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Into Instrument: A Case for the Musical Tectonic

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For architecture, tectonics is what emerges when construction is assembled in a way that produces more than just the construction itself. A kind of precious excess. For musical instruments, tectonics is what emerges when the construction of the instrument produces more than just the sound that the instrument makes.

There is a study of musical instruments that doesn’t strictly apply to architecture. But for some reason, architecture still starts to merge out of the artifacts of music. This thesis contends that the link between musical instruments and architecture is tectonics, and that tectonic link can be understood and explored through the nature of musical interfaces.

The user interfaces of a musical instrument is always thoughtfully considered, in terms of both music and construction. It will be argued that these interfaces – and the actions associated with them – can be discussed and explored architectonically, beyond just the sounds they produce. Music is being abstracted as an organizing principle, so that the expressive capabilities of user interface can be understood.

The connection between user interface and action is open to tectonic expression. How we use instruments is what matters, not necessarily the sound that comes out of them. The notion of “use” can be conceived in terms of the primary function of the object, as well as the thoughtful positioning of the object in space.

This thesis will observe and investigate the relationship between musical objects and architectonic construction. It will begin to test relationships between musical notational systems and architectural notational systems. Musical instruments can provide key insights into how architecture might possess the same qualities of interactivity, action and personal value that musical instruments inherently own.

Within the discussion of music and architecture is the constant threat of cliché, and of letting the trappings of musical genre cloud the architectural goals of the project. The hope is that including Music as the principle subject of an architectural problem will allow abstract architectural discussion to become almost literal. In including diagrams of music, dichotomies like harmony and discord, excess and economy, rhetoric and geometry, will have to be negotiated as real compositional obstacles.

Case for the Musical Tectonic

Advisor: MARK LINDER
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>0</td>
</tr>
<tr>
<td>Abstract</td>
<td></td>
</tr>
<tr>
<td>A CASE FOR THE MUSICAL TECTONIC</td>
<td>1</td>
</tr>
<tr>
<td>The tricky ground between frame and stereotomy</td>
<td></td>
</tr>
<tr>
<td>TAXONOMY</td>
<td>2</td>
</tr>
<tr>
<td>Means of sound-making</td>
<td></td>
</tr>
<tr>
<td>Means of music-making</td>
<td></td>
</tr>
<tr>
<td>INTO INTERFACE</td>
<td>3</td>
</tr>
<tr>
<td>The tectonics of play</td>
<td></td>
</tr>
<tr>
<td>ORGANS &amp; ORDERS</td>
<td>4</td>
</tr>
<tr>
<td>Out of interface; into outer-face</td>
<td></td>
</tr>
<tr>
<td>INSTRUMENTURE (ARCHITECTMENT?)</td>
<td>5</td>
</tr>
<tr>
<td>De-sounding music with architecture</td>
<td></td>
</tr>
</tbody>
</table>
I’M MAKING INSTRUMENTS!
ABSTRACT

Instruments are constructed objects. The nature of an instrument’s construction is often the primary indicator of the instrument’s character. Musical instruments provide mechanisms which allow them to control pitch. Depending on the kind of instrument, the qualities of the pitch can also be manipulated. They are alive; they must be moved and transformed in order to produce their distinctive sounds. If we begin to consider them as tectonic objects, both literally and figuratively, then it would be fair to categorize them as the most inherently dynamic and interactive tectonic objects on the spectrum.

The motivation behind this thesis lies in the belief that musical instruments are more fun than architecture. These objects allow for a kind of play which architecture accommodates and houses, but has yet to live up to. How can tectonics evolve to include issues of interactivity, of which are most clearly demonstrated by the tectonic construction and function of musical instruments?

Musical instruments are self-exhaustive systems. This thesis will observe and investigate the relationship between musical objects and architectonic construction. It will begin to test relationships between musical notational systems and architectural notational systems. Musical instruments can provide key insights into how architecture might possess the same qualities of interactivity, action and personal value that musical instruments inherently own.
GOTTFRIED SEMPER (1851)

CARIBBEAN HUT at GREAT EXHIBITION OF 1851

1) HEARTH
   NON-Spatial

2) EARTHWORK

3) FRAMEWORK

4) ROOF

REVEALS

Theory of Formal Beauty (1856)

“...no longer grouped architecture with painting and sculpture as plastic art, but instead with dance and music as cosmic art, as an ontological world-making art rather than representational art.”

KARL BÖTTICHER (1874)

kunstform
DECORATIVE CLADDING

REVEALS

kernform
THE THING INSIDE

*tectonic nucleus*
Responding to the state of commodity culture of post-modernism, arguing that it was fueled by Romanticism and enacted through scenographic architecture.

“...building is **ontological** rather than **representational** in character, and that built form is a presence rather than something standing for an absence.”

“...in which members of varying lengths are conjoined to encompass a spatial field.”

“...compressive mass that, while it may embody space, is constructed through the piling up of identical units.”

“[We] tend to be unaware of the ontological consequences of these differences*:

---

**KENNETH FRAMPTON (1990)**

**ONTLOGICAL** (structural-technical)

Allowing for a constructional element to emphasize an object’s **static role and cultural status**.

**REPRESENTATIONAL** (structural-symbolic)

Allowing for a constructional element to be **hidden**, but present.

---

*Materiality of frame

**Immateriality of frame**

**Materiality of mass**
Within architectural discourse, tectonics always concerns issues of building and construction, but never has tectonics been narrowly objective. At the very least, tectonics betrays complex strategies of representation.

MICHAEL SCHWARZER (1996)

**TECTONICS...** seems condemned to the dominion of fact.

**tekton** (GREEK) “builder” or “carpenter”

19th CENTURY

German theorists refer to tectonics more broadly as ARCHITECTURE’S coordination of CONSTRUCTIONAL FEATURES with SYSTEMS OF DECORATION

20th CENTURY

Tectonics as supportive of the PHENOMENOLOGICAL experience of craft and detailing.

(LATE) 20th CENTURY

TECTONICS has been deconstructed alongside other devices (e.g. objective vision, linear perspective) for its insinuation of a logic of continuity and integration.

“Within architectural discourse, tectonics always concerns issues of building and construction, but never has tectonics been narrowly objective. At the very least, tectonics betrays complex strategies of representation.”
“Tectonic strategies [...] bring as much disruption as stability to architecture.”

“It is not much of a stretch to claim that through tectonics the necessity of fact gives way to the passions of necessity.”

Tectonics is the product of ideas as much as a construction of products. It encompasses great attempts to redeem the hollowness of architecture in an age of global capitalism and commodity culture.

I don’t think there’s a hollowness in architecture anymore. I think today’s crisis is an overwhelming density. A culture of “too much”: too much content; too much to watch, too much to see, too much to read, too much to find meaning in! How is anything special in a sea of specialties?

“Here tectonics is suspended between urges for overpowering and dissolving materiality, mimetic contemplation and technological advance, individual self-realization and nation-building.

Tectonics is at once total experience and splintering representational tale.

“Tectonics is the product of ideas as much as a construction of products. It encompasses great attempts to redeem the hollowness of architecture in an age of global capitalism and commodity culture.”

“TECTONICS as... a counter hegemonic condition of knowledge.

“FRAMPTON”

“THE CREATION OF A TIMELESS, TIMEBOUND MOMENT: a mythical quest by Frampton’s standards.

“Tectonics, as the shaping of an authentic reality, is an attempt at salvation.”
A CASE FOR THE MUSICAL TECTONIC
WHAT IS AN INSTRUMENT?

ARCHITECTURE AS instrument*

* (definitions adapted from Marcos Novak’s “The Music of Architecture” [2007])

instrument as:

1. an expressive extension of the individual

2. scientific apparatus, “allowing us to peer into worlds beyond our normal senses”

3. both an expressive extension and scientific apparatus
THE TECTONIC LANGUAGE OF MUSIC THEORY
Understanding music as identical pieces to be assembled and disassembled. A certain note next to another certain note will present harmony or tension, depending upon the note.

Conventional music requires geometric clarity; as such, musical instruments must reflect this clarity without fail and without flaw. Why has geometric perfection stuck around in music, but not in architecture? Does it still have a place here? What can music theory reveal about architecture?

Disregarding genre for a second, the structures of music and all of its conventional parts exist in a self exhausting system, bound by the number 12. Musical “notes” can be understood as a serial system, which can be exploited architecturally, while still remaining true to the rules of scale, chord structure and intervals.

These principles are tectonic, because they inform structural principles of musical composition. They represent an assembly of pieces, part-to-whole relationships and the groundwork for what one might consider ‘song’ or music.
## SCALES & INTERVALS

### DIATONIC SCALE
- minor 2nd
- major 2nd
- minor 3rd
- major 3rd
- perfect 4th
- tritone
- perfect 5th
- minor 6th
- major 6th
- minor 7th
- major 7th

### CHROMATIC SCALE
- minor 2nd
- major 2nd
- minor 3rd
- major 3rd
- perfect 4th
- tritone
- perfect 5th
- minor 6th
- major 6th
- minor 7th
- major 7th

### PENTATONIC SCALE
- minor 2nd
- major 2nd
- minor 3rd
- major 3rd
- perfect 4th
- tritone
- perfect 5th
- minor 6th
- major 6th
- minor 7th
- major 7th

**HARMONY!**

**DISCORD!**
THE CIRCLE OF FIFTHS

major

P5

M3 m3

minor

P5

m3 M3
TAXONOMY
HORNBOSTEL-SACHS METHOD

means of sound-making

+ 

means of music-making

CHROMATIC BARS
FINGER/FRETBOARD
KEYBOARD
VALVES/OPENINGS
PIPE AEROPHONES

BRASS

REED PIPE

EDGE

WITHOUT VALVES

conch shell

didjeridu

trombone

animal horn (shofar)

bulge

SINGLE REEDS

clarinet

saxophone

single reed bagpipe

WHISTLE FLUTES

whistle

organ flute pipe

recorder

WITH VALVES

trumpets

cornets

french horn

euphonium

saxophone

silver flute

double reed bagpipe

DOUBLE REEDS

bassoon

oboe

TREE FLUTES

panpipes

flute

jug

piccolo
any musical instrument that produces sound primarily by causing a body of air to vibrate, without the use of strings or membranes, and without the vibration of the instrument itself adding considerably to the sound.

**FREE AEROPHONES**

**FREE REED**
- sheng
- khaem
- harmonica

**BEATING REED**
- aeolian harp
- bull-roarer
- leaf
- organ reed pipes

**SINGLE REED**
- organ
- reed pipes

**DOUBLE REED**
- human voice

**FREE REED**
- concertina
- bandon
- accordion
- india harmonium

**MOUTH-BLOWN**
- sheng
- khaem
- harmonica

**HAND-BLOWN**
- concertina
- bandon
- accordion
- india harmonium

**MECHANICALLY-BLOWN**
- barrel organ
- orchestration
- pipe organ
- electric chord organ

**FOOT-BLOWN**
- pedal concertina
- harmonium
- reed organ
- pipe organ
any musical instrument which produces sound primarily by way of **vibrating a stretched membrane**.
any musical instrument that creates sound primarily by the *instrument as a whole* vibrating—without the use of strings or membranes.
a musical instrument that makes sound by way of a vibrating string or strings stretched between two points.

CHORDOPHONES

PITCHED

STRUCK

hammered dulcimer

piano

BOWED

cello

violin

viola

contrabass

PLUCKED

guitar

ukulele

banjo

mandolin

harpichord

harp
INTO INTERFACE
MUSICAL INTERFACE to ACTION

CHROMATIC BARS

FINGER/ FRETBOARD

DIRECT ONTOLOGICAL
MUSICAL INTERFACE to ACTION

- CHROMATIC BARS
- FINGER/ FRETBOARD

DIREC

ONTOLÓGICAL
VALVES/OPENINGS
THE COMPANION

Great instrument for improvisational activity. Not many “parts” to work with; and range of possibility is not often present. This tectonic requires creative combinations which can also get in the way of its other operations. These interfaces are often on instruments that can be easily transported. There is a sense of ease.
KEYBOARDS

Seems to present itself all at once. “Music” is presented and organized as legible scales, and most systematically out of all of the interfaces. But it is representational. The key doesn’t make the sound. It represents the note. It tells you what you want hear an what you want to know.
THE TOTAL PACKAGE
HELSINKI CATHEDRAL PIPE ORGAN
E. F. WINCKEL
FINGER/FRETBOARDS

A way to understand compartmentalizing and construction of grids. Music as units. Music as abstraction and geometry. It wants you to know that it’s music, but it won’t necessarily be clear about how you can use it. It can’t really make up its mind. It has to compartmentalize and post-rationalize.
THE POLITICIAN
GUITAR GUY
ANIMAL HOUSE
FOR VISUAL ARTS
FENENMAN

FÉNÉSTRATION AT LA TOURETTE
IANNIS XENAKIS
CHROMATIC BARS
Extremely minimal. The guru speaks in aphorisms; quickly and with truth. Would be often found outside and in nature. Members of this system reflect the range of the chromatic scale.
CHIMES
The following is a tool proposed for negotiating between the two worlds of frame and stereotomy. It is both empty frame and stackable brick. This tectonic dichotomy will be used to illustrate the inherent musical relationships of its diagram. The circle of fifths was literally transposed into the groundwork, so as to lay the “spots” where 12 identical objects could congregate to form the 12 tones of a conventional musical scale.

These objects can be flipped and turned, to make it possible to situate with each other in a self-exhaustive system of variations. These variations seek to make musical relationships between “notes” clear. Some variations include flipping an object from its root note to form a musical path in plan. Certain notes, when placed next to each other, will be clear examples of harmony or discord, depending on which note they situate next to. A field of these relationships will serve as a didactic arena for interaction with these objects specifically through its system of assembly.
SONG AS "BUILDING" AS

MUSIC AS song

ARCHITECTURE AS building

SONG AS assembly

"BUILDING" AS assembly
RESTING POSITION
OPEN MAJORS
MINOR FIELD
MAJOR FIELD
EXPERIMENT #2
HIGH VAULT
LOW VAULT
RESPONSIVE REST
ORGANS & ORDERS
If we are to admit that organs are in fact architectural, then we should be so inclined to observe and understand and critique its architectural qualities.

Most of the largest scale organs also make use of the “facade pipe” which is a pipe that rests within the casing of the front pipes. These pipes don’t make any sound. They look like music trying to fit in with architecture.

Instead of the previous method – rooting through a taxonomy of instruments to extract something architectural – we start to notice in organs, architecture beginning to itself emerge out of musical instruments. Architectural tectonics become the mode of expressing ornament for musical instruments at this scale, as a way to supply or represent meaning.
BIBLIOGRAPHIES

IMAGES:

KEYBOARDS


VALVES/HOLES


FINGER/FRETBOARDS


CHROMATIC BARS


TEXT:


