Why Should One Build an Archicembalo? An Attempt at a Response According to Nicola Vicentino

Martin Kirnbauer

This paper was shaped by two major research projects that were carried out at the Schola Cantorum Basiliensis in the last ten years. The first was 'Studio31' with a reconstruction of two keyboard instruments proposed by Nicola Vicentino in his treatise *L'antica musica ridotta alla moderna prattica* (Rome, 1555): the *archicembalo* and the *arciorgano*, two keyboard instruments with 36 keys per octave.[1] After having started the project, we decided not to build an *archicembalo* according to Vicentino (among other reasons, Marco Tiella lent us his reconstruction of the *archicembalo*, built in the 1970s). Instead we opted for a kind of new interpretation of the *clavemusicum omnitonum*, i.e. the only completely preserved harpsichord with 31 keys per octave (although this instrument has a different story that has yet to be told).[2] Since then, a reconstruction of Vicentino's *arciorgano* (Fig. 1) and of the *clavemusicum omnitonum* (see Fig. 2) in Basel have been available for further research and practical exploration. It can already be emphasised at this point that the presence and availability of the reconstructed instruments (especially Vicentino's *arciorgano*) was – and is – fundamental for reading and understanding Vicentino's treatise which is the focus of the second project 'Vicentino21'. This project has the creation of a digital edition and

1 <https://www.fhnw.ch/de/forschung-und-dienstleistungen/musik/hochschule-fuer-musik-klassik/projekte/studio-31> (accessed on 26 August 2024); <https://www.projektstudio31.com/> (accessed on 26 August 2024); see also the contributions in Martin Kirnbauer (ed.), *Zwischen Vieltönigkeit und Mikrotonalität. Materialen und Beiträge aus dem Forschungsprojekt 'Studio31'*, Schola Cantorum Basiliensis Scripta 10 (Basel, 2024), <https://schwabe.ch/Martin-Kirnbauer-Zwischen-Vieltoenigkeit-und-Mikrotonalitaet-978-3-7965-5193-2>.

2 Cf. Johannes Keller, 'Das Basler *Arciorgano* und *Clavemusicum omnitonum*', in: Kirnbauer (ed.), *Zwischen Vieltönigkeit und Mikrotonalität* (see n. 1), 137–70; in particular to the *clavemusicum omnitonum* see David Gallagher, 'Vicentino's missing music', in: ibid., 9–84, at 82–4.

translation (into German and English) of Vicentino's notorious treatise as its aim.[3] A team consisting of Luigi Collarile, David Gallagher, Johannes Keller, Anne Smith and me, began an intensive re-reading of Vicentino's treatise, which led to new insights and understanding of his ideas. In my contribution I would like to try to analyse the role of the *archicembalo*, described in detail by Vicentino in the treatise, and what the function of the instrument is. Before attempting to answer the question in the title, a few preliminary remarks on Nicola Vicentino, his treatise *L'antica musica ridotta alla moderna prattica* and the instruments presented in it are necessary.

Fig. 1: Reconstruction of Vicentino's *arciorgano* by 'Studio31' and Bernhard Fleig, Basel 2016 (Photo: Susanna Drescher).

Fig. 2: Reconstruction of the *clave-musicum omnitonum* by 'Studio31' and Markus Krebs, Schaffhausen 2016 (Photo: Susanna Drescher).

3 <https://www.fhnw.ch/plattformen/vicentino21/> (accessed on 26 August 2024); <https://vicentino21.ch/> (accessed on 26 August 2024). Unless otherwise stated, all translations are by the author or 'Vicentino21', when quoting from Vicentino's texts..

Don Nicola Vicentino dei Vicentini (Fig. 3), as he called himself, was probably born in Vicenza in 1510 (but this is not certain) and he must have been active in Venetian circles in which the ancient genres and their potential for modern music were discussed, especially in the circle of Willaert, as whose pupil he describes himself.[4] In Venice, he applied in 1549 for a printing privilege for music 'in the two genera (long ago lost), that is, the enharmonic and chromatic' ('de li dui generi [gia tanto tempo persi] cioe henarmonico et cromaticho').[5] He explicitly states that he sings and plays them ('cantar et sonar'), which suggests the existence of an instrument capable of producing the fine subdivisions of the octave in instruments, and not only in singing.

Fig. 3: Portrait of Nicola Vicentino dei Vicentini at the age of 44; frontispiece of Vicentino, *L'antica musica*, fol. [A1^v].

This specialisation led him to Rome in the service of the powerful cardinal Ippolito II d'Este, who was 'papabile' several times, and the famous dispute with Vicente Lusitano in the spring of 1551. This dispute – behind which also lay a power struggle between competing cardinals –, which Vicentino is known to have lost, influenced and inspired the publication of his notorious treatise *L'antica musica ridotta alla moderna prattica*

4 For references for the following biographical information see Davide Daolmi, 'Vicentino, Nicola', in: *Dizionario Biografico degli Italiani* 99 (2020), <https://www.treccani.it/enciclopedia/nicola-vicentino_(Dizionario-Biografico)/> (accessed on 26 August 2024); Martin Kirnbauer, 'Nicola Vicentino (1510–1577) – Ein biographischer Abriss', in: idem (ed.), *Zwischen Vieltönigkeit und Mikrotonalität* (see n. 1), 3–8.

5 Richard J. Agee, 'The Privilege and Venetian Music Printing in the Sixteenth Century', PhD diss., Princeton University, 1982, 101–2, 179, 222–3; the quote on p. 202.

(Rome: Antonio Barrè 1555). According to Claude Palisca, this was 'one of the most famous books in the history of music theory and one of the least read'.[6]

The colophon of the treatise is dated the day after the election of Pope Paul IV, an ardent opponent of Vicentino's patron Ippolito d'Este, who was immediately sent into exile. Vicentino had to leave Rome together with his patron, never to return, which could explain the failed 'marketing' of slightly differing printed versions and editions of his voluminous treatise. Vicentino's further life is irrelevant for the topic of this paper, and we do not know all his later positions apart from his being *maestro di cappella* in Venice, Vicenza and then in Milan, where he was called by Cardinal Carlo Borromeo; he died there of the plague in 1577.

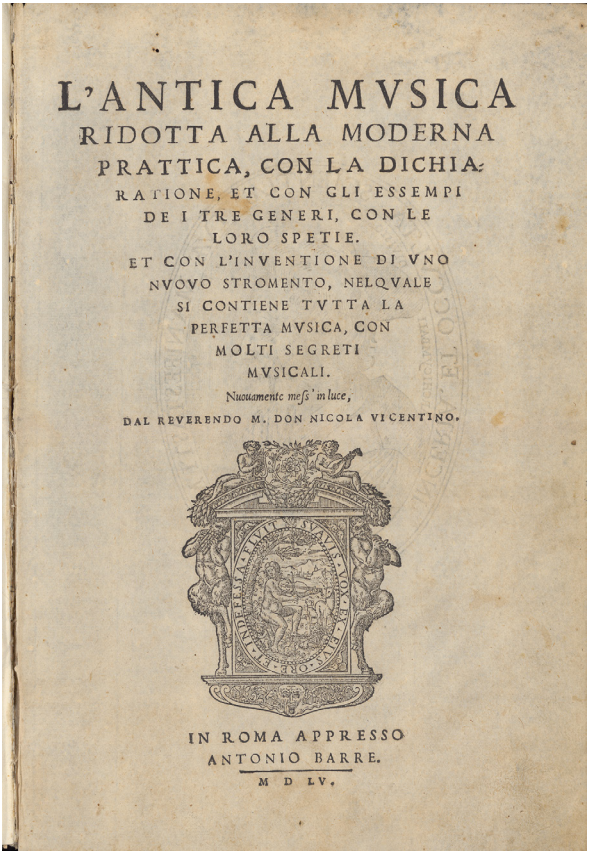

L'ANTICA MVSICA
RIDOTTA ALLA MODERNA
PRATTICA, CON LA DICHIA-
RATIONE, ET CON GLI ESSEMPI
DE I TRE GENERI, CON LE
LORO SPETIE.
ET CON L'INVENTIONE DI VNO
NVOVO STROMENTO, NELQVALE
SI CONTIENE TVTTA LA
PERFETTA MVSICA, CON
MOLTI SEGRETI
MVSICALI.
Nuouamente mess' in luce,
DAL REVERENDO M. DON NICOLA VICENTINO.
IN ROMA APPRESSO
ANTONIO BARRE.
M D LV.

Fig. 4: Titlepage of Vicentino, *L'antica musica*, fol. [A1r].

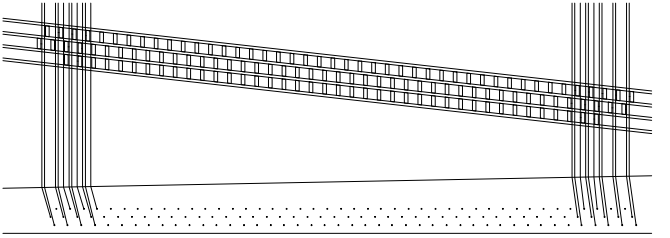
6 Claude V. Palisca, 'Foreword by the Series Editor', in: *Nicola Vicentino, Ancient Music Adapted to Modern Practice*, trans. by Maria Rika Maniates, Music Theory Translation Series (New Haven/London, 1996), vii–viii, at vii.

L'antica musica is a lavishly printed and extensive treatise of 152 folios in small folio format, dedicated to Vicentino's patron Ippolito d'Este (Fig. 4). The title 'Ancient music adapted for modern practice' very clearly describes its content, although this title was and still is often misunderstood; it is not a treatise on music theory, or more precisely a scholarly contribution to the music theory of antiquity, on the contrary, Vicentino was interested only in the 'moderna prattica' and accordingly he writes about many aspects of the musical practice of his time. He also provides rare first-hand information about composition and performance practice of conventionally composed music. But at the centre is 'nostra prattica', by which he means above all the use of a much larger number of pitches. Vicentino calls these the 'gran ricchezza de i gradi' – 'the great wealth of steps', embedded within the demands of the polyphony of his time, which he made audible and measurable in the form of a musical instrument, his so-called *archicembalo*.[7] This instrument is highlighted prominently on the title page of the treatise (cf. Fig. 4) announcing the invention of a new instrument, which contains within it all perfect music, with many musical secrets ('con l'inventione di uno nuovo stromento, nelquale si contiene tutta la perfetta musica, con molti segreti musicali'). One of the six books of the treatise is devoted to the practice of the instrument, he calls *archicembalo* ('sopra la Prattica del stromento, da lui detto Archicembalo').[8] At the beginning of this book, Vicentino describes in detail how to build the harpsichord with 36 pitches in the octave with very practical building instructions, including three foldout woodcuts for the instrument builder with the design of the keyboard, keys and key-lever, and the wrestplank with the position of the tuning pins and jack guides (Fig. 5). With these detailed specifications an *archicembalo* can be built by every experienced instrument maker ('ogni Prattico de fare stromente'), as Vicentino claims.[9] But why build an *archicembalo* at all?

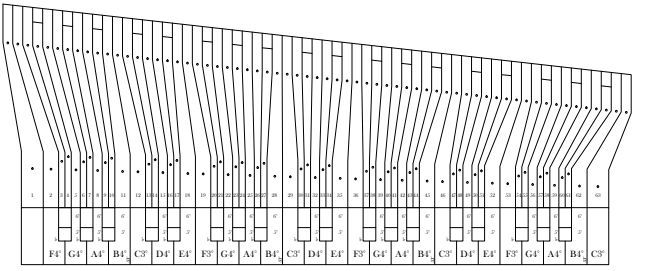
7 Nicola Vicentino, *L'antica musica ridotta alla moderna prattica* (Rome: Antonio Barrè 1555), III.44.2 (fol. 61^{v}); Vicentino's treatise is cited according to the following principle: Book. chapter.paragraph-subparagraph (fol. indication), as it is also used in the digital edition *Vicentino21* (<https://vicentino21.ch>).

8 Ibid., V.1.title (fol. 99^{r}).

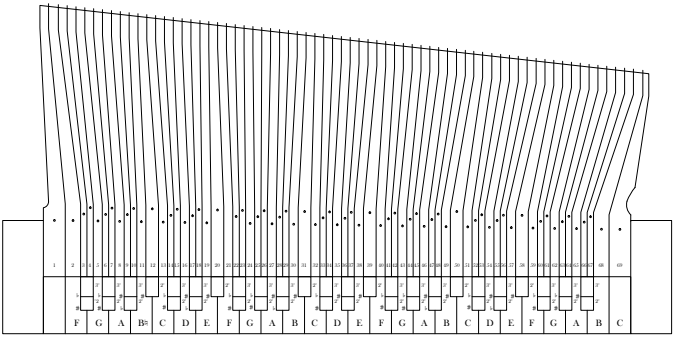
9 Ibid., V.2.1 (fol. 100^{r}).



wrestplank



upper manual



lower manual

AUFBAU CEMBALO | VORABZUG | MST. 1:5 | 14.11.2023

0 5 10 15 20 25CM

Fig. 5: CAD drawing of the assembled woodcuts for the keyboard of the *archicembalo* from the appendix of Vicentino, *L'antica musica* by 'Vicentino21' (Jacqueline Benzinger, Architekturbüro Werner Keller).

Several attempts have already been made to answer this question in the secondary literature, wherein it becomes evident that a certain obsession with tunings and temperaments has been cultivated within the field of musicology. I now would like to present a few prominent stances:
Patrizio Barbieri, in his magistral study on *Enharmonic instruments and music*, asks the question 'Why enharmonic keyboards?' and gives three categories:[10]

- transpositions of church modes and the increasing spread of their 'major mode' version
- the revival of the ancient Greek enharmonic genus
- the 'stylus metabolicus', later 'enharmonic of the Italians' (for which I coined the term 'vieltönig' as a tag for this context – see below).

For Vicentino, Barbieri explicitly refers here to the latter's intention of a 'revival of chromatic and enharmonic genera'; at the same time he criticises that Vicentino 'did not strictly respect the original tetrachordal form of the three Greek genera, but instead mixed them together'.[11] Barbieri goes on to present the *archicembalo* in detail in the chapter 'ETS 31: Vicentino's *archicembalo*' ('ETS' stands for 'Equal Tempered System' also known as 'EDO' or 'Equal Division of the Octave'), i.e. as an instrument with which a closed cycle of fifths is possible through 'an equal multiple division' of the octave into 31 equal parts. Here Barbieri cites the description of the *archicembalo* by Francesco de Salinas in *De musica libri septem* (Salamanca: Mathias Gastius, 1577):

> à quibusd[am] magni nominis Musicis in precio habitum, & vsu receptu[m]; eò quòd omnis in eo sonus habet omnia interualla, atque omnes consonantias (vt sibi videntur) infernè, & supernè, & post certam periodum ad eundem, aut æquiualentem sibi sonum post 31 interualla reditur.[12]
>
> ('esteemed and accepted in practice by certain famous musicians, for the fact every one of its notes can command any interval and any consonance – as they claim – both above and below, and that every interval, after 31 repeats, returns with a specific periodicity to the starting note or to one equivalent to it'.)

But in Vicentino's treatise, the possibility of a circular tuning does not seem to have interested him; there is no mention of this anywhere, unlike in later research.

---

10 Patrizio Barbieri, *Enharmonic Instruments and Music 1470–1900. Revised and Translated Studies*, Tastata 2 (Latina, 2008), 45–52.

11 Ibid., 49.

12 Ibid., 308–24, at 308; in Salina's treatise on p. 164, <http://bdh-rd.bne.es/viewer.vm?id=-0000046156&page=1> (accessed on 20 Dec. 2024).

In a similar direction to Barbieri, Nicolas Meéus in his *New Grove* article on 'Enharmonic keyboard' writes:

> Such keyboards may serve various purposes, to make available mean-tone temperament in tonalities involving more than two flats or three sharps; to make possible the playing of a number of chords in Just intonation; and to produce microtones.[13]

Meéus explicitly assigns Vicentino's approach to the third category:

> Nicola Vicentino […] appears to have been one of the very few Renaissance or Baroque theorists to realize that the best purpose of an enharmonic keyboard would be the playing of microtones, and some of his compositions use the quarter-tone as a melodic interval.[14]

This deduction seems to me to be ahistorical, since the concept of 'microtones' (as well as 'quartertones') was only developed in much later times (especially in the 20th century) and is inappropriate in the thought and sound world of the 16th century. This is why I have argued to use less historically loaded terms for this purpose, i.e. 'vieltönig' (literally, 'many-toned' or 'multitonal') or 'Vieltönigkeit' (as a noun) to describe music that, in its conceptual and structural design, employs more than twelve pitches per octave – leaving open for the time being what the concrete occasion for the respective 'Vieltönigkeit' is.[15]

A few years before the publication of Barbieri's book, Rudolf Rasch asked the same question and begins his answer with the earliest instrument known to him, the

---

13 Nicolas Meeùs, 'Enharmonic keyboard', in: *New Grove2*, xiii (London, 2001), 248–50, at 248. Similar explanations can also be found in Volker Rippe, 'Nicola Vicentino – sein Tonsystem und seine Instrumente: Versuch einer Erklärung', in: *Mf* 34 (1981), 393–413, at 413, or Franz Josef Ratte, *Die Temperatur der Clavierinstrumente: Quellenstudien zu den theoretischen Grundlagen und praktischen Anwendungen von der Antike bis ins 17. Jahrhundert*, Veröffentlichungen der Orgelwissenschaftlichen Forschungsstelle im Musikwissenschaftlichen Seminar der Westfälischen Wilhelms-Universität Münster 16 (Kassel etc., 1991), 376 (who on pp. 387–8, however, also names the 'manifold possibilities of differentiation' arising in the *archicembalo* with 'affective qualities' for 'imitar le parole').

14 Meeùs, 'Enharmonic keyboard' (see n. 13), 249.

15 Cf. Martin Kirnbauer, *Vieltönige Musik: Spielarten chromatischer und enharmonischer Musik in Rom in der ersten Hälfte des 17. Jahrhunderts*, Schola Cantorum Basiliensis Scripta 3 (Basel, 2013); idem, '"Vieltönigkeit" instead of Microtonality. The Theory and Practice of Sixteenth- and Seventeenth-Century "Microtonal" Music', in: *Experimental Affinities in Music*, ed. Paulo de Assis, Orpheus Institute Series (Leuven, 2015), 64–90, at 64–7, <https://library.oapen.org/handle/20.500.12657/32935> (accessed on 14 August 2024)>.

archicembalo.[16] Rasch begins with a description of Vicentino's approach. This differs from that of the ancient tetrachords, i.e. with the division of the diatonic semitone by means of the chromatic semitone, resulting in either the sequence chromatic semitone – *diesis*, or *diesis* – chromatic semitone. In the end this leads to a division of the diatonic semitone into three more or less equal intervals. This concept had enormous consequences, 'since it makes the generalization over the entire keyboard possible'. Rasch concludes:

> So Vicentino's motivation for building the archicembalo may be summarized in the following succinct phrase: the archicembalo was constructed in order to make audible the enharmonic pitches of Greek music theory.[17]

This is more cautious than Barbieri's formulation, but leaves open the question of what Vicentino intended with the 'enharmonic pitches of Greek music theory', apart from the fact that Vicentino knew and used many other smaller 'gradi' (or steps) which he called 'propinque' or even 'propinquissime' (see below), that cannot be systematized, nor has Vicentino tried to do so.

This leads to the classic 'chicken-and-egg question': did Vicentino design his instrument after he had developed his ideas and musical concepts based on the revival of ancient genera? Or vice versa, i.e. did he first develop the instrument and then its possible uses? In my attempt to answer this question, I propose to approach it differently and place Vicentino's perspective at the centre. In addition, I would like to separate the egg from the chicken (so to speak), or the hardware from the software, i.e. the instrument from what Vicentino did with it – and also ask what was before the chicken or the egg.

The motivation and beginning of Vicentino's interest can be traced back to the then current and fashionable interest in the Greek genera, which is documented since the end of the 15th century, especially in Italy.[18] In this context, we should consider

---

16 Rudolf A. Rasch, 'Why were enharmonic keyboards built? From Nicola Vicentino (1555) to Michael Bulyowsky (1699)', in: *Chromatische und enharmonische Musik und Musikinstrumente des 16. & 17. Jahrhunderts – Beiträge zu einem Kolloquium der Schola Cantorum Basiliensis, Hochschule für Alte Musik Basel, und dem Musikwissenschaftlichen Institut der Universität Basel am 9. April 2002*, ed. Thomas Drescher and Martin Kirnbauer, in: *Schweizer Jahrbuch für Musikwissenschaft* 22 (2002), 11–250, at 35–93 (in particular 37–43), <https://www.e-periodica.ch/digbib/view?pid=sjm-004%3A2002%3A22 - 40>.

17 Rasch, 'Why were enharmonic keyboards built?', 43.

18 See for instance Claude V. Palisca, *Humanism in Italian Renaissance Musical Thought* (New Haven/London, 1985); Karol Berger, *Theories of Chromatic and Enharmonic Music in Late 16th Century Italy*, Studies in Musicology 10 (Ann Arbor, 1980) [PhD diss., Yale University, 1975]; David R.M. Irving, 'Ancient Greeks, world music, and early modern constructions of

Vicentino's teacher Adrian Willaert and the discussions about antique genera and their use in Venice and its environs. A prime example of this are letters in the Spataro correspondence from autumn 1532. They report conversations in the house of the English ambassador in Venice in the presence of Willaert, discussing the question, if 'in view of the marvellous effects ascribed to ancient Greek music – compositions could be written in other than the common diatonic genus' ('se el se poteva comporre canti per altri generi che per el genere diatonico usitato').[19] It is therefore quite conceivable that Willaert's circle actually tried to use the other genera in practice and to explore their musical possibilities.

Interest in the Greek genera is also reflected in the earliest document of Vicentino's activities in this regard, namely the Venetian printing privilege of 1549 as mentioned above, and also in the title lines of his treatise, 'con la dichiaratione, et con gli essempi de i tre generi, con le loro spetie' ('with an explanation and examples of the three genera with their species', cf. Fig. 4). But reading Vicentino's treatise, he already states in his extremely short book on theory (covering only 8 pages of 270 pages in all), that much of the music theory of the ancient is not applicable to today's practice, which is why he does not discuss it ('Hauiamo lasciato à dire tutte queste cose per non ci essere hoggi utile alcuno alla nostra prattica […]').[20] Noteworthy is Vicentino's observation that the qualities of contemporary music, which are in principle higher, cannot come to the fore because among other reasons it is heard too often and 'because of its abundance, it is afforded little esteem' ('& ne loro tempi erano tenute bonissime, per il che si conclude molto piu sapersi di Musica ne I nostri tempi che innanzi, ma per la abbondanza di quella esserne fatta poca stima').[21]

Vicentino describes the three genera and their species only to motivate the multiplicity of accidentals and thus the 'gradi' (steps) – introduced shortly after the beginning of the following First Book of Musical Practice. In a spectacular list at the end of this book called the 'arbore delle proportoni & delle diuisioni' (fol. 26^{v}; Fig. 6), he introduces not only the smaller subdivisions of the *semitono*, for which he introduced what he calls his 'inuentione' (i.e. invention or device) of dots placed above the notes designating a half of a *semitono minore*,[22] but also different types of *diesis* and an even smaller *comma* (as a kind of smallest unit).

Western European identity', in: *Studies on a Global History of Music: a Balzan Musicology Project*, ed. Reinhard Strohm, SOAS Musicology Series (London/New York, 2018), 21–41.

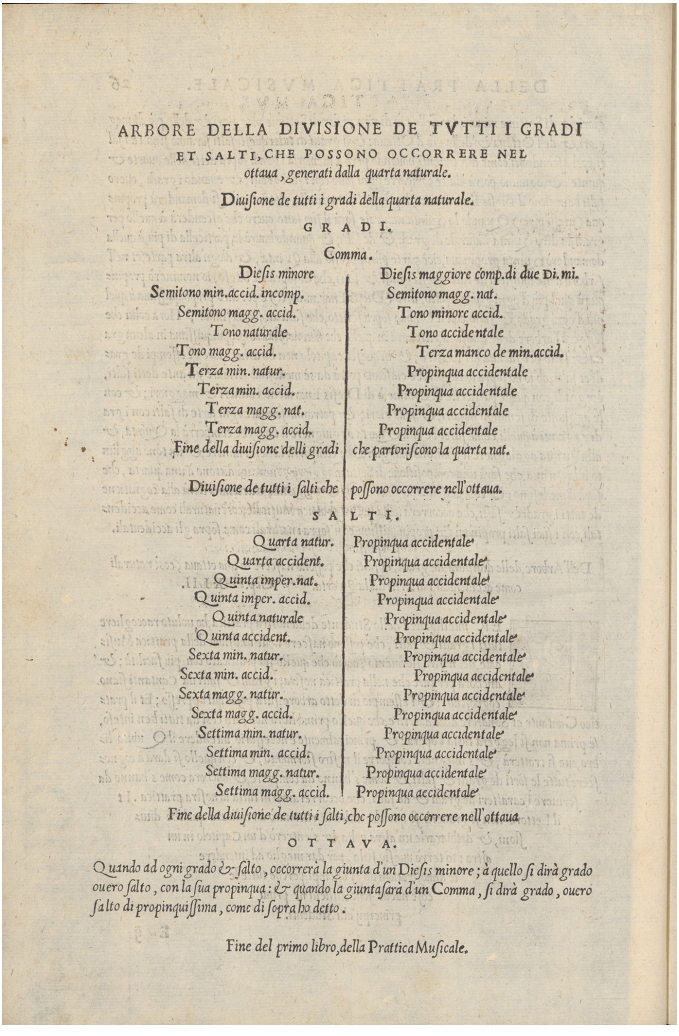
19 Bonnie J. Blackburn, Edward E. Lowinsky and Clement A. Miller (eds.), *A Correspondence of Renaissance Musicians* (Oxford, 1991), 548–62, (No. 46) at 548.

20 Vicentino, *L'antica musica*, libro della theorica.16.5 (fol. 6^{v}).

21 Ibid.

22 '& anchora l'inuentione, ch'io ho fatta nel scriuere sopra le note con il punto', I.7.6 (fol. 14^{v}). It should be noted that for him, of course, the whole tone is divided into two unequal semitones, one 'maggiore' and the other 'minore', which at the same time ensures that his ideas

Remarkable here is the category of 'propinque' (literally close or related), which means that the step is a little bit larger (by about a 'diesis enarmonico minore') than the 'normal' step and can be used for aesthetic reasons. In the Vicentino21-team we called this 'precise, but not exact'.[23]



ARBORE DELLA DIVISIONE DE TVTTI I GRADI
ET SALTI, CHE POSSONO OCCORRERE NEL
ottaua, generati dalla quarta naturale.

Diuisione de tutti i gradi della quarta naturale.

GRADI.

Comma.

Diesis minore	Diesis maggiore comp. di due Di. mi.
Semitono min. accid. incomp.	Semitono magg. nat.
Semitono magg. accid.	Tono minore accid.
Tono naturale	Tono accidentale
Tono magg. accid.	Terza manco de min. accid.
Terza min. natur.	Propinqua accidentale
Terza min. accid.	Propinqua accidentale
Terza magg. nat.	Propinqua accidentale
Terza magg. accid.	Propinqua accidentale
Fine della diuisione delli gradi	che partoriscono la quarta nat.

Diuisione de tutti i salti che possono occorrere nell'ottaua.

SALTI.

Quarta natur.	Propinqua accidentale.
Quarta accident.	Propinqua accidentale.
Quinta imper. nat.	Propinqua accidentale.
Quinta imper. accid.	Propinqua accidentale.
Quinta naturale	Propinqua accidentale.
Quinta accident.	Propinqua accidentale.
Sexta min. natur.	Propinqua accidentale.
Sexta min. accid.	Propinqua accidentale.
Sexta magg. natur.	Propinqua accidentale.
Sexta magg. accid.	Propinqua accidentale.
Settima min. natur.	Propinqua accidentale.
Settima min. accid.	Propinqua accidentale.
Settima magg. natur.	Propinqua accidentale.
Settima magg. accid.	Propinqua accidentale.

Fine della diuisione de tutti i salti, che possono occorrere nell'ottaua.

OTTAVA.

Quando ad ogni grado & salto, occorrerà la giunta d'un Diesis minore; à quello si dirà grado ouero salto, con la sua propinqua: & quando la giunta sarà d'un Comma, si dirà grado, ouero salto di propinquissima, come di sopra ho detto.

Fine del primo libro, della Prattica Musicale.

Fig. 6: 'arbore delle proportoni & delle diuisioni' in Vicentino, *L'antica musica*, I.42 (fol. 26ᵛ).

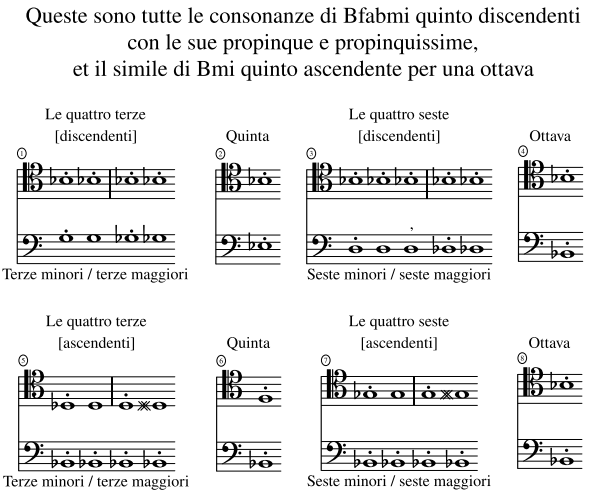
were consistent with the music of his time, which was tuned in meantone – to which his claim 'ridotta alla moderna prattica' probably also refers.

23 This category is only briefly explained in I.18.2-3 (fol. 21ᵛ–22ʳ), but frequently appears in the catalogue of all intervals available on the *archicembalo* in the Fifth Book.

This supposed terminological blurring clearly demonstrates how a concept is pragmatically expanded by the reality of the instrument and access via the keyboard, unlocking a new kind of aesthetic potential. At the same time, it can also be experienced and understood in practice. Accordingly, Vicentino 'declines' all possible pitches and intervals of his instrument in the fifth and last book 'On the Practice of the Instrument, called by him *Archicembalo*' ('sopra la prattica del stromento, da lui detto Archicembalo') presenting them in long lists of note examples. If you have the instrument at hand, this huge tonal variety can also be understood and experienced through the senses (Fig. 7 from chapter V.38) with 'all the consonances of B*fa♭mi acuto quinto* [♭Ḃ] descending with their *propinque* and *propinquissime*, and the same of B*mi quinto* [♭Ḃ] ascending through an *ottava*' ['tutte le consonanze di B fa b mi quinto discendenti con tutte le sue propinque & propinquissime, & il simile di B mi quinto ascendente per una Ottaua']).[24] The reader is invited to visualise the individual intervals through the music examples, to play them on the instrument, and thereby to experience and to memorise them sensually.

Fig. 7: 'tutte le consonanze di B fa b mi quinto discendenti con tutte le sue propinque & propinquissime, & il simile di B mi quinto ascendente per una Ottaua', in Vicentino, *L'antica musica*, V.38 (fol. 118ᵛ) in the edition of *Vicentino21*: a) digital representation of the original music example and b) transcription in modern notation and clefs with c) video of the presentation on the *arciorgano* (Johannes Keller – Vicentino21).

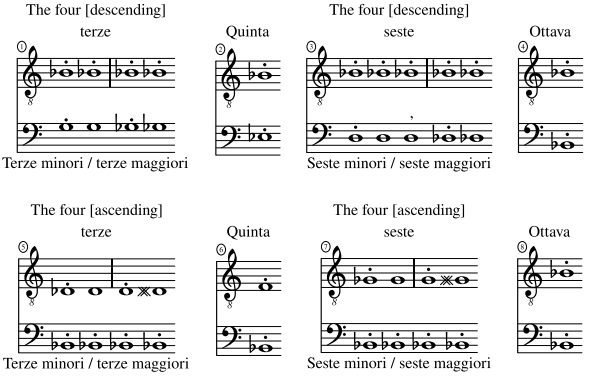
a)



24 Vicentino, *L'antica musica*, V.38 (fol. 118ᵛ).

b)

These are all consonances of Bfabmi quinto descending
with their propinque and propinquissime,
and the same of Bmi quinto ascending through one ottava



c)

Video i: The four [descending] *terze*

Click to play.

Video ii: *Quinta*

Click to play.

Video iii: The four [descending] *seste*

Click to play.

Video iv: *Ottava*

Click to play.

Video v: The four [ascending] *terze*

Click to play.

Video vi: *Quinta*

Click to play.

Video vii: The four [ascending] *seste*

Click to play.

Video viii: *Ottava*

Click to play.

The key point is that, with reference to his *archicembalo*, all these intervals are declared both singable and usable. Vicentino has, so to speak, created a taxonomy of all the intervals that can be distinguished and heard through his instrument, effectively creating a kind of acoustical microscope. Immediately upon introducing these many intervals and steps, Vicentino refers to the explanation and examples in the Fifth Book, stating that

> Et tal prattica non ti paia strana in questo principio, perche queste diuisioni meglio l'intenderai nel quinto libro da molti essempi accompagnato sopra tal diuisione, & più ti farà capace il nostro instrumento, detto Archicembalo, che

> ti mouera più l'essempio accompagnato dalla prattica, che gli essempi scritti & accompagnati con parole non fanno.[25]
>
> ('This practice should not seem strange to you in this beginning, as you will better understand these divisions [later] in the Fifth Book from many accompanied examples on this division. And our instrument, called the *archicembalo*, will make you more competent, because an example accompanied by practice will sway you more than written examples accompanied by words.')

A few lines later, in the context of teaching how to sing the subtle steps via scaled-down traditional solmisation he explains the 'Vieltönigkeit' in relation to the keyboard of his instrument:

> & non sarà fuore della regola Cromatica nominare ut. re. mi. fa. sol. la. in ogni riga, & in ogni spatio, & come le mutationi uengano piu commode al cantante; Ma queste mutationi, lo nostro instrumento li certificarà, come in esso appareno, che in ogni luogo delli tasti si può dir ut. re. mi. fa. sol. la. scritti con li segni delli semitoni, & delli Diesis Enarmonici[26]
>
> ('And it would not be outside the chromatic rule to utter *ut*, *re*, *mi*, *fa*, *sol*, *la* in every line and in every space [sc. of the staves], so that the mutations become more convenient for the singer. But our instrument [*archicembalo*] will confirm these mutations by the way they appear on it, because in every position of the keys one can say *ut*, *re*, *mi*, *fa*, *sol*, *la*, written with the signs of the *semitoni* and of the *diesis enarmonici*.')

Perhaps this can be misunderstood as a kind of technical extension of the tonal range resulting from the design of the instrument and its keyboard. But Vicentino goes much further in supporting the use of all intervals aesthetically. Already in the First Book of Musical Practice, he muses on the imperfection of things and the duty of every good artisan, to adorn the defects through their skill:

> così auiene nella prattica Musicale, che si uede l'ordine naturale mancare in molte cose, et con gli accidenti, di aggiugnere et minuire alli gradi naturali, si fà un grandissimo acquisto, di poter usare in ogni luogo, ogni sorte di consonanze, come si uedrà nel nostro Archicembalo, quanta ricchezza de gradi, in quello si hà racquistata, et così anchora nella prattica del cantare, come per questa mia fatica la esperienza ne farà ogniuno certissimo, et se tal abondantia de gradi è tanto utile: […][27]

25 I.5.10 (fol. 11^{v}).
26 I.5–1.5 (fol. 12^{r}).
27 I.30.1 (fol. 22^{v}).

> (Thus it happens in the musical practice that one sees the natural order is lacking in many things, and with the accidentals for adding to or decreasing [the number of] the natural steps, one has made a very great acquisition, which one can use any place and for any sort of consonance; just like one sees in our *archicembalo* what a wealth of steps has been recovered in it, and also in the practice of singing, where due to my effort, anybody may make the most certain experience of whether the abundance of steps is so useful.)

Elsewhere, in the context of composing not only in eight diatonic modes (or scales), but also in eight chromatic and enharmonic modes, Vicentino writes that the composer

> haurà modi di comporre con tanta ricchezza de gradi, & di uarie spetie insieme adunati, con uarietà di procedere, che sarà cosa marauigliosa all'Oditore, per le tante differenze de gradi commisti.[28]

> ('will have ways of composing with so great a wealth of steps and of various species gathered together, with such a variety of ways to proceed, that it will be a marvelous thing for the listener, because of the mixture of so many different steps.')

This is also where the listeners come into play, because, according to Vicentino, the purpose of the music is ultimately to convince them and to satisfy the ear ('adunque il fine della Musica è di satisfare à gl'orecchi.').[29] To explore this variety of intervals and gain practical musical experience, an appropriately equipped instrument, the *archicembalo* or *arciorgano*, is needed, perhaps comparable to a catalyser or interface.[30]

Although concrete evidence is sparse, presumably earlier instruments (monochords, as well as keyed monochords, i.e. clavichords, and harpsichords) were set up for the practical implementation of the genera, as well as for acoustic reference or as research devices.[31] In the literature, a 'chordotonum' is mentioned by Franchino Gaffurio in his treatise *Practica musica* of 1496, perhaps referring only to a hypothetical monochord designed for finding the notes of the enharmonic genus.[32] However, a real instrument was the 'manocordio', described by John Hothby, a Lucca-based

28 III.49.5 (fol. 65^{v}).

29 IV.40.5 (fol. 93^{v}).

30 Cf. Johannes Keller and Martin Kirnbauer, 'Keyboards Adapted to Music vs. Music Adapted to Keyboards: An Essay on "Vieltönigkeit" and Keyboard Instruments', in: *Keyboard Perspectives. Yearbook of the Westfield Center for Historical Keyboard Studies* 12 (2019/20), 61–82.

31 For the broader context see Alexander Rehding, 'Instruments of Music Theory', in: *Music Theory Online* 22/4 (2016), <https://mtosmt.org/issues/mto.16.22.4/mto.16.22.4.rehding.html> (accessed on 24 August 2024).

32 Franchino Gaffurio, *Practica musice* (Milan: Guillermus Le Signerre for Johannes Petrus de Lomatio, 1496), fol. [a6^{v}], <https://gallica.bnf.fr/ark:/12148/bpt6k15160772> (accessed on

English theorist and composer, who died in 1487. It featured additional red upper keys ('tasti rossi') for so-called enharmonic notes (such as $a^{\#}$, $e^{\#}$, or $b^{\#}$), alongside the normal 'tasti bianchi' for the diatonic and 'tasti neri' for the chromatic keys.[33] Hothby explained the necessity of these additional keys in relation to the different sizes of the semitone (*semitonio maggiore*, *semitonio minore*, *semitonio minime*) and connected them to the chromatic and enharmonic genera, referring to two species of the tetrachord as described in ancient Greek theory. He referred to his clavichord as a 'true master of all music' ('el monochordia e vero maestro di tuta la musica') because, in Hothby's view,[34] of its ability to produce all the necessary pitches for any kind of music. However, Hothby oriented himself according to Pythagorean tuning, which made the instrument unsuitable for musical practice in his time – in distinct contrast to Vicentino.[35]

The basic design of the keyboard as described by Hothby would later be called 'cimbalo cromatico'.[36] Although it seems obvious to assume that split keys – used sporadically for tuning and temperament reasons on keyboard instruments from the second half of the 15th century – served as a makeshift solution to the limitation of

---

9 Sept. 2024); see also Irwin Young, *The 'Practica musicae' of Franchinus Gafurius, Translated and Edited with Musical Transcriptions* (Madison/Milwaukee/London, 1969), 27, n. 30.

33 John Hothby, 'Epistola' (in: I-Fn Magl.XIX.36), fol. 74–8, at 75^{v}; ed. Albert Seay (ed.), *Johannes Hothby: Tres tractatuli contra Bartholomeum Ramum*, CSM 10 (Rome, 1964), 79–92, at 83–5.

34 Hothby, 'Epistola', fol. 76^{v}; Seay (ed.), *Johannes Hothby*, 89.

35 Bonnie J. Blackburn, 'Musical Theory and Musical Thinking after 1450', in: *Music as Concept and Practice in the Late Middle Ages*, ed. Reinhard Strohm and Bonnie J. Blackburn, New Oxford History of Music III.1 (Oxford, 2001), 301–45, at 324–5; Sigrun Heinzelmann, 'John Hothby as Innovator: The Solmization System in La Calliopea Legale', in: *Studi Musicali*, N.S. 2 (2012), 353–96, at 366–72.

36 Christopher Stembridge 'The *Cimbalo cromatico* and Other Italian Keyboard Instruments with Nineteen or More Divisions to the Octave', in: *PPR* 6 (1993), 33–59, <https://scholarship.claremont.edu/ppr/vol6/iss1/> (accessed on 17 August 2024); Denzil Wraight and Christopher Stembridge, 'Italian Split-Keyed Instruments with Fewer than Nineteen Divisions to the Octave', in: *PPR* 7 (1994), 150–81, <https://scholarship.claremont.edu/ppr/vol7/iss2/> (accessed on 17 August 2024); Denzil Wraight, 'The *cimbalo cromatico* and other Italian string keyboard instruments with divided accidentals', in: *Chromatische und enharmonische Musik und Musikinstrumente des 16. & 17. Jahrhunderts – Beiträge zu einem Kolloquium der Schola Cantorum Basiliensis, Hochschule für Alte Musik Basel, und dem Musikwissenschaftlichen Institut der Universität Basel am 9. April 2002*, ed. Thomas Drescher and Martin Kirnbauer, in: *Schweizer Jahrbuch für Musikwissenschaft* 22 (2002), 11–250, at 105–34, <https://www.e-periodica.ch/digbib/view?pid=sjm-004%3A2002%3A22 - 110>, and the addition 'Checklist of Italian Harpsichords and Virginals with Split Sharps' (2016) <http://www.denzilwraight.com/download.htm> (accessed on 28 August 2024)>; Martin Kirnbauer, 'Viele Tasten – viele Töne. Das Cimbalo cromatico und musikalische Praxis', in: *Les espaces sonores. Stimmungen, Klanganalysen, spektrale Musiken*, ed. Michael Kunkel (Büdingen, 2016), 43–57.

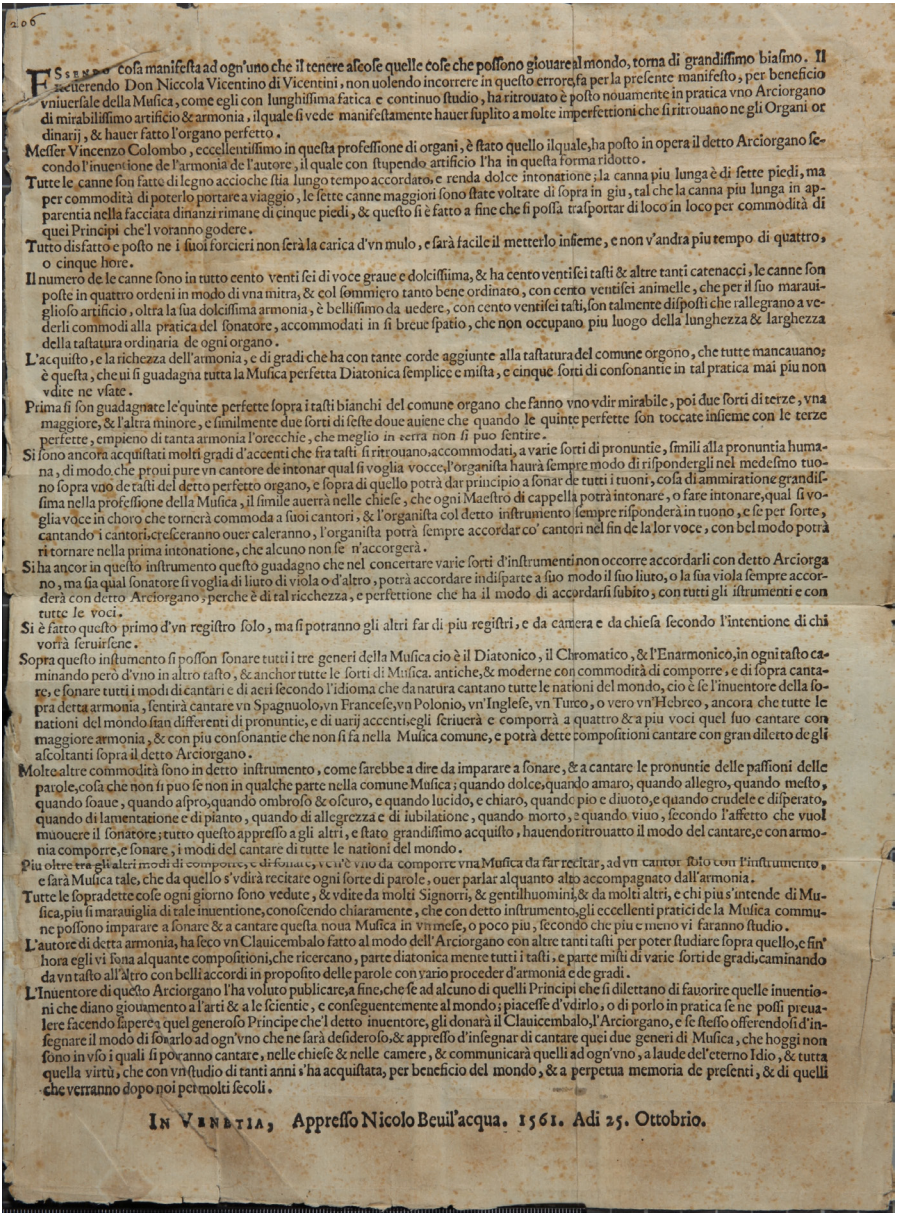
only 12 keys per octave, they were also likely applied for all semitones on a keyboard. However, there is no concrete evidence of such an instrument before the middle of the 16th century and thus before the activities of Vicentino. Zarlino in 1558 claimed that the construction of such an instrument occurred as early as 1548.[37] But he is not necessarily a credible witness here, as he was also a student of Willaert and an aspirant to succeed him, clearly in competition with Vicentino, who had published his treatise three years prior.[38] In any case, Vicentino can claim to be the first to have combined two *cimbali cromatici* for his *archicembalo* by placing, so to speak, one on top of the other.

The instrument thus functioned as a catalyst, triggering and accelerating further development by making concrete listening experiences possible. It also made the many intervals and steps nameable and accessible in a very practical way via the keyboard, functioning here as an interface. On this basis, Vicentino developed new musical and previously unheard-of possibilities for 'nostra prattica'. It was neither an interest in ETS31, in microtones or quarter-tones, nor the antiquarian revival of chromatic and enharmonic genres, that led him to 'invent' the *archicembalo*, although these latter were probably already in Vicentino's mind earlier. But as soon as the instrument was available, the concrete experiences made completely different musical realities possible. This is also confirmed by the *arciorgano* built in 1561, as can be seen from the advertising leaflet published for it (Fig. 8).[39]

37 Gioseffo Zarlino, *Le Istitutioni harmoniche* (Venice: author, 1558), 139–42. Incidentally, the term *cimbalo cromatico* is not used in the text, but in Zarlino's estate inventory the instrument is explicitly described as 'Vn clauiciembalo cromatico'; Isabella Palumbo Fossati, 'La casa veneziana di Gioseffo Zarlino nel testamento e nell'inventario dei beni del grande teorico musicale', in: *NRMI* 20 (1986), 633–49, at 640 and 648 (facs.). On this instrument see now also Denzil Wraight, 'The Tuning of Trasuntino's "Clavemusicum Omnitonum" and Zarlino's Enharmonic System' (2024) <https://www.denzilwraight.com/publications.htm> (accessed on 20 Dec. 2024).

38 See Michael Fend, *Gioseffo Zarlino, Theorie des Tonsystems – Das erste und zweite Buch der Istitutioni harmoniche (1573). Aus dem Italienischen übersetzt, mit Anmerkungen, Kommentaren und einem Nachwort versehen*, Europäische Hochschulschriften, Reihe XXXVI, Musikwissenschaft 43 (Frankfurt a.M., 1989), 397–9 and 429–33.

39 I-Bc C.32; see the edition in Martin Kirnbauer, 'Das Werbeblatt für das *Arciorgano*: Edition, Übersetzung und Kommentar', in: idem (ed.), *Zwischen Vieltönigkeit und Mikrotonalität* (see n. 1), 115–27, at 116–19; for an English translation see Henry William Kaufmann, 'Vicentino's Arciorgano: An Annotated Translation', in: *JMT* 5/1 (1961), 32–53.



206

ESSENDO cosa manifesta ad ogn'uno che il tenere ascose quelle cose che possono giouare al mondo, torna di grandissimo biasmo. Il reuerendo Don Niccola Vicentino di Vicentini, non uolendo incorrere in questo errore, fa per la presente manifesto, per beneficio vniuersale della Musica, come egli con lunghissima fatica e continuo studio, ha ritrouato è posto nouamente in pratica vno Arciorgano di mirabilissimo artificio & armonia, il quale si vede manifestamente hauer suplito a molte imperfettioni che si ritrouano ne gli Organi or dinarij, & hauer fatto l'organo perfetto.

Messer Vincenzo Colombo, eccellentissimo in questa professione di organi, è stato quello il quale, ha posto in opera il detto Arciorgano secondo l'inuentione de l'armonia de l'autore, il quale con stupendo artificio l'ha in questa forma ridotto.

Tutte le canne son fatte di legno accioche stia lungo tempo accordato, e renda dolce intonatione; la canna piu lunga è di sette piedi, ma per commodità di poterlo portare a viaggio, le sette canne maggiori sono state voltate di sopra in giu, tal che la canna piu lunga in apparentia nella facciata dinanzi rimane di cinque piedi, & questo si è fatto a fine che si possa trasportar di loco in loco per commodità di quei Principi che'l voranno godere.

Tutto disfatto e posto ne i suoi forcieri non sera la carica d'vn mulo, e sarà facile il mettetlo insieme, e non v'andra piu tempo di quattro, o cinque hore.

Il numero de le canne sono in tutto cento venti sei di voce graue e dolcissima, & ha cento ventisei tasti & altre tanti catenacci, le canne son poste in quattro ordeni in modo di vna mitra, & col sommiero tanto bene ordinato, con cento ventisei animelle, che per il suo marauiglioso artificio, oltra la sua dolcissima armonia, è bellissimo da uedere, con cento ventisei tasti, son talmente disposti che rallegrano a vederli commodi alla pratica del sonatore, accommodati in si breue spatio, che non occupano piu luogo della lunghezza & larghezza della tastatura ordinaria de ogni organo.

L'acquisto, e la richezza dell'armonia, e di gradi che ha con tante corde aggiunte alla tastatura del comune orgono, che tutte mancauano; è questa, che ui si guadagna tutta la Musica perfetta Diatonica semplice e mista, e cinque sorti di consonantie in tal pratica mai piu non vdite ne vsate.

Prima si son guadagnate le quinte perfette sopra i tasti bianchi del comune organo che fanno vno vdir mirabile, poi due sorti di terze, vna maggiore, & l'altra minore, e similmente due sorti di seste doue auiene che quando le quinte perfette son toccate insieme con le terze perfette, empieno di tanta armonia l'orecchie, che meglio *in terra non si* puo sentire.

Si sono ancora acquistati molti gradi d'accenti che fra tasti si ritrouano, accommodati, a varie sorti di pronuntie, simili alla pronuntia humana, di modo che proui pure vn cantore de intonar qual si voglia vocce, l'organista haurà sempre modo di rispondergli nel medesmo tuono sopra vno de tasti del detto perfetto organo, e sopra di quello potrà dar principio a sonar de tutti i tuoni, cosa di ammiratione grandissima nella professione della Musica, il simile auerrà nelle chiese, che ogni Maestro di cappella potrà intonare, o fare intonare, qual si voglia vocce in choro che tornerà commoda a suoi cantori, & l'organista col detto instrumento sempre risponderà in tuono, e se per sorte, cantando i cantori, cresceranno ouer caleranno, l'organista potrà sempre accordar co' cantori nel fin de la lor voce, con bel modo potrà ritornare nella prima intonatione, che alcuno non se n'accorgerà.

Si ha ancor in questo instrumento questo guadagno che nel concertare varie sorti d'instrumenti non occorre accordarli con detto Arciorgano, ma sia qual sonatore si voglia di liuto di viola o d'altro, potrà accordare indisparte a suo modo il suo liuto, o la sua viola sempre accorderà con detto Arciorgano; perche è di tal ricchezza, e perfettione che ha il modo di accordarsi subito, con tutti gli istrumenti e con tutte le voci.

Si è fatto questo primo d'vn registro solo, ma si potranno gli altri far di piu registri, e da camera e da chiesa secondo l'intentione di chi vorrà seruirsene.

Sopra questo instrumento si possono sonare tutti i tre generi della Musica cio è il Diatonico, il Chromatico, & l'Enarmonico, in ogni tasto caminando però d'vno in altro tasto, & anchor tutte le sorti di Musica. antiche, & moderne con commodità di comporre, e di sopra cantare, e sonare tutti i modi di cantari e di aeri secondo l'idioma che da natura cantano tutte le nationi del mondo, cio è se l'inuentore della sopra detta armonia, sentirà cantare vn Spagnuolo, vn Francese, vn Polonio, vn'Inglese, vn Turco, o vero vn'Hebreo, ancora che tutte le nationi del mondo sian differenti di pronuntie, e di uarij accenti, egli seriuerà e comporrà a quattro & a piu voci quel suo cantare con maggiore armonia, & con piu consonantie che non si fa nella Musica comune, e potrà dette compositioni cantare con gran diletto de gli ascoltanti sopra il detto Arciorgano.

Molte altre commodità sono in detto instrumento, come sarebbe a dire da imparare a sonare, & a cantare le pronuntie delle passioni delle parole, cosa che non si puo se non in qualche parte nella comune Musica; quando dolce, quando amaro, quando allegro, quando mesto, quando soaue, quando aspro, quando ombroso & oscuro, e quando lucido, e chiaro, quando pio e diuoto, e quando crudele e disperato, quando di lamentatione e di pianto, quando di allegrezza e di iubilatione, quando morto, e quando viuo, secondo l'affetto che vuol muouere il sonatore; tutto questo appresso a gli altri, e stato grandissimo acquisto, hauendo ritrouatto il modo del cantare, e con armonia comporre, e sonare, i modi del cantare di tutte le nationi del mondo.

Piu oltre tra gli altri modi di comporre, e di sonare, ve n'è vno da comporre vna Musica da far recitar, ad vn cantor solo con l'instrumento, e sarà Musica tale, che da quello s'vdirà recitare ogni sorte di parole, ouer parlar alquanto alto accompagnato dall'armonia.

Tutte le sopradette cose ogni giorno sono vedute, & vdite da molti Signorri, & gentilhuomini, & da molti altri, e chi piu s'intende di Musica, piu si marauiglia di tale inuentione, conoscendo chiaramente, che con detto instrumento, gli eccellenti pratici de la Musica commune possono imparare a sonare & a cantare questa noua Musica in vn mese, o poco piu, secondo che piu e meno vi faranno studio.

L'autore di detta armonia, ha seco vn Clauicembalo fatto al modo dell'Arciorgano con altre tanti tasti per poter studiare sopra quello, e fin' hora egli vi sona alquante compositioni, che ricercano, parte diatonica mente tutti i tasti, e parte misti di varie sorti de gradi, caminando da vn tasto all'altro con belli accordi in proposito delle parole con vario proceder d'armonia e de gradi.

L'Inuentore di questo Arciorgano l'ha voluto publicare, a fine, che se ad alcuno di quelli Principi che si dilettano di fauorire quelle inuentioni che diano giouamento a l'arti & a le scientie, e conseguentemente al mondo; piacesse d'vdirlo, o di porlo in pratica se ne possi preualere facendo sapere a quel generoso Principe che'l detto inuentore, gli donarà il Clauicembalo, l'Arciorgano, e se stesso offerendosi d'insegnare il modo di sonarlo ad ogn'vno che ne sarà desideroso, & appresso d'insegnar di cantare quei due generi di Musica, che hoggi non sono in vso i quali si poranno cantare, nelle chiese & nelle camere, & communicarà quelli ad ogn'vno, a laude del'eterno Idio, & tutta quella virtù, che con vn studio di tanti anni s'ha acquistata, per beneficio del mondo, & a perpetua memoria de presenti, & di quelli che verranno dopo noi per molti secoli.

IN VENETIA, Appresso Nicolo Beuil'acqua. 1561. Adi 25. Ottobrio.

Fig. 8: Advertising sheet of the *arciorgano*, Venice 1561 (Museo internazionale e biblioteca della musica di Bologna, C.32).

In the list of advantages, the three *genera* are mentioned only briefly and in passing; where at the centre of this 'organo Perfetto' are (again and to mention only a few)

- 'the richness of *armonia*, and of steps it has with so many pitches added to the keyboard of the common organ, that they [the common organs] all lack' ('la richezza dell'armonia, e di gradi che ha con tante corde aggiunte alla tastatura del comune orgono, che tutte mancauano'; line 19)
- the 'many gradations of accents which can be found among the keys, accommodated to various kinds of pronunciation, similar to the human pronunciation' ('molti gradi d'accenti che fra tasti si ritrouano, accommodati, a varie sorti di pronuntie, simili alla pronuntia humana'; line 25)
- 'to learn to play, and to sing the pronunciations of the passions of words' ('da imparare a sonare, & a cantare le pronuntie delle passioni delle parole'; lines 45–46)
- and 'to set a music to be recited by a single singer with the instrument ('da comporre vna Musica da far recitar, ad vn cantor solo con l'instrumento'; line 51).[40]

In addition to the other advantages emphasized by Vicentino — such as the ability to better accompany singers and other instruments with flexible tuning, allowing performers to move beyond the constraints of meantone tuning when using a keyboard instrument, and adjust slightly to enhance the tuning of certain chords — the goal of linking music theory and practice is also clear here. His ideas resonate far into the future and, in my opinion, provide more than enough motivation to build an *archicembalo* or *arciorgano*.

Bibliography

Richard J. Agee, 'The Privilege and Venetian Music Printing in the Sixteenth Century', PhD diss., Princeton University, 1982

Patrizio Barbieri, *Enharmonic Instruments and Music 1470–1900. Revised and Translated Studies*, Tastata 2 (Latina, 2008)

Karol Berger, *Theories of Chromatic and Enharmonic Music in Late 16th Century Italy*, Studies in Musicology 10 (Ann Arbor, 1980) [PhD diss., Yale University, 1975]

40 Cf. Martin Kirnbauer, '"sonare & cantare le pronuntie delle passioni delle parole" – Annäherungen an Nicola Vicentinos *arciorgano*', in: *Stimme – Instrument – Vokalität. Blicke auf dynamische Beziehungen in der Alten Musik*, ed. Martina Papiro, Basler Beiträge zur Historischen Musikpraxis 41 (Basel 2021), 71–91, <https://schwabe.ch/martina-papiro-gross-geigen-um-1500-orazio-michi-und-die-harfe-um-1600-978-3-7965-4109-4?c=833> (accessed on 20 Dec. 2024).

Bonnie J. Blackburn, 'Musical Theory and Musical Thinking after 1450', in: *Music as Concept and Practice in the Late Middle Ages*, ed. Reinhard Strohm and Bonnie J. Blackburn, New Oxford History of Music III.I (Oxford, 2001), 301–45

Bonnie J. Blackburn, Edward E. Lowinsky and Clement A. Miller (eds.), *A Correspondence of Renaissance Musicians* (Oxford, 1991)

Davide Daolmi, 'Vicentino, Nicola', in: *Dizionario Biografico degli Italiani* 99 (2020), <https://www.treccani.it/enciclopedia/nicola-vicentino_(Dizionario-Biografico)/>

Michael Fend, *Gioseffo Zarlino, Theorie des Tonsystems – Das erste und zweite Buch der Istitutioni harmoniche (1573). Aus dem Italienischen übersetzt, mit Anmerkungen, Kommentaren und einem Nachwort versehen*, Europäische Hochschulschriften, Reihe XXXVI, Musikwissenschaft 43 (Frankfurt a.M. etc., 1989)

Franchino Gaffurio, *Practica musice* (Milan: Guillermus Le Signerre for Johannes Petrus de Lomatio 1496), <https://gallica.bnf.fr/ark:/12148/bpt6k15160772>

David Gallagher, 'Vicentino's missing music', in: *Zwischen Vieltönigkeit und Mikrotonalität. Materialen und Beiträge aus dem Forschungsprojekt «Studio31»*, ed. Martin Kirnbauer, Schola Cantorum Basiliensis Scripta 10 (Basel, 2024), 9–84, <https://schwabe.ch/Martin-Kirnbauer-Zwischen-Vieltoenigkeit-und-Mikrotonalitaet-978-3-7965-5193-2>

Sigrun Heinzelmann, 'John Hothby as Innovator: The Solmization System in La Calliopea Legale', in: *Studi Musicali*, N.S. 2 (2012), 353–96

David R.M. Irving, 'Ancient Greeks, world music, and early modern constructions of Western European identity', in: *Studies on a Global History of Music: a Balzan Musicology Project*, ed. Reinhard Strohm, SOAS Musicology Series (London/New York, 2018), 21–41

Henry William Kaufmann, 'Vicentino's Arciorgano: An Annotated Translation', in: *JMT* 5/1 (1961), 32–53

Johannes Keller, 'Das Basler *Arciorgano* und *Clavemusicum omnitonum*', in: *Zwischen Vieltönigkeit und Mikrotonalität. Materialen und Beiträge aus dem Forschungsprojekt «Studio31»*, ed. Martin Kirnbauer, Schola Cantorum Basiliensis Scripta 10 (Basel, 2024), 137–70, <https://schwabe.ch/Martin-Kirnbauer-Zwischen-Vieltoenigkeit-und-Mikrotonalitaet-978-3-7965-5193-2>

Johannes Keller and Martin Kirnbauer, 'Keyboards Adapted to Music vs. Music Adapted to Keyboards: An Essay on "Vieltönigkeit" and Keyboard Instruments', in: *Keyboard Perspectives. Yearbook of the Westfield Center for Historical Keyboard Studies* 12 (2019/20), 61–82

Martin Kirnbauer, 'Nicola Vicentino (1510–1577) – Ein biographischer Abriss', in: *Zwischen Vieltönigkeit und Mikrotonalität. Materialen und Beiträge aus dem Forschungsprojekt «Studio31»*, ed. Martin Kirnbauer, Schola Cantorum Basiliensis Scripta 10 (Basel, 2024), 3–8, <https://schwabe.ch/Martin-Kirnbauer-Zwischen-Vieltoenigkeit-und-Mikrotonalitaet-978-3-7965-5193-2>

Martin Kirnbauer, 'Viele Tasten – viele Töne. Das Cimbalo cromatico und musikalische Praxis', in: *Les espaces sonores. Stimmungen, Klanganalysen, spektrale Musiken*, ed. Michael Kunkel (Büdingen, 2016), 43–57

Martin Kirnbauer, *Vieltönige Musik: Spielarten chromatischer und enharmonischer Musik in Rom in der ersten Hälfte des 17. Jahrhunderts*, Schola Cantorum Basiliensis Scripta 3 (Basel, 2013)

Martin Kirnbauer, '"Vieltönigkeit" instead of Microtonality. The Theory and Practice of Sixteenth- and Seventeenth-Century "Microtonal" Music', in: *Experimental Affinities in Music*, ed. Paulo de Assis, Orpheus Institute Series (Leuven, 2015), 64–90, <https://library.oapen.org/handle/20.500.12657/32935>

Martin Kirnbauer, '"sonare & cantare le pronuntie delle passioni delle parole" – Annäherungen an Nicola Vicentinos *arciorgano*', in: *Stimme – Instrument – Vokalität. Blicke auf dynamische Beziehungen in der Alten Musik*, ed. Martina Papiro, Basler Beiträge zur Historischen Musikpraxis 41 (Basel 2021), 71–91, <https://schwabe.ch/martina-papiro-gross-geigen-um-1500-orazio-michi-und-die-harfe-um-1600-978-3-7965-4109-4?c=833>

Martin Kirnbauer, 'Das Werbeblatt für das *Arciorgano*: Edition, Übersetzung und Kommentar', in: *Zwischen Vieltönigkeit und Mikrotonalität. Materialen und Beiträge aus dem Forschungsprojekt «Studio31»*, ed. Martin Kirnbauer, Schola Cantorum Basiliensis Scripta 10 (Basel, 2024), 115–27, <https://schwabe.ch/Martin-Kirnbauer-Zwischen-Vieltoenigkeit-und-Mikrotonalitaet-978-3-7965-5193-2>

Martin Kirnbauer (ed.), *Zwischen Vieltönigkeit und Mikrotonalität. Materialen und Beiträge aus dem Forschungsprojekt «Studio31»*, Schola Cantorum Basiliensis Scripta 10 (Basel, 2024), <https://schwabe.ch/Martin-Kirnbauer-Zwischen-Vieltoenigkeit-und-Mikrotonalitaet-978-3-7965-5193-2>

Nicolas Meeùs, 'Enharmonic keyboard', in: *New Grove2*, xiii (London, 2001), 248–50

Claude V. Palisca, 'Foreword by the Series Editor', in: *Nicola Vicentino, Ancient Music Adapted to Modern Practice*, trans. by Maria Rika Maniates, Music Theory Translation Series (New Haven/London, 1996), vii–viii

Claude V. Palisca, *Humanism in Italian Renaissance Musical Thought* (New Haven/London, 1985)

Isabella Palumbo Fossati, 'La casa veneziana di Gioseffo Zarlino nel testamento e nell'inventario dei beni del grande teorico musicale', in: NRMI 20 (1986), 633–49

Rudolf A. Rasch, 'Why were enharmonic keyboards built? From Nicola Vicentino (1555) to Michael Bulyowsky (1699)', in: *Chromatische und enharmonische Musik und Musikinstrumente des 16. & 17. Jahrhunderts – Beiträge zu einem Kolloquium der Schola Cantorum Basiliensis, Hochschule für Alte Musik Basel, und dem Musikwissenschaftlichen Institut der Universität Basel am 9. April 2002*, ed. Thomas Drescher and Martin Kirnbauer, in: *Schweizer Jahrbuch für Musikwissenschaft* 22 (2002), 11–250, <https://www.e-periodica.ch/digbib/view?pid=sjm-004%3A2002%3A22 - 40>

Franz Josef Ratte, *Die Temperatur der Clavierinstrumente: Quellenstudien zu den theoretischen Grundlagen und praktischen Anwendungen von der Antike bis ins 17. Jahrhundert*, Veröffentlichungen der Orgelwissenschaftlichen Forschungsstelle im Musikwissenschaftlichen Seminar der Westfälischen Wilhelms-Universität Münster 16 (Kassel etc., 1991)

Alexander Rehding, 'Instruments of Music Theory', in: *Music Theory Online* 22/4 (2016), <https://mtosmt.org/issues/mto.16.22.4/mto.16.22.4.rehding.html>

Volker Rippe, 'Nicola Vicentino – sein Tonsystem und seine Instrumente: Versuch einer Erklärung', in: *Mf* 34 (1981), 393–413

Francesco de Salinas, *De musica libri septem* (Salamanca: Mathias Gastius, 1577), <http://bdh-rd.bne.es/viewer.vm?id=0000046156&page=1>

Albert Seay (ed.), *Johannes Hothby: Tres tractatuli contra Bartholomeum Ramum*, CSM 10 (Rome, 1964)

Christopher Stembridge 'The *Cimbalo cromatico* and Other Italian Keyboard Instruments with Nineteen or More Divisions to the Octave', in: *PPR* 6 (1993), 33–59, <https://scholarship.claremont.edu/ppr/vol6/iss1/>

Nicola Vicentino, *L'antica musica ridotta alla moderna prattica* (Rome: Antonio Barrè 1555), <https://vicentino21.ch>

Denzil Wraight, 'Checklist of Italian Harpsichords and Virginals with Split Sharps' (2016) <http://www.denzilwraight.com/download.htm>

Denzil Wraight, 'The *cimbalo cromatico* and other Italian string keyboard instruments with divided accidentals', in: *Chromatische und enharmonische Musik und Musikinstrumente des 16. & 17. Jahrhunderts – Beiträge zu einem Kolloquium der Schola Cantorum Basiliensis, Hochschule für Alte Musik Basel, und dem Musikwissenschaftlichen Institut der Universität Basel am 9. April 2002*, ed. Thomas Drescher and Martin Kirnbauer, in: *Schweizer Jahrbuch für Musikwissenschaft* 22 (2002), 11–250, <https://www.e-periodica.ch/digbib/view?pid=sjm-004%3A2002%3A22 - 110>

Denzil Wraight, 'The Tuning of Trasuntino's "Clavemusicum Omnitonum" and Zarlino's Enharmonic System' (2024), <https://www.denzilwraight.com/publications.htm>

Denzil Wraight and Christopher Stembridge, 'Italian Split-Keyed Instruments with Fewer than Nineteen Divisions to the Octave', in: *PPR* 7 (1994), 150–81, <https://scholarship.claremont.edu/ppr/vol7/iss2/>

Irwin Young, *The 'Practica musicae' of Franchinus Gafurius, Translated and Edited with Musical Transcriptions* (Madison/Milwaukee/London, 1969)

Gioseffo Zarlino, *Le Istitutioni harmoniche* (Venice: author, 1558)