

Davide Monti

Conservatorio di Musica “Giovanni Pierluigi da Palestrina”, Cagliari

HEINRICH IGNAZ FRANZ BIBER’S PASSACAGLIA: BETWEEN FORM AND CONTENT

Abstract

The analysis of historical sources and the study of the social context provide clues to both formal solutions like the structure of a piece, and also to the philosophical attitude of the time. This article aims to suggest an interpretation of formal elements found in the *Passacaglia* for solo violin from the *Rosary Sonatas* by Heinrich Ignaz Franz Biber, in conjunction with the ‘carnal’ physicality of the experience suggested by the Jesuit philosophy of 17th-century Salzburg. An intellectual awareness on one hand (*analytical* thinking) will therefore be flanked by an emotional/experiential awareness on the other (*analogical* thinking). In particular, the value of the number 10 within Biber’s piece will be analysed, highlighting the structural and experiential logic of the compositional structure of the *Passacaglia*. The numerological approach intends to explain the structure of the piece and to be a stimulus to arrive at a performance that is more aware of historical processes, of the spatial/temporal journey experienced during the performance, and the communicative impact inherent in a rhetorically-informed performance. This article aims to invite the reader to consider similar methodologies to baroque music in general.

Keywords

H. I. F. Biber | Baroque Violin | Performance | Analogical Thinking | Music Analysis



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Certain pieces of music possess an enduring ability to reveal new insights, unveil unexplored pathways, and inspire those who engage with them to continue their journey of discovery and inquiry. This is precisely my experience with Heinrich Ignaz Franz Biber's (1644-1704) collection of *Rosary Sonatas* or *Mystery Sonatas* (*Rosenkranzsonaten*). Each time I perform these sonatas, I am struck by the sense that even more can be uncovered, both in their compositional structure and emotional depth, which in turn influences their interpretative possibilities.

The challenges of historical performance practice have provided me with valuable tools for investigating this score. I am merely one among many who have delved into Biber's work. I express my gratitude to the scholars who have significantly contributed to the understanding of this masterpiece,¹ and who have offered their own musical interpretations.² Generally, artistic research consists of two areas: the intellectual comprehension of formal and compositional processes, and then, the experiential, emotional journey. For interpreters, study and analysis often constitute the initial phases of research, serving as a foundation for the ultimate stage of emotional engagement. This method is especially prevalent today, given that modern educational approaches to music predominantly begin with the score, emphasizing visual engagement as the starting point for interpretation. The order is however the opposite for a composer, as the expressive urgency (possibly associated with the "necessity" that the ancient Greeks called *Ananke*), or the emotional spark that motivates the action, is found at the beginning of the creative process. In fact, the first canon of classical rhetoric is *Inventio*, also referred to as purpose, story, emotion or the energy that moves.³

This article has two primary objectives. The first is to bridge the perspectives of both the performer and the composer by sharing my personal journey, which encompasses my performance experience, intuition, historical research, and the concepts I have developed over recent years, particularly those related to Sonata XVI. This work, as indicated by the emblem at the head of the score, is dedicated to the *Guardian Angel*, with the term *Passagalia* appearing at the beginning of the manuscript.⁴ The second objective is to reflect on the necessity of a deeper integration between the physical and emotional experiences and the rational, intellectual aspects of communicative processes in music.

Numerous sources address the relationship between these two poles from different angles. The discussion of the dual nature of music dates back to ancient times, as Habermas states:

¹ I took as a reference point the bibliography on Biber contained in Daniel John Edgar's PhD, *The Encoding of Faith: Scordatura in Heinrich Biber's Mystery Sonatas*, PhD dissertation, University of York, 2008.

² Naxos Music Library lists at least twenty-two complete recordings of these sonatas.

³ The canons of classical *Ars Oratoria* is usually divided into five phases: *Inventio*, *Distributio*, *Elocutio*, *Memoria* and *Action*.

⁴ The sonatas in this collection do not have numbers and do not even have an explicit title. The title is deduced from the figure/engrave emblem placed at the beginning of each sonata, relating it one of the fifteen Mysteries of the Rosary.

[...] since Aristotle (384-322 BC) criticized the Pythagorean and Platonic equation of harmony and soul (Politics VIII/5), which also reflects the heated debate of the time about a more speculative or more empirical (as harmonic) theory of music - a debate that did not begin only with Aristotle's pupil Aristoxenus [around 370], to whom musicology often refers as its ancestor. This controversy between the Pythagoreans and the Pythagorean acousmatics and Aristoxenian harmonizers has often been revived throughout the history of music, where it is not uncommon for one to have strayed from the real heart of the dispute to extend it to a dispute between theory and practice [...].⁵

Aurelius Augustine of Ippona (Saint Augustine) (354-430) says that "music is the art of right composition",⁶ and Flavius Magnus Aurelius Cassiodorus (c. 485 - c. 580) says that "music is a doctrine or science dealing with numbers".⁷

Orden summarizes the Renaissance and Baroque conceptions by grouping together the ideas of Niccolò Machiavelli, Thoinot Arbeau, Nicolas Bergier and René Descartes, saying:

We see how music came into play both in old systems of thought (such as Neoplatonism and language-based reasoning), and new ones (such as mechanism and number-based reasoning), occupying a place at once classic and modern. In the first paradigm, music possessed extraordinary affects that struck differently upon the soul and could be used to direct the body; in the second, the pulses of music could condition the body's reflexes and elicit predictable responses on command. [...] Civility itself made the same transition music did from being deeply moralized system to a more mechanical one.⁸

Is it possible today to return to consider the corporeality of the performative act? Borrowing the term used by Le Guin, the musical experience can actually become "carnal".⁹ In his article, Giles explains the connection between intellectual experience and bodily experience, especially from a historical point of view. Here is a concluding passage from his article:

⁵ D. HABERL, *Ordo arithmeticus: Barocker Zahlbezug und seine Wurzeln dargestellt am Beispiel der Rosenkranzsonaten von Heinrich Ignaz Franz Biber*, University of Salzburg 1995, p. 5: "Der Streit zwischen Anhängern der beiden Strömungen ist sehr alt, denn schon Aristoteles (384-322 v. Chr.) kritisiert die pythagoreische und platonische Gleichsetzung von Harmonie und Seele (Politica VIII/5), worin sich nicht zuletzt auch die seinerzeit schon heftig geführte Auseinandersetzung um eine mehr spekulativ oder mehr empirisch orientierte Musiktheorie (als Harmonik) spiegelt - eine Auseinandersetzung, die nicht erst mit Aristoteles' Schüler Aristoxenos [um 370] beginnt, auf den sich die Musikwissenschaft vielfach als ihren Ahnherrn beruft. Diese Kontroverse zwischen pythagoreischen Akusmatikern und aristoxenischen Harmonikern wurde im Laufe der Musikgeschichte oft auf gegriffen, wobei man sich nicht selten weit vom wahren Kern der Auseinandersetzung entfernte und sie entweder auf einen Streit zwischen Theorie und Praxis ausweitete [...]". Author's translation.

⁶ AURELIUS AUGUSTINE OF IPPONA, *De musica libri sex* (Book I, Chapter 2): "Musica est scientia bene modulandi".

⁷ FLAVIUS MAGNUS AURELIUS CASSIODORUS, *De artibus ac disciplinis liberalium litterarum* (Cap. V, *De Musica*): "Musica est disciplina vel scientia, quae de numeris loquitur" (M. A. CASSIODORO, *Le Istituzioni. Basi per una rinascita di civiltà*, edited by A. Caruso, Edizioni Vivere In, Roma 2003, pp. 208-213).

⁸ K. VAN ORDEN, *Music, Discipline, and Arms in Early Modern France*, University of Chicago Press, 2005, p. 215.

⁹ E. LE GUIN, *Boccherini's Body: An Essay in Carnal Musicology*, chapter 1, University of California Press, Berkeley 2006, pp. 14-37.

The performer of these sonatas grants intent and control on all fronts: in the act, they are perpetually oscillating between confusion and understanding, volatility and stability, doubt and enlightenment. In truth, the performer's second nature is acting without them. Such internal struggle, externalized through an artistic medium, draws attention to physically ingrained habits and compels the worshiper, here equated with the performer, to doubt their preconceptions and simultaneously propels them into a new understanding.¹⁰

Recent studies in neurology show that music acts simultaneously on the temporal, frontal, subcortical areas (insula, cingulate, corpus callosum, cerebellum and basal ganglia), the amygdala, the hippocampus, the thalamus and the hypothalamus. These areas of the brain deal with both the rational management of musical information, as well as being “involved in emotional coding and body representation [...], emotional and fear processing [...], memory consolidation [...], multi-sensory coding”.¹¹ The starting point of this article is therefore founded on an awareness that music simultaneously affects the brain areas of emotion and rationality.

1. *Analogical thinking*

Several articles and doctoral dissertations cited here have already addressed themes that are instrumental to understanding the subject of this article. My proposal is to connect elements derived from a numerological analysis of Sonata XVI to the corporeal and emotional experiences this piece offers both the performer and the audience. Additionally, I aim to suggest a model that reflects the delicate balance between *analogical* and *analytical* thinking in a broader context.

These two terms serve as the key concepts of this article. It is essential to contextualize their meaning within the broad historical framework spanning the Renaissance and Baroque periods to understand the expressive and communicative mechanisms they embody, as well as their role in the history of Western European music – specifically in the *Rosary Sonatas*. This contextualization also enables to highlight the profound significance of this compositional work, not only within the broader history of music but also, more specifically, within the violin repertoire.

Communication during this period relied heavily on symbols, employing an *analogical* strategy to convey information, emotions, concepts, and parallel worlds, dimensions that were not necessarily explainable or objectively quantifiable, and thus not reducible to univocal mathematical terms. The *Rosary Sonatas* were composed during a transitional phase, marked by the shift from the *analogical* thinking characteristic of ancient experiential approaches to the *analytical* mindset formalized by the scientific revolution.

This reflection, as articulated by Melandri, underscores the fundamental role of analogy in the fabric of human existence.

¹⁰ R. GILES, *Physicality and Devotion in Heinrich Ignaz Franz Biber's Rosary Sonatas*, «Yale Journal of Music & Religion», IV/2, 2018, p. 104.

¹¹ A. MADO PROVERBIO, *Cognitive Neuroscience of Music*, Zanichelli, Milan 2019, pp. 16-17.

We all use analogies. Learning, experience, and intellectual development depend on such use; without it, one could not even think.¹²

It is therefore interesting to outline the theme of *analogical* thinking from a historical point of view, and explore how thought has transformed over time.

To explain the concept of *analogical* thinking, I will begin by looking at a period predating the composition of the *Rosary Sonatas*. Figure 1 is the first page of the fencing treatise *Flos Duellatorum* (circa 1410), which outlines the qualities required for a skilled fencer. Each part of the body is symbolically associated with an animal or object, serving as *analogical* elements to convey and describe attributes essential for effective fencing. More importantly, these symbols were intended to inspire personal growth and foster the energy required for successful fencing.¹³



Figure 1: Fiore De'Liberi, *Flos Duellatorum*, ca. 1410

¹² E. MELANDRI, *Analogy, proportion, symmetry*, Quodlibet, Macerata 2023, p. 13.

¹³ FIORE DE'LIBERI, *Flos Duellatorum*, ca. 1410. The transcription and translation into French was made by Charl  lie Berthaut. The translation into English was made from the French version.

<p>Omnia nata oculis ego linx cernendo sub axe Vinco mensuraris quicquid tentare placeb[it] Prudentia</p>	<p>Tous les autres nés, moi le linx, en discernant des yeux sous l'axe, je les vaincs, tu auras mesuré quoi que ce soit qu'il plaira de tenter. Prudence</p>	<p>All the others are born, I the <u>linx</u>, discerning perceptive eyes under the axis, If I defeat them, you will have measured everything you will want to try. Caution</p>
<p>Sum celer in cursu, subitosque revolui et in orbes Nec me currentez superabunt fulmia tigriz Celeritas</p>	<p>[à gauche] Je suis rapide dans la course, et je ramène aussi dans les cercles imprévus, et les éclairs ne me dépasseront pas, moi le tigre courant. Célérité</p>	<p>[left] I am swift in running, and I carry even in unexpected circles, and lightning shall not overtake me, I the running <u>tiger</u>. Speed</p>
<p>Quadrupedum sum fortis apex, audacia Nam mea quaeque polo subsunt, nec corde leonez vincu[nt] [...]pant, quemcumque ergo vocitamus ad arma Audacia</p>	<p>[à droite] Je suis le sommet courageux qui marche à quatre pattes, En effet ma propre audace est sous le pôle, et ils ne vainquent pas le lion par le coeur* [...], nous appelons donc chacun aux armes Audace</p> <p>*cette traduction est faite à partir des éléments transcrits, le premier mot de la dernière ligne étant effacé, il est difficile de faire une traduction.</p>	<p>[right] I am the brave peak that walks on all fours. Because my own boldness is under the stake, and does not conquer the heart of the <u>lion</u>* [...], wherefore we call all to arms Audacity</p> <p>*this translation was made from the transcription as the first word of the last line was eliminated, it is difficult to make a translation.</p>
<p>Quatuor ecce sumus animalia paribus ampla Que monuit nam potens ?ot* qu[isque] in armis Esse cupit clarus necnon prôvitate refulgens</p>	<p>[bas, à gauche] Voilà nous sommes les quatre animaux, grands dans les pareils, Que chaque puissant en effet a averti dans les armes, Il désire être clair et aussi brillant d'honnêteté. *peut-être un nombre (7, 4,), peut-être indéclinable (cf. «ot» final), qui irait avec «potens quisque».</p>	<p>[bottom left] Here we are with the <u>four animals</u>, large in kind, that every powerful man has felt in arms, Wishes to be clear and bright with honesty. *perhaps a number (7, 4,), perhaps indeclinable (cf. final "ot"), which would go with "potens quisque".</p>

<p>Accipiat* documenta sibi quę cernit [in]esse Pectoribus nostris affixa indicitus, inde Ille erit armorum pr[ędoc]tus inter amicos</p> <p>* il est possible que «accipiat» (subj. présent) soit une erreur pour un «accipiet» (indic. Futur).</p>	<p>[bas, à droite] Que, notifié, il reçoive* à lui les modèles appliqués, qu'il discerne être dans nos pensées, De là celui-ci sera instruit d'avance aux armes parmi les amis.</p> <p>* en gardant l'idée de la note de la transcription, on aurait «Notifié, il recevra».</p>	<p>[bottom right] Let him be notified of receiving* from him the applied patterns, which he discerns to be in our thoughts, For this reason he must be trained in advance about weapons among friends. *keeping the idea of the transcription note, we would have "Notified, he will receive".</p>
Fortitudo	Force [text coupé]	Strength [missing text]
<p>Pos[ta dominarum] dextra [Posta dominarum] sinistra Posta fenestrarum dextra Posta fenestrarum sinistra Posta longa Posta brevis Tota porta ferea Media porta ferrea Dens apri</p>	<p>[autour du maître d'armes en rouge de haut en bas et de gauche à droite] Posture des dames droite Posture des dames gauche Posture des fenêtres droite Posture des fenêtres gauche Posture longue Posture brève Porte de fer entière Porte de fer médiane Dent du sanglier</p>	<p>[around the master-at-arms in red, from top to bottom and from left to right] The correct posture for ladies Ladies' left posture Right window position Left Window Posture Long Position Short position Solid iron door Central iron gate Boar's tooth</p>

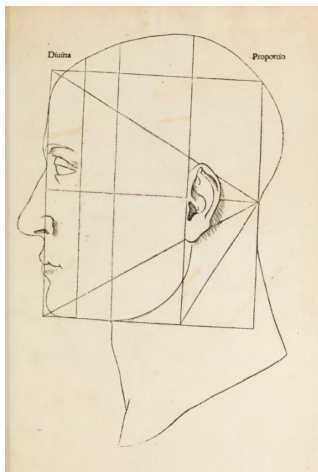
Fencing remained a subject of vital interest throughout the Renaissance and Baroque periods, as survival necessitated the activation of various parts of the body to respond rapidly and effectively. This instinctive and emotionally driven mindset was characteristic of a society accustomed to living near death's door. Conversely, in a prosperous society where survival is generally assured, the level of vigilance tends to diminish. A striking example underscores the prevalence of sword duels during this era: between 1589 and 1607, in France alone, four thousand individuals are documented to have died in duels. Additionally, nine hundred fatalities occurred within the first seven years of Louis XIV's reign (1643-1650), while over two hundred deaths from dueling were recorded during the sixty-year reign of George III of England (1760-1820).¹⁴

In a society where survival is a daily concern, the intrinsic meaning of numbers remains deeply tied to instinct, the observation of nature, and the evocation and invocation of God. This connection is also reflected in the educational practices of the time, particularly in the curriculum of colleges and academies. Within the framework of

¹⁴ R. COHEN, *The Art of the Sword*, Sperling & Kupfer Editori, Milan 2003, pp. 71, 178

the *Quadrivium*,¹⁵ education begins with Mathematics, progresses through Geometry and Astronomy, and culminates in Music. Music represents the highest realization of Measure, the Harmony of the Spheres, and the Divine Order – embodying beauty, harmony, and Divine Proportion. These concepts were deeply cherished in a world striving to balance the well-honed instinct for survival with a newly emerging approach to the organization and systematization of knowledge. Niccolò Machiavelli writes in his treatise *Dell'Arte della Guerra*: “And without a doubt, ferocious and disorderly men are much weaker than timid and orderly ones, because order drives fear out of men, disorder diminishes ferocity”.¹⁶

The desire to transition from disorder to order drives humanity to shape knowledge and uncover its underlying formulas. The evocation of perfection in the proportions between God, humanity, and creation (illustrated, for instance, in Pacioli's *De Divina Proportione*, Figures 2 and 3),¹⁷ is characteristic of *analogical* thinking. This perspective enables the description, organization, and elevation of daily life, politics, artistic forms, and disciplines such as fencing and horse riding to the status of noble perfection. The celestial harmony within which human activities are immersed imparts meaning and structure to the human experience.



(From the left)

Figure 2: L. Pacioli, *De Divina Proportione*, 1509, p. 136

Figure 3: L. Pacioli, *De Divina Proportione*, 1509, plate XXIII, p. 236

Figure 4: C. Ripa, *Iconology*, figure of Joy, Padua 1618, p. 13

¹⁵ The *Quadrivium*, which includes arithmetic, geometry, astronomy and music, from Boethius to the Baroque period, is the set of subjects that, together with the *Trivium* (grammar, rhetoric and dialectic), were taught within the school curriculum of the Liberal Arts.

¹⁶ N. MACHIAVELLI, *On the Art of War*, 1537, p. 115.

¹⁷ L. PACIOLI, *De Divina Proportione* of 1509, by Luca Pacioli with the aid of drawings by Leonardo da Vinci, is the emblem of this research: the golden section, from its observation in nature to the creation of perfect geometric figures, represents a perfect and indispensable Divine Order.

The use of symbols in communication is a strategy that harkens back to ancient wisdom, serving as a means to organize and transmit knowledge. Beginning in the late Renaissance, Cesare Ripa's *Iconologia* became a seminal work, with editions published from 1593 to 1860. This book functions as a catalog of affects, vices, passions, and virtues, a kind of florilegium that preserves the memory of ancient wisdom while showcasing *analogical* knowledge. *Iconologia* provides a framework for identifying and selecting symbolic elements that facilitate the formulation of effective communication.¹⁸

Figure 4 represents the affect of *Allegrezza*, which is described as follows:

YOUNG GIRL with a large, smooth, fleshy forehead, will be dressed in white, and said dress painted with green leaves and red and yellow flowers, with a garland of various flowers on her head, in her right hand she should hold a crystal vase full of rubicund wine, and in her left a large golden cup. She should be of graceful and beautiful appearance, and should readily pretend to dance in a meadow full of flowers.

Joy is a passion of the soul directed towards the pleasure of something that is intrinsically contemplated supernaturally, or that is brought to it extrinsically by the senses by nature or by accident.

She will have a fleshy, large and smooth forehead, according to Aristotle's saying on Physiognomy in chapter 6. Flowers in themselves signify joy, and it is said that meadows laugh when they are covered with flowers; therefore Virgil called them pleasant in the 4th Eclogue, saying: *Ipsa tibi blandos fundent cumabula flores*.¹⁹

The crystal vase full of red wine, with the golden cup, shows that joy is not hidden for the most part, and is willingly communicated as St. Gregory certifies in book 28 of *Morals*, thus saying: *Solet letitia arcana menti aperire*.²⁰ And the Prophet says: Wine gladdens the heart of man, and gold likewise has the virtue of comforting the spirits: And that comfort is the cause of joy. The disposition of the body, and the demonstration of dancing are manifest indications of joy.²¹

The symbol evokes the archetype, rooted in the memory of the ancients, along with the recollection of physical sensations and emotions experienced often through empathetic closeness to others. This process triggers similar effects within the body, recalling and reanimating ancient memories in the present. Imagination and evocation thus become powerful strategies for education, for stirring the emotions, and for effective communication and persuasion. The Jesuits, in particular, built their spiritual and educational practices on this principle. The *Spiritual Exercises* of St. Ignatius of Loyola (1548) serve as a quintessential example of a synesthetic strategy, designed to evoke the object of reflection through a multi-sensory experience. Biber most probably was educated like this and applied it fully to the *Rosary Sonatas*. Giles (2018) notes that the

¹⁸ C. RIPA, *Iconologia*, first edition in 1593.

¹⁹ Personal Translation: "Those same things will fill you with sweet flowers".

²⁰ Personal Translation: "Happiness usually opens up the secrets of the mind".

²¹ C. RIPA, *Iconologia*, Padua 1618, p. 13.

Bohemian composer received a Jesuit education, likely at the boarding school in Opava, Moravia.²² This topic is addressed in Edgar's 2008 doctoral dissertation.²³

This article represents a synthesis of topics I have explored extensively in the fields of research, education, and performance since 2015, particularly within the realm of historically informed improvisation through a project titled the *Helicon Project*.²⁴ This initiative seeks to rediscover the origins of expressive codes by engaging with the physical, emotional, and multidisciplinary historical experience. *Helicon* integrates physical activities such as fencing, horseback riding, theater, and dance with improvised music, emphasizing the emotional impetus that drives an action and the gesture that articulates it. The historical perspective is central to this project, as it provides a foundation for understanding and working on the balance between two paradigms: the *analogical* and the *analytical*.

2. Numbers in the analogical context

During the Renaissance and Baroque periods, *analogical* thinking entered a phase of conflict and contrast with the newly emerging *analytical* paradigm, which gradually – and sometimes at great personal cost to both sides – became a driving force of modernity. The scientific revolution, championed by figures such as Galileo Galilei and René Descartes, solidified a shift toward abstraction and detachment in the observation of phenomena. This transition progressively replaced the ancient *analogical* framework with the new *analytical* system, wherein numbers ceased to embody experiential and symbolic meanings, becoming merely abstract identities. The Renaissance and early Baroque eras thus represent a pivotal moment in human history, rooted in the ancient worldview while also anticipating the future organization of knowledge.

Paraphrasing the numerous examples of numerical usage presented in Kate van Orden's work, the value of numbers assume multifaceted meanings in a range of contexts. She illustrates how numbers simultaneously serve as the organizational principle for a military phalanx and as the rhythmic force that unites infantry in marching, instilling collective strength. Numbers are the measures that structure architecture while also defining the social geometry that reinforces hierarchies. They dictate the steps of a dance and function as psychological and physical training during peacetime to prepare for war. Numbers represent both the length of a sword and the calculation of a safe distance in combat. They choreograph equestrian ballets and symbolize the King's capacity to govern his people effectively.²⁵ The origins of the King's temporal power are legitimized through numbers, giving rise to a new form of music.²⁶

²² R. GILES, *Physicality and Devotion in Heinrich Ignaz Franz Biber's Rosary Sonatas*, «Yale Journal of Music & Religion», IV/2, 2018, p. 78.

²³ D. J. EDGAR, *The Encoding of Faith: Scordatura in H. Biber's Mystery Sonatas*, University of York 2008, pp. 24-38.

²⁴ D. MONTI, *The Helicon Method*, <https://helicon.it>.

²⁵ K. VAN ORDEN, *Music, Discipline, and Arms in Early Modern France*, University of Chicago Press, 2005

²⁶ Jean Bodin wrote *Six books of the Republic*, a best-seller published in numerous editions and languages between 1576 and 1641, in which he theorized the perfection of government harmony based on the series of Pythagorean numbers from 1 to 4.

Numbers associated with the Old and New Testament serve as a constant reference in shaping the form of things: consider the 12 tribes of Israel, the 33 years of Christ, or the number 3, symbolizing the Trinity. The *Rosary Sonatas* are no exception to this logic and these symbolic strategies.²⁷ Numerous studies have shown that Johann Sebastian Bach, composing just a few decades after Biber, remained deeply engaged with these strategies. His compositions are often based on numerical calculations imbued with specific meanings, for example, the sum of the numbers corresponding to the letters in his name.²⁸ Numbers are employed to represent something beyond themselves: in the case of the *Rosary Sonatas*, a number, whether a physical or abstract element, is used analogically to evoke an idea, an image, or perhaps a force.

Although modernity has devoted significant energy to the *analytical* approach, historical investigation reinforces the persuasiveness of Melandri's call to explore *analogical* thinking. Experiential knowledge and its connection to the imaginative realm emerge as essential steps toward a deeper understanding and appreciation of ancient aesthetics.²⁹

3. Historical and social contextualization of the *Rosary Sonatas*

Biber stands as both a man of his time, adept at employing the communication strategies of his era, and an innovative genius, capable of expanding the boundaries of "good taste" and invention. To fully appreciate the compositional choices in the *Passaglia* (hereinafter referred to as "Passacaglia") dedicated to *The Guardian Angel*, it is essential to situate this work within its historical and aesthetic context. This sonata is the concluding piece of the *Rosary Sonatas*, a collection intended to represent, convey, and exalt the power of the Rosary prayer, set against a social and political backdrop of Central-Eastern Europe deeply influenced by the Counter-Reformation.

Composed around 1680 in Salzburg, the Passacaglia dates to a period when Biber was serving under Archbishop Maximilian Gandolph. This was prior to his appointments as counterpoint teacher for the young singers of the cathedral choir, deputy Kapellmeister, and eventually Kapellmeister in 1684 for the Archbishop's Chapel. Before his Salzburg tenure, Biber had been in the service of Prince-Bishop Karl of Kremsier (modern-day Kroměříž), whose extensive library still preserves a significant body of music composed by Biber during and after his employment there, a testament to the enduring relationship between the composer and the episcopal court.

²⁷ Just to give two examples, in Sonatas X and XI, the number 10 is used with a specific reference to the Roman numeral X; Sonata XV contains a reference to the number 33. Number 10 is also present in the Sonata XVI, the subject of this article.

²⁸ We are referring to the use of the numbers 14, as well as 41 and 158, which represent the sum of the letters in Bach's first and last name.

²⁹ The article written by R. GILES, *Physicality and Devotion in Heinrich Ignaz Franz Biber's Rosary Sonatas*, «Yale Journal of Music & Religion», IV/2, 2018, is also interesting in this regard.

The Archbishop of Salzburg, himself educated by the Jesuits at the Collegium Germanicum in Rome, was a significant figure of the Counter-Reformation, known for his staunch doctrinal stance against heresies and witchcraft. Under his governance, nearly two hundred individuals – primarily children under eighteen, impoverished individuals, and women accused of witchcraft – were executed.³⁰ He also served as the protector of the Confraternity of the Assumption of the Virgin Mary.³¹

The Confraternities wielded substantial political influence, facilitated by their financial resource mobilization, event organization, and stewardship of communal assets. Though each Confraternity had its own Prior, vicars, assistants, counselors, and governing statutes, as well as a designated clothing habit and meeting place, they ultimately operated under the authority of the Bishop of the diocese. These congregations thus became strategic venues through which the Bishop could exert influence when necessary. As Giles writes:

All the students at the University of Salzburg belonged to this confraternity, and their main religious obligation was the prayer of the Rosary. Their devotions took place in the Große Aula (Great Hall), called the Aula Academica, which had been erected in 1619. The hall, then as it is now, was something of a multipurpose room used for convocations, religious devotions, and even the staging of works. Hanging in the room are fifteen paintings depicting the Mysteries of the Rosary.³²

Biber himself became a member of a Confraternity in 1684, the same year he was appointed Kapellmeister, a coincidence that could signify his ascent in social status. His growing prominence is further evidenced by the noble title “von”, bestowed upon him by Emperor Leopold I in December 1690.

In earlier years, it is likely that Biber attended the Confraternity alongside his patron and employer, Archbishop Maximilian Gandolph. The private chapel of the Archbishop, as well as the Aula Magna of the University of Salzburg, features medallions depicting the Mysteries of the Rosary. These, along with other iconography of the time, likely served as significant inspiration for Biber's *Rosary Sonatas*. This connection may also explain the graphic representations of each Mystery that appear at the beginning of each sonata in the existing edition of the collection.

³⁰ B. A. PAVLAC, *Witch Hunts in the Western World: Persecution and Punishment from the Inquisition Through the Salem Trials*, Bloomsbury Academic, London 2009, p. 79.

³¹ R. GILES, *Physicality and Devotion in Heinrich Ignaz Franz Biber's Rosary Sonatas*, «Yale Journal of Music & Religion», IV/2, 2018, p. 80.

³² Ditto, p. 80.

CELSISSIME AC REVERENDISSIME PRINCEPS,
DOMINE, DOMINE CLEMENTISSIME.

*Harmoniam Soli Justitiae, et Lunae sine macula consecratam TIBI tertiae
Luci, quam ab utroque Divino sumpsisti Lumine humilime dedico. Filius enim dignitate sa-
crum rutilans, Matris Virgineum Virgo defendis honorem; Ideo pro mercede ab filio Christo cae-
lesti manna nutritis, ab Matre Maria gratiis lactaris. Quae primam de suo beatissimo Nomi-
ne fremens Litteram, primam Tuo Celssissimo Nomini imposuit. Sic Maria Maximilianum
condecoravit. Quatuor Chordis Chelium meam instructam quindecim vicibus discordatam
diversisque Sonatis, Praeludijs, Allemandis, Corentis, Sarabandis, Arijs, Ciaconâ, Variationib;
us. &c. Una cum Basso continuo fedula cum diligentia, et secundum possibilitatem magno
artificio elaboratam reperies. Causam si numen scire velis enucleabo: Haec omnia hono-
ri XV Sacronem Mystherionem consecravi, quem cum Tu ferventissime promoveas.*

CELSISSIMO TUE

TIBI flecto poplite dedico.

Humilimus Servus.
Henr. Ignat. Franciscus Biber.
Libro Harmoniarum pro Violino solo et basso continuo, 1693

Figure 5: Introductory dedication to Biber's Rosary Sonatas ³³

Archbishop Maximilian was a devout advocate of the Rosary cult in honor of the Virgin Mary *Regina Coeli*, as evidenced in the preface of Biber's *Rosary Sonatas* (Fig. 5): "...I have consecrated them in honor of the XV Sacred Mystery which you [Archbishop] have firmly promoted." The fifteenth Mystery refers to the coronation of the Virgin Mary in Heaven, corresponding to the fifteenth Sonata (Fig. 6). This particular devotion is further underscored by several interconnected details. The feast of Our Lady of the Rosary (originally named Our Lady of Victory) is celebrated on October 7th and was established by Pope Pius V in 1571 following the Christian victory over the Turks at the Battle of Lepanto. October also coincides with the Archbishop's birthday, as he was born on October 30th, 1622. Furthermore, in 1677, Pope Clement XI officially instituted the Feast of the *Guardian Angel* on October 2nd at the request of Emperor Leopold I, with celebrations held in both Vienna and Salzburg (likely already venerated in earlier years). While there is no explicit documentation, it is plausible that the theme of the Rosary served as a strategic and advantageous pretext for Biber to bolster his position at the Archbishop's court. His association with this devotion may well have supported his promotion in Salzburg, marking a well-earned milestone in his career.

³³ "Harmoniam Soli Justitiae, et Lunae sine macula consecratam TIBI tertiae Luci, quam ab utroque Divino sumpsisti Lumine humilime dedico. Filius enim dignitate sacram rutilans, Matris Virgineum Virgo defendis honorem; Ideo pro mercede ab filio Christo caelesti manna nutritis, ab Matre Maria gratiis lactaris. Quae primam de suo beatissimo Nomine fremens Litteram, primam Tuo Celssissimo Nomini imposuit. Sic Maria Maximilianum condecoravit. Quatuor Chordis Chelium meam instructam quindecim vicibus discordatam diversissime Sonatis, Praeludijs, Allemandis, Corentis, Sarabandis, Arijs, Ciaconâ, Variationibus & c. Una cum Basso Continuo fedula cum diligentia, et secundum possibilitatem magno artificio elaboratam reperies. Causam si numen scire velis enucleabo: haec omnia honori XV Sacronem Mystherionem consecravi, quem cum Tu ferventissime promoveas." I thank Matteo Zenatti for the transcription from the Latin.



Figure 6: Image of Sonata XV



Figure 7: Image of Sonata XVI

4. Passacaglia Scheme

As already mentioned, numerology has long been part of composing from the works of Johann Sebastian Bach to those of Alban Berg and Sofia Gubaidulina. Haberl's aforementioned doctorate has explored this subject extensively, particularly from a mathematical perspective. This article, however, aims to examine Sonata XVI, or the Passacaglia known as the *Guardian Angel* (Fig. 7), by employing numerology as a means of *analogical* thinking. Here, numerology serves as an avenue to convey and experience the "carnal" significance of the symbol and the memories it evokes.³⁴

In the context of the Rosary and the narrative of the life, death, and resurrection of Jesus Christ, the number 10 holds significant meaning. This is reflected in the repetition of the 10 *Ave Mater* for each Mystery (3 series of 5 Mysteries, amounting to a total of 150 *Ave Mater*).³⁵ Additionally, the symbolic value of the number 10 is further emphasized when written in Roman numerals, "X," which can be directly associated with the cross, the ultimate Christian symbol.³⁶

The analysis of this sonata therefore uses the number 10 as its primary reference point. The diagram in Figure 8 provides a graphical summary of key moments within the sonata, serving as a visual aid to the narrative presented in this article.

³⁴ E. LE GUIN, *Boccherini's Body: An Essay in Carnal Musicology*, University of California Press, 2006.

³⁵ The formula of the 150 Ave Mater is further strengthened, as previously mentioned, by the papal bull of Pope Pius V, "Consueverunt romani Pontifices", in which the origin of the rosary, its name, its essential elements (15 Our Fathers and 150 Hail Marys, plus meditation on the mysteries) and its purposes are definitively established: "The rosary or psalter of the most blessed Virgin Mary is a very pious way of prayer and prayer to God; an easy way within everyone's reach, which consists in praising the most blessed Virgin herself, repeating the angel's greeting 150 times, as many as the psalms of David's psalter, interposing the Lord's prayer after each decade, with specific meditations illustrating the entire life of our Lord Jesus Christ" (Source: R. DE SANTIS, *Rosarium, La devozione mariana di San Pio V*, catalogue of the exhibition of small devotional images, SMS 2004, p.15).

³⁶ Biber used the symbol of the cross as a rhetorical device in the composition of other sonatas, notably the X, the Crucifixion, and in the XI the Resurrection.



Figure 8: Diagram of Sonata XVI, Passacaglia

The piece under analysis is a Passacaglia, characterized by a *basso ostinato* built upon the repetition of a descending tetrachord comprising the notes G, F, E \flat , and D (Fig. 9).

Biber structured the piece by composing variations over a total of 65 repetitions of this *basso ostinato*. To appreciate the beauty and ingenuity of this compositional structure, it is essential to begin by numbering each repetition of the Passacaglia bass (hereafter referred to as the “tetrachord”) throughout the entire piece. This approach identifies specific points where the composer employed particular strategies, which can then be interpreted to derive potential meanings.



Figure 9: Passacaglia bass from Sonata XVI

Below are the key points that I consider significant for understanding the piece (see *Attachment*):

- ▶ At the tetrachord repeats 1, 10, 20, 37, 51, 65, Biber leaves the Passacaglia “empty”, without harmonization or other voices, just the bass line;
- ▶ On the 25th tetrachord, he writes *adagio* and two tetrachords later, on the 27th tetrachord, an *allegro* begins;
- ▶ After thirty (30) tetrachords from the beginning, at the 31st tetrachord, the Passacaglia rises by an octave;
- ▶ The next unharmonized tetrachord, the solo bass line in the Passacaglia, the 37th, ten (10) tetrachords occur after the start of the *allegro* marked on the 27th tetrachord;
- ▶ There is a fermata / pause written at the end of the *adagio* of the 46th tetrachord, exactly ten (10) tetrachords after the unharmonized tetrachord of the 37th repetition;
- ▶ The new section, which starts at the 47th tetrachord and concludes the piece, consists of nineteen (19) tetrachords;
- ▶ The 5th tetrachord after the fermata is again an unharmonized repetition of the Passacaglia tetrachord (this is the 51st tetrachord);
- ▶ At the 52nd tetrachord another section of ten (10) tetrachords begins, and it precedes the final coda tetrachord, the 62nd tetrachord;
- ▶ At the 57th tetrachord, ten (10) tetrachords after the fermata of the 46th tetrachord, which is also halfway through the ten (10) tetrachord cycle that goes from the 52nd to the 61st, there is a change of melodic motif that lasts five (5) tetrachords, characterized by a theme proposed both at the 57th and at the 61st tetrachord, in preparation for the concluding cycles;
- ▶ The final coda begins at the 62nd tetrachord and lasts four (4) tetrachords, ending with a piano in the last notes of the last tetrachord.

Having concluded this initial analysis, some additional reflections emerge. The final cycle of the Passacaglia, beginning on the 57th tetrachord, should theoretically conclude with a 66th repetition of the tetrachord, following the symbolic rule of 10. However, the piece ends instead at the 65th repetition, followed by only a single G major chord, which could be understood as the implied beginning of a hypothetical 66th tetrachord.

The fourth unharmonized repetition of the Passacaglia at the 37th tetrachord, the fermata at the 46th, and the total number of tetrachords from the fermata to the end of the piece, equal 19, seem to conceal a numerical strategy linked to the number 10: in fact, summing the individual digits always results in 10 ($37 = 3+7 = 10$, $46 = 4+6 = 10$, $19 = 1+9 = 10$). This numerical consistency may not be accidental and could point to the innate and fascinating symbolism of the number 10 present throughout the work. Furthermore, considering only the harmonized repetitions, there are 64 tetrachords, and here too, the sum of the digits results in the number 10 ($64 = 6+4 = 10$). When the initial and final unharmonized repetitions are considered, the total results in 65 tetrachords, whose sum of digits equals 11 ($6+5=11$). This number, in my opinion, recalls Sonata XI dedicated to the Resurrection, where 11 represents $10+1$, a symbol of the miracle of the Resurrection that occurs after and beyond the cross (X). Similarly, the total number of repetitions in the Passacaglia could suggest a reference to the Resurrection.

5. Interpretation proposal

From the analysis carried out, the number 10 seems to be a key element in Biber's compositional strategy: its symbolic value is expressed in the piece to such an extent that it becomes an experience of a *space/time* journey for both the performer and the listener, similar to the thinking of Giles. This means that the tension curve of the entire sonata can be understood through cycles of ten tetrachords as the unit of measurement for the piece. The narrative represented in the entire sonata has its own life cycle, composed of numerous smaller tension curves, each corresponding to a cycle of ten Passacaglia repetitions. The invitation I derive from Biber's decimal strategy invites me to organically manage the different tension curves within the piece, understanding their placement, the energy they develop in relation to the thematic modules, the use of different techniques, and the formulas in service of the *basso ostinato*. Tackling the piece means experiencing the tension that develops within each cycle of ten tetrachords, the fundamental unit of measurement of the entire piece, while feeling the fatigue of the

journey through the *space* traveled and the sensation of the *time* spent on this journey.³⁷ These tension curves will naturally have varying levels of intensity depending on the melodic solutions chosen to develop the different musical phrases.

6. A rhetorical analysis

Classical rhetoric was a foundational subject of study in Jesuit colleges during Biber's era, and it is therefore plausible that it served as a guiding principle in the compositional strategies of the Baroque period. By retracing the typical processes of *Ars Oratoria*, the significant structural points of the sonata are identified and analyzed just as if it were a crafted oration. The canonical phases of rhetoric include the following steps: *Inventio*, *Dispositio*, *Elocutio*, *Memoria*, and *Actio*.

The symbolic significance of the Cross, both within the broader context of the Rosary and as a specific evocation in the Passacaglia, is inherent as part of *Inventio*. This part of *Ars Oratoria* concerns the conceptual content or "narrative" that Biber seeks to communicate, functioning as a thematic reminder for the listener at the conclusion of his collection of sonatas.

The *Dispositio* section adheres to clearly defined principles that can be summarized into four overarching stages when organizing a discourse: *Exordium*, *Narratio*, *Argumentatio*, and *Peroratio*.³⁸

The hypothesis I propose is to situate the *Exordium* either within the bare exposition of the Passacaglia theme (the bass line unharmonized), or, alternatively, to extend it to encompass the first section of the piece up to the 10th tetrachord. This would serve as an introductory passage, equivalent to a first movement in a sonata. This section functions as an invitation to the audience, opening the door of the sonata's narrative and encouraging listeners to perceive the temporal and spatial dimensions of the first cycle of ten bass repetitions in the Passacaglia.

³⁷ In the aforementioned book, *The mystery of the Mystery Sonatas: a musical rosary picture book*, on page 27, Katia Strieck reports the following hypothesis, probably made by Davitt Moroney: "The structure of the Passacaglia summarizes all of the prayers of the Rosary and connects the rest of the cycle to the *Guardian Angel*. It consists of a two-measure theme and 64 variations. Why 64? A rosary necklace has enough beads for one set of five mysteries, the normal daily devotion, but if one counts the number of prayers (not the number of beads since some beads are used for two prayers) for that set of five mysteries the magic number of 64 appears. Going around the set of rosary prayers once, for one cycle of five mysteries, you get the following:

- 1 x Pater Noster, 10x Ave Maria, 1 x Gloria Patri (12)
- 1 x Pater Noster, 10x Ave Maria, 1 x Gloria Patri (24)
- 1 x Pater Noster, 10x Ave Maria, 1 x Gloria Patri (36)
- 1 x Pater Noster, 10x Ave Maria, 1 x Gloria Patri (48)
- 1 x Pater Noster, 10x Ave Maria, 1 x Gloria Patri (60)

then add on the four prayers (Pater Noster, three Ave Marias) corresponding to the four beads leading to the attached crucifix and you get 64!" In the booklet that accompanies the CD of the Rosary Sonatas performed by the group Bizzarrie Armoniche, Riccardo Minasi (Arts 47735 -8) instead maintains that "the descending tetrachord of the Passacaglia suggests the tetragrammaton JHWH, the four Archangels, the four Gospels and the four rivers of Paradise, as well as the four Fathers of the Church and the four Horsemen of the Apocalypse."

³⁸ The Canons of Rhetoric may include more detailed subdivisions which I will not refer to here.

The *Narratio* can be understood as unfolding from the 11th bass to the fermata at the 46th tetrachord. This section resembles the second movement of a sonata from, for example, Corelli's era, where the narration explores various facets: exploring different octaves, presenting a kind of *fugato* among the parts, and subtly shifting the cycles of 10 tetrachords. In this section, mathematical calculations govern the structure of the composition, much like how nature is "tamed" and formalized in the symmetrical design of an Italian-style garden, reflecting the aesthetics of the period.

The section following the fermata represents the most intimate moment of the piece, serving as an emotional climax, a hallmark of *Argumentatio*. Here, passion, the ecstasy of prayer, and the culmination of a long and intricate journey are vividly expressed. This section spans ten tetrachords, from the 47th to the 56th, although two cycles of 10 repetitions overlap, with a new cycle beginning at the 52nd tetrachord and continuing until the 61st.

At the 57th tetrachord, *Peroratio* begins, setting the stage for the conclusion. However, the true end of the piece commences five tetrachords into this cycle, starting from the 62nd. This *Peroratio* mirrors the finale employed by Biber at the end of the second cycle of 10 tetrachords near the beginning of the Passacaglia (at the 17th repetition).

For a musician, it is of paramount importance to identify and articulate the tension curves within a composition, shaping the energy of its narrative in alignment with the principles of Classical Rhetoric. The beginning and end of a musical phrase define the structure and provide the first level of awareness when approaching a piece. In this Passacaglia, these moments correspond to the cycles of 10 tetrachords. Additionally, recognizing the climax of a piece, a point of heightened emotional intensity or special expressive quality, is so useful for performing a piece. According to the rhetorical framework, the emotional peak of the Passacaglia aligns with *Argumentatio*. This climactic moment is the profound space where the orator (or performer) can address the most heartfelt and significant aspects of their message, following a carefully constructed tension curve introduced through a thoughtful *Exordium* and developed through a compelling *Narratio*.

The same concept can be illustrated through the use of a *messa di voce*, a core symbol of Baroque aesthetics that also serves as a compositional strategy. The *messa di voce* – a note beginning softly, swelling to a climax, and then returning to softness – mirrors the curvature of the Baroque bow and the dynamic effects it produces. However, it also extends beyond this to represent the shape and tension of a musical phrase, or, as in the present case, the cycle of 10 bass repetitions of a Passacaglia. This expressive gesture can be further applied to broader musical forms, encompassing sections of a composition (whether they represent *Exordium*, *Narratio*, *Argumentatio*, or *Peroratio*), the overall structure of a piece, and even the coherence of an entire collection of sonatas. Such a perspective sheds light on why the *finale* of the sonata concludes *piano* and also provides a compelling rationale for the Passacaglia serving as the concluding sonata in Biber's *Rosary Sonatas* collection.³⁹ Following this logic, each decimal unit, or functional section of the tens, will include a relative *climax* of that section.

³⁹ In the Baroque period, *ostinato* basses were often used at the end of a collections of sonatas. Considering the violin repertoire, examples include A. Corelli's *Follia*, Sonata XII, Op. 5, the *Ciaccona* in Sonata XII, Op. 2, or the *Ciaccona* by C.A. Lonati at the end of his 12 Sonatas.

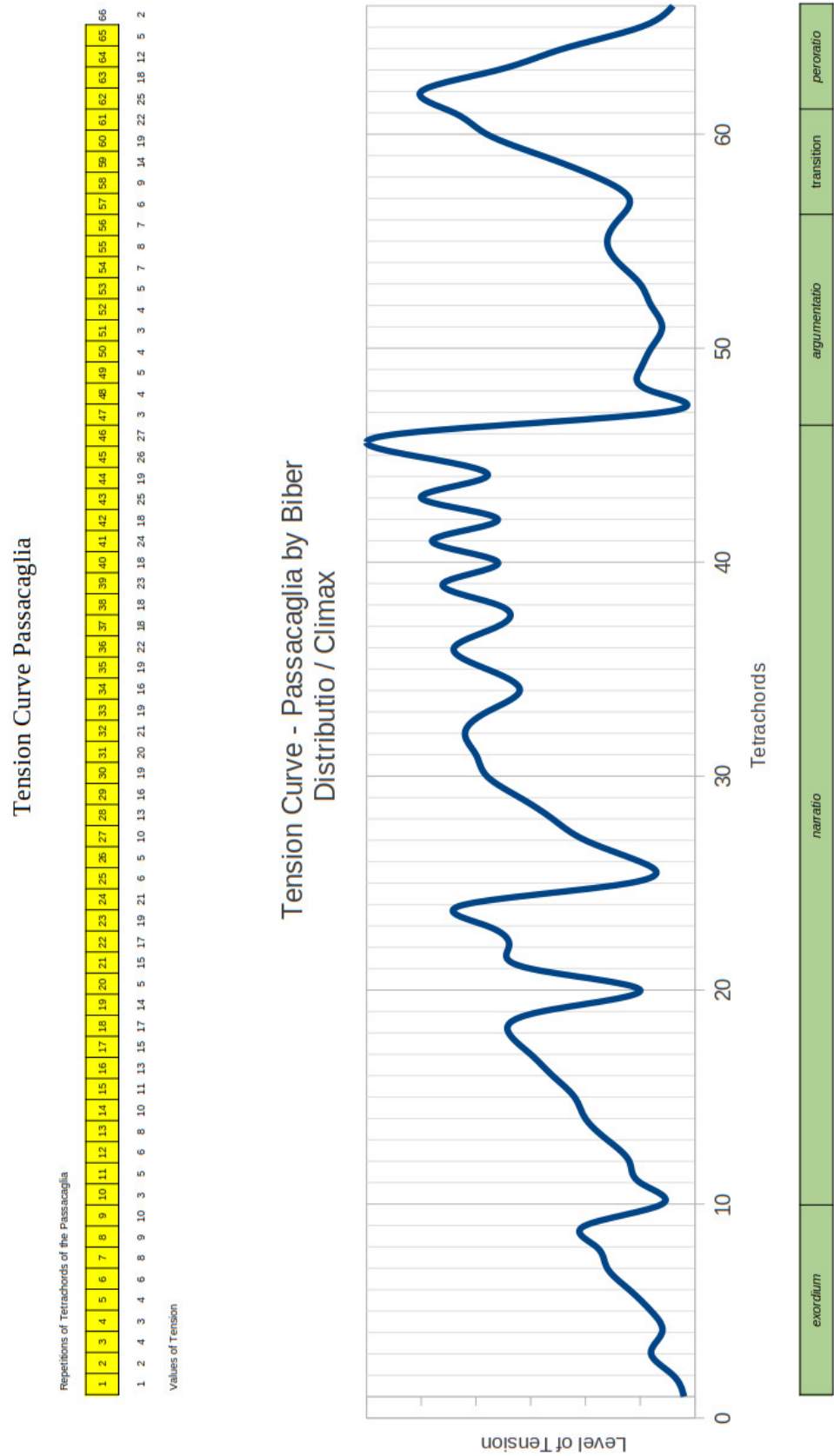


Figure 10: Passacaglia tension curve

The graph in Figure 10 illustrates my personal interpretation of the tension curves within this piece, linking the principles of rhetoric to the specific expressive tension of each cycle, and proportionally to the entire composition. I have assigned a numerical value to each repetition of the Passacaglia's tetrachord, reflecting my subjective perception of the tension inherent in its musical phrases. As noted earlier, the section corresponding to *Argumentatio* represents a truly intimate moment within the sonata. However, this intimacy does not translate into a high numerical value on the diagram. This empirical representation is intended as an example of my personal journey through the piece. I hope it serves as an encouragement for others to explore their own interpretations of the sonata and its Passacaglia cycles, perhaps reconsidering both the *analogical* and *analytical* dimensions that this article seeks to highlight.

The discussion surrounding the programmatic nature of Biber's sonatas remains active, with staunch supporters on one side and skeptical opponents on the other. Aware of the debate, I contend that part of the answer lies in the *analogical* – thus evocative and experiential – dimension inherent in the composition and performance of these sonatas.

The artistic tension experienced by a Baroque composer is, in my view, quite comprehensible. These composers inherited a deep understanding of Renaissance counterpoint, yet, influenced by the *Seconda Prattica* of the early 17th century, they developed increasingly sophisticated compositional strategies aimed at representing affects and imitating nature. From the late 16th century onwards, numerous sonatas in a representative style emerged, with Biber himself playing a significant role in this evolution.

This period also coincided with the heightened political and cultural influence of the Counter-Reformation, which sought to promote art that conveyed the power and glory of God and the Church. Consequently, the artistic journey of both composer and performer – then as now – was one of discovering the most effective formal strategies to communicate profound and meaningful messages. This pursuit reflects the ongoing challenge of balancing *Content* and *Form* in both composition and performance, a dynamic tension that I see as the essence of the artistic process. It is this principle that underpins my proposal of the Helicon method, mentioned earlier in this article.

At the conclusion of this journey, my hope is that *analogical* thinking – nurtured through the experience of personal exploration – will serve as an opportunity to reclaim our roles as responsible advocates for maintaining the balance between *Content* and *Form*. This process necessitates rediscovering an intimate perspective, both interpretative and compositional. Moreover, after engaging in a deeply personal dialogue with a written piece, I envision this journey progressing into a collective experience, brought to life through an effective communicative act shared with one's musical companions and, ultimately, with the audience.

BIBLIOGRAPHY & DISCOGRAPHY

- AURELIO AGOSTINO D'IPPONA, *De musica libri sex*, 389 ca.
- BODIN J., *Six livres de la République*, Jacques du Puys, Parigi 1576
- CHAFE E. T., *The Church Music of Heinrich Biber*, Ph.D. University of Toronto, UMI Research Press, 1987
- CASSIODORO F. M. A., *De artibus ac disciplinis liberalium litterarum*; in F. M. A. CASSIODORO, *Le Istituzioni. Basi per una rinascita di civiltà*, edited by A. Caruso, Edizioni Vivere In, Roma 2003, pp. 159-220
- COHEN R., *L'Arte della spada*, Sperling & Kupfer Editori, Milano 2003
- DE SANTIS R., *Rosarium, La devozione mariana di San Pio V*, Catalogo della mostra di piccole immagini devozionali, SMS 2004
- EDGAR D. J., *The Encoding of Faith: Scordatura in Heinrich Biber's Mystery Sonatas*, Ph.D. Dissertation, University of York 2008
- GILES R., *Physicality and Devotion in Heinrich Ignaz Franz Biber's Rosary Sonatas*, «Yale Journal of Music & Religion», IV/2, 2018
- GOEBEL R., *Sonate del Rosario*, CD, Musica Antiqua Koln, Archiv production, UPC 00028943165624
- HARBERL D. J., *Ordo arithmeticus: Barocker Zahlbezug und seine Wurzeln dargestellt am Beispiel der Rosenkranzsonaten von Heinrich Ignaz Franz Biber*, Dissertation zur Erlangung des Doktorgrades an der Geisteswissenschaftlichen Fakultät der Universität Salzburg, 1995
- IGNAZIO DI LOYOLA (SANT'), *Esercizi Spirituali*, Antonio Blado, Roma 1548
- LE GUIN E., *Boccherini's Body: An Essay in Carnal Musicology*, University of California Press, Berkeley 2006
- MADO PROVERBIO A., *Neuroscienze cognitive della Musica*, Zanichelli, Bologna 2019
- MELANDRI E., *L'analogia, la proporzione, la simmetria*, Quodlibet, Macerata 2023
- MINASI R., *Sonate del Rosario*, CD, Bizzarrie Armoniche, Arts 47735-8
- MORONEY D., *Sonate del Rosario*, CD, John Holloway - Tragicommedia, Virgin Classic, Veritas 0777 7595512 5
- VAN ORDEN K., *Music, Discipline, and Arms in Early Modern France*, University of Chicago Press, Chicago 2005
- PACIOLI L., *De divina proportione*, A. Paganus Paganinus, Venice 1509
- RIPA C., *Iconologia*, Gli heredi di Gio. Gigliotti, Roma 1593
- STRIECK K., *The Mystery of the Mystes, Sonatas: A Musical Rosary Picture Book*, McGill University, Montreal 1999



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