space of the "other"

Planar entities, positioned according to their intrinsic material properties
Toward a Complex Minimal Architecture
Toward a Complex Minimal Architecture
Organization of the volumetric nature of the site through planar and linear aggregates
Resultant modification of the steel frame

The interstitial mass negotiates the originary cells and framework
Interaction and distortion of the original entities
ENDNOTES


on Iannis Xenakis, in David Ewen, Composers of Tomorrow's Music (Westport Connecticut: Greenwood Press, 1980), p. 120.


55 Jan Maguire, as quoted in David Ewen, Composers of Tomorrow’s Music (Westport Connecticut: Greenwood Press, 1980), p. 120.


65 Umberto Eco, *The Open Work*, Trans. Anna Cancogni, (Cambridge, Harvard University Press, 1989), (Orig. publ. as *Opera Aperta*).


68 Fumihiko Maki and Masato Ohtaka, “Some Thoughts on Collective Form,” in *Structure in Art and Science* (New York: George Brazillier, 1966), p. 120.


BIBLIOGRAPHY

(AROUND) LAW AND JUDGMENT


_________. *Economic Analysis of Law*


*(AROUND) HERMENEUTICS AND INTERPRETATION*


(AROUND) PHILOSOPHY, THEORY, CRITICISM, VARIOUS CULTURE


*(AROUND) MUSIC*


----------. "The Origins of Stochastic Music." Photocopied article. n.d.

*MUSICAL COMPOSITIONS*


----------. *String Quartet No. 4*.


----------. *Structures 1A*.

Cage, John. *4′33″*.

----------. *Imaginary Landscape Nos. 1-5*.

----------. *Music for Prepared Piano*. 

Glass, Philip. *Einstein On The Beach.*

________. *Music in Contrary Motion.*

________. *Music in Fifths.*

________. *Music in Similar Motion.*

Liszt, Franz. *Nuages Gris.*


Reich, Steve. *18 Musicians.*

________. *Come Out.*

________. *Drumming.*

________. *It’s Gonna Rain.*

________. *Music for Six Pianos.*

Riley, Terry, *In C.*


Stockhausen, Karlheinz. *Gesang der Junglinge* (Song of the Youths).

———. *Gruppen*.

———. *Elektronische Studien I + II*.


———. *Variations for Piano [3]*. Op. 27.

Xenakis, Iannis. *Pithoprakta*.

———. *Metastasis*.

*(AROUND) ART AND ART THEORY*


**AROUND ARCHITECTURE**


—. *Changing Ideals in Modern Architecture*. Kingston: McGill-
Queen’s University Press, 1967.

Conrads, Ulrich, Editor. *Programs and Manifestos on 20th Century Archi-

Ferro, Sergio, Chérif Kebbal, Philippe Potié, and Cyrille Simonnet. *Le

Gamard, Elysabeth Burns. “Virgil/Beatrice: Remarks on Discursive
Thought and Rational Order in Architecture.” in *Journal of Archi-
tectural Education*, vol. 48, no. 3, February, 1995. Cambridge, Mas-
sachusetts: M.I.T. Press for the Association of the Collegiate Schools

Kahn, Andrea, Editor. *Drawing/Building/Text: Essays in Architectural

Martin, Elizabeth, Editor. *Architecture as a Translation of Music*. New


---

**SCIENCE**


