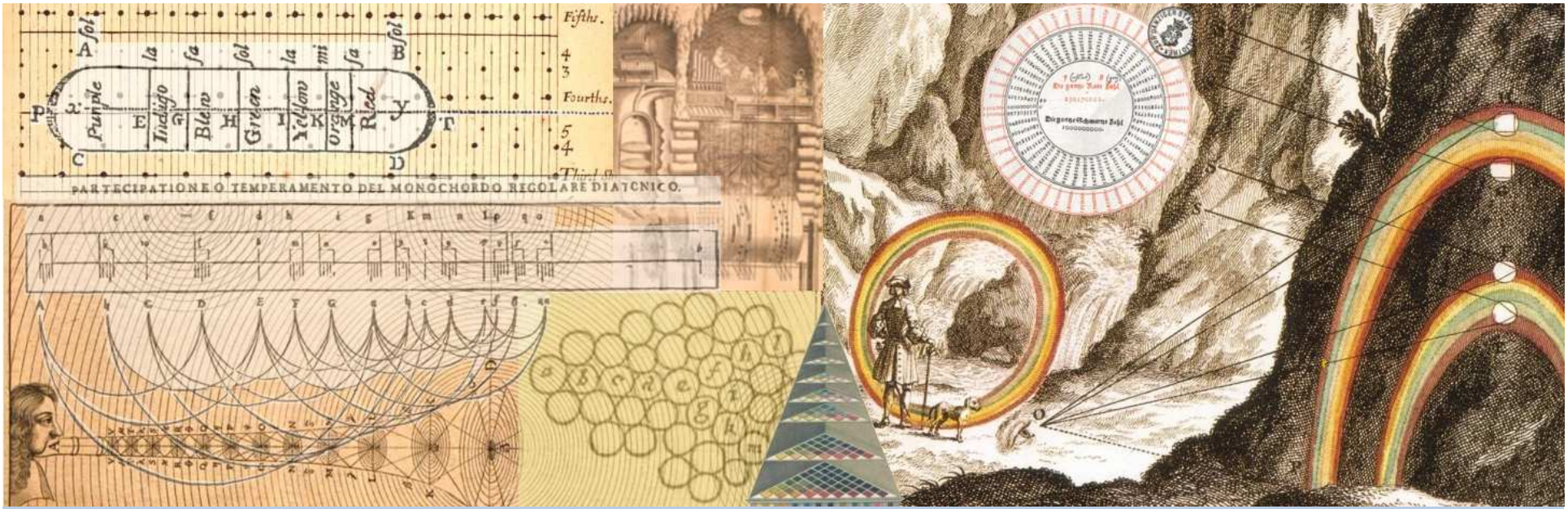


DIAGRAMS in SCIENCE
SCIENCE in DIAGRAMS

BIBLIOTHECA HERTZIANA
MAX-PLANCK-INSTITUT FÜR KUNSTGESCHICHTE

Daniel Muzzulini

ISTITUTO SUPERIORE DI ARTE DI ZURIGO

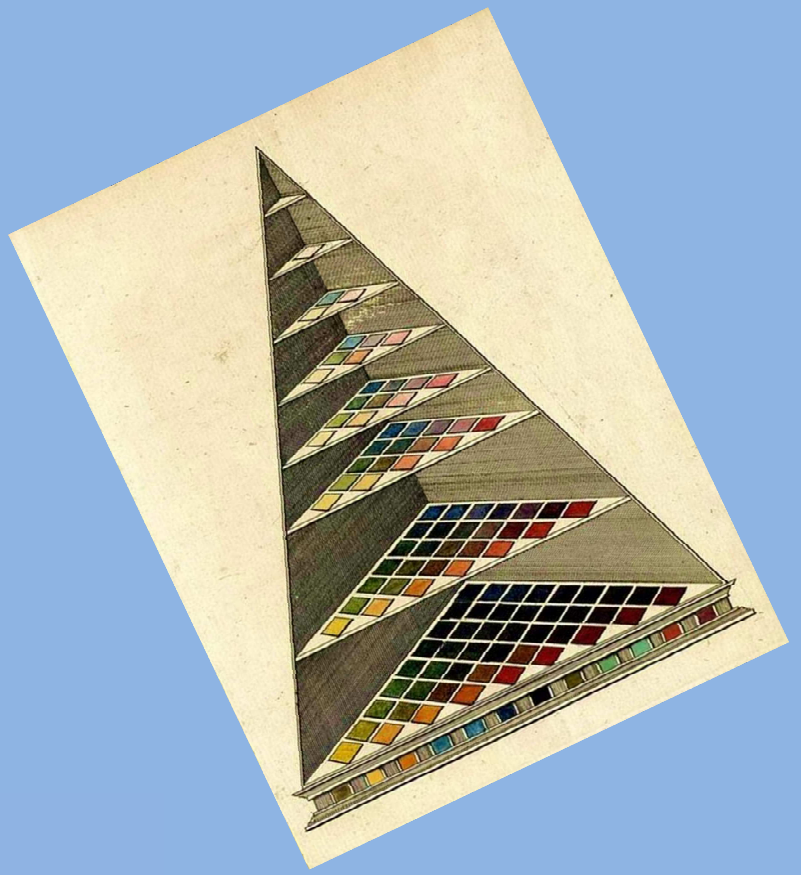
Roma 15 June 2021

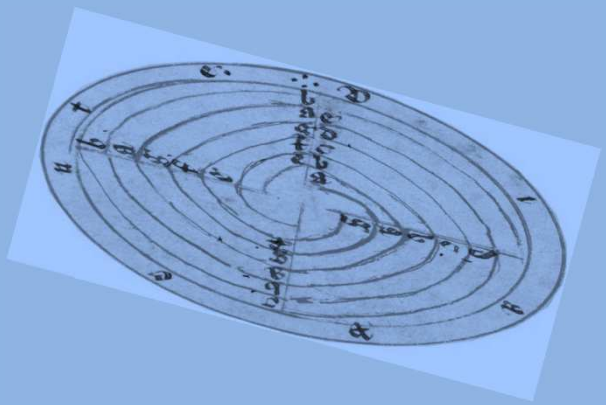
[online]

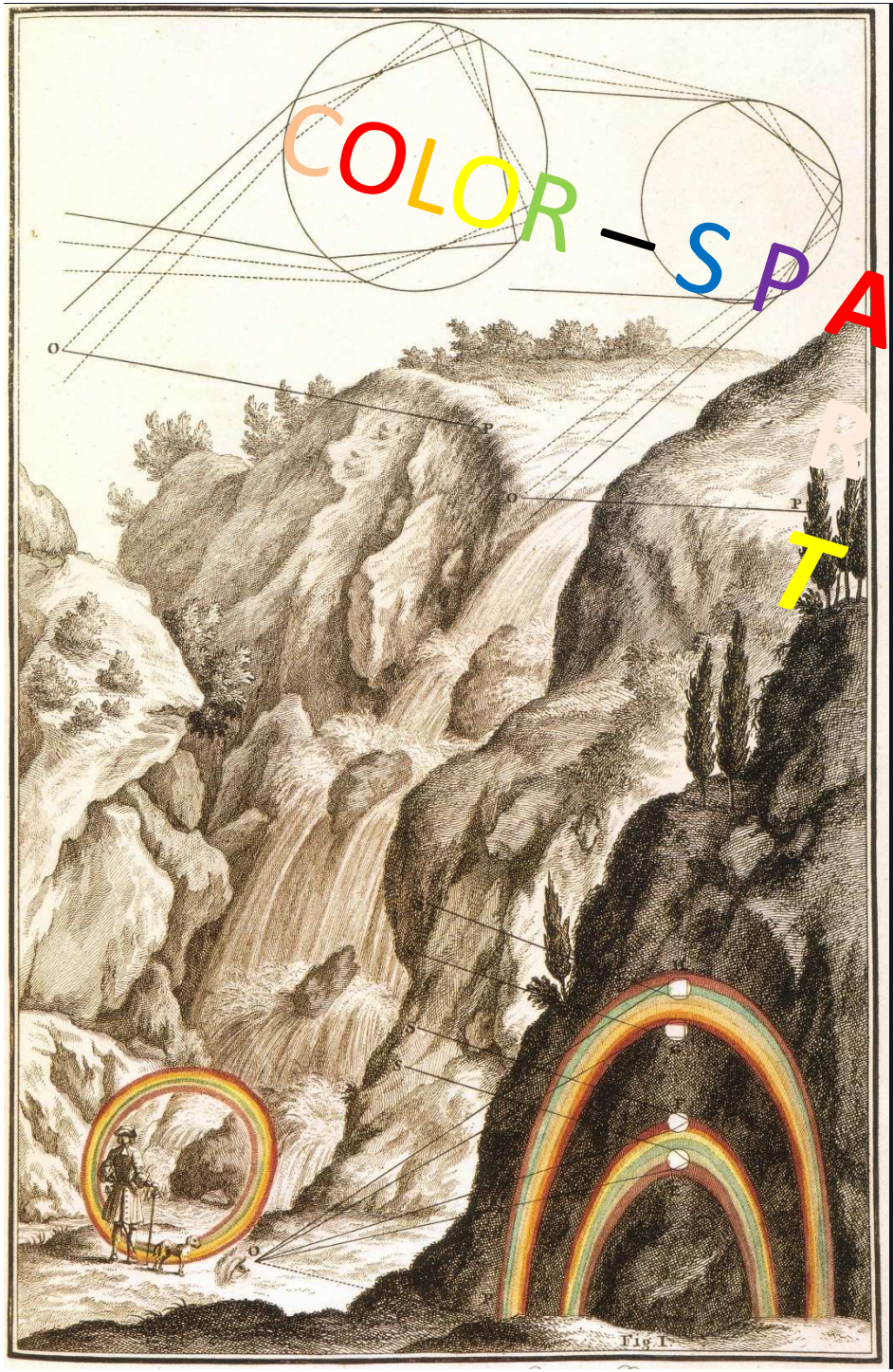
hdk

Zürcher Hochschule der Künste
Zurich University of the Arts

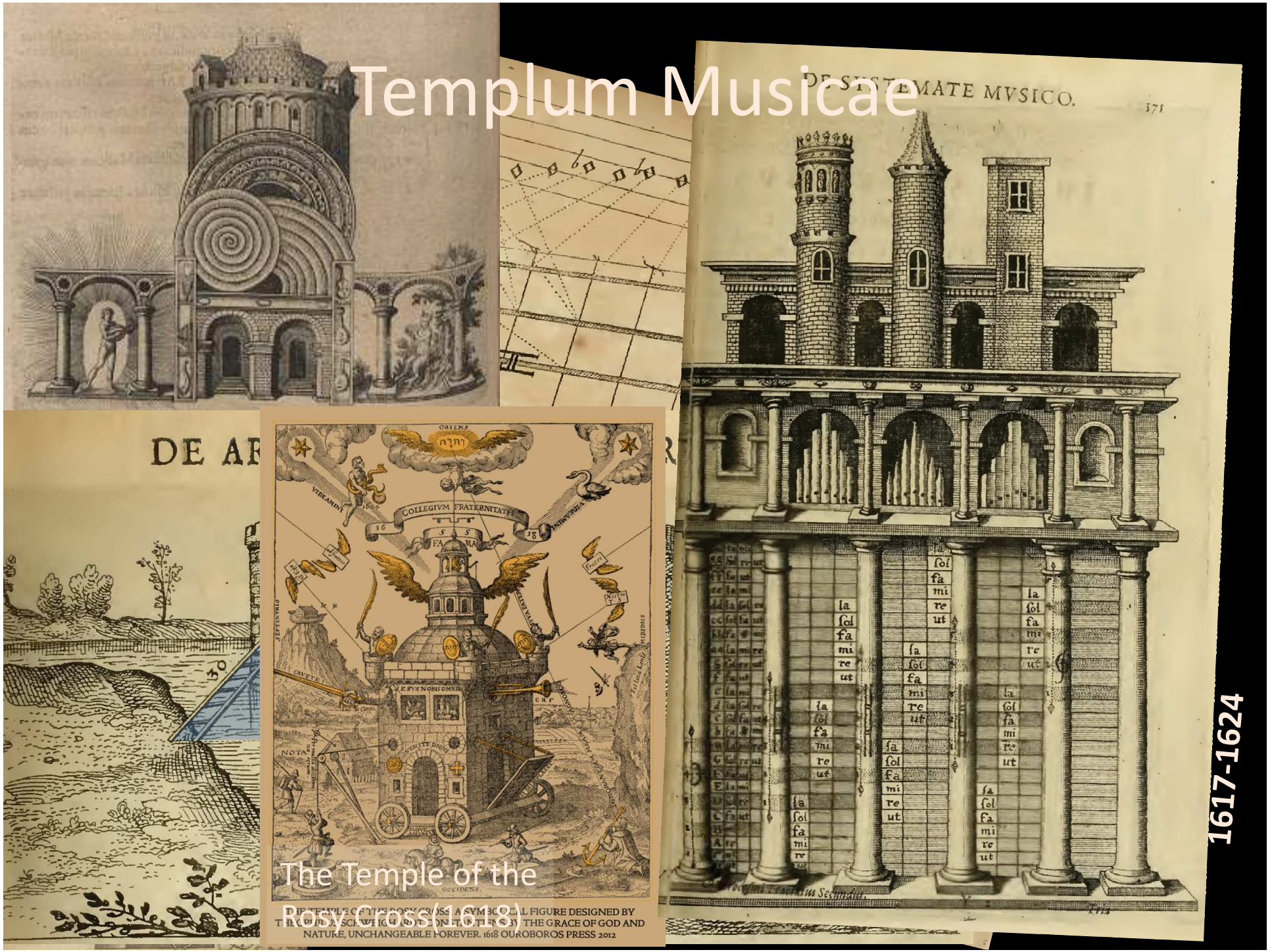
Sound Colour Space



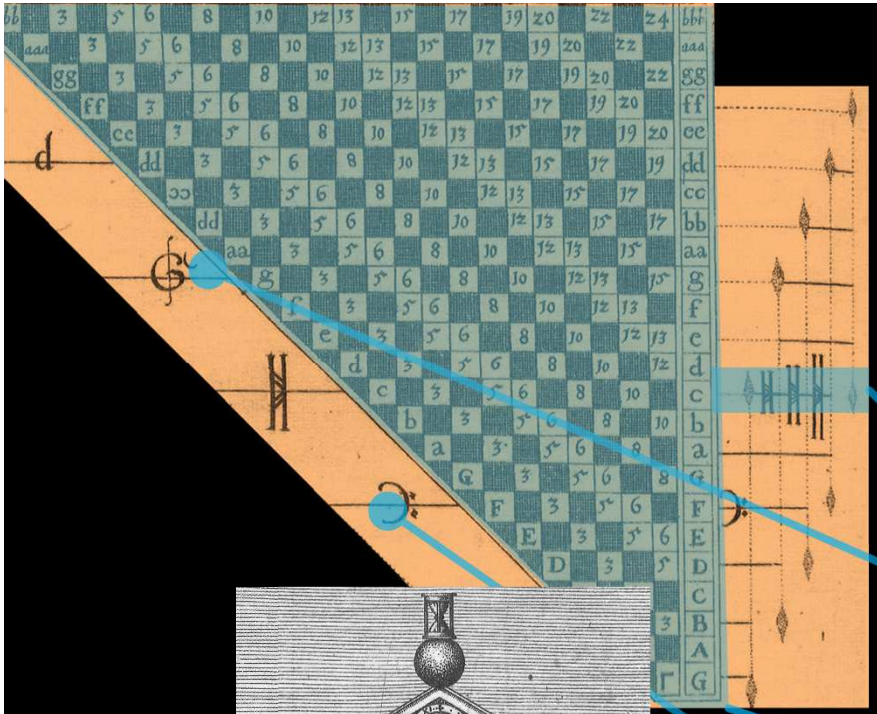


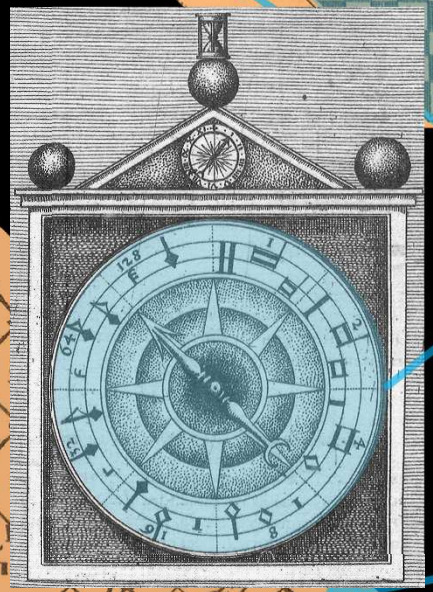

COLOR – SPACE – SOUND
Fig I.

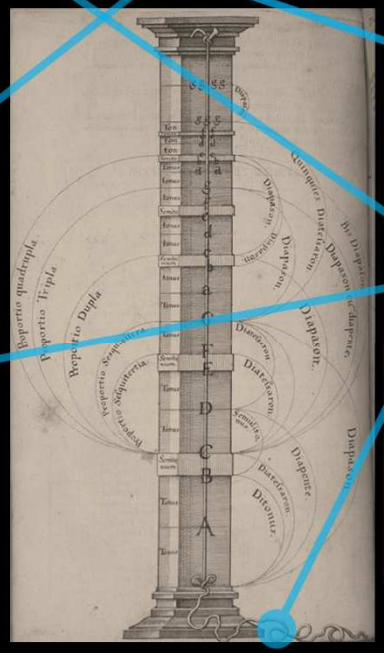
Templum Musicae

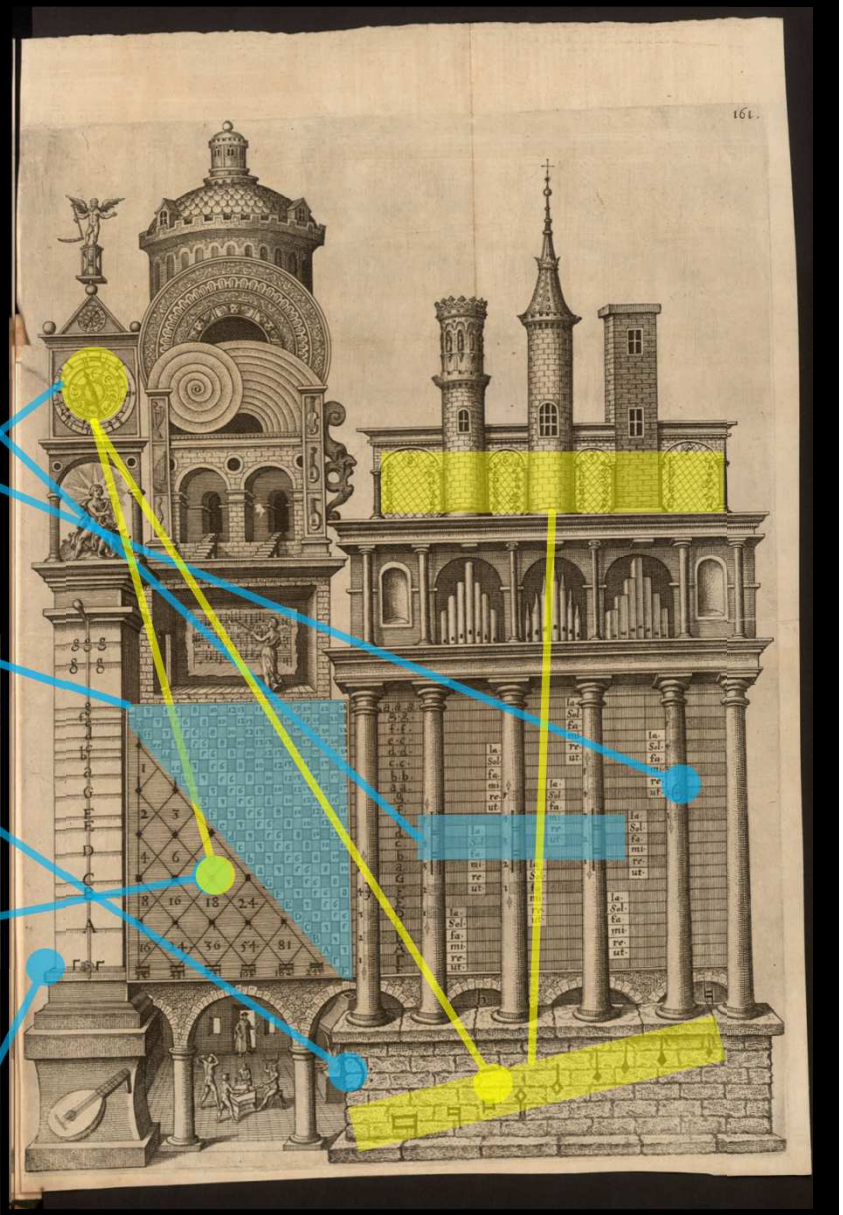


MUSEO VIRTUALE

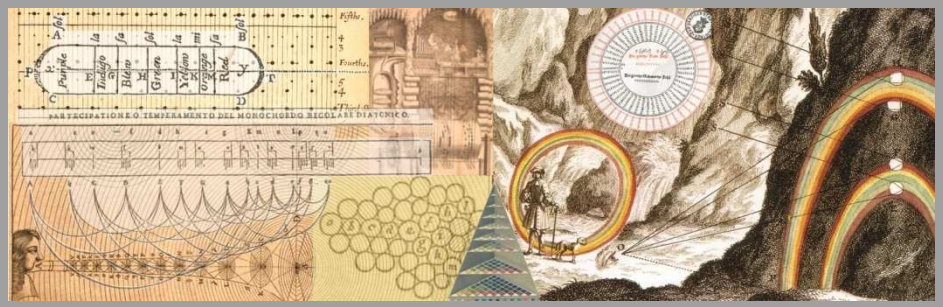








CARTOTECA



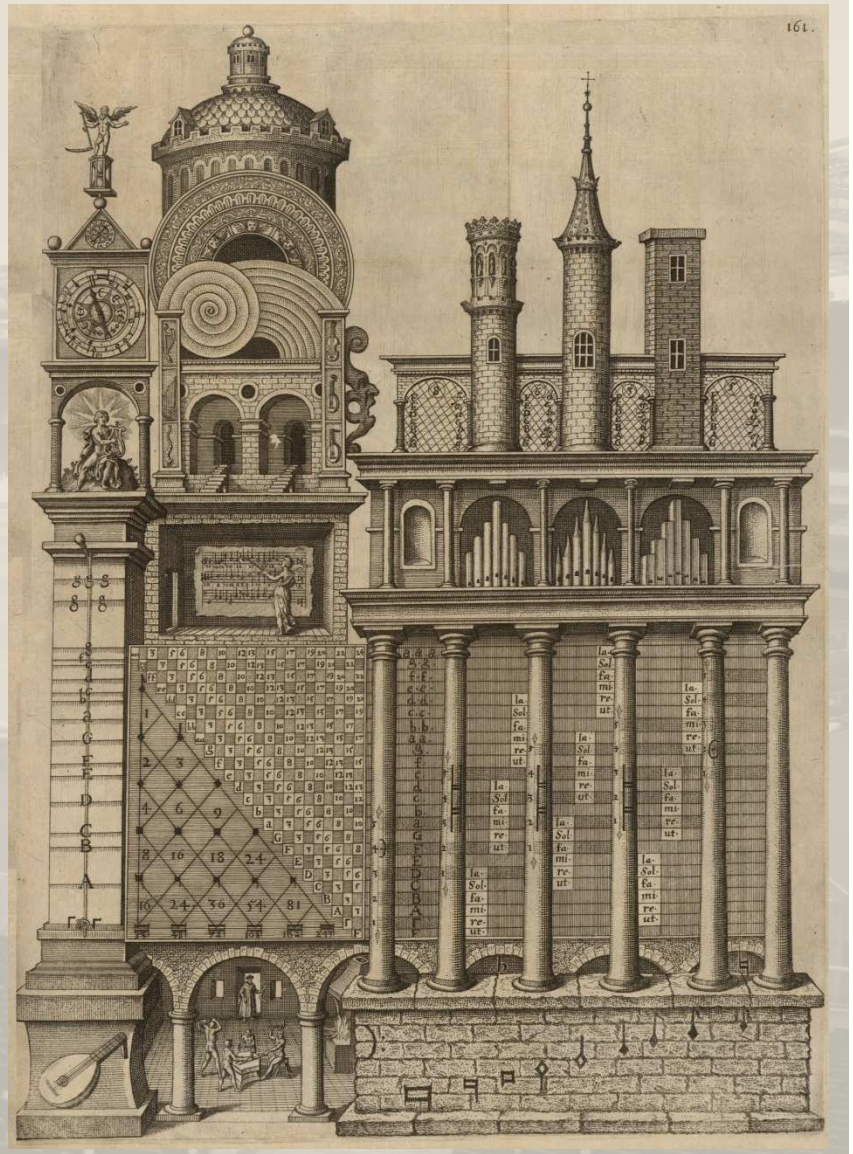
Sound Colour Space
Zurich University of the Arts (ZHdK)
Virtual Museum Project (2015 – 2016)

Martin Neukom – Dieter Mersch (*applicants*)
Daniel Muzzulini (*project management*)

Raimund Vogtenhuber – Philippe Kocher – Christoph Stähli – Lucas Bennett – Jeroen Visser – Susanne Schumacher

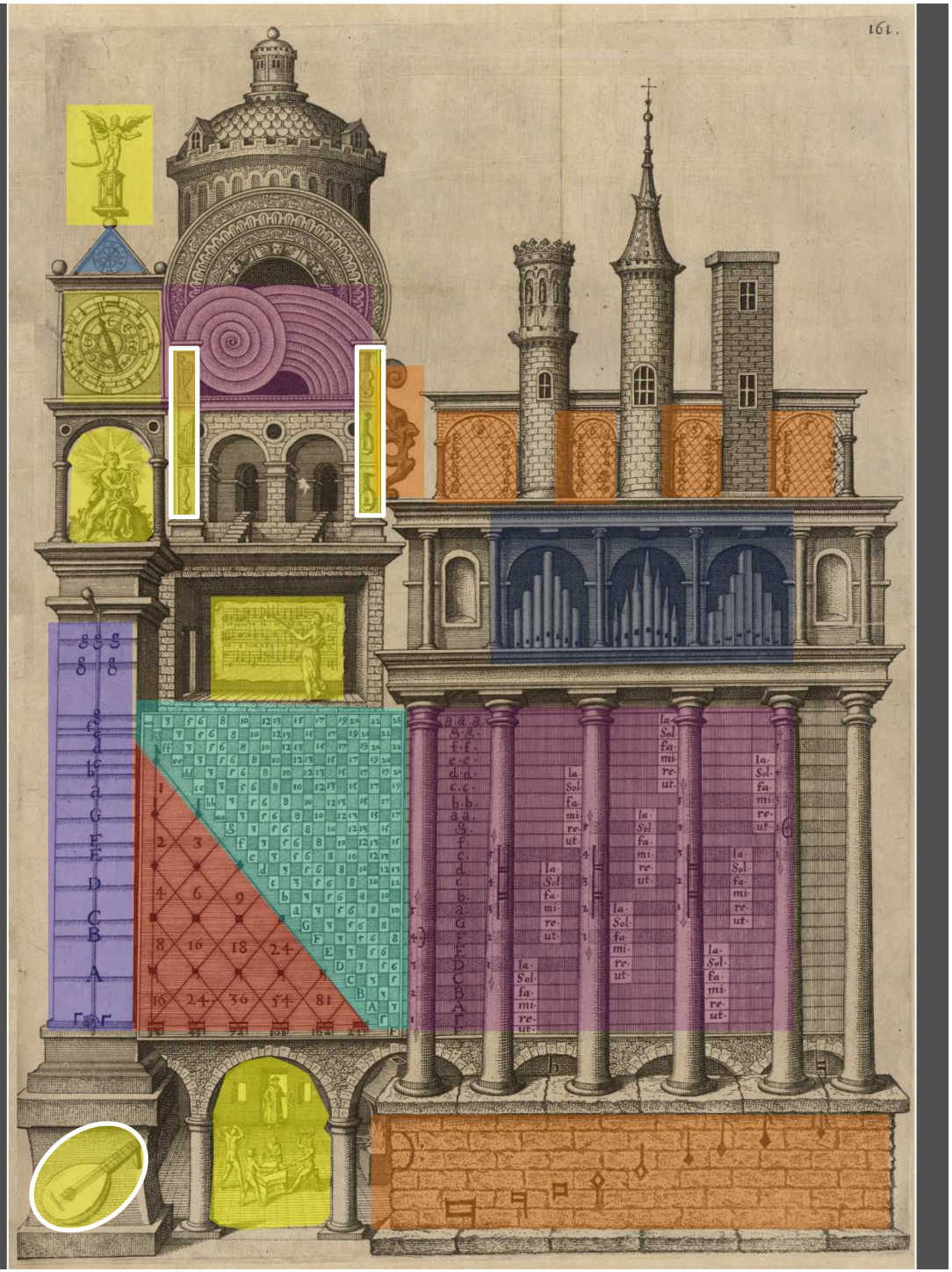
Partners

Christoph Reuter (Wien)
Benjamin Wardhaugh (Oxford)
Sybille Krämer (Berlin)
Gerhard Dirmoser (Linz)
Robert Fludd (Oxford)

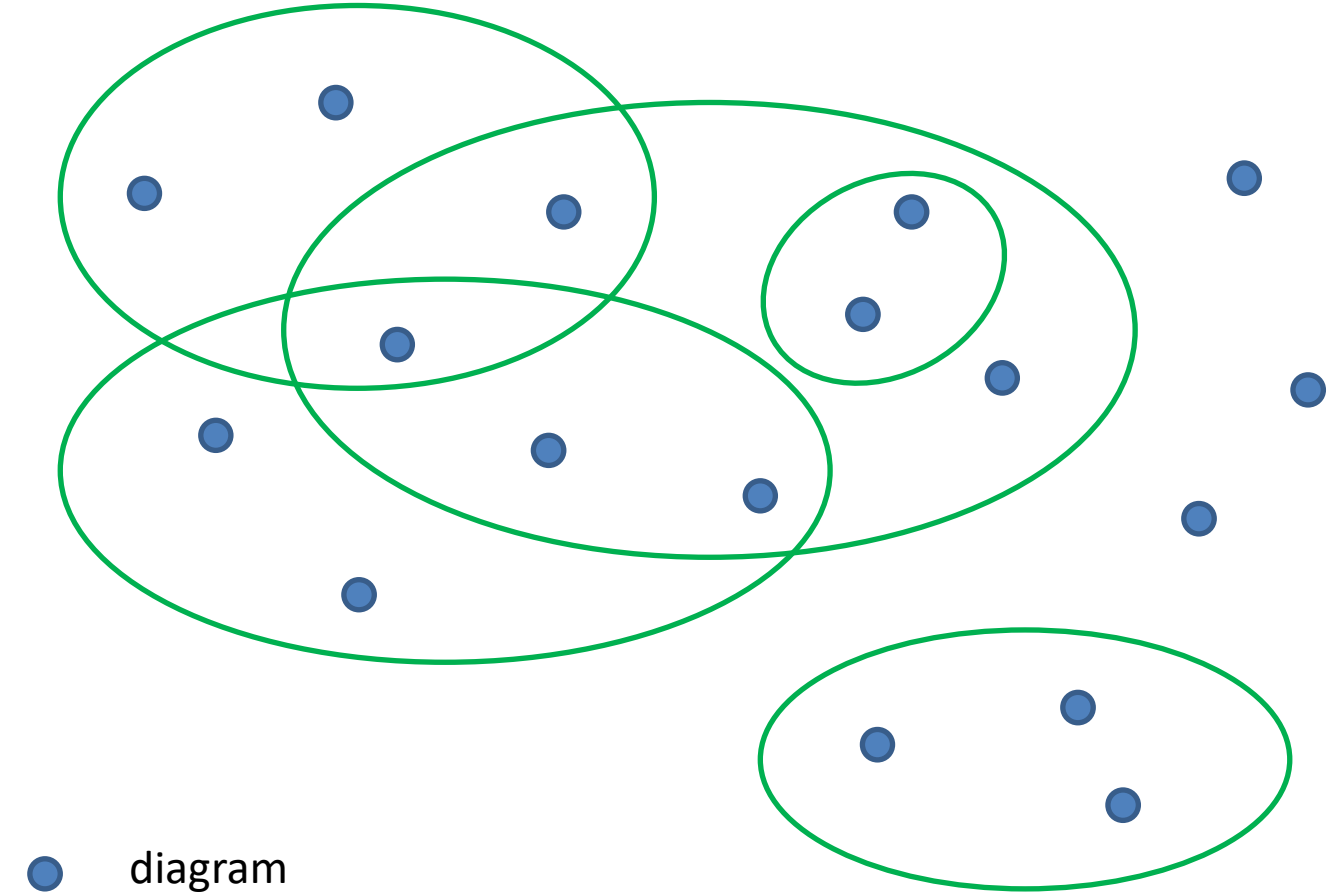


μουσειο
Temple of the Muses

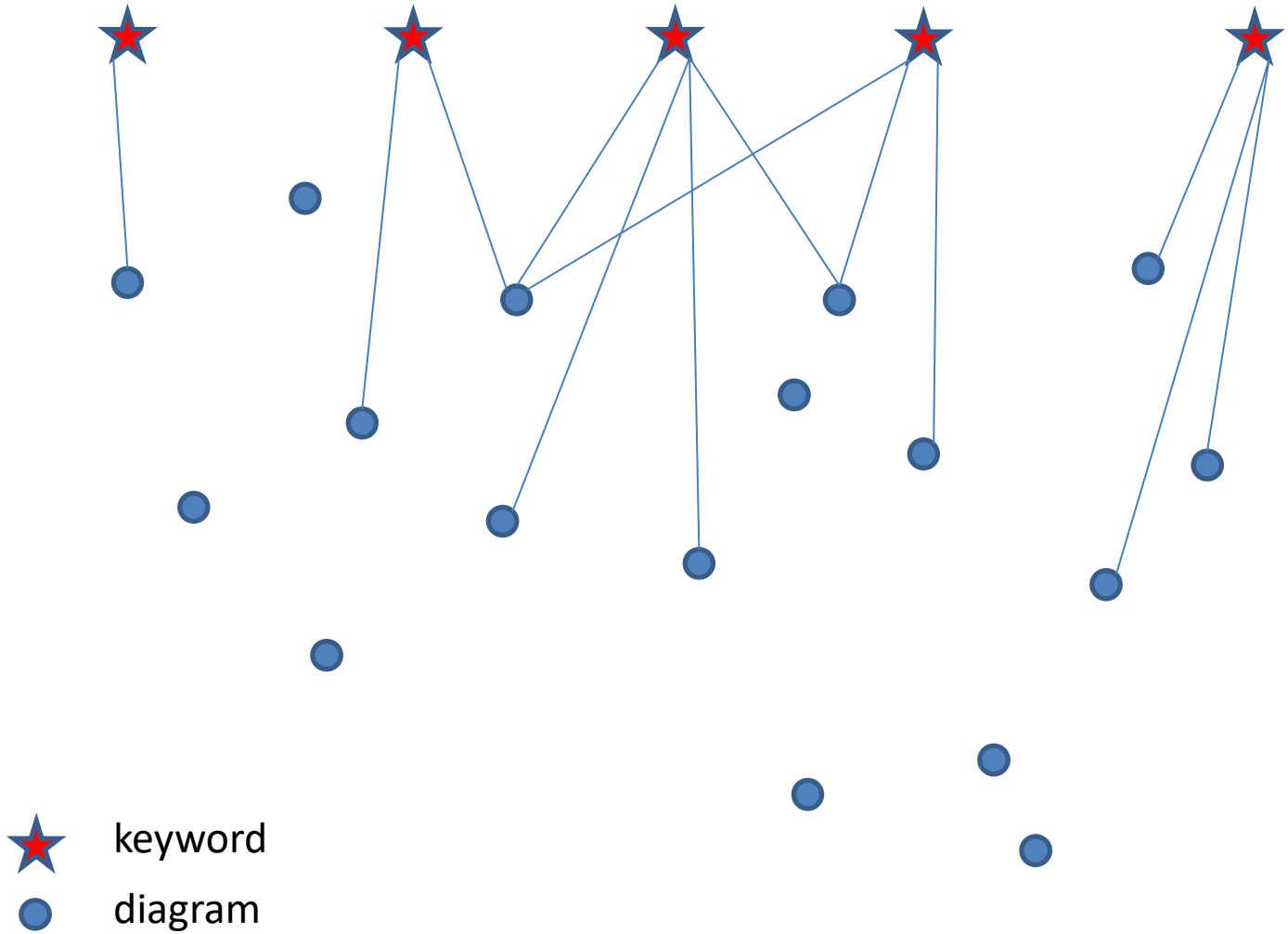
Robertus de Fluctibus (1618)
Templum Musicæ



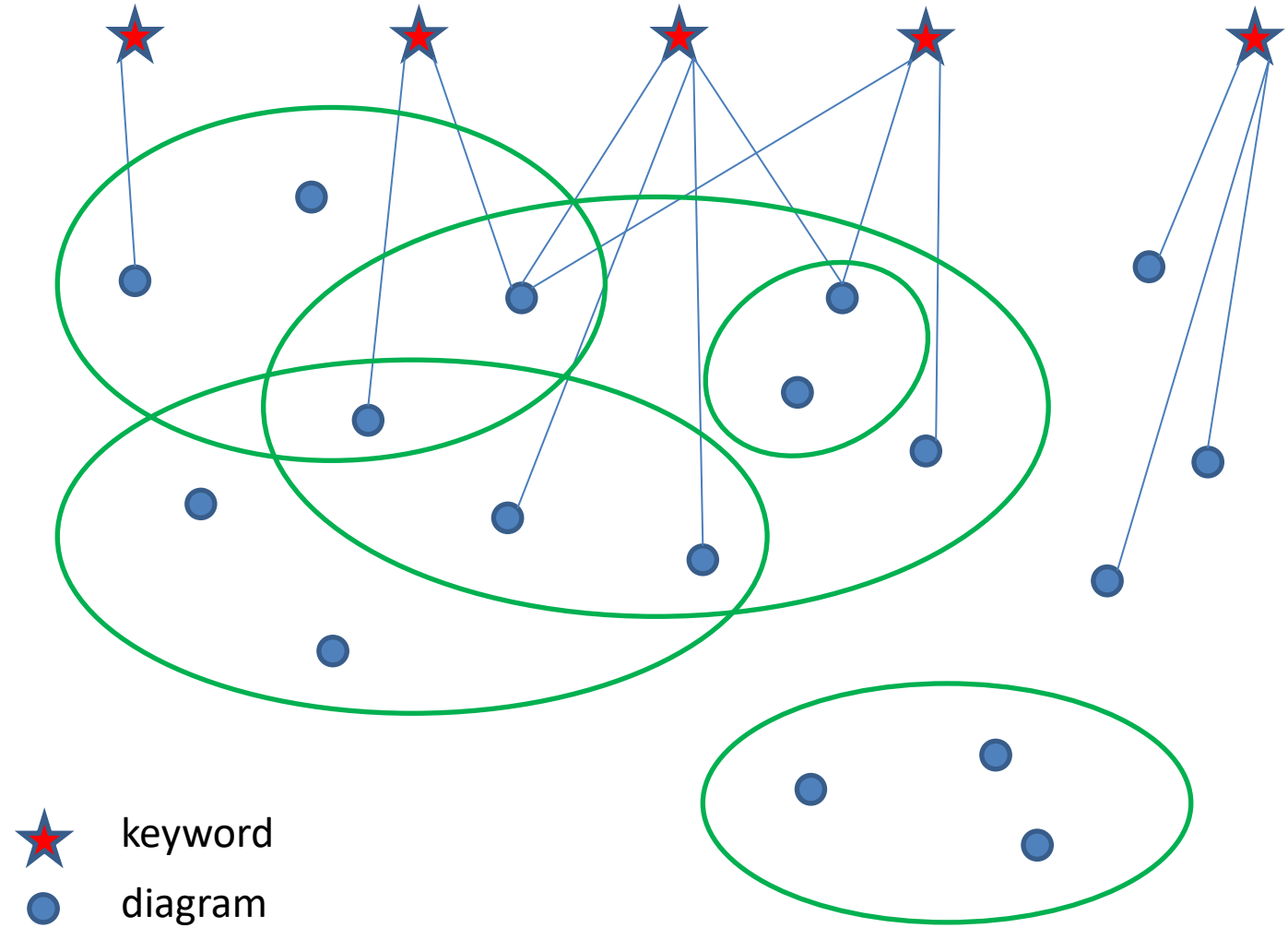
Diagrams and sets



Diagrams and keywords



Diagrams, sets & keywords



Diagrams

Keywords

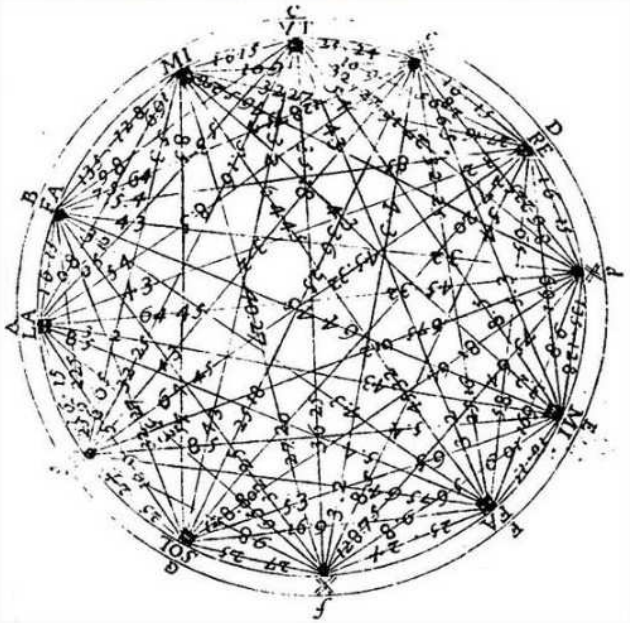
Links to diagrams

Syntonic Chromatic Scale

1636

Marin Mersenne

Tags: circular pitch diagram, kappa-12, syntonic chromatic scale



Syntonic chromatic scale of twelve notes arranged on a circle. The structure of the scale is different from [210]. It has four different semitones:
Chromatic semitones: 25:24 and 135:128
Diatonic semitones: 16:15 and 27:25.
The arrangement of the notes on the circle reflects a logarithmic understanding of pitch. However, the angles are neither equal to 30° (12-tet) nor do they express the four different sizes of the semitones.

The resulting scale is C-C#-D-Eb-E-F-F#-G-G#-A-Bb-B-C. Mersenne uses only sharps as alteration signs. The underlying C-major scale has a flat second degree and is of the form t-T-S-T-t-T-S, so that the solmisation agrees with Descartes's solmisation [316,208,209].
A solmisation syllable is given for both Bb (B-FA) and B (MI).
The diagram is a complete analysis of the scale, where for each pair of notes (except for the semitones) both possible ratios are indicated on the connecting line. For example, B-D (MI-RE) has the ratios 32:27 and 27:16 corresponding to a Pythagorean minor third and a Pythagorean major sixth.
This diagram was probably inspired by a similar diagram for the syntonic diatonic scale by Johannes Lippius (1612) [515]. Mersenne's estimation of the octave as a multiple of the syntonic comma [210] has also its predecessor in Lippius: "Octava comprehendit Commata ultrà quinquaginta" [Lippius 1612, fol. C7r]

Quotation

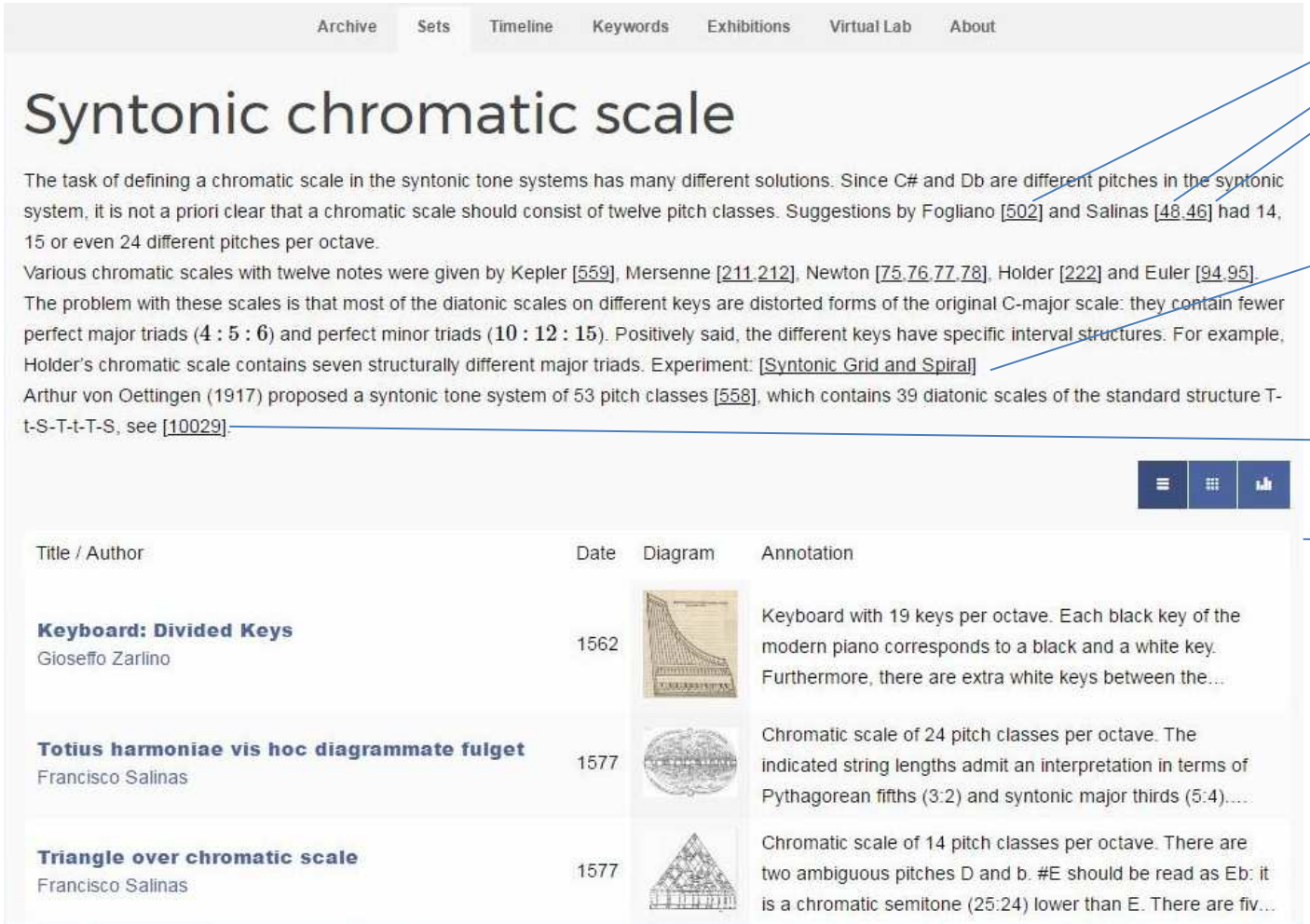
Related sets:
Combinations: kappa-n
Solmization
Syntonic chromatic scale

Set memberships

Source: Mersenne, Marin (1636), Harmonie Universelle, contenant la Theorie et la Pratique de la Musique, Paris 1636, Traitez des Consonances, des Dissonances, des Genres, des Modes & de la Composition, Livre Second, Des Dissonances, p.132

http://sound-colour-space.zhdk.ch/diagrams/212

Sets



Links to diagrams

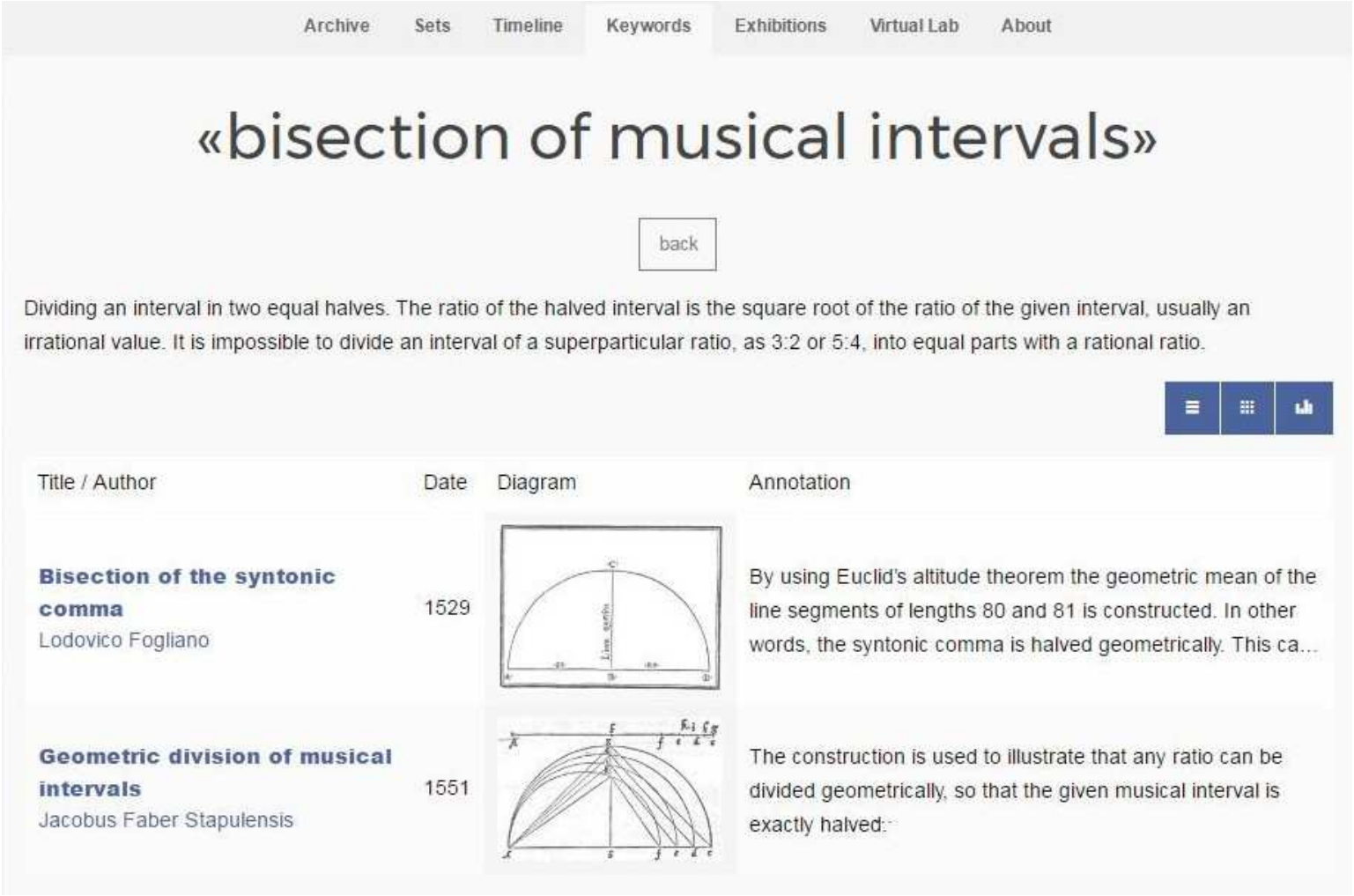
Link to experiment

Link to set

Elements of the set: diagrams

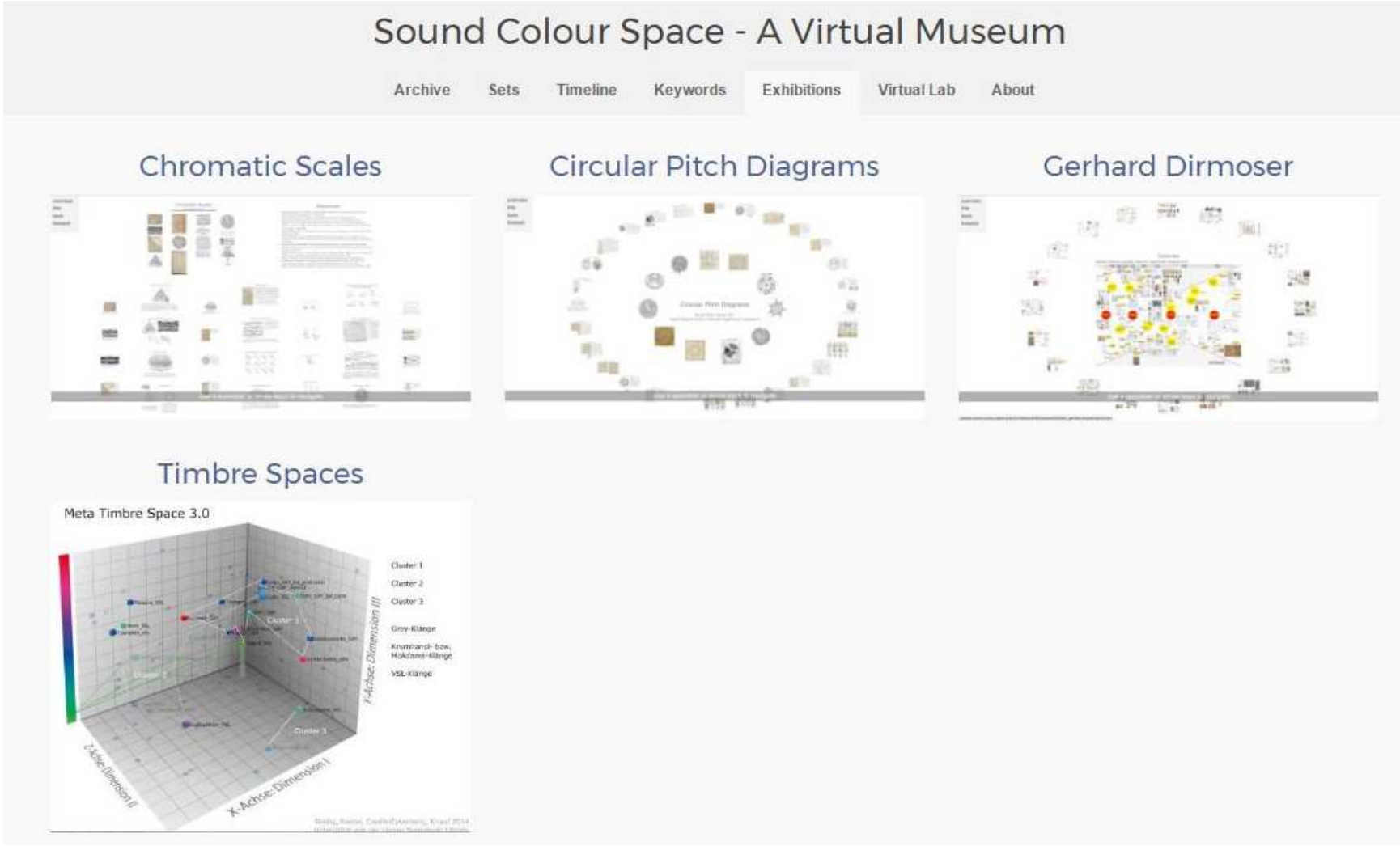
http://sound-colour-space.zhdk.ch/sets/10027

Keywords



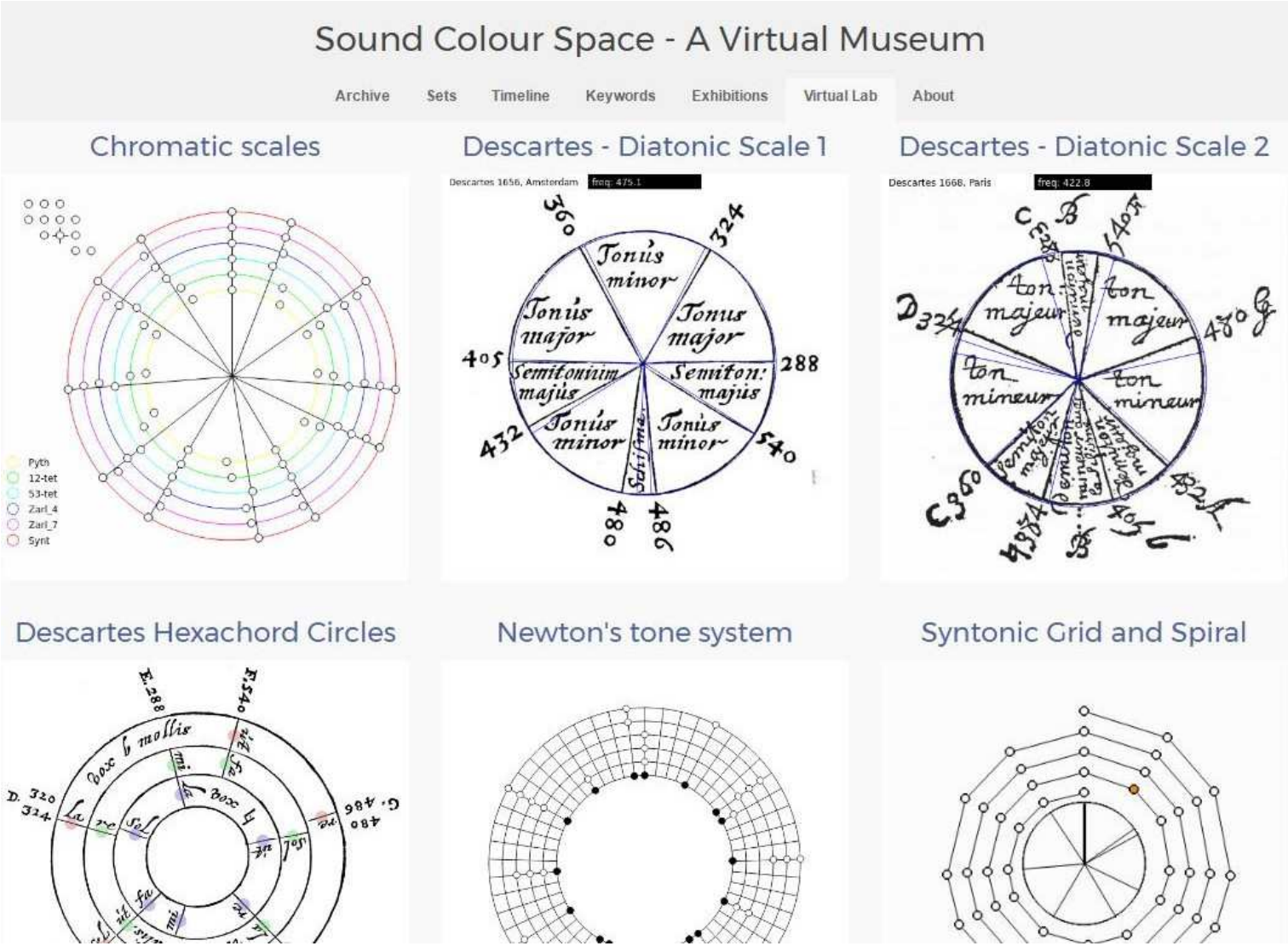
http://sound-colour-space.zhdk.ch/keywords/bisection-of-musical-intervals

Exhibitions



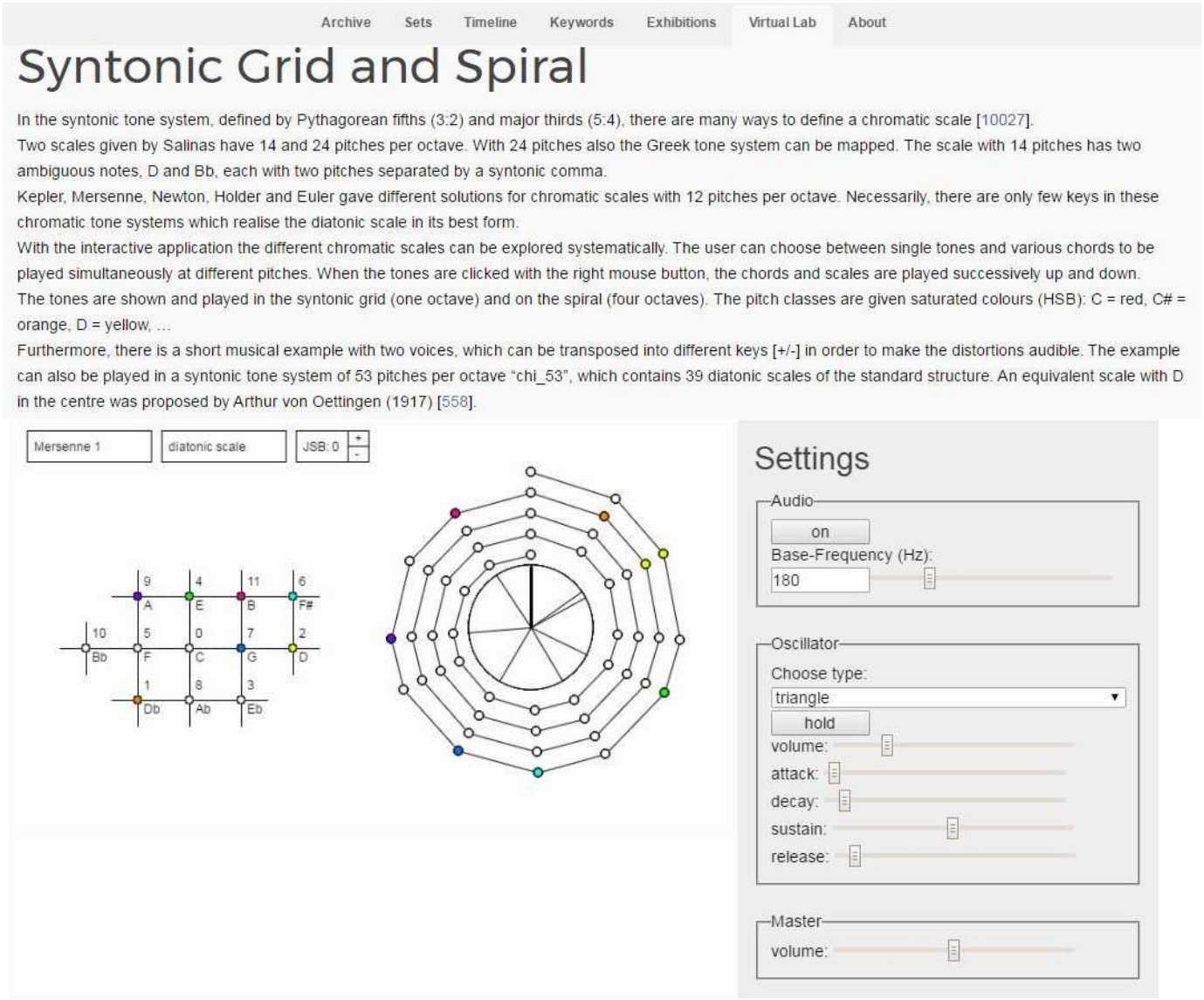
http://sound-colour-space.zhdk.ch/exhibitions

Experiments

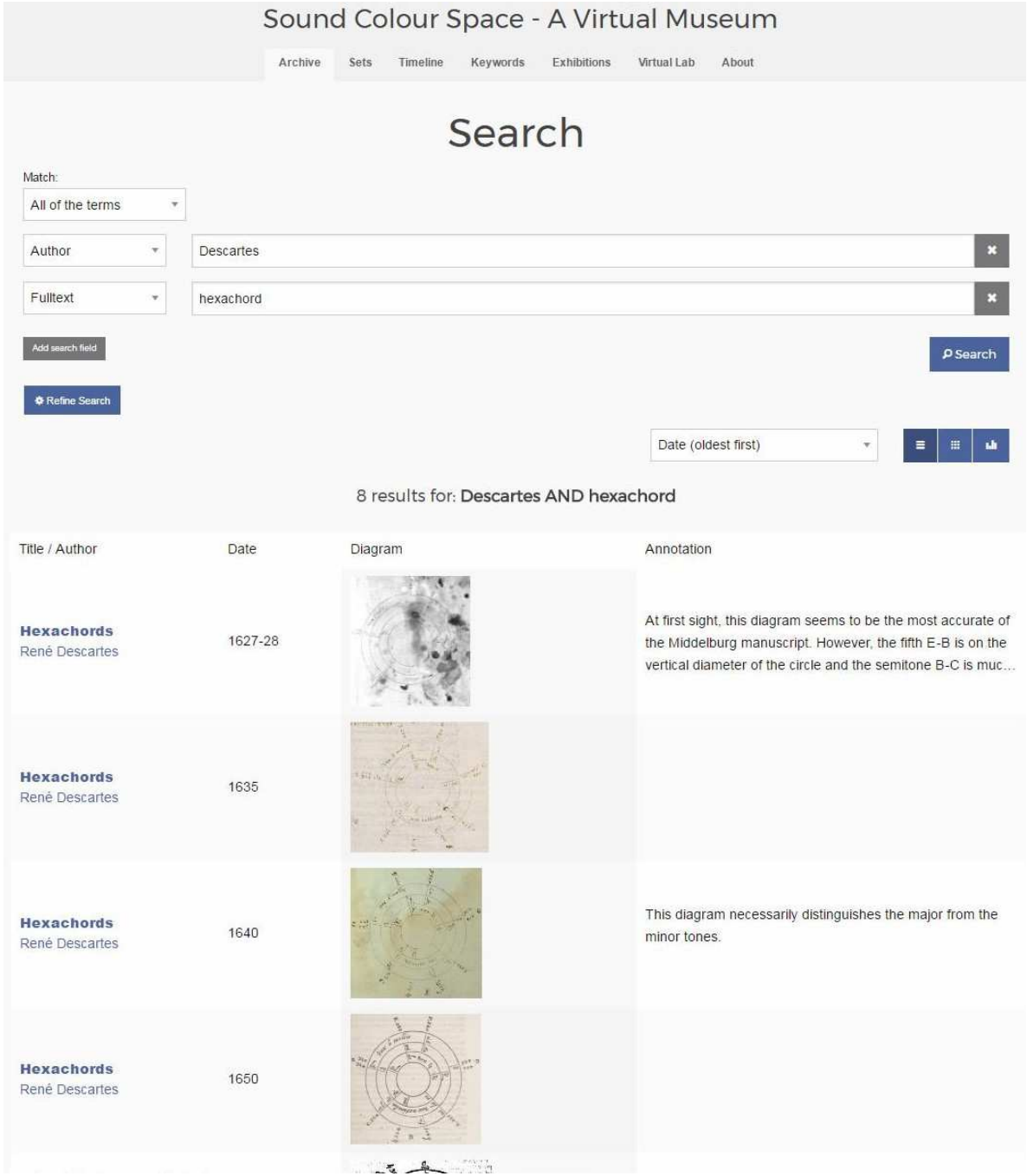


http://sound-colour-space.zhdk.ch/virtuallab

Experiment: Syntonic Grid and Spiral

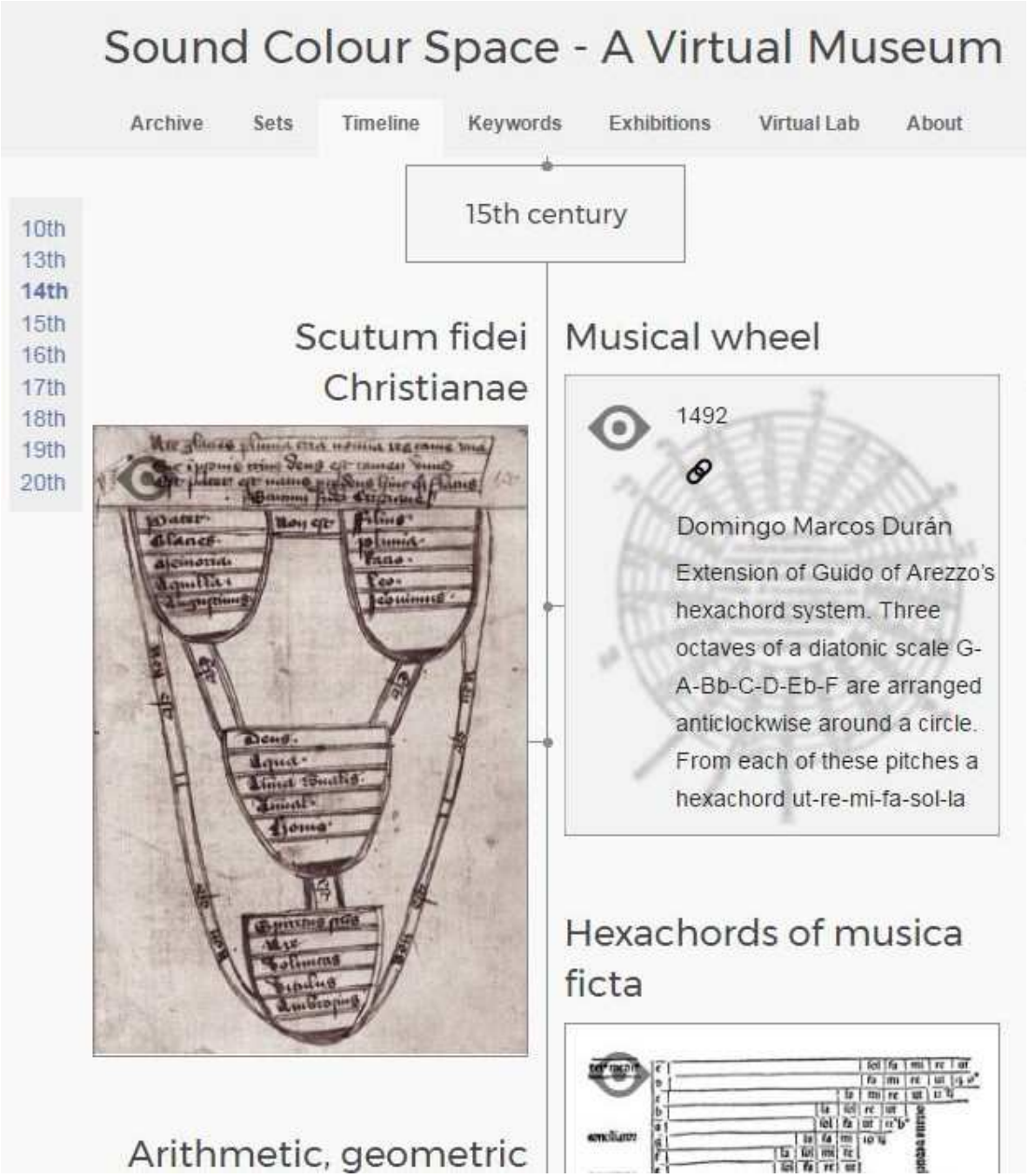


Archive



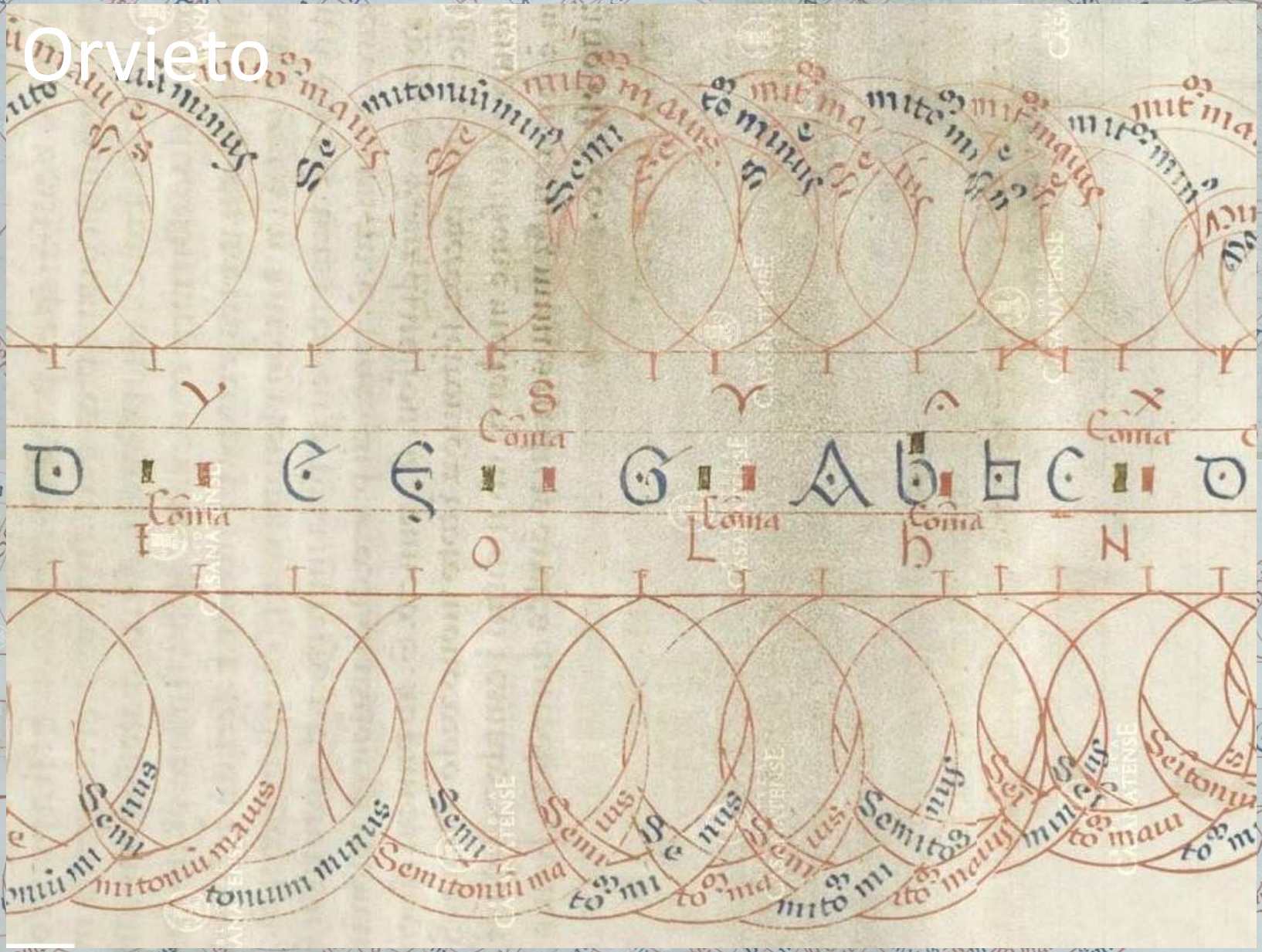
http://sound-colour-space.zhdk.ch/archive

Timeline



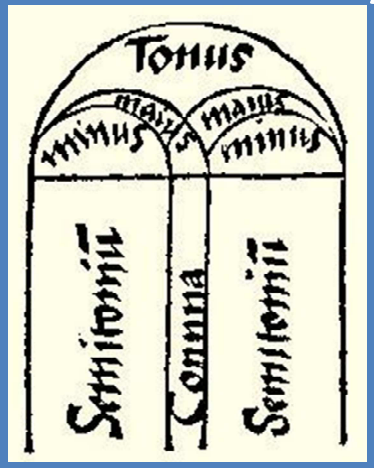
http://sound-colour-space.zhdk.ch/timeline

Ugolino di Orvieto



Sistema enarmonica pitagorico divisione symmetrico del tuono

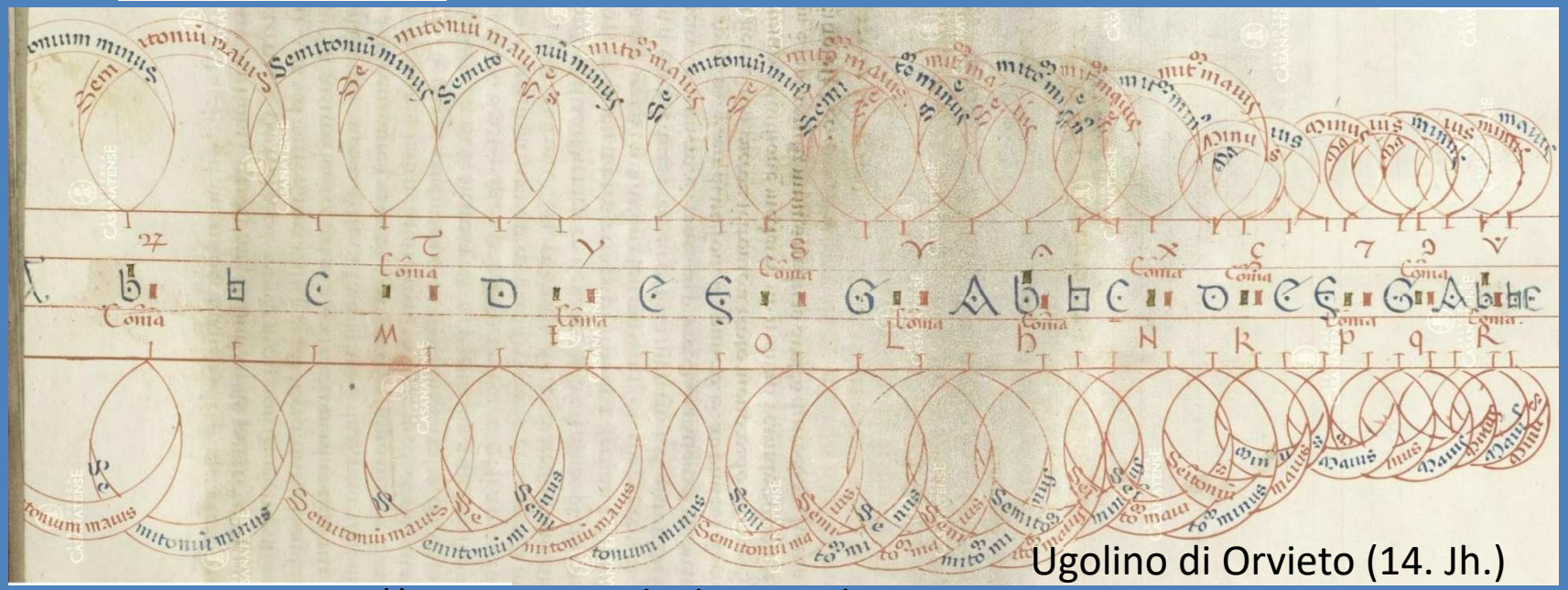
Cochlaeus (1512)



Tonus =
2 semituoni minori
+ 1 comma pitagorico

Ottava =
5 Tuoni + 2 semituoni =
12 semituoni **+ 5 commata**

17 cromata pitagorici *)

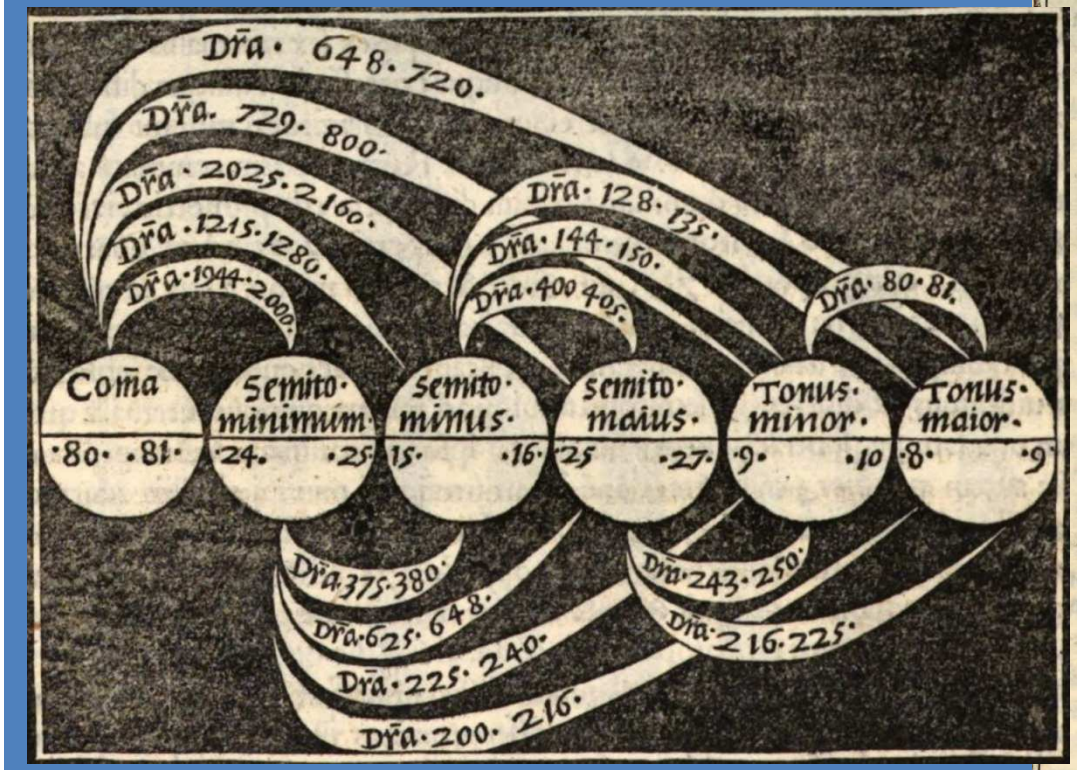


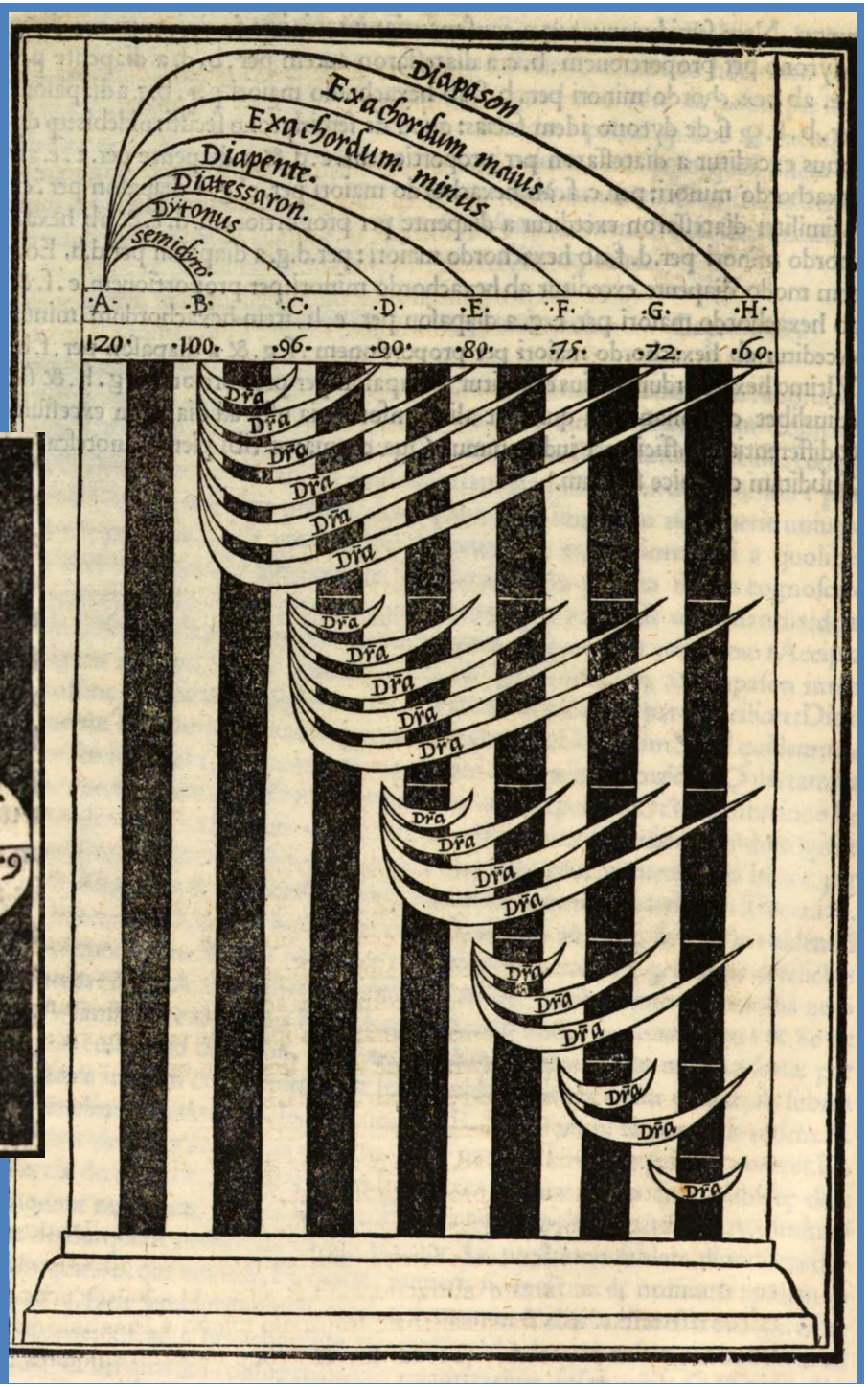
Ugolino di Orvieto (14. Jh.)

*) croma = pitch class mod octave

Lodovico Fogliano (1529)

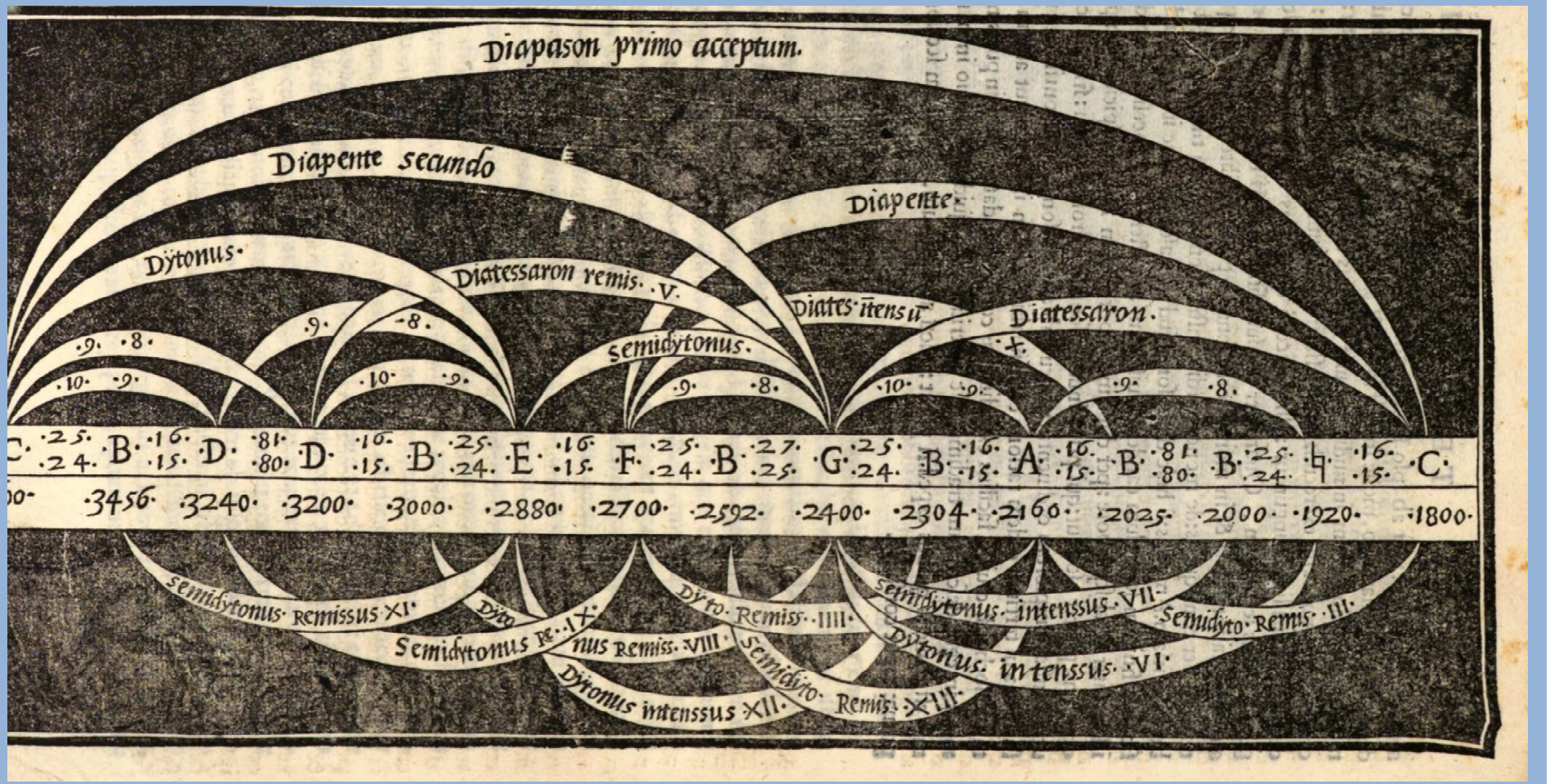
just intonation: complete graphs



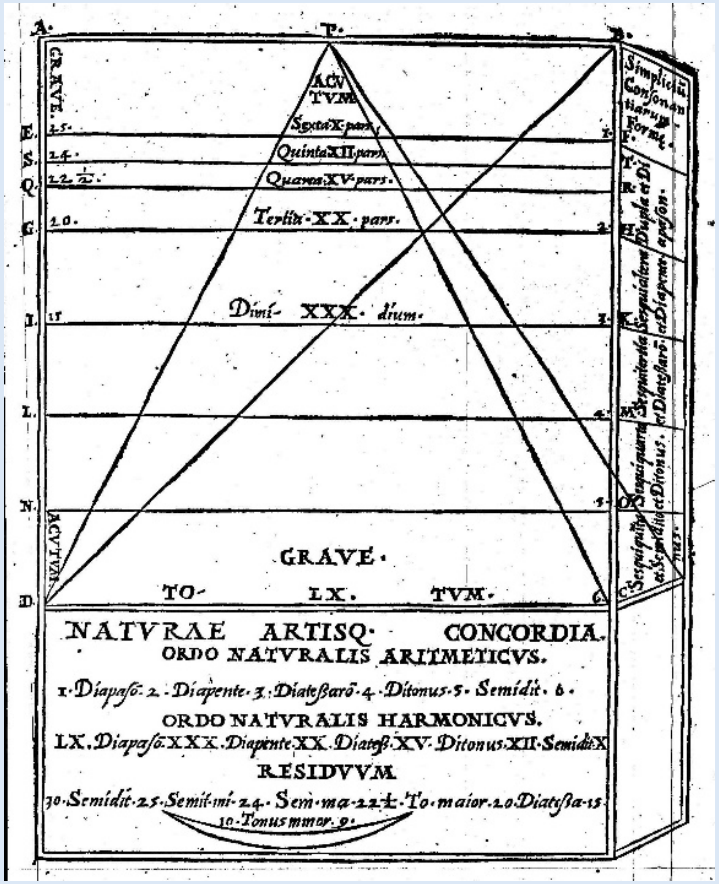


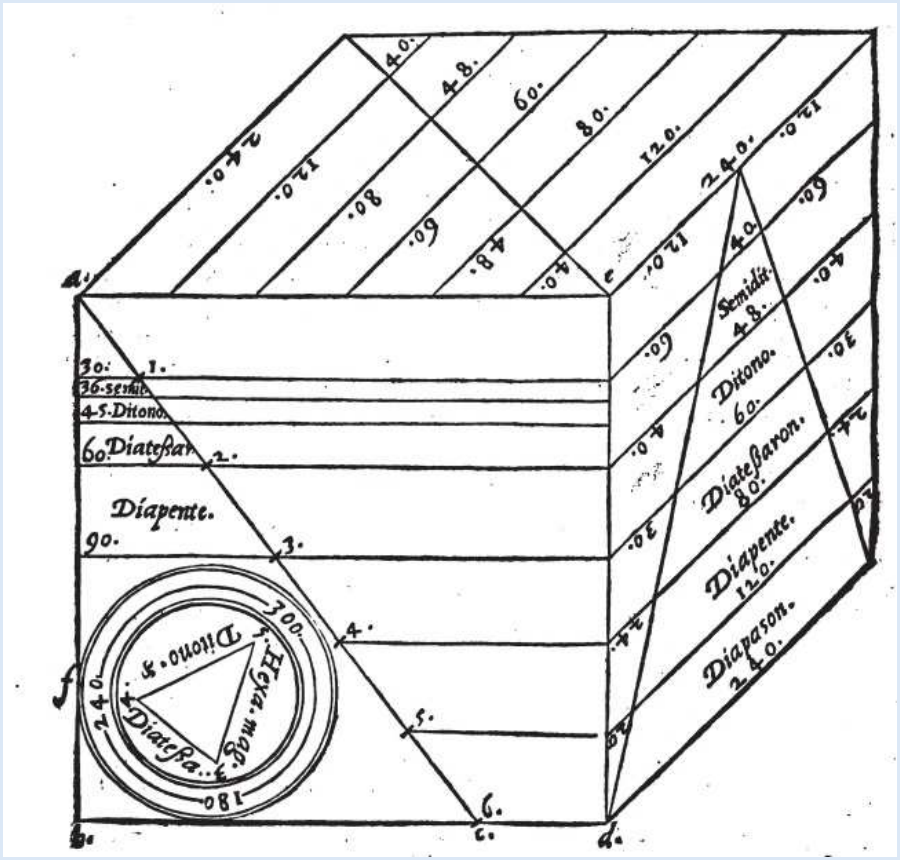
Lodovico Fogliano (1529)

Monochordi in puris numeris rationi tantum subjecta Divisio

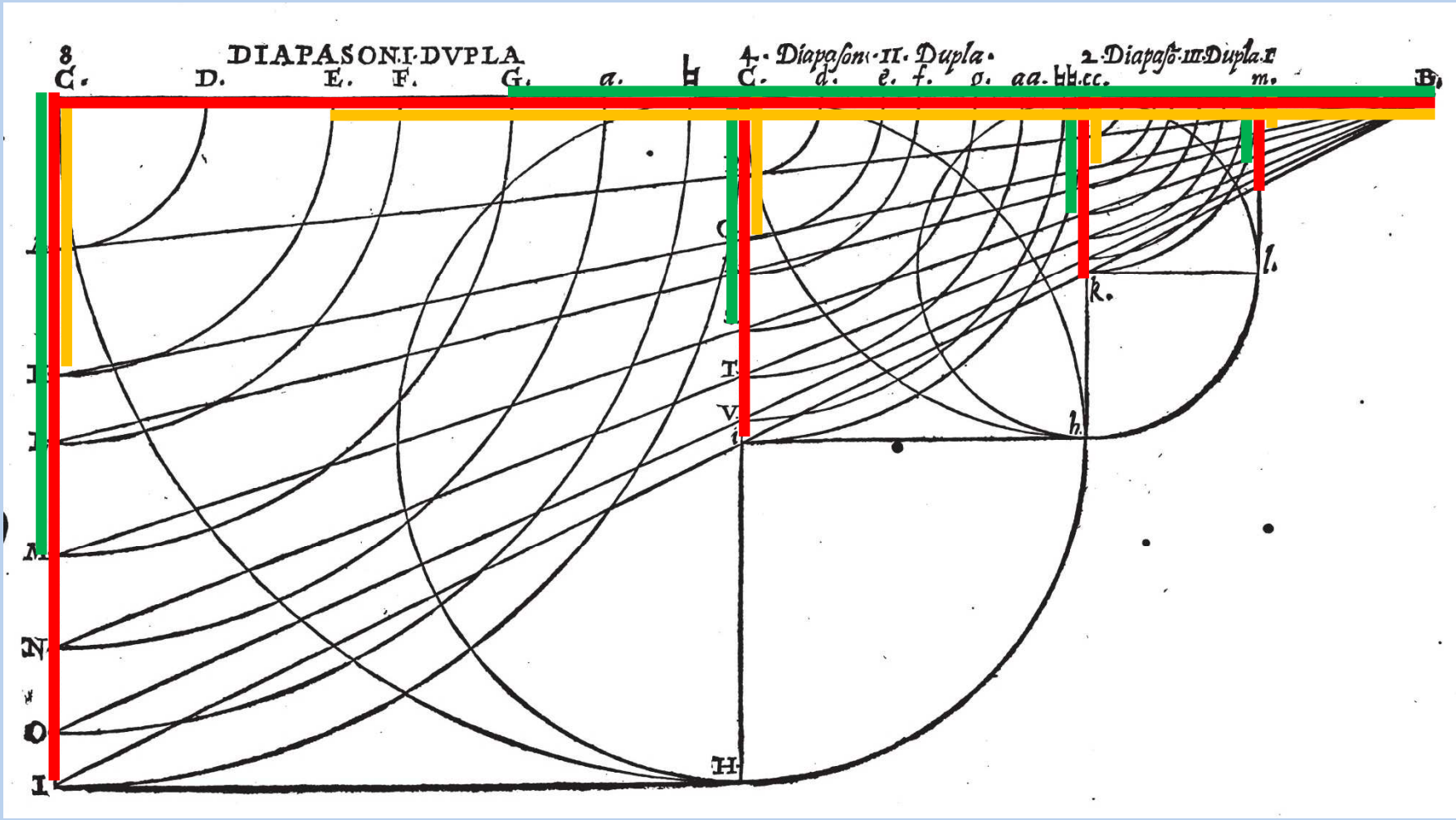


Gioseffo Zarlino: Heliconae

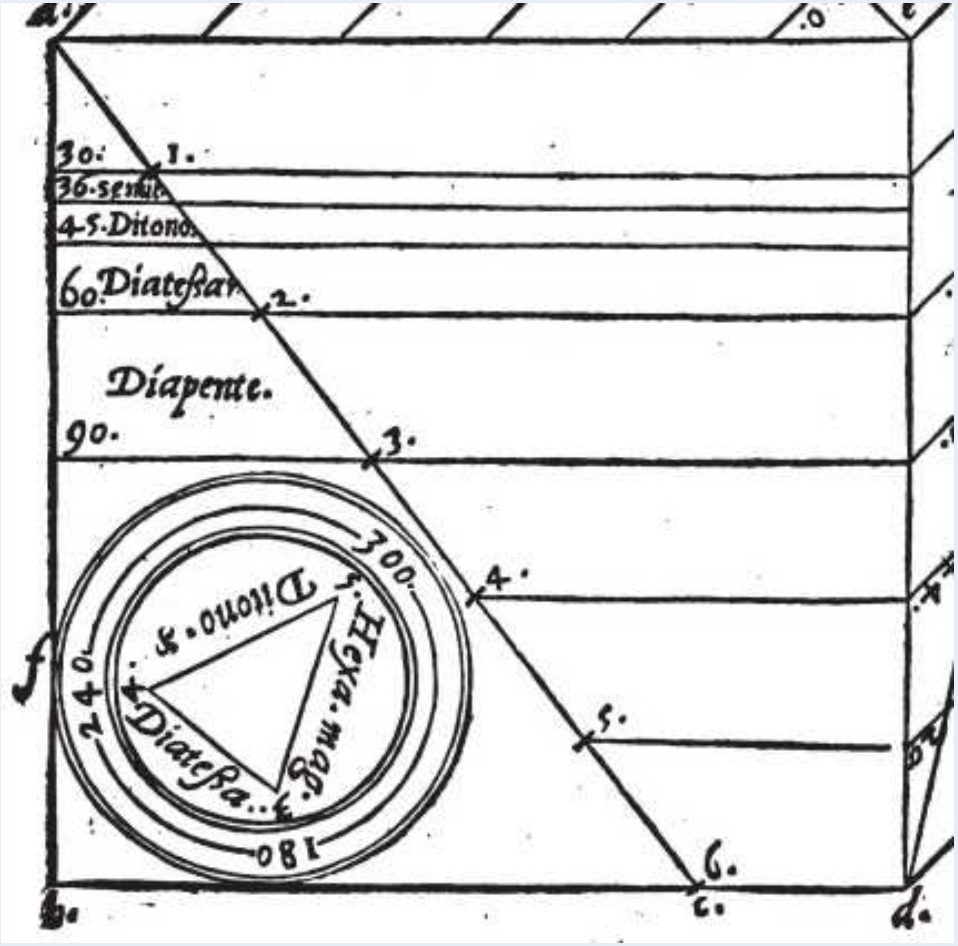




Croma: Monochord e Polychord



Zarlino interattivo (2020)

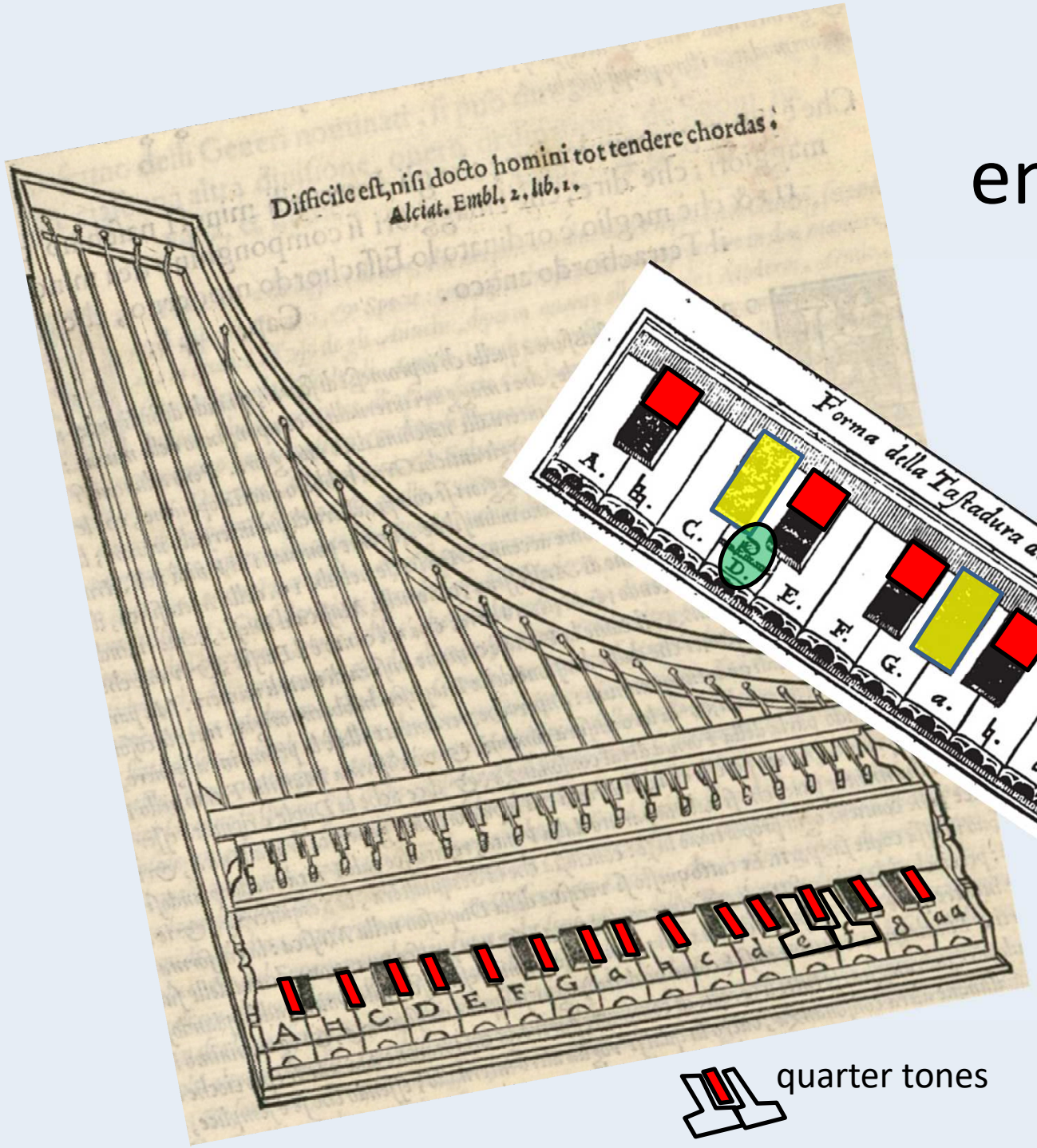


[Zarlino: Helicona/Volvelle: synthetic](#)
Daniel Muzzulini (2019)

[Zarlino: Helicona/Volvelle: analog](#)
Daniel Muzzulini (2020)

https://muwiserver.synology.me/zarlino/
Christoph Reuter 2020. Polyphonic Clavichord with19 just intonation pitches per octave (approximated through 53-EDO)

Tastiere enarmoniche di Zarlino

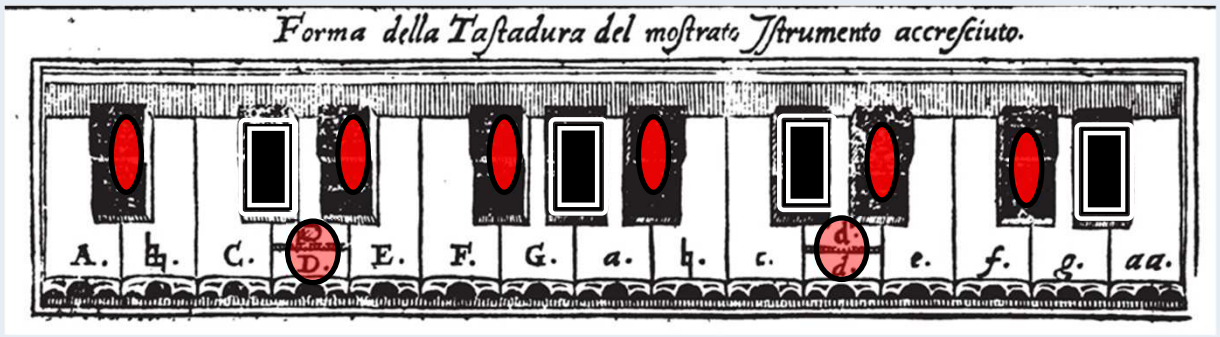


syntonic commas

quarter tones

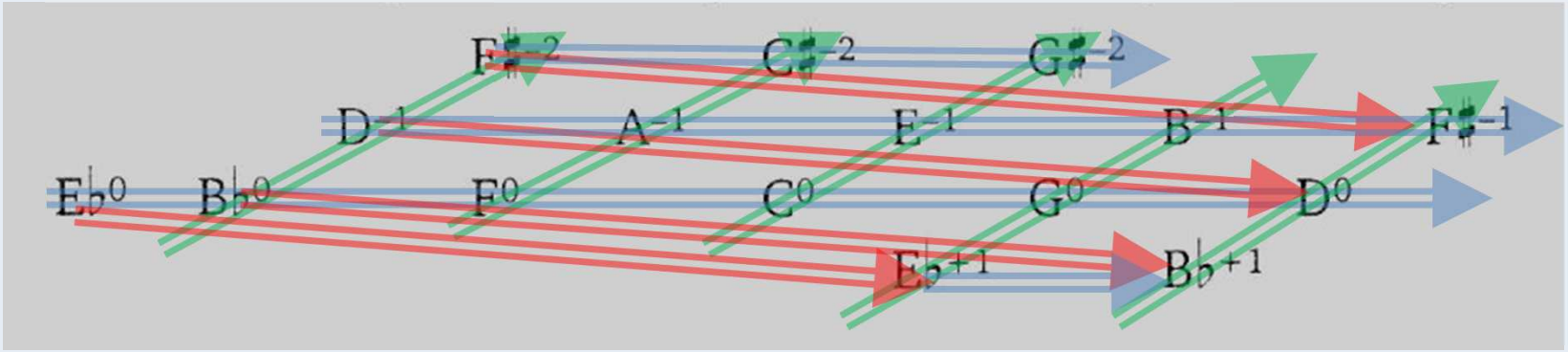
enharmonic changes

Tastiera con 16 suoni sintonici per ottava

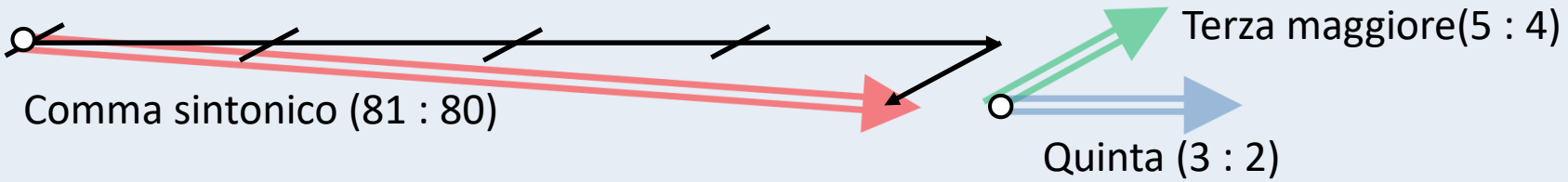


comma sintonico (81:80)

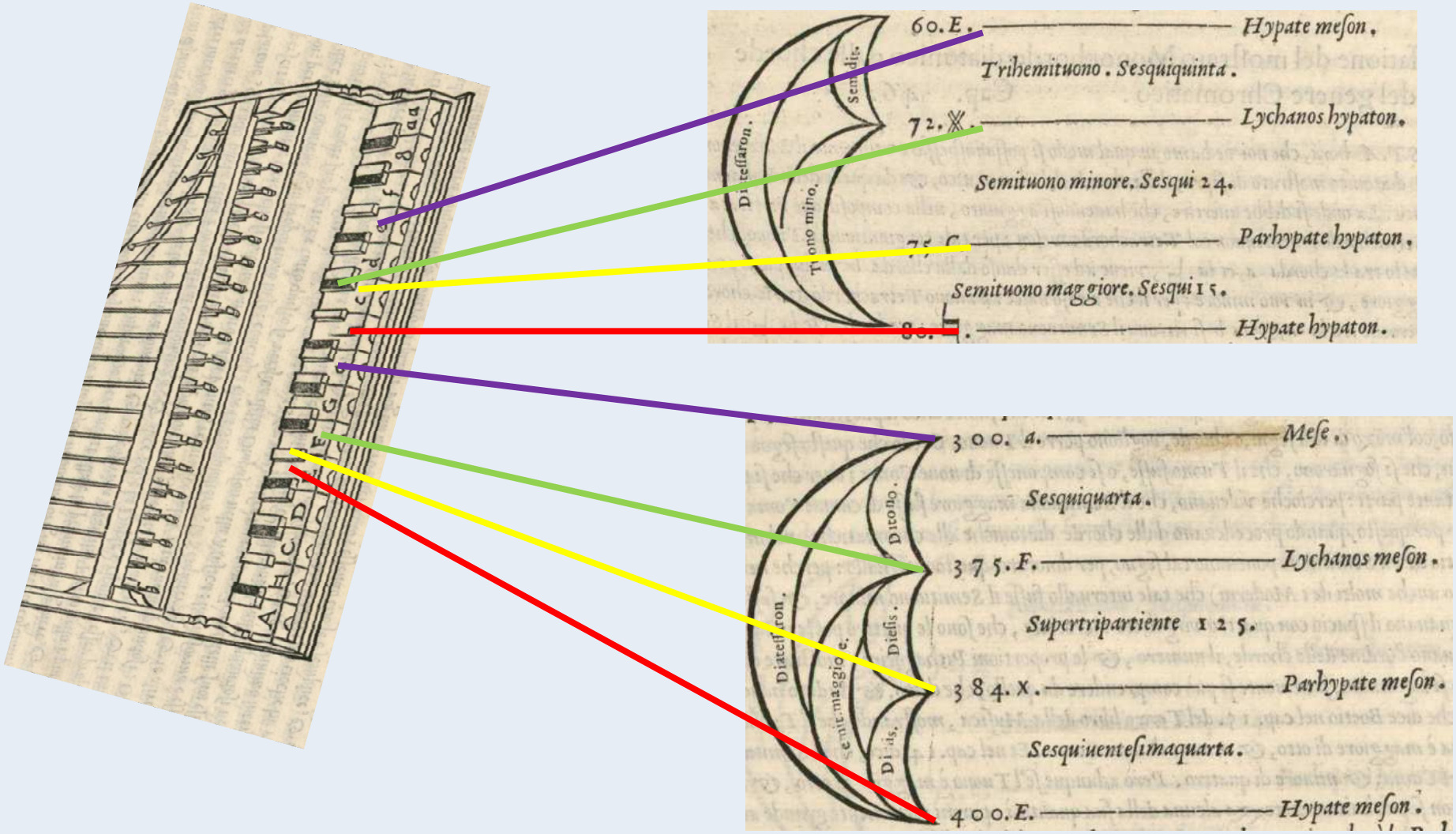
Singleton (1 : 1)



Interpretatione di Patrizio Barbieri (2002, p. 161)



Zarlino_19: syntonico?



Mapping: Zarlino 16 – 19 via 53-EDO

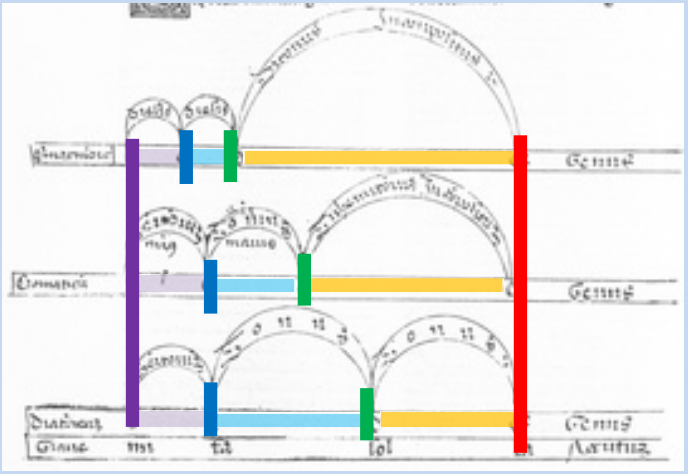
Analoge Hellicona/Volvelles

[analog, 2020 Klavier/53-EDO Clavichord]

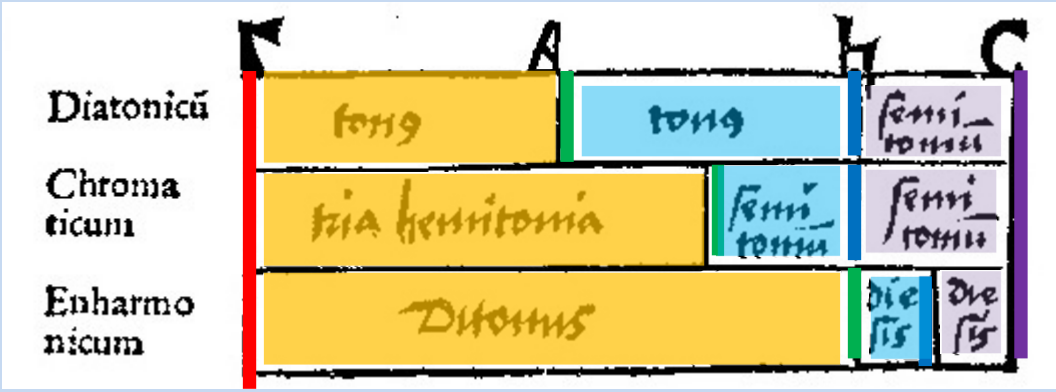
Keyboard mapping: Zarlino 19 => Zarlino 16

[Keyboard-Vergleich zweier Tastaturen bei Zarlino]

Greek Tetrachords



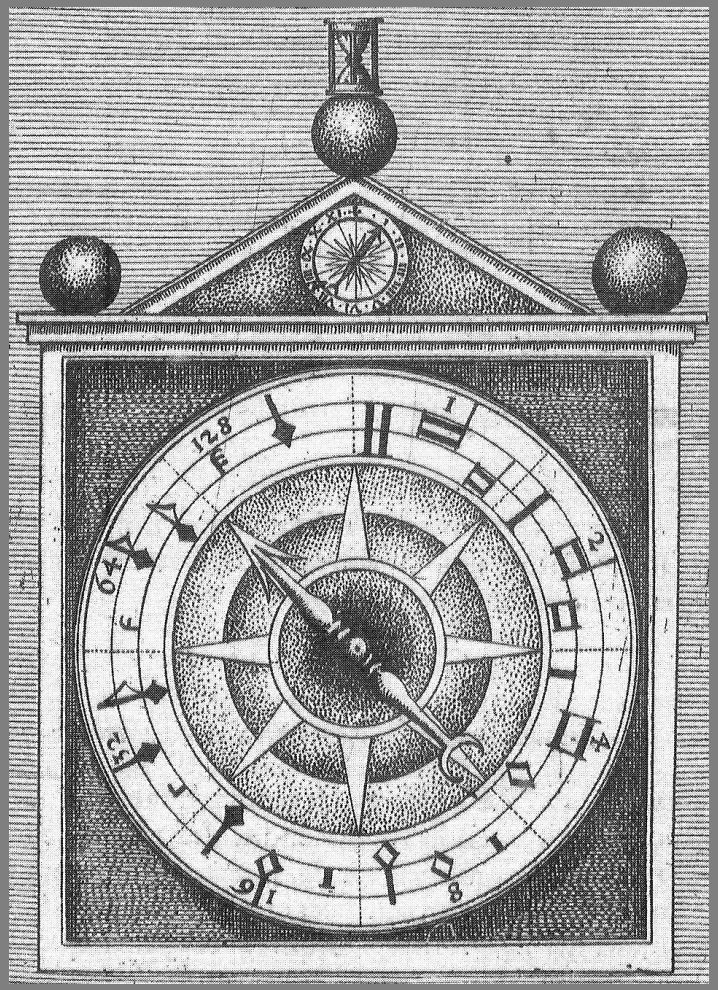
Guillermo de Podio (1495)

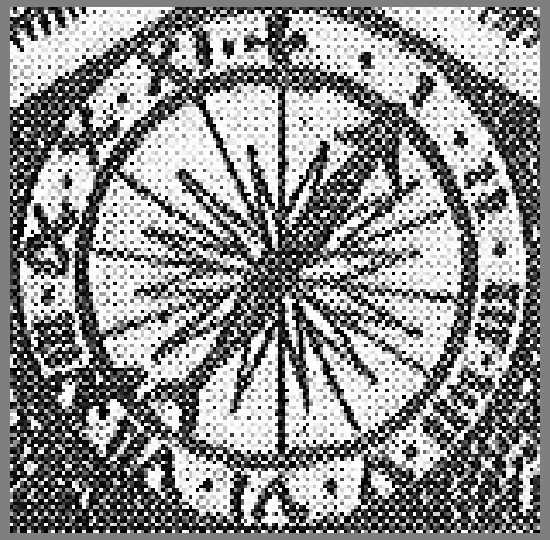


Johannes Cochlaeus

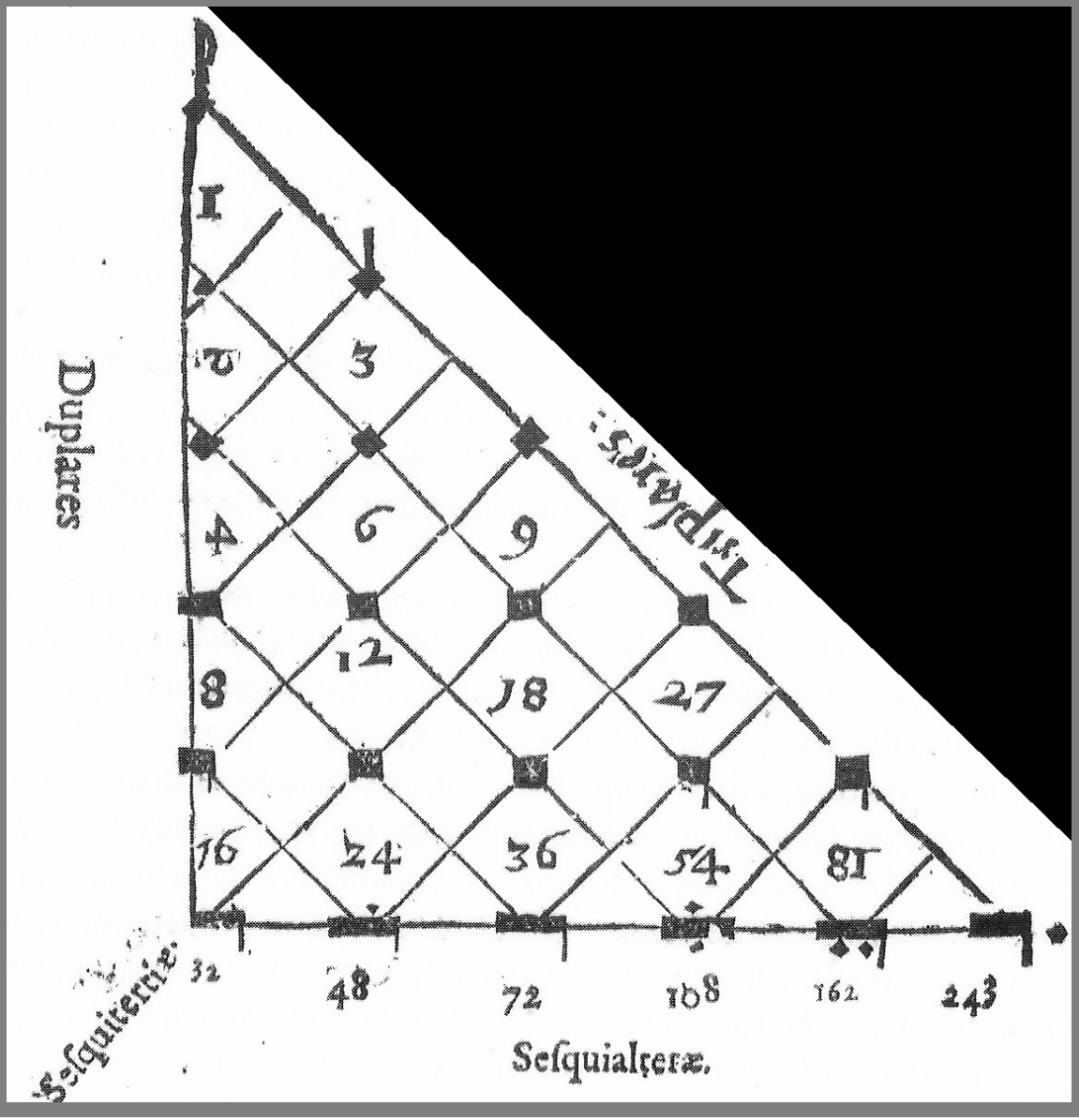
Fludd: binary durations

[←]



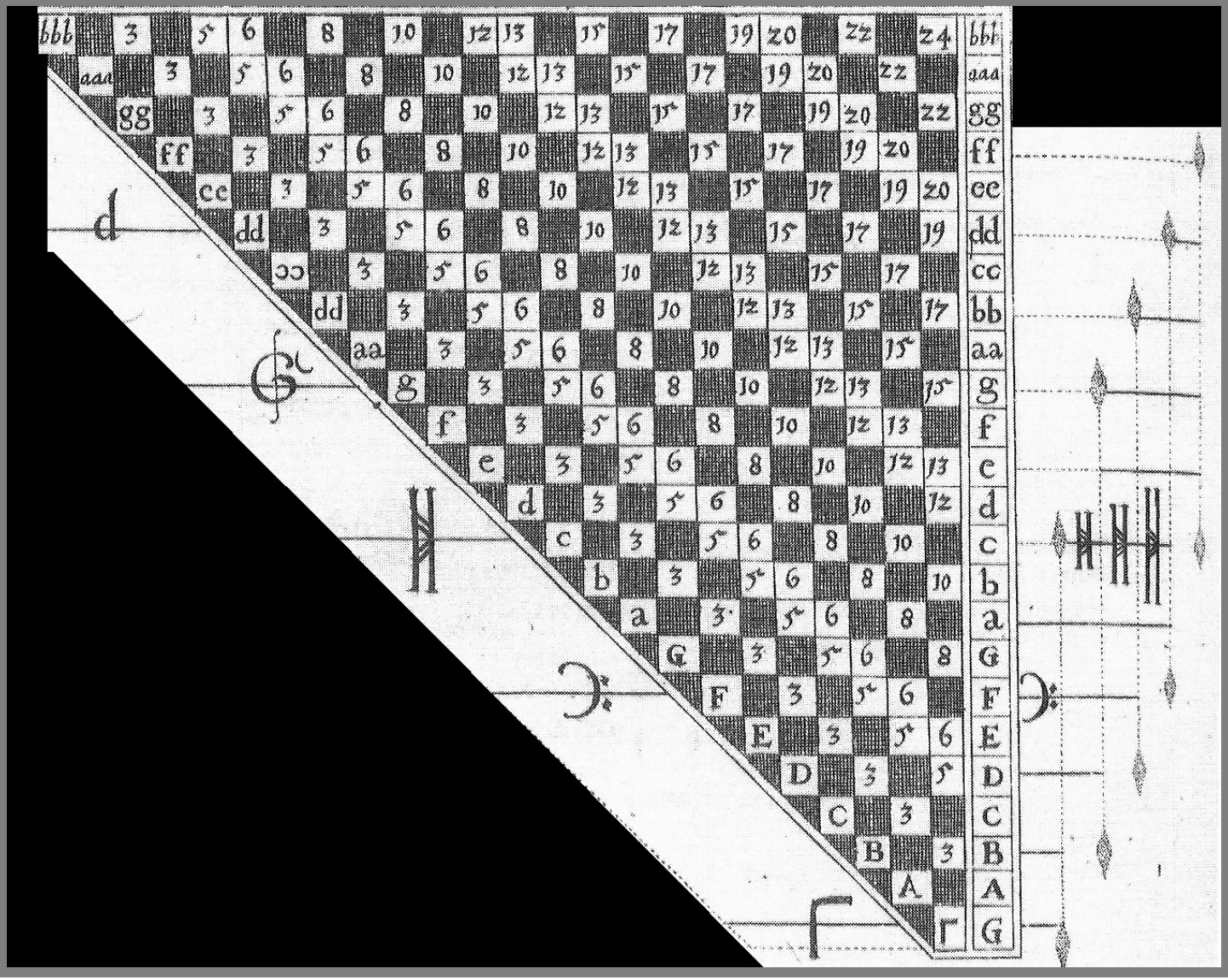


Fludd: lower triangle



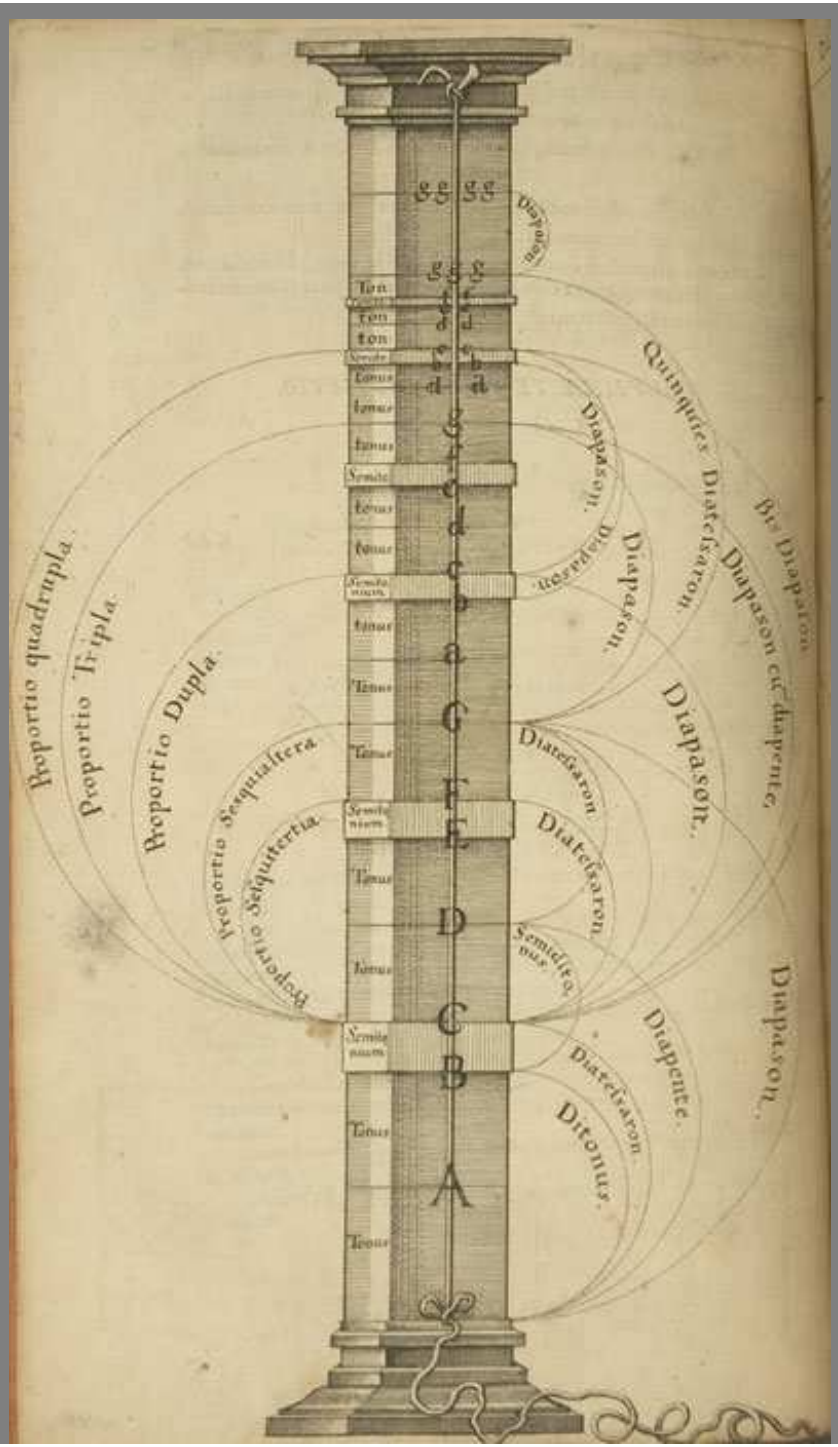
[←]

Fludd: upper triangle



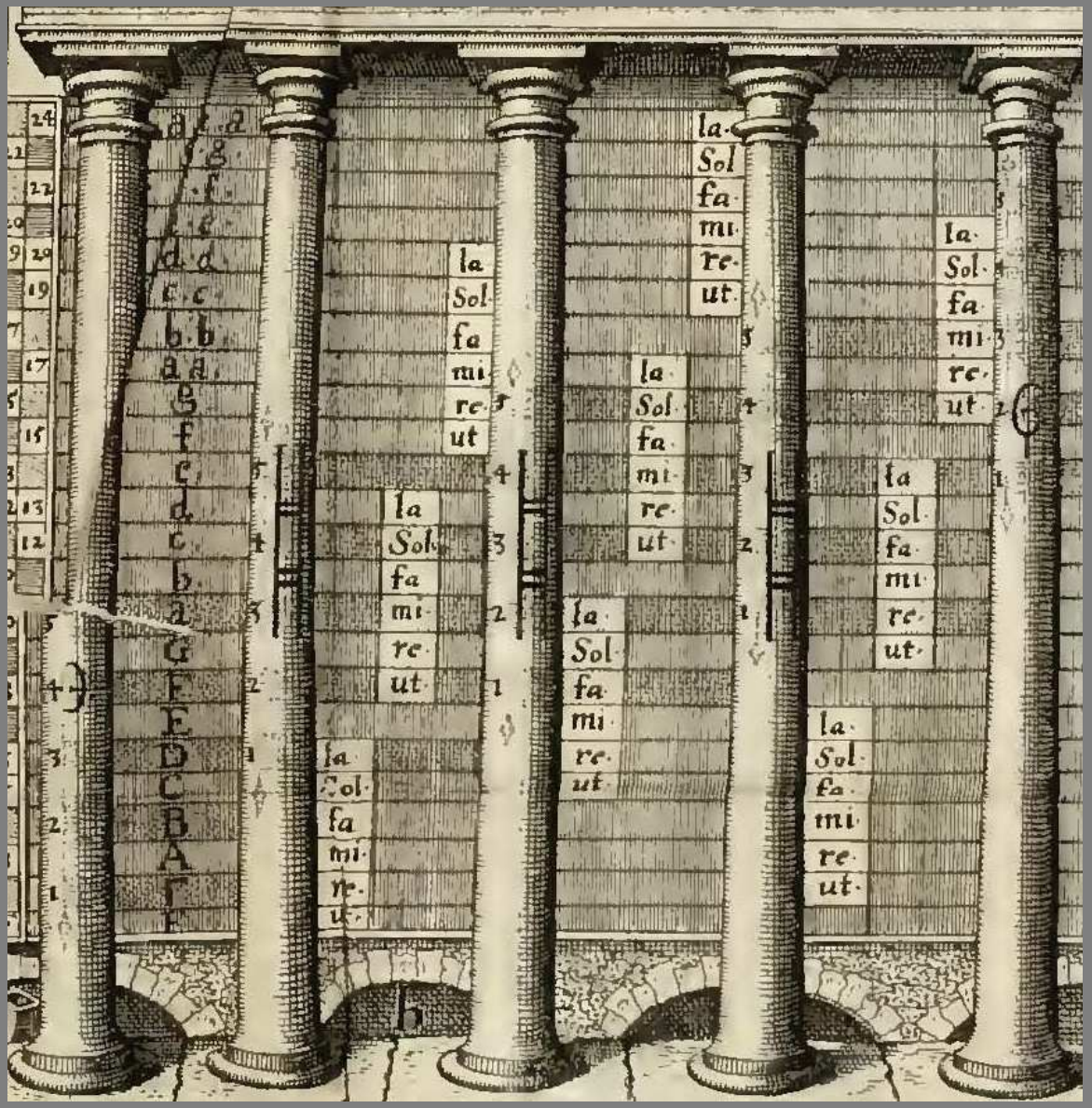
[←]

Fludd: Monochord



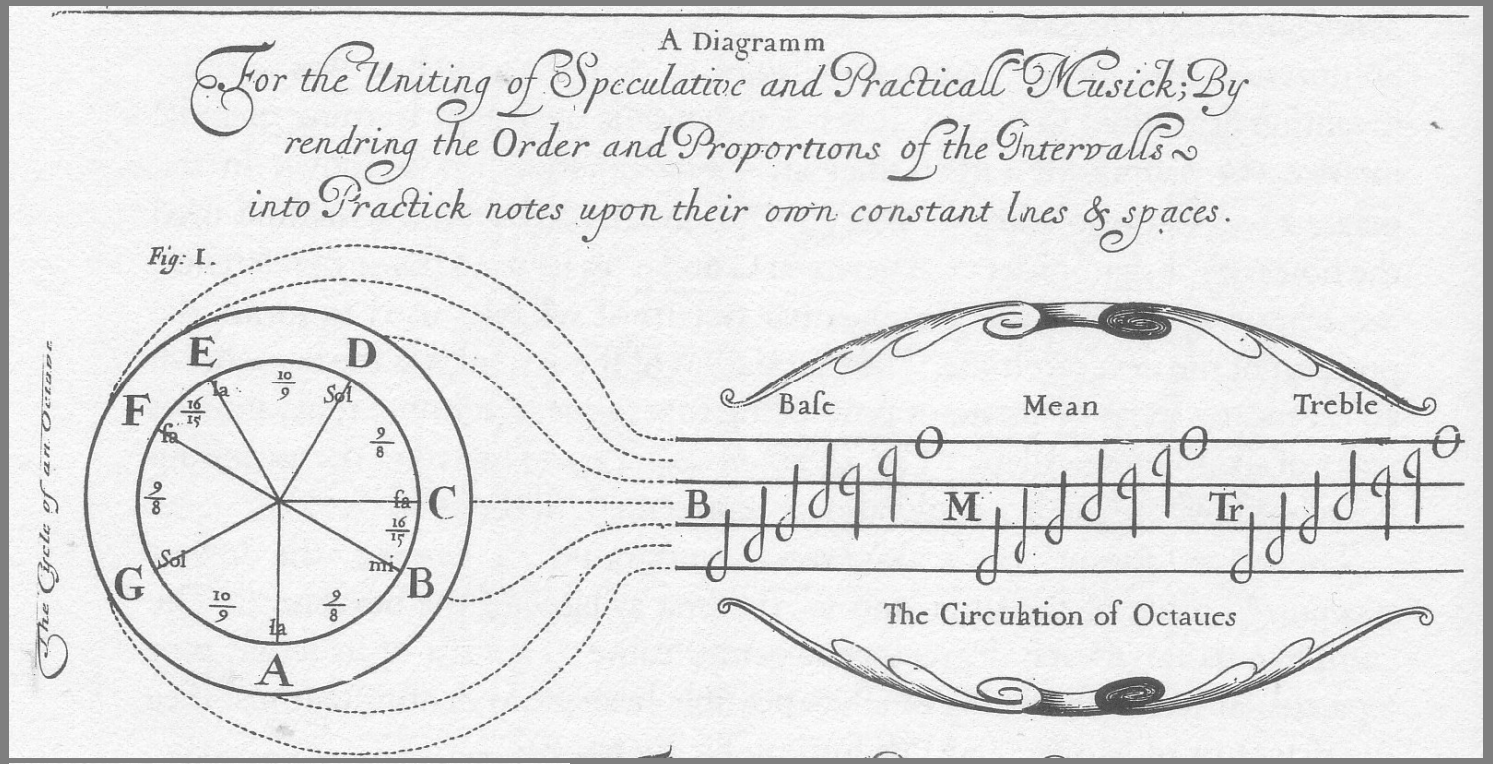
[←]

Fludd: Hexachords

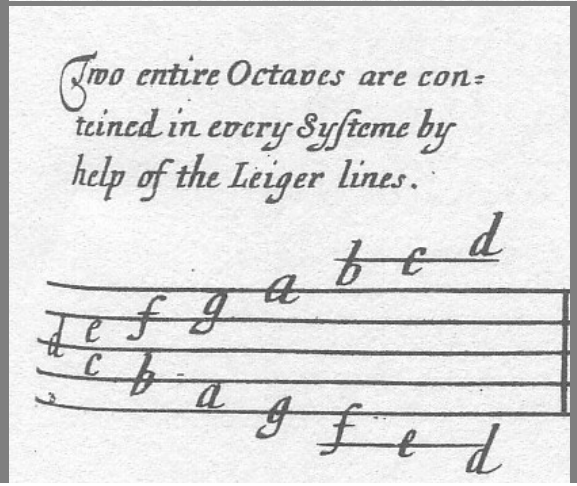


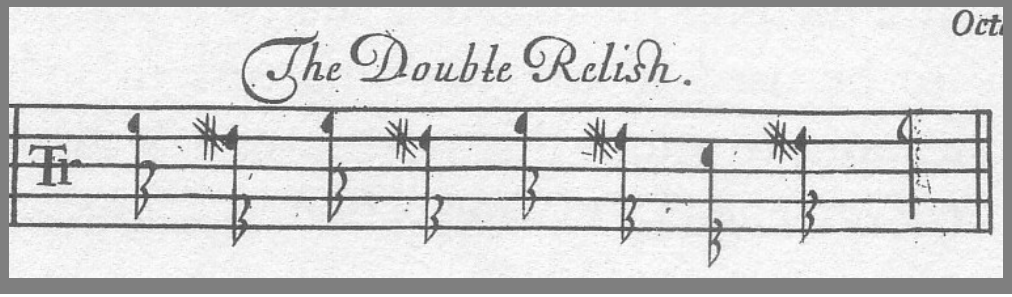
[←]

Thomas Salmon 1672

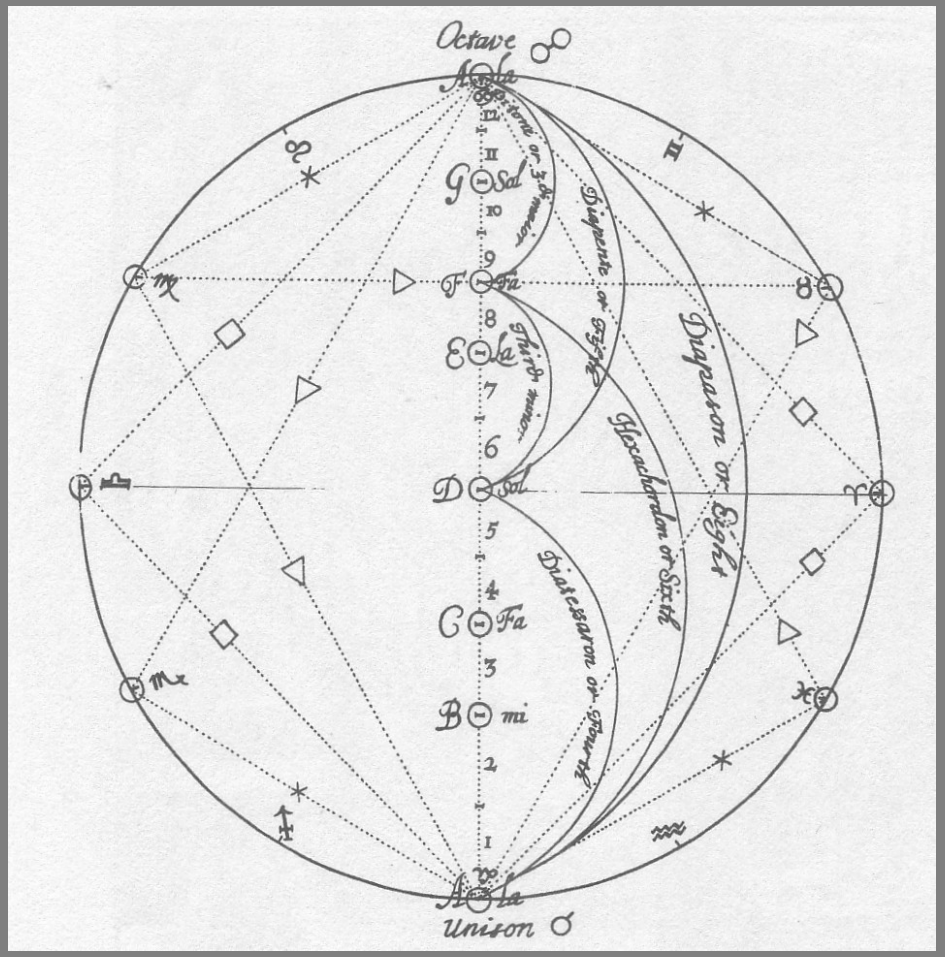

A Diagramm
For the Uniting of Speculative and Practicall Musick; By rendring the Order and Proportions of the Intervalls into Practick notes upon their own constant lines & spaces.
Fig: I.
The Cycle of an Octave
E D F C G B A
Base Mean Treble
B M Tr
The Circulation of Octaues

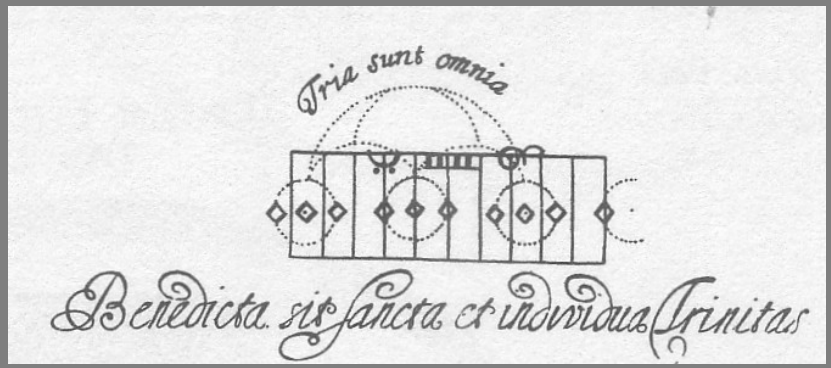
[←]


Two entire Octaves are contained in every Systeme by help of the Leiger lines.


The Double Relish.
Tr

Christopher Simpson 1667



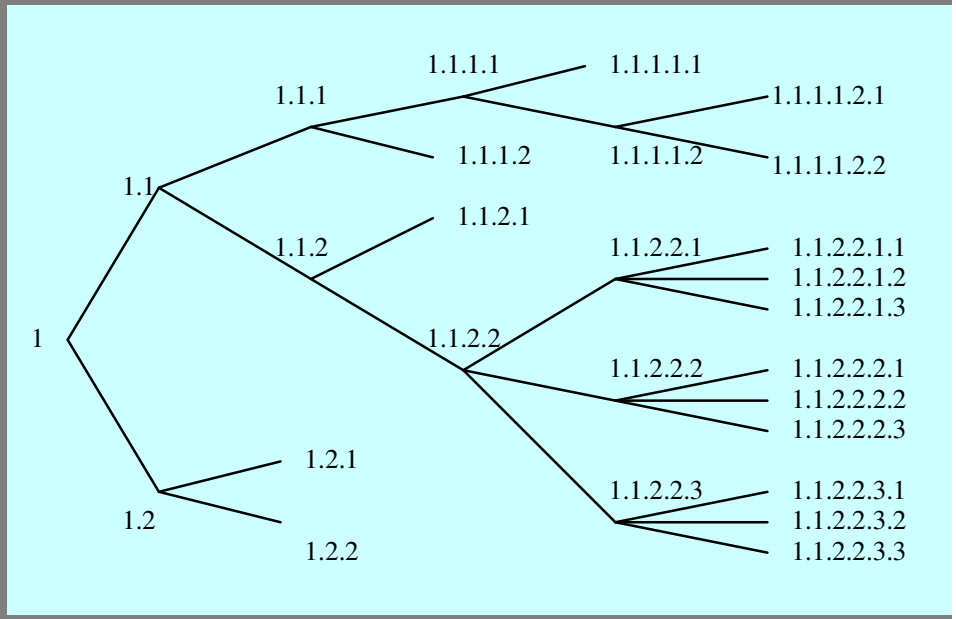


[←]

Fludd: Tree sentence

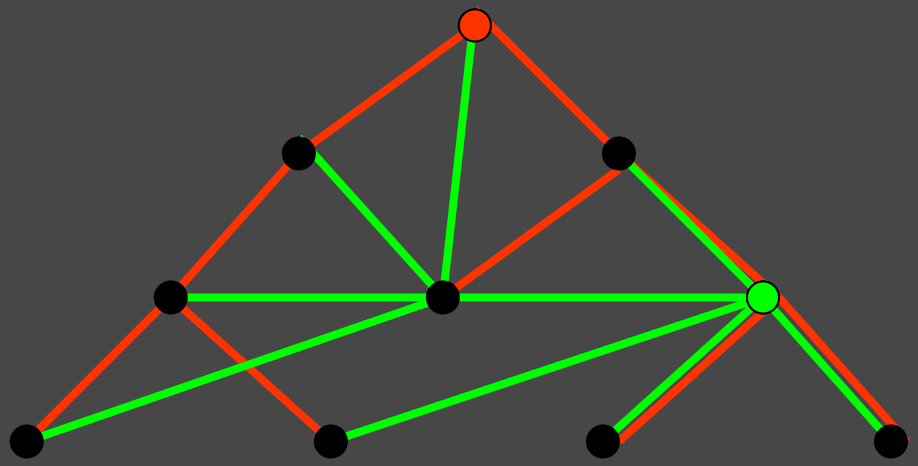
In musical sound, two things are usually considered:

- the difference, which is
  - either general, which is considered
    - either by quality of nature, and thus there are two species of sounds since
      - [63] some are unisons, whose pitch is the same in low and high;
      - others are non-unisons, of which one pitch is lower, another higher by a certain quantity, and they are:
        - either consonances, which coupled produce mixed and sweet sounds;
        - or dissonances, which coupled displease the ears and generate weariness.[65]
    - or by quantity, that is,
      - by position, whence also two-fold:
        - the low pitch included in the low keys and is the bass sound;
        - the high pitch contained within the order of high and highest keys.
      - by duration;
  - or special, for sound is
    - [62] either natural such as songs, proceeding from the voice of a living being;
    - or artificial which is caused
      - by the stroking of strings, as on
        - the cittern,
        - the lyre,
        - the bandora;
      - by blowing, as on
        - the pipe,
        - the organ,
        - the trumpet;
      - by beating, as on
        - small bells,[66]
        - the bell,
        - the timpanum.
- motion in music is made
  - either by *arsis*, that is, an upwards motion;
  - or by *thesis*, that is, a downwards motion.[64]



[←]

Hierarchies and networks



[→]

[←]

Networks and dimension

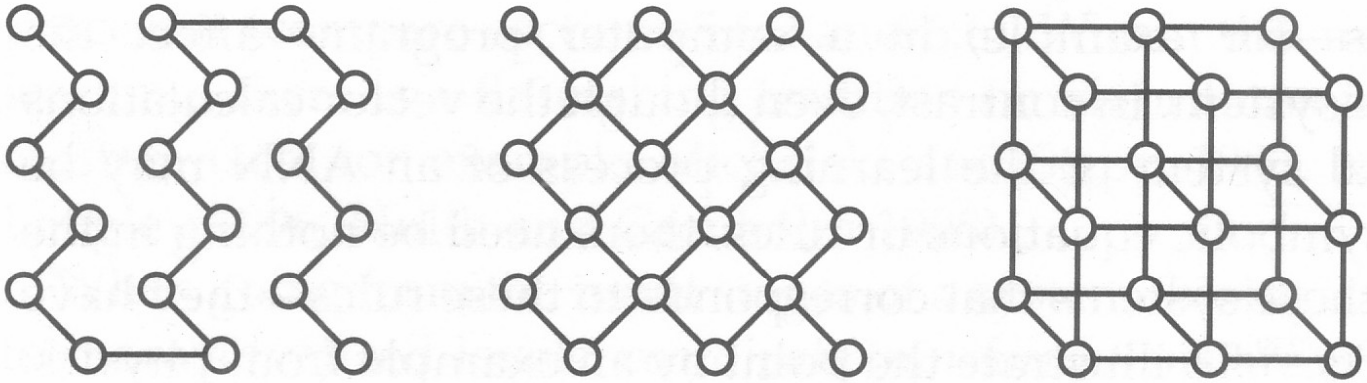


Figure 7.1
Different topologies implemented on the same 2-D pattern of neurons (based on Morasso and Sanguineti 1996, 291).

[←]