COMPOSITION_ MUSIC AS AN INSPIRATION TO AND GENERATOR OF SPACE

DESIGN RESEARCH PROJECT APG5058S

Submitted in partial fulfillment of the requirements for the degree MASTER OF ARCHITECTURE (PROFESSIONAL)

by

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Composition

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ANASTASIA MIRANDA MESSARIS

PRELUDE

MUSIC AND SPACE
DEVELOPMENT OF A THESIS

Composition_ Music as an inspiration to and generator of space

The analogy between the two arts of music and architecture has been a central theoretical theme since the conception of either. Emerging from a background that is situated in both architectural and musical instruction, the correlation between the two has always provided a certain degree of fascination for me. Having understood the linear narrative running between the translation of music and architecture, I endeavoured to locate a more conceptual foothold from which to derive my arguments.

The essays below outline my discovery and development of the topic, transforming a simple analogy into a conceptual way of reading context so as to create an architectural composition of space, just as a musician uses the tools of notes (sounds), rests (silences), instrument quality, beat (time) and sequence to create a musical composition.

This thesis developed similarly to that of a musical composition: where themes are presented, then developed, then treated in new ways, and finally returned to, creating a final composition that moves through exposition (stability), development (heightened tension and conflict) and resolution.

FIRST MOVEMENT

CONTENTS #1

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PREFACE

THE SUPPLEMENTARY INFORMATION

• When words occur within curved brackets {example}, particularly within the context of quotations, they refer to that which I have added and does not occur in the original text.

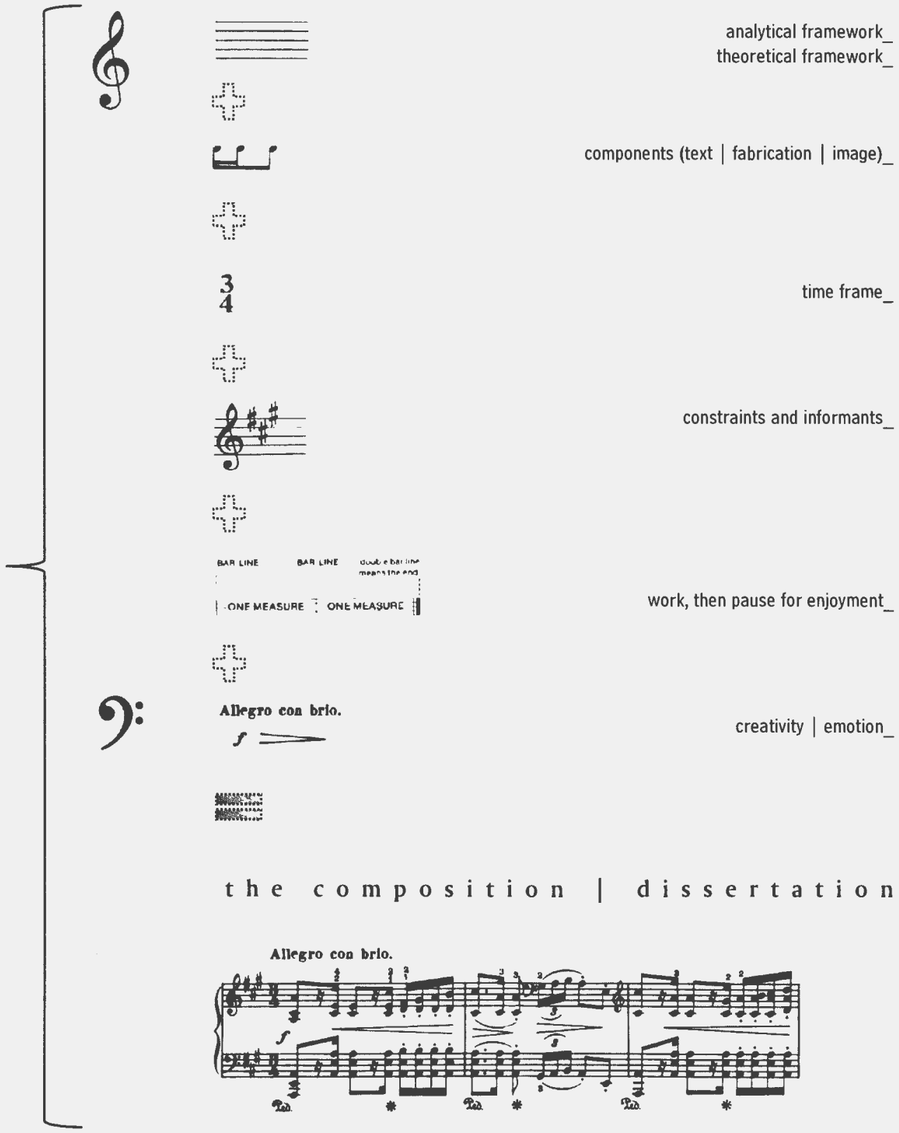
• Cross referenced words occur in ***bold italic*** as indicated. Supplementary information on the word may be found in the vertical paragraphs to the left of the page.

• When contextualising the three modes of thought for the music | architecture relationship, the terms conceived of are (although based on musical terminology) entirely of my own association and not sourced from research. The term 'retro-romantic' was conceived of by my supervisor Mr Francis Carter.

• When writing of the ***post-modern*** in this essay I refer simply to that which has followed the conditions of pure modernist thinking. Therefore, it is assumed that the post-modern is not a style but rather a condition that we still practice in today.

Post modernism: There are two ways of conceiving the term; either as a rejection of modernism, or with influence on the idea 'post' which suggests a sense of continuity between the two concepts. My thesis accommodates the second definition. Therefore, postmodernism is recognised within a historical framework while accepting the pluralism that is contained within the present (Beard & Gloag 2005)

ARCHITECTURE & MUSIC
A PRELUDE



analytical framework_
theoretical framework_

components (text | fabrication | image)_

time frame_

constraints and informants_

work, then pause for enjoyment_

creativity | emotion_

the composition | dissertation

MUSIC AS AN INSPIRATION TO AND GENERATOR OF SPACE

A BRIEF INTRODUCTION

My thesis topic, how music can influence and inspire space, portrays a personal interest of mine as both a musician and an architectural student. The journey taken to understand the influence these two art forms have on one another is traced in the forthcoming pages. The process in which I discovered the indefinable link that music and architecture share is outlined as they were encountered.

Rather than providing a guide for specific design implementations, this essay presents a framework in which to consider how music and its components may conceptually influence space. It introduces a certain way of thinking and considering through the associated ideas of Retro-Romanticism, the y-condition and deconstruction.

{Allegro con brio means fast and with spirit | vigor}

Within King's College Chapel, Cambridge

TAX not the royal Saint with vain expense,
With ill-match'd aims the Architect who plann'd
(Albeit labouring for a scanty band
Of white-robed scholars only) this immense
And glorious work of fine intelligence!—
Give all thou canst; high Heaven rejects the lore
Of nicely-calculated less or more:—
So deem'd the man who fashion'd for the sense
These lofty pillars, spread that branching roof
Self-poised, and scoop'd into ten thousand cells
Where light and shade repose, where music dwells
Lingering—and wandering on as loth to die;
Like thoughts whose very sweetness yieldeth proof
That they were born for immortality.

(W. Wordsworth)

COMPOSITION

Composition: is about the process of forming and alludes to defining boundaries and giving shape...

Composition (forming) is both controlled and controllable

Score: "The process of drawing vertical lines through the music. The notes of each instrument's part are spaced in such a way that all sounds meant to be heard together are lined up." (Martin 1994: 60)

Notation: "A method of recording music so that it can be read for performance". Musicians commonly use staff notation. (Isaacs & Martin 1982: 267)

UNDERSTANDING THE TERM COMPOSITION

DEFINITION OF A KEY TERM

In the article *Thinking Through Construction* Simon Shaw-Miller speaks of the origins of the word 'composition' as deriving from the Italian term *disegno*. The sixteenth century painter, writer and architect Giorgio Vasari believed that the word *disegno* was the father of the three arts (music, architecture and the fine arts) and was a "manifest expression and embodiment of the concept which he (the artist) has in mind" (Shaw-Miller 2006: 42):

"Disegno is the idea, the artistic conception. It is generally held to be the theoretical element, albeit born from the imagination." (Shaw-Miller 2006: 42)

Composition, as a term referring to painting and architecture, evolved prior to that of it referring to music. The Renaissance term of composition, with regard to architecture and painting, equates to that which is described above. However, it was only in the seventeenth century that it began to be associated with "the sounds embodied in written form, the building of a work through the observance of implicit or explicit rules" of music (Shaw-Miller 2006: 42). Prior to this, music had been a predominantly communal affair where musical information was transmitted and communicated via sound and gesture. It was with the emergence of polyphony and counterpoint in sacred music that a need to control what was being sung emerged. Thus, the idea of musical composition was developed.

The term composition may be considered as both **a noun and a verb.** As a noun, the expression stands as a physical object which is usually manifest as the musical ***score***. In this way it is impossible to conceive the noun composition without associating it with the noun ***notation***. As a verb the term is "more about forming than simply a synonym for form" (Shaw-Miller 2006: 45). In this sense composing alludes to defining boundaries and giving shape.

Composition may be compared to the other device of forming, that of improvisation. While composition as a noun is text specific (it is controlled by the score) and largely occurs outside of time (it is notated in a time other than when it is performed), improvisation stands as an entity that is entirely based in the present (real time) and for which no written musical composition exists. Composition has boundaries and structure, while improvisation creates them only in retrospect. The terms stand as testimony to that factor of forming (that may be applied to music and architecture) that is both **controlled and uncontrollable.**

ARCHITECTURE & MUSIC

>INSPIRE

>generate

Inspire: To stimulate a person's creative activity; to prompt or give rise to (Thompson 1996: 458)

Generate: To bring into existence or produce (Thompson 1996: 364)

CONTEXTUALISING
A HISTORY OF ASSOCIATIONS

CLASSICAL

Key text: Vitruvius' *Ten Books of Architecture* (1st Century BC)
Key building: The Howe House by R.M Schindler

Howe House (1922) + W.A Mozart (1756 – 1791)

CLASSIC-ROMANTIC

Key text: Claude Fayette Bragdon's *The Beautiful Necessity* (1910)
Key building: Notre Dame du Haut, Ronchamp Cathedral by Le Corbusier

Notre Dame du Haut (1953) + F. Chopin (1810 – 1849)

RETRO-ROMANTIC

Key text: Elizabeth Martin's *The y-condition* (1994)
Key building: Berlin City Edge by Daniel Libeskind

Berlin City Edge (1987) + I.F Stravinsky (1882 – 1871)

In the history of the complex, profound and barely definable relationship between music and architecture three dominant streams of thought become apparent. These, in the context of my thesis, I have labelled the 'Classical', the 'Classic-Romantic' and the 'Retro-Romantic'. These views are not necessarily time specific but rather indicative of a certain way of thinking. Understanding the divergent and resulting relationships between these three streams of thought will contextualise where my thesis poses its arguments.

THE CLASSICAL VIEW AS BUILT FORM: THE HOWE HOUSE BY R.M. SCHINDLER

The Classical stream of thought is translated into architecture in R.M. Schindler's Howe House. Built as a duplex project for Mrs EE Lacey in 1922, Schindler gained inspiration for the initial design of the house from three musical works, namely Prokofiev's *Classical Symphony* of 1918, Stravinsky's *Pulcinella* of 1919 and Strauss's *Ariadne auf Naxos* of 1927. By understanding the classically Pythagorean musical ratios at play in the pieces of music, Schindler was able to transform these intervals into architectural mathematical proportions. The project speaks of the empowerment of ratios as a classical architectural device (March 1993).

The design of the house is gravitates toward three over-riding concepts: that of the significance of the proportional grid and plane in this grid; that of suitable relative sub-shapes; and that of "a conscious referencing of classical themes by affirmation (proportion), by negation (symmetry), by contraversion (aab becomes bba), or more generally by transformation" (March 1993: 129). Therefore the Howe House is a symptom of Pythagoras's imagined ideal (the importance of harmony and proportion) and the classical idea of theme and variation.

While Schindler doesn't succumb to the classical idea of the 'orders' of architecture, the house is still an example of architecture as a practice of control and mathematical convention. I believe, however, that the Howe House is a successful classical architectural translation of music, thus demonstrating how the classical view is not only a practice of control, but a practice of opportunity if managed appropriately.

"Certainly, the Howe House is a neo-Classical tract for the 20th Century ... Is a virtuoso performance of proportional design, but it is not 'unhistorical' ... The Howe House is a chamber work {that is} complex and precise in its formal architecture of space." (March 1993: 125)

Harmonics: "The components of a musical tone having frequencies that are integral multiples of the fundamental frequency ... The first harmonic is called the fundamental; higher harmonics are called overtones." (Isaacs & Martin 1982: 161)

THE **CLASSICAL** VIEW

The root of the Classical view toward architecture stems from the writings of Vitruvius in his *Ten Books of Architecture* and is exemplified in the imagined ideal, best understood by observing the Pythagorean belief that concerned itself with the static balance of fixed, perfect parts. Stating that the profession is universal and inclusive of all human abilities, Vitruvius deduces that the practice of architecture is simply the combination of the acts of doing and knowing (Martin 1994). Architecture is thus understood as a practice of control, manifesting itself in the idea of the Greek Doric, Ionic and Corinthian orders:

"So that the buildings oppress while they inspire, for there is in them no freedom, no spontaneity, no individuality, but everywhere the felt presence of an iron conventionality, of a stern immutable law." (Bragdon 1910: 6)

Johann Wolfgang von Goethe, in stating that "I call architecture frozen music" (quoted in Johann Peter Eckermann's 1836 *Conversations with Goethe*) was declaring that architecture was understood as a formal translation of music, predominantly based on the harmonic and formal relationships existing in music. Vitruvius describes how ***harmonics*** are the literature of music and consequently the literature of architecture (Vitruvius 1999). Three types of modulation occur, namely the enharmonic, the chromatic and the diatonic. Each of these is associated to a certain emotional view namely solemn and dignified, refined, and understandable respectively. Ratios and intervals (for example the octave in the ratio of 2:1, perfect fifth in the ratio of 3:2, perfect fourth in the ratio of 4:3) govern and rule the ideas of harmony and proportion (Vitruvius 1999). These ideas led the composer (to that of both architectural and musical compositions) to practice within the idea of **universal order** based on a simple set of numbers:

" ... that which in music is expressed by means of harmonious intervals of time and pitch, successively, after the manner of time, may be translated into corresponding intervals of architectural void and solid, height and width."(Bragdon 19910: 5)

Therefore in music, as was the case in architecture and consequently the relationship between the two, the Classical stream of thought was a depiction of **a linear (traditional) concept**, a process with both a beginning and an end.

Top image: Vitruvius' facade (Vitruvius 1999)
Images below: The Howe House (Gebhard 1971)

THE CLASSIC-ROMANTIC VIEW AS BUILT FORM: LA TOURETTE MONASETERY BY LE CORBUSIER

In Carl's discussion *Architecture and Time: a prologomena*, Le Corbusier states that "music, like architecture, is time and space. Music and architecture alike are a matter of measure." (Le Corbusier in Carl 1991: 48). In this statement Le Corbusier is verbalising the way of the Classic-Romantic view towards architecture, that of being more than pure mathematics and proportion. His design for the La Tourette Monastery is a physical manifestation of his beliefs.

Designed as a building dedicated to monastic silence, meditation and devotion, Le Corbusier belies the formal classical view of sacred architecture and begins to experiment with light as a symbol. The building lacks any further ornamentation or images, relying on natural light to accentuate monastic beliefs. " ... He succeeded in creating a true modern monumentality, that is, building which through their plastic presence symbolises characters that give identity to the society in which they were built ... The intention is to make a building something more than a functional container ..." (Norberg-Schulz 1975: 396)

Using concrete and light as his primary building materials, Le Corbusier's sparse formal design exploits architectural harmonies and proportions to achieve a rhythm of light, solid, void and texture throughout the building. Every room, through formal architectural implementations, manipulates light in a different way to allude to both a certain measure of time (stillness or progression) and therefore its consequent emotion (meditation or sacred learning).

Le Corbusier's design for the La Tourette Monastery is a beautiful and successful Classic-Romantic architectural translation of music. Using the ideas of harmony and proportion not as restraints but as stimulus for certain emotive objectives, architecture concretises the relationships between time and space, rhythm and harmony and timbre and texture.

Thematic transformation: The theme in music is the "musical idea that forms an essential structural part of a composition" (Isaac & Martin 1982: 385). It is by the repetition and development of the theme that it assumes its structural importance.

THE **CLASSIC–ROMANTIC** VIEW

The Classic-Romantic view stands in opposition to the Classical position. Exemplified in the text *The Beautiful Necessity* by Claude Fayette Bragdon, it becomes clear that the Classic-Romantic stream of thought attempts to break free from the rigidity imposed by Classicism. Theorists and practitioners of both music and architecture begin to understand that interpreting architecture from music may be derived from something more than mathematical relationships and that the process could become deeply philosophical and personally emotional. Harmony and proportion are no longer viewed as rigid formulae but simply act as stimulus in the process:

" ... an all pervasive harmony of parts, between which definite numerical relations are traceable, and an apprehension of these should assist the architectural designer to arrive at beauty of proportion by method of his own, not perhaps in the shape of rigid formulae, but present in the consciousness as a restraining influence acting and reacting upon the mind with a conscious intention toward rhythm and harmony." (Bragdon 1910: 28)

Therefore, while the Classical stream of thought draws inspiration from rhythm, notation, proportion, form and mathematics, the Classic-Romantics are concerned with the *concepts* of the more subversive timbre, texture, pitch and dynamics. Presenting themselves in the compositions of both Chopin and Beethoven, the ideas of progressively more unstable and complex harmonies are emotively expressed. These harmonies are continuously more difficult to translate literally into the realm of architecture. However, as a symptom of this, the contrapuntal concepts of **time and space** begin to make themselves increasingly more apparent as well as the idea of ***thematic transformation*** (as opposed to the Classical view of theme and variation). As the musician John Cage states, the Classic-Romantic stream of thought consequently presents itself as the ***perception*** **of a concept**, rather than the depiction of a linear concept (Cage in Martin 1994).

Left: La Tourette Monastery – influences of light and space are apparent (All images Henza 1966)

THE RETRO-ROMANTIC VIEW AS BUILT FORM: BERLIN CITY EDGE BY DANIEL LIBESKIND

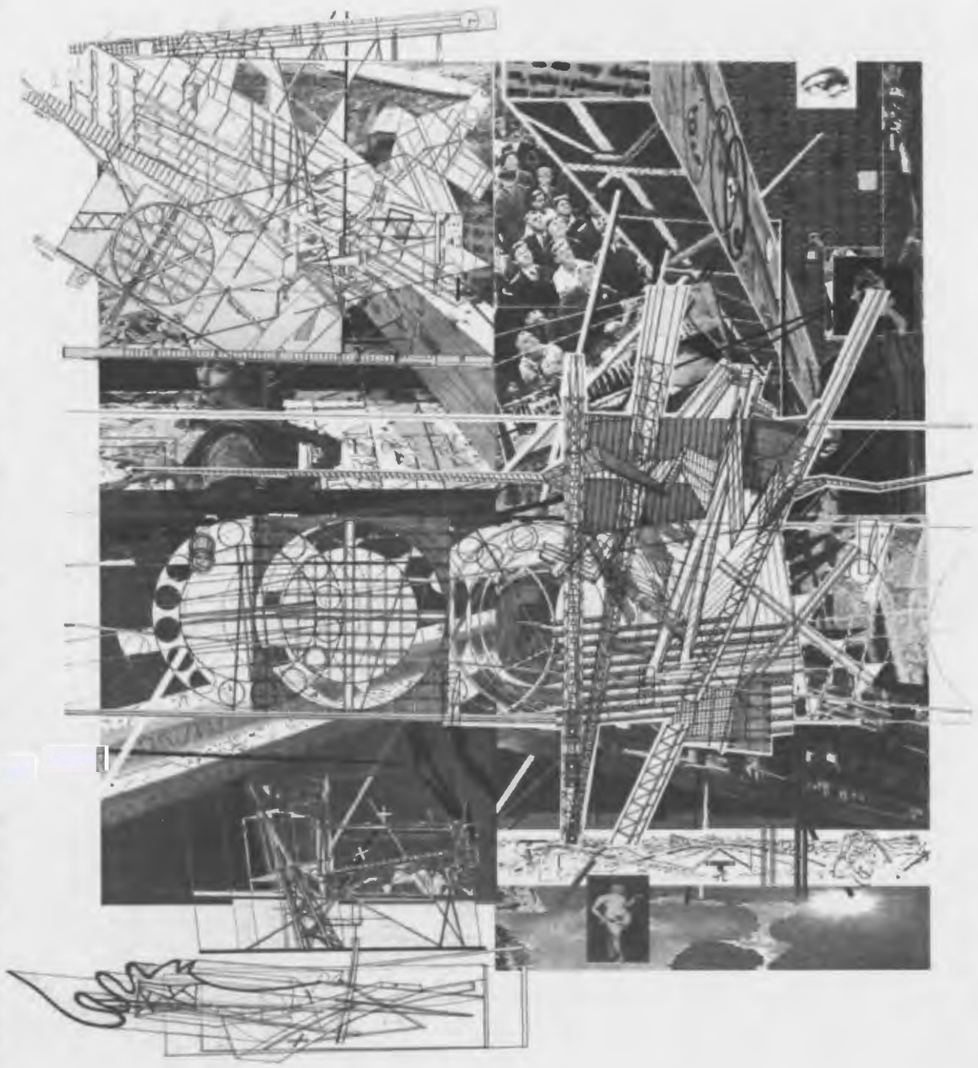
Libeskind's competition proposal for a city edge building in Berlin seeks the opportunities of the specific site, thus revealing design potential which is an ideal entirely specific to its location. In this way, Libeskind adheres to the ideas of the Retro-Romantics.

Physically manifesting itself as a large, straight, elevated structure for dwelling, commerce and public activity, the project is much less about the programme of the building and more about the architecture uncovering that which already exists on the site. Like other Retro-Romantic designs, the project seeks to reveal the potential that already exists within its location and its form (the Berlin Wall's "violent slicing up of territory" (Johnson & Wigley 1988: 34)). The project is situated on a traditional Berlin city block and, while seeking to utilise the confines the block offers, it aims to transcend the physical limitations of it to create a new scale and (current and historical) consciousness. Along this boulevard occurs transformation of experience. The City Edge design "becomes a device for breaking down divisions rather than establishing them" (Johnson & Wigley 1988: 34).

Libeskind describes what this city-edge building uncovers (Libeskind 2001):

1. Erased line: Historical Axis. A public space. Underneath the ground of the city lies its memories
2. Solid line: Dwelling in its Totality. Re-establishing an architecture without limits
3. The Field: Intersecting Nature. A Garden in the City. Where the sky is reflected on the earth
4. A final point: The Beginning of a New Diagonal. Moving out of dark crevices and corners.

Questioning the confines of time and space, Libeskind uses history and the imagination to reveal an architectural solution of transcending them both. Not necessarily being a realistic project, it is nevertheless an adventure and exploration where the form of the historical (in the guise of the city block and the Berlin Wall) is utilised but transformed in order to reveal the history that is embedded within it. "A voyage into the substance of a city and its architecture entails a realignment of arbitrary points, disconnected lines, and names out of place along the axis of Universal Hope" (Libeskind 2001: 55). Libeskind uses the marked, fixed and measured points to discover the architecture of the unknown (Libeskind 2001: 55). It is in this way that Libeskind has designed a Retro-Romantic building.



Berlin City Edge project collage (Libeskind 2001, Johnson & Wigley 1988)

THE **RETRO–ROMANTIC** VIEW

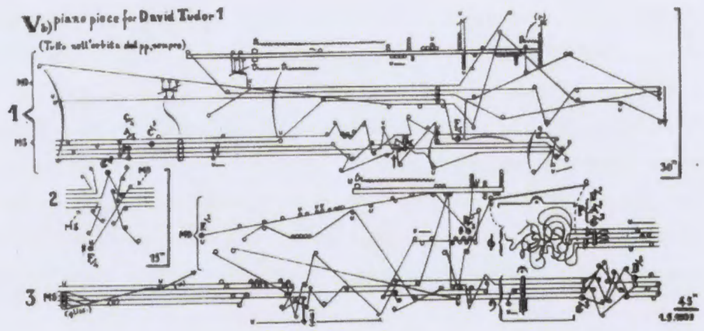
Developing from the Classic-Romantic is the idea of the Retro-Romantic. The architect Elizabeth Martin's writing in *Breaking the Cage,* on the musician John Cage, forms a valid base from which to understand the concepts of the Retro-Romantic stream of thought. While Classicism was based on rigid concepts that were adhered to by composers of both music and architecture, and the ideas of the Classic-Romantics strove to rupture themselves from this way of thought, the views of the Retro-Romantics seek to understand the opportunities present in both categories. While breaking free from the (musical and architectural) forms existing in both, Retro-Romanticism understands composition and interpretation as practices of control that can lead to both oppression and truth, provided that this multi-faceted and marginal view of control is only to reveal *potential*, rather than acting as a repressive dogma. The idea of formal structure, present in Classical and Classic-Romantic streams of thought, is questioned and dissected, leaving room for **multiple interpretations** and avenues of possibility. The study of music, architecture and the relationship between the two is a blank score awaiting inspiration from the various avenues of history and the imagination. Although in Classic-Romantic music and architecture the ideas of form, pitch and rhythm were examined it was predominantly within the continuing constrains of the Classical view. The Retro-Romantic seeks to approach these concepts within a new organisation, unhindered by preconceived notions (although acknowledging their validity) and within an ever-broadening musical and architectural vocabulary:

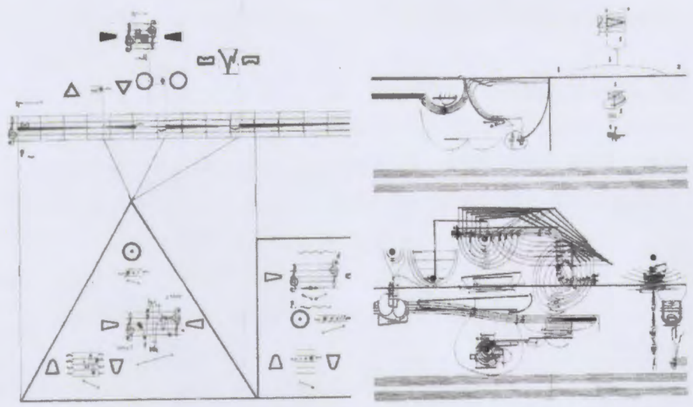
"Listeners are guided primarily by musical cues within an individual composition ... We listen openly, with no assumptions about how tones 'should' relate, this music is an adventure." (Kamien 2006: 291)

Pythagoras' insinuated belief of the ideal becomes specific to its situation and capable of being interpreted (the answer to Pythagoras's question of 'what is ideal?' lies in its context). The Classic-Romantics understood that time and space were worthy of debate and exploration, yet it is the Retro-Romantics who develop this understanding that, particularly with regards to notation, time and space are able to be warped and their traditional understanding usurped. The Retro-Romantic observation is also a perception of a concept rather than merely the conception of one. However, developing from this Classic-Romantic view, the Retro-Romantics seek to repeat the product and, in so doing, create the **cyclical perception** of a concept:

"The music of the past was dealing with conceptions and their communication, but the new music being created has nothing to do with the communication of concept, only to do with perception." (John Cage in Martin 1994: 30)

The roles are reversed; the performer {user} has the opportunity to become the composer {architect}





Top: Sylvano Bussotti's *Five Piano Pieces for David Tutor – No. 1* (1959)
Left: Karlheinz Stockhausen's *Zyklus* (1959)
Right: Cornerlius Cardew's *Treatise* (1967)
(All images from Shaw-Miller 2006)

THE EVOLUTION OF **COMPOSITION & NOTATION** WITHIN ALL THREE VIEWS

The author Simon Shaw-Miller writes of the progression of composition and notation in his work *Thinking Through Construction...The Architecture of Music* (2006). By understanding the evolution of musical (and metaphorically architectural) composition the consequent converging and diverging relationships between the three streams of thought become apparent.

CLASSICAL VIEW

The Classical role of composer was that of the single author of the work, while the musician was regarded as a mere technician in communicating the composer's message to the listener. The composer uses the method of notation to convey his linear concept, creating a composition that is viewed as the work of a single removed individual. The composer was the 'thinker', the man who instructed his musical technicians through the notation of the score. The use of notation was the embodiment of the musical idea:

"Notation was a transparent medium through which the composer's thoughts passed without distortion, as if the musical idea came to imagination outside the form of notation, and then was merely recorded in manuscript." (Shaw-Miller 2006: 41)

CLASSIC–ROMANTIC VIEW

In comparison to this, composers observing the Classic-Romantic stream of thought began to allow the performers to express their own personalities or identities through the process of performance. Although the performer still had to realise the composer's ambitions as accurately as possible, it was no longer as the role of mere technician. Romantic (musical) composition was itself considered a torturous ordeal; Beethoven composed fourteen versions of the opening melody of his 5th symphony before his final theme emerged (Shaw-Miller 2006: 41). Once again notation was the physical manifestation of this long-conceived musical idea, however rather than the author being removed from the work (as it was in the Classical stream of thought) the author's ever-present emotions present themselves up for limited interpretation to the audience via the performer.

RETRO–ROMANTIC VIEW

Developing on this is the Retro-Romantic vision of that of cyclical role reversal (much like the cyclical perception of a concept) where the roles of composer | author, musician | performer and audience | listener are in a state of continuous flux. Notation is not simply a platform in which the composer can present his ideas; it is relatable more to a dynamic graphic drawing or text where the performer and audience contribute to its fulfilment, in Roland Barthes' term: "renderly rather than writerly" (Shaw-Miller 2006: 41). Marks on the score are not the dictation of the author for personal satisfaction, but are used as stimulus for the performer's imagination. The roles are reversed; the performer has the opportunity to become the composer:

"Notation affects and conditions musical thinking. Then, in a complex and diagonal process, the musical idea is realised through and in notation." (Shaw-Miller 2006: 42)

CONCLUDING THE POSITION OF THE **RETRO-ROMANTIC**

The practices of and relationships between music and architecture have been constantly examined and developed. Evolving from a simple literal translation from one essence to the other, where one author worked within the strict doctrine of composition, the understanding between the two has evolved into a stream of Retro- Romantic thought that is entirely subversive, predominantly contextual, and always radical and hybrid. Containing those opinions relevant to modern thought, as well as drawing inspiration from those pertaining to traditional thinking, the Retro-Romantic view seeks to find the *possibility within* to create an entity which is entirely open to deconstruction and interpretation.

The Retro-Romantic view aims to find the *possibility* within:

- **The classical and classic-romantic views**
- **Form, timbre, pitch, rhythm**
- **Context (the ideal is specific to its location)**
- **Time and space**
- **History and the imagination**

To create a project that is entirely contextual and open to interpretation. Retro-Romanticism creates a condition in which the architect can formalise a concept.

THE Y-CONDITION
INFLUENCING THE CONCEPT

An attempt to experience the unknown residing between two knowns

THE Y-CONDITION
EXPLORING ELIZABETH MATRIN'S TERM

"Louis Kahn once described great architecture as that which starts with the immeasurable, proceeds through the measurable, and returns to the immeasurable." (Martin 1994: 16)

The y-condition

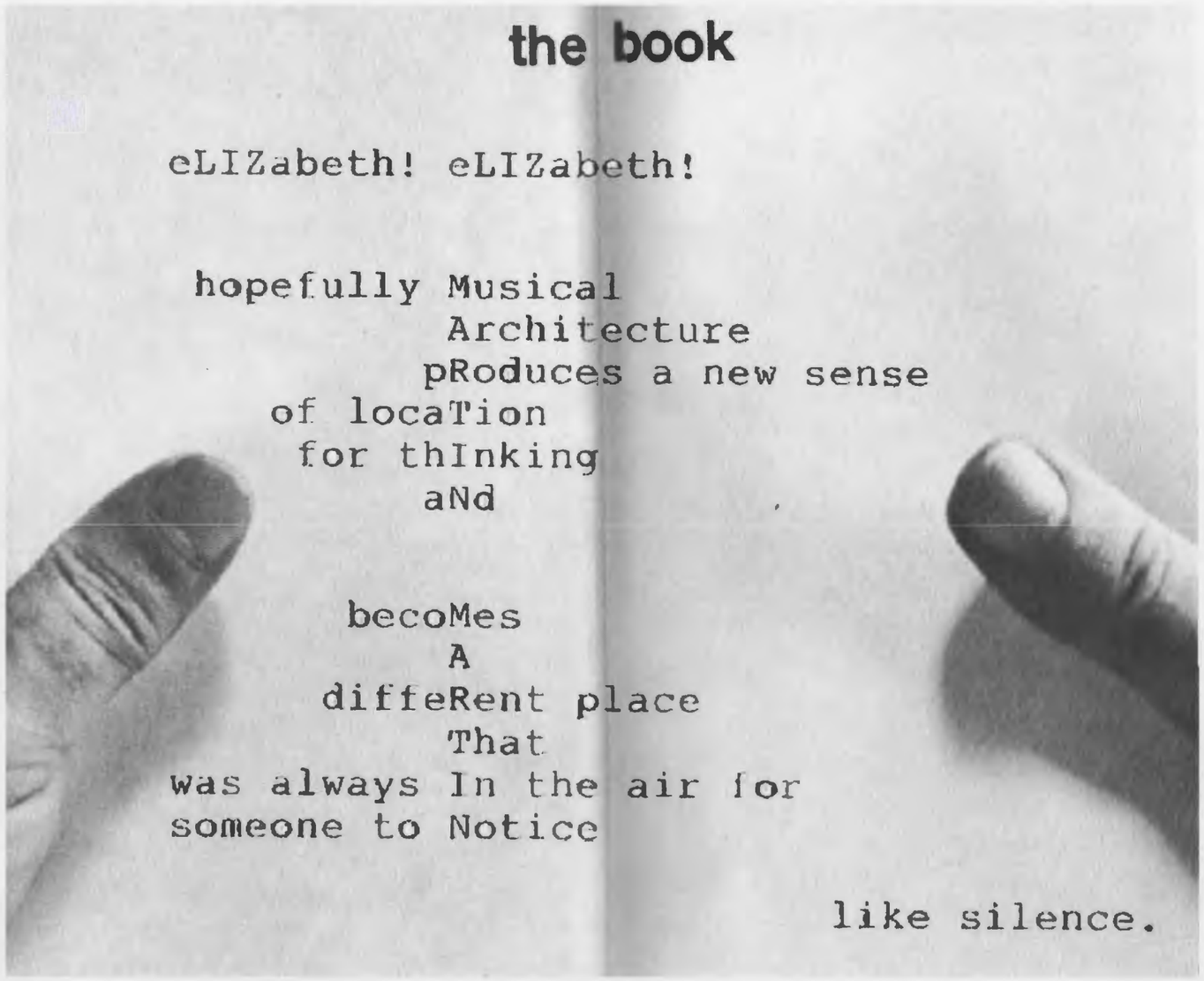
Music (Sound & Hearing) ∞ Architecture (Light & Optics)

In her book *Architecture as a Translation of Music* the author Elizabeth Martin writes a short essay entitled 'y-condition'. Intended as a methodology toward creating a multi-layered building, the text may also be deconstructed as an acknowledgment of a meaning more radical than the classical correlation between music and architecture. In it, Martin recognises the membrane that exists when translating from one discipline to another (Martin 1994: 16). Entitled 'y-condition' so as to indulge the study of phonetics, where the transitional sound from the letters *i* to *e* is in fact *y*, Martin states: "I am suggesting that something similar occurs, a y-condition, in the middle position of music + architecture when translating one to the other" (Martin 1994: 16).

The y-condition is such that it describes **the immeasurable membrane**, semi-tone or phase shift residing between two measurable orders, it is in itself its own entity while taking on the characteristics of the two knowns. In this instance the measurable orders are music and architecture. Martin describes a phase shift as a **multi-dimensional space** creating "a behavioural portrait of events in time" (Martin 1994: 22). It is thus insinuated that by discovering this immeasurable y-condition, an opportunity presents itself that may draw from the conventional and so **lead to *possibility* in that particular context.** (In so doing it adheres to Derrida's philosophy of deconstruction, as described later). The y-condition refers to the instance when one things reveals its potential to become another.

Elizabeth Martin's short discussion on the y-condition forms the foundation upon which my thesis is based. All information that follows serves to divulge what could potentially be embroiled within this concept of **the in-between.** The term reveals an attempt to experience the unknown residing between two knowns.

the book



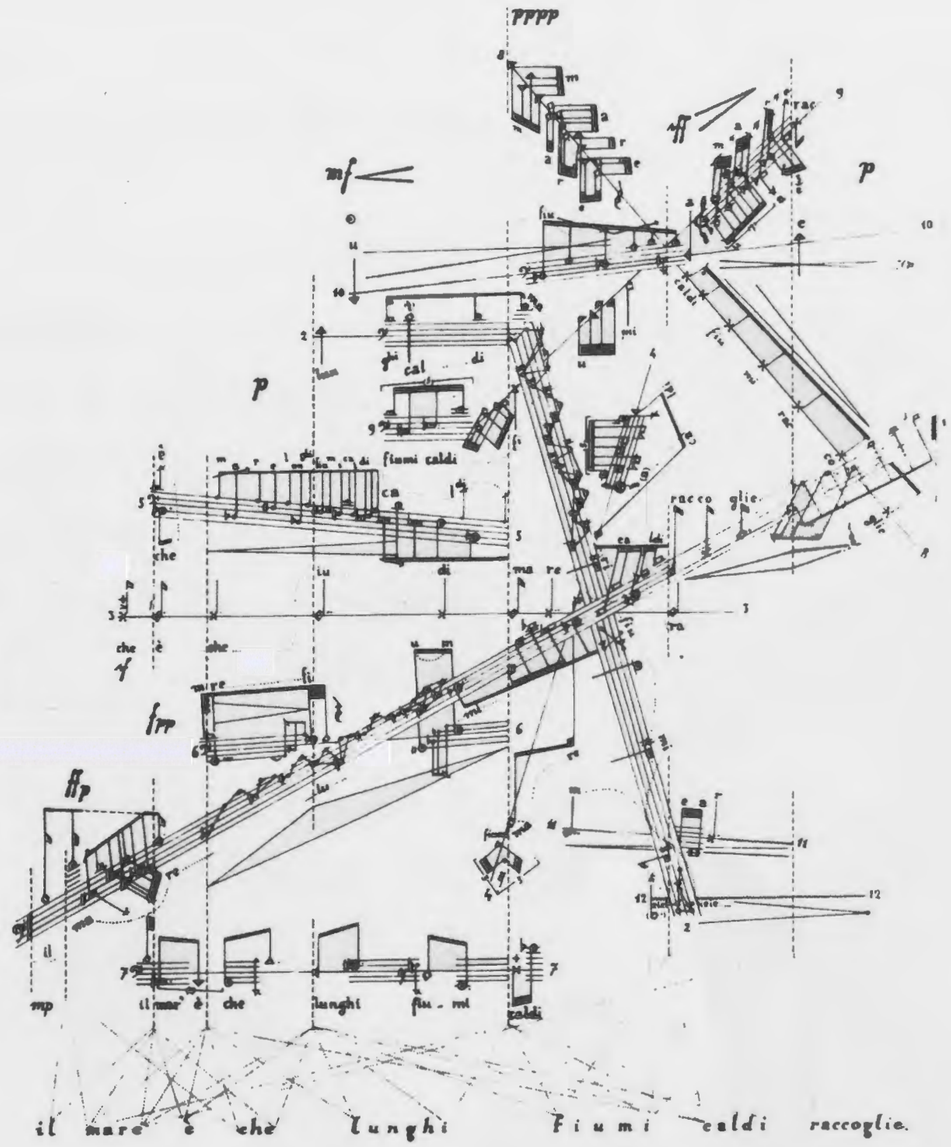
The y-condition: is situated in the ideas of Retro-Romanticism

The y-condition: does not pose an architectural solution to my thesis, it describes a certain way of exploring the relationship of the in-between of music and architecture so that it reveals its' potential

The y-condition: might give rise to an architectural concept rather than an architectural design.

A poem composed by musician John Cage to Elizabeth Martin (Martin 1994)

MUSIC | ARCHITECTURE
DEFINING THE INDEFINABLE



MUSIC | ARCHITECTURE
THEORETICAL BASIS AND UNDERSTANDING

Claude Fayette Bragdon, a Classic-Romantic theorist, writes in his book *The Beautiful Necessity* (1910) of the nature of the arts of music and architecture. Labelling them both as 'pure arts' he explains why both are situated at opposing ends of the cultural spectrum to one another. He argues that, in all other art forms, space and time work to varying degrees beside each other, however in music and architecture they can occupy only one or the other, never both (Bragdon 1995):

"Music is interior, abstract, subjective, speaking directly to the soul in a simple and universal language whose meaning is made personal and particular in the breast of each listener ... A work of architecture is the exact opposite of this: existing principally and primarily for the uses of the body ... attaining to esthetic expression only in the reconciliation and fulfilment of many conflicting practical requirements." (Bragdon 1995: 4)

It is this Classic-Romantic view (that in itself draws so entirely from that of the strictly Classical) that the y-condition attempts to contradict. Through a more thorough exploration of these two arts it becomes apparent that music is the architecture of sound and that architecture is the music of space. The two share an indefinable overlap which may be **architecturally translated so as to become a physical manifestation of the y-condition.**

Left: Sylvano Bussotti's *Siciliano* (1962). Notation and the performance of music have become architectural, they require designing and interpretation and cannot be fully comprehended on the first reading. Can architecture obtain this degree of multi-dimensionality while still creating a rewarding and complete end composition? (Shaw-Miller 2006)

Musical {architectural} information is communicated through sound and gesture. The performer {user} plays an integral role in the interpretation and identity of the {architectural} performance, creating a style that is entirely singular to that specific performance

Music (vs. non-music): "When something is not heard as individual sounds, but can be recognised as a larger figure with rhythm, form, motion, direction, stability and instability" (Parcell 2007: 4). The primary phenomenon of music if gesture. Music does not only happen within time, it creates time.

UNDERSTANDING THE TWO ART FORMS

It is indisputable that music is of the ear, it is an aural exploration that deals with sound and hearing. Architecture, as commonly understood, is of the eye. It is visual and deals with light and optics. While architecture is translated as the physical feeling of space, music is the emotional feeling of space. It is within these parameters that we have commonly understood these two arts. Bragdon explains music as "dynamic, subjective, mental, of one dimension" (Bragdon 1910: 4) and architecture as "static, objective, physical, of three dimensions" (Bragdon 1910: 4). What develops from this common understanding of the two arts is one valid response to the nature of this duality, however the y-condition, situated within the realm of Retro-Romanticism, seeks to uncover more.

Music has been through a process of far greater reinvention and experimentation than that of architecture, deviating substantially from the original musical conventions. Music, of all the arts, is the most unencumbered by materiality. It is thus capable of much expression and reincarnation while architecture achieves much of its fulfilment in the material world and has been delayed in its desire for new avenues of self-expression and experimentation.

There remains a general distinction between the music of Western cultures and that of other traditions. In Western music the composer is concerned with his individual identity, where the composition is a musical text dictated by the composer. Music in these cultures is predominantly associated with the written notation of aural sounds and therefore composition, and the notation of it, is considered a necessary practice. In contrast to this are the prevailing principles of many traditional forms of music where music is considered an aural experience, often passed through generations via listening rather than notating, where musical information is communicated through sound and gesture (Shaw-Miller 2006). The performer plays an integral role in the interpretation and identity of the performance, creating a style that is entirely singular to that specific performance. In this way, music becomes a communal affair which contains the possibility of constructing a group identity (Shaw Miller 2006). South Africa, as an example of a hybrid culture, practices and appreciates both avenues of musical tradition. It may be argued that both the Western and traditional styles of music have something to offer communities, as well as practitioners.

'Tecture' is the multi-dimensional physical manifestation of space that seeks inspiration from specific place

"***Timbre*** is difficult to conceive but easy to perceive ... from a timbral standpoint, pitch is merely one simplified component of timbre, not a primary attribute in its own right ... to compose music that emphasises timbre, one would work directly with sound and not be overly concerned with primary pitches and their graphic notation" (Parcell 2007: 3)

"***Materiality*** is difficult to conceive but easy to perceive ... from a material standpoint, form is merely one simplified component of materiality, not a primary attribute in its own right ... to design architecture that emphasises materiality, one would work directly with substance and not be overly concerned with primary forms and their graphic notation" (Parcell 2007: 3)

Just as architecture is composed of those components contributing toward the building fabric, so music itself has its own fabric. Musical meaning is more than a mere question of the sound produced, it is integrally linked to the composition and expression of this musical ***materiality***. ***Timbre***, instrumentality, harmony, rhythm, balance, theme and variation, the nature of performers and listeners – these are all contained within the make-up of the musical building fabric. However, each element is merely a brick in the entire structure and its importance is only garnered when combined within a whole:

"Scores, notations, instruments and spaces all play their part in music's fabric, important and necessary to its identity but individually sufficient for its existence ... they are as fundamental to the discursive structure of music as the sound" (Shaw-Miller 2006: 41)

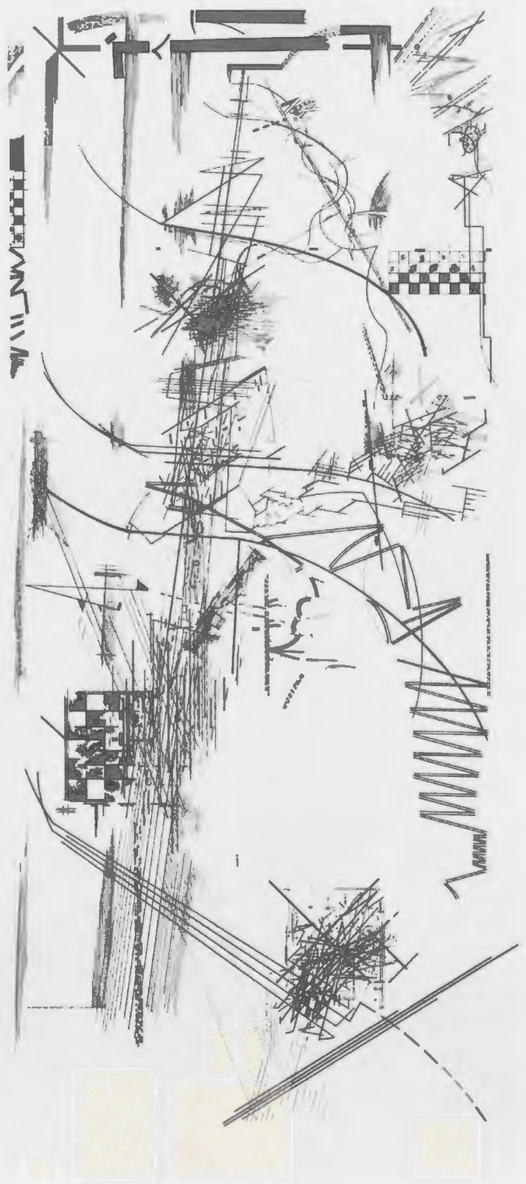
Architect Steven Parcell prefers the word 'tecture' to that of 'architecture' in his writing *Architects Since Birth* (2007). He describes **'tecture' as a gesture** rather than a practice, implicit within it are the conditions of rhythm, form, motion and direction:

"'Tecture' would be realised not merely as a set of individual substances but as a larger figure with implicit rhythm, form, motion, direction and degrees of stability and instability. As in music, the primary phenomenon would be gesture. Tectural gestures would create their own space; they would not happen in space. They might be experienced not just spatially and visually but in a quasi-temporal way that recognises forces." (Parcell 2007: 7)

Therefore the gesture of 'tecture' composes with many of the same elements as that of musical fabric. Just as a musician learns and develops his discipline throughout a lifetime, the discipline of tecture would be one that slowly improves through the conditions of experience – not delving straight into the avenues of composing (or designing) (Purcell 2007). "This would draw a line between tecture and architecture" (Purcell 2007: 8).

This meaning of the term 'tecture', as opposed to architecture, corresponds with Martin's y-condition. Deviating from a simple formal definition, 'tecture' is the multi-dimensional physical manifestation of space that seeks inspiration from specific place. It **locates the *possibility* within context to form a temporal experience**, utilising knowns to discover the unknown: moving from the immeasurable, to the measurable, and back to the immeasurable (Martin1994).

Rhythm is a component of either side of the duality. Within it are incorporated the aspects of space (or the movement through space) and time. Rhythmic motion is capable of energy, energy is capable of flow. This may be interpreted into both art forms.



Drawing from Libeskind's *Chamberworks* set demonstrating the idea of rhythm (Papadakis 1991)

MUSIC | TIME : ARCHITECTURE | SPACE

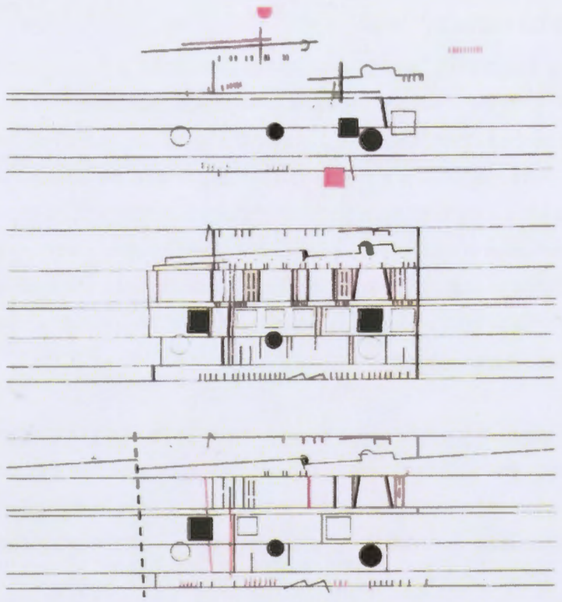
Music has been described as the "art of design in time", with its supplementary characteristic of succession, while architecture is said to be the "art of design in space" with a characteristic of simultaneousness (Martin 1994: 8). Yet the architectural theorist Christian Norberg-Schulz states that "architectural space can be defined as a 'concretisation' of existential space. Existential space is a psychological concept, denoting the schemata man develops, interacting with the environment, in order to get along satisfactorily" (Norberg-Schulz 1971: 37). In this way the theorist acknowledges a further dimension to space, that of the existential. Albert Einstein, in his Theory of Relativity, poses " ... substituting the former idea of lumps of matter in a three-dimensional space, with a series of four-dimensional space-time" (Norberg-Schulz 1971: 10) and in so doing supports the idea of the 'other' dimension of space, one that incorporate man's existential appreciation of time.

Following this understanding of the 'other' or fourth dimension of space | time is the idea of rhythm as a component of either side of the duality. Rhythm, according to architectural theorist Rasmussen, is the "subtle variation with distinct regularity" (1969: 127) and within it are incorporated the aspects of space (or the movement through space) and time. Rhythmic motion is capable of energy, energy is capable of flow. This may be interpreted into both art forms.

There exists a strong desire to understand the architecture of music. Both art forms deal with the concepts of notation (planning), composition (construction) and event (the presentation of the final product). The concepts of notation, composition and event may be approached in any order (Shaw-Miller 2006) to create a score (or the finished product) that is an object tracing history and usurping both current space and time. Notation, regarded as the conveyance of the musical or architectural idea, may become an avenue in which to explore composition. Through it, music or design becomes visual, the reader can exist within many different times and a number of spaces. So architecture and music has the ability to arrest time, to become spatial, to see an entirety within one prolonged glance:

"Scores {musical and architectural scores} arrest time. They allow the composer to look around the piece, to hold it in his hands, to compare past event with future ones, to create balance and measure (or not), in short to see the music {architecture} ... For the musical work of art exists whole and intact before it has sounded and after the sound has finished. It is, at the same time, in and outside of time." (Shaw-Miller 2006: 41 -42)

In so doing, music transcends the confines of time, and architecture that of space.



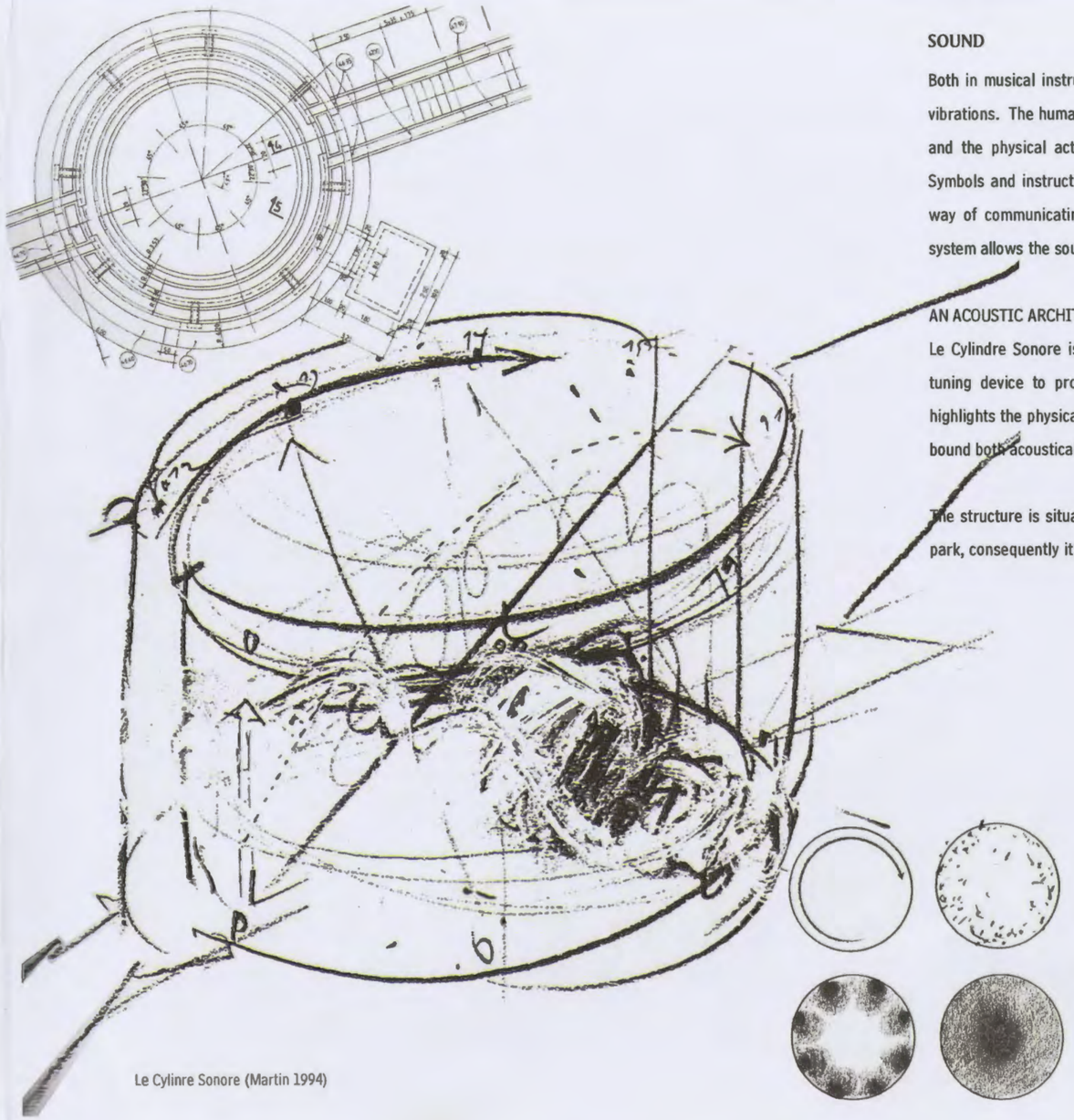
Tschumi's work *Musical Notation*, 1987 (Johnson & Wigley 1988)

MUSIC | THE ARCHITECTURE OF **SOUND** : ARCHITECTURE | THE MUSIC OF **LIGHT**

A relationship exists between time and sound because time determines sound (refer to the technology paper for an abbreviated scientific account of this). Similarly, space in the guise of solid and void give rise to differentiated experiences of light and consequently music is the architecture of sound while architecture is the music of light.

A THEOREM:

Music = time	&	Architecture = space	(Martin 1994)
	But		
Music = aural = sound	&	Architecture = visual = light	(Martin 1994)
	Therefore		
Time = sound	&	Space = light	
	But		
	Time = space		
	(In Einstein's fourth-dimension)		(Norberg-Schulz 1971)
	Therefore		
Music = light = space	&	Architecture = sound = time	
	And		
Music = architecture (= sound)	&	Architecture = music (= space)	



Le Cylinre Sonore (Martin 1994)

SOUND

Both in musical instruments and in the human ear, sound is physically manifest as vibrations. The human ear may be considered as an instrument for measuring space and the physical act of hearing a dialogue between the inside and the outside. Symbols and instructions on a musical score (for example adagio and piano) are a way of communicating or describing sounds as images. The musical annotation system allows the sound to become visual (Martin 1994).

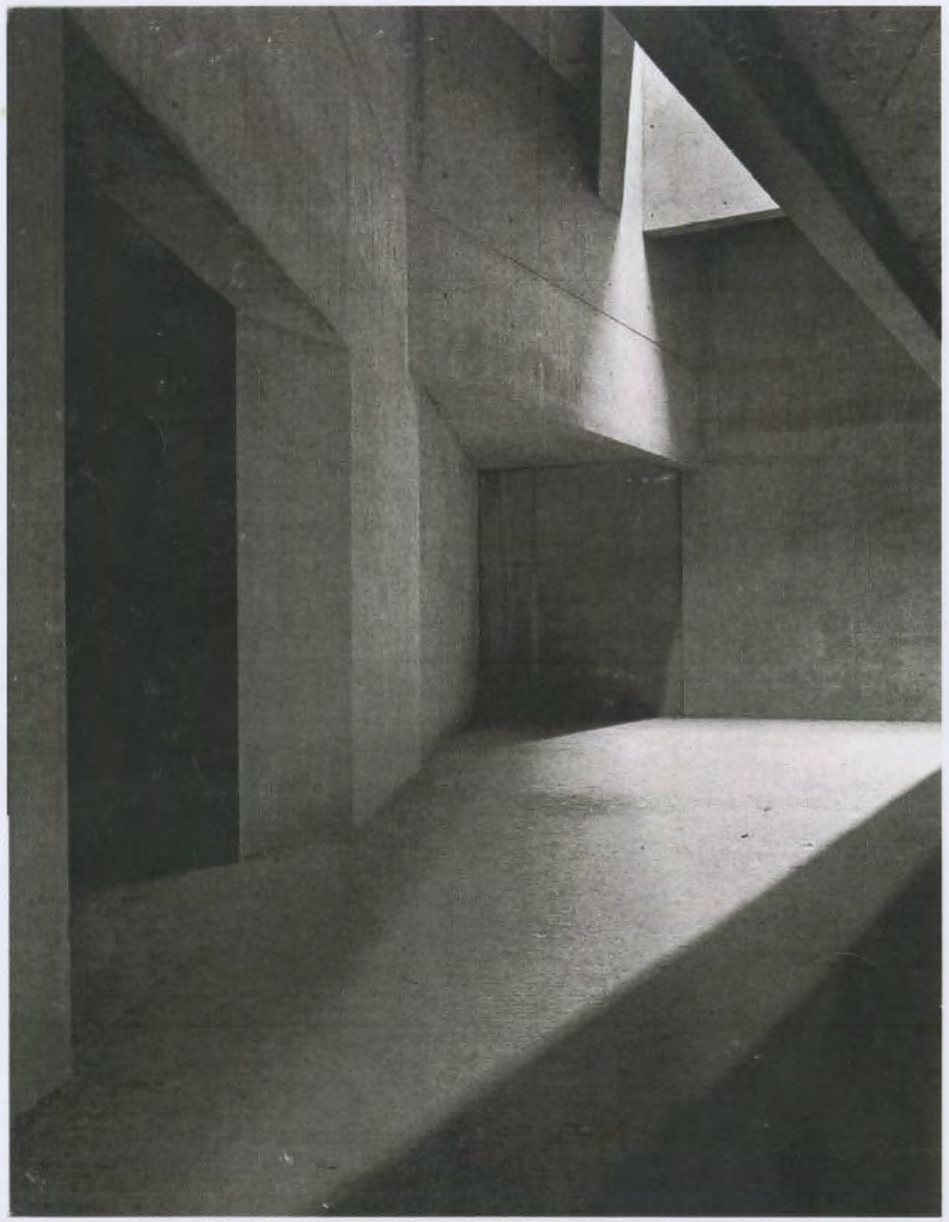
AN ACOUSTIC ARCHITECTURE: LE CYLINDRE SONORE BY BERNARD TSCHUMI

Le Cylindre Sonore is situated in Tshumi's Parc de la Villette. It uses water as a tuning device to produce a sound that is an acoustic delineation of space and highlights the physical massing of sound (Leitner in Martin 1994). A visitors senses are bound both acoustically and spatially within the immediate structure.

The structure is situated in a small valley at the entry to the bamboo garden of the park, consequently it marks a conceptual entry to an area of different sound quality. The design seeks to highlight this acoustic change and is thus composed of a double cylinder which in turn becomes a resonator for eight thin strips of water. Constructed from precast concrete panels, the double 10 metre wide cylinder is a composer of sound. Although built as a solid structure, this structure only exist insofar as it is useful to the experience of sound within the space. "Sound is no longer exclusively the instrument of musical expression; designed with precision, it becomes a building material in the creation of space" (Leitner in Martin 1994: 30).

In this space sound is perceived rather than conceived. It is heard and felt differently every time, creating a unique experience that is entirely contextual. In this design, Le Cylindre Sonore is an architectural creation of the y-condition which draws from convention in order to create an acoustic and sensorial event in time. This multi-dimensional space is the middle position between sound and space – merging the two concepts so that each is accentuated within a membrane that suits them both equally.

Quote: Sound is no longer exclusively the instrument of musical expression; designed with precision, it becomes a building material in the creation of space (Leitner in Matrin 1994)



LIGHT

Light and shadow have the ability to create a temporal experience within a building as shadows are a temporal (or time based) experience that act as visual representations of the sun in time. Daylight is the one uncontrollable factor within architecture. The sun, time and weather are able to produce variations within light, tone and harmony. The fluctuations in the quality of the light can become improvised music. Light has been used as a symbol of time throughout history:

THE CLASSICAL VIEW: THE PANTHEON, ROME

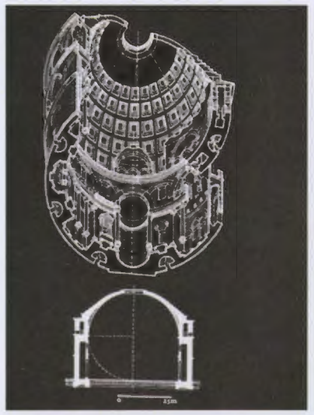
The Pantheon introduced interior space as an existential dimension (Norberg-Schulz 1975). The structure is composed of a columnar porch and a domed rotunda that stands as an incarnation of man's universe. To organise the interior space, the vertical axis towards the central pinnacle of the dome becomes important, it is where man views an opening to heaven. Highlighting this is the Pantheon's single source of light, that of a circular unglazed opening at the centre of the dome. The light produced is able to highlight every part of the Pantheon's structure at certain times of the day. This, in effect, is a symbolic progression of light (truth) around man's constructed universe. "Architectural space {time, and light} is used to symbolise man's existence in space." (Norberg-Schulz 1975: 104)

THE CLASSIC-ROMANTIC VIEW: RONCHAMP CATHEDRAL, LE CORBUSIER

Contained within plastically sturdy, thick walls lies Le Corbusier's design for a temporal sacred sanctuary. "It is a cave open to the essential meanings of human existence" (Norberg-Shulz 1975: 412), that of life, death, earth and heaven. Highlighting the depth of the container and the dimension of time are the perforations that allow seemingly haphazardly-placed shards of light to enter the south wall. The church's cave-like interior obtains a vertical axis from three towers that draw in light, making the alter (the innermost place of the church) the space where divine light is most strongly felt (Norberg-Schulz 1975). Light highlights man's conception of sacred and humane time: "In fact, true spatial identity without integrating the dimension of time is an impossibility. To integrate time is a problem of architectural character and articulation." (Norberg-Schulz 1975: 412). Le Corbusier overcomes this 'problem' via a means of articulating various timbres of light.

THE RETRO-ROMANTIC VIEW: THE JEWISH MUSEUM, DANIEL LIBESKIND

Daniel Libeskind's articulation of light to form a temporal and existential meaning is highlighted in 'The Works of Daniel Libeskind' .



Left - Right: The Jewish Museum (Binet 1997); The Pantheon; Ronchamp (both Norberg-Shulz 1975)

the arts are not isolated,

froM one another
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woRk we have
not yet seEn
- only heard.

A poem composed by musician John Cage (Martin 1994)

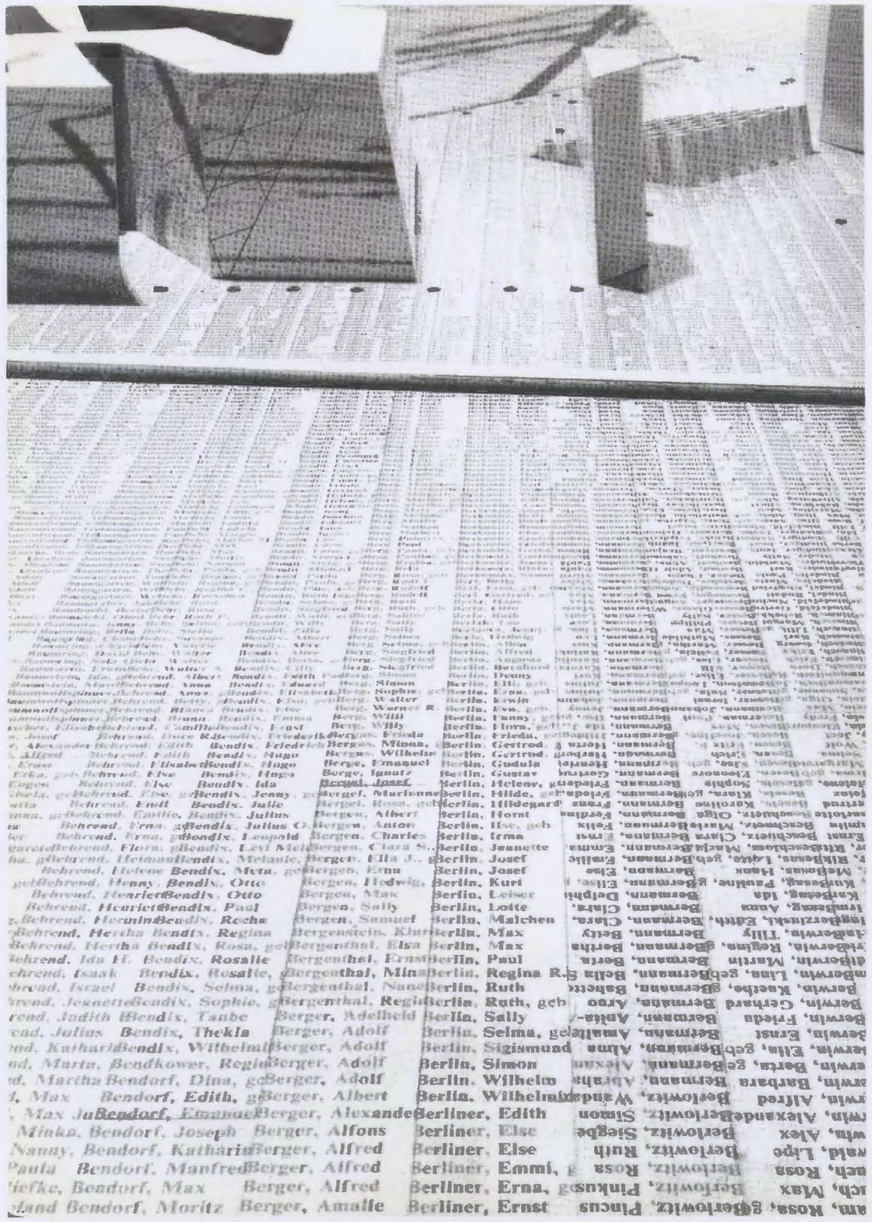
Comparing music and architecture introduces ways of physically manifesting the y-condition.

'Tecture' and music share the main component of gesture. Gesture is direction or motion, an experience that is place-specific and temporal. Sound and light become materials that establish rhythm and delineate space, and in so doing introduce gesture.

Sound and light reveal the possibility within a specific context yet remain open to multiple interpretations.

CASE STUDY

OF A MAN AND HIS WORK



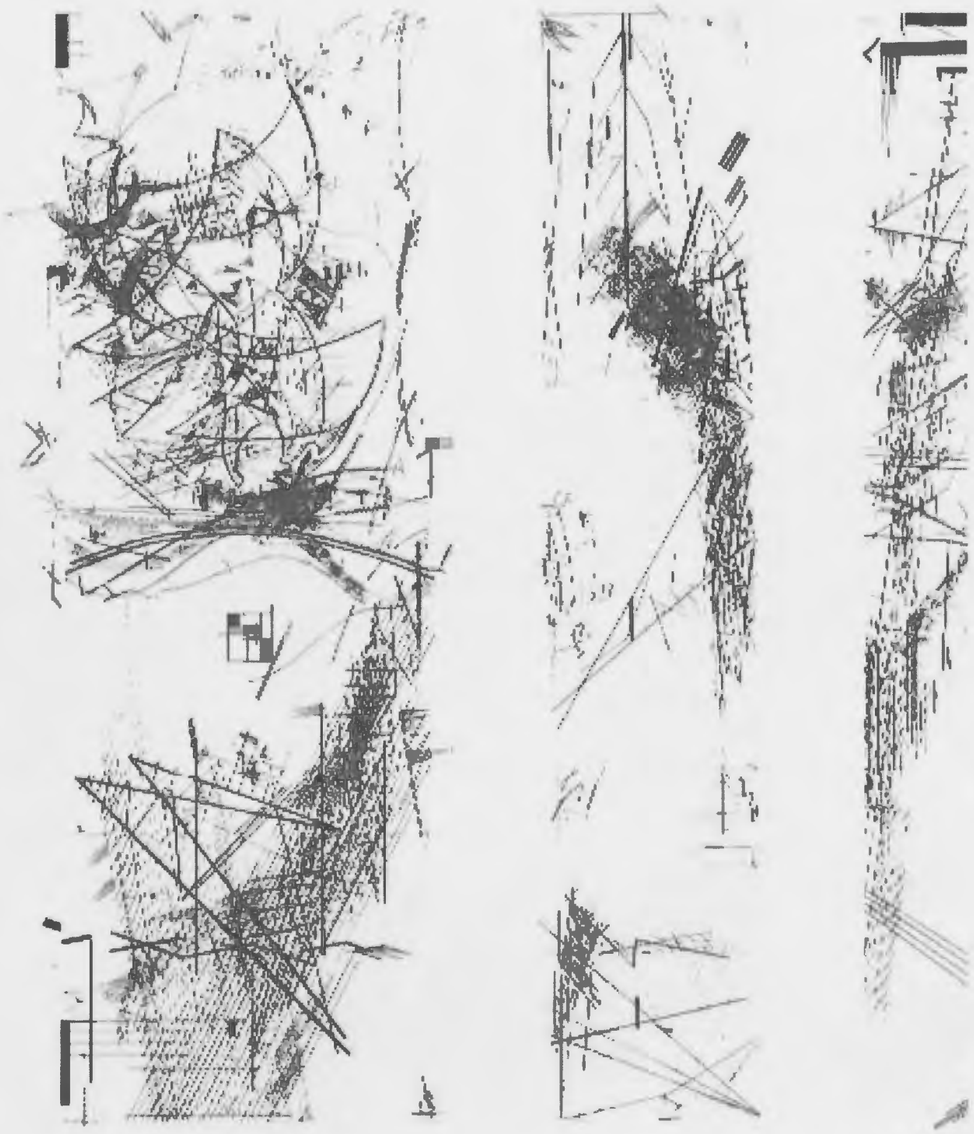
THE WORKS OF DANIEL LIBESKIND

TWO PROJECTS EXPLORING THE SEMI-TONE BETWEEN...

Libeskind himself was a practising virtuoso musical performer before becoming an architect; consequently one can begin to understand why he conceived of a spatial structure in music. Citing the writings of Glenn Gould in his book The Space of Encounter, he writes of the realisation that the physical positions in a Bach fugue (the positions of the fingers over the keyboard) were of more importance to the composer than the sounds produced (Libeskind 2001: 53). It is due to his acknowledgment of the threshold that exists (between music and architecture, between time and space, between the known and the unknown) that the architect and his projects may be examined.

Between the Lines project in Berlin (Papadakis 1991)

Quote: A differentiated experience...
Between what is and what will be (Libeskind 2001: 50)



CHAMBERWORKS

Architectural Meditations on the Themes of Heraclitus: a set of (14 x 2) 28 drawings, 1983

"I explored through my work in Chamberworks a more exposed investigation of the ideas of architecture and music as they intersect in the chamber of the mind." (Libeskind 2001: 52)

What does Libeskind's *Chamberworks* mean? Is it interplay between line and sign, as the architect and curator Jeffrey Kipnis believes (Libeskind 2001)? Libeskind states that it concerns the concepts of potent truth, symbol or symbolism (or the lack of it) and meaningless time (the empty and the endless) (Papadakis 1991), yet he also says it involves " ... chamber music, the tracks of a cloud chamber, the philosophy of Heraclitus, arcane numerology, cabala, Duchamp, chess, Rorschach, formal analysis ..." (Libeskind 2001: 10). What is apparent is that, through each set, line progresses from the horizontal to the vertical. It is also apparent that the work strives to avoid overt signification of any kind. However, what is overwhelmingly evident is that this is a composition questioning the relationship between music and architecture and that it "contains early graphic notes of many of the themes that develop into the architects' designs for buildings" (Kipnis in Libeskind 2001: 11). *Chamberworks* asks the question: 'what is architecture?' and ascertains:

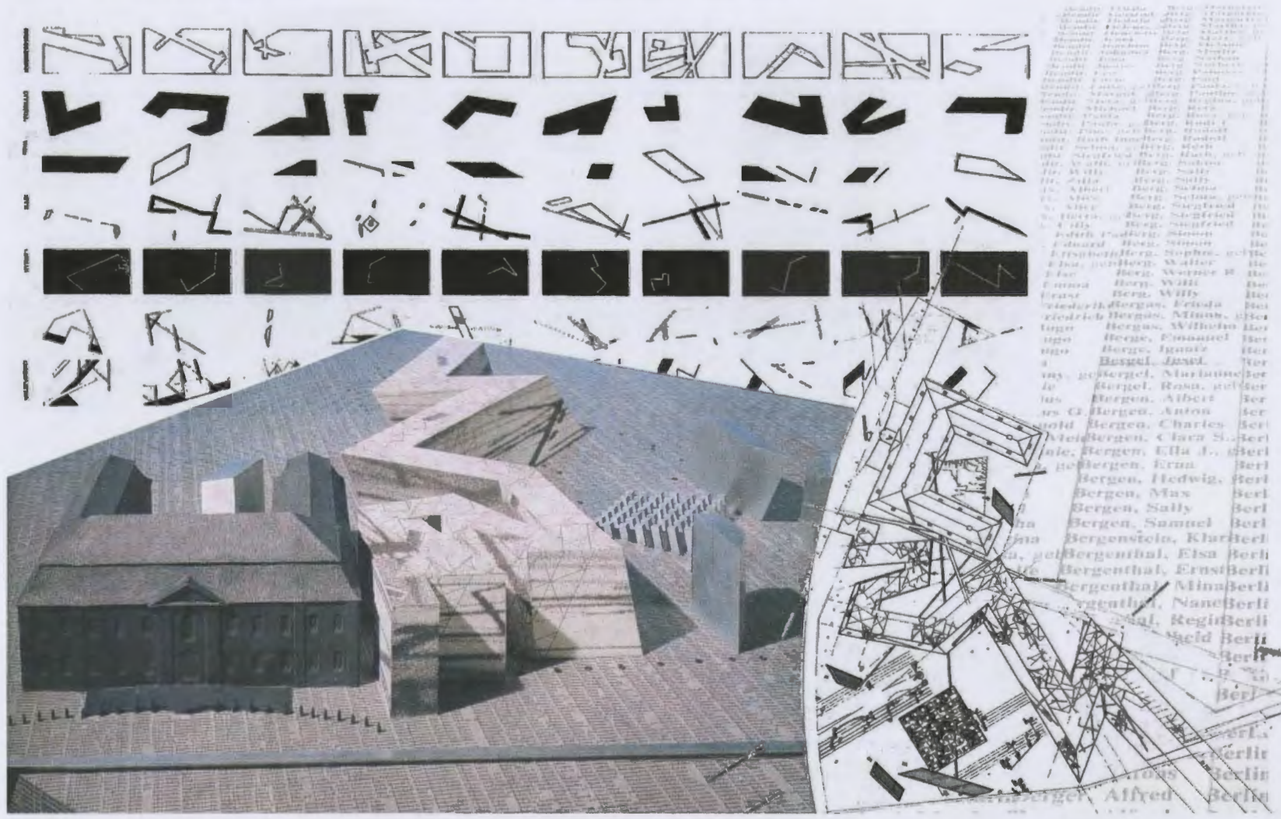
"This work in search of architecture has discovered no permanent structure, no constant form, and no universal type. I have realised that the result of this journey in search of the 'essentials' undermines, in the end, the very premise of their existence. Architecture is neither on the inside nor the outside. It is not a given nor a physical fact ... What emerges in differentiated experience is architecture as an index of the relationship between what is and what will be." (Libeskind 2001: 50)

In *Chamberworks* Libeskind questions the significance between music and architecture, exploring the in-between and in so doing manages to create a physical manifestation of Elizabeth Martin's y-condition. The following quote demonstrates how Libeskind deviates from the Classical and Classic-romantic views toward that of the Retro-romantic stream of thought. In this he seeks the opportunities presented by the y-condition: challenging the space of the two knowns to come across a multi-dimensional unknown:

"I think the relationship between architecture and music stands on both the divide and the connecting line {the y-condition}... *Very often this might give rise to representing architecture as a linear connection to music* {Classical view}, *but I think the connection is multi-wired, multidimensional, and at the same time extremely figurative* {Retro-Romantic view, enveloping the y-condition}. *It is definitely a spatial figure ... Architecture is not free of music, no matter how it wants to purify itself, to reduce itself to a set of controllable proportions."* (Libeskind 2001: 52-53)

Chamberworks (Papadakis 1991)

"An Architecture such as this work of Libeskind, also formulated from Music, approaches its finality along a dual front, and introduces time as one of the directions in which it unfolds or is manifested. If Architecture, through the construction of the space, is to make the word possible, Music is the matrix of the Word…Names and words shed their significant burden and become music in their architecture; in the form of signs of a luminous writing that prints rhythm onto the itinerary through their spaces, playing in an expressionist style with shadow and light and the luminous beams that penetrate them through apertures that are like engravings or clean perforations in the walls bounding them. The signs of this musical writing are so intense that they volatise the dense, solid matter on which they are written. Through them, the light – Music – constructs space with shadows and clarities: Architecture" (Cobelo, 1996: p. 37)



Between the Lines project in Berlin (Papadakis 1991 & Libeskind 2001)

BETWEEN THE LINES

The Extension to the Berlin Museum with the Jewish Museum, 1989 – 1999

" … I have called it 'Between the Lines'. I called it this because it is a project about two lines of thinking, organisation, and relationship. One is a straight line, but broken into many fragments; the other is a tortuous line, but continuing indefinitely." (Libeskind 2001: 23)

The project was conceptualised around four logics. The first was the invisible matrix of connections between Germans and Jews already existing within Berlin. Although the connections were invisible, they were irrationally linked to form a figure resembling the Star of David that was so often worn on the very site. The second logic was the metaphor of Arnold Schoenberg's opera *Moses and Aaron*. Libeskind states that he tried to deviate from simply examining the structure and sound of the opera, preferring to deconstruct it so as to see if each sound had reason or a logic that could be represented in a building (Libeskind 2001: 54). For certain (compositional) structural reasons, Schoenberg could not complete the libretto of the opera and Moses sings only "Oh word, thou word". Libeskind sought to complete the opera architecturally in order to form the non-musical fulfilment of the word (Libeskind 2001: 26). The third logic was derived from two volumes called *Gedenkbuch* which contained within them all the names, dates and destinations of Jewish people deported from Berlin during the Holocaust. Libeskind used these volumes to complete the missing dimension in the project. The final logic for the making of the Museum emerged from the writings of Walter Benjamin in his *One-Way Street*. In it, he speaks of the urban apocalypse: "This aspect is incorporated into the continuous sequence of sixty sections along the zig-zag, each of which represents one of the 'Stations of the Star' described in the text of Walter Benjamin" (Libeskind 2001: 26). Two ideas stands out for me in Libeskind's initial concept. The first being that Libeskind **uncovered possibilities that were already existing on the site in order to develop an architectural composition.** The other is that Libeskind sought to find the *possibility within* and consequently complete the incomplete. Both these ideas suit the conceptual viewpoint of the y-condition (seeking the possibility within a specific context and **identifying the unknown, the incomplete, the phase-shift**).

The building seeks to develop and make apparent the void and the invisible (the y-condition's 'in-between') through structure. In keeping with this idea the link between the traditional Neo-Classical building and the new extension occurs beneath the ground where the two are bound undetectably together in the depth of time and space (a space embodying the concept of the phase-shift). Inspirations are drawn from the *Chamberworks* project and Libeskind's endless fascination and consideration of the straight line continue.

The two projects seen together may be considered a step in the evolution of the straight line. The liminoid (a term conceived by Victor Turner that describes an inter-structural object, a threshold space that produces a gap or fold in space or time (Binet 1997)), or void cuts through the form of the museum in an endlessly straight line[1]. The concept of the liminoid is a physical manifestation of the y-condition's in-between and unknown space. The void space is "the embodiment of the absence" (Libeskind 2001: 28) and is the indefinite torturous line that Libeskind speaks of above. Constructed so as to be **acoustically, materially and architecturally different from the surrounding spaces**, the void is illuminated by overhead skylights alluding to that which may never be exhibited (the indefinite torturous line continues). One may cross over this painful non-existence, both literally and figuratively, from one fragmented straight line to another that occurs in the guise of white-walled and inherently luminous museum space. Here, the concept of the music of light comes into play. Light forms a temporal, rhythmic element that is a condition of both music and architecture, forming a space with existential meaning:

"The past fatality of the German Jewish cultural relation in Berlin is enacted now in the realm of the Invisible. (It is this remoteness which I have tried to bring to consciousness)." (Libeskind in Papadakis 1991: 86). I believe the museum is Libeskind's personal interpretation of what I have chosen to call the y-condition. Libeskind desires to represent the in-between (the invisible) through multi-dimensional architectural space.

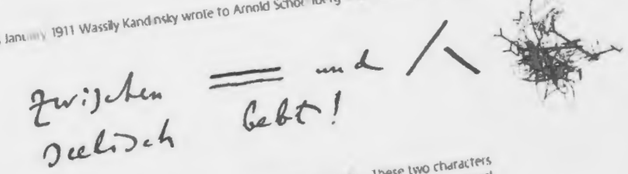
The building is open to multiple interpretations and consequently may be architecturally experienced in a number of ways. Three streets or routes (*One Way Street*) exist within the design. The first is the Garden path that leads the protagonist toward an external garden of 49 concrete columns. Arranged along a rigid orthogonal grid, 48 of the columns contain the earth of Berlin while the remaining one contains the earth of Jerusalem. The second route is that of 'The Stair of Continuity' (the fragmented straight line) enclosing the exhibition space. The final space is the spatial embodiment of the absence, namely the 'Stair of Continuity' (the torturous straight line) which ends abruptly amongst raw concrete and a narrow beam of "reflection-without-source" light (Libeskind 2001: 26).

"... the physical space and form should give substance beyond the visible; a dimension that forms a permanent trace of the past in the future {the in-between | the unknown residing between two knowns...}" (Libeskind 2001: 24)

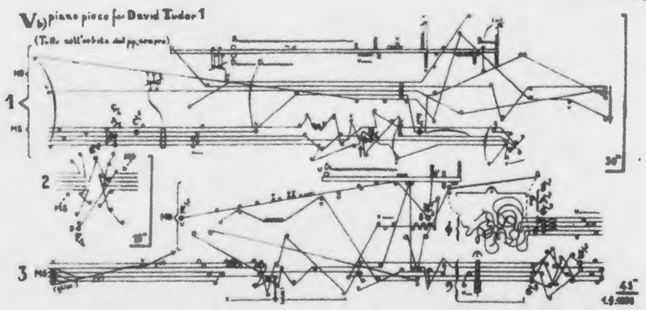
The Jewish Museum continues Libeskind's personal (he was a Polish Jew whose parents suffered under the Holocaust) exploration of both the straight line; of the reflection of history; of the continuity between music and space ("So, in one sense we are immersed in music, the all-encompassing dimension of reality (Libeskind 2001: 51)); of the idea of representing that which remains invisible (the y-condition) through the constructs of both space and time. It is Libeskind's ability to overcome the traditional barriers of both space and time, as well as his desire to find that which has been disregarded, that makes the architect and his projects worthy of examination. *Chamberworks* and the *Between the Lines* projects reveal that "... there are dimensions that are not purely in space, dimensions inscribed in time" (Libeskind 2001: 24). Libeskind inherently searches for this idea that Elizabeth Martin labelled the y-condition, that Derrida calls the supplement, that Turner regarded of Libeskind's work as the liminoid.

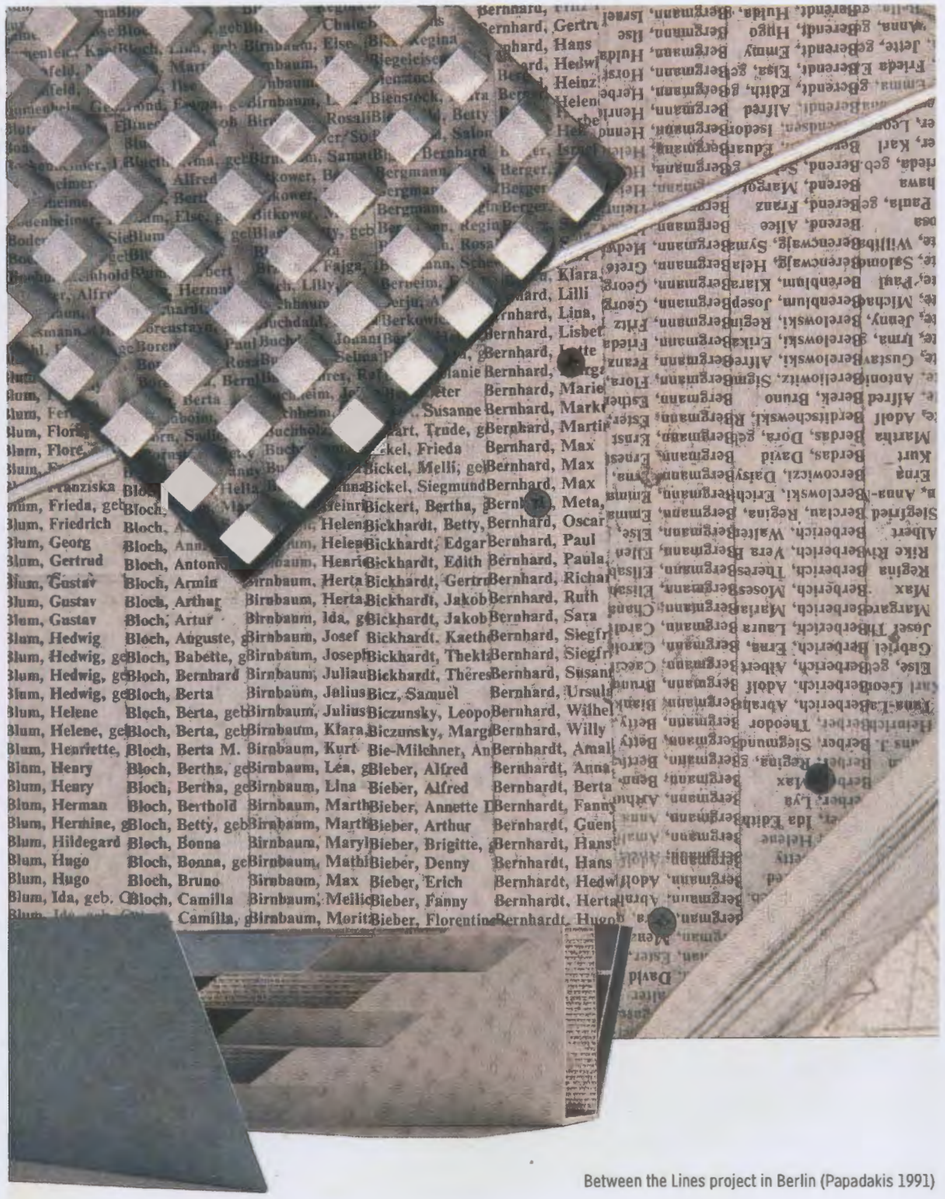
"As the night is sinking on realities that have had their day, one can still hear some lamenting a vanishing present. Others rejoice at the luminous perspectives – fascinating both as threat and charm – that emanate from the empty and the endless." (On speaking of Chamberworks in Libeskind 2001: 49)

On 26 January 1911 Wassily Kandinsky wrote to Arnold Schoenberg and included the following



He speaks about an 'inner voice' vibrating between = and ∧. These two characters interlocking form the main ingredient of the plan of the extension to the Berlin Historical Museum. They also come back in the interior elevations of the main exhibition spaces, in the form of the parallel lines of the floor and ceiling intersected by the windows. 'writing' on the wall. This process of intersection can also be read as the *leitmotif*





Between the Lines project in Berlin (Papadakis 1991)

Libeskind's work describes his conceptual desire to find the relationship between music and architecture, and his architectural fulfilment of this desire. In both, he seeks the equivalent of the differentiated experience of the y-condition.

Libeskind finds the *possibility within* context | site, the incomplete and history to uncover (recover) the in-between.

Through light, shadows, acoustics, materials Libeskind creates a temporal experience situated in the ideas of Retro-Romanticism and alluding to the y-condition.

DECONSTRUCTION
LINK TO ARCHITECTURE

Deconstruction: The idea of Derrida's binary opposites may also be translated into the realm of musicology. In the common practice of musical styles, the binary opposites of themes and keys usually are resolved toward the end of a composition. However, in the musical styles of Romanticism and modernism, the binary opposites are less clearly defined and susceptible to a greater degree of interpretation. In this way they begin to deconstruct themselves. The musicologist Rose Rosengard Subotnik suggests that "romantic music provides an explicit basis for its own deconstruction". (Beard & Gloag 2005: 52). In his writings the Enlightenment thinker Rousseau writes of his notion of "a pure melodic style untouched by the bad 'supplement' of harmony" (Benjamin & Norris 1988: p.9). He views the essence as melody which is primary to harmony. Derrida argues, however, that the supplement of harmony may, when examined, in turn become melody, forming both the 'missing piece' and the 'actual' piece of musical language (Beard & Gloag 2005: 53).

UNDERSTANDING THE PRINCIPLES OF DECONSTRUCTIVIST ARCHITECTURE

DECONSTRUCTION'S PHILOSOPHICAL LINK TO THE Y-CONDITION

"In other words, the new condition of the object must be between in an imageable sense as well: it is something which is almost this, or almost that, but not quite either ... Again, this between is not a between dialectically, but a between within."

Peter Eisenmann in his 'En Terror Firma: In Trails of Geotexts' essay (Norris 1989: 43)

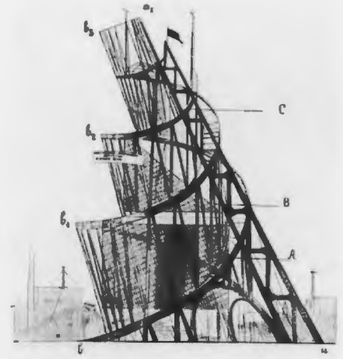
Developed from the writings of French philosopher Jacques Derrida (writing in his works *Of Grammatology* of 1976 and *Writing and Difference* of 1978), the concept of ***deconstruction*** was first explored as a philosophical idea relating to the laws of linguistics and literary criticism. Derrida was interested that when one seeks to define a term in the context of a sentence or passage, the definition or meaning of it is continuously delayed and substituted "along the chain of linguistic substitutions and displacements" (Benjamin & Norris 1988: 9). Therefore, a fixed interpretation of a word or text was impossible as it altered and warped throughout the reading. Resisting a simple explanation, the term deconstruction can best be described as a particular way of thinking and reading that requires one to challenge that which is known and understandable so as to explore that which might lead to possibility and in so doing is a term equalling Martin's y-condition (Derrida insisted that deconstruction was not a method or a system as it deviates from one context to another):

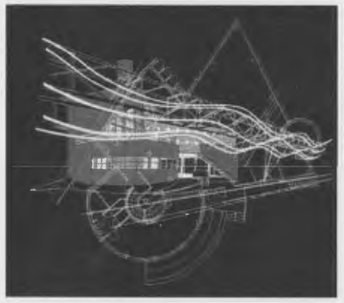
"Deconstruction is 'philosophical' in the sense that it deploys a distinctive mode of argument in raising certain problems about knowledge, meaning and representation. It suspends our commonsense ..." (Benjamin & Norris 1988: 13)

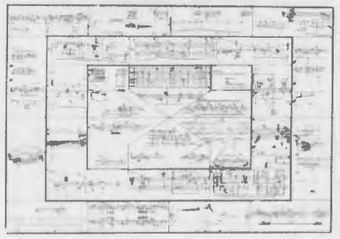
The presence that deconstruction seeks to extrapolate is always within the (con)text. The purpose of deconstruction is to re-think or re-read the object in such a way that it stands in opposition to an initial, logical and natural reason so that *a possibility* may emerge. Derrida speaks of the need to destabilise hierarchy in the order of binary opposites so as to neither reside within these opposites nor neutralise them. However, the hierarchy of binary opposites will always exist, albeit in a rather aggressive form (Beard & Gloag 2005: 51). He also distinguishes between the ideas of **essence and supplement**, the essence being those of primary consideration, the supplement meaning "both the missing piece and the extra piece" (Beard & Gloag 2005: 52):

Top to bottom:
Tatlin's *Monument to the Third International* (ir-62.livejournal.com);
Libeskind's *Berlin City Edge* (Benjamin & Norris 1988);
Tschumi's *Parc de la Villette* (Benjamin & Norris 1988);
Roman Haubenstock-Ramanti's *Moblile for Shakespeare/Sonnets 53 & 54* (Shaw-Miller 2006)

Avant-Garde: Consideration toward the concept of the avant-garde developed during the nineteenth century. The term became synonymous with all that was progressive, experimental, and innovative and strove toward pioneering tendencies in all high art forms. The avant-garde deviated from the beliefs of mass or popular culture, choosing instead to explore the ideas of the non-traditional. Descending from the ideas of late Romanticism and exemplified in Baudelaire's *Painter of Modern Life*, the concept, as well as having a philosophical link to deconstruction, was connected to the ideas of futurism, Dadaism, surrealism and abstract expressionism. The composers John Cage and Arnold Schoenberg's work exemplifies the use of the avant-garde in musical composition, deviating from fixed and autonomous music toward that which develops from abstraction, extremity and experimentation (Beard & Gloag 2005).







"A typical strategy of deconstruction may involve consideration of something that may appear incidental or marginal in a {con}text, something that is quickly passed over in pursuit of a main narrative or argument. However, this moment can actually be the supplement ... it could conceivable be the moment that constructs the doubleness of 'missing piece' / 'extra piece'." (Beard & Gloag 2005: 52)

It is in opposition to this subversive way of thinking that the philosophical beliefs of the classical theorists and architects sought to define the relationship between music and architecture. Paradoxically, the way deconstruction reads (con)text is appropriate to Elizabeth Martin's y-condition of exploring the unknown residing between the binary opposites of architecture and music. Consequently, **my thesis poses to deconstruct (con)text so as to explore how music may be an inspiration to and generator of space.**

These attitudes and philosophical beliefs are developed by practitioners into a catalyst for the design and creation of architecture. Architecture, as exemplified in Vitruvius' *Ten Books on Architecture*, has traditionally been synonymous with the qualities of harmonious proportion and order. Paradoxically, the Deconstructivist architects endeavour to disturb this traditional view toward making:

Deconstruction is not demolition or dissimulation ... deconstruction gains all its forces by challenging the very values of harmony, unity, and stability, and proposing instead a different view of structure: the view that the flaws are intrinsic to the structure. They cannot be removed without destroying it; they are, indeed, structural." (Johnson & Wigley 1988: 11)

The irregular forms often viewed in Deconstructivist works of architecture arise as a symptom of displacing structure. Making use of irregular and conflicting forms is not an aesthetic utilised in order to confirm to a certain style of formal thinking, rather so as to encourage a radical shift from the normal and to deviate from the traditional condition of architectural thinking (Johnson & Wigley 1988: 16). The formal conditions of the perfect and the imperfect, the classical | traditional and modern | post-modern are embroiled within each other. By disturbing the perfect the potentials within it are revealed. Eisenmann states that **deconstruction releases what has always been in existence but is repressed within the classical** (Norris 1989: 7).

One origin of the Deconstructivist design system may be traced back to the works of the Russian ***avant-garde***.

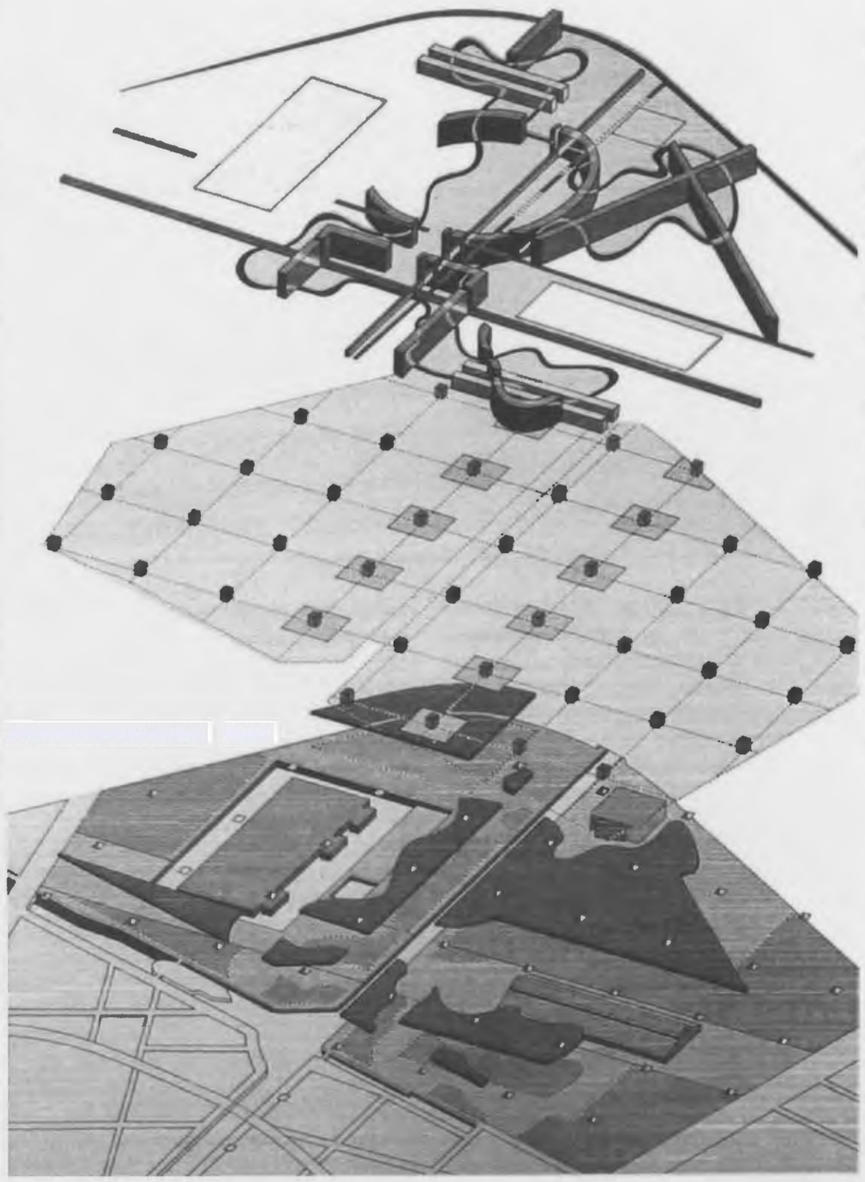
DECONSTRUCTION AS BUILT FORM: TSCHUMI'S WINNING ENTRY FOR THE PARC DE LA VILLETTE COMPETITION

Tschumi used the narrative of deconstruction to order and explore the brief of the Parc de la Villette project and to achieve mutually interchangeable results between the function (space), the event (experience) and the user. He states that: "Architecture ceases to be a backdrop for actions, becoming the action itself" (Viotti: 1987). Through the process of deconstruction the essence of structure and the idea that it is central to design is challenged, Tschumi seeks the supplement.

There are three inherent systems at play in the design: that of lines, points and surfaces. These three systems are superimposed, each bringing their own limits and logic in order to create an architecture that is subversive, braking down traditional building systems (deconstruction) and reconstructing them with varied relations and meaning. What I understand this to mean is that Tschumi destabilised the essence in order to find the possibility within it, the supplement. Deconstruction states that the presence of the supplement is always within the (con)text and Tschumi uncovered it by challenging what is known and understandable. The spaces created are "of variable size and character, which are dependent on situations of reciprocity (when elements reinforce one another), conflict (when opposing elements confront each other), and indifference (when there is low intensity of proximity of unrelated elements). The overlay of different systems thus creates a carefully staged series of tensions that enhance the dynamism of the park" (Wall, 1983; p: 28).

Tschumi goes further in his use of the idea of folly, used throughout the park as a point which can occupy meaning and a position of status, according to which is most appropriate: "They work not so much to define the events that take place around them, but to identify and situate actions that are not necessarily events" (Viotti: 1987). The folies, emerging from the possibility of deconstructing structure, become susceptible to further deconstruction and reinterpretation. As in Libeskind's Jewish Museum, Tschumi relies as much on the concept of emptiness, or the void, as on the model of presence to create meaning. "As Tschumi explains, it is '...an empty slot or box in a chart or matrix, an unoccupied square in a chessboard, a blank compartment – the point of the unexpected, before data entered on the vertical axis can meet with the data on the horizontal one'." (Graafland, 2007/2008: p. 22). This is the supplement.

Style, structure and form no longer occupy primary consideration in the design. The unfolding of experience and event becomes an inspiration to the architecture. "The result is a series of ambiguous intersections between systems, a domain of complex events ... In which the status both of ideal forms and traditional composition is challenged" (Johnson & Wigley 1988: 92). The meaning of space is unspecific, it changes according to its (con)text, event and user. Tschumi creates a multi-layered space open to numerous interpretations. In this he deviates from subscribing to the essence (the apparent, obvious, understandable) into the supplement (the unknown, the in-between, the y-condition). It is a supplement that always existed within the space but required uncovering.



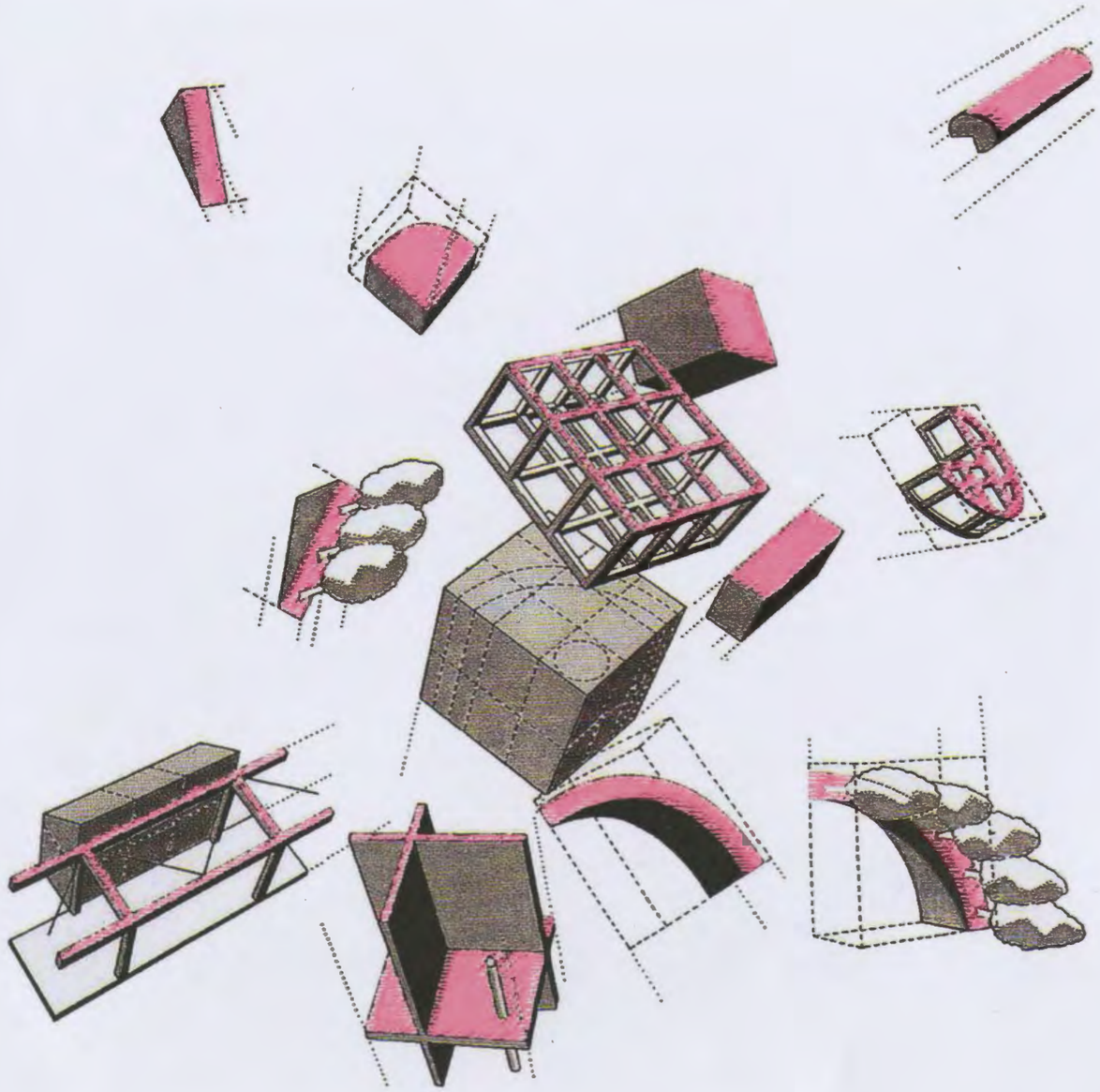
Three autonomous systems at play in Parc de la Villette (Benjamin & Norris 1988)

The Russian avant-garde posed a threat to tradition by breaking the classical rules of composition, in which balanced, hierarchical relationships between forms creates a unified whole. Pure forms are now used to create 'impure', skewed geometric compositions." (Johnson & Wigley 1988: 12)

Emerging from before the 1917 Revolution (thus becoming an architecture advanced and inspired by social revolution) and deriving much inspiration from pre-revolutionary art, the Russian Constructivist architects such as Tatlin, Malevich and the Vesnin brothers created structures in which the hierarchy of forms and axes was disrupted, where the unstable geometry arose from the idea of planes and forms floating in space. Common, however, between all architects was the understanding of the purity and stability of structure, despite the skewed and conflicting relationships between forms.

The role of the architect exploring the ideas of Deconstructivism is to challenge that which is known, **to exploit the potential residing within the stable and pure and logical, to seek the unfamiliar.** In this way this architectural and philosophical realm of deconstructivist thinking suits the ideas of Elizabeth Martin's y-condition: to search for the unknown residing between two knowns. As the architect Peter Eisenmann states, deconstruction poses to destabilise hierarchy:

"For architecture to enter a post-Hegelian condition, it must move away from the rigidity and value structure of the{se} dialectic oppositions. For example the traditional opposition between structure and decoration, abstraction and figuration, figure and ground, form and function {music and architecture} could be dissolved. Architecture could begin an exploration of the 'between' within these categories." (Benjamin & Norris 1988: 27)



The concepts of Deconstructivism coincide with those of the y-condition and Retro-Romanticism

Deconstructivism: seeks the supplement or the unfamiliar, rather than the essence

Deconstructivism: locates and develops the potential already existing within the (con)text

Deconstructivism: applies the potentials already existing within the classical and classic-romantic

Parc de la Villette deconstruction (Benjamin & Norris 1988)

THE TRINITY THEORY
A CONCEPTUAL CONCLUSION

THE TRINITY THEORY | EXPLORING THE IDEA OF SUPPLEMENT

THE FORMATION OF A THEORY

From Elizabeth Martin's theory of the y-condition emerges a particular system of thought best suiting the views of Retro-Romanticism. It is a conceptual way of thinking concerning rediscovering the in-between, the incomplete, the forgotten, the left over, the temporal and the unfamiliar that is inherent in every (con)text. Overcoming conventional definitions, the theory sits perfectly within Derrida's idea of the 'supplement': An entity within and between dual essences, an attempt to experience the unknown residing between two knowns. My thesis poses to call this its trinity theory:

"That in every duality a third is latent (that two implies three) ... which is like neither of the original two but partakes of the nature of them both." (Bragdon 1995: 16)

With the dissolution of the ideal and the idea of universal type, and the progression toward the unorthodox view of the trinity theory, comes the idea of the transitional space that locates itself somewhere between the physical feeling of space (commonly understood as architecture) and the emotional feeling of space (commonly understood as music). However, both essences have a dynamic pull on one another, the threshold and tension between the two producing this transitional space | the supplement | the third duality:

"I am interested in architecture and music as grounds for the present and poetic processes for the making of the future ... I am not interested in the stable core of the known, but in the turbulent edge of the barely conceivable. What is architecture? What is music?" (Martin 1994: 69)

The result of applying what this thesis poses to call a trinity theory would be to deconstruct the potential within conservative streams of thought as well as context to create a hybrid that falls between the two disciplines of music and architecture and may give rise to differentiated experience and, more importantly, *a possibility*. What exists in this theory is the idea of multiple layers of information and inspiration, music simply being one of several layers of opportunity. It is a hypothesis that poses to discover rather than to solve.

This is the essence: music | architecture
This is the supplement: the y-condition
This is the (con)text: Retro-Romanticism

This is the essence: temporal event
This is the supplement: sound | light
This is the (con)text: rhythm & gesture

This is the essence: a place of music
This is the supplement: differentiated experience
This is the (con)text: Woodstock Town Hall

Extract from Little Gidding (No. 4 of Four Quartets)

We shall not cease from exploration
And the end of all our exploring
Will be to arrive where we started
And know the place for the first time.

(T.S. Eliot)

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IMAGE REFERENCES

Front cover: Graphic composed by author from 1st year portfolio drawings

Pg. 9: A drawing from *Chamberworks* by Daniel Libeskind (Papadakis 1991)

Pg. 12: Cartoon by Chas Addams, author's own

Pg. 16: Graphic composed by the author from images obtained from Libeskind 2001 and Johnson & Wigley 1988

Pg. 18: Libeskind's Berlin City Edge design (Johnson & Wigley 1988)

Pg. 20: Graphic composed by the author from images obtained from McLuhan & Fiore 1967 and Martin 1994

Pg. 26: Graphic composed by the author from images obtained from Martin 1994

Pg. 28: Graphic composed by the author

Pg. 31: Image composed by the author from images obtained from Papadakis 1991 and Libeskind 2001

Pg. 32: Image composed by author from images obtained from Papadakis 1991 and Binet 1997

Pg. 33: Image composed by the author from images obtained from Papadakis 1991, Binet 1997, Shaw-Miller 2006 and Libeskind 2001

W. Wordsworth poem (pg. 10) originally from Francis T. Palgrave ed. (1824–1897); 1875; The Golden Treasury. Source: www.bartleby.com

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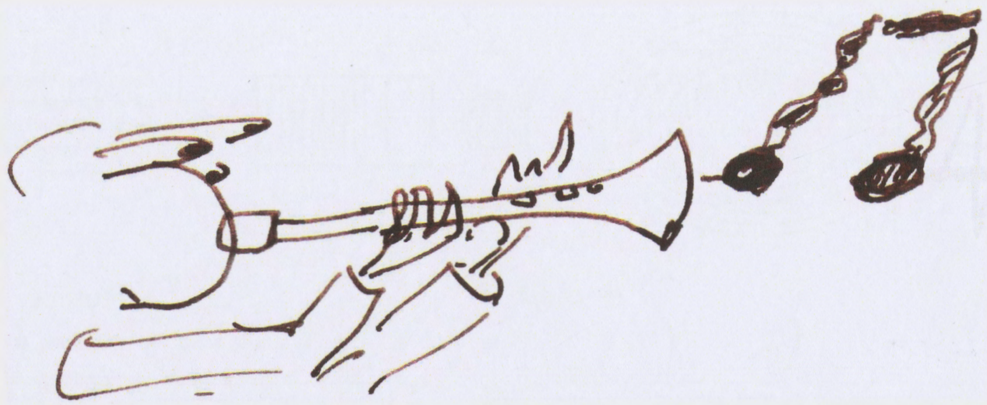
SECOND MOVEMENT

CONTENTS

The performance has ended|

TECHNICAL & CONCEPTUAL
INSTRUMENT & ACOUSTICS



THE INSTRUMENT & ACOUSTICS AS INSPIRATION TO AND GENERATOR OF SPACE

A BRIEF INTRODUCTION

My theory thesis proposes the idea that music may act as an inspiration to and generator of space. However, the concept of music cannot be understood without a sound understanding of the general principles of instruments and acoustics, as all three terms are inter-related in conception, production and performance.

Music is unequivocally linked to the idea of instrument. The word instrument in this thesis comes to mean both a device that produces musical sounds – a musical instrument (Martin 1994), and a tool that shapes and produces an outcome. The thesis engages the concept of instrument as a an opportunity to inspire and generate space, be it as a literal interpretation of the form, structure and materiality of a musical instrument, or as a conceptual understanding of instrument as tool:

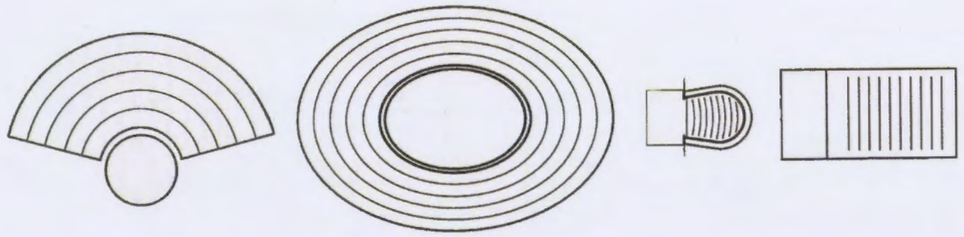
instrument as architecture

Within this context of instrument as architecture, the term acoustics may be understood as an instrument (a tool) in producing a conceptual point of reference for design. Acoustics are also the scientific benchmark for the appreciation of the nature of sound. Both entities are to be understood equally and in so doing create a layer of opportunity in which (scientifically and conceptually) acoustics may be an inspiration to and generator of space:

acoustics in architecture

TRACING THE (SIMPLIFIED) **HISTORY** OF MUSIC, THE INSTRUMENT & ACOUSTICS

"The English acoustician Hope Bagenal used to say that all auditoria fall into two groups: those with the acoustics of a cave and those with the acoustics of the open air. From the former, where music originated, grew the concert hall, and from the latter, where the spoken voice belongs, grew the theatre." (Forsyth 1985: 3)



Classical fan-shaped theatre
Classical Roman arena
Baroque horseshoe-shaped theatre
19th Century rectangular concert hall
(Barron 1993: 2)

ANCIENT CIVILISATIONS

The Ancient Greeks had studied music and were aware that within the resonance of stretched strings lay the idea of harmony, which was dependent on the arithmetic ratios existing between those strings (Barron 1993).

During Ancient Greek civilisation the classical amphitheatre was the prevailing design. The amphitheatre form lent itself to the acoustics of speech. The open air, lacking the elements that create a large amount of reverberation, is a good absorber of sound and therefore ideal for the characteristic of clarity rather than fullness of tone. From this amphitheatre design developed the idea of the theatre (as opposed to the concert hall).

The earliest written record of acoustics and their formal incarnations may be traced back to the Roman architect Vitruvius in the 1st Century BC. The fan-shaped amphitheatre plan and raked seating that Vitruvius favoured was based on his belief that sound curved in an upward arc and not just horizontally (Barron 1993).

13TH CENTURY

The idea of the Pythagorean ideal and an inter-related cosmic universe is the predominant way of thinking. Music adheres to this zeitgeist in the consonances and intervals between notes. The design of the Gothic abbey church, such as that of St. Denis near Paris, is designed to act as an instrument, highlighting the reverberation time of music. Acoustics develop the idea and structure of building into a musical instrument, a trait particularly obvious in the design of churches. The design of the Romanesque church, "where the successive notes of plainchant melody reverberate and linger in the lofty enclosure, becoming superimposed to create the idea of harmony" (Forsyth 1985: 3), is a valid example of how the design of a building (in this case a stone church) may give rise to a musical outcome (for instance, the idea of harmony, or more than one melodic voice) in music. The predominant instrument at the time was the voice, commonly used in Gregorian chant. Secular instruments were the harp, lute and fiddle.

14TH CENTURY

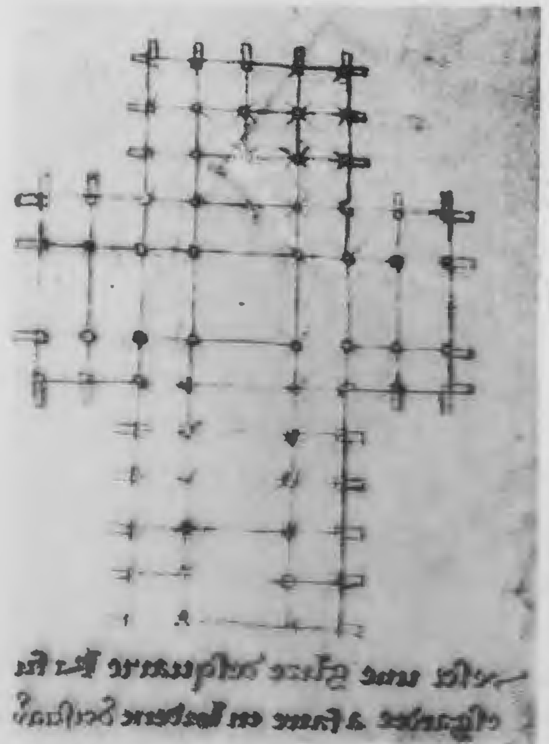
15TH CENTURY

It was around this time that the classical amphitheatre was roofed and from this structure developed the idea of the Baroque horseshoe-shaped theatre (such as Alotti's Teatro Farnese in Parma) (Forsyth 1985). Seating developed into boxes which were filled with elaborately draped spectators who had come for a night of entertainment. With the fashion evolution, the low ceiling and the heavy drapery arose the implication of a greater degree of sound absorption and shorter reverberation time. The acoustics reverted back to being similar to that of the amphitheatre (that of clarity and intimacy) and in so doing the music developed into the Baroque opera, with its rich musical ornamentation and powerful librettos. Designers advocated the use of thin wood panelling throughout the opera house in order to absorb medium- and low-frequency sound (although often successful, they did this without adequate scientific knowledge).

16TH CENTURY

It was during the Renaissance that the idea of 'universal man' emerged (Kamien 2006) and consequently every educated man was expected to be skilled in music. Secular music became as important as sacred music and in this instrumentality began to shift from a focus on the voice as primary instrument, to that of considering other musical instruments as solo instruments (although secular vocal music still remained popular). Likewise, the idea of resonant church acoustics shifted to the acoustics of the smaller and more ornate court room with a decreased reverberation time.

Epidauros Theatre, 350 BC (Norberg-Schulz, 1975: 52)

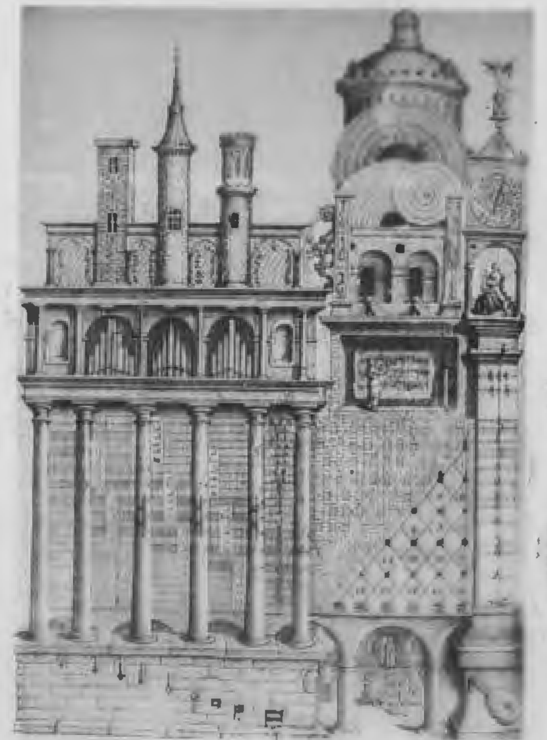


Villard de Honnecourt's church sketch plan, designed by Pythagorean laws (Forsyth, 1985: 6)

A page from the Peterborough Psalter (Kamien 2006: 60)

Teatro Farnese (www.conosciparma.it/images/farnese.jpg)

An illustration from the book of hours in Tours, France (Kamien 2006: 90)

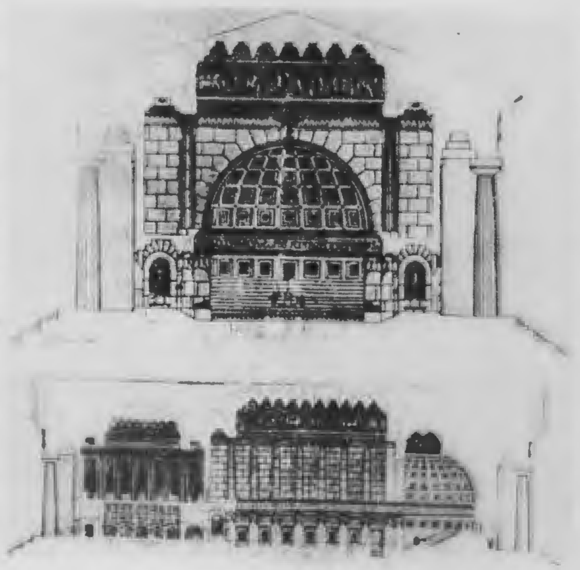


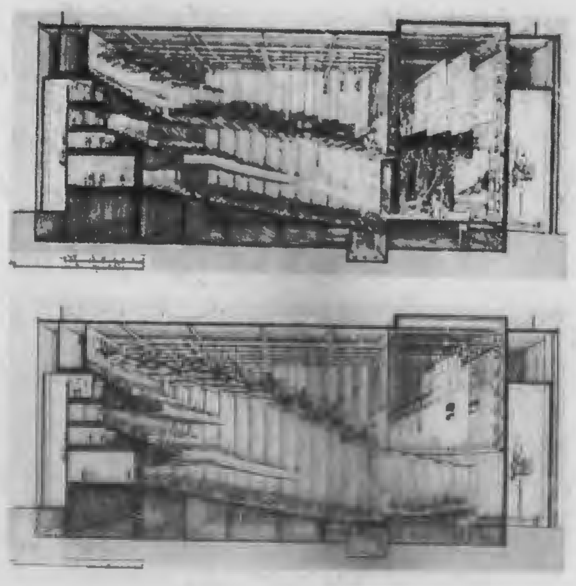
The Temple of Music by Robert Fludd (Forsyth 1985: 6)

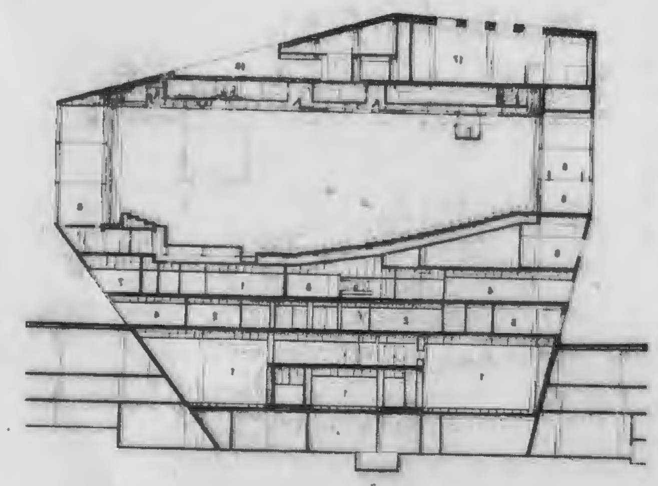
The performance of a Haydn opera for a wealthy aristocratic family at their Esterhaza Theatre, 1775 (Kamien 2006: 160)

(Right): Sections of Symphoniehaus by Ernst Haiger. Conceived as a shrine to Beethoven's music and the performance of monumental symphonic works (Forsyth 1985: 139)

(Far right): Izenour's 1966 model for Jesse H Jones Hall in Houston, Texas. Theatre & concert hall section (Forsyth 1985: 291)







OMA's Casa da Musica in Portugal, 2001 (A + U 2005)

"Even a superficial study shows that early composers were very aware of the effect on their music of the surroundings in which it was to be performed, and that they deliberately shaped their music accordingly ... Plainsong is resonant music, is perfectly adapted to the acoustics of the highly resonant cathedral for which it was written ... pieces written in the broader style of the fifteenth century ... are resonant music ... The forms used by Mozart and Haydn in their chamber and orchestral music are identical; but the details of style (counterpoint, ornamentation, rhythm, the layout of chords and the rate at which harmonies change) will vary according to whether they are writing room-music, concert music or street music" (Thurston Dart from his book 'The Interpretation of Music' in Forsyth 1985: 8)

17TH CENTURY

In the 'age of reason' scientists, such as Boyle and Newton, began to dispel the idea of music in planetary space while gaining significant knowledge of sound (acoustic) behaviour (Barron 1993). With this, the first scientific attempt to find a correlation between auditorium form and acoustic behaviour was established in the union of mathematics and experiment (Kamien 2006). Instrumentally, Baroque music shifted the focus from choral music to instrumental music with composers favouring the violin in orchestras and the harpsichord for solo performance. Music was popular in opera houses, court, church and residential houses – all requiring a unique and different perspective on acoustics.

18TH CENTURY

Music rooms, because of their limited size, became popular for their acoustic intimacy. Musicians such as Mozart composed specifically for the music room that the piece was to be performed in. Due to room size, reverberation time was short and therefore every detail in the music could be deciphered. The piano replaced the harpsichord as the instrument popular for music room performance.

19TH CENTURY

20TH CENTURY

"Until about the beginning of the nineteenth century music had its appropriate auditoria – church, opera house, salon – and was written in styles which, consciously or unconsciously, have been moulded by the acoustics of these auditoria" (Humphrey & Parkin 1963: 80).

In 1907 the physicist Wallace Clement Sabine stated that room acoustics, embedded within the type of architecture that different societies developed, were of such importance that they had the ability to influence that societies' music in order to best suit their acoustical environment. Whether a society lived predominantly inside of structures of within the environment ultimately determined their style of music (Forsyth 1985).

These two comments suggest an evolution in the idea of acoustical design: that it is more than mere scientific and mathematical understanding, but has the ability to shape the environment in which acoustics occur. Society, music and architecture are all influenced by acoustics – and visa versa.

21ST CENTURY

The modern idea of acoustics is a broad study where the singular scientific definition of acoustics is no longer viable. Those factors affecting the acoustic design of a building are expanded: "Acoustics is a science, but acoustics also has a bigger picture; the acoustics of the city and the tonality of the city comes about by intervening in big spatial areas that are specifically located" (Libeskind 2001: 54).

Furthermore, economic constraints and spatial limitations in the 21st century have led architects and acousticians to creating multi-purpose halls for the duality of music acoustics and speech acoustics (and each of their varying counterparts). The implementation of variable acoustics may be aided by the use of mechanical (e.g. altering the amount of absorptive material) or electro-acoustic adjustments (e.g. the aid of loudspeakers). Furthermore, the idea of the electronic instrument becomes popular which may be adjusted to suit the acoustical environment that it occupies.

Acoustics, music and architecture have a profound and reciprocal relationship upon one another ...

Acoustics may not be considered simply as a scientific approach but as a layer of opportunity (an instrument) in the development of a concept

THE HISTORY OF MUSIC, ACOUSTICS & THE INSTRUMENT AND THEIR DEVELOPMENT

Throughout history instrument has dwelled in two domains: as that of a physical musical instrument and as that of a concept. Like architecture, musical instruments have developed with civilisation, taking on the level of complexity, beauty and functionality that is required of them. Inherent in the history of instrument is also the idea that architecture is capable of becoming a musical instrument through a specific use of acoustics. The word instrument here implies a tool for achieving an architectural outcome.

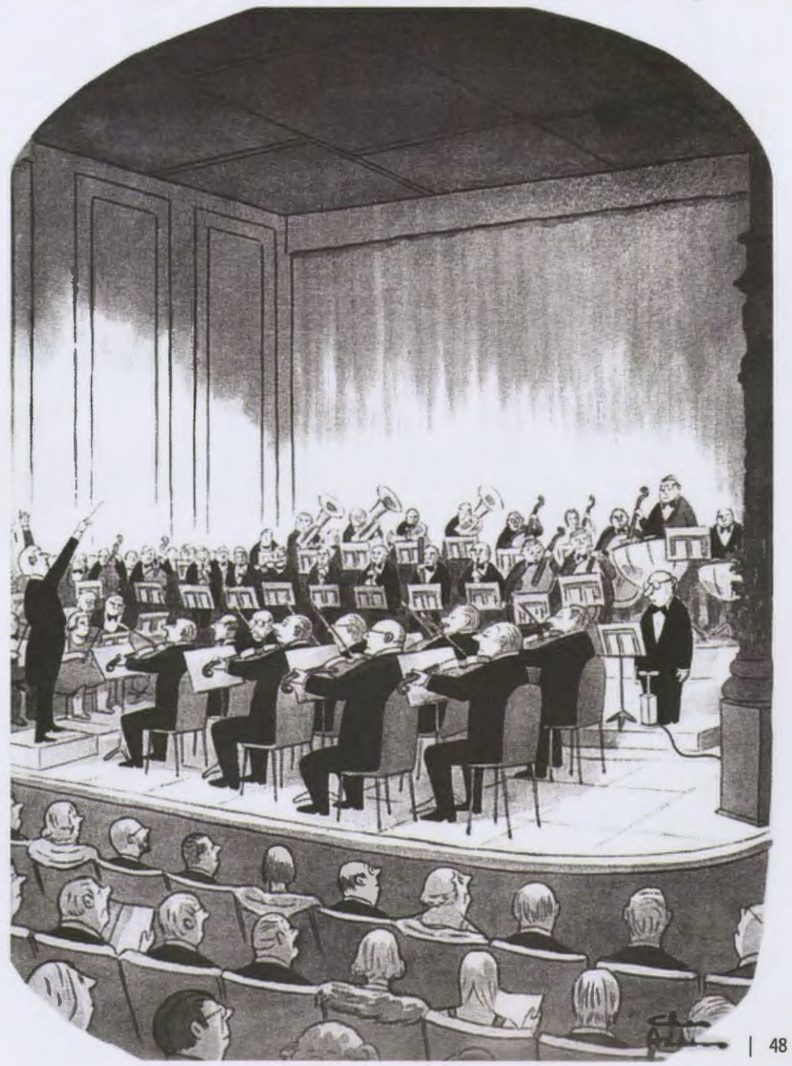
Understanding the multi-faceted arena in which the concept of acoustics has developed, it becomes clear that the study of acoustics is no longer merely concerned with the realm of scientific accuracy. Although important to all auditorium designs (by this I mean places requiring a knowledge of acoustics) and necessitating a certain level of scientific understanding, acoustics also have the ability to conceptually develop a composition, be it musical or architectural. Both historically and currently these three entities – that of acoustics, music and architecture – have a profound and reciprocal relationship upon one another.

Acoustics may not be considered simply as a scientific approach but as a layer of opportunity in the development of a concept. Historically, acoustics have been a layer of possibility that exposes the potential within music and architecture. By positioning the thesis within this framework that is both scientifically accurate and conceptually liberating the idea of the unknown, the transitional space and the idea of differentiated experience may be encountered.

tHE INStRUMENt & ACOUStICS

>INSPIRE

>generate



Inspire: To stimulate a person's creative activity; to prompt or give rise to (Thompson 1996: 458)

Generate: To bring into existence or produce (Thompson 1996: 364)

INSTRUMENT
MATERIAL & IMMATERIAL

THE INSTRUMENT AS ARCHITECTURE

EXPLAINING THE METAPHOR

The term instrument may be interpreted in both a technical and conceptual manner. What Libeskind describes below is the profound relationship between instrument and architecture, highlighting the ideas of materiality, immateriality and scale. To me, what may be interpreted from his meaning is the notion that architecture may be a formal translation of instrumentality – relying on the understanding of musical instrument's structure, finishes, junctions (a translation of materiality) – but also a conceptual (immaterial) reading in which architecture uses instruments that are tools for design, regardless of what their physical properties are. It is here that the idea of instrument relates to the idea of acoustics in that acoustics are a conceptual instrument for architectural design.

"In fact, the immateriality of music and the materiality of matter can be understood to be reversible, because one can see very often that the musical experience leaves a far more profound experience than the biggest of buildings. It is also very interesting how scale is intertwined in the instrumentality of how music is produced and how architecture is produced. Music certainly is produced by instruments, which have a very powerful physiognomic and mythical relationship to architecture, and visa versa. Architecture, after all, is produced often by instruments that have no recollectable or memorable forms in shaping the spaces in which we live, in cities and elsewhere." (Libeskind 2001: 52)

By briefly understanding how sound is produced by the construction of a musical instrument one has the opportunity to draw parallels with the making of architecture...

Pablo Picasso's *Three Musicians*, 1921 (Kamein 2006: 282)

TECHNICAL TRANSLATION OF THE TERM 'INSTRUMENT'

A musical instrument is an object that produces sound and is constructed for the purpose of making music (Isaacs & Martin 1982: 183). Just as in architecture, the construction of a musical instrument is a specialised skill and, as a building does, each musical instrument has a character and voice that is entirely unique to it. By briefly understanding how sound is produced by the construction of a musical instrument one has the opportunity to draw parallels with the making of architecture.

Musical instruments may be classified in many diverse ways according to their physical properties, how they are played, their range etc. For the purpose of exemplifying their inherent characteristic to architecture I prefer the Schaeffner system of instrument classification that distinguishes between instruments that produce a sound from a vibrating solid (e.g. a piano or cello), air (e.g. a flute), or liquid (e.g. hydaulophone).

Each musical instrument and group of instruments have a construction method too diverse to directly appropriate into the making of a building, however, within each classification lie properties that may be translated into architecture. For the purpose of simplification, and for its closeness to the idea of building mass, I have chosen to briefly analyse an instrument that produces a sound via a vibrating solid.

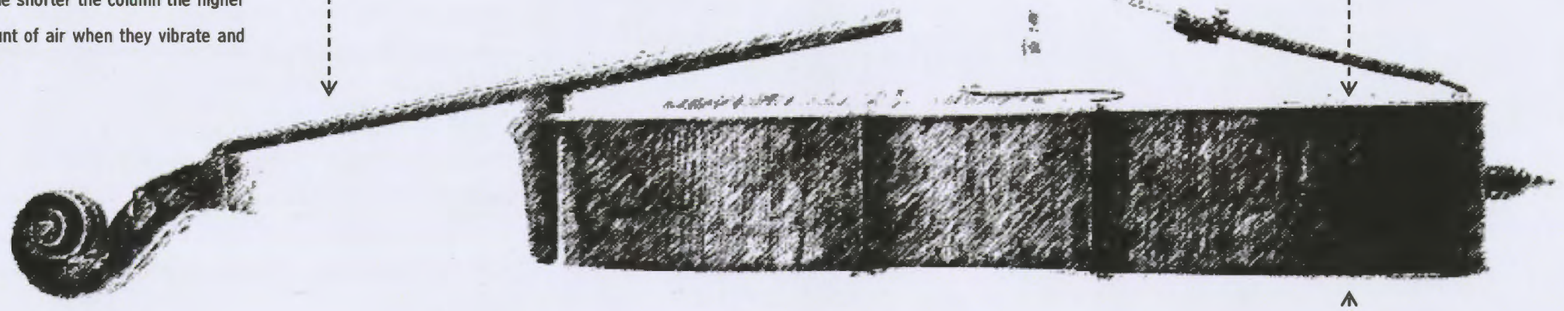
What follows is a brief description of how sound is produced in and the structure of a cello, a musical instrument that falls under the above mentioned category.

HOW **SOUND** IS PRODUCED IN THE CELLO AND ITS CONSEQUENT **FORM**

The way that sound is produced and developed in a 'solid' instrument is similar to the way that sound is transmitted in a building. It is this transmission of sound to other parts of a building that the role of acoustic design wishes to counteract (discussed in detail later). The form of solid instruments are designed much like the form of a concert hall, where the use of line and contour aids the reflection of sound waves within the instrument before they exit the structure and enter the overall performance space, therefore form develops not primarily along the lines of aesthetics, but of function and optimum performance.

1 When a bow is drawn across **the strings** of the cello it produces a friction between the hairs of the bow and the strings of the instrument. This in turn produces a vibration known as a standing wave. This standing wave may be altered by either adjusting the tension of the string (tuning) or adjusting the length of the sting (playing) – a similar effect occurs in instrument's that produce sound by vibrating columns of air, the shorter the column the higher the pitch. Strings only displace a small amount of air when they vibrate and are therefore produce a quieter sound.

2 **The bridge** has two main functions, firstly to support the strings and secondly to transmit the vibration of the strings to the larger surface of the soundboard. In order to do this it lies perpendicular to both the strings and the soundboard (which are parallel to one another) and may be altered in height and position. When a string vibrates it causes the bridge to vibrate.



3 **The soundboard** transmits vibrations that have travelled down from the bridge, producing an audible sound at the same pitch as that of the string. When a larger surface vibrates it displaces a greater volume of air and this in turn produces a louder sound. The soundboard vibrates at the same frequency as the string, only with a richer timbre. These vibrations are then transmitted to the sound box. The soundboard has sound holes cut into it (these are the s-shaped holes in the cello). The sound holes are to enhance the resonance of the instrument. The soundboard exists in other instruments such as the piano.

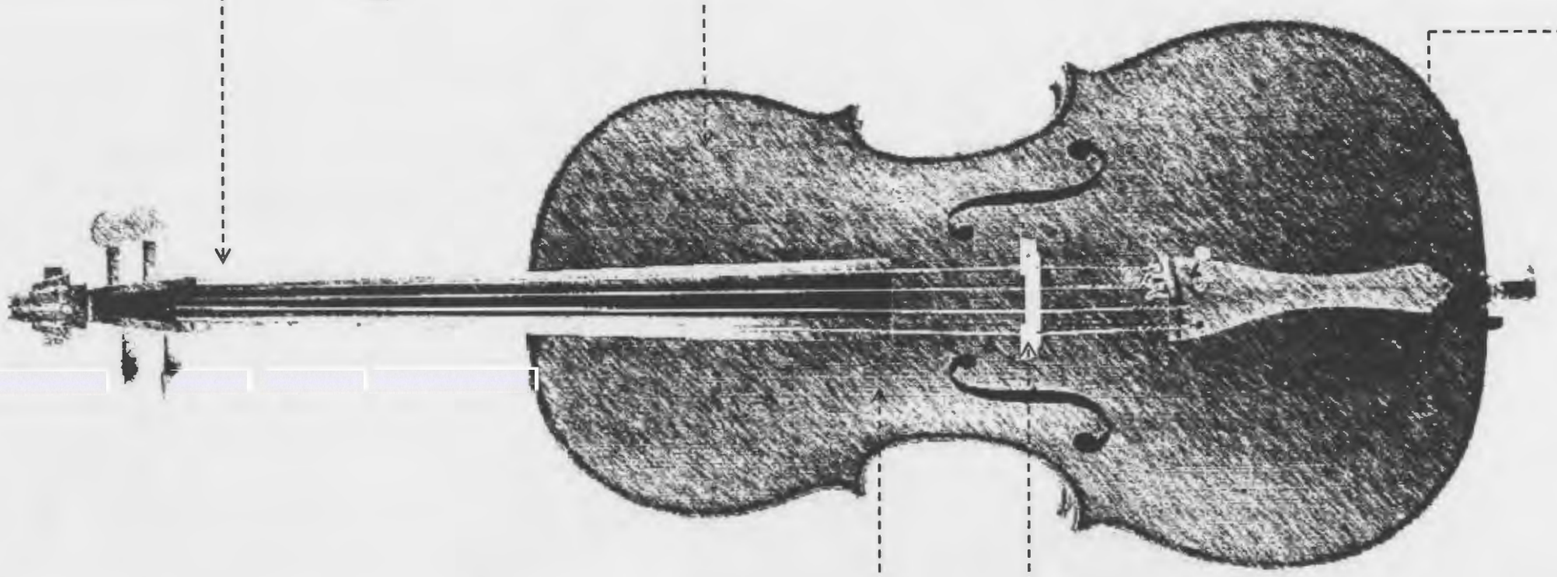
4 The **sound box** is a hollow chamber that aids sound amplification and tone quality of the instrument. It does not add any more energy to the vibrating string but merely allows for a greater surface area in which the sound waves may develop and radiate into the air. The sound box adds resonance at lower frequencies to the original resonance therefore improving the timbre of the instrument.

STRUCTURE, **MATERIALITY**, JUNCTIONS & FINISHES OF THE CELLO

The form of an instrument is held together through a distinctive system of tension and compression and, regardless of the instrument, it works through the transferral of energy (vibrations) throughout the structure and, interestingly, along the grain line of the material itself (specifically in timber instruments). In order to minimise vibration loss in all instruments, joinery and fitting throughout the instrument is detailed, perfect and precise. Generally speaking, instruments have to be lightweight enough to be properly used by the musician yet solid enough to maintain a degree of structural integrity. It is this fine balance that can best be translated into the practice of architecture. All instruments contain a very limited number of materials, each being chosen to contribute to the instrument's sound quality rather than their appearance.

The neck is the base of the fingerboard and projects from the main body of the instrument. The neck counteracts a large bending stress imposed by the tension of the strings. The ability of the neck to resist bending stress contributes significantly to the quality of the instrument. If the neck can resist bending stress then the pitch of a note will stay constant. The way in which the neck is attached to the instrument is in one of four ways: a dovetail joint (has the characteristic of strength), a mortise and tenon joint (which often has to be reinforced by a screw or pin), a foot which is glued, or a neck which is laminated to the body (this is the strongest attachment but is not susceptible to alteration). The neck is usually in the shape of transverse curve so as to aid ease of playing.

The soundboard is traditionally made of a timber that is strong enough to offer structural support to the instrument but also light enough to be transported and played easily.

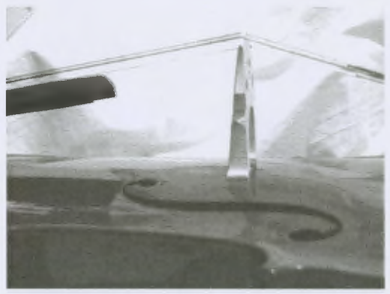


The soundboard and box | body are finished in a high-sheen polish with a certain level of light refraction (achieved through rubbing French oil polish into the instrument) that is common to the finishes of most Classical instruments. Generally, musical instruments' finishes are kept to a minimum so as to avoid overloading the structure.

The sound box or body contains both structure and enclosure. The structure is generally hidden within the instrument and composed of a lightweight timber. Purfling, which are thin strips of wood, are placed in the internal grooves of the instrument for extra support. The enclosure must be strong enough to support the weight of the strings in tension but should also be light enough to vibrate adequately. It is generally made of thin wooden timber panels that are then varnished.

The bridge must be made of any material that vibrates sympathetically with the strings yet is strong enough to resist the weight of the strings in tension. The most commonly used material is softwood. The openings in the bridge reduce the weight of the structure while improving the timbre of the sound.

1. **Solid internal structure and lightweight skin**
2. **To be beautiful as well as functional**
3. **The importance of the junction**
4. **A simple palette of useful materials**

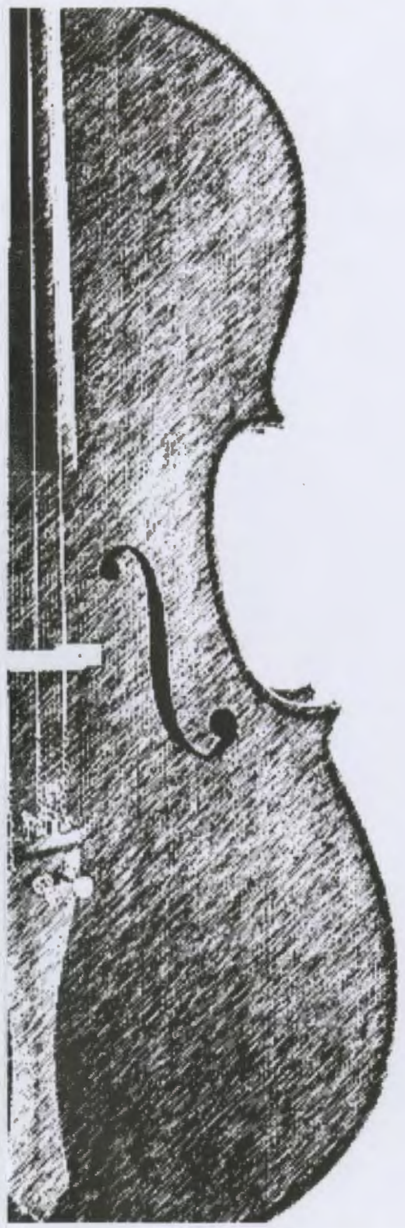


CONCLUDING HOW MUSICAL INSTRUMENT MAY EFFECT **ARCHITECTURE**

The physical characteristics that exist in the cello are common to many other instruments that produce sound through a vibrating solid (such as the piano and oboe) as well as having properties similar to that of instruments that produce sound via a vibrating column on air (such as the trumpet). Therefore by briefly examining how this instrument produces sound and how it is constructed, a general understanding of how many instruments are produced and performed is insinuated.

What the architect may learn from this is twofold. Firstly, that a building may react to a vibration much as an instrument does. It is due to this fact that the scientific study of acoustics is so important when designing a building primarily for the practice and performance of music. In most circumstances, the vibrations, resonance and consequent sound of the musical instruments are preferably limited to the auditorium. Here, the scientific study of acoustics may be seen as a (conceptual) instrument for achieving this.

Secondly, the architect may gain inspiration from the practical construction of a musical instrument. Composed of a solid internal structure and predominantly lightweight skin, an instrument is conceived under the principles of function rather than beauty. However, ignoring external finishes may be detrimental to the acceptance of the instrument and as such a musical instrument is finished to be beautiful as well as functional. Incorporating the idea of the importance of junction and a with simple palette of useful materials, a musical instrument is an ideal comparison to a technological approach to architecture. **Endlessly practical yet utterly beautiful a musical instrument stands as a profound example of what architecture inspires to become.**



MATERIAL: Architecture may be inspired by the physical properties of a musical instrument

Structure | form | materiality | junction | finish

IMMATERIAL: Architecture may be inspired by the conceptual properties of the word instrument. Instrument is another word for {design} tool. Acoustics are an instrument in generating space.

Instrument and acoustics as inspiration to and generators of space

ACOUSTICS
MATERIAL & IMMATERIAL

Acoustic(s): Describe the properties and qualities of sound within a room and are often referred to as "the science of sound" (Thompson 1996: 8). "Pertaining to the ears, to the sense of hearing, or to the doctrine of sounds" (Martin 1994: 27).

ACOUSTICS IN ARCHITECTURE
FORMATION OF AND APPLICATION IN SPACE & DESIGN

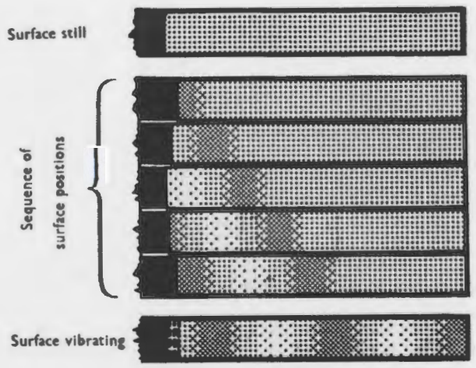
Acoustics have the ability to make, transform and experience space. Not only are they imperative to the way of understanding and being aware of the spaces surrounding us, our appreciation of both music and space is directly attributed to acoustics' ability to perform ideally within their specific context (this paper focuses specifically on acoustics within the *musical* environment). Therefore by acknowledging and learning from the very precise study of acoustical science we may benefit from a deeper experience of the spaces that surround us and the music performed.

"However, ground somehow doesn't exist for architecture, as it doesn't exist for music. I think, for example, that we cannot take the ear as the ground for music. There is an acoustical phenomenon, but certainly music is not only an acoustic phenomenon. I would like to remind you that the mechanisms of the ear, with the cochlea and the other internal organs, are simultaneously intertwined with the mechanisms of spatial balance and sound orientation, that spatial perception is also in the ear" (Libeskind 2001: 52)

Quote: spatial perception is also in the ear (Libeskind 2001: 52)

Acoustic design is known as a science of compromise, a science entirely specific to that which is occurring in the room (Humphreys & Parkin 1963). Designing a music room for classical music differentiates from designing a room for modern electronic music. Furthermore, although the scientific principles of the acoustician may be near 'perfection' there is still the uncompromising factor of the taste of the human ear. Each person's ideal acoustical environment differs from that of the other. Described below is a simplified understanding of the production of sound, its acoustic characteristics and how it may be implemented into the building process.

"Sound is the sensation produced through the ear resulting from fluctuations in the pressure of the air" (Humphreys & Parkin 1963: 23). These fluctuations are usually caused by a vibrating object that produces compression and consequent displacement of air particles. Scientifically sound is described as compression (high pressure next to a surface), and rarefaction (low pressure next to a surface). Both occur parallel to the surface. The distances between these layers of compression are named the ***wavelength***, and the ***frequency*** of sound is defined as the rate at which these vibrations occur:



The generation & propagation of plane sound waves (Humphreys & Parkin 1969: 23)

Wavelength x frequency = speed of sound

(The speed of sound is generally at a rate of about 340m per second)

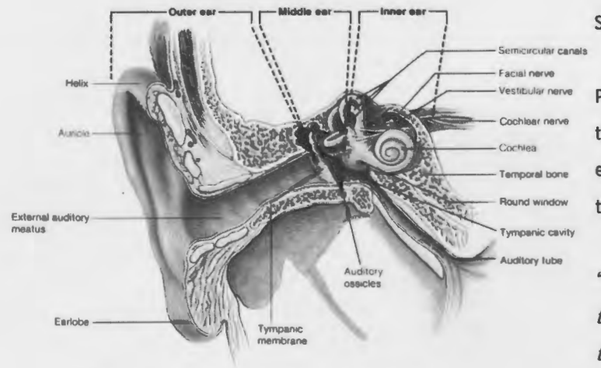
Sound waves are longitudinal and characterised by ***amplitude***, frequency and direction (Barron 1993).

Wavelength: The distance between layers of particle compression (where the pressure is at its highest) in the air

Frequency: The rate at which vibrations occur (stated in cycles per second and measured in Hertz: Hz) (Humphreys & Parkin).

Amplitude: The maximum departure from the average (the fundamental) in an oscillation (Thompson 1996: 25)

People perceive sound between 30 and 20 000 Hz (which is cycles per second) although 1000 Hz is generally the threshold of human audibility, the sounds they can just hear (Humphreys & Parkin 1963). The ear does not perceive every individual sound but rather comprehends a total acoustic experience. The diagram alongside (p.28) signifies the workings of the human ear:



The ear and its principal parts (Huprojects.cbe.ab.ca)

"Thus the alternating pressure in the air acts first on the eardrum and this in turn acts on the oval window through the action of the ossicles {three bones}; finally the pressures on the oval window {membrane} are transmitted to the liquid in the cochlea. The resulting alternating pressures in this liquid are detected by the nerve endings and transmitted to the brain as the sensation of sound" (Humphreys & Parkin 1963: 29)

Sound never changes but three things happen to it when it strikes a surface: it is either reflected off the surface, absorbed by the surface or transmitted through the surface.

REFLECTION

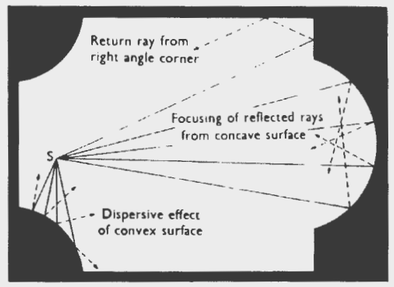
Reflection is the reproduction (the throw back) of a mirror image of the original (Thompson 1996: 759). The reflecting geometries for light and sound are identical (Barron 1993). When reflection is against a hard, flat surface the angle of incidence is equal to the angle of reflection. When reflection is against a concave or convex surface the sound waves act as the diagram below indicates. Therefore, to direct reflections, **splayed, flat or slightly convex surfaces** should be used in plan and in section (barrel vaults, concave surfaces and domes should be avoided). Reflections are of the most use when they arrive very shortly after the onset of the direct sound as those reflections arriving after about 15,5m may give rise to echoes.

Sounds with short wavelengths behave like light-rays, "constantly reflected and re-reflected until they die away" (Humphreys & Parkin 1963: 47). Longer wavelengths, however, take longer to die away (especially if the wavelength of the sound is equal to one of the room dimensions). "In smaller rooms where the dimensions are less than 10,5m it is found that the modes become widely spaced out at the low-frequency end of the range. This is particularly so if two or more room dimensions are the same, or at least related by simple ratios such as 2:1 or 3:1 ... When widely spaced groups of modes occur sounds can be strongly influenced by them ... the ***reverberation*** may assume a 'vibrato' effect" (Humphreys & Parkin 1963: 48-49). This situation should be avoided.

Reverberation time: The time required for the sound to decay (Humphrey & Parkin 1963). The Sabine formula is used to determine reverberation time:

$R.T = (0.16V) \div A$

Where RT is reverberation time, V is volume in the room (m^3), A is total absorption (m^2) and 0.16 is the constant

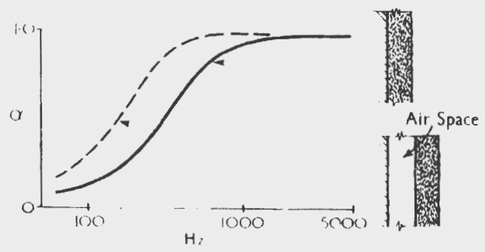


Reflection off a plane surface and reflection off curved surfaces (Humphreys & Parkin 1969: 44 – 45)

ABSORPTION

Absorption is the taking in of one entity by another and is dependent on flow resistance (the ability of the material to create resistance to the sound path) (Thompson 1996: 4).

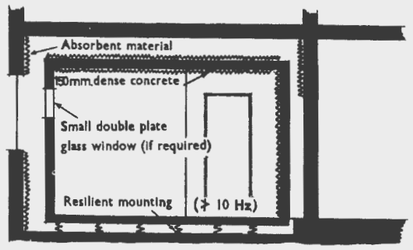
Sound absorption is entirely dependent on the nature of the surface that the sound wave is hitting. Generally speaking rigid non-porous surfaces provide the least absorption (but are the best reflectors) while **soft porous surfaces**, those capable of vibration, provide a higher level of sound absorption (Humphreys & Parkin 1963).



Absorption characteristics of porous materials (Humphreys & Parkin 1969: 59)

TRANSMISSION

Transmission is the transferral of sound from one space to another. "The best way to stop sound transmission through a building structure is to isolate the source sound from the structure before the structure has a chance to vibrate" (Smith 2006). There are two primary ways of alleviating sound transmission: that of **adding mass** and that of **decoupling**. Decoupling "is the concept of detaching partitions from each other, or physically detaching layers in a partition, in order to improve sound isolation" (Smith 2006), most commonly achieved by increasing the air space. Every material has a unique resonant frequency (that frequency where it begins to resonate like a tuning fork) and the general aim of acoustics is to prevent this. If a material vibrates it transmits a large amount of sound.



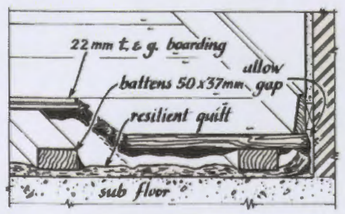
Section through highly insulated decoupled room (Humphreys & Parkin 1969: 208)

FLOOR & CEILING DESIGN

The most important principle in floor design is that this element should be 'floating'. This concept means that the floor element should not be directly attached to the slab (which in turn needs to be an isolated slab) or any other elements, such as walls, in order to prevent the sound vibration travelling. Sound transmission can only be prevented by isolating the source of sound from the structure.

The materials used in floor construction are not as important as the way in which these materials are constructed. Wherever a seam or junction occurs between two different structural elements (such as floor and wall) and two different materials (such as concrete and brick), extra caution has to be taken to seal this seam. Generally the use of glue for creating a connection point would be preferable to the use of nails or screws. This is due to the fact that glue is a material that contributes to isolation while nails and screws transmit sound. When layering a single material (this applies in al building elements) subsequent layers should be staggered and rotated so that no seams line up (Smith 2006).

Sound travels at a fixed speed and therefore the greater the volume of a room, the less sound will come into contact with a surface or boundary, therefore the longer the sound will take to die away. The pace that a sound dies away depends firstly on how much absorptions occurs when a wave meets that boundary and, secondly, how often a wave meets a boundary (Humphrey & Parkin 1963). Flat ceilings are rarely the ideal for rooms primarily concerned with the optimum transmission of sound. The best option is a ceiling that allows for a large cubic volume. Sound waves need space to develop and breathe and "this effectively means the room allow[s] time-delayed reflections to develop; reflections that would give the room a sonic 'acoustical space' signature" (Smith 2006).



WALL DESIGN

Good acoustics in wall design are based on four simple principles namely:

1. Mass layers (the bigger the mass the better the acoustic performance). Limp mass is often better to use that stiff mass (or the most preferable option would be to use a combination of the two)

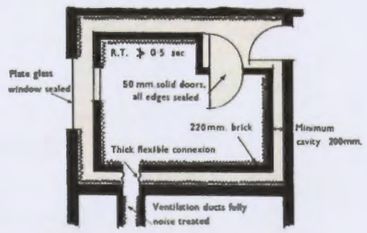
2. The depth of airspace (the deeper the airspace the greater the improvement in transmission loss). This is effective in decoupling.

3. The coupling of the structural framing. The aim should be to reduce the vibration path travelling through the framing element. The greater the number of paths the vibration can travel the more dispersed the sound will become and therefore the grater the acoustic performance (Stewart 2005)

4. The presence of absorptive material. In a wall the use of insulation *in* the wall would only be beneficial to the acoustic performance. Most acoustic engineers suggest the use of glass-fibre or mineral fibre. The denser or thicker the glass fibre, the more the material has the ability to absorb low frequency sounds (such as that of traffic and machinery). When applying absorptive materials *onto* a wall they are not in themselves sufficient in keeping sound in or out of a room. They are used primarily to control the *quality* of sound within it. Using an absorptive material reduces the amount of ambient reflected sounds within the room. The designer is to decide what kind of room is being designed before specifying the amount of absorptive materials as too many of them can lead to a 'dead' sound. It is best to use approved products as "it is important to realise that empty egg cartons, cork squares and carpet scraps are not going to (a) keep sound form leaving or intruding upon your studio & (b) yield that pleasing … neutral sound" (Smith 2006). Thinner absorbent materials absorb shorter wavelengths. In order to increase the wavelength size that is being absorbed it is best to implement these thinner materials with an air-gap (space it away from its solid backing).

Ideally, walls should be isolated from ceilings, floors and door and window element (this is often done with the use of dense, pliable rubber)

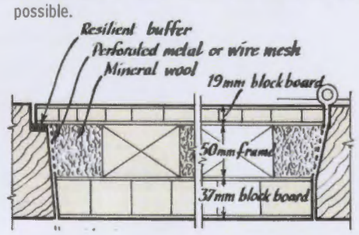
"Project drawings should clearly detail all joints and penetrations within an acoustical assembly, providing comprehensible guidance for their construction, supported by material specifications. This requires the walls be detailed with elements of the area where the ceiling meets the wall and presenting the sidewall conditions" (Stewart 2005: 37).



DOOR & WINDOW DESIGN

If manufactured sound-rated doors are not able to be obtained, exterior grade, solid-core wood doors are the ideal easily-obtained option or alternatively exterior grade insulated steel doors (Smith 2006). Flat doors without mouldings are always preferable, regardless of the source of the door. However, whichever doors the designer chooses to specify, one of the most important aspects of the specification to remember is that of sealing the door correctly. The doors (and windows) should always be adequately sealed to both the frame and the floor. A compressed rubber threshold is often the best option.

The use of the double door is often implemented so as to increase the air-space and therefore decrease the amount of sound being transmitted. Hinged and door knobs should be alternated left to right. All glass in doors and windows should be insulated, laminated and with at least two panes, ensuring that the air gap between each pane is as large as possible.



The total sound level (whether sound appears loud or soft) in a room is made up of two parts, namely *direct sound* (waves direct from the source to the listener produce this type of sound. Direct sound depends on the strength of the source) and *reverberant sound* (waves reflected from walls and other surfaces produce this type of sound. Reverberant sound depends on the strength of the absorption in the room). Therefore, if the room contains many highly reflective surfaces the sound will appear louder whereas if there are many highly absorbent surfaces it will appear softer.

The performance level of the acoustic device (or of the acoustics of a room) should be chosen according to what is contained within the space, it is **entirely site- and space-specific**; therefore general principles will only extend so far. When selecting a device's acoustic performance the source-path-receiver (where is the sound coming from? What is the in-between element? Where is the sound going to?) method should be used (Stewart 2005). In all projects develop a design criterion, select the appropriate acoustical elements and detail the assembly accordingly. Sealed construction is the best for acoustical performance as sound, like air and water, has the ability to breach any threshold and fissure:

"One way to control sound in general and low frequency in particular is to force the sound waves to fight their way through multiple layers of different materials and dead air before they can strike the room boundary" (Smith 2006)

It is may be concluded that the general scientific aims of acoustic design are firstly to provide a certain amount of reverberation to ensure constant frequency, and secondly to allow unmodified direct sound to reach every listener at the greatest possible strength (Humphreys & Parkin 1963). These intentions, although based on the concepts of mathematics, physics and reason, create a layer of opportunity to apply within the composition of building.

Floor & ceiling design image: Section of a wood raft floating floor
Wall design image: Plan of a highly insulated room utilising mass layers, airspace and absorptive material
Door & window design image: Insulated door with absorbent-lined edges
(All images from Humphreys & Parkin 1969: 209, 208 & 222 respectively)

SOURCE – PATH – RECEIVER

Definition
Fullness of tone
Balance
Blend
Uniform acoustics
~~**Obvious faults**~~
~~**Intruding noise**~~

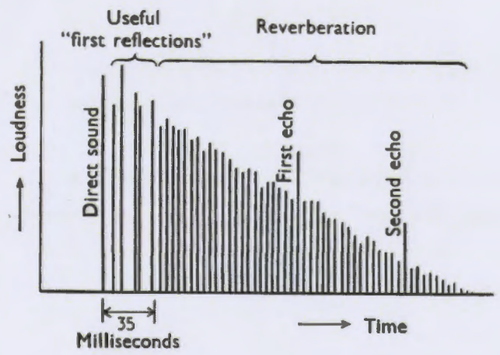


Illustration of the behaviour of sound (Humphreys & Parkin 1969: 85)

Resonance: The echoing or resounding of sound, reinforced or prolonged by reflection or vibration (Thompson 1996: 773)

THE SPECIFIC NATURE OF SOUND & ACOUSTICS IN MUSIC

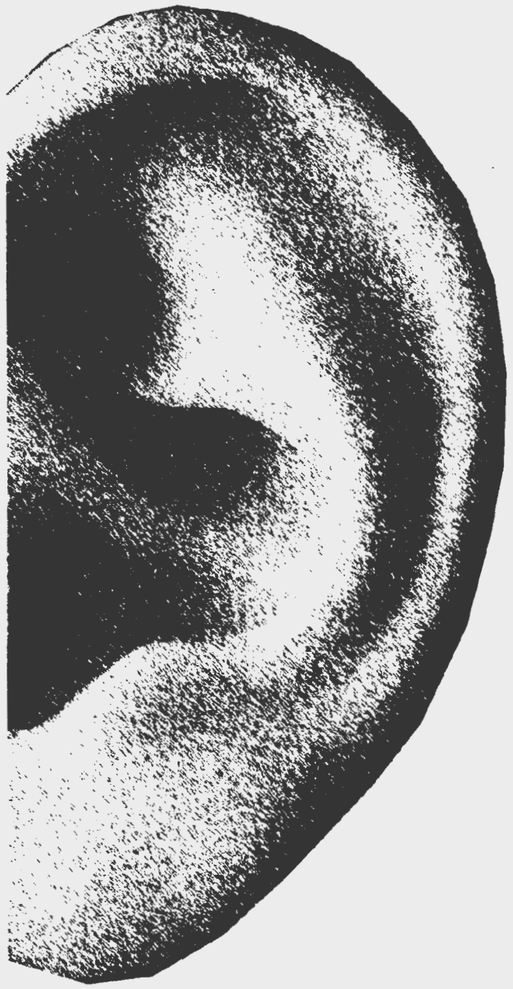
Having garnered a general understanding of the nature of acoustics, what is described below are the very broad principles of how sound is produced in an instrument and the general acoustic design for music rooms with an emphasis on classically instrumental (and vocal) music.

The production of musical sounds predominantly relies on ***resonance***. Energy is supplied by the musician which creates vibration. A musical sound is described as the fundamental (or the first harmonic) with a combination of over-tones (harmonics) (Humphreys & Parkin 1963). The fundamental resonant frequency is determined by the length of the string, tube etc. (Barron 1993). The strength of the harmonics characterises the sound quality of the instrument. The piano, for example, has a large number of harmonics when the fundamental note is struck and therefore has a timbre that can be described as 'rich' and 'resonant'. The flute, however, contains very few over-tones and therefore the timbre of it may be described as 'pure'.

While the production of a space catering for speech (the theatre) is relatively straight-forward, the acoustic design of a space for music is far more multi-dimensional (Barron 1993). In small halls the designer may rely mainly on reverberation time, while in larger halls with an increased audience other factors become important. In general, the musical requirements that may affect the acoustical design of a space designed for music are the follows (Humphrey & Parkin 1963):

a) **Definition: hearing the full timbre of each instrument clearly; definition is understood as clarity**
b) **Fullness of tone: the "satisfying quality added to the sounds produced by musical instruments (or voices) when in a room as compared with in the open air" (Humphrey & Parkin 1963: 83)**
c) **Balance: the correct loudness ratio between different sections of the orchestra**
d) **Blend: the potential to hear the music as a homogenous composition of all instruments**
e) **No obvious faults, such as echoes**
f) **A low level of intruding noise**
g) **Reasonably uniform acoustics throughout the audience area**

Principles developed under the understanding of general acoustics may be applied in order to achieve these results



MATERIAL: Adequate acoustic design in a musical environment is imperative to the enjoyment of that music. To achieve this, general scientific principles should be applied.

IMMATERIAL: Acoustics are an instrument in conceiving space and consequently generating architectural form. They serve as a layer of opportunity in the building process.

Instrument and acoustics as inspiration to and generators of space

INSTRUMENT & ACOUSTICS
A CASE STUDY

THE INSTRUMENT & ACOUSTICS TRANSLATED INTO AN ARCHITECTURAL CASE STUDY

THE BERLIN PHILHARMONIC BY HANS SCHAROUN & LOTHAR CREMER

The design of the Berlin Philharmonic poses an interesting case study as it was the work of two specialists in their field, namely the architect Hans Scharoun and the acoustician Lothar Cremer, who worked together from the onset of the project creating a musical building in which both the design element and acoustical element tailored themselves to suit the other. In the final product neither one was drastically compromised for the sake of the other.

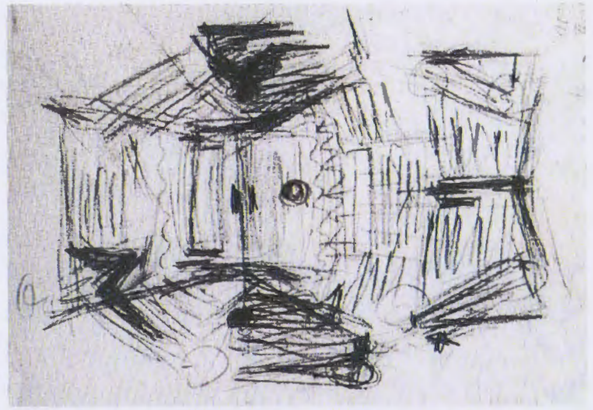
Scharoun's architectural concept was that of music as the central focal point (visually and acoustically). This architectural aim was an instrument in determining consequent form and acoustical design for the space, which all had to relate back to the initial endeavour.

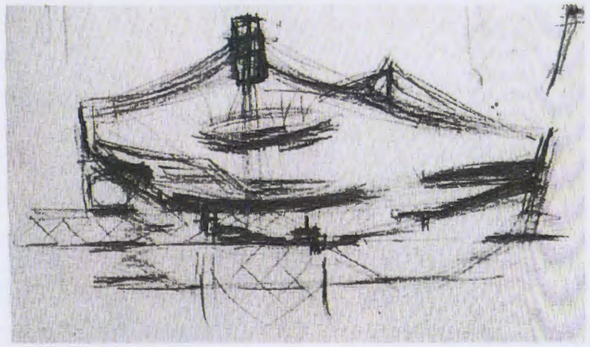
instrument as architecture

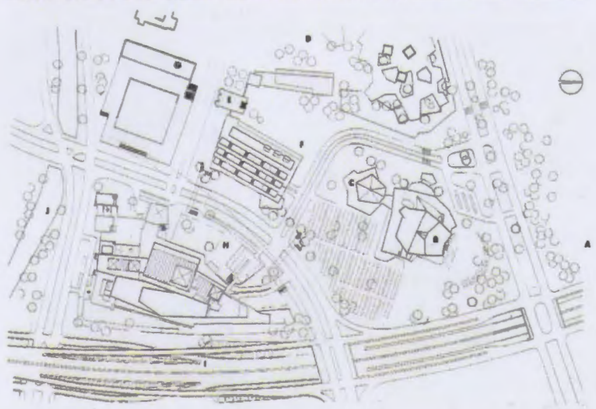
With the aid of the acoustician Lothar Cremer, Scharoun transformed his initial sketch design into a space that not only functioned well acoustically but also aided the spatial perception of his architectural concept of music as the central focal point. Acoustics functioned in both a material and immaterial way so as to inspire and generate space.

acoustics in architecture

"One has to admit that as predicted the social advantages are at the expense of some acoustic uniformity, particularly with regard to balance ... Yet as a concert experience, the Philharmonie is indeed remarkable" (Barron 1993: 100). The building stands as a commendable example of how acoustics and architecture may be inspired by one another. This building strikes an admirable balance between architectural desire and technological necessity creating a space that functions near-perfectly in what it aimed to achieve from the onset.







A Tiergarten,
B Philharmonie, C future Chamber Music Hall, D site of future museums, E Church of St. Matthew, F future cultural hostel, G National Gallery by.Mies van der Rohe, H State Library by Scharoun, I ring road, J canal

CONTEXTUAL INFORMATION

The Competition

The design emerged from a competition issued in 1956 for the outline of the new permanent venue for the Berlin Philharmonic Orchestra. The design was completed in 1963. Scharoun's aim for the winning entry was to produce a space in which "everything serves to prepare for the experience of music" (Forsyth 1985: 303).

Herbert von Karajan, a jurist wrote:

"Of all the entries, our over-whelming preference is for the one which essentially strives to incorporate the mass from which sound emerges into the middle of the hall ... I know of no existing concert hall which resolves the seating problem in such an ideal way as this design. The positioning of the orchestra practically in the middle of the space sees to ... allow a hitherto unparalleled opportunity to experiment and to express the Philharmonic Orchestra's typical style of musical interpretation ..." (Bürkle 1993)

The Site

The site changed during the development of the competition to that of the edge of the Tiergarten which was conveniently close to the city centre and near the East German frontier. The context was to be developed into the cultural centre of Berlin. Mies van de Rohe's Twentieth Century Gallery and Scharoun's State Library and Chamber Hall are also built within the context.

Previous page: Interior of the Berlin Philharmonie showing the skyscrape and the landscape (Blundell Jones 1995: 175)
Top: Scharoun's sketch designs (Burkle 1993: 123)
Bottom: Site plan of the Kulturforum in 1964 (Blundell Jones 1995: 179)

Interior of the hall with central stage and consequent acoustic implementations (Blundell Jones 1995: 181)

The concept:
Music as the focal point. Creating a space for music in which the performance of it is central to the space.

IMMATERIAL

CONCEPTUAL INFORMATION

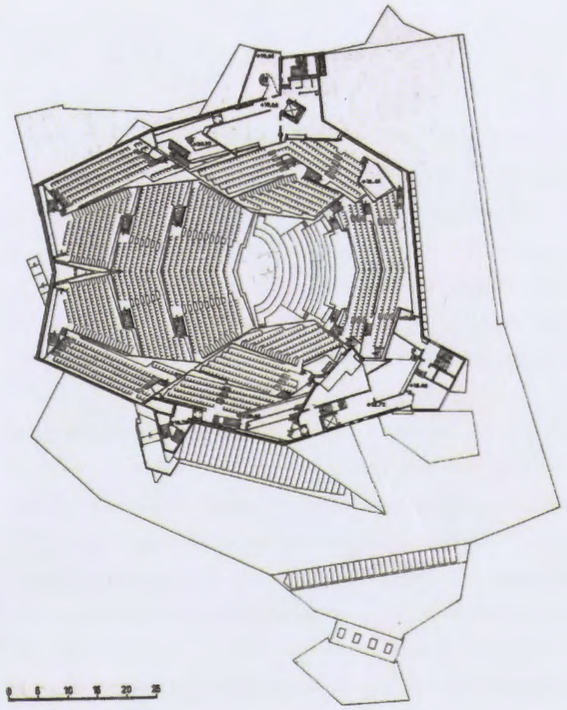
Architecture as Instrument

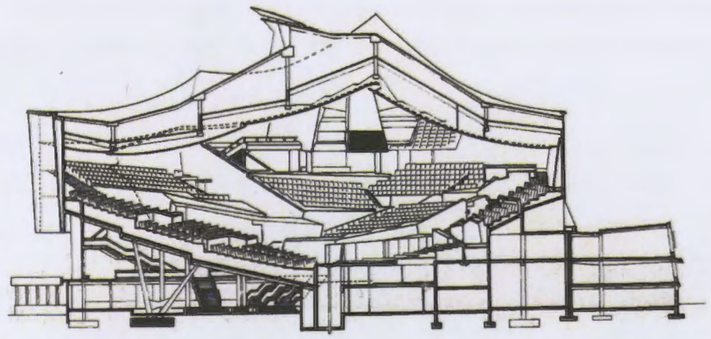
Scharoun developed the concert hall along the ideal that people naturally gathered in circles when they informally listened to music:

"Music was the focal point. This was the keynote from the very beginning. This dominating thought not only gave shape to the auditorium of Berlin's new Philharmonie but also ensured its undisputed priority within the entire building scheme. The orchestra and conductor stand spatially and optically in the very middle of things; if not at the mathematical centre then certainly completely enveloped by their audience. Here you will find no segregation of 'producers' and 'consumers', but rather a community of listeners grouped around an orchestra in the most natural of all seating arrangements ... The construction follows the pattern of the landscape, with the auditorium seen as a valley, and there at its bottom is the orchestra surrounded by a sprawling vineyard climbing the sides of its neighbouring hills. The ceiling, resembling a tent, encounters this 'landscape' like a 'skyscrape'. Convex in character, the tent-like ceiling is very much linked with the acoustics ....every effort was taken to transmit the sound waves to the most distant part of the auditorium by the shortest possible route" (Scharoun in Blundell-Jones 1995: 178)

Scharoun, working within the ideals of the organic architects developed one of the last designs of the German Expressionist era. The form, developing from the spaces inside, forms a sculptural mass attributing the creation of music and acoustics.

The Berlin Philharmonic consequently may be understood as such:
Scharoun witnessed an occurrence in everyday life, the idea that people naturally gather in circles when listening to music. From this he developed the architectural concept of creating a space for music in which the performance of it is central to the space. Scharoun's concepts of skyscrape and landscape became technologically accurate structures in achieving his desired architectural concept. Scharoun determined the general components of the acoustical design based on what the architectural concept was. It may be understood, therefore, that an architectural concept has become an instrument in the generation of space, an architectural technology, and what the appropriate acoustics should strive to obtain. Architecture is the instrument for achieving the idea that music is the focal point.





Plan and section of the concert hall (Burkle 1993: 124)

IMMATERIAL

CONCEPTUAL INFORMATION

Acoustics as Instrument

It was the first centralised concert hall to be built that was of a moderate size and seated 2220 people (Barron 1993). Scharoun originally designed the stage to be entirely central within the main auditorium. Cremer, however suggested that the design, although still maintaining its amphitheatre-like charm, become more directional in design so as to prevent acoustical problems with the directional effects of instruments. It is for this reason that the majority of the audience is around the front of the stage, while the back only houses about 10% of the audience members. Due to the relatively small size of the audience, no member is ever more than 35m from the source of sound (Bürkle 1993). In this way acoustics may be considered as an instrument in inspiring and generating architectural space.

Inside the main auditorium, the ceiling is shaped like that of a text, with light filtering down from the gaps between the structures. Staircases are designed so as to be placed according to crowd movement. The tiered seating, which has consequently come to be known as the 'vineyard terraces' (Forsyth 1985: 303) cascade down toward the orchestra who is situated at the lowest level. The stage has an area of 300m² and can house a full choir. The way in which Scharoun dealt with these programmatic requirements was not only so as to adhere to his design concept, but so that every element became important both visually and acoustically.

Adequate acoustic design, who's importance was continually reinforced by Cremer, was a key instrument in determining the space of the Berlin Philharmonic. What I read from this is the idea that the knowledge of acoustics (in any building) may provide an immaterial or conceptual platform from which architectural space can be inspired. A musical building is not only generated by an architectural concept, but by an acoustical concept too.

√ Definition
√ Fullness of tone
× Balance
√ Blend
× Uniform acoustics
√ ~~Obvious faults~~
√ ~~Intruding noise~~

MATERIAL

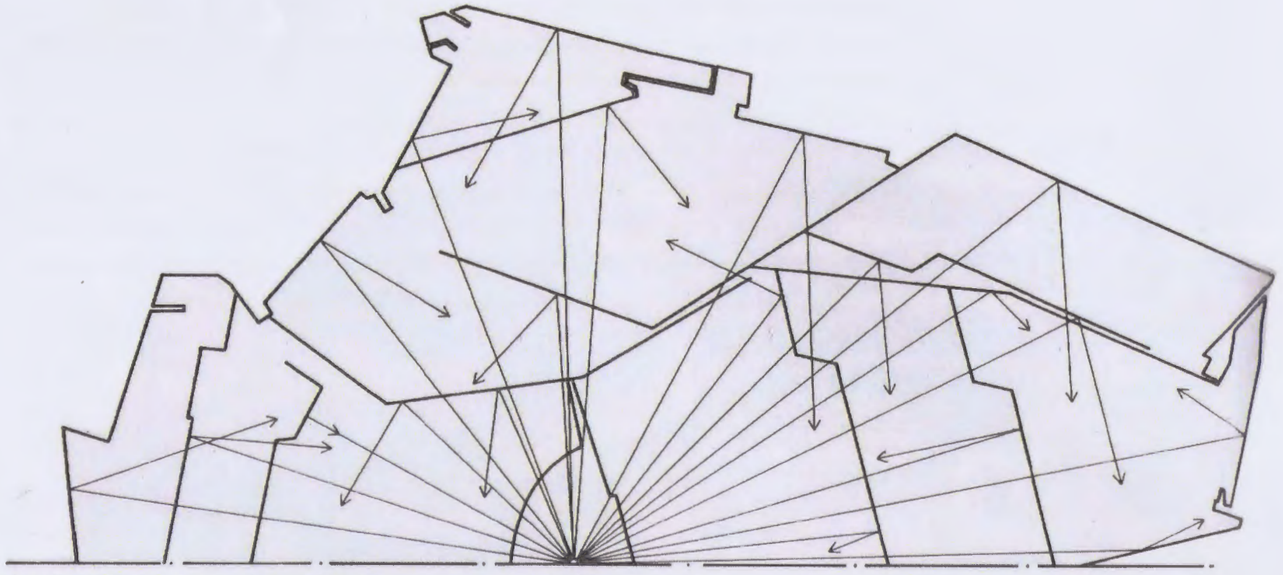
TECHNICAL INFORMATION

Acoustics as a Science

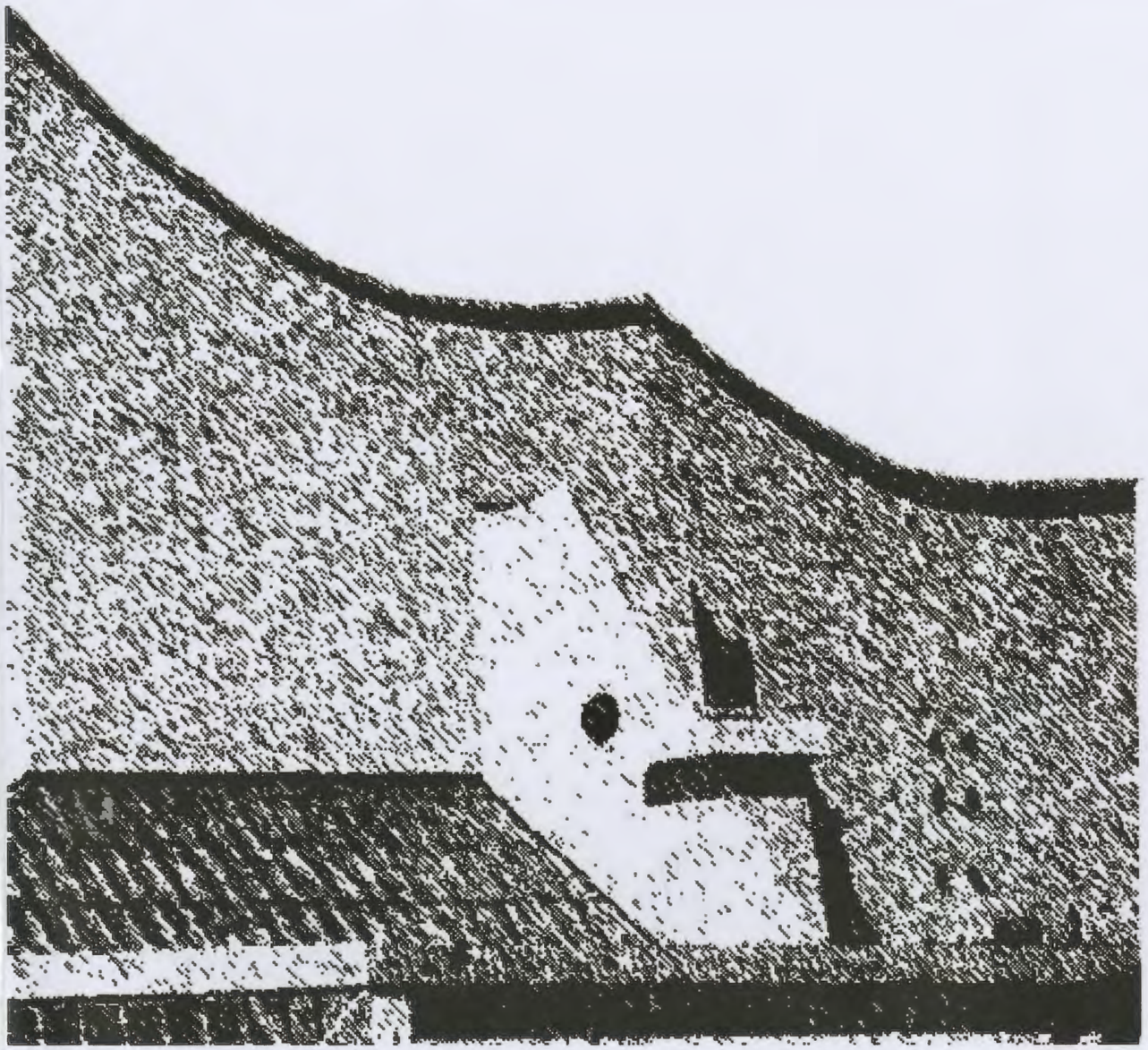
Acoustical problems arise when the stage is designed centrally, most predominantly that many instruments are directional and this means that any audience member who is behind the instrument lacks a certain degree of loudness and richness. Instruments with a small radiating surface such a flutes, do not adhere to the directional problem. However, instruments such as brass, the voice and string instruments, do succumb to the problems of being directional and shadowing (when the player blocks the transmission of sound) (Barron 1993). Due to these problems, early reflections are required in order to distribute sound equally around the structure. Cremer was notorious for his attention to early reflections of sound.

The tent-like ceiling with its uniquely convex shape and low ceiling toward the perimeter reflects sound toward the rear seats (Barron 1993). This tent-like structure encloses a volume of 25 000m³. What may be considered 'retaining walls' in the terraces of vineyard seating act as planes to serve the acoustical function of laterally reflecting sound back toward the audience and the orchestra. These planes are often inclined around the vertical in order to direct sound back down toward the audience member below (Barron 1993). These steps also avoid the acoustical problem of grazing incidence and act to divide up the seating and audience. Tall surfaces (some that reach the height of 3m) and suspended reflective ceiling panels surround the centralised stage area so that the orchestral conditions for the orchestra resemble that of other halls due to the reflections directed back toward them (Barron 1993). By testing the hall in an acoustic model it was found that the suspended ceiling panels above the stage would also be required to direct sound toward the first rows of seating. The reverberation time of the hall when it is fully occupied has been measured to be 2.0 seconds at mid-frequency and 2.2 seconds at 125Hz (Barron 1993).

The balance of the acoustics is where the concert hall chooses to compensate on the ideal acoustics so as to serve a greater social function. On one side of the stage the violins are soft, while on the other the double basses are soft, however the greater social function desires that these acoustics be slightly compromised.
The lateral and longitudinal dispersal of the seating and audience serve as absorbents of sound. "These features help to ensure in such a wide hall that reflected sound reaches he ear sufficiently soon after the direct sound (within about 50 milliseconds) for it not to obscure the clarity of the primary sound" (Forsyth 1985: 303).



Reflections in the Berlin Philharmonic (Barron 1993: 98)



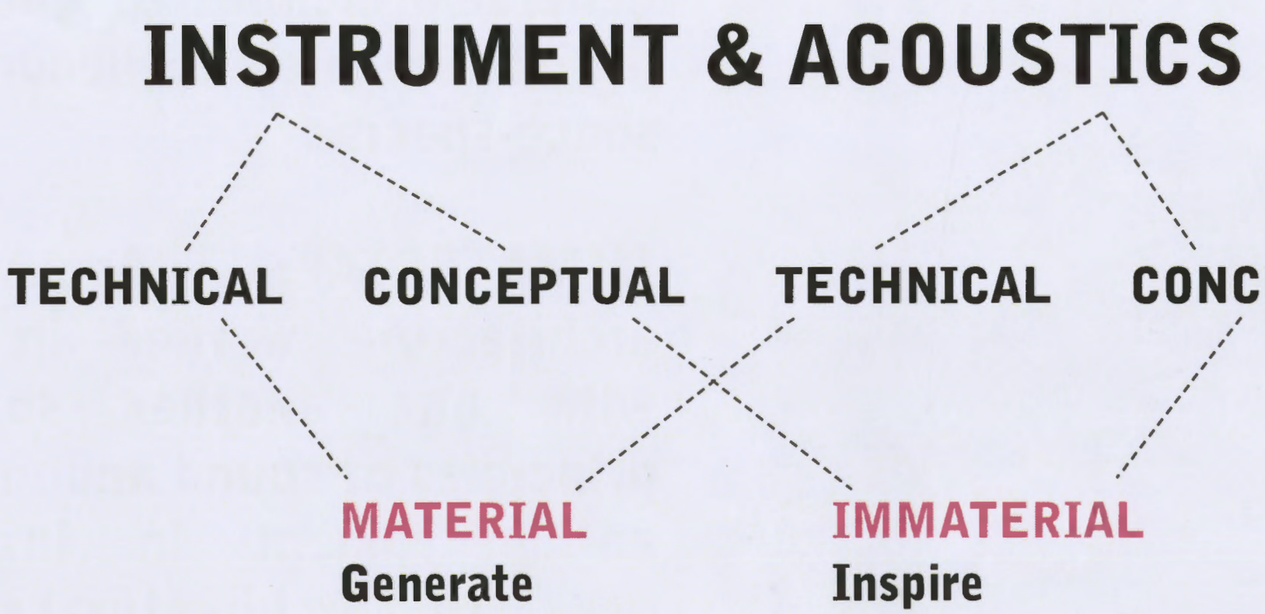
MATERIAL: The Berlin Philharmonic stands as an example of how the general principles of good acoustics may be adapted to become site- and space-specific

IMMATERIAL: Acoustics and architecture worked in correlation with one another so that the principles of sound and music became an instrument in inspiring and generating architectural space

Instrument and acoustics as inspiration to and generators of space

Composition

Music as an inspiration to and generator of space



Composition

Instrument and acoustics as an inspiration to and generator of space

TRANSLATION INTO ARCH.
INSTRUMENT & ACOUSTICS

THE INSTRUMENT & ACOUSTICS AS INSPIRATION TO AND GENERATOR OF SPACE

THE FINAL ARCHITECTURAL CONCLUSION

The theory thesis proposes the idea that music may act as an inspiration to and generator of space. However, the concept of music cannot be understood without a sound understanding of the general principles of instruments and acoustics, as all three terms are inter-related in **conception, production** and **performance.**

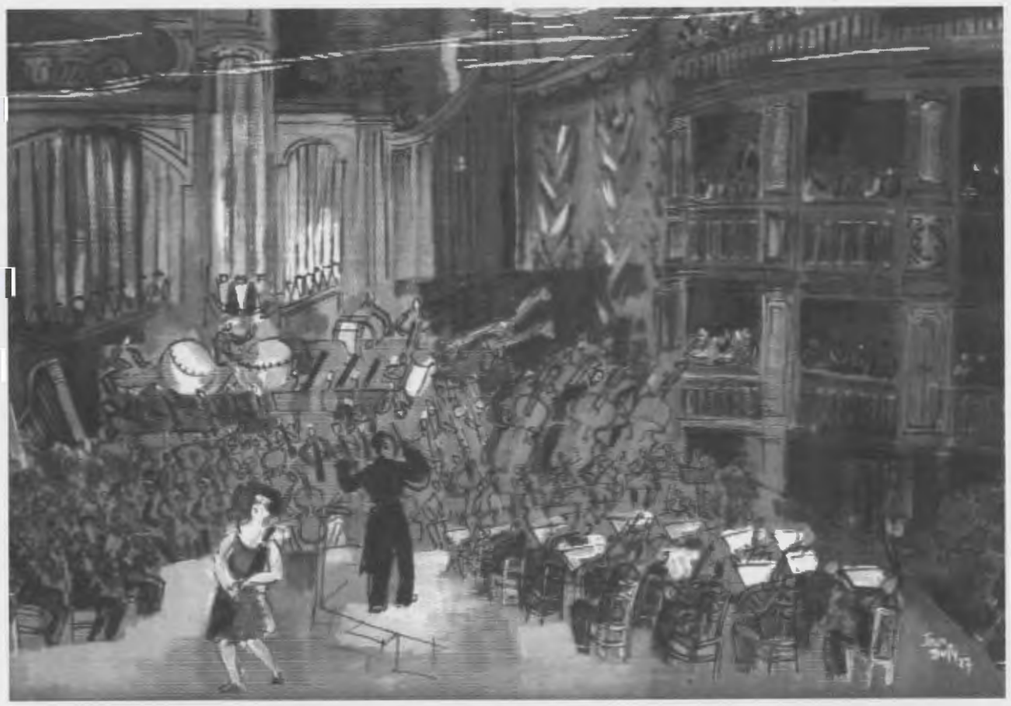
Generate & Inspire: The study of the physical properties of a musical instrument can inspire an architect to generate similar tectonic solutions in architecture.

instrument as architecture

Generate & Inspire: A general understanding of the scientific knowledge of acoustics is crucial when designing a building for the practice and performance of music. The generation of space is often governed by the basic knowledge of how sound works in a room, it is in this that a knowledge of how instruments work is also useful, as a building relates to sound much as a musical instrument does. Acoustics are thus an instrument in perceiving and inspiring space.

acoustics in architecture

Both instrument as architecture and acoustics in architecture may be beneficial in developing a design solution in this thesis. As well as offering sound practical knowledge, this study seeks to find opportunities from which to generate and inspire a thesis design and technological approach. Instruments and acoustics present a layer of opportunity.



The Orchestra, by Jean Duffy, 1927 (Kamien 2006: front cover)

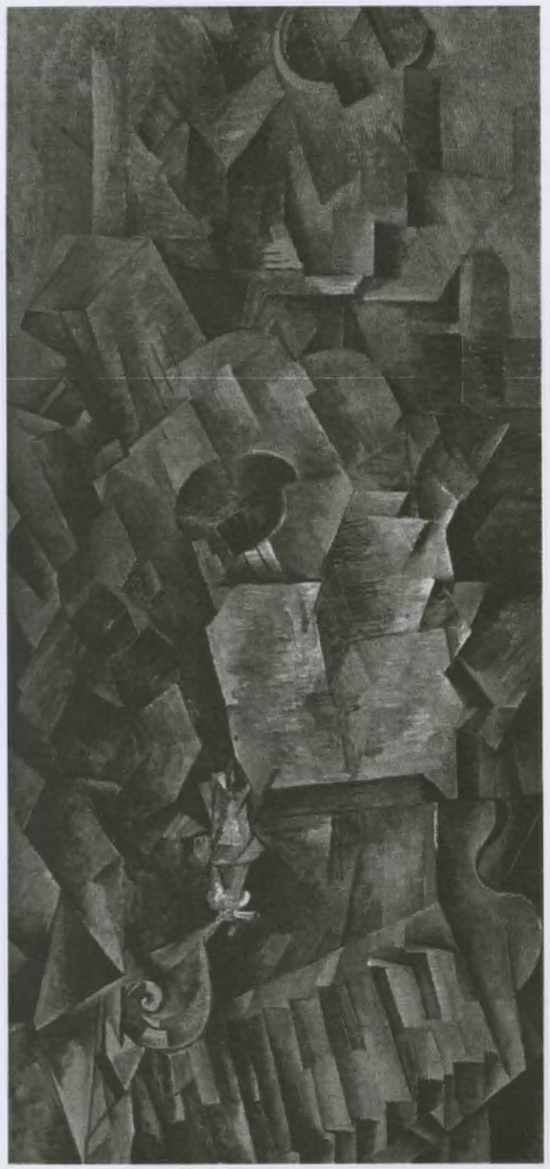
AFTERWORD
FOR CONSIDERATION

This technical document stands as a foundation from which to create *opportunities* for design and technology, it in no way disregards that an auditorium or concert hall is also a gathering space for people and has specific functional requirements. The acknowledgement of other technical aspects (which will be explored in the design process) and their exclusion from this report in no way diminishes their importance:

1. Technologies related to climate control – natural and mechanical
2. Technologies related to lighting – natural and mechanical
3. Technologies related to sustainability and the sustainability of the environment (through the process of siting I have decided on a brownfields site which initiates a framework for this analysis)
4. Technologies related to movement and accommodation of large numbers of people – escape and seating
5. Technologies related to building material choice
6. Technologies related to structure

(Although this report aims to create a gateway for further exploration for the above two points)

Acknowledgement off all the above (and more) would need to be addressed in the design of the building.
This technology report serves merely to generate ideas and opportunity regarding technologies.



Georges Braque's *Piano and Mandola* of 1909 (Lucie-Smith 1979: 31)

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IMAGE REFERENCES

Pg. 44: Graphic constructed by the author from images obtained from:
www.lesession.co.uk/rauschpferfe/images/rjp_cartoon.jpg, and
www.vibroseis.com/images/waves3.jpg

Pg. 48: Cartoon by Chas Addams. Possession of the author.

Pg. 49: Photograph by the author, 2009

Pgs. 51 – 54: Photographs by the author, 2009

Pg. 60: Graphic constructed by the author from footstompin.wordpress.com

Pg. 66: Graphic constructed by the author from Burkle 1993: 125

Pg. 68: Graphic constructed by the author, 2009

THIRD MOVEMENT

CONTENTS

CONCRETISING CONCEPTS
A PROCESS OF CREATION

INTRODUCTION
FROM THEORY TO ARCHITECTURE

While the first and second movements of this thesis concerned themselves with developing a conceptual framework in which to understand the relationship between music (and its many counterparts) and architecture, the third movement provides the foundation from which to translate these theoretical and technological concepts into architecture. If the process of this thesis were compared to the sonata form present in musical composition, the third movement would equate to that of the recapitulation. The recapitulation in sonata form brings resolution, it reasserts the themes that emerged in the exposition and resolves the tension of the piece, bringing it to its final point of rest.

Through the processes of siting, programming and detailed conceptual design, the first and second movements of this thesis may be realised within the building fabric.

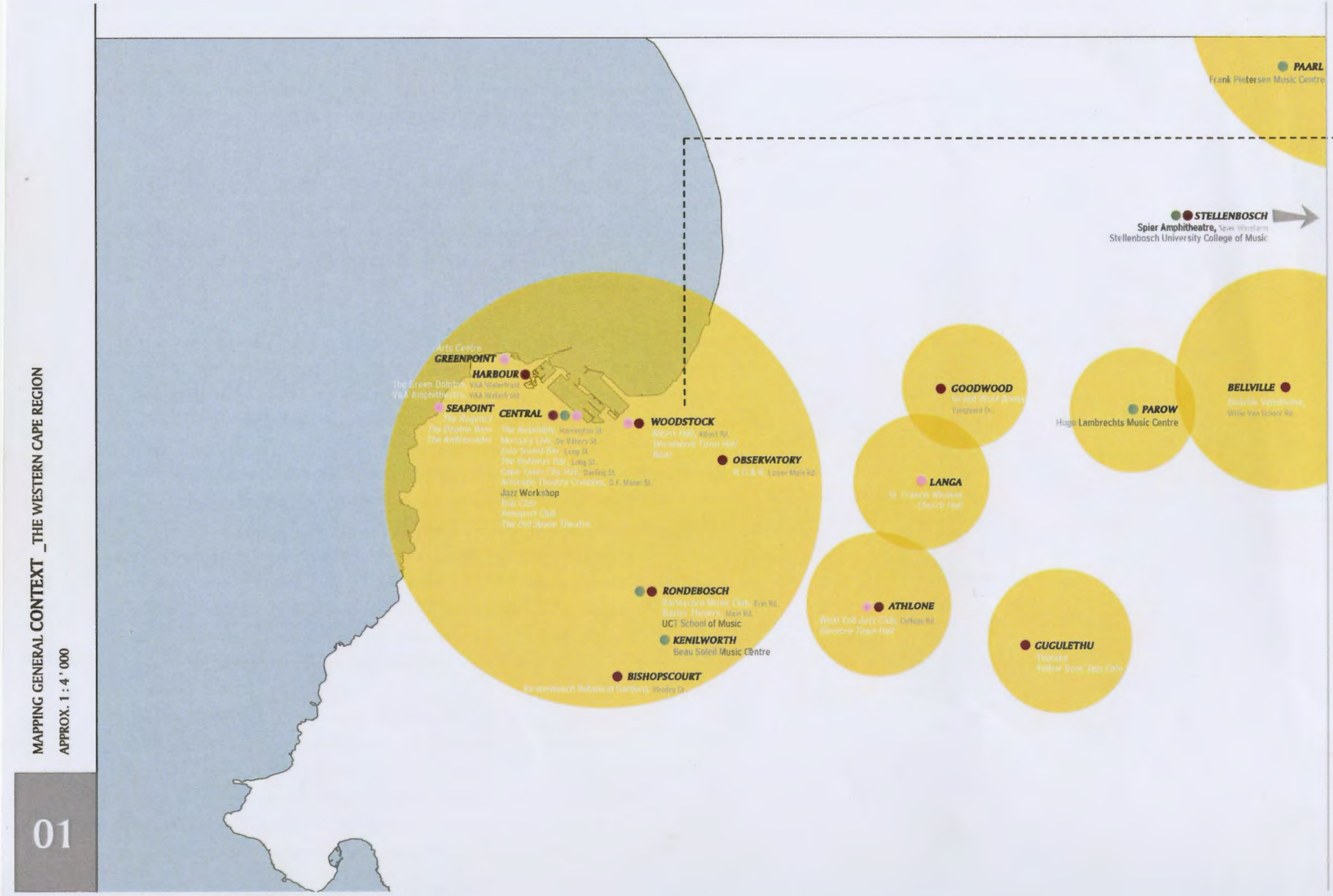
CONTEXTUALISING DESIGN
A PROCESS OF (RE)COVERING SITE

MAPPING
A PROCESS OF UNCOVERING | (RE)COVERING SITE

The process of siting sought to locate a supplementary site of historical significance, to uncover (recover) the possibilities already existing within this particular context, and in so doing to reveal the conceptual idea of the in-between. Consequently, the process of siting adhered to the ideas of both the y-condition and Retro-Romanticism, that of rediscovering the in-between, the incomplete, the forgotten, the left-over, the temporal and the unfamiliar that is inherent within every (con)text.

The mapping method began within the broad framework of the Western Cape region (refer to map no. 1). In keeping with the theme of the junction between music and architecture, current and historically important musical venues were plotted. From this, Woodstock was identified as an area with a rich and diverse musical (and political and architectural) history, however it features a distinct lack of current musical institutions. In order to fully understand the (con)text of Woodstock, and to refine the framework in which to uncover (recover) site, a general appreciation and awareness of the area was garnered through the use of an area encirclement map (refer to map no. 2), a historical timeline of history and building growth (refer to map no. 3) and, lastly, through a mapping and tracking exercise. Having read and familiarised myself with the written history of Woodstock , I chose to plot and re-visit the exact spatial memories of three different urban players who had lived, or did live, in the area (refer to map no. 4). This process proved to be particularly useful for, through the application of other's spatial awareness, it emerged that one specific area of Woodstock was of particular spatial and historical importance for those who lived in the region. From this exercise, the (con)text was reduced to two possible sites, that of an old Elkin Paints Warehouse (refer to map no. 5), and that of the old Woodstock Town Hall (refer to map no. 6).

The Woodstock Town Hall site is what Deconstruction terms 'the supplement', it is "both the missing piece and the extra piece" (Beard & Gloag 2005: 51). It is a building, site and (con)text that is remembered fondly and forms an integral part of the social and architectural heritage of the area, however it is currently underused and falling into a state of minor disrepair. The (con)text lends itself to the conceptual idea of (re)discovering the possibility within the site, the incomplete, and its history so as to uncover (recover) the in-between. It is situated in the conceptual realm of the y-condition in that it contains within it the possibility of becoming another, entirely different, entity.



MAPPING GENERAL CONTEXT _THE WESTERN CAPE REGION

APPROX. 1 : 4 ' 000

01

"The new jazz scene of the 1950's found its operational base in the clubs of Woodstock, a suburb just outside the city centre, which was something of a 'gray area' ... richer people came to slum in Woodstock ... In the clubs there was mixing to the point of contravening the Immorality Act! ... Had it been left to itself the jazz scene could have developed into something remarkable ... it was an apartheid casualty."

(Nixon in Muller 2004: 101)

The Ambassador in Woodstock was a place where jazz and other musical genres were created as an art form:

"... from this centre of the jazz scene, which is up an iron staircase near where the Cape's trolley buses get their nightly wash and brush up, the music world stretches far down the Peninsula ..."

(Muller 2004: 102)

*Key_*

- General area
- Current musical performance venues
- Current musical tuition venues
- *Historical musical performance venues*

MAPPING GENERAL **CONTEXT** _CBD & WOODSTOCK

APPROX. 1: 30 ' 000

02

" … tecture would be recognised not merely as a set of individual substances but as a larger figure with implicit rhythm, form, motion, direction, and degrees of stability and instability. As in music, the primary phenomenon would be gesture. Tectural gestures would create their own space; they would not happen *in* space. They might be experienced not just spatially and visually but also in a quasi-temporal way that recognises forces. As in musical tonality, tecture might rely on a narrative structure that exerts a pull on incompatible substances to bring them back to a state of rest."

(Parcell 2007: 7)

Key_

- Established green space | conservation
- Sea
- Primary vehicular routes
- Main railway connection
- Historical space
- Contested space
- Established space

THE DEVELOPMENT OF WOODSTOCK

A Timeline of History and Building Growth

Cape Town circa 1778, from an engraving based on Johannes Schumacher's drawing of 1776. Roodebloem and Zonnebloem farms can be seen to the east (Rennie 1978: 3)

The French Fort just off Searle Street. Part of a chain of defenses known as the French Line (Athiros 2007: 79)

1509: 45 of d'Almeida's Portuguese sailors massacred by the Hottentots near the Treaty Tree

1650

18th September 1666: VOC granted land to Hendrik Lacus on the slopes of Devil's Peak. The strongest mountain stream flowed through the site. The second road made in South Africa (Salt River Road) ran nearby it. Lacus called the farm Roodebloem after the profusion of red flowers that sprung up there before the land had been cultivated. The flowers were known as 'Rooibloem'. Lacus was later banished to Robben Island for embezzlement

1692: Coenraad Lisser owns Roodebloem farm

1692: Roodebloem, Zonnebloem and Leliebloem all granted as freehold farms

1700

1706: Roodebloem sold to Johannes Pfeiffer for 1550 guilders

1750: Hendrik Oostwald owns Roodebloem

1750

1760

1770

June 1773: Wreck of the Jonge Thomas. Wolraad Woltemade was the hero who pulled people from the sea and wreckage on horseback. His figure is now engraved in the Woodstock emblem

1777: Pieter Laubscher owns Roodebloem farm. The homestead is enlarged so that entry is via Victoria Road, facing Salt River Road. The boundary on the opposite side becomes Booth Road

From 1780: Papendorp develops as a small fishing village. Residents primarily dependent on casual labour eg. domestic work and fishing

1780

1781: Fort built by French Line of Defence. Now exists near Trafalgar Park, off Searle Street. The French Line consisted of four forts from Knokke (where Woodstock railway station now stands), to the Hollandse Redoubt, the Burger Redoubt and the French Redoubt

The Treaty House where the surrender of the Cape was signed in 1806. (Athiros 2007: 79)

Zonnebloem farm's washing day circa 1860 (Athiros 2007: 72)

Woodstock Beach the morning after the great gale of 17th May 1865. (Athiros 2007: 67)

The Toll Gate Terminus at the bottom of Searle Street, looked over by the brothers Edward and William Searle. (Athiros 2007: 82)

1788: A Hollander named Pieter van Papendorp lives in the area between the Castle and Salt River. Farmed in the area between 1781 and 1784. His house was called La Belle Alliance. Owned a small thatch cottage on the corner of Treaty and Spring Streets, just off Albert Road. The Milkwood Tree where the slave dealers proclaimed the quality of their human goods was also on the site. Slaves were hanged from the branches of the tree (which still stands today)

1790

1800

10th January 1806: Signing of the Peace Treaty between the Dutch and British underneath the Treaty Tree (the 300 year old Milkwood previously mentioned, where felons were hanged and acted that as a hitching post for horses which drank from the nearby Bromwell Spring)

1809: Papendorp becomes Woodstock

1810

1820

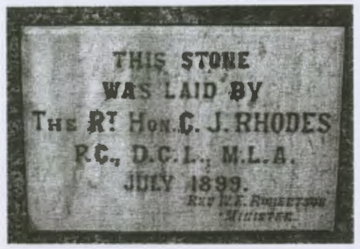
1828: F Denys owns Roodebloem, which is converted from a farm homestead into a Georgian townhouse. Cape Town was drawing nearer, farming activities in Woodstock were dwindling. Early governors leased Roodebloem during the summer to escape the heat of the Cape Town city centre

1830

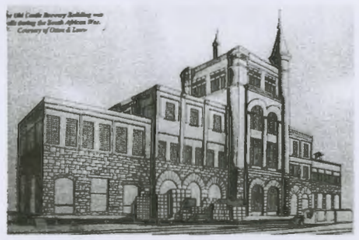
1840

7th June 1848: Grant obtained for La Belle Alliance farm by the Anglican Church from the Cape government. The building is restored and used as a chapel, known originally as the Papendorp District Chapel and later as St Mary the Virgin's Chapel


St. Mary's as it looked in the 1880's (left). The Bishop Robert Gray and his wife, Sophy Gray, attempted to build it in the Decorated style. St Mary's as it looks today (right). (Martin 2005: 58 and 59)



The stone laid by Cecil John Rhodes on the Presbyterian Church in Clyde Street. (Athiros 2007: 81)



The Old Castle Brewery building on Beach Road, built during the South African War. (Athiros 2007: 82)

St Agnes Church and school grounds. (Athiros 2007: 84)

1850

1859 – 1864: Church of St Mary the Virgin on Albert Road built

1860

1860: Railway construction begins. Mr Pickering is the contractor of the first government railways. He was a resident of Roodebloem House in 1860. The first telephone line was laid between Roodebloem and the Castle so that Pickering could speak to the Governor

1862: The Laubscher family move in to Roodebloem. The Laubscher farm cemetery was above the old house (from Wormwood Lane to the street above). The family's small children used to play in it

1870

1870: St Agnes Roman Catholic Church at the Corner of Dublin, Regent and Argyle Streets is established a simple government school.

1875: Woodstock population equals 1211 total (588 whites, 623 non-whites)

1880

1881: Separate municipalities are established, including Altona, Roodebloem, Leliebloem, Zonnebloem and Salt River

1882: Woodstock is given municipality status. It is divided into three wards:
Ward 1 – below Albert Road
Ward 2 – between Upper (Victoria) and Lower (Albert) Road
Ward 3 – above Victoria Road

1890

1896: Construction of the Permanent Way (The Electric Tramway Lines) from Seapoint to Wynberg begins as preparation to the operation of the electric street cars. The first electric car went down Victoria Street in Woodstock. A power station was built at the Toll Gate at the same time as the electric tramway lines. The road in the 1890's was still gravel.

1897: Herbert Baker completed the final phase of St Mary the Virgin's Church. The Dutch Reform Church in Aberdeen Street was established

1897: Woodstock Municipality boundaries enlarged. It becomes the largest municipality next to Cape Town

1898: Cowley House, on No. 126 Chapel Street, erected. Served as a residence for Anglican priests who had come from England

1899: Sisters arrived to convert St Agnes Roman Catholic School into a Dominican Convent School. The stone material used on the church and convent was from St James mountain. It was the architectural work of a Dublin firm

1899 – 1902: SA War / Anglo-Boer War. Bubonic plague hits Woodstock. Sespected carriers are sent to Rentkies Farm. Plague traced to infected rats. Indian traders owned small grocery store in lower Woodstock. If an infected rat was caught the shop was closed and a 3ft. yellow ring was painted on the door. Walmer Estate developed. Old Castle Building on Beach Road built by SA Breweries. The army troops loved it (both the building and the beer!). The steel frame skeleton was imported from the USA. The building was designed by the American H. Steinmann in spirit of Victorian Romance (designed to look like a Castle)

1900

1900: Woodstock Presbyterian Church in Clyde Street had foundation stone laid by Cecil John Rhodes.
Melbourne terrace houses erected on what was Leliebloem farm by two speculators, WS Armstrong and GA Gamars. Initially known as South Sea Terrace

Woodstock High School as seen in 1939 (Athiros 2007: 90)

Woodstock beach, sanatorium and Hotel. (Athiros 2007: 71)

Thomas Whitley and Co. situated 15 – 23 Sir Lowry Road (left) and their advertisements on the trams from Cape Town to Woodstock (right). (Athiros 2007: 93)

The Greek Orthodox Church of St. George on Mountain Street. (Athiros 2007: 97)

1901: Father Artemios, a priest from a Greek monastery, arrives in Cape Town from Crete to build a Greek Orthodox Church. Foundation stone laid in 1903. Completed by April 1904. Contractor was Rollandi Co. who built it for £2 200 total. Church services were followed by socials in the surrounding area

1903: 'Rocklands' house was built by the Van Eyssens family (who had a dairy in Salt River) at the top of Roodebloem Road

1904: Woodstock population is 28 990 (21 530 whites, 7 460 non-whites). The increase in population is due to the industrialization of the area, influx of refugees from the Anglo-Boer War, immigrants from Europe and Woodstock's central location to other industrial areas

1909: Altona Hotel on Victoria Road erected. Served as a club for the Cape Flats farmers. A popular wayside inn: "Here the German farmers from Phillipi, Ottery and Wetton on the Cape Flats, after disposing of their vegetables, chickens, pork and fruit at the early morning market in Sir Lowry Road, would on their way home call for a 'tickey beer' ..." (p. 49, Athiros, 2007)

1910

1913: Woodstock municipality is incorporated into the greater Cape Town municipality

1915: St Agnes School grows from a primary school of 4 teaches to a 10 teacher school. Commercial subjects were taught as an extra to pupils who had completed Std. 6. Government did not allow these classes to be held on the school's premises and so they were held in the convent.

1920: The Greek Church purchases land adjacent to their Woodstock Church.

1920

1921: Woodstock population reaches 16 453 (11 258 whites, 5 195 non-whites)

1929: The beach pier is demolished to make room for future development

1930

1930: Woodstock population rose due to influx of immigrants from Southern Europe

1932: Small hall and new priest's house built adjacent to the Greek Orthodox Church

1935: Treaty House knocked down for a factory

1936: At St Agnes School, Christian Brothers took over the boys standards 2 to 6 and added standards 7 to 8. Built a school block separate from the rest of the school, with its one communicating gate colloquially known as "The Brenner Pass"

1939: The Woodstock Town Hall and Library are officially opened

1940

1940: Population rose due to industrialization during the Second World War

1947 / 1948: Land acquired on William Street for the construction of a mosque. Building commenced and the basic building was completed by 1955. D.F. Malan's Nationalist Party comes into power.

1949: Mixed Marriages Act becomes law

1950: Population Registration Act becomes law

1950

1951: Greek architect K. Sgoutos commenced work on a larger hall for the Greek Church. By 1953 the hall had been renovated to its present status

1956: Castle Brewery merges with Ohlssens and so moves from the Old Castle Building. The building becomes a cold-storage warehouse and is then abandoned

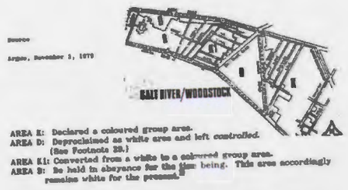
31st January 1958: Proclamation 13 set aside a significant portion of Woodstock for white residents only

1960

Woodstock experiences a significant economic boom

1967: Ruth Prowse bequeaths her property "The Retreat" for the establishment of an art and multi-cultural centre

1968: The French Fort in Trafalgar Park is proclaimed a National Monument.
The Greek Orthodox Church is elevated to the status of cathedral



(Conerly 1988: 8) (originally Argus, November 1, 1979)

The row of seven houses in Melbourne Terrace. (Athiros 2007: 132)

Cowley House (now a trauma centre). (Athiros 2007: 132)

The building on the corner of Gympie and Cornwall Streets, situated in the Victorian Quarter, used in the Nicholas Cage film *Lord of War*. (Athiros 2007: 127)

1970: The Ruth Prowse School of Art is founded. It currently exists as one of the two remaining Cape Dutch farmsteads in Woodstock

1970

1978: Cowley House, under the aegis of the Western Province Council of Churches (WPCC) is opened to families who arrived in Cape Town to visit political prisoners. It became a 'clearing' house for prisoners and their families and today houses a Trauma Centre

1980: Woodstock population is 18 864 (57% Coloured at 10 724, 39% White at 7 408, Indian 636, African 96)
"As from its earlier days, Woodstock residents are small businessmen, factory workers and artisans who have co-existed peacefully, for the most part, in several racially-mixed neighbourhoods" (p.2, Conerly, 1989)
1980: An off-license is added on to the front on the Altona Hotel

1980

1983: The firm Conidaris & Greshoff are appointed to draw up the plans for the extension of the Greek Orthodox Cathedral. Construction began in February and the renovation were completed by December

Late 1980's: The Castle Building is restored by Willem Otten of Otten & Louw Architects. The building now houses about 50 business enterprises (mostly artistic and creative tenants). Contains film studios, a sculptor, artists, photographic studios, an architecture firm

March 1991: Melbourne Terrace is declared a National Monument

1990

1998: Renovations to the Suleimaneya Mosque are undertaken. A minaret is constructed

2000

2003: John Rennie repairs and restores the front balcony and façade of the Ruth Prowse School of Art

2004: Anwar Omar renovates the Altona Hotel (and the building next door at 194 Victoria Road)

2009: Architectural thesis poses a rediscovery of the Woodstock Town Hall precinct

2010

NTS

The above map plots my personal mapping experience of the area as occurred on Friday, 20th March 2009. The organic process of ***wandering*** was influenced by the mapping of the historical urban player's memories as understood from the 'Woodstock Whisperer'. In this exercise the ***'drifting'*** mapping technique was exercised in order to found atmosphere and understand both current and historical context.

Source: Athiros; p.77 – 83 (Keen), p.88 – 96 (Church), p.108 – 111 (Egert)

Please refer to map in end sleeve in obtain a larger scale view of the above

"This work in search of Architecture has discovered no permanent structure, no constant form and no universal type ... Architecture ... is not a given nor a physical fact. What emerges in differentiated experience is Architecture as an index of the relationship between what was and what will be."

(Libeskind in Papadakis 1991: 110)

Route Key_

- Personal mapping route
- Area of examination

Historical Urban Player Key_

- General information
- A.F. Keen
- Blanche Church
- Simon Egert

Nolli Plan _ Viewing solid | void (NTS)

Transport Diagram _ Viewing major public transport routes _ bus and taxi (NTS)

*Key_*

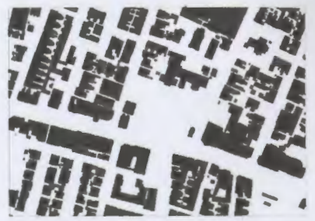
Places of worship

Public places | institutions

Commercial: serving society

Commercial: private enterprise

Transport route



Nolli Plan _ Viewing solid | void (NTS)

Transport Diagram _ Viewing major public transport routes _ bus and taxi (NTS)

*Key_*

- Places of worship
- Public places | institutions
- Commercial: serving society
- Commercial: private enterprise
- Transport route
- Public open (green) space

Site No. 1: Albert Road | Elkin Paints

Erf numbers: 14972, 15029

The site lies on Albert Road, with a small lane (Gelb Lane) running down the West side of it. The closest street perpendicular to Albert Road is Dublin Street.

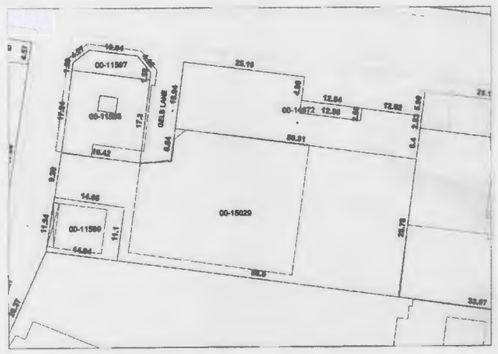
Council information: building zoned as C3, 100% coverage, 3.7 bulk factor, 34 habitable rooms, height restriction 7 storeys

Existing Building on site: derelict warehouse

Current available area

Important neighbour: St Anges School

Necessary back entry: Gelb Lane



Site No. 2: Victoria Road | Town Hall

Erf numbers: 11428, 11431, 11432, 11433, 11434, 11435, 11437, 11438, 11439

The site lies on Victoria Road, with Aberdeen Road and Plein Street running parallel to it. The back of the site may be accessed via Clyde Street

Council information: building zoned as POS (Public Open Space), a public building is permitted on the site with council consent. Currently there are no further zoning laws, height restrictions, bulk factors etc. for the site

Existing Building on site: Town Hall

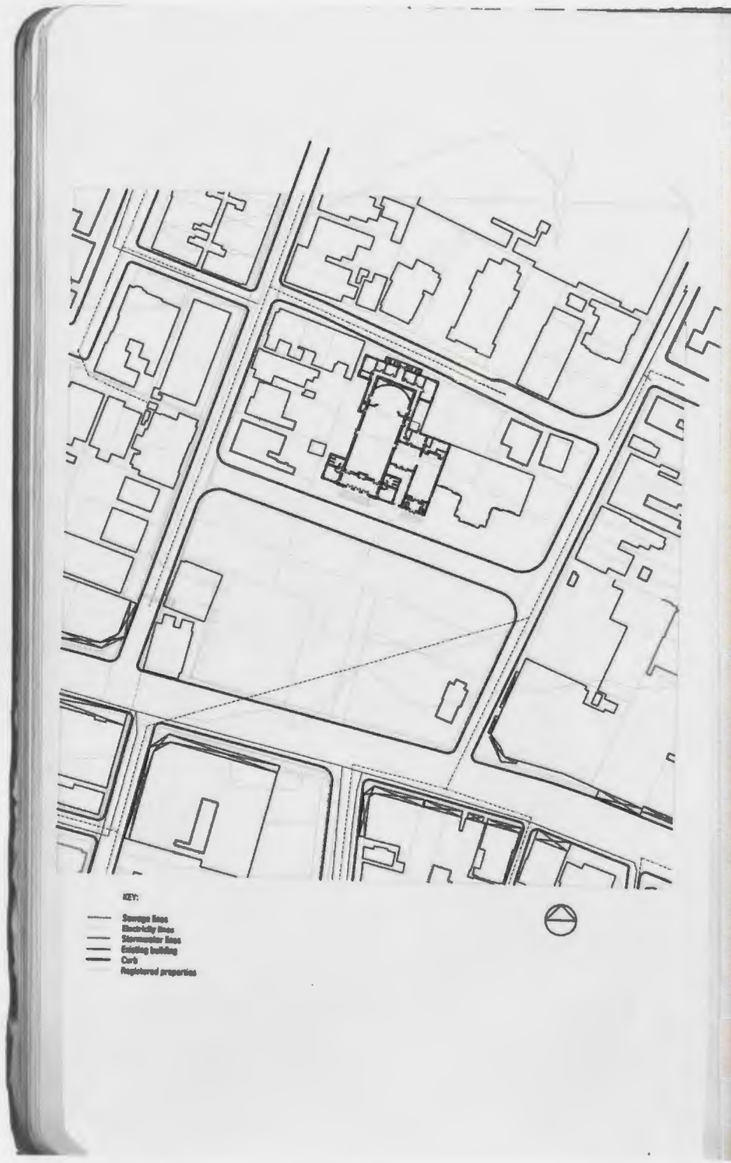
Current available area: existing park

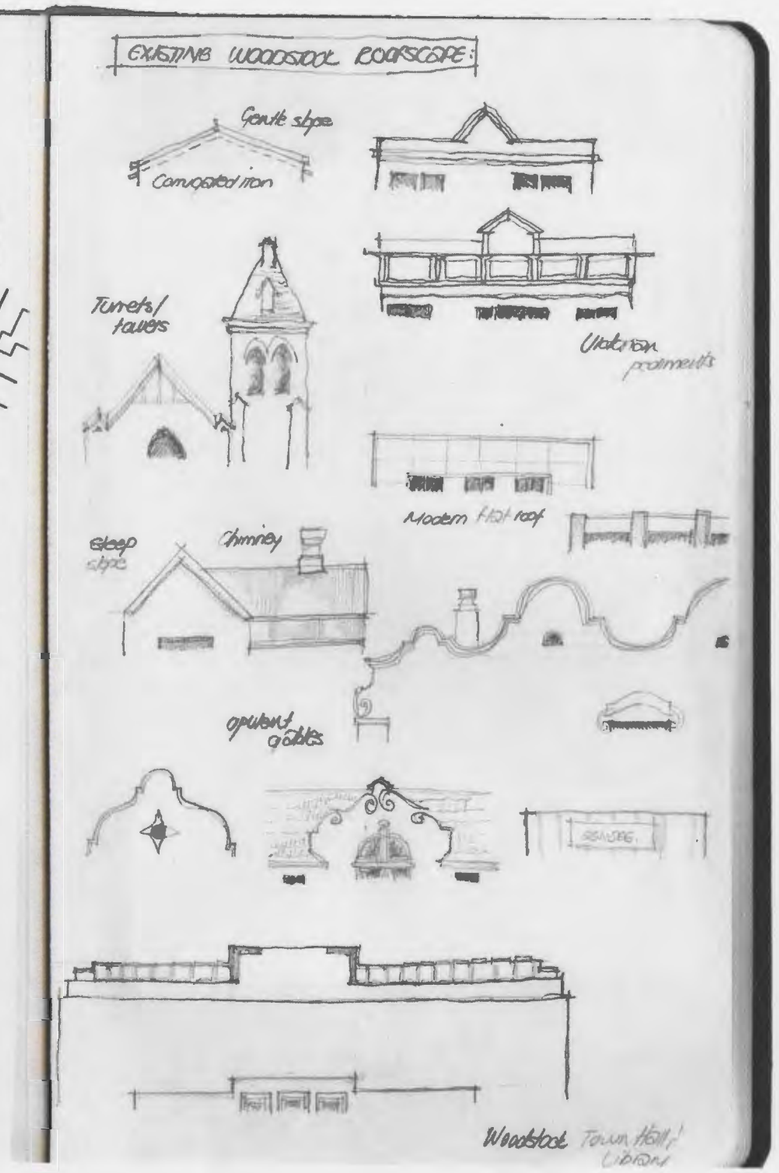
Important neighbour: Woodstock Library

Necessary back entry: Clyde Street

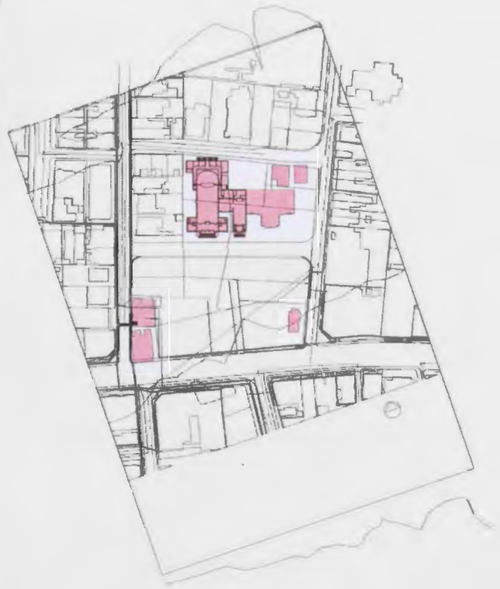
"...neither a projection into the future nor simply a historicist remembrance to the past... Deconstructivist architecture locates the frontiers, the limits of architecture coiled up within everyday forms. It finds new territory within old objects."

(Johnson & Wigley 1988: 18)

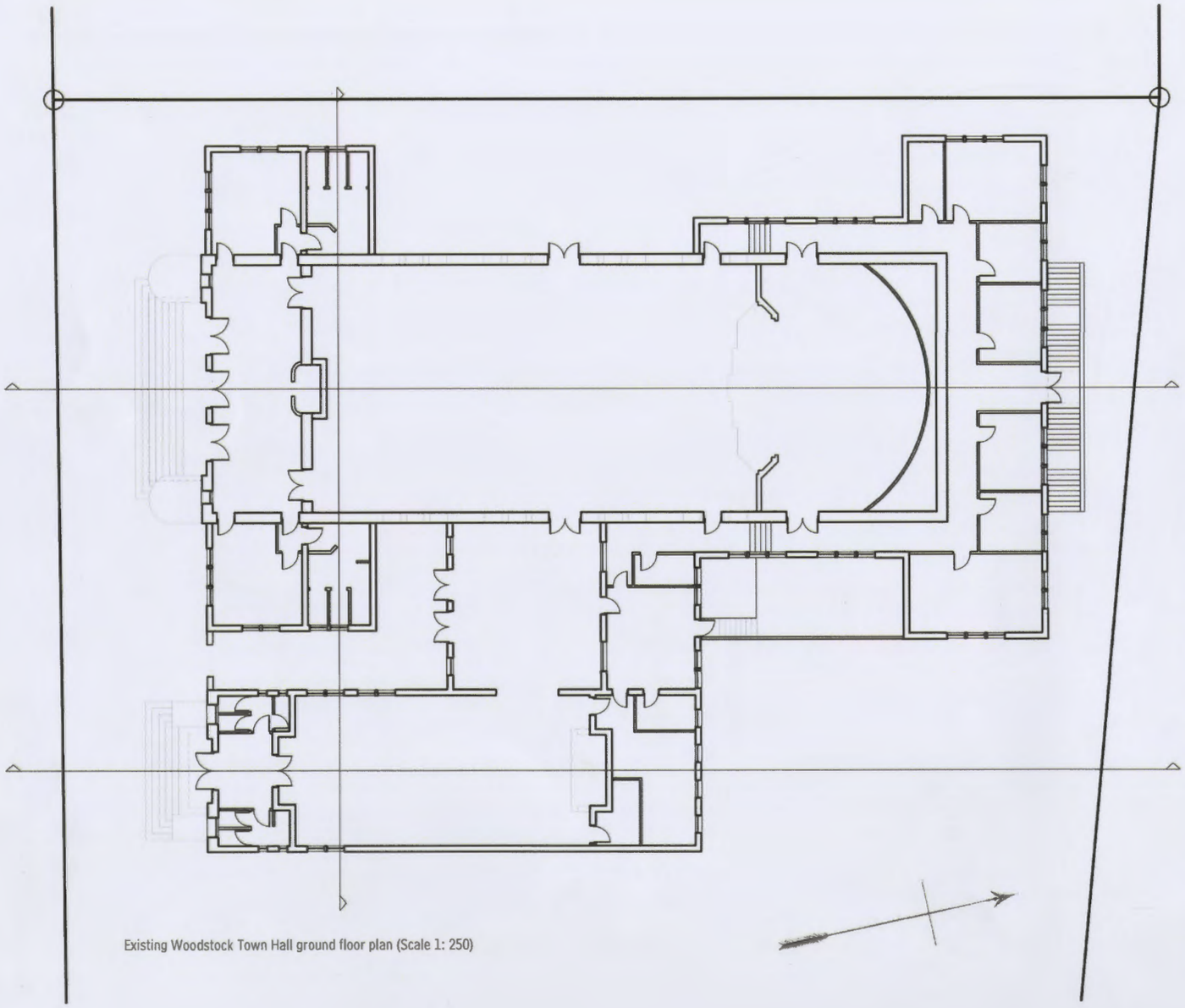

KEY:
Sewage lines
Electricity lines
Stormwater lines
Existing building
Curb
Registered properties


EXISTING WOODSTOCK ROOFSCAPE
Gentle slope
Corrugated iron
Turrets/ towers
Victorian pediments
Modern flat roof
Steep slope
Chimney
Woodstock Town Hall / Library


MAIN RD.
HOTSPOT
PLEIN ST.
PROSTAR
CLYDE ST.
ABERDEEN RD.




VICTORIA FOODWORLD
SUB-STATION
WOODSTOCK TOWN HALL
CITY OF CT HEALTH DEPT.
FTHK THEATRE COMPANY
WOODSTOCK PUBLIC LIBRARY
PUBLIC TOILETS



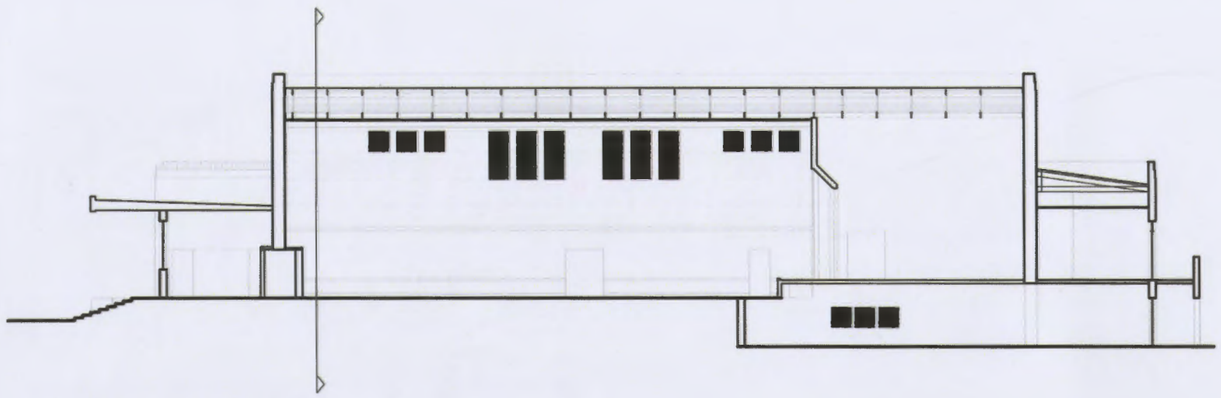
Existing Woodstock Town Hall ground floor plan (Scale 1: 250)

UNCOVERING **EXISTING** SITE INFORMATION

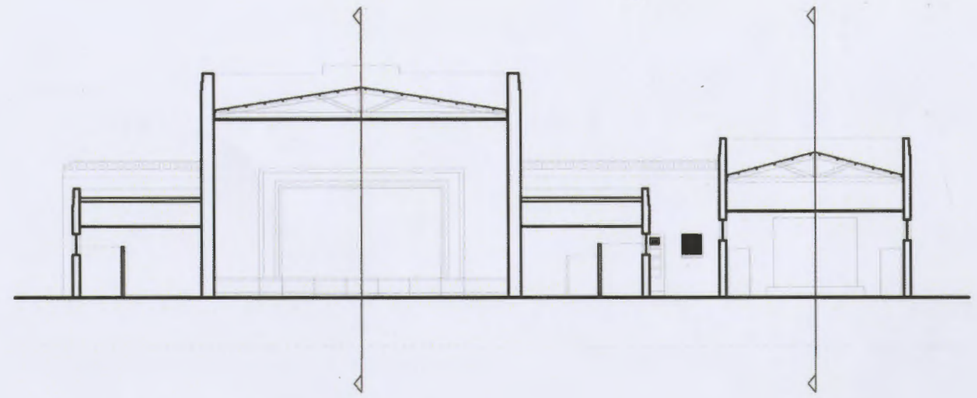
The process of uncovering, or recovering, the existing architectural drawings for the Woodstock Town Hall revealed the building to be the 'supplement' that Deconstruction speaks of. On examination of the council log, which tracks my time spent in both the Cape Archives and the City of Cape Town Council, and based on the understanding that no architectural drawings of the building currently exist, it is made apparent that the building, although still used by the public, has all but been forgotten by governmental agencies.

Council log:

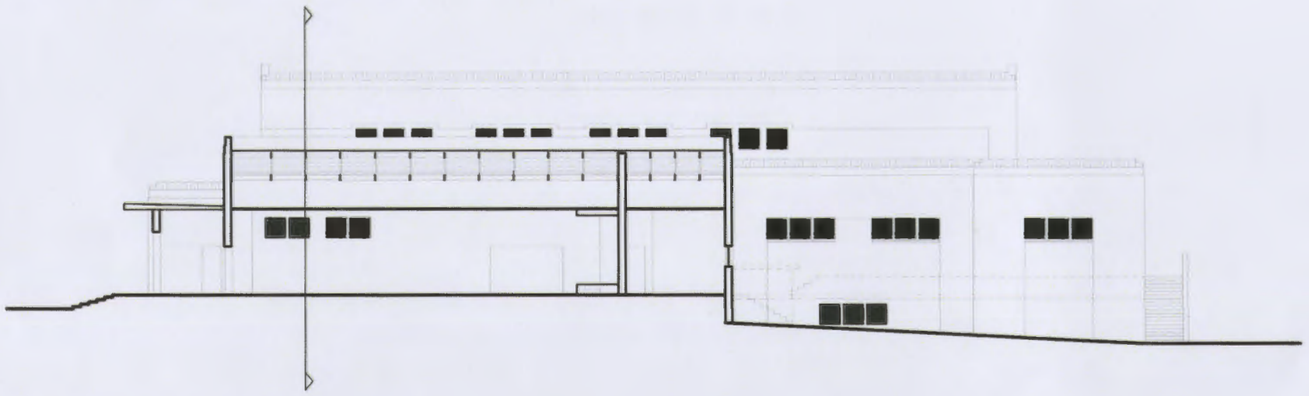
Mon. 1st June	Plumstead council Cape Town City Council no plans for town hall exist in either request plans from CT archives
Tues. 2nd June	Archive visit: no success Phone John Rennie: gives me the no. of Stuart Harris Phone Harris 2 times, no reply, leave message
Wed. 3rd June	Council: library plans exist Mr Jones allows me in to measure up town hall
Thurs. 4th June	Council Mr Jones won't let me in: event
Fri. 5th June	Council phones: system down Mr Jones won't let me in: cleaning
Mon. 8th June	Council: system down again Measure up the rest of town hall!



Existing Woodstock Town Hall longitudinal section through main hall (Scale 1: 250)



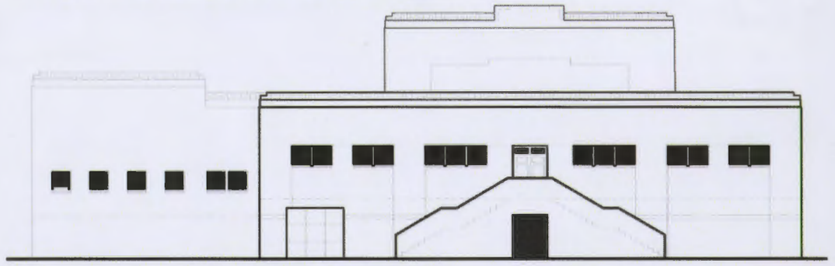
Existing Woodstock Town Hall cross-section (Scale 1: 250)



Existing Woodstock Town Hall longitudinal section through subsidiary hall (Scale 1: 250)

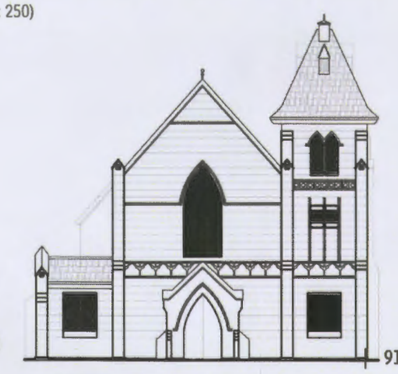
Deconstruction: releases what has always been in existence but is repressed within the classical; exploits the potential residing within the stable and pure and logical; seeks the supplement

Existing Woodstock Town Hall south elevation (Scale 1: 250)



Existing Woodstock Town Hall north elevation (Scale 1: 250)

Existing Woodstock Public Library south elevation (Scale 1: 250)



Existing Presbyterian Church south elevation (Scale 1: 250)

Uncovering | (re)covering site created a way in which to physically manifest music | architecture

Retro-Romantic: to find the possibility within the classic and classic-romantic

'Tecture': to create a space that sought inspiration from place

Libeskind: to find the *possibility within* context | site, the incomplete and history to uncover (recover) the in-between

Deconstructivism: to locate the supplement or the unfamiliar, rather than the essence

PROGRAMMING DESIGN
A PROCESS OF DISCOVERING USE

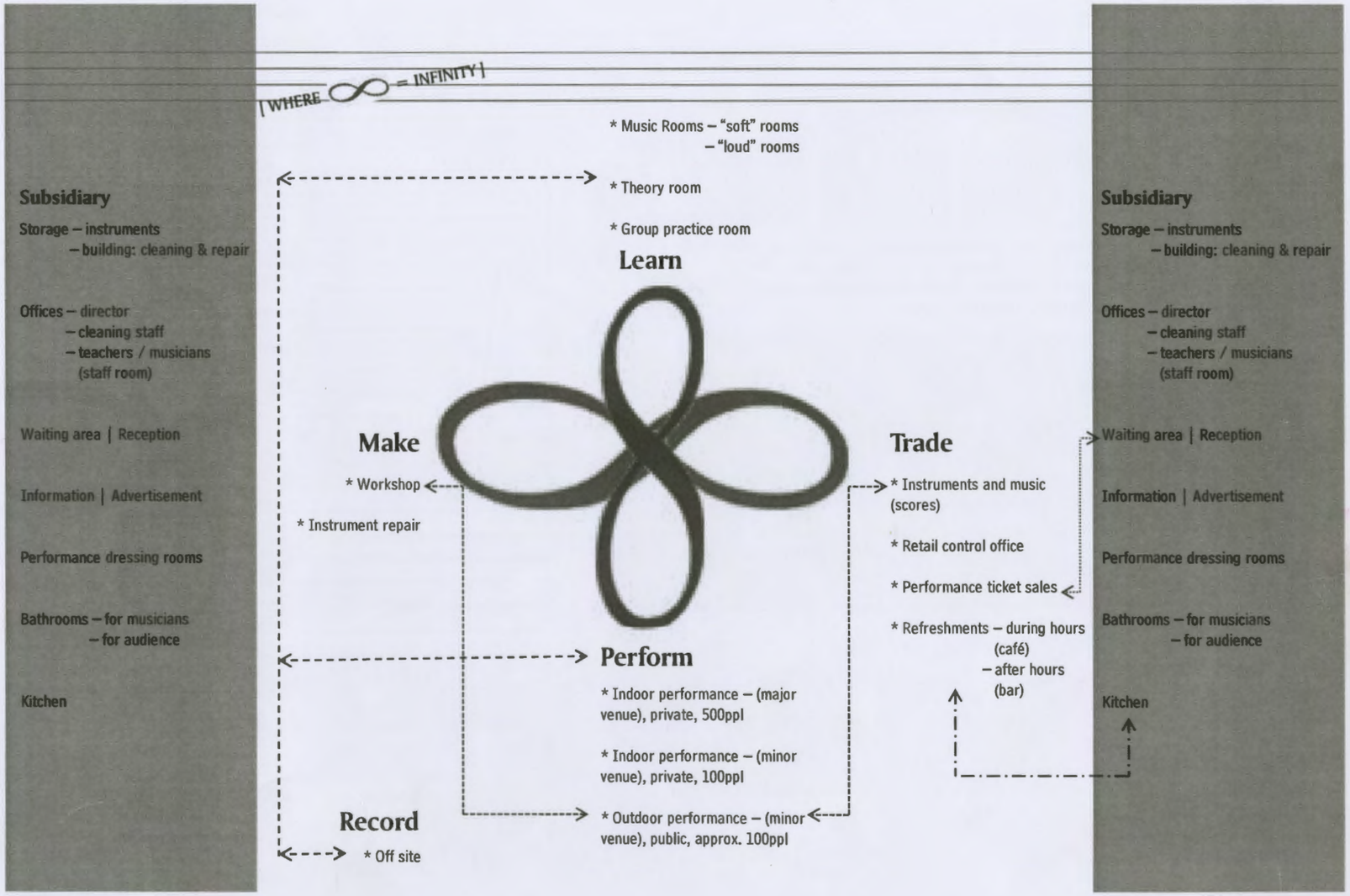
EXPLORING PROGRAMME
ANALYSIS IN WHICH NO PROGRAMME PROVIDES FOR ALL

The process of engaging with a programme for the site was twofold. Firstly, the programme sought to reveal the potential that was already alluded to within the site and context (as Libeskind had achieved in his 'Between the Lines' proposal). Secondly, the progression *through* the programme needed to be indicative of the ideas of the unfolding of event and experience, rhythm (movement through space in time), motion, direction and gesture, all concepts considered in the theories of music, architecture and the y-condition between the two. It is in this way that the intention of the programme is similar to that of Retro-Romanticism and the y-condition, creating a multi-dimensional space with a cyclical perception of a concept, where the unknown (the programme) is derived from two knowns (site | context, music | architecture) so that the scheme becomes another, entirely different entity.

The primary endeavour of the programme is to create a space-of or place-for music. As discovered through the process of siting, Woodstock, and its surrounding precinct, lacks the basic facilities for music tuition and performance. In order to create a programme that encompasses all avenues of the musical process, I visited four different cultural institutions. The first, Beau Soleil Music School in Kenilworth (visited on the 11th March 2009), is one of three music institutions sponsored by the Western Cape Education Department. The second, Maingard Guitars in Scarborough (visited on the 13th March 2009) is one of South Africa's most highly regarded guitar-making studios and the third, Ruth Prowse School of Art (visited on the 10th March 2009) is a fine example of a successful cultural institution in Woodstock. The last was a site visit to the Cape Audio College in Mowbray (visited on the 19th March 2009). All four visits revealed the potential within a cultural and educational institution, as well as highlighting the areas of opportunity left vacant within the programme. No one institution provided a place in which to make, trade, learn and perform.

It is within this context that a programme can emerge, based on the concepts enveloped by music and architecture, and materialising from the opportunities present in existing cultural and educational institutions.

The unfolding of experience and event becomes an inspiration to the architecture



Learn

BEAU SOLEIL MUSIC SCHOOL

PRACTICE / LEARNING ROOMS _ "Soft" instrument rooms with 2 soundboards; violin room; brass room; flute, clarinet, oboe room; mirrors for technique. Percussion rm. outside (noise), carpet to prevent kit slipping. Minor hall for orchestra practice 7.2 x 14.4m. Theory room, classes grades 1-4 and 5-7. Library.

MAINGARD GUITARS

OPPORTUNITY

RUTH PROWSE SCHOOL OF ART

STUDIOS_
For painting, casting, life drawing, graphic design

WORKSHOPS_
For jewelry design, photography, printmaking

FURTHER LEARNING PROGRAMMING_
Computer room; library; lecture theatre; acid room; dark room .

SCHEDULE OF ACCOMMODATION

SPATIAL NAME & CLASS OF OCCUPANCY	SPATIAL CONSTRUCTS	LEVEL	NUMBER REQUIRED	NUMBER OF PEOPLE	AREA REQUIRED (m^2)	TOTAL AREA (m^2)	OTHER NOTES
LEARN							
MUSIC SCHOOL (A3)							
Music rooms	Soft music rooms - small	G/1	5	1 to 3	6.5	32.5	
	Soft music rooms - large	G/1	5	1 to 3	9	45	
	Loud music rooms-small	G/1	5	1 to 3	6.5	32.5	
	Loud music rooms-large	G/1	5	1 to 3	9	45	
	Percussion room	B	1	1 to 4	15	15	
	Group practice room	B/G	3	50 @ 1.4m^2 per musician	70	210	
	Recording studio	B/G	1	20 @ 1.4m^2 per musician	28	28	
Instruction	Theory room	G/1	2	15 @ 1.6m^2 per pupil	24	48	
Administration	Reception	G/1	1	1	24	24	
	Staff room	1	1	8	15	15	
	Head's room	1	1	1 to 3	15	15	
	Print and copy room	1	1	N/A	9	9	
	Finance room	1	1	1	9	9	
Subsidiary	WC for pupils	G	10	10	7 WC + 3 U	14.2	M: 2WC + 3U; F: 5WC
	WC for staff/guests	G	4	4	3 WC + 1 U	5.8	M: 1WC + 1U; F: 2WC
	Kitchenette	1	1	N/A	6	6	
	Cleaning store	G	1	N/A	6	6	
	Instrument store	G	1	N/A	9	9	
						569	23 parking bays
MUSIC LIBRARY (A3)							
Retail centre	Book display	G	1	N/A	50	50	
	Book reserve	G	1	N/A	12	12	
	Audio reserve	1	1	N/A	12	12	
Administration	Reception	G	1	1	9	9	
	Referencing station	G	1	2	6	6	
	Workroom	G/1	1	2	12	12	
Subsidiary	Book store	G/1	1	N/A	6	6	
	WC for staff and pupils	G	4	4	3 WC + 1U	5.8	M: 1WC + 1U; F: 2WC
						112.8	5 parking bays

Make

BEAU SOLEIL MUSIC SCHOOL

INSTRUMENT REPAIR_
Not construction, simply small-scale repair and loan

MAINGARD GUITARS

WORKSHOP _ One extended workshop with a humidity cupboard; timber guitar frames; industrial cutters, varnishes and molders; worktables and tool cupboards

RUTH PROWSE SCHOOL OF ART

OPPORTUNITY

MAKE							
CONSTRUCTION WORKSHOP (D3)							
Workshop	Machinery area	G	1	N/A	96	96	
	Worktable area	G	1	8			
	Display area	G	1	N/A			
	Office	G	1	1	12	12	
Subsidiary	Storage area	G	1	N/A	6	6	
	WC	G	1	2	2 WC	3.2	M: 1WC; F: 1WC
						117.2	7 parking bays
TRADE							
MUSIC SHOP (F2)							
Retail	Instrument display	G	1	N/A	50	50	
	Sheet music display	G	1	N/A	6	6	
Administration	Reception / front desk	G	1	1	15	15	
	Office	G	1	2	12	12	
Subsidiary	Storage area	G	1	N/A	12	12	
						95	6 parking bays
GENERAL RETAIL (F2)							
Retail	Display area	G	1 per shop (3)	N/A	48	144	
	Dining area	G	1 per shop (3)	14	48	144	
Administration	Reception / front desk	G	1 per shop (3)	1	12	36	
Subsidiary	Storage area	G	1 per shop (3)	N/A	6	18	
	Refuse area	G	1 per shop (3)	N/A	6	18	
	Kitchenette	G	1 per shop (3)	2	12	18	
	WC	G	6 for all retail	6	4 WC + 2 U	6.8	M: 1WC + 2U; F: 3WC
						384.8	23 parking bays

Trade

BEAU SOLEIL MUSIC SCHOOL

OPPORTUNITY

MAINGARD GUITARS

LOCAL AND INTERNATIONAL EXPORT_
Made to order, the business has a largely foreign clientele. Produce on average six guitars every three to four months. The work is highly skilled and professional, very few practitioners are able to make ones of similar standard

RUTH PROWSE SCHOOL OF ART

ART AND COFFEE SHOP_
For the sale of papers, paints, glues (all products applicable to the courses of study) and instant coffee from a kettle in the corner

PERFORM							
LARGE PERFORMING VENUE (A2)							
Performance space	Audience space	G/1	1	500 + @ 1.1m² per person	550	550	Existing
	Stage space (orchestra)	G/1	1	50 @ 1.1m² per musician; 5m² for piano; 5-6m² for timpani	66	66	Existing
Administration	Lighting control room	1	1	2	9	9	
	Acoustic control room	1	1	2	9	9	
	Preparation room	1	1	15 @ 3.75m² per person	56	56	Existing
	Reception	G	1	300	90	90	Existing
	Ticket sales	G	1	1			Existing
	Main office	1	1	2	15	15	
	Finance office	1	1	2	15	15	
	Superinendent's office	1	1	1	12	12	Existing
Subsidiary	WC for musicians	1	4	4	3 WC + 1 U	5.8	M: 1WC + 1U; F: 2WC
	WC for audience	G	22	22	15 WC + 7 U	31	M: 3WC + 7U; F: 12WC
	Storage: cables, lighting	B	1	N/A	12	12	Existing
	Storage: cleaning, repair	1	1	N/A	6	6	
						876.8	53 parking bays
SMALL PERFORMING VENUE (A2)							
Performance space	Audience space	G	1	50	110	110	Existing
	Stage space (small band)	G	1	6	12	12	Existing
Subsidiary	WC for audience	G	4	4	3 WC + 1U	5.8	M: 1WC + 1U; F: 2WC
						127.8	8 parking bays
OUTDOOR PERFORMING VENUE (A2)							
Performance space	Audience space	G	1	120 @ 0.8m² per person	96	96	
	Stage space	G	1	22 (20 musicians + drums + piano)	40	40	
						136	parking bays N/A

Perform

BEAU SOLEIL MUSIC SCHOOL




MAJOR HALL _ 40 to 50 musicians, 120 audience. Storage. Curtains absorb sound. Hall size inadequate for annual major concert which has to be held in CT City Hall

RECITAL ROOM _ Seats 70 – 80 people; room good with string acoustics, bad for brass because of the low ceiling and narrow width

MAINGARD GUITARS

OPPORTUNITY

RUTH PROWSE SCHOOL OF ART



OUTDOOR SPACE_
For exhibitions and debates

WALL SPACE_
For display and exhibition

REFRESHMENT VENUE (A1)							
Café	Table space	LG	1	80 @ 0.8m² per diner	64	64	
	Bar space	LG	1	40 @ 0.8m² per patron	32	32	
Administration	Office	LG	1	1	12	12	
	Waitron station	LG	1	5	6	6	
	Till point	LG	1	1	6	6	
	Reception	LG	1	N/A	6	6	
Subsidiary	WC for staff	LG	4	4	3 WC + 1U	5.8	M: 1WC + 1U; F: 2WC
	Kitchen	LG	1	6	48	48	
	Storage	LG	1	N/A	6	6	
						185.8	parking bays N/A
						2605.2	125 parking bays
						312.624	12 % circulation
						2917.824	TOTAL AREA

Type of Occupancy:

A1: Entertainment and public assembly	Fixed seats OR 1 person per m²
A2: Theatrical and Indoor sport	Fixed seats OR 1 person per m²
A3: Place of instruction	1 person per 5m²
D3: Low risk industrial	1 person per 15m²
F2: Small shop	1 person per 10m²
G1: Offices	1 person per 15m²
J4: Parking garage	1 person per 50m²

Sizes Worked With:

WC: 1.2m²
WC + washbasin: 1.6m²
Urinal + washbasin: 1m²

Parking Requirements:

Retail and entertainment: 6 bays per 100m² GLA
Place of instruction and offices: 4 bays per 100m² GLA

Parking provided off site: 26 bays
Parking provided on site: 108 bays
6 bays above ground (1 disabled parking)
102 bays in underground parking (2 disabled parking)

Subsidiary

BEAU SOLEIL MUSIC SCHOOL




WAITING ROOM_
For students

KITCHEN_
For staff only

STORAGE_
For caretaker and excess instruments

OTHER _ Principal's office; reception; sick room; photocopy room (for music scores); notice board (for concerts, instruments, repairs, timetables)

MAINGARD GUITARS

OPPORTUNITY

RUTH PROWSE SCHOOL OF ART

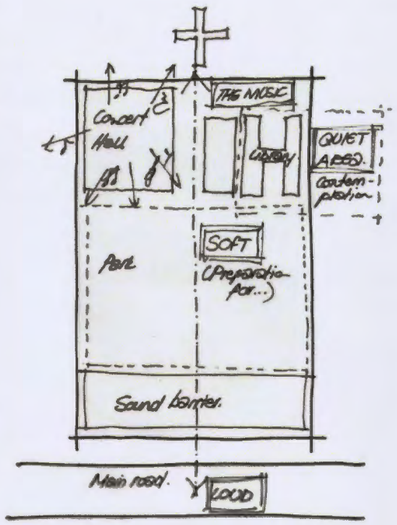


RECREATION _ Courtyard

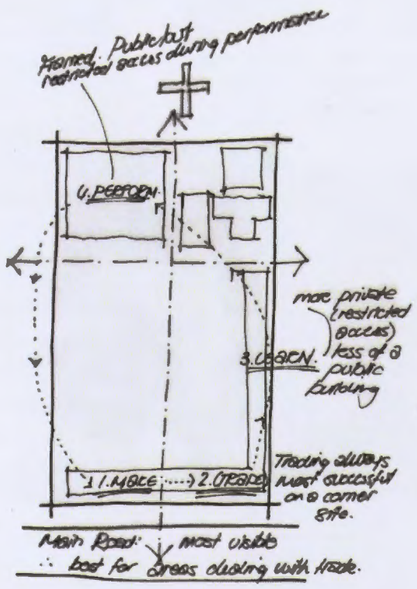
RECREATION _ Outdoor

STORAGE AND CLEANING_

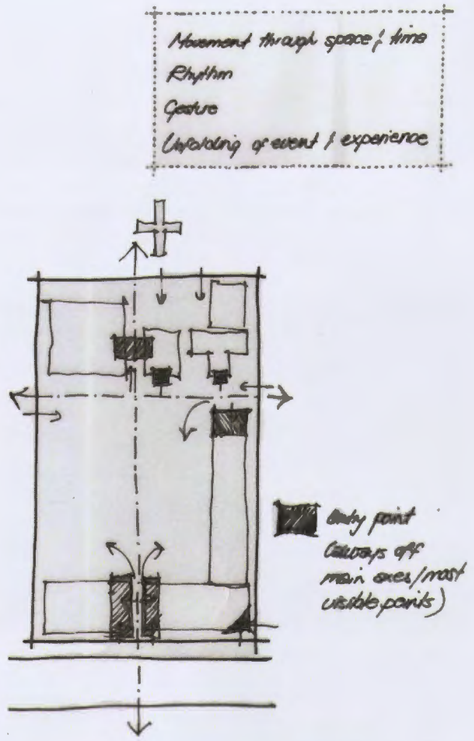
OTHER _ Reception | secretary; kitchen; caretaker's room; director's office; bathrooms; small staff offices



EXPERIENCE... (Aural experience) SOUND DIAGRAM
Manipulates programme



EVENT... PROGRAMME DIAGRAM



GESTURE... ENTRY PT / AXIS DIAGRAM

Initial programme sketches based on the theoretical concept (graphic drawn by the author)

The y-condition and Retro-Romanticism emerge through the process of programming:

By uncovering possibilities within the context, a programme is created that encompasses the unfolding of event, experience and gesture (a cyclical perception of a concept)

The programme reveals the potential of a space to create a differentiated experience ... between what is and what will be (Libeskind 2001: 50)

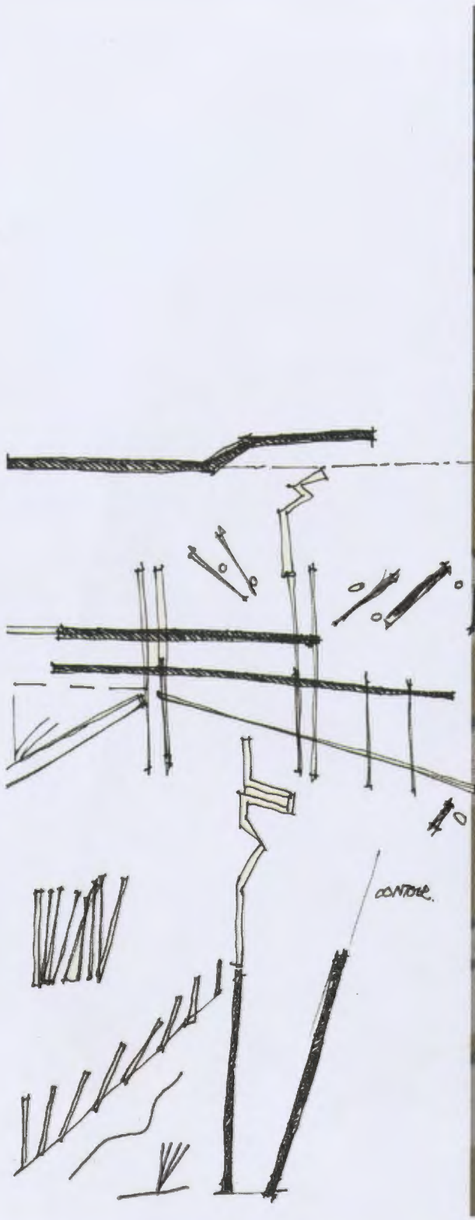
INITIAL ARCHITECTURAL CONCEPTS

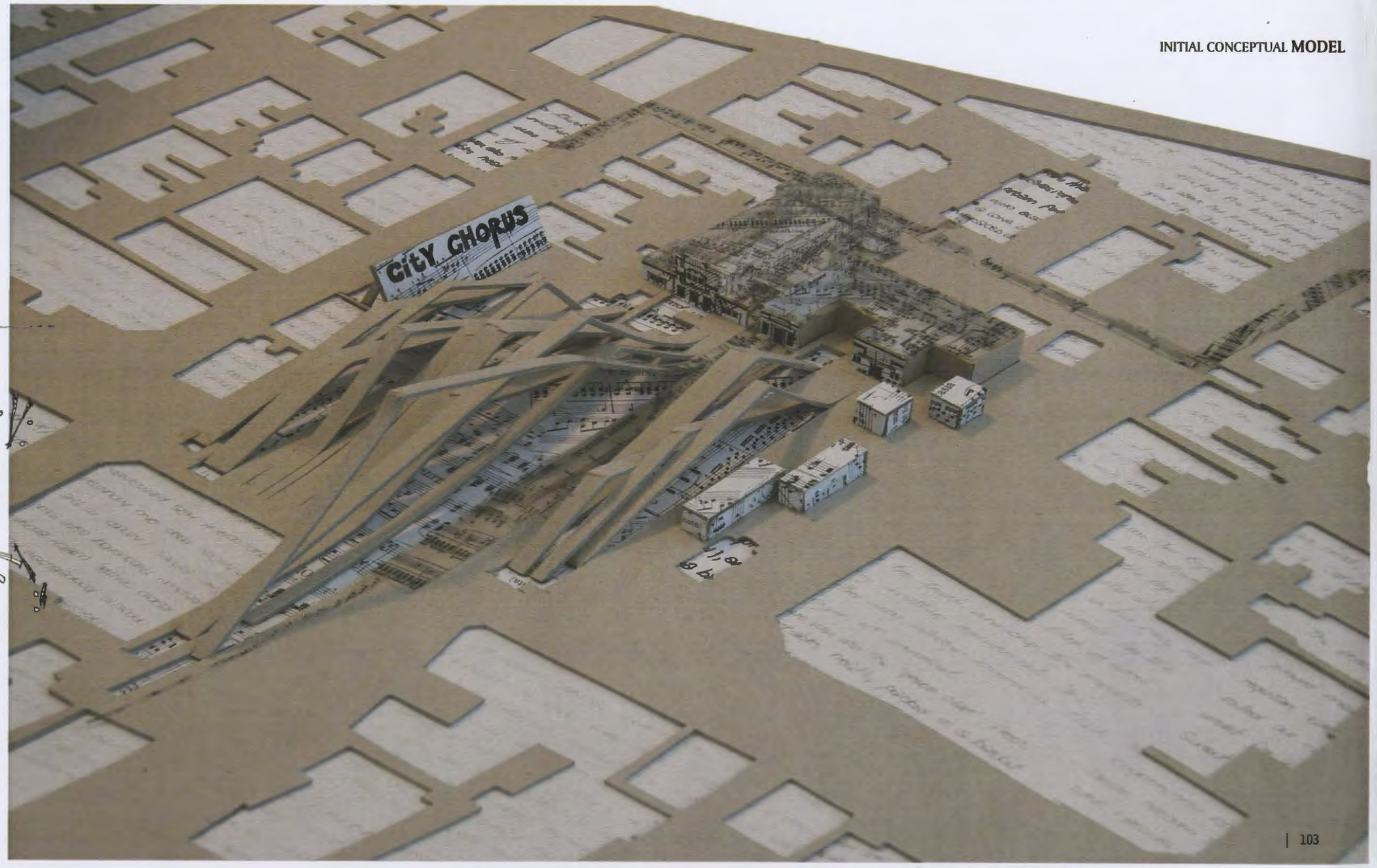
THE MAKING OF MUSICAL PLACE

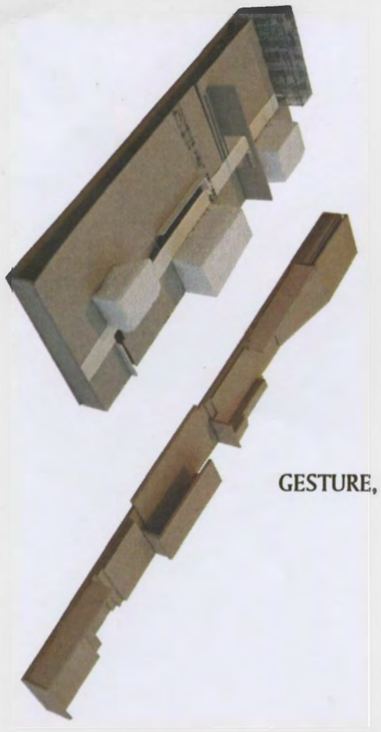
Following from the themes of siting and programming comes the initial architectural concept development, where the theoretical and technological ideas are translated directly into the making of space. The ensuing sketches and models are all an attempt at making considered, relevant architecture which is not a direct translation of musical concepts, but rather a composition drawing inspiration from context and the possibility within it. In this way architecture discovers the idea of the y-condition: a multi-dimensional space, an unknown (the new design) residing between the knowns (the context, programme, theories) , the in-between.

The initial architectural development does not concern itself with a single building impacting on its immediate space, it is an experiment for an entire context to create a new composition.

INITIAL CONCEPTUAL DIAGRAM


CONTOUR


City Chorus

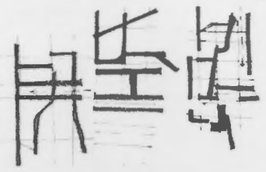


GESTURE, MOTION, DIRECTION

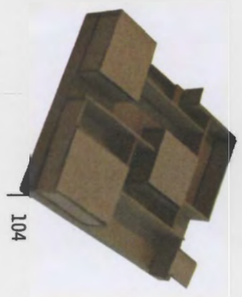
LIGHT AND ACOUSTICS

HARMONY AND VARIATION

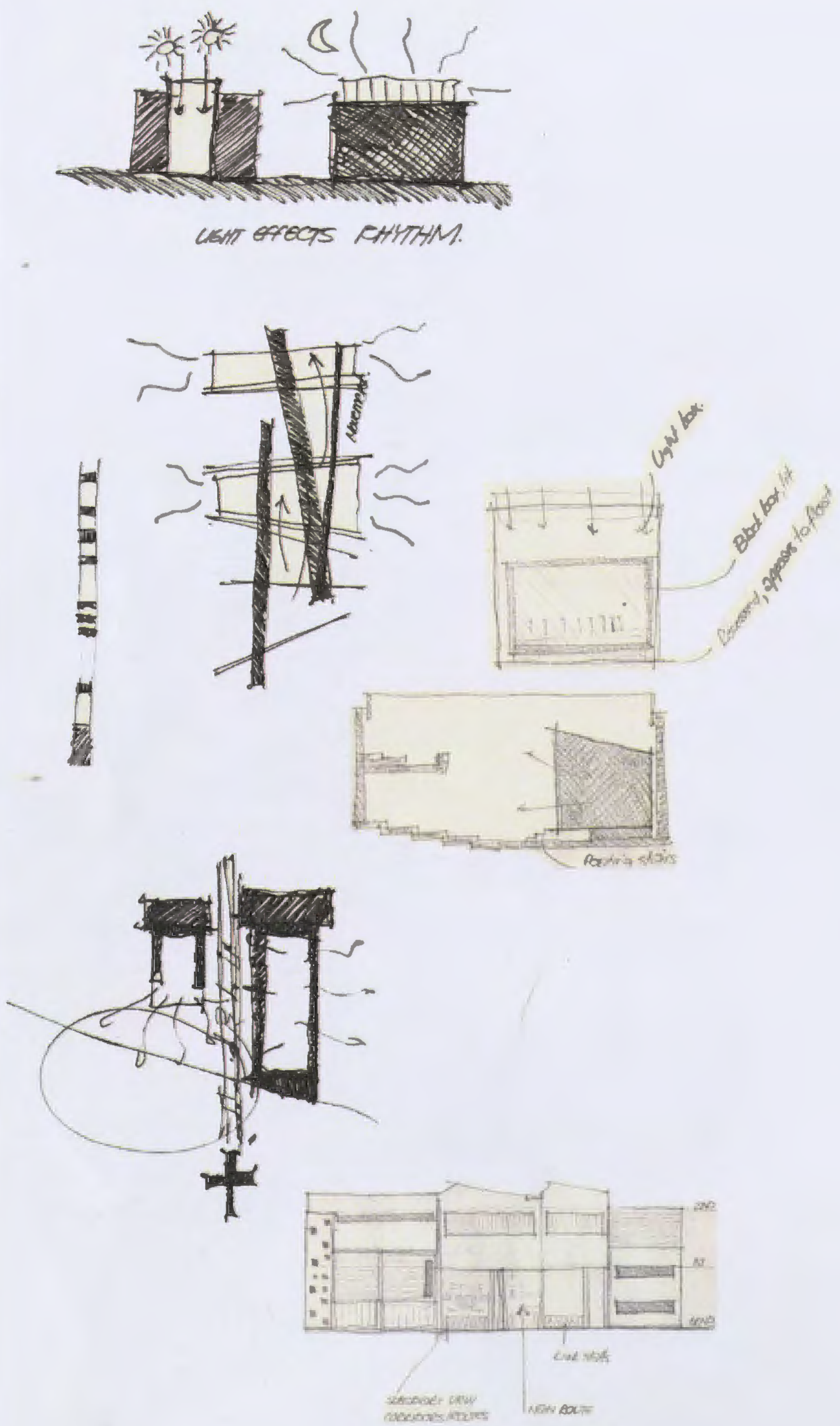
THE IN-BETWEEN

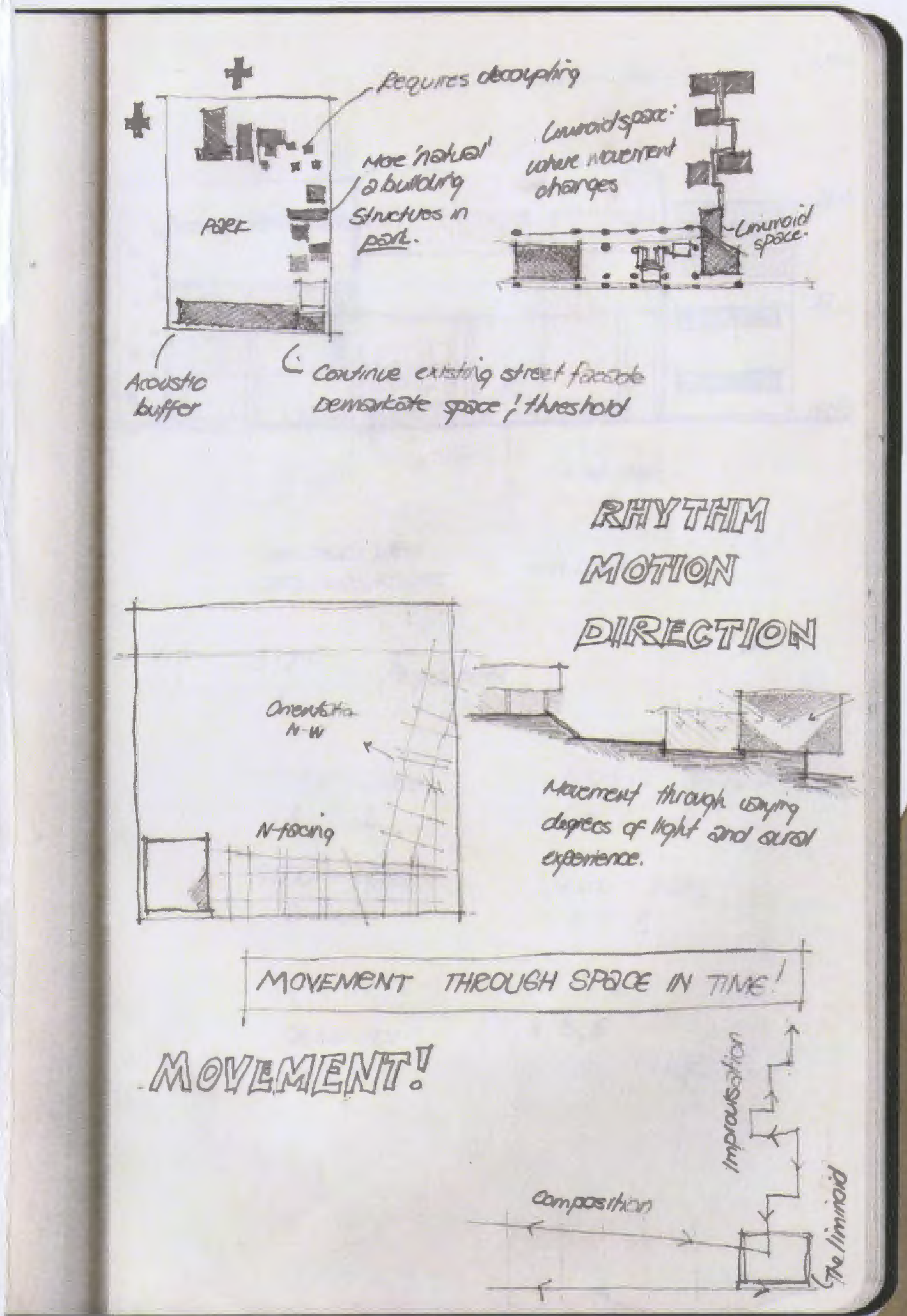


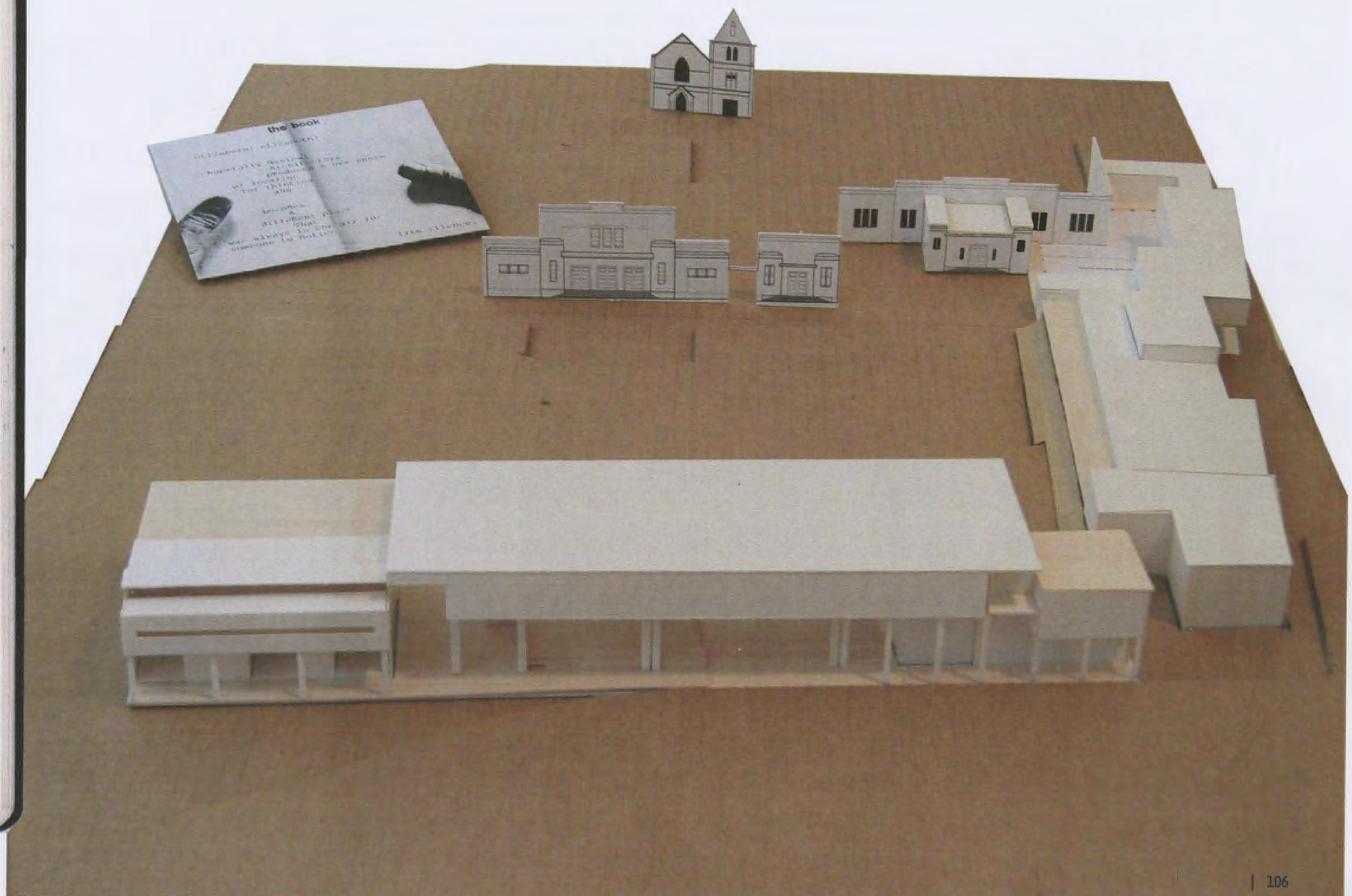
THEMATIC TRANSFORMATION

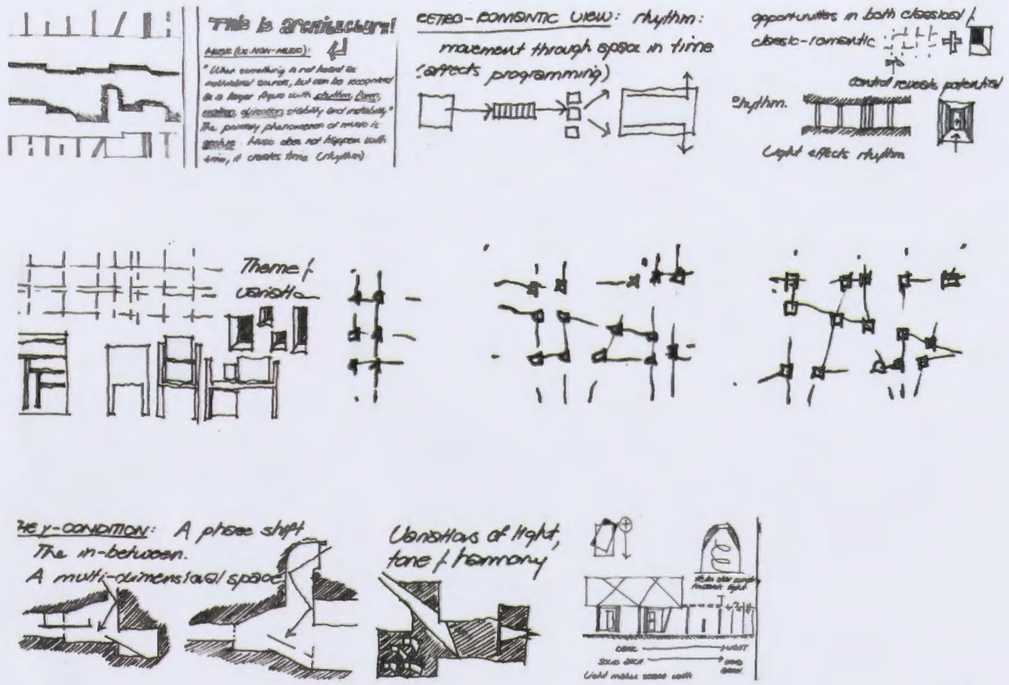


PROPORTION AND CONTROL


LIGHT EFFECTS RHYTHM.
Light box.
Black box lit


Requires decoupling
More 'natural' a building
Structures in park.
Park
Liminoid space: where movement changes
Liminoid space.
Acoustic buffer
Continue existing street facade
Demarcate space; threshold
RHYTHM
MOTION
DIRECTION
Orientation N-W
N-facing
Movement through varying degrees of light and aural experience.
MOVEMENT THROUGH SPACE IN TIME!
MOVEMENT!
Improvisation
Composition
The liminoid


the book



Initial conceptual design considers:

- Gesture
- Rhythm
- Proportion, harmony
- Timbre, texture, materiality
- Thematic transformation
- Light and shadows
- Acoustics

In order to reveal the possibility within the specific site | context and in so doing bring about the idea of the unknown, the supplement, the in-between

TEXT REFERENCES

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IMAGE REFERENCES

All images, unless referenced otherwise, by the author

This is the essence: music | architecture
This is the supplement: the y-condition
This is the (con)text: Retro-Romanticism

This is the essence: acoustics | instrument
This is the supplement: aural experience
This is the (con)text: material and immaterial

This is the essence: a place of music
This is the supplement: Woodstock Town Hall
This is the (con)text: theory and technology

ACKNOWLEDGEMENTS

Special thanks to

My parents

My supervisors