



Ethology of art: Music and Architecture:  
From the Seikilos epitaph to the  
composer-architect Iannis Xenakis.

ISHE Summer School in Athens, May 2015  
Gerhard Apfelauer



# Abstract

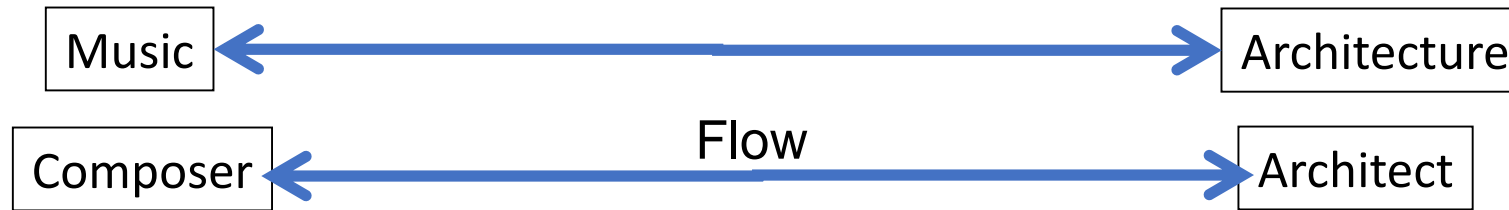
Music and Architecture are two closely correlated human arts, with regard to their creation and performance by architect and musician as well as to their watchers' / listeners' reception.

Composer and architect experience enthusiasm for the successful application of rules, the „getting organized“ according to prescriptions create ...

- **Flow Experience** for the architect as well as for the composer, cp. with play→
- Dopamin production, synapse formation. More analysis needed.

The listener / beholder enjoys organization, form and structure, recognition of components, symmetry, sound and colours, harmony (or disharmony), aesthetics, counterpoints, rhythmic ....

# Music and Architecture: what do they have in common?



1. Historic „Embodiment“ of Music: notation on components of Architecture: the Seikilos epitaph ...

2. „Gestaltism“ is an aesthetical universal for both arts

3. Mathematical rules in architecture and music in „advanced“ civilizations: Palladio, Xenakis ---

4. Mutual metaphors in Architecture and Music in various cultures: Arabian music, Europe: e.g. Busoni, ...

5. Sound localisation in architecture and its phylogenetic background: Venice, Nono, ....

6. Acoustics, the common denominator

## Notation: Example 1. The Seikilos epitaph

The song is written in the Phrygian harmoniai (mode).

Found in the vicinity of Aydın, Aegean region, close to Ephesus by Sir William Mitchell Ramsay, 1883).

Dated around 200 before Christ.

Today in the Danisch Nationalmuseum.



central tone (mese)



ΕΙΚΩΝΗ ΛΙΘΟΣ  
ΕΙΜΙ· ΤΙΘΗΣΙ ΜΕ  
ΣΕΙΚΙΛΟΣ ΕΝΘΑ  
ΜΝΗΜΗΣ ΑΘΑΝΑΤΟΥ  
ΣΗΜΑ ΠΟΛΥ ΧΡΟΝΙΟΝ

*Eikonē lithos  
eimi; tithēsi me  
Seikilos entha  
mnēmēs athanatos  
sēma poly chronion*

*Ich bin ein **Bild in Stein**;  
Seikilos stellte mich hier auf,  
wo ich auf ewig bleibe,  
als Symbol zeitloser Erinnerung.*

Ὅσον ζῆς φαίνου  
μηδέν ὄλως σὺ λυποῦ·  
πρὸς ὀλίγον ἐστὶ τὸ ζῆν.  
τὸ τέλος ὁ χρόνος ἀπαιτεῖ.

*Hoson zēs, phainou  
mēden holōs sy lypou  
pros oligon esti to zēn  
to telos ho chronos apaitēi*

*Solange du lebst, tritt auch in Erscheinung.  
Traure über nichts zu viel.  
Eine kurze Frist bleibt zum Leben.  
Das Ende bringt die Zeit von selbst.*

It combines the sculpture, piece of architecture and music with poetry.

Martin Litchfield West:  
*Ancient Greek Music*. Oxford 1992.



Seikilos epitaph



## Example 2: Delphic hymns

The Delphic hymns are the most extensive of the very few examples of notated antique Greek music. The two hymns to Apollo are engraved in Parian marble in on the **Athenian Treasury for Apollo** in Delphi. Its date of construction is disputed (from 510 to 480 BCE), excavated by the French School at Athens, led by Pierre de La Coste-Messelière, and reconstructed from 1903–1906

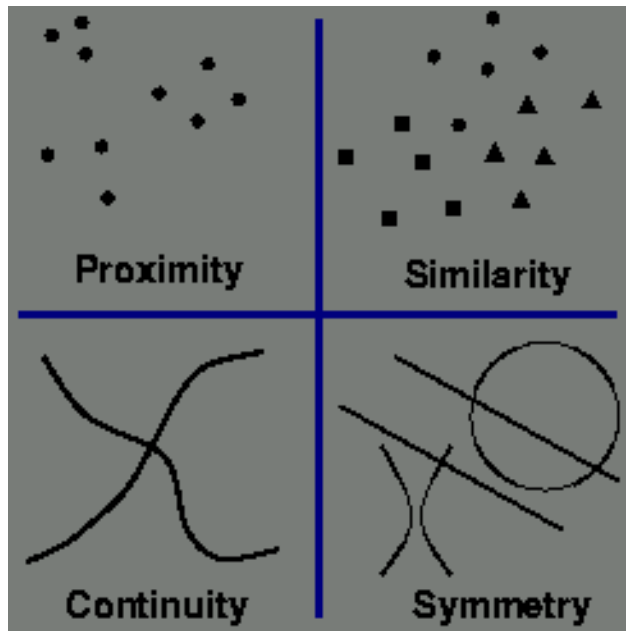
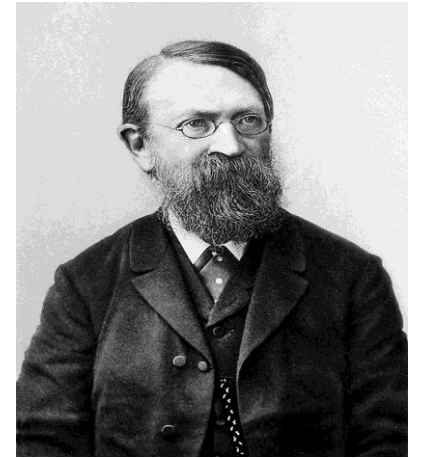


## 2. Gestaltism, the holistic perception, human recognition in evolution

The „Gestalttheorie“ emphasizes the wholeness and organized structure of every experience.

Experiences are not reducible and thus cannot be derived from a simple summation of perceptual elements.

(Ernst Waldfried Josef Wenzel **Mach**, 1886, Austrian physicist, philosopher, musicologist) / compare Wertheimer / Hornbostel



### Gestalt Laws of Grouping

- Law of Proximity*
- Law of Similarity*
- Law of Closure*
- Law of Symmetry*
- Law of Common Fate*
- Law of Continuity*
- Law of Good Gestalt*
- Law of Past Experience*

Details in Gerhard Apfelauer, 2014: „Aesthetics: Universal Qualities of Music as a Biological need“,

applic  
for Ar

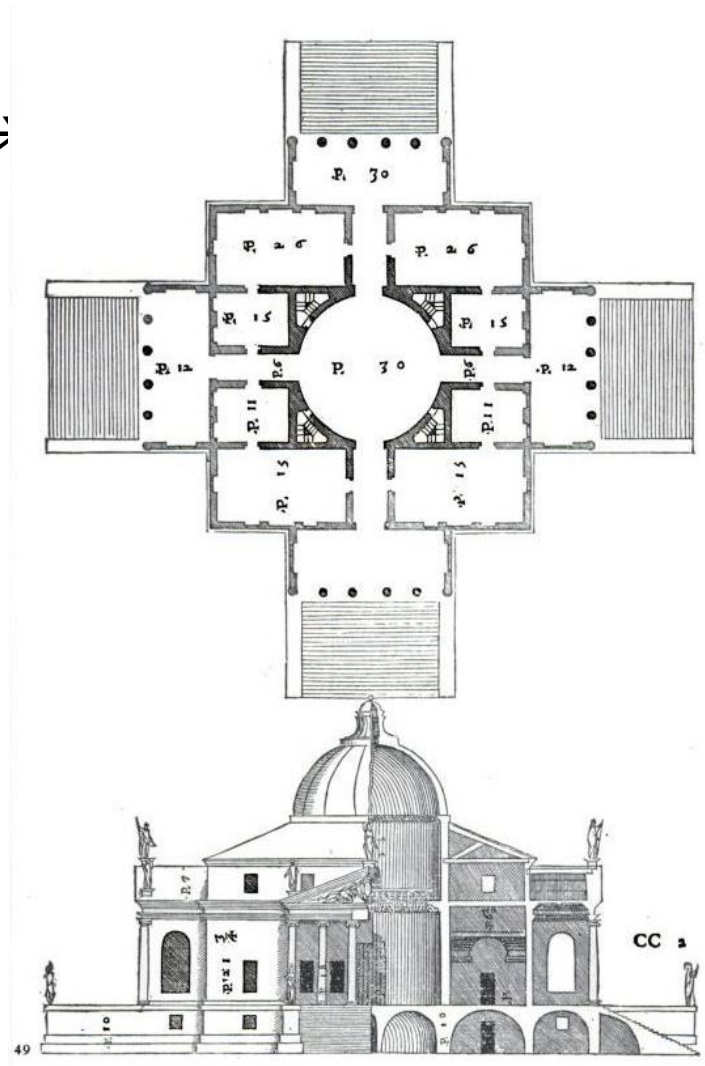


### 3a. Mathematics: Harmonic proportions of music (e.g Pythagoras) applied to architecture, 16th cty.

*Andrea Palladio* applied the harmonic portions not only to a single room but to the combination of the rooms in the entire building.

Vertical and lateral projection of the Villa Rotonda in Vicenza (1567–1571) ⇒

the building is conserved as part of the Unesco **World Heritage Site** "City of Vicenza and the Palladian Villas of the Veneto".



The design is for a completely symmetrical building having a square plan with four facades, each of which has a projecting portico. The whole is contained within an imaginary circle which touches each corner of the building and centres of the porticos. (*illustration, left*). The name **La Rotonda** refers to the central circular hall with its dome. To describe the villa, as a whole, as a 'rotonda' is technically incorrect, as the building is not circular but rather the intersection of a square with a cross.

Each portico has steps leading up, and opens via a small cabinet or corridor to the circular domed central hall. This and all other rooms were proportioned with mathematical precision according to Palladio's own rules of architecture which he published in the *Quattro Libri dell'Architettura*.

The design reflected the humanist values of Renaissance architecture. In order for each room to have some sun, the design was rotated 45 degrees from each cardinal point of the compass. Each of the four porticos has pediments graced by statues of classical deities. The pediments were each supported by six Ionic columns. Each portico was flanked by a single window. All principal rooms were on the second floor or *piano nobile*.

Building began in 1567. Neither Palladio nor the owner, Paolo Almerico, were to see the completion of the villa. Palladio died in 1580 and a second architect, Vincenzo Scamozzi, was employed by the new owners to oversee the completion.

One of the major changes he made to the original plan was to modify the two-storey centre hall.



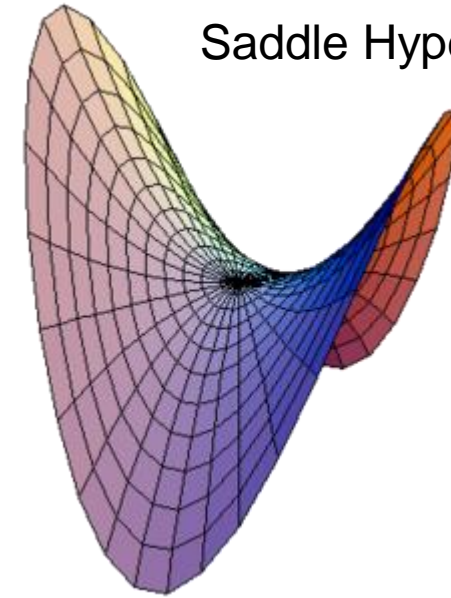
### 3b. Mathematics, strings glissandi and eye music

Iannis Xenakis, 1922-2001, greek composer

composition **Metastaseis** → Premiere at the *Donaueschingen Festival 1955*.

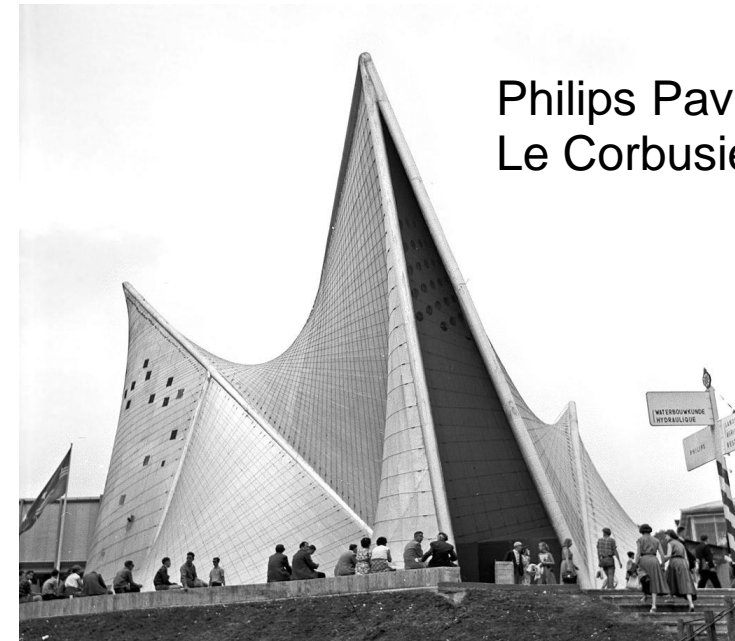
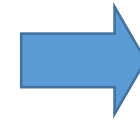
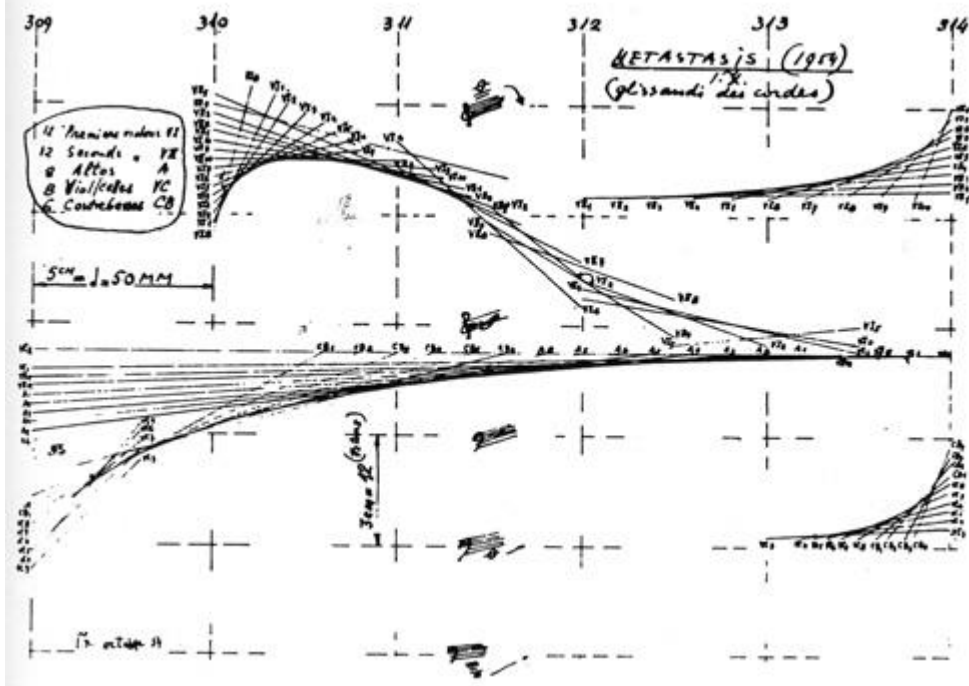
The musical „Score“ inspired Xenakis and Le Corbusier to design a **pavillon** on the EXPO 1958 → parts of a hyperbolic paraboloid.

Envelope of glissandi notes, „curved planar surfaces in sonic space“



Saddle Hyperbolic Paraboloid

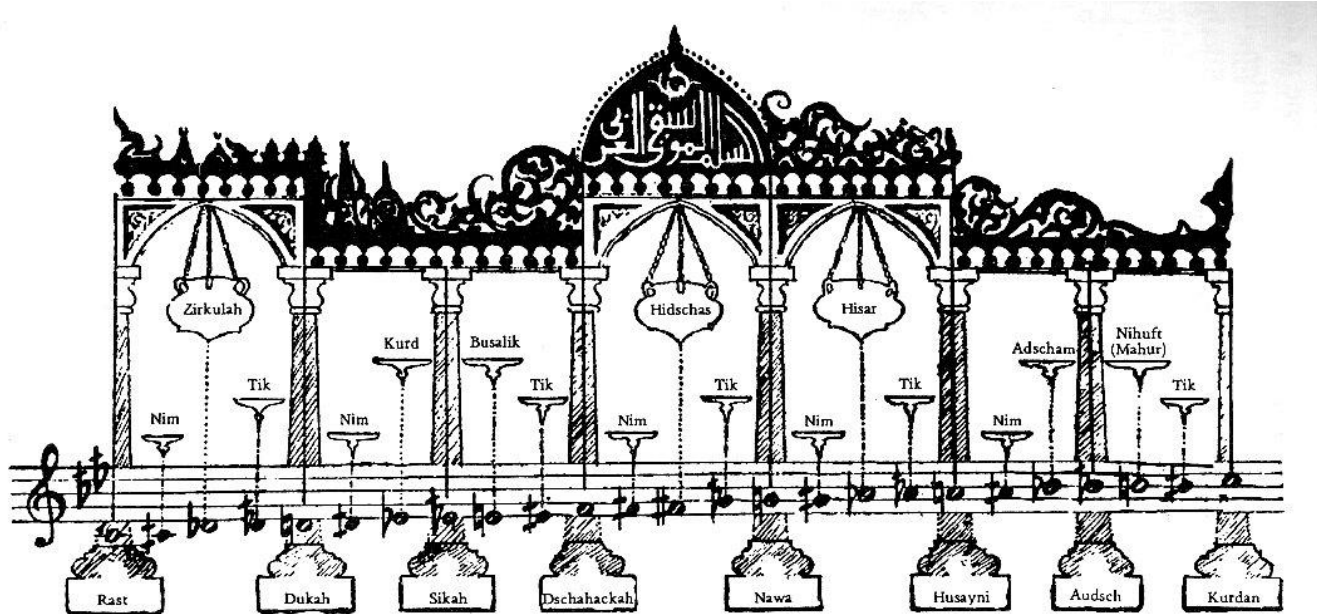
Score of Metastaseis



Philips Pavillon,  
Le Corbusier

## 4. Metaphoric correlations between architecture and music

Example: Arabian music: Building as a metaphor for tone systems



Die arabische Tonleiter

Source: Habib Hassan Touma: Die Musik der Araber, Wilhelmshafen 1975

A **maqam** is a melodic modus in the Arabic music.

24 tones, each of them refer to another **associated** tone more important than itself.

**These more important tones are the columns of a building,** which support the building of the entire tone system (maqam).

Some tones = some columns occur more often than others in the traditional music

Most of the **maqam**-rows start with this tones (compare with our European „Strukturtöne“ in medieval music ).

**μεταφορά**



## 4. Metaphoric correlations: Example 20<sup>th</sup> century

**Ferruccio Busoni** (1866-1924) explained the structure of his *Fantasia contrappuntistica* 1921 (revision for 2 pianos) by means of an architectural drawing.

A Homage to Johann Sebastian Bach's *Die Kunst der Fuge*.

The rhythmic groups of the building visualize the structure and the inner symmetries of the parts of the composition.

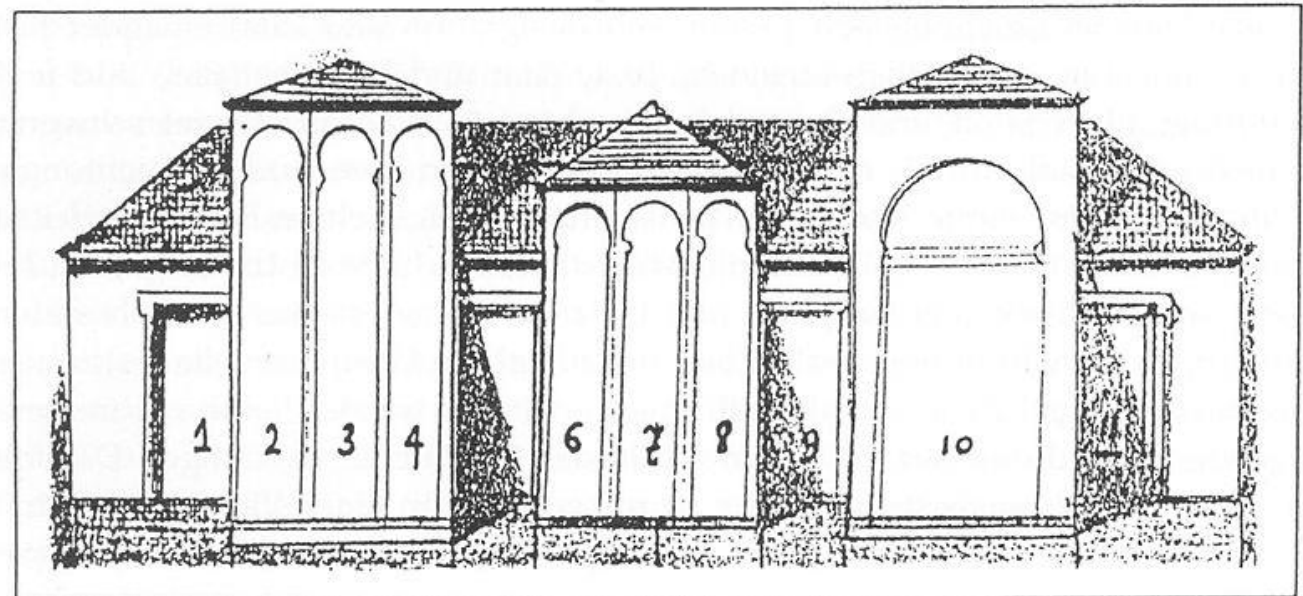
Refer to  
Beaumont, Antony (1985). *Busoni the Composer*.  
London: Faber and Faber.

# Plan des Werkes

A. Analytischer:

1. Choral - Variationen (Einleitung — Choral und Variationen — Übergang)
2. Fuga I.
3. Fuga II.
4. Fuga III.
5. Intermezzo.
6. Variatio I.
7. Variatio II.
8. Variatio III.
9. Cadenza.
10. Fuga IV.
11. Corale.
12. Stretta.

B. Architektonischer:



# **Ethology of Sound-Localization (for tympanic ears)**

**Critical to the survival of a wide range of species.**

**Sound localization abilities important for prey and predator alike.**

**Spatial hearing for human communication providing cues as to the relative number and location of sources and objects**

**Helping to determine the dimensions and characteristics of rooms and enclosed spaces**

**Sound localization is highly complex in terms of its neural processing**

**Other nonmammalian vertebrates (Wirbeltiere) and insects: different solutions for sound localization**

**Successful localisation of humans creates Dopamin and Happiness. More analysis needed.**



# Spatial sound ~1600:

## Syntagma Musicum



Monteverdi: 1567-1643  
Vespro della Beata Virgine

**Venetian polychoral style of late Renaissance music in San Marco.**  
→ Experimental compositions in Europe using the church interior for sound engineering.

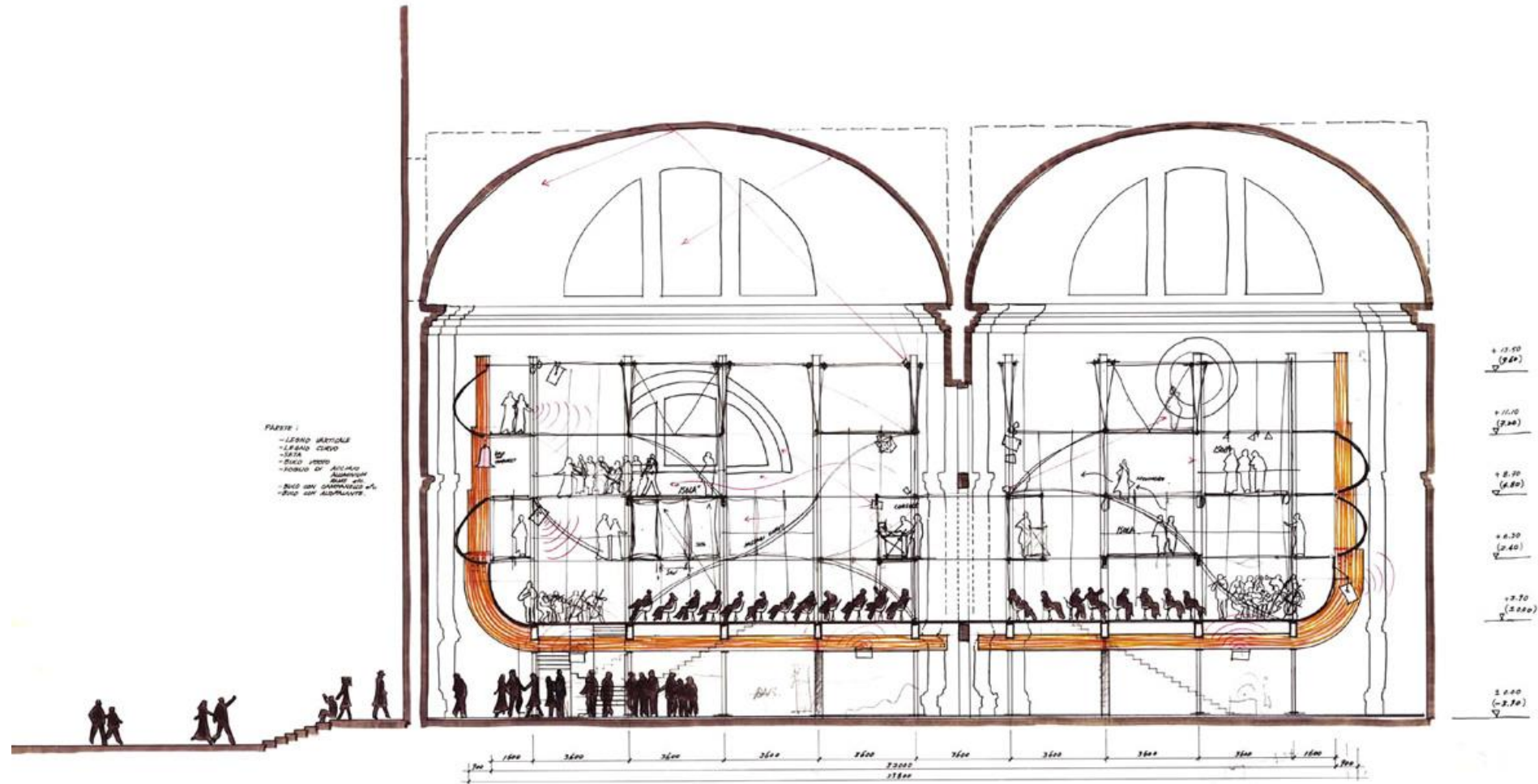
→ Figure: Michael Praetorius' *Syntagma musicum* (1620)  
**Spatially separated choirs singing in alternation**

→ Baroque style:  
separated choirs, broken apart: **cori spezzati**

Compositions from Adrian Willaert, Cipriano de Rore, Gioseffo Zarlino, Claudio Merulo, Giovanni Gabrieli, Andrea Gabrieli, **Claudio Monteverdi**, Heinrich Schütz

Luigi Nono commissioned Renzo Piano to design a musical space for an orchestral piece with soloists and choir - called Prometeo, Tragedia dell'ascolto, or Tragedy for Listening.

Audience at the centre, 80 musicians spread over three tiers of surrounding wooden galleries









# Βιέννη: Musikvereinsaal



Theophil von Hansen, 1813-91, studied in Athens, important: the proportions of the room, many sound-dispersing objects, reverberation time=2 sec., early reflections from all sides, „Schuhschachtelprinzip“