Piedmont scholars and harmonic theory applied to architecture

In the mid-eighteenth century the best known group of Italian scholars who dealt with theme of harmonic theory in architecture was the so-called schola riccatiana, from Treviso. This society included many mathematicians, architects, physicists – first and foremost the famous mathematician Count Jacopo Riccati – who debated the applications of musical proportions in architecture, writing treatises and essays on this topic, which was well-known throughout Europe.

The use of musical ratios in architecture had a certain echo in Piedmont too. Some famous architects, such as Bernardo Antonio Vittone and his collaborator Giovanni Battista Galletto, approached these topics in architectural theory. The famous European architect from Piedmont, Giovanni Battista Borra, also seemed to be interested in harmonic topics, as well as a less well-known architect, Francesco Ottavio Magnocavalli from Casale Monferrato. Magnocavalli earned a certain amount of fame in this arena. But as we will see, the debate reached as far as Turin academies.

Bernardo Antonio Vittone, who wrote about musical proportions in his two treatises, Istruzioni elementari per l’indirizzo di giovani allo studio dell’architettura civile (1760) and Istruzioni diverse concernenti l’ufficio dell’architetto civile (1766), is the most famous architect concerned with this topic. In both of these works Vittone showed his knowledge of music theory and tried to apply the numbers of music to the parts of buildings. Many critics studied the contents of his treatises. In addition to the second treatise, we can also consider the so-called Istruzioni armoniche, o sia Breve trattato sulla natura del suono, written by Vittone’s collaborator Giovanni Battista Galletto, which was a related insert that examined elements of music theory, the way sound was propagated, and elements of acoustic physics. The presence of such a long chapter dedicated to music is unusual in an architectural treatise, especially since it didn’t contain any interesting paragraphs on acoustic problems. Moreover, the ideas set out by Galletto were somewhat confused and written rather unsystematically, and were related with cabbala concepts, such as the mystic nature of the number 22, which concluded ended the entire essay. We...
also know that at the end of his life Galletto wrote a long manuscript, now conserved at the Archivio di Stato in Turin, entitled *Clavis sacra profundiora*, a very elaborate essay in Latin. This difficult manuscript is a personal lecture on the world according to the cabbala, and was directly connected to some of the contents of the *Istruzioni armoniche*. The presence of *Istruzioni armoniche* in Vittone’s second treatise shows that Vittone and Galletto were both interested in harmonic theory and in mystic topics.

Giovanni Battista Borra dealt with the theory of musical proportions in architecture. News of this arrived from a nobleman of Turin, Vincenzo Amedeo Ferrero di Ponziglione, Magnocavalli’s first biographer. In 1790 Ponziglione reported contacts between Magnocavalli and Giovanni Battista Borra. He also noted that Borra had written some papers on harmonic architecture and that the famous Count Prospero Balbo owned those documents:

*Sulle proporzioni armoniche pur anche si hanno alcuni pregevoli manoscritti del rinomato architetto piemontese Borra, il quale era in corrispondenza con il Conte Magnocavalli. Questi manoscritti sono posseduti dal ch. sig. Conte Prospero Balbo* [Ponziglione 1790: 12].

However, none of the historians who have searched for these manuscripts have managed to find them in the Archives of Piedmont. There is not even a reference to the presence of harmonic topics in Borra’s treatise, *Trattato della cognizione pratica delle resistenze geometricamente dimostrato*, which was a technical work that dealt with problems such as arches, building materials, etc.

Magnocavalli and Borra came into contact in spring 1759 over technical matters regarding the embankment of the Po River in Casale. Magnocavalli went to Turin to find an architect to carry out this work, and there he moved in the capital’s circles. The count entrusted this task to Borra, and thus began a friendship that soon afterwards turned to exclusively architectural matters. In fact some years later, in 1765, Magnocavalli asked Borra for an opinion about the roofing of the Palladian theatre in Vicenza, following a request from his friend, Count Arnaldi. The document, now in the Fondo Gonzati in the Biblioteca Bertoliana in Vicenza, attests to Borra’s interest in the aesthetic problems of the theatre and was a direct consequence of the friendship with the count of Casale.

Even though Borra’s manuscript has not been found, if Ponziglione’s news is correct it seems reasonable to suppose that Borra and Magnocavalli might also have shared their mutual interest in harmonic architecture. Obviously the nature of such an exchange cannot be evaluated in a documentary context, but supports the hypothesis of interesting cultural exchanges on the harmonic topics between two famous architects in Piedmont in the second half of the eighteenth century.

In 1730, Borra trained at the studio of Bernardo Antonio Vittone, which leads us to hypothesize that they shared an interest in the application of musical proportions to architecture as well. Thus, although his harmonic manuscript has been lost, we can state that Borra received his suggestions about the application of musical numbers to architecture from different sides.

**Francesco Ottavio Magnocavalli**

The most important participant in the debate on harmonic architecture in Piedmont is Count Francesco Ottavio Magnocavalli (1707-1788) from Casale Monferrato. His contributions to this topic are better documented. Magnocavalli took his degree in law,
but he was above all a scholar, interested in architecture, music, mathematics, technical topics, physics and literature. All his interests are documented in a large manuscript archive and in a very large library, inherited from his father and enlarged by him but dispersed after the extinction of the family. During his long life he held some important political offices in his town. He was also interested in antiquities and in theatre, being involved in some consultations related to this topic, such as the reconstruction of the roofing of the Palladian theatre in Vicenza, and the rebuilding of the Casale’s Teatro Trincotto. He lived all his life long in his native town, but he made two journeys, the first to the Veneto in 1756, when he was architect Enea Arnaldi’s guest, and another in 1759 to Turin, where he met some of the members of the nobility as well as the most famous local architects. As an architect he designed several churches and buildings in Casale and surrounding areas (fig. 1), and in the final part of his life he wrote tragedies that brought him fame in national competitions.

Fig. 1. The facade of the church of SS. Vittore and Quirico designed by Magnocavalli, Odalengo Grande, Piemonte

Angelo Comolli, in his Bibliografia storico-critica dell’architettura e arti subalterne of 1791, attested to his reputation as one who was competent in harmonic themes:

L’accennato manifesto dell’opera del Ricciolini diede motivo al sig. Conte Francesco Ottavio Magnocavallo di Casal Monferrato di scrivere alcuna cosa sull’architettura armonica in una lettera al sig. Filippo Gastaldi avvocato romano, in data 23 giugno 1773. Essa è breve ma piena di cose, ed io ne ho una copia, che tengo preparata per la suddetta Raccolta di Opuscoli di belle arti [Comolli 1788-1792: III (1791), p. 233].
According to Comolli, Magnocavalli took part in the debate on harmonic architecture by writing a personal contribution in a letter to the Roman lawyer Filippo Gastaldi, but until now no scholar has tried either to find that letter or to reconstruct Magnocavalli’s harmonic theory. On the other hand, Comolli never published the *Raccolta di opuscoli* which was supposed to have contained Magnocavalli’s contribution, and there is no archive of Comolli’s documents. Thus today it is impossible to know anything about that document. However, in spite of the loss of the letter, we do have a number of Magnocavalli’s manuscripts concerning harmonic subjects, now conserved in the historic archives of the municipality of Casale Monferrato.

Magnocavalli’s letter to Gastaldi wasn’t found in the Magnocavalli archives, or in any other archives, but there is another interesting letter to Filippo Gastaldi written in 1772 [ASCCM-FM: folder 249]. Until now, this letter was not considered to be very important in the study of Magnocavalli’s thinking, but we believe that it is quite revealing.

![Fig. 2. The first page of Vincenzo Corazza’s letter to Gastaldi conserved in the Historic Archives in Casale Monferrato](image-url)
The letter was written to the abbot scholar Vincenzo Corazza and the subject is the theatre of Herculanum. We don’t know if Gastaldi and Magnocavalli ever actually met in person, but the presence of this letter in the Casale archives proves that Magnocavalli and Gastaldi knew each other in the 1770s and that they shared interests in antiquities. Further, Magnocavalli is sometimes mentioned in some of Gastaldi’s letters to Corazza, dating from 21 April 1772 to 25 March 1774 and archived in the Fondo Corazza at the Biblioteca Nazionale di Napoli [BNN-FC: Ms. X AA 29/19].

This group of letters deals with the circle of Arcadia in Rome. We can presume that Gastaldi was a member of that circle, although there are no documents that attest to it. In these letters Magnocavalli is shown to be well known as a writer of tragedies; in 1772 he won the second prize at the National Competition of Parma with his tragedy Corrado and gained fame all over Italy.

In one of these letters Gastaldi wrote about Corazza’s letter on the ancient theatre of Herculanum, which he had lent to Magnocavalli:

… sabato … ricevetti la dottissima vostra dissertazione intorno al Teatro di Ercolano … Come l’avrò fatto vedere ad alcuni più voglio mandarlo … al Sig. Conte Magnocavallo, autore del Corrado tragedia che ottenne il premio in Parma e architetto intelligentissimo, sotto condizione però di riaverlo [BNN-FC: Ms. X AA 29/19, letter dated 13 October 1772].

This passage shows that the letter cited is the one archived at Casale; evidently Magnocavalli never returned it to Gastaldi.

This allows us to see that in the 1770s there was a direct epistolary relation between Magnocavalli and Gastaldi, and we can consequently suppose that Comolli’s report that he possessed a letter about harmonic topics from the Piedmontese Count to the Roman lawyer is really true.

We also found, at the Biblioteca Mai in Bergamo, another letter by Gastaldi written in 1777 in Turin and addressed to another scholar, Pietro Antonio Serassi. Although the letter was simply a claim for a wrong forwarding of a book, it does show that Gastaldi stayed in Turin for a period. This doesn’t necessarily mean that on that occasion Gastaldi met Magnocavalli, but future research may clarify this.

In any case, we can say that Magnocavalli wrote something to Gastaldi about harmonic theory. We also know that in 1767 Magnocavalli expressed his intention to write a treatise on the ideal of beauty in architecture; in a letter dated 5 September 1767 he wrote to his friend Arnaldi: “Potrebbe però accadere che una volta tentassi di proposito un argomento che apporterebbe molta luce all’arte di cui ragiono …” [Fiorioli 1872: 21].

Some fundamental works on the history of harmonic architecture appeared in the Count’s “cattalogo dei libri da provvedersi” [ASCCM-FM: folder 168, file 7], a summary of the books desired or acquired by the count. These books were also mentioned by Blondel and later by Comolli: Ouvrard’s Architecture Harmonique, Wotton’s Elementi di architettura, Villalpandi’s Commentarius in prophetam Ezechielem, Lauterbach’s Compendium architecturae, and the Abbè de Saint Hilarion’s Application de la proportion geometrique avec parties de la architecture. Since Ouvrard’s book was no longer available by that time, we must suppose that Magnocavalli’s interest in harmonics started with Blondel’s Cours d’architecture [1683]. The French architect gathered the
legacy of harmonic topics from the sixteenth- and seventeenth-centuries theorists and handed down it to those of the eighteenth century.

Magnocavalli probably began to address harmonic theory during his journey to the Veneto in 1756, where he saw Palladian buildings and met the count Enea Arnaldi, with whom he had corresponded since 1750. This journey strengthened their friendship and had a great influence on Magnocavalli’s style. Many scholars consider this moment as a turning point in his architecture. Since travelling to the Veneto Magnocavalli had started to study the relationship between music and architecture, and in 1767, in a letter addressed to Arnaldi, he openly showed that he was convinced of it:

> Ho appoggiata l’opinione che le ragioni e le proporzioni le quali formano le consonanze musicali e rendono soave ed armonioso un concetto sieno quelle medesime che costituiscono nella massima parte la bellezza reale dell’architettura… [Fiorioli 1872: 21].

Contents related to harmonic theory can be found in several among the dozens of Magnocavalli’s manuscripts that exist. These documents, dating from 1756 to 1771, contain excerpta drawn from works of authors who dealt with harmonic architecture (Riccati, Palladio, Blondel) and from music treatises, and include letters on the idea of the beauty in architecture, personal essays, some quite interesting exercises on musical proportions applicable to architecture, as well as personal meditations and notes. It is quite difficult to reconstruct the development of Magnocavalli’s harmonic thinking because the documents are rarely dated, and it is impossible to know where and when he read the treatises of reference. However it is possible to define Magnocavalli’s thinking overall.

Ponziglione’s biography had led scholars to believe that among the Count’s manuscripts there was a well-defined harmonic treatise:

> Evvi un saggio sul bello reale dell’architettura, alcuni trattati sulle proporzioni armoniche, ne’ quali si spiega la relazione che queste possono avere colla musica, e sebbene quest’argomento sia stato da altro autore discusso, sappiamo per altro che il conte Magnocavalli lo precedette [Ponziglione 1790: 12].

Other reviewers after Ponziglione underlined the existence of this document, but a recent and accurate analysis has proved that this belief is groundless; it appears that the letter to Arnaldi dated 5 September 1767 was confused with an actual treatise on harmonic proportions.

In this letter Magnocavalli wrote about ancient basilicas, because Arnaldi had written a book [Arnaldi 1767] on this theme, and had started discussing this topic with the Piedmontese count. Magnocavalli showed that he was familiar with the contents of Arnaldi’s book, and expressed his belief in the usefulness of harmonic proportions for achieving absolute beauty in architecture. Moreover, the letter shows that he had read the treatises of the most important architects and theorists of architecture of the past, such as Vitruvius, Palladio, Sebastiano Serlio, Daniele Barbaro and Berardo Galiani. This fact confirms that the Count had studied these books in depth to learn the principal elements of architectural theory that he needed for his own practice as an architect.

In the first part of the letter Magnocavalli describes the musical proportions he had found in the Ionic pedestal of Palladio’s project of basilica and explained which musical intervals they corresponded to:
… mi contenterò di osservare che le parti componenti il medesimo sono tutte in
ragione armonica, poiché il basamento è alla cimasa come due a uno, il tronco al
basamento come quattro a due … e il tronco alla cimasa come quattro a uno …
[Fiorioli 1872: 15].

In the second part of the letter Magnocavalli expressed his opinion about a building
by Arnaldi, the Curia. Even here Magnocavalli found some musical proportions: once
more the Count showed his belief that musical numbers lent unquestionable beauty to
architecture:

… mi diletta in essa la ragion de’ lati, i quali essendo come tre a due,
compongono la diapente ossia la quinta, soave consonanza della musica. Ne’
meno armoniose sono le camere … imperocchè la dimensione delle due prime
hanno fra loro la ragione di uno a due, formando la diapason … ed i lati di
amendue le ultime sono, se non rigorosamente almeno a un dipresso, il che
l’occhio non distingue, in ragione di cinque a sei, che è … la terza minore
[Fiorioli 1872: 17-18].

In this quotation there’s a very interesting passage, where Magnocavalli admits a sort
of relativity of the eye’s vision and consequently suggests a ratio, that is similar but not
exactly equal to third major, despite of his adhesion to harmonic theory. The problem
of the different way that eye and ear perceive ratios resurfaces here very clearly. This
had been debated since the previous century, when theorists such as Claude Perrault started
to give importance to taste in opposition to those who wanted to prescribe strict rules for
achieving ideal beauty in the arts. There had been a famous querelle between Perrault
and Blondel which even involved the musical analogy, with its supporters and opponents.

Despite this slight correction, Magnocavalli ended the passage writing that “… tutto
è armonia nella vostra distribuzione” [Fiorioli 1872: 18]. He then noted musical ratios
between the three orders Arnaldi used in the Curia, and finally ended by stating his
intention to write a treatise on harmonic architecture dedicated to Arnaldi. As we know,
the treatise was never written. However, there are some manuscripts in the Fondo
Magnocavalli that can be considered as part as a planned treatise or documents at the
proof stage.

In particular, there are three manuscripts: Trattato di architettura civile, Saggio delle
ragioni e delle proporzioni relative all’architettura and Proporzioni armoniche. The first
is disappointing, despite the title. The nine-page document deals with arithmetic,
without tackling any architectural problem. In contrast, Saggio delle ragioni e delle
proporzioni relative all’architettura is directly connected with the musical theme. As a
matter of fact Magnocavalli wrote:

L’armonia delle parti nell’Architettura è la principale cagione da cui deriva la sua
bellezza; ed essa non solo riguarda le ragioni, le proporzioni, e gli ornamenti di
una facciata … ma si estende … agli interni e specialmente richiede che la
lunghezza di una sala … abbia ragione conveniente colla larghezza e ad amendue
corrisponda l’altezza proporzionata, di modo che ne risulti quella certa armonica
unità che è il carattere della bellezza [ASCCM-FM: folder 168, file 3, p. 1].

In this passage there’s a general concept of building based on musical harmonies
regarding both exterior and interior elements of a building. Then Magnocavalli reasserts
the necessity of using musical numbers in the project: … le diverse dimensioni de’
membri degli edifici debbono esser tali che formino, per così dire, le consonanze nell’architettura uniformi alle musicali [ASCCM-FM: folder 168, file 3, p. 2].

In a successive passage the author underlines once more the difference between visual and acoustic perceptions that we previously noted in the letter to Arnaldi: “… l’occhio non è giudice tanto severo quanto l’orecchio, e pertanto tollera alcune licenze, che sarebbero insopportabili a questo [ASCCM-FM: folder 168, file 3, pp. 1-2].

The manuscript ends with a list of all musical consonances and their numbers, including the seventeenth, the nineteenth and the tenth.

In the third document, Proporzioni armoniche, Magnocavalli examined the musical proportions that could be used for two- and three-dimensional elements of architecture. The first case was related to small, medium and large rooms. Here Magnocavalli listed only the consonances of unison, octave, fourth, fifth, double octave and fifth above the octave and applies each of them according to the type of the room. We can note that this passage was directly inspired by Leon Battista Alberti, who in fact defined the same proportions for small, medium and large rooms [Alberti 1966: IX, vi, p. 824]. Thus the contents of this document cannot be considered an original idea by Magnocavalli, but he does agree with Alberti’s opinion.

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In the final analysis, Magnocavalli’s original documents about harmonic theory are not elaborate enough to allow us to suppose that he was capable of compiling a treatise on this theme. Nevertheless, his interest in this topic was earnest and enduring, and his attempts to apply harmonic theory to buildings demonstrate it.

It must be noted that in September and October 1756, and some twenty years later, in late summer of 1767, Magnocavalli intensified his reflections on harmonic themes, producing some designs in which he directly applied musical proportions to elements of architecture.

The first period probably felt the effects of his recent travels to the Veneto, as attested by a group of manuscripts containing the Memoria per una casa ad imitazione della Rotonda di Andrea Palladio, dated 23 September 1756, the Memoria per una casa di
villa dated 2 October 1756, and other incidental writings dedicated to specific aspects of the design.

First of all it must be kept in mind that Magnocavalli is an amateur architect, so he didn’t have the competence of a professional. His designs were drawn with a list of elements and their measures, which need to be transformed into images in order to furnish the representation of the architectural element.

All the documents of 1756 related to the design of the same villa; the manuscript of 2 October was more detailed than that of 23 September. Musical proportions appeared only in the first of them; instead these emerged in the incidental writings.

The villa was a perfect square with four loggias with six Ionic columns each, and shows that his model was Palladio’s Villa Capra in Vicenza. In this structure Magnocavalli embraced musical proportions:

… in questo modo l’altezza sino sotto all’architrave è appunto la metà della lunghezza delle logge, ed è eguale all’estensione delle due ali … il che fa una proporzione armonica di unisono e di ottava. Le ali altresì prese insieme hanno un unisono con le logge e prese separatamente fanno un’ottava con esse ed un unisono tra loro [ASCCM-FM: folder 168, file 3, p. 2].

Musical ratios emerged in the incidental documents for this design, in which Magnocavalli chose the proportions of the single rooms of the villa. You can find explicit references to the major third, fourth, fifth and double fifth, double octave and to their harmonic equivalences. For example, in the incidental writing Memoria per le proporzioni, we read: “La sala è in proporzione della lunghezza delle camere come 4:3, che è una quarta” [ASCCM-FM: folder 168, file 3, p. 2].

In Memoria per le altezze there is another musical reference: “Altezza dal piano di terra all’origine delle scale sino al piano della loggia mod. 2:31:1/4 il che dà la proporzione con tutto l’ordine ionico di 1:4, che è una doppia ottava” [ASCCM-FM: folder 168, file 3].

The second phase of Magnocavalli’s interest in harmonics went from August to October 1767, when he wrote three other harmonic documents. They are: Metodo per ornare le Porte, le Finestre e le Nicchie ad imitazione degli Ornamenti usati da’ buoni Architetti, Divisione armonica di una cornice (similar to Divisione di una cornice che non abbia gola rovescia sopra il gocciolatoio written on the same day) and Memoria per l’ordine corinzio.

For the second time Magnocavalli showing a renewed interest in musical topics. We believe that this is related to the friendship with Arnaldi. It might be that Arnaldi stimulated Magnocavalli to write something about harmonic theory, or that Magnocavalli wanted to return to Arnaldi the favour of his having dedicated his Idea di un teatro Nelle principali sue Parti simile a` teatri antichi [1762] to him.

However, Magnocavalli wrote this second group of harmonic documents during the same period in which he expressed the intention to write an harmonic treatise of his own. This is why we think that this group of documents might be exercises to test the direct application of musical numbers to architecture with a view to writing a treatise.

In Metodo per ornare le Porte, le Finestre e le Nicchie, written on 9 August 1767, the motivation of the musical ratios for architectural beauty was based on the analogy
between beauty perceived by the ear and beauty perceived by the eye: “tutta questa cornice è piena di consonanze musicali, che un dilettevole effetto debbon produrre all’occhio, come tali suoni produrrebbero all’orecchio” [ASCCM-FM: folder 168, file 3, p. 4].

According to this statement, which concludes the document by giving an aesthetic motivation, Magnocavalli’s reasoning started from the first division, the height of the architrave, according to Palladio’s opinion: “giusta il parere di Andrea Palladio, esser deve la quarta, la quinta, la sesta parte della larghezza delle porte, finestre o nicchie, secondo che più o meno leggero convien che sia l’ornamento loro” [ASCCM-FM: folder 168, file 3, p. 1]. Then, the musical division determines the ratios between the architrave and the other two elements of the entablature, such as frieze and cornice: the ratio between architrave and frieze is 4:3, and that between architrave and cornice is 4:5.

The first part of the manuscript is dedicated to the division of the various mouldings of architrave, frieze and cornice and to the musical significance of each ratio. Magnocavalli showed the existence of the numbers of these musical intervals: unison, fourth, fifth, octave, double and triple octave, twelfth, major seventeenth, major third, major sixth.

The Divisione armonica di una cornice and the similar Divisione di una cornice che non abbia gola rovescia sopra il gocciolatoio were both written on 11 August 1767, two days after the writing of Metodo per ornare le Porte, and show that Magnocavalli in those days was very concerned with this type of exercise. Musical proportions appeared only in the first manuscript, the second being a sort of variant of the first one.

The Divisione armonica is a three-part document: in the first Magnocavalli showed the values of each part of the cornice; in the second he explained the ratios between the parts, and in the third he referred each ratio to a musical interval. Here once more he found the unison, the double octave, the fifth, the fourth, the major third, the major sixth, the major tenth, the major seventeenth, i.e., the major third on the double octave.

Two months later Magnocavalli wrote Memoria per l’ordine corinzio [ASCCM-FM: folder 168, file 3], dated 6 October 1767, another attempt to apply musical numbers to the elements of an order. In the first part Magnocavalli assigned exact numbers to each part of the Corinthian order, and in the second part he explained once again the musical nature of each ratio:

Beneficiando la cornice colla colonna unita alla base e capitello si averà la proporzione … di 1 a 12 … che … può considerarsi come la doppia ottava della dodicesima della colonna con base e capitello. Paragonando l’architrave colla suddetta colonna con base e capitello sono nella ragione di 600 a 40, che si riduce a quella di 1 a 15 … che … è la dodicesima della diciassettesima maggiore …. Paragonando il fregio colla suddetta colonna con base e capitello essa è nella ragione di 600 a 30 che si riduce all’altra di 1 a 20, e … sarà la doppia ottava della diciassettesima maggiore. Paragonando tra loro i suddetti membri la cornice e l’architrave sono fra loro come 5 a 4 e sarà una terza maggiore. La suddetta cornice col fregio è come 2 a 5 il che forma il diapason col ditono o decima, o sia terza maggiore sopra l’ottava. Il fregio e l’architrave sono tra loro come 3 a 4, il che esprime la quarta [ASCCM-FM: folder 168, file 3].

In Table 1 we have summarized the architectural elements of Magnocavalli’s project and their musical equivalents.
Table 1.

These three manuscripts bring to mind an analogous exercise by Blondel, that is, his famous application of musical ratios to the base attica in his *Cours d’architecture* [1683]. The French architect drew on the division of this element previously proposed by Vitruvius and Vignola. However, in contrast to his predecessors he interpreted the dimensions of the base in a musical way. That famous example was also drawn on by Vittone, in his *Istruzioni Elementari*, with other modifications due to musical reasons.

We mustn’t forget that Blondel, quoting Ouvrard, writes that “sans la doctrine des proportions harmonique tout les ordres d’architecture ne sont qu’un amas confus de pierres sans règles et sans ordre” [Blondel 1683: 756].

Apart from the results of the way each theorist explained recourse to music by, it is noteworthy that Magnocavalli aligned himself with those for whom the application of musical ratios to elements of architecture assured architecture an ideal of absolute beauty.

We have to come back to his theoretical thinking to outline his personal contribution to harmonic theory in the second part of the eighteenth century in Italy. As we have seen, his thoughts appear incomplete and fragmented. This is probably due to his lack of formal training, and leads us to the conclusion that Magnocavalli didn’t have the necessary knowledge of architectural theory to allow him to organize this complex theme. His *Trattato di architettura* was only nine pages long, and other theoretical documents were simply reworked the ideas of others. An evaluation of his ideas must rely only on his existing documents, not the ones rumored to have existed but no longer found, and in our opinion the theoretic documents are not exhaustive enough to have made it possible for the Count to write a complete treatise on this topic, despite what Ponziglione and Comolli report.

We know that Magnocavalli was genuinely interested in harmonic themes, and in music theory in general, because he wrote two long *excerpta* from d’Alembert’s treatise, and from a manuscript from Tartini (unfortunately lost in the relocation of the archives from Casale’s municipal library to the historic archives), as well as some other manuscripts from Rameau, Quadrio, and Zarlino, and a few personal notes relating to musical intervals. Therefore the Count’s interest in harmonic theory was lasting and convincing, but remained less than systematic, often imitating other people’s ideas and sometimes fragmented among brief notes and memoires.
Fig. 4. Magnocavalli’s “Numeri e ragioni armoniche secondo Padre Gioseffo Zarlino”

Fig. 5. Magnocavalli’s note from d’Alembert’s Éléments de musique
Fig. 6. Magnocavalli’s “Diagramma dei numeri armonici” (written out from Zarlino’s *Istitutioni Harmoniche*)

At this point we might wonder if harmonic proportions can be found in his architectural projects. We know that Magnocavalli never drew his projects so we haven’t any drawings of his own. Even if historians were to try to find musical ratios by measuring his buildings, this type of measuring is often disputable because the choice of the points can be subjective or arbitrary.

In Magnocavalli’s case, direct evidence of musical ratios is found only in the literary documents relating to each project. There are no musical proportions specifically declared in any of his works, even though he made frequent use of ratios between small integers such as 2, 3 and 4. When he did use such ratios he explained their musical nature declaring his aesthetic intention.

*Other Piedmont scholars and the societies and academies of Turin*

The debate on ideal beauty, which included the concept of architectural beauty based on the analogy between music and architecture, also reached the newly-founded Turin
academies Filopatria and Sanpaolina and, later, the Accademia delle Scienze. As some historians pointed out, some aspects of the cultural European debate about ideal beauty also reached local historians and scientists because of the great interest in mathematics that emerged in the local context.

Amedeo di Ponziglione, Magnocavalli’s first biographer, published his obituary of the Count in the Biblioteca oltremontana, a review born in the literary circle of the Filopatria academy in 1787. Although Magnocavalli’s fame was mainly due to his three tragedies and to the prizes he earned, Ponziglione also praises the Piedmontese Count as a famous architect and theorist and speaks about Borra’s harmonic manuscript.

As Canavesio [1993] notes, the rules of mathematics influenced the field of aesthetics, becoming decisive for architectural theory as well as for the theme of beauty in the arts. The use of mathematics in the arts has ancient roots: from Greek philosophy, to medieval writings such as the Saint Augustine’s *De pulcro*, and in the many editions of Vitruvius’s *De Architecture* beginning in the fifteenth century. The seventeenth century also produced many editions of Vitruvius’s treatise in addition to other literary works by local authors that addressed the mathematical basis of architecture. One such figure was Benedetto Feroggio, who discussed beauty in architecture:

> il bello filosoficamente definito è un sentimento … destato da grate impressioni le quali ricevonsi per mezzo dei nostri sensi dagli oggetti esterni [che] sono in noi eccitate dall’unione di quelle proporzioni e rapporti convenienli alla natura dell’oggetto, che ci viene alla mente rappresentato (quoted in [Canavesio 1993: 318]).

The interest in ideal beauty also appears in the works of another local theorist, the Barnabite father Giacinto Sigismondo Gerdil. He knew Magnocavalli because he taught philosophy at the Real Collegio in Casale Monferrato, and he wrote some books dealing with themes of religion and aesthetics. In one of them, the *Dissertazioni sopra l’origine del senso morale e sopra l’esistenza di Dio* of 1755, Gerdil dealt with architectural themes when he spoke about beauty and its rules. He defined the concept of order as “… una serie di cose, determinata per un qualche rapporto, per cui si intenda il perchè i termini di essa serie sono piuttosto connessi in una maniera che in un’altra [Gerdil 1755: 48]. Further on the Barnabite father connected order with truth:

> Quella stessa inclinazione che muove l’uomo a rintracciare il vero … il muove altresì a rintracciare l’ordine e fa che nel ravvisarlo si diletti, approvi e si compiacca. E … siccome il vero consiste nelle relazioni delle cose in quanto esse sono semplicemente così l’ordine consiste nelle relazioni in quanto per esse viene determinata la collocazione delle cose [Gerdil 1755: pp. 48-49].

Gerdil stated that order was found in Nature and didn’t depend on prejudice, education or caprice. In the objects that we observe with both the senses and the intellect there is an order that was the basis of the idea of beauty. Gerdil thought that the architectural beauty too was founded on Nature, and that when someone thinks that particular buildings, such as Gothic architecture, are beautiful, this depends on an insufficient intelligence. Genuine beauty is that perceived as such by all people in all epochs. Finally, Gerdil believed that beauty was founded on order and that order depended on proportions similar to those of Nature:

> Per conoscere l’ordine e il bello delle cose è necessario di conoscere distintamente i rapporti di convenienza in virtù dei quali hanno tutte le parti di un complesso naturale una data connessione [Gerdil 1755: 63].
Although Gerdil didn’t refer to musical proportions when he spoke about architectural beauty, his reasoning has led Canavesio to suppose that he shared some common interests with Magnocavalli:

*Ci sono ancora ignoti i rapporti che intercorsero tra il giovane filosofo e il grande letterato e architetto casalese. Le ambizioni teoriche di quest’ultimo … non disdegnarono argomenti che potevano sollecitare l’attenzione di Gerdil e forse sostenetarne i gusti filosofici* [Canavesio 1993: 320].

Actually such an opinion remains only an hypothesis but future studies may clarify the nature of the friendship between Magnocavalli and Gerdil and their shared cultural views.

Between the end of the eighteenth century and the beginning of the nineteenth century, meditations on ideal beauty in architecture are found once more in the thoughts of Gian Francesco Galeani Napione and Leopoldo Cicognara, two local scholars, members of Turin’s academies.

Galeani Napione and Cicognara certainly shared in the interest in harmonic themes, although in different ways. In his work, *Monumenti dell’architettura antica* [1820], Galeani Napione dealt with the theme of harmonics, although according to Canavesio [1994: 605], by that time such studies appeared to be passé. And although Cicognara had criticized Galeani Napione’s work, his review of Galeani Napione’s *Monumenti* showed that he too believed in the idea of beauty founded on musical proportions. His own book, *Del Bello* [1808], was entirely dedicated to aesthetic themes. In *Del Bello* Cicognara wrote: “Queste armoniche leggi formano la proporzione che determina il Bello nelle cose e la difficoltà non consiste … nel persuadersi dell’esistenza di questa ma in trovare il modo di misurarla” [Cicognara 1808: 66].

Further on he added:

*… non v’ha dubbio dunque che la sensazione del Bello nell’armonia sia determinata … da essenziali proporzioni … Nell’architettura … pare dimostrato che corrispondendosi le parti esattamente anche per misurate dimensioni tanto più siavi di bellezza assoluta quanto v’ha più di precisione e simmetria per esservi realmente maggior proporzione* [Cicognara 1808: 70-71].

These few quotations from the nineteenth-century reflections are certainly not exhaustive, but they do highlight the presence of a sequel to the earlier debate about harmonics. These elements merit further investigation to permit a deeper understanding of the nature of this revival in the local context.

**Conclusion**

To summarize, the debate in Piedmont regarding harmonic topics – up to now scarcely studied – originated from all these elements. It was a debate including the theme of ideal beauty and architectural theme of the use of musical harmonies as guarantors of beauty in architecture. Thus, what emerges is a picture in which the three architects, Magnocavalli, Borra and Vittone, in a more or less documentary context, shared interests in music applied to architecture and definitely situated – at least judging from Magnocavalli’s *excerpta* – near the far more famous eighteenth-century *schola riccatiana*. Unlike the Veneto circle, the local Piedmont context appears fragmented because there wasn’t a center where these ideas were developed and so these personalities rarely met. In spite of the great interest in this theme, only Magnocavalli and Vittone wrote about it.
more or less systematically, but it is impossible to say whether the two architects ever met.

This present research was intended to outline a general frame of reference for local Piedmont thinking about the relationships between music and architecture, but it has also shed light on some of its more obscure aspects. Future research might uncover new elements that will better delineate the Piedmont context and possibly its relationship to circles, both Italian and European.

Notes

1. For the rich bibliography on Vittone see [Piccoli 2008].
2. Olga Zoller researched the document for her Ph.D. research; see [Zoller 1996]. She talks about the document on p. 210.
3. The most recent research on Magnocavalli is [Perin and Spantigati 2005]. One of the essays is dedicated to Magnocavalli’s harmonic theory: F. Testa, “L’armonia delle parti nell’architettura è la principale cagione, da cui deriva la sua bellezza”, pp. 365-382.
4. In Casale, Magnocavalli designed Palazzo Magnocavalli (1735-40), the façade of the church of S. Croce degli Agostiniani (1748), the church of the Addolorata (1751) – inspired by S. Giorgio Maggiore in Venice –, and Palazzo Callori (1761). In the surrounding vicinity we find religious buildings: the church of S. Maria delle Grazie and S. Michele’s Oratorio della Confraternita in Moncalvo (1756-57), the church of SS. Vittore e Quirico in Odalengo Grande, the church of S. Eusebio in Varengo di Gabiano, the church of S. Germano in San Germano Monferrato and the parish churches of S. Maria Assunta in Balzola (1752), S. Grato in Penango (1756) and S. Eusebio in Fabiano di Solonghelo (1767).
5. Magnocavallo won the second prize at National Competition of Parma in 1772 with his tragedy Corrado Marchese di Monferrato, about the short reign in Jerusalem of Corrado, Marquis of Monferrato, during the fourth crusade. This tragedy was reviewed in the Effemeridi romane. His second tragedy, Rossana, set in Turkey during the reign of Tamerlane, earned him the first prize in the same competition in 1775. His third, Sofonisba, wasn’t awarded a prize but was published in 1781 and became widely known.
6. Vincenzo Corazza (1721-1798) was an abbott from Bologna and a preceptor of nobles in Rome and Naples. He wrote the books Orfeo and Inno al Sole, was a member of Arcadia, was a friend of Comolli and was also interested in Antiquity.
7. This friendship led Arnaldi to dedicate his treatise Idea di un teatro universale, published in 1762, to Magnocavalli.
8. The manuscript Memorie sulla musica ricavate da’ libri del Quadrio is drawn from “Francesco Saverio Quadrio’s Della storia e della ragione d’ogni poesia volumi quattro” and deals with the birth of music.
9. In 1782 Prospero Balbo founded the Società Filopatria, an academy devoted to local history. The Società Sanpaolina was founded in 1776 and continued until 1791. The Accademia delle Scienze was created by royal decree in 1783 from a ‘Società scientifica di carattere privato’ founded in 1757 by Joseph Louis Lagrange, Giuseppe Angelo Saluzzo di Monesiglio and Giovanni Cigna.
10. Benedetto Feroggio (1760 ca.-?) was the architect of the astronomical observatory erected on the roof of the Torino Accademia delle Scienze. In 1788 he published Dell’utilità ed applicazione delle matematiche all’architettura civile (Torino, Stamperia Reale).
11. Giacinto Sigismondo Gerdil (1718-1802) was a scholar and author of several books of philosophy that fit in the European debate. His fame earned him membership in many literary and scientific academies and societies.
12. Galeani Napione (1748-1830) was an illustrious historian also interested in arts and literature. In 1773 he wrote Saggio sopra l’arte storica; in 1820 Monumenti dell’architettura antica. Lettere al conte Giuseppe Franchi di Pont; and in 1826 Opuscoli di letteratura e belle arti. According to Ponziglione, he was also a friend of Prospero Balbo, the one in possession of Borra’s harmonic manuscript.
13. The count Lopoldo Cicognara (1767-1834) was an art historian and scholar. Younger than Magnocavalli, he was nevertheless interested in themes such as classicism culture, ideal beauty and harmonic proportions. He wrote an interesting treatise, Del Bello [1808], which became very well known and enjoyed several editions in the first half of the century. In 1822 he reviewed Galeani Napione’s Monumenti in two issues of the collection Antologia.

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