1. HISTORICAL DEVELOPMENTS OF MUSICAL SYSTEMS: LATE ROMAN TO RENAISSANCE PERIOD

In this part, I will introduce two main musical systems, Greater Perfect System (GPS) and Hexachord Theory. These were analytical tools which used by contemporary music theorists and musicians in early European culture. We will briefly look at their developmental historical journey from late Roman to Renaissance period. Then, we will see the reception of these tools in our time which led to some debates in which how those contemporary scholars were thinking about their own music. Was the mental referent of music to be GPS or hexachord theory in the medieval term?

1.1 Musicus: From Late Roman to Early Middle Ages

Calvin Bower in his *The transmission of ancient music theory into the Middle Ages* draws the main framework for interactions between the Ancient Greek based music theory and its reception in the medieval era. In this work, Bower first of all explains the place of the musicus (music theory) in the late Roman and early medieval worlds, and then described the main boundaries of how musical thoughts of these periods were being re-formatted in the Carolingian and Post-Carolingian period.

In Roman intellectual world, the musica was one of the branches of the quadrivium in seven liberal arts. In the beginning of this term, it was regarded as a referential knowledge – well-known musicians and the origin of some instruments - that enhances the orator's prestige in his speech; thus, there was a superficial understanding of the Greek tonal system. In terms of the rhetorical tradition, a systematic musical understanding had lagged behind when Martianus Capella, in his *Marriage of Philology and Mercury*, set out the foundations of musicus that forged the main idea that arts are the most important externalization of the human intellect. While this work took its

essential premises from the ideas of Cicero, it had considerable influence on Boethius's ideas in the 6th century.

In the first century, Marcus Tullius Cicero found a musical paradigm that reactivated Platonist thoughts which have far reaching impact on musical thoughts. In his *Dream of Scipio* Cicero concluded that motion of spheres are channeled into musical ratios in which meaningful sound motions brought the physical universe to the realm of the metaphysical philosophy that was explained with relationships of musical elements. Relatedly, the general form of Cicero's conclusion was being taken into a new form in St.Augustinus' thoughts that blended principles of Neo-Platonism with Christian testimonies. Accordingly, Pythagorean musical tradition in ancient Greek musical system was the main reference for Martianus Capella and St.Augustinus. In his *De Musica*, 387 BCE, Augustinus, for example, refers musical ratios and their interactions with poetic meters to the knowledge of God, and maintains the Cicero's paradigm in which music is the most discipline that mediates the human mind to sublime to the eternal knowledge of the divine. At the end of this period, Anicius Manlius Severinus Boethius set higher standards of Neo Platonism in music with his arduous works. Boethius explained the Ancient Greek Music theory, and laid the foundations of a moral philosophy derived from musical ratios.

> Of all the mathematical disciplines, music is unique; for music is the most sensual of the arts, and can thus influence behavior, can determine character. Boethius proceeded to develop a theory of sound that was quantitative, and argued that the rational person must cultivate a music structured according to principles that were themselves rational, principles that reflected the most consonant essences found in that species of quantity expressed in beautiful ratios and proportions. For Boethius – and indeed for the Pythagoreans and Neo- Platonists – those essences were discovered neither by rational deduction nor by induction from sensual experience; they were revealed truths. (Bower, 2002, p.142)

1.1.1 Greater and Lesser Perfect Systems and Modes of Boethius

In 520 BCE, Anicius Manlius Severinus Boethius wrote the *De Institutione Musica* (Fundamentals of Music) whose legacy formed the music-theoretical thoughts more than thousands of years up until the 17th century. Almost all medieval and Renaissance theorists referred their ideas to the principles of the book. Until the 6th century, Martianus Capella's book Marriage of Philology and Mercury was the main reference book that considered the Greek Music Theory; however, in this book, there was very little technical explanation of the Greek music system. Boethius filled this gap. While he brought the light of the Fundamentals of Perfect Greater System (GPS) and Lesser Perfect System (LPS) of Ancient Greek music theory to the early medieval term, he maintained the tradition of attributing divine origins of music to mathematical ratios.

GPS and LPS are the two-octave scales that include various conceptualizations with interactions of individual notes and segments on the system. First of all, we will see how these two systems were represented in Boethius's Foundations of Music. Then, as building blocks, I will introduce the Diatessaron, Diapente, and Octave species. Most of all, generated scales of different modes, as will see, use the same intervallic pattern of the original two-octave scale of the GPS. I will then represent GPS and LPS, tetrachords and octave species, and Boethius's famous wing diagram with modern notation which provides the process of mode derivation of Boethius. Even if this system is quite understandable from the time we live in when we think of it with our medium of the fully developed notational system, there was no standardized and widely understood music notation in the 6th century. This was likely to lead Boethius to sacrifice the clear explanation to the ease of using some diagrams without explaining them in detail which obviously wasn't being understood, well, in later centuries of the Middle Ages. In 1460, when Francis Gallicus cautioned in his *Ritus Carendi* that the medieval mode system and Greek harmoniai hadn't been the same entities, it already passed nine centuries from the first appearance of Boethius's Fundamentals of Music.

In GPS and LPS, Boethius drew the most fundamental nature of Greek Music theory, and several categorical aspects of them: individual note names, tetrachordal segmentations, the disjunct (in the case of GPS) and conjunct (of LPS) regions of two

octave scales, and the intervallic code between the voices in two octave scales. (T-ST-T-T-ST-T-T-T-ST-T-T-ST-T-T).

Fig.2.1 illustrates the main organization of the Greek Musicus which is represented by Greater Perfect System (GPS) and Lesser Perfect System (LPS), and Boethius derives 7 modes of the music from the GPS. If we look at differences between GPS and LPS, the "bb" note which is placed at the red zone brings about the main difference between these two systems, and the rest of features of them remain identical. There are two functions of "b natural" in GPS that firstly provides the disjunction by mese between two halves of the two octave scale, and secondly, overall tetrachord is called Diezugmenon and individual notes in this tetrachord are called Paramese (a), Trite Diezugmenon (b), Paranete Diezugmenon (c), and Nete Diezugmenon (d), respectively.

There are five tetrachords in GPS and LPS. Hypaton, Meson, Diezeugmenon, and Hyperbolean in the GPS. Hypaton, Meson, and Hyperbolean remain the same tetrachords in two systems, as for the function of the "bb" in the LPS, it firstly provides the conjunction with the preceding tetrachords that are Hypaton and Meson, and overall tetrachord at the red zone is referred to as Synemmenon. Individual notes in this tetrachord are called Mesa Synemmenon (a), Trite Synemmenon (bb), Paranete Synemmenon (c), and Nete Synemmenon (d), respectively. That worth noting here is that the two common notes in both tetrachords, that are "c" and "d" take different names depends on the effect of the "b natural" and "bb" in their tetrachords. Main scale of the system is the combination of the meson and diezeugmenon which is called Pythagorean Octochord.

Boethius, then, introduces the building blocks of GPS which are illustrated in fig.2.2. As the general framework of the system, while there are three species diatessaron, diapente, and diapason, two orders of species (first order species and second order species) classify the parts. However, the first and second orders always constitute a pair of ascending and descending notes of the same species. The first orders are featured with descending scales which are shown in the blue zone, the second orders are defined with ascending scales which are demonstrated in the red zone of each species. The brackets indicate some numbers on the individual diatessaron, diapente, and diapason scales.

Numbers, in diatessaron and diapente species, are regularly presented in the first order, the numbers of the second order align with the numbers of the first-order species, and thus they are presented in a complex order. For example, in the diatessaron species, the first "first order species" is paired with the first "second order species," second "first order species" is paired with the third "second order species" etc. In diapason species, there has been a mirror effect in terms of descending and ascending scales. Those are pairs of orders, 1-7, 2-6, 3-5, 4-4, 5-3, 6-2, 7-1. Numbers at the left belong to the first order and, numbers at the right belong to the second order. The matrix which is given at the bottom of Fig. 2.2 shows the intervallic code and movements. While T shows the whole tone intervals, ST illustrates semitone intervals. It is observable how the ST regularly changes its place depending on transforming species. Bower in his *Modes of Boethius, 1984* discussed the roots of these orders in the case of the trajectories of ideas from Ptolemy, Martinus Capella, Nichamacos to Boethius, and concluded that there is an irregularity in diapente species which is observable at the matrix of the second species of the diapente. Accordingly, in fig.2.2, the small box matrix of the second species of diapente denotes two possibilities, the actual series of this species is at the right, however, and it might be supposed that the non-existed position should have been taken place in the system because of order of semitones. However, in this scenario, its last row would give rise to a diminished fifth between the first note which such a combination never existed in GPS. Bower refers these problems to be minor inconsistencies to Boethius. Finally, in terms of the octave species, there is a mirror effect of the species in the code of the intervals which is only visible by reading the intervals of the first order species back, and then we find the second order species.

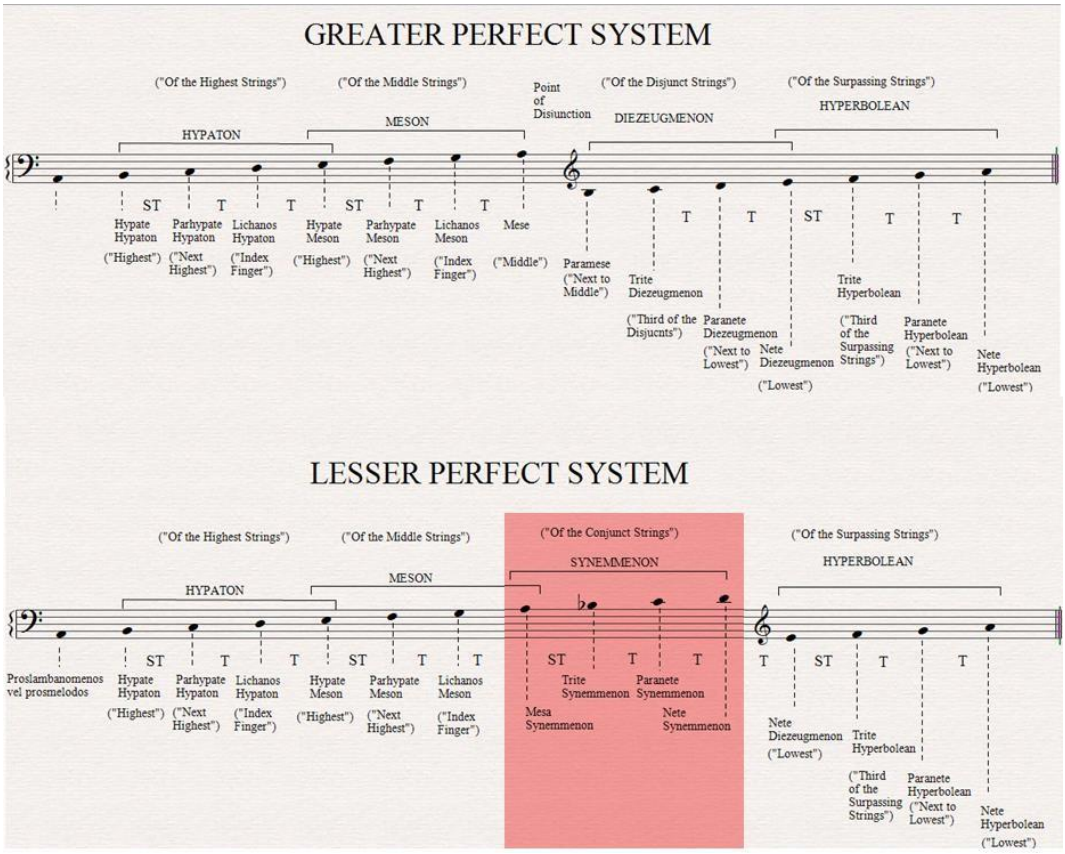


Figure 2.1: Greater and Lesser Perfect System.

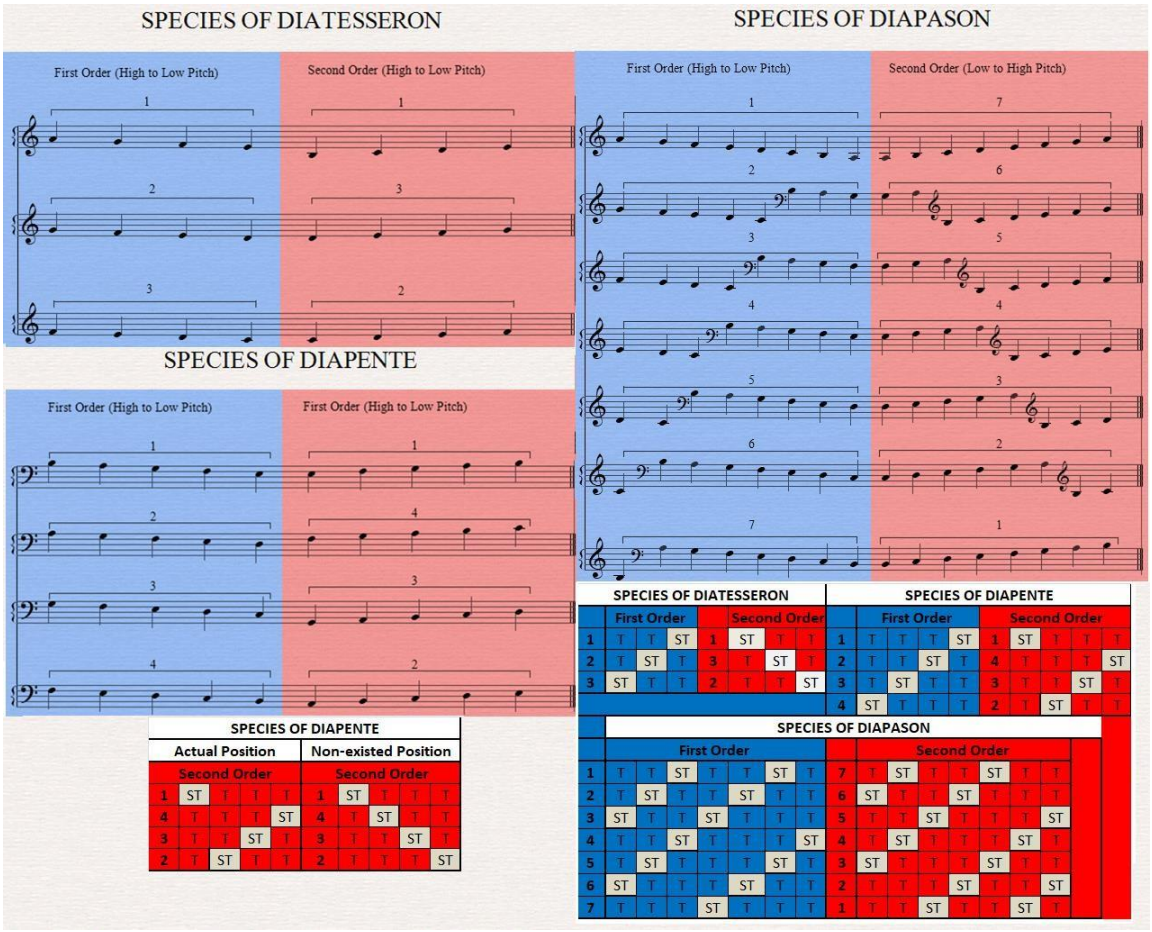


Figure 2.2: Diatesseron, Diapente, and Diapason Species

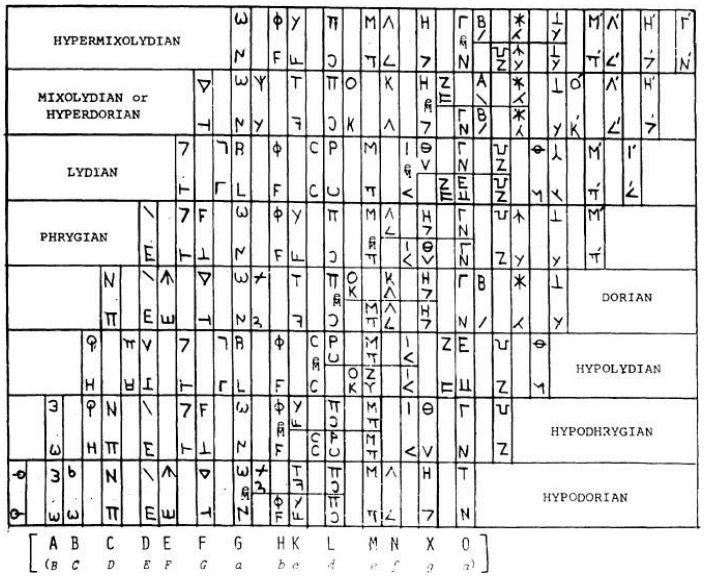


Figure 2.3: Boethian Wing Diagram for Mode Derivation (Bower, 1984, p.260)

Boethius' Species	1	2	3	4	5	6	7
		b	c# b	d c b^b	e d c b	f# e d c# b	g f e^b d c b^b
MODES (left to right):	a	a	a	a	a	a	a
Hypodorian							T
Hypophrygian			g#			g#	
Hypolydian							
Dorian	g	g		g	g	T	g
Phrygian							
Lydian		f#	f#		f#	f#	
Mixolydian							
	f			f	T		f
	e	e	e	e	e	e	
			d#	T			e^b
	d	d	T	d	d	d	d
		c#	c#			c#	
	c	T		c	c		c
	b	b	b		b	b	
	T			b^b			b^b
	A	A	A	A	A	A	A
	G	G	G#	G	G	G#	G
	F	F#	F#	F	F	F#	
	E	E	E	E	E		
	D	D	D#	D			
	C	C#	C#				
	B	B					
	A						

Figure 2.4: Translation of the Wing Diagram (Bower, 1984, p.261)

Boethius is quite brief about the aspects of the modes

> Has igitur constitutiones si quis totas faciat acutiores, vel in totas remittat secundum supradictas diapason consonantiae species, efficiet dos VII. quorum nomina sunt haec: hypodorius, hypophrygius, hypolydius, dorius, phrygius, lydius, mixolydius.
>
> If someone should make these entire systems higher, or lower them in entirety through loosening, *in accordance with the species of the consonance of the diapason discussed above* (Bower's emphasis), then he will bring about seven modes, the name of which are these: Hypodorian, Hypophrygian, Hypolydian, Dorian, Phrygian, Lydian, and Mixolydian. (Bower, 1984, p.259)

Boethius explains this statement in a diagram (fig.2.3) with Alypian notation which most of the modern reader is certainly illiterate to read; however, Bower brings this diagram to the attention of the modern reader with his excellent new representation based on Boethius's wing diagram (fig.2.4). I re-produced Bower's diagram with color analysis and some additions in fig.2.5 and translated it to the modern notation in fig.2.6.

At this point, I would like to remark on some crucial points without expanding the conceptual scope of the present work. In terms of the derivation of modes, movement of the mese (disjunction) is the most important point in the system, and this refers to Ptolemy's thetic and dynamic character of tones in his *Harmonic*. Second point, this system is quite important for the derivation of modern tones, one can easily see that while, in table 2.1, first mode hypodorian generates A minor scale in the modern sense, and second mode hypophrygian generates B minor, hypolydian - C# minor, Dorian – D minor, Phrygian - E minor, Lydian - F# minor, and Mixolydian – G minor, thus the very roots of the tonal system did have to strike similar features with the Ancient Greek Music theory at least in a theoretical level. However, this system will be transmitted to the early medieval period with various ambiguities that lead to an alternative way to externalize the nature of the human mind in music; however, in the end, the point where the solmization system (as the substitution of GPS) arrives will the exact twin of

the system in which Boethius had told us in his translation of Greek Music Theory with different lexical items that referred to the same sonorities. The good news though while the solmization system runs to be perfect, its by-product operations, e.g. voice leading and contrapuntal settings of the sacred and secular works, will construct the basis of firstly Medieval and Renaissance modal music, and then Western tonal music tradition. Finally, it is remarkable that tones which are referred to as feigned music (musica ficta) in the Middle Ages are one of the essential parts of the Ancient Greek system. Even if they don't exist in the GPS, the Greek theorists saw no harm in generating them transposing the original two-octave scale to the other ranges of the tonal organization.

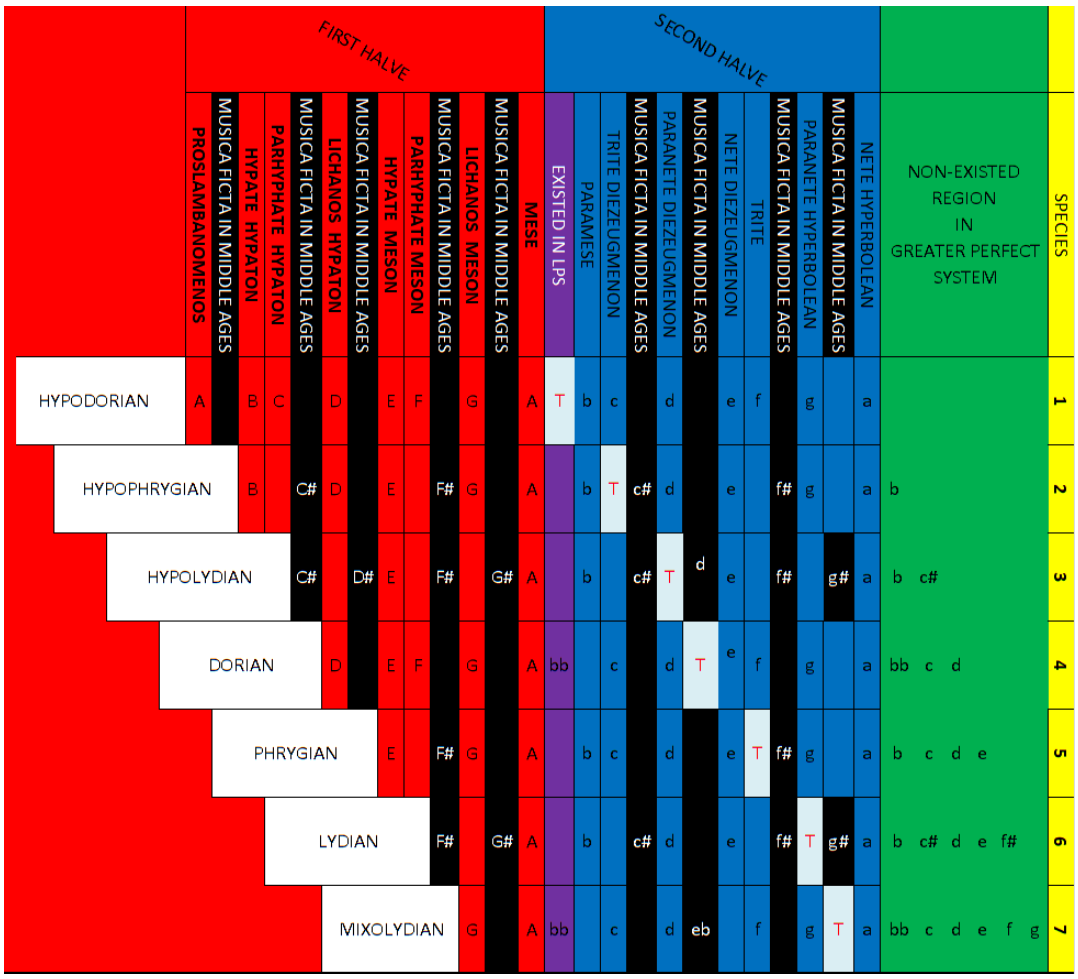


Figure 2.5 : Reproduction of Wing Diagram of Boethius

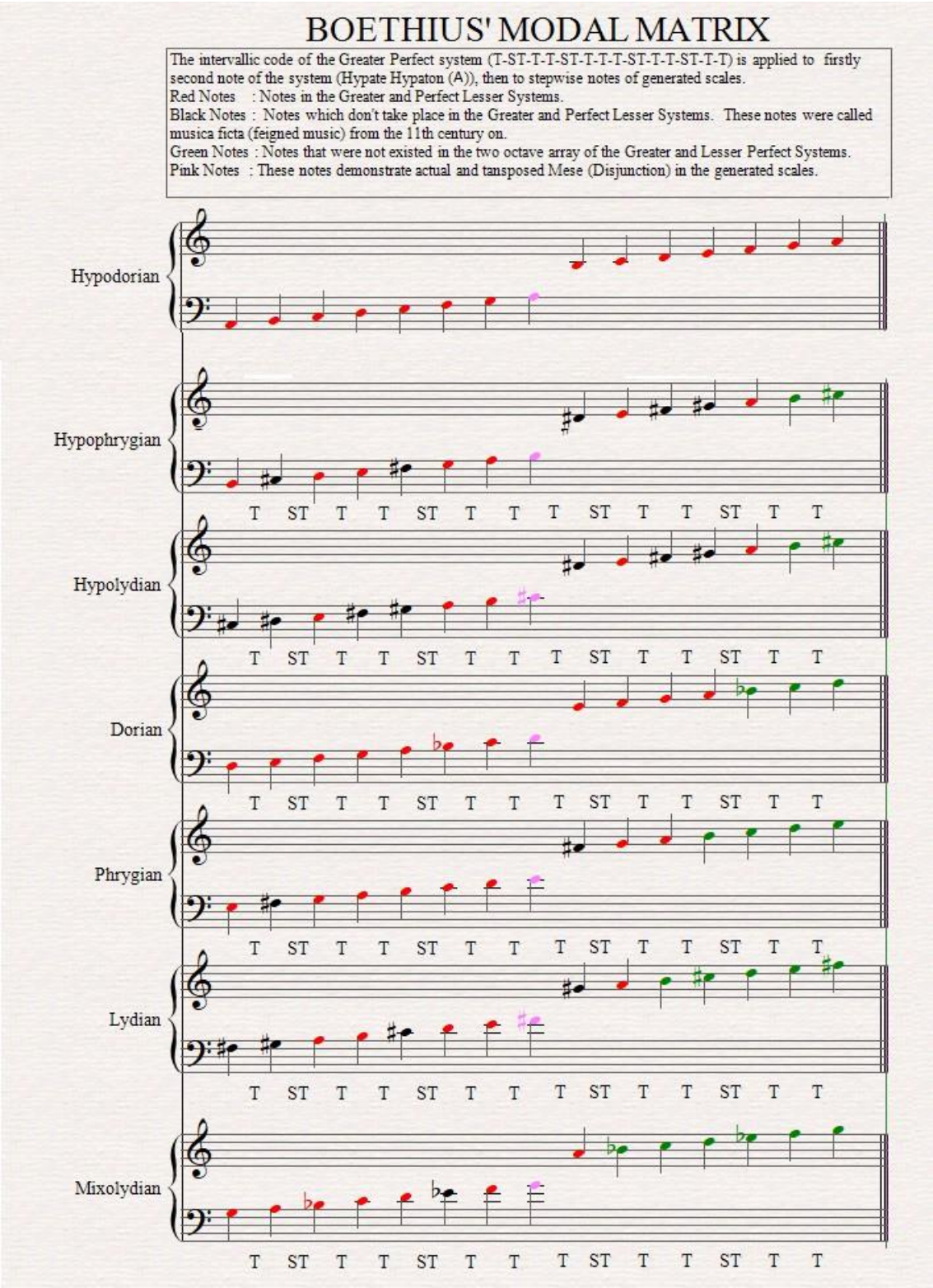


Figure 2.6: Modes of Boethius

Table 2.1: Modes of Boethius and Minor Tones Correspondence

THE MODES OF BOETHIUS DERIVED FROM GREATER PERFECT SYSTEM (MODERN LETTER NOTATION WITH INTERVAL ALIGNMENT)																															
Ancient Modes	**Church Modes**	**Modern Tones**															MESE														
Hypodorian	Hypodorian	A Minor	A		B		C		D		E		F		G		a		b		c		d		e		f		g		a
				T		ST		T		T		ST		T		T		T		ST		T		T		ST		T		T	
Hypolydian	Hypophrygian	B Minor	B		C#		D		E		F#		G		a		b		c#		d		e		f#		g		a		b
				T		ST		T		T		ST		T		T		T		ST		T		T		ST		T		T	
Hypophrygian	/	C# Minor	C#		D#		E		F#		G#		a		b		c#		d#		e		f#		g#		a		b		c#
				T		ST		T		T		ST		T		T		T		ST		T		T		ST		T		T	
Dorian	Dorian	D Minor	D		E		F		G		a		bb		c		d		e		f		g		a		bb		c		d
				T		ST		T		T		ST		T		T		T		ST		T		T		ST		T		T	
Phrygian	Phrygian	E Minor	E		F#?		G		a		b		c		d		e		f#		g		a		b		c		d		e
				T		ST		T		T		ST		T		T		T		ST		T		T		ST		T		T	
Lydian	/	F# Minor	F#		G#		a		b		c#		d		e		f#		g#		a		b		c#		d		e		f#
				T		ST		T		T		ST		T		T		T		ST		T		T		ST		T		T	
Mixolydian	Mixolydian	G Minor	G		a		bb		c		d		eb		f		g		a		bb		c		d		eb		f		g

1.2 Music Theory: From Early Middle Ages to Post Carolingian Era

In terms of the transmission of musical thoughts in medieval period, two writers, Cassiodorus (c.485-580) and Isidore (c.570-636,) who were deeply influenced by the philosophy of St. Augustinus, brought Augustinus' intellectual paradigm to the everyday life in South of Italy and Seville. Bower says that

> Because of their offices and their spiritual characters, they introduced two new dimensions into reflections concerning music: (1) the presence of music in Biblical literature and (2) the centrality of singing in Christian worship. Both writers draw on Biblical passages to demonstrate the power of music, thereby supplementing pagan myth with Judeo-Christian narratives. Both authors are clearly moved by the singing of psalms in the liturgy, and begin to integrate the spheres of secular learning concerning musica with the sacred tradition of singing in worship. …These authors thus began to break down the boundaries that isolated the ancient discipline of musica – that collection of facts known by the orator and that Platonic sphere of learning leading to abstract knowledge – from the practice of music that was rapidly becoming an ever more significant part of the liturgy. (Bower, 2002, p.148)

After presenting the main developments in musicus in the late Roman and early medieval periods, Bower explains the legacy of musical improvements in these terms which were transmitted into the Carolingian and late Carolingian terms.

In a brief interlude between two painful periods of invasions in the continent, the 9th century is the magical term in which Franks and Lombards were united under the reign of Frankish King Charlemagne. In the period in which clerical and secular education were given special attention, Alcuin and Theodulf of Orléans, who were main contributors to setting out the intellectual agenda of the empire, paid considerable attention to the musica in the room of the Roman rhetorical and Platonic traditions. In this term, the famous royal library in Aachen was the host of books which are gathered from all four winds of the continent. Works of St. Augustinus and Boethius were attached to a particular importance whose legacy provided a substantial ground for the secular learning in Christian education. In terms of the

music education, two important books that are Capella's *Marriage of Mercury and Philology* and Boethius's *Fundamentals of Music* were studied for practical purposes of singing liturgical chants. Bower remarks that the first copies of these works were written by non-musician scribers who paid particular attention to those points

> The writers of these glosses were obviously scholars and philosophers, not musicians; for their primary concerns were explanation of Greek proper names and places using medieval principles of etymology, (2) definitions and explanations of technical terms inherited from the Greeks, (3) discussion of basic elements of Greek music theory – particularly the basic building blocks of the Greek musical systems, and(4) relating the whole of the discipline of music to the broader issues of philosophy. These scholars were particularly attracted to the advanced mathematical problems discussed in Boethius's text, and wrote numerous commentaries on the semitone, the apotome (2,187 : 2,048), and the Pythagorean comma (531,441:524,288). Their interest in ratios led them to an obsession with musical pitch, with the consequence that other parameters of music were largely ignored. Conspicuously absent from the early ninth-century commentaries on classical musical texts is any extended discussion of practical music. (Bower, 2002, p.151)

Towards the end of the century, in political life, there appeared a turmoil in which the empire was divided into parts between Charlemagne's sons. Accordingly, the political developments led the intellectual activities to be carried out in the monastic centers because of the lack of a central unity in the empire. In these centers, the primary activities of monastic scholars were to make the abstract testimonies of Boethius explicit and practical in the categorization of the liturgical chants, and D, E, F, and G notes of the GPS were converted to some modal categories that are Protus, Deuterus, Tritus, and Tetrardus. However, these modal categories were highly different than the Ancient Greek Music modes the latter gave rise to a misunderstanding because of its explanation given by the ancient instrument kithara which is not used in medieval Europe.

> Medieval scholars, ignorant of Greek musical practice, were not in a position to interpret these (Boethius's) statements correctly, since they were familiar

> with a set of modes that could be formed from the same octave species …, but they numbered them in the order 7 to 1 instead of 1 to 7, they also recognized an eight mode having the same octave species as the first. The system of modi (see fig.2.6 in the present work) that Boethius described in chapter 16 was incompatible with this interpretation, but because he did not explain how it arose from the species, readers were thrown into confusion. (Palisca)

At this point, it is important to see that despite some misunderstandings of the external entities - mode, tones, tetrachords, etc.- of the music that would be understood as late as the 15th century, it should give due to their efforts which it is still observable how early theorists combined the Capella and Boethius's testimonies that represent the Platonism in music. Accordingly, the music consisted of two levels; natural and artificial music, while the former might be associated with Boethius's musical mundane and ideal music, the latter might be the counterpart of the musica instrumentalist that every attempt to compose a piece to sublime to the natural music. In this respect, all these attempts represented artificial music that is practiced with four tonaries that governed tonal structures of chant repertoire: protus deuterus, tritus, and tetrardus. Each tonaries included an authentic and plagal tone series which consists of 5 whole tones and 2 semitones. In terms of the natural and artificial music, Bowen says that

> But these two levels of being are not independent of each other: the experience of artificial music through instruments and the study of musica as a liberal art are basic to the knowledge of natural music, for musical knowledge begins with the artificial and rises to the natural. Natural music is "proved" by the artificial; things invisible are demonstrated by the visible. … Independent tonaries and catalogues of chants combined with musical treatises played a very significant role in the manuscript culture of cantus and musica during the Carolingian period, and they remained practical and theoretical tools for the cantor and musicus until the end of the Middle Ages.
>
> …and the cross-fertilization between the philosophical tradition of musica and the practical tradition of chant defines a new chapter in the study of music theory. But before the initial phases of the new chapter can be traced,

> the four tones – protus, deuterus, tritus, and tetrardus – must be examined as fundamental parts of a musical system independent of musica. (Bower, 2002, p.153)

In this term, there was also a breaking point in terms of polyphonic music in which Enchiriadis treatises (*Musica Enchiriadis* and *Music Scholarum*) started to appear on the scene of the music theory. While the path to follow the authorial sources in the early Middle Ages is relatively easy as opposed to the Musica Enchiriadis tradition, it required scholars to overcome certain difficulties because the treatises were most widely disseminated sources in 10^{th} and 11^{th} centuries together with Boethius's *Fundamentals of Music* and anonymous *Dialogus de Musica*. The liturgical chants in Enchiriadis treatises were placed at the center while ratios of the tones were taking a back seat. Three important developments appeared Dasean notation, theoretical discussion of tetrachords, and development of the first polyphonic form: organum. Technically, tetrachords are building blocks of the theory which also consists of tonaries as the classification tools of the chant repertoire. Accordingly, protus deuterus, tritus, and tetrardus refer to D-E-F-G notes respectively which are called "qualities". Intervallic relations (Whole-Semitone-Whole-Whole) between the D-E-F-G are the main considerations of the tetrachords without paying attention to ratios.

Musica Enchiriadis brought about a coherent theoretical model to the GPS by some external modules of tonaries; however, this system was not independent of some imperfections.

> The most obvious peculiarity of the Enchiriadis pitch collection lies in the fact that this text seems oblivious to the lack of periodicity at the octave (and double octave); augmented octaves occur between the tritus of the lower pitches (Bb) and the deuterus of the high pitches (b), between the tritus of the final pitches (f) and the deuterus of the upper pitches (fs), and between the tritus of the high pitches (c) and the deuterus of the residual pitches (cs). (Bower, 2002, p.156)

Undoubtedly, Enchiriadis treatises gave rise in a reasonable and systematic classification of the chant repertoire, however, even if Musica Enchiriadis and

Musica Scholarum was the first treatise on how to sing organum by avoiding the tritone in favor of the principal interval that is the fourth in singing, nevertheless, certain deficits of periodicity in the system required scholars to cope with the problem. First, they came up with somewhat agreeable points, "astonishing" (mira) that is when the melody is transmitted to the eight tones, new criteria are applied, depending on a new series of pitches, to the system; however, this point didn't convince the later generations who were still persistent to find a solution for substantial theoretical tools for the performance of polyphonic settings of chant. Bower explains the legacy of the Enchiriadis treatises and its paradigm shift in the period.

> The essence of the Enchiriadis tradition lies in singing rather than in knowing, yet the fundamentals of singing (pitch- and phrase structure) are treated with a theoretical rigor comparable to the mathematical theory of Boethius and his Carolingian commentators. … The musical structures themselves perceived by the ears in the performance, not mathematical ratios, offer direct, albeit partial, knowledge of a higher reality, a reality that will be known in full only when one exists at a higher level of being. Thus, the discipline of music should be directed toward gaining some understanding – albeit incomplete – of the sonorous revelation of a higher order reflected in the cantor's song. (Bower, 2002, pp.157-158)

Even in a speculative level, singing had an advantage over knowing in Musica Enchiriadis, this counsel of the treatise didn't block theorists from thinking about an accurate system that was still important in terms of proposing a common ground in practice of singing of vast body of liturgical chants. These authors were Hucbald of St.Amand, anonymous authors of Alia Musica treatises, German theorists, who were Berno of Reichenau, Hermannus Contractus, Wilhelmus of Hirsau, and Theogerus of Metz, and Pseudo Odo. At the end of this period, Guido'd Arezzo was the theorist who canonized the medieval practice from the 11^{th} to the 16^{th} century with his solmization system, and even beyond, new tendencies in music theoretical system compromised with solmization, thus, the solmization system was still in the reckoning in further centuries.

1.2.1 Guido'd Arezzo and the Hexachord Theory

Before having a look at some far-reaching influences of the hexachord system, I will, first of all, present essential concepts of the system, and how it was practiced in the medieval repertoire. When we look at Fig. 2.7, there are 9 main concepts in the system, and in the interactions of its segments; in addition, we encounter mutatio, coniuncta, and disiuncta concepts in the actual compositions. These main 9 concepts are grave, acutae, and superacutae, voce, loca and deductio that the latter is divided into three categories hard, natural and soft deductiones. Deductio and hexachord can be used interchangeably.

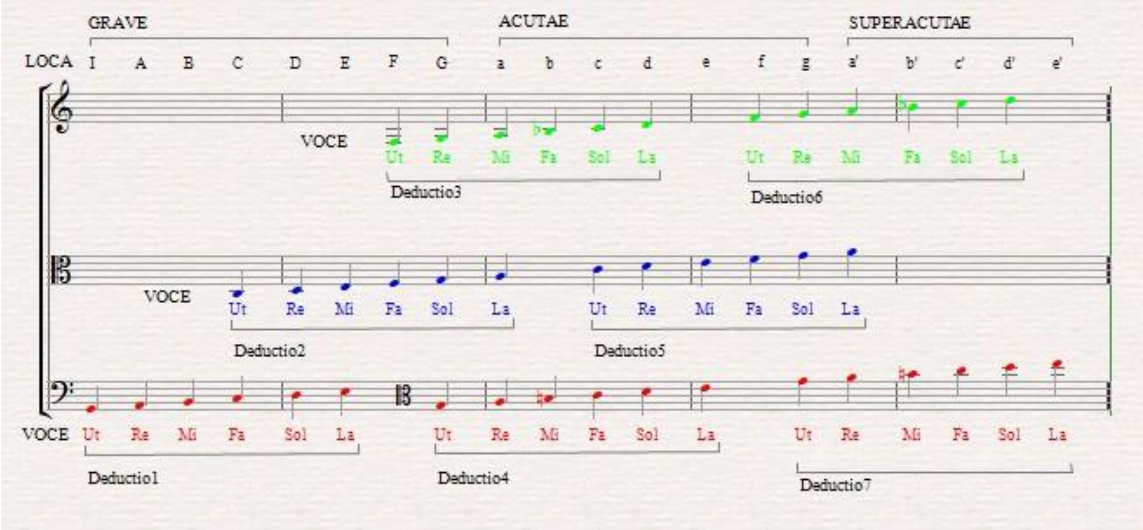


Figure 2.7 : Hexachord System

Grave, acutae, and superacutae are the regional concepts that Γ - A - B - C - D - E – F -G are notes which take place in the grave region, acutae zone includes a-b-c-d-e-f-g, and a'- b'- c'- d'- e' are notes that are placed on the superacutae region. All individual letters are called loca, and depending on the deductiones, these letters are represented with voce (syllables) that are ut-re-mi-fa-sol-la. The melodies in which loca are coupled with syllables are referred to as three hexachords: hard, natural, and soft.

There are three hard hexachords in the system which is indicated with red notes in Fig. 2.7. Hard hexachords begin with Γ, g, and g' loca, and subsequent 5 other loca take place in the series which are solmized with the first deductio (ut/ Γ – re/A – mi/B –fa/C – sol/D – la/E) fourth deductio (ut/G – re/a – mi/b –fa/c – sol/d – la/e)

and seventh deductio (ut/ g – re/a' – mi/b' –fa/c' – sol/d' – la/e'). Natural hexachords (blue notes in fig.2.7) begin with C, c and c' loca that take other notes in order, and solmized with the second deductio (ut/ C – re/D – mi/E –fa/F – sol/G – la/a), and fifth deductio (ut/ c – re/d – mi/e –fa/f – sol/g – la/a'). Finally, soft hexachords (green notes in fig.2.7) begin F, f, and f' loca, the following notes (loca) in order are solmized with the third deductio (ut/F – re/G – mi/a –fa/bb – sol/c – la/d), and sixth deductio (ut/f – re/g – mi/a' –fa/bb' – sol/c' – la/d').

In Fig. 2.7, some notes take one, two, and three syllables in related regions and hexachords, this nature of the system is one of the crucial points in analyses of these building blocks. In terms of the compositional process, there are three concepts that specify hexachordal transmission to each other: mutatio, coniuncta, disiuncta. Coniuncta and disiuncta also triggers another crucial concept, musica ficta.

In "Venecie Mundi Splendor/Machaci, qui Stenadomus" pair of the text (fig.2.8,) there are three musical lines that are tenor, counter tenor, and discantus. While there is no a mutatio with the tenor and countertenor which are represented with natural hexachord in blue notes, there are two mutatio in the discantus. Accordingly, the passage begins with the hard hexachord (red notes), in the last syllable of the "mundi," the overlapping Guidonian syllables "Re/a, and Mi/a" indicate the first mutatio from hard to soft hexachord, after this momentarily change, the second mutatio, from soft to natural hexachord, comes into play on the sixth fusa of the 7th bar (ut/f and fa/fa.) All these notes take place in the main hexachordal zone. Thus, we can define the mutatio as the hexachordal transformations between hard, natural, and soft hexachords that consist of the notes that take place in the original, untranspossed hexachord system. Mutatio is always signaled by a pivot tone which is the common tone in two hexachords in momentarily use that is also always illustrated with overlapping different syllables.

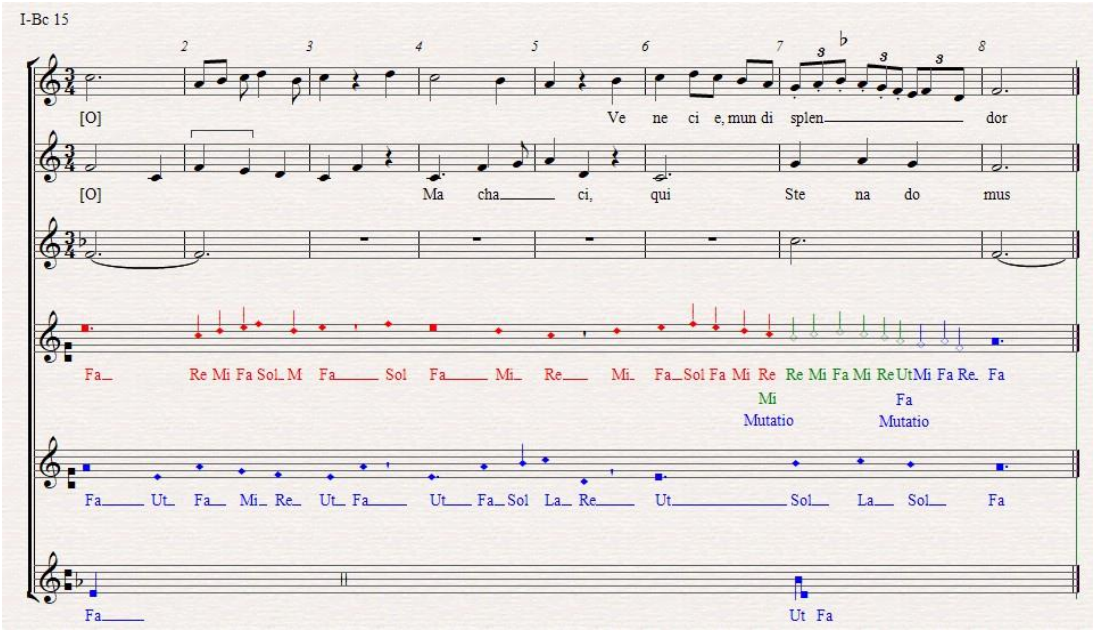


Figure 2.8 : Solmization Analysis of *"Venecie Mundi Splendor"*

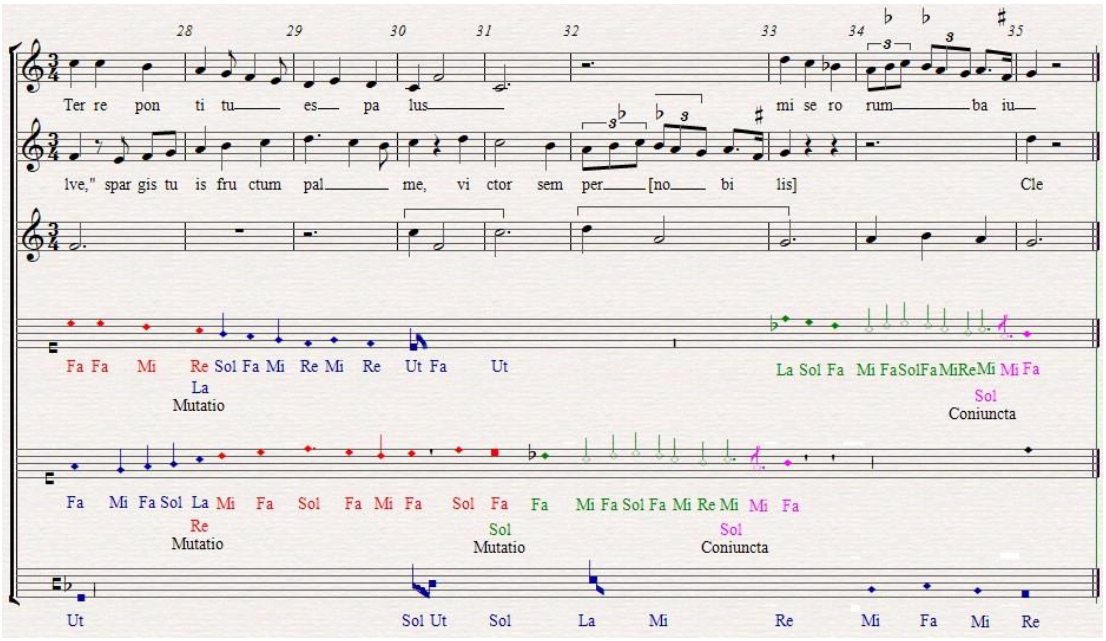


Figure 2.9 : Solmization Analysis of *"Terre pointi es palus miseroroum"*

In fig.2.9, we have seen the musical representation of "Terre pointi tu es palus miserorum, baiula/spargis tu is fructum palme, victor semper [nobilis]" pair of texts with two mutatio and two coniuncta. All parameters which are outlined above for mutatio are observable in this part of the piece, too. Coniuncta gives rise to the cultivation of musica ficta notes. The soft hexachord in the countertenor (green syllables) comes to an end with the f# which provides the first coniuncta at the pivotal point (mi/a – sol/a). The same figure is imitated two measures later that is the second

the appearance of the same coniuncta. When we look at the syllable-loca pair that brings this concept (pink-colored syllables and paired notes), at least one of the notes is not used in the regular gamut, and in this case that is mi/f #. Reading the pivotal point backward in pink syllables demonstrates this fact as sol/a, fa/g, mi/f#, re/e, ut/d. While there is neither d hexachord in the original gamut, nor does it contain an f# in its deductiones. Therefore, we can define the coniuncta which is the transposed hexachord, thus I will use a historically informed term for transposition as coniuncta. It extends the range of the gamut into the numerous different hexachords which may, in principle, be constructed for all individual loca tones of the system. Coniuncta enters the musica ficta notes into the theory which is applied to all loca tones by way of the interval pattern of ut-re-mi-fa-sol-la (T-T-ST- T-T), and musica ficta notes are generated in this method.

One can easily trace the main scale system of hexachord theory back to the Greater Perfect System. The whole gamut of the hexachord theory is notes that are placed on the GPS with the exception that an additional Γ tone takes place in the hexachord theory. As the main differences between the two systems, GPS is divided into diatessaron, diapente, and diapason species which ultimately derives 7 modes from them. This process provides a possible chromaticism with practical music even though it was never applied to any repertoire in later periods. As for the hexachord system, it considers the GPS, however, it is not associated with tetrachords, pentachords, octave species, and original modes in the system. Instead of these layers of GPS, hexachord theory derives the chromatic inflection by way of the coniuncta that brings musica ficta notes to dialogue with a compositional process.

As we have seen while theories tend to give monochord division special attention was one of the camps e.g. Ptolemy, Aristoxenus, and Boethius, on the other end, the ideas associated with the Enchiriadis tradition presented that singing had an advantage over knowing. According to principles of anonymous authors of Enchiriadis books, theoretical systems, monochord division, and principles of theory derived from these mathematical ratios might sometimes be flexible enough to make the overall system compatible with practical music. The main reason Guido'd Arezzo devised the solmization system was to reconcile these two opposing views: singing and knowing. Guido wrote four treatises to convey his thoughts to the posterior: Micrologus (after 1026,) the Regule, the Prologus, and the Epistola (Before 1033.) In

these treatises the main idea was how to solve the problem that singing all new songs by rote and in every new case brought singers to start from scratch. Guido brought forward that singers should familiarize themselves with the intervallic disposition of the music. In addition, some properties of music, namely solmization syllables, can convey the general feelings of all the new cases to the performers' minds that are already inherited in musical modes.

1.3 Renaissance Humanism and Paduan Music Theory in the Early 15th Century

In the early 15th century, an ongoing movement, humanism, which is the arousal of the ancient classics in Greek and Roman culture in arts and literature had a strong and far-reaching impact on the intellectual scene of the European culture that is not only specified the preceding generations in arts and science as scholastics but also created its title in academia, humanist scholarship. The roots of the movement date back to the second half of the 13th century which began in Padua and Florentine literature. While Paduan humanists were interested in their Roman roots and enlivened this cultural movement with a combination of Provencal lyric and a sophisticated approach to the text, Florentine realized the same goal with translations from Greek to Latin and vernacular languages. This sense of art was transmitted to Low Countries from Italy two hundred years later, and the influences of humanism on music waited for developments of this period which were mainly based on composers from Low Countries who were active in Italy; thus, humanism in music followed an opposite direction. Humanism in arts was brought to the Renaissance Period in Europe which is the term for the first time was coined by Jules Michelet, in 1855. In terms of music, Hugo Riemann defined this term when was from the 14th to 17th century, Heinrich Besseler extended the beginning of the period to Ars Nova music in France.

Individualism was one of the main concepts of humanism. Medieval individualism was recognized as an identity that depended on the approval of the groups to which people belonged, and this identity was formed in faith, and illusion within childish fears. In the Renaissance, the term acquired a new meaning in which all individuals have objective views of themselves, or independent spirits in their own thinking. Dante and Pietro Aretino were the foremost recognizable authors who carried on this ideal character of a Renaissance man. Besides individualism, there were

some other factors were the rising ruler class who supported the activities in various arts whose main topics were the revival of ancient stories and technical knowledge of the term, and the rediscovery of the power of the world of nature.

In the beginning, music was not an essential part of the humanist curriculum which is called Studia Humanitatis which is developed by Paduan humanists which consists of grammar, rhetoric, poetry, history, and moral philosophy. In the first appearances of the humanism in Paduan intellectual climate, seven liberal arts that is the privileged curriculum of scholasticism had still advantage over the Studia Humanitatis. At this period Ibn Rushd's (Averroes) comments on the Aristotelian writings were taking considerable attention at the university despite Averroes' controversial claims about the mortality of the human soul. While Pietro d'Abano and Biagio Pelacani da Parma who were the first humanists in the university held some new Aristotelian thought in line with Averroes, the humanist ideas were being articulated in courts and cathedrals at Padua until 1407 in which Gasparino Barzizza met his position as the first chair of the rhetoric at the University of Padua.

Pier Paolo Vergerio (1370-1444 or 1445,) who was one of the founding members of Studia Humanitatis, started to teach at the University of Padua including topics in music that were derived from Aristotle's Politics, Book 8, and he was also one of the colleagues of Francesco Zabarella in which they taught dialectics and law at the University who latter was also the archpriest, at that time, who appointed Johannes Ciconia as the cantor of Cathedral of Padua. Even if, in this term, Ciconia forged his style in his works which is explained in his *Nova Musica,* it took two decades that the main scope of humanism to spread to the other branches of philosophy, mathematics, natural science, and music. Accordingly, music appeared in the humanistic curriculum in the Vittorina da Feltre who is a graduate of the University of Padua and a prominent humanist's school at the court of Gianfrancesco Gonzaga in Mantua, in 1424. Feltre's school was particularly important in which Johannes Gallicus for the first time realized the differences between the Church and Boethian modes.

> That the church modes were not the same as the similarly named Greek modes seems to have been first realized in the circle of Vittorino da Feltre, founder of a school for patrician youth in Mantua and a collector Greek

manuscripts. … Vittorino lectured on music treatise of Boethius not simply as a manual on one of the mathematical arts of the quadrivium but as a document in the history of Greek music and music theory. His pupil and associate Johannes Gallicus de Namur testified that in spite of all his musical training in the north, he never understood music until his studies in Mantua, where he heard Vittorino lecture on "that Musica, which the so often mentioned Boethius turned into Latin from Greek. This important acknowledgment of Boethius's *De Institutione Musica* as a prime resource for investigating the nature and history of Greek modes placed it in an entirely different light. Studying on Boethius in this new light persuaded Gallicus that he described a system totally different from the church modes. The Greek "tropes and modes," Gallicus said, "differ only in location, in the whole appear alike." They were "artificial" transpositions to lower and higher pitches of a single double-octave system, unlike the church modes, which were all naturally different and destined to praise God. (Palisca, 2006, p.88)

1.3.1 Johannes Ciconia and Prosdocimus de Beldemandis

Johannes Ciconia is a renowned composer between the turn of the 14th to the 15th century. Heinrich Besseler states that this period when Guillaume de Machaut died (1377) and Guillaume Dufay was born (1420) was "the era of Ciconia.[1]" Until 1970, the birth and death date of the composer were accepted as 1335 – 1411, Liege. However, Besseler and David Fallows' discoveries changed the view about these dates. The composer's birthdate is referred to as the early 1370s because of a record of a choirboy in Liege, 1385, and his death date is concluded 1412. The preceding death date was a misreading of the book "De Proportionibus" which date of completion of the book that was attributed to the death date of the composer.

Margaret Bent, the editor of *Works of Ciconia*, said that there were various authenticity and dating problems in Ciconia's secular works because of several reasons that are dissemination of sources in various places, ambiguous route of the transmission, diversity in genre, language, style, and procedure. Validity of the attributions to sacred works of the composer presents much less problems than the

[1] https://www.jstor.org/stable/3526160?seq=1#page_scan_tab_contents

secular works, and in most cases, it is safe to determine the identity of the sources. In terms of the sacred works, it is worth noting that the evidence of witnesses has shown that Ciconia never wrote Kyrie, Sanctus, and Agnus, he was especially interested in composing Gloria and Credo settings. For motet works, some manuscripts are all in I-Bc Q.15[2], and Ciconia's signature of his name on the manuscripts makes it safe to be sure about the authenticity of the documents; in addition, some other works in the same period which didn't include the name of the composer were attributed to Ciconia because of uncontroversial style resemblance. Bent states that Ciconia's motet pieces reflected the characters of Italian style as opposed to the belief that it was a fusion of styles of Italian and French motet. Most of the works of Ciconia were dedicated to some important figures and written for some important occasions.

Recently, in his *Climbing Mont Ventoux: The Contest/context of Scholasticism and Humanism in Early Fifteenth-century Paduan Music Theory and Practice*, 2017, Jason Stoessel concluded that in the age of the humanism, and threshold of the Renaissance, Johannes Ciconia was one of the earliest humanist composers. In addition, Stoessel deemed works of Prosdocimus belonging to scholastic tradition. Accordingly, prominent characteristics of Ciconia's works that one can easily classify the composer into humanist culture are that, first of all, Ciconia proposed an individual, highly subjective view of music by equating it with grammar and making this connection through ancient music theory. These two points are highly convincing proposals to represent the main tenets of humanism: individualism and the revival of ancient sources.

Stoessel's work in 2017 coupled with his other work *Con lagreme bagnandome el viso: mourning and music in late medieval Padua, 2015* has brought about another point of view towards Renaissance humanism in music. Stoessel refers to his work in 2015 as be example and extension of the principles of Ciconia's allegedly humanistic compositional technique which was proposed in his work in 2017. This work brought to an analytical stance that takes its essence from the contemporary rhetoric, notably of Vergerian, and applies it to the Giustinian poems of the term and equates it with the stylistic features of Johannes Ciconia's music. Stoessel finds

[2] The manuscript is accessible as of the date of April 2018, https://www.diamm.ac.uk/sources/117/#/

evidence for this proposal on a philological level, and presents some demonstration in archival studies.

Con lagreme bagnandome was a lament which is written by Leonardo Giustinian (1388-1446) who was a well-known humanist poet active in the early 15th century in Padua. This lament was composed in a ballad form by Ciconia. The poem was written for the death of the last lord of Padua who was Francesco II Novello da Carrara (1359 -1405.) Stoessel claims that the general phrases and word choices of the poet projected the main discourse of the emotional community of humanist Padua. Furthermore, Stoessel proposed that Ciconia composed this lament with rhetorical technique which is used by Vergeria in his funeral orations. One of these orations was given for the death of Francesco II Novello da Carrara, and Stoessel constructs various analogies of Vergeria's rhetoric with the musical setting of Con lagreme bagnandome.

The emotional community is an applied concept from the work of Barbara Rosenwein who is a world-wide known historian. Rosenwein (2006) defines her concept,

> I postulate the existence of "emotional communities": groups in which people adhere to the same norms of emotional expression and value-or devalue-the same or related emotions. More than one emotional community may exist-indeed normally does exist-contemporaneously, and these communities may change over time. Some come to the fore to dominate our sources, and then recede in importance. Others are almost entirely hidden from us, though we may imagine they exist and may even see some of their effects on more visible groups. (p.2)

Stoessel quickly introduces the concept of emotional community and then presents another complementary concept: emotives.

> These (emotional communities) are not necessarily communities in a locative sense, but rather social and cultural groups unified through their use of common modes of emotional expression or – to use William Reddy's term – 'emotives'. Emotives are emotional utterances that, in Reddy's words, 'have a direct impact upon what they are supposed to refer to'. Emotives are neither

> emotions themselves nor simply descriptions of emotional states, but expressions that can elicit emotional responses. (Stoessel, 2015, p.74)

William Reddy describes the concept of emotive

> The startling features of emotional utterances that take the form of first-person, present tense emotion (i.e. I am happy to see you) claims warrant designating such utterances as constituting a form of speech act that is neither descriptive nor performative. I propose that we call such utterances "emotives. Emotives are influenced directly by, and alter, what they "refer" to. (Reddy, 2004, pp.104-105)

At this point, this recognition of emotional utterances requires us to define the descriptive and performative words or phrases. Descriptive words are perceived by one of the five sense organs of humans, and people define these words with their stimulating motivations. In a broad sense, performative words change their meaning depending on the context and speaker's implicit performative action which are activated in a sentence in which the speaker is unaware of them.

What we may conclude from all these definitions may be those emotional communities have some conventions to using emotives that is a speech act different than the descriptive or performative sense, and the sense of this emotional lexicon relies on the subject or object they interact with. It is also worth noting that there may be more than one emotional community contemporaneously. In this context, what we have seen at Padua in the early 15th century, two emotional communities existed in the intellectual scene of the city: humanism and scholasticism. To make sure about the discourse of the emotional communities in humanism, one of the prerequisites is to distinguish the emotives of humanism from the emotives of the scholastic communities. In Stoessel's work, it seems humanism was the primary intellectual movement at Padua, the author doesn't consider a scholastic community. However, when it is determined what the daily routine of the scholasticism was, how its poems and rhetoric differ from the humanist community, and how those rhetorical figures were permeating into the compositions, Stoessel's work would be more intelligible to ones who want to make sure of certain cultural routines and rituals of two communities. One can contest that the compositional procedure of the

scholastic thought ought not necessarily to follow similar paths in which Ciconia allegedly applied the humanist rhetoric to his compositions. Even if this is a well-sounded criticism, nothing precludes a researcher from taking the same path which Stoessel follows in his works. Accordingly, at the point where a very limited amount of archival evidence is not able to demonstrate the allegedly very well-organized relationships between Vergeria, Giustinian, and Ciconia, Stoessel looks for the demonstration of Ciconia's humanism in music rhetoric in philological ground. This gives a license to propose a scholastic rhetoric in music by using the same methodology, however, unless it is not derived from the historical archives and first-person authorities of the composers, poets, and orators, it seems to have an excellent historical imagery to de-construct the scene of Ciconia's stylistic method in his compositions.

On another point, Stoessel says that previous records of modern scholarship discriminate Prosdocimus as an isolated scholar from the humanist environment categorically, and he has only limited contacts with humanist scholars.

> The tendency of previous scholarship has been to locate Ciconia's contemporary Prosdocimo de' Beldomandi (†1428), the Paduan author of numerous writings on music, in a scholastic sphere, isolated from the monumental changes to intellectual culture going on around him in Padua. Indeed evidence of Prosdocimo's contacts with the circle of humanists at Padua is extremely limited. The dedication in 1425 of his Musica speculative to Luca da Lendinatia, cantor of Padua cathedral who succeeded Ciconia in 1412, is the only clue that has emerged so far that links Prosdocimo to the cathedral chapter and its closely associated humanist circle in Padua. (Stoessel, 2017, p.320)

What makes Prosdocimus a scholastic is, Stoessel thinks, that Prosdocimus was highly venerable to the ratios of the tones, and their true calculations. In this respect, while it might be acceptable to divide the whole tone into 5 categories, is what intolerable for Prosdocimus in Marchettus' practice is that of division of the whole tone into equal parts which is impossible in terms of Pythagorean proportions. However, this seems to be a concern of a meticulous professor who sees that is untenable to be careless at points of where the devil lies in details. This point was the

mere competent evidence for Stoessel to dismiss Prosdocimus from the world of humanism. On the other hand, even if three of the authors, Marchetto, Ciconia, and Prosdocimus, shared the main ideas of Pietro d'Abano who was one of the earliest and pioneering humanist scholars taught at Padua University, in Stoessel work, only Marchetto and Ciconia were lucky enough to be privileged with benefits of the humanism. One of the key points to consider is the relationship between Prosdocimus and Ciconia, which could challenge the categorical assumption that Prosdocimus's work is entirely independent. This issue arises in response to Margaret Bent's 1998 article, where she questions the nature of the connection between these two figures. Jan Herlinger offers valuable insight into this question, providing a nuanced perspective that helps clarify their intellectual and musical relationship.

Herlinger explains the main motivation of Prosdocimus in his *Musica Speculative*, 1425. First of all, from 1401 to 1412, Ciconia and Prosdocimus lived in Padua, while Prosdocimus was in the earlier periods in his career, Ciconia had been acting as the cantor of the Cathedral of Padua who passed away in 1412. One of the monastic brothers of Prosdocimus, Lucas de Lendenaria, was the successive cantor of the Padua Cathedral. In their readings, they started to be aware of far-reaching false determinations of Marchetto of Padua were being disseminated through Italy, and Lendenaria encouraged Prosdocimus to compose a treatise against these errors. Even if Prosdocimus never mentioned Ciconia's name in his works, he attacked to testimonies of Marchetto and call the other authors Marchetini who are distributors of Marchetto's errors to Italy. Thus, Ciconia was classified into this category.

> Given Prosdocimus' criticism of Marchetus – and especially given the importance he attached to Marchetus' division the tone – there can be little doubt that Prosdocimus placed Ciconia among the Marchetini who have disseminated these errors throughout Italy. (Herlinger, 2003, p.318)

One of the considerations of Herlinger that future research may elucidate the relationship between the life of Prosdocimus and his relationships with Ciconia and Lucas de Lendenaria would also help us to determine whether these authors belonged to some certain intellectual spheres i.e. humanism, scholasticism, or they were concerning about the internal organization of music, and they simply argued each other with this reason.

> Is Prosdocimus's silence with respect to Ciconia significant? Perhaps not: in none of his music treatises does he name any theorist later than Marchetus de Padua or Johannes de Muris. But it is certainly interesting that Prosdocimus' criticism of Marchetus is documented from 1413, the year after Ciconia's death; fascinating that he said he first became aware of the errors in the Lucidarium through reading it with Lucas de Lendenaria, who succeeded Ciconia as cantor at the cathedral of Padua after the latter's death. Our knowledge of Ciconia's life has increased immensely over the last thirty years through the discovery of archival documents and through attention to the texts of his works; one can hope that over the next thirty years we might gain comparable insight into the life of Prosdocimus and his interaction with both Ciconia and Lucas de Lendenaria. (Herlinger, 2003, p.319)

This evidence might lead us to ask some questions. It is obvious Prosdocimus's relation with the cathedral chapter which was obviously one of the centers of humanism in consideration of its archpriest Francesco Zabarella. Secondly, it is also evident that the close friendship between two monastic brothers to whom Stoessel referred one of them, Prosdocimus, to be a scholastic, and referred another, Lendenaria, to be a humanist. Then, how these two people form an assembly to read the work of another theorist -who is Marchetto of Padua, one of their predecessors who was the cantor of cathedral of Padua - with some categorical concerns of humanism or scholasticism. Ironically, Prosdocimus dedicated the product of these studies to Lendenaria which is *Musica Speculative, 1425*. Furthermore, Marchetto of Padua was implicitly ascended to the spheres of humanism by Stoessel with cross-references of one contemporary and one modern author who former is Pietro d'Abano and the latter is Antonio Lovato.

> Already at the beginning of the fourteenth century, medieval Padua's famous professor of astrology and medicine Pietro d'Abano (one of the earliest humanist scholars) situates pleasure at the heart of musical aesthesis…
>
> For Pietro, music expresses universal values and is proper to the human mind more for the fact that it can please a human being of any age through the sensations it generates from combinations of audibly discrete sounds, than its essential numerical order on which it depends according to the Pythagorean

> concept of music. While proportion remains fundamental to the governance of consonance, its perfection is verified through the pleasure (delectatio) that it brings to the listener.
>
> Lovato notes that similar concerns for an aesthetic of musical hearing permeate Marchetto of Padua's Lucidarium. This is played out in the Lucidarium through the tension between Marchetto's appropriation of Remigius of Auxerre's musical division of the monochord according to the strict proportional relationships required by a Pythagorean concept of music and Marchetto's unique division of the tone. (Stoessel, 2017, p.324)

There are several points to clarify in this picture. First, companion of Prosdocimus and Lendenaria, the latter may not be a humanist scholar, however, they meet at the cathedral chapter, this might make Prosdocimus a perfect humanist who was one of the members of the brotherhood in the society of the chapter. Another possibility, these authors may have little interest in some categorically polarized intellectual environments of humanism and scholasticism, but most of all, it may be the motivation of two musicians who speak up the things about the music according to their lights. As Herlinger expects from the future research about these three authors, it would reveal the truth about scholarly concerns.

We have a brief knowledge about Prosdocimus de Beldemandis; however, they have been precise dating and authenticity of his works. Prosdocimus de Beldemandis was a student of Arts at Padua University in 1402. On 15 May 1409, he took his doctorate in Arts, and, two years later, he graduated from the medicine department with a licensed degree. From 1422 to 1428, Prosdocimus was a professor at Padua who taught several different subjects: astronomy, astrology, mathematics, experimental philosophy, arts, and medicine. For his eight musical treatises, Jan Herlinger divided Prosdocimus' works into three categories that are student years, central musical treatises in his maturity, and late work which are shown in Table 2.2.

Table 2.2 : Works of Ciconia

Student Years		
1	Expositiones tractatus pratice cantus mensurabilis Johannis de Muris	(Padua, 1404 [?])
2	Tractatus Pratice cantus mensurabilis	(by 1409 [?])
3	Brevis summula proportionum quantum ad musicam pertinet	(by 1409 [?])
Central Musical Treatises in his Maturity		
4	Contrapunctus	Montagnana (1412)
5	Tractatus Pratice cantus mensurabilis ad modum Ytalicarum	Montagnana (1412)
6	Tractatus Plane Musice	Montagnana (1412)
7	Parvus Tractatulus de modo monacordum dividendi	Padua (1413)
Late Work		
8	Tractatus musice speculative	1425

> His eight treatises on music constitute a systematic survey of the main departments of the art and show not only a comprehension of the authorities most influential in the academic circles of the day, Boethius and Johannes de Muris, but also a sense of the development of musical theory over the preceding hundred years or so (Herlinger, 1984, p.4)

Herlinger says that Contrapunctus was the most sophisticated and coherent work of Prosdocimus de Beldemandis which is dated 1412, completed in Montagnana near Padua. In his *Contrapunctus*, rather than including all aspects of music theory, Beldemandis included points that are necessary for music practice, and he codified the art of the contrapunctus with 6 rules (table.2.3) which are used as the workings of musical grammar in Margaret Bent's work in 2003. After another publication of author, *Musica Speculative*, 1425 - when was the period of last three years of Prosdocimus' life - in which Prosdocimus attacked Marchettus for his unorthodox division of the whole tone, and unusual disposition of natural or "cross" sign, Prosdocimus also revised his *Contapunctus* by carrying his criticism of Marchetto into the new added parts of the book.

Table 2.3: Six Contrapuntal Rules, Prosdocimus de Beldemandis (Charted from Herlinger, 1984, p.8)

Prosdocimus' Six Rules for Counterpoint	
1	Only concords are to be used
2	A counterpoint must begin and end with a perfect concord
3	Parallel perfect concords are prohibited
4	Imperfect concords are not to be used continually without the occasional insertion of perfect ones
5	In fifths, octaves, and the like, mi should never be placed against fa
6	Parallel imperfect Concords are allowed, provided perfect ones are occasionally inserted.

In 2003, Margaret Bent in her *Ciconia, Prosdocimus, and the Workings of Musical Grammar as Exemplified in O felix Templum and O Padua*, applied Prosdocimus's six rules to Ciconia's motet repertoire. Before studying how these rules play a crucial role in Margaret Bent's analysis of Ciconia' motets, the time was ripe to see both some compositional techniques in medieval terms with counter pleas, and a proposal that the solmization was a system that was being used quite differently by followers of Guido (Guidonistae).

1.4 Medieval Composition: Was It Successive or Simultaneous?

In 1984, Daniel Leech Wilkinson presented some different tendencies in analytical approaches in early music as a criticism of the current state of the field. Accordingly, Wilkinson states two approaches in widely accepted views in analysis. Firstly, acceptable readings of pieces should be historically informed with sources that were produced in those days; secondly, polyphony was being conceived successively which doesn't give a license to a vertical relationship between sonorities.

For the first view, Wilkinson thinks that even if we can retrieve some information from evidence as to how those people were thinking about the music, ultimately the evaluation is only intelligible to us with our modern understanding. In this context, as is denoted in modern structural and philosophical studies, there is no way to have been an adequate reconstruction process of lost entities like those in medieval music.

> And ultimately, however much we may be able to recapture of a period view - using such evidence as notation, theory treatises, literary sources and archives - what we then see in the music has still to be expressed in terms which make sense to us. Thus analyses of surviving works, while taking careful account of what we know of period techniques, have to proceed from, and to seek to explain, what we currently see and hear in the music. There is no other view available to us. (Wilkinson, 1984, p.9)

As for the successive composition, Wilkinson criticizes the mainstream thought that the medieval composers were thinking about tenor structures firstly as one voice at a time, and then constructing upper parts with only consonance sonorities, and even

dissonance voices were taken place at the strong points in tactus, they omitted them in favor of consonant building blocks of the music. While Wilkinson admonishes that historically informed sources were taught to whom they hadn't had a chance to learn versatile aspects of the compositional process in person by experienced scholars, these sources included very basics of the compositional process in their contents. Accordingly, Wilkinson presents some historical readings from Egudius de Murino who was a medieval music theorist in the 14th century, and presents his concerns about the consideration of successively composed medieval music analysis.

> We have no reason to think that the skilled composer of late-medieval polyphony celebrated chance as part of his technical arsenal. As a master of his craft, he presumably exercised as much control over his material as he could. And in view of the great importance attached during the Middle Ages to the faculty of imagination - a faculty celebrated in the writings of Machaut as energetically as anywhere - it is hard to believe that musical imagination lay uncultivated. Are we really to assume that this faculty was unavailable to musicians? Is it conceivable that a composer of the calibre of Machaut was unable to imagine a piece of music; that, rather, he had to assemble it a line at a time according to a set of rules (which, incidentally, he honoured more in the breach than the observance) in the hope that the result would sound acceptable? And must we therefore assume, as has been usual, that he and his contemporaries somehow managed to perceive polyphony principally in a single horizontal dimension, remaining largely insensitive to vertical coincidences? So simplistic a view of medieval polyphony could never adequately explain the complexity of much of the surviving music. (Wilkinson, 1984, p.10)

For the studies of which Wilkinson addresses his criticism, Richard Crocker was one of the influential scholars who elaborated almost all available historical sources in medieval music and laid the foundations of a substantial basis of successive compositional techniques in medieval music analysis.

In 1962, Crocker presented the principles of successive compositions in early music. In his *Discant, Counterpoint, and Harmony*, first, he raised the question of how medieval composers thought about their compositions, and he stated the main

the principle that the vertical structure of dyads was the natural outcome of intersecting autonomous linear lines in medieval music. After determining this very fundamental rule, Crocker specified that rather than imposing our understanding of medieval works, it is important to understand how they conceived them. Then, as the main compositional material, he clarified the meaning of the discant and its distinctive features in pieces. Accordingly, discant was a two-part composition in medieval teaching from the 13th to 16th centuries, it was associated with some set of principles which is practiced in upper voice(s) of a composition. Discant combines note against note procedure in each melodic progression, and there are two principles; first, sonorities disposed of through the given melodic line, and second ascending or descending motions between these sonorities. According to Crocker, the disposition of sonorities in a melodic line mainly tended to move the consonance sonorities, and this characteristic of the discant, after the 14th century, was referred to as "contrapunctus", that is a term of main building blocks of the music not only for the medieval and renaissance period but also Baroque and common practice era in Western classical music.

In terms of the first principle, Crocker genuinely showed the fluidity between intervals from perfect consonances to perfect dissonances with Figure 2.10.

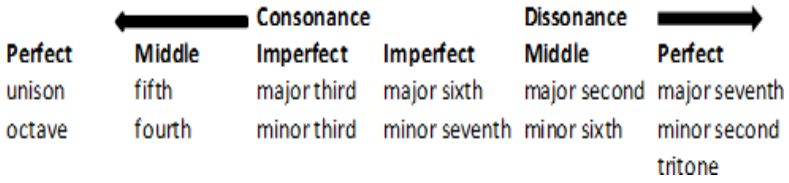


Figure 2.10 Fluidity between Consonance and Dissonance Tones (Crocker, 1962, p.3)

After presenting several examples from contemporary medieval scholars in music theory e.g. John of Garland, Anonymous I and II, Phillippum de Vitriaco, Jacob of Liege (after Margaret Bent's last discovery, he is called Iacobus de Ispania,) and Johannes Tinctoris, he concludes that

> "These authors say, in sum, that the ear takes pleasure in consonance, and the greater the consonance the greater the pleasure; and that for this reason one should use chiefly consonances in composing discant." (Crocker, 1962, p.4)

As closely related to the present work's proposal, Crocker indicates that even if the continuum that is presented in Table 2.10 has not changed over many centuries, the stylistic dispositions of these consonance sonorities were being updated steadily in different periods in music history.

> The description of the continuum between consonance and dissonance does not change much through the centuries-indeed it cannot change, being a description of the plain facts of sound. On the other hand, the description of the functions of the various consonances and dissonances changes steadily, since here the theorist must constantly account for stylistic practices. (Crocker, 1962, p.5)

Then, Crocker presents both different treatments of the perfect fourth and intervals larger than one octave in different periods in the light of the contemporary theoretical witnesses and a list of how consonances are evaluated in the different terms which are presented in Figure 2.10.

1250	**1300 (?)**	**1336**	**after 1350 (?)**
unison	unison	unison	unison
octave	octave	octave	octave
fifth	fifth	fifth	fifth
fourth	fourth		
major third	major third	major third	major third
minor third	minor third	minor third	minor third
	major sixth	major sixth	major sixth
			minor sixth

Figure 2.11 Consonance Treatment in Early Music, reproduced (Crocker, 1962, p.7)

From this point on, Crocker starts to evaluate the second principle of discant, the contrary motion between the lines by using consonance with the rules explained above. According to Crocker, medieval treatises account for rather a compositional process than how the composer or listener hears these lines in their mind. Then, he presents some voice leading rules; the first rule is contrary motion - the order is determined by Crocker and the second is a discant that begins with a concord

(consonance,) which should end with a perfect concord that allows imperfect thirds at the beginning, but it is not allowed at the end. A third rule permits similar motion without differentiating it from parallel motion; accordingly, parallel motions can be used in proper places in the compositions, this rule gives a license to the most characteristic compositional technique in the 14th-century composition with a term which is "doubly leading" cadence. The last rule is that a composition should be blended with concords and discords in equilibrium. Then, he explains principles of contrary, similar, and parallel motions referring to a 14th-century theorist, Petrus Dictus Palma Ociosa.

Then, Crocker talks about by far the most important structure of the compositional process which will have been called some prominent imperfect to perfect dyadic successions that are called directed progressions thirty years later in Sarah Fuller's conceptualization. Crocker thinks that thirds and sixths in contrary motion bring about the foundation of triadic harmony in later periods of the history of Western music. At another point which determines the unwritten accidentals of mensural notation to be inflected in editorial studies, Crocker states that

> The importance of these progressions is great enough to demand alteration of the written pitches through musica ficta. If a sixth proceeds to an octave is written as a minor one because of its position scale (for example, a-f proceeding to g-g), then according to 14th century writers this sixth is to be made major by raising (Crocker, 1962, p.11)

Directed progression, indeed, turns out to be a focal point of the late medieval and Renaissance harmony. Sarah Fuller investigated various kinds of directed progressions, their places, and whether they are internal points or conclusive parts of the compositions. Then, these progressions were taken into consideration in Margaret Bent and Elizabeth Eva Leach's works with some differences from Fuller, though the concepts led to a lively debate between Eva Leach and Fuller due to some compelling ideas of Eva Leach's *Gendering the Semitone, Sexing the Leading Tone* in 2006. Before presenting how Eva Leach and Bent mentioned the concept in their analytical approach, I'd like to present that directed progressions, to my knowledge, were being taken into consideration as early as 1995 by Joseph Swain, and in 1997, by Shai Burstyn, in the way that is compatible with the present study's concern. In

her work where Burstyn investigates listeners' attitudes to works as to how they make them meaningful, she states that

> Is tonal teleology a sine qua non requirement of Western music? If so, how did it operate, for example, in pre-1500 music, that is, without the driving force of functional harmony? If not, or if only partly so, what other organizing principle/s served as a sufficiently strong agent/s of perceptual unity, enabling the creation of musical Gestalts? As students of music history, we have partial answers to these questions, in which the controlled handling of consonance and dissonance must figure prominently: the contrapunctus treatises amply prove contemporary concern with cadential motions from imperfect to perfect consonances. Interpreting Ars Nova music in terms of tendency- resolution motions, Sarah Fuller has concluded that "... in Machaut's oeuvre ... a sustained concern for and virtuoso disposition of directed progressions is manifest (Fuller, 1992, p.252). (Burstyn, 1997, p. 699)

As another consideration of directed progression, regarding its psychological and syntactical role in musical continuum, Joseph P. Swain writes that

> Meyer has written that "in order for syntax to exist . . . successive stimuli must be related to one another in such a way that specific criteria for mobility and closure are established. (Meyer, 1989, p.42)" Fred Lerdahl likewise hints that "stability conditions," which seem to have no parallel in language grammars, are intimately connected with syntax. (Lerdahl, 1988, p.245) Fuller is more explicit: "The power of the directed progression lies in its syntax of tendency followed by resolution. (Fuller, 1992, pp232)" Syntax in music is not simply a system that controls information by organizing pitches and durations. As it mediates expressed relationship in natural languages, syntax mediates tension and resolution in musical languages. (Swain, 1995, p.289)

Moving forward from this evidence, Margaret Bent, Collins Judd, and Eva Leach take sides with Richard Crocker's approach in favor of successive compositional tendencies of the medieval composers, Daniel Leech Wilkinson presents another

look at the early music in favor of modern interpretations of music in line with the tonal context involving some questions for psychological and cognitive studies in music.

1.5 Dilemma of Analysis: Greater Perfect System vs. Solmization System

Up until now, there appeared two approaches in the ground of music theory; on one hand Greek musicus which is practiced by Greater Perfect System; it depends on the monochord division, and the other, Guido's Hexachord system. Margaret Bent uses Guido's solmization system in her analyses and practices it in various repertoires of the term including Ciconia's repertoire. This distinction is an important one, because as we will see Stefano Mengozzi approaches with caution the role of the solmization system before the 15th century and demonstrates how the solmization system was opposed approach to the Ciconia's repertoire because Ciconia proposed a new paradigm of music theory by reconsidering GPS.

1.5.1 Hexachord Theory in Pre- and Post-15th Century

In his works, Stefano Mengozzi cast doubt on how solmization syllables were functional from the side of performers in medieval terms, and the transmission of the solmization system into the next centuries. Furthermore, Mengozzi demonstrated this point by referring his thoughts to Johannes Ciconia who is the composer Margaret Bent applied her principles which are mainly derived from the solmization system.

In his *The Ciconian Hexachord*, 2003, Mengozzi first agrees upon that dissemination of the solmization system was far-reaching from the 11th century on through the continent. However, some scholars remained resistant to the new system in this term, and those authors preferred the seven letters in hexachord, Γ-A- B-C-D-E-F-G, and octave equivalence of these letters. The main contributor to the latter idea was Johannes Gallicus who is a Carthusian Monk, and he had a direct influence on Ramos de Pareja who has a great influence on the musical paradigm of the period with his *Musica Practica*, 1482. Having presented these precursors of the system which favors seven letters, Mengozzi states that Johannes Ciconia was also one of the authors who rejected principles of hexachordal solmization.

Mengozzi presents how Ciconia set out a music-theoretical foundation especially in book 4 of his most prominent music theoretical treatises, *Nova Musica* (between 1403–1410) and *De Proportionibus* (1411.) In these works, Ciconia systematically rejected the principles of Guidonian system and presented the main goal of his work. Accordingly, he aimed to revive the main principles of ancient music theory by re-considering some points that need to be perfected in line with new acquisitions of musica. In the detail of his work, Ciconia underlines how music and grammar are closely related to two domains that couple the quadrivium with trivium which is related to grammar and rhetoric. Having reviewed Ciconia's works and how he constructed his intellectual project in 4 books in Nova Musica, Mengozzi compares the legacy of the Guidonian theory on later generations between the 11^{th} to 15^{th} centuries, and the revival of the ancient music theory which rejected the interpretation of the hexachord system since then. It is also important to see how anachronism is a far-reaching topical ground in which Johannes Ciconia, Johannes Gallicus, and Ramos de Pareja, directed their criticism to those works of the post-Guidonian theorists.

First, the conceptual context of the Guidonian theory plays no role in the Nova Musica. There are three important arguments of Ciconia when he downplayed the significance of the hexachord system. Foundations of musical sound in monochord, the relevance of the musical pitches to the seven letters, A-B-C-D-E-F-G and its equivalent names in Greek, and the reasoning for the rejection of the Guidonian system.

Ciconia thinks that three Boethian monochords had already been able to be practiced to the actual music, and followers of Guido'd Arezzo (Guidonistae) undermined the wisdom of early authors by changing the principles of the ancient theory. In consideration of this view, Musica recta and ficta are superfluous concepts that are already contained in the GPS. Thus, for Ciconia, Boethian and Guidonian musical worlds are two distinct ones in he never attempted to reconcile them with each other. Thus, seven letters satisfy the need in singing, Ciconia never mentioned solmization syllables to navigate the letters in appropriate intervals. Even if he never used the hexachord system as a tool, he mentioned another concept exachordum. This concept doesn't contain the syllables between c-a, however, it means either adding a whole tone to diapente to derive a major sixth, or subtracting a third from

octave. Octave and diapente are two of six symphonies that are more significant than exachordum.

In 2006, Mengozzi extended his investigation into the hexachord theory and solmization system and presented their reception before the Renaissance period. In his *Virtual Segments: The Hexachordal System in the Late Middle Ages*. Mengozzi begins his work by introducing Christopher Pepusch's "Treatise on Harmony," and describes how Pepusch were considering hexachord theory. Then, he presents what the legacy of his work was on the next generations of scholars, and then states his goal in his work.

> The overall goal of this study is to trace the historical origin of Pepusch's understanding of the Guidonian system in "foundational" terms, that is to say, as a diatonic theory with structural-paradigmatic implications for all medieval and Renaissance musicians. I intend to show that Pepusch's reading of hexachordal theory reflected a longstanding orientation that was embraced by influential Renaissance theorists active in Northern Italy. At the same time, however, I wish to argue that the foundational interpretation of the hexachordal system may in fact be no older than the Renaissance and may represent a branch of Guidonian theory that is only feebly connected with the medieval tradition. (Mengozzi, 2006, p.428)

Mengozzi states that ideas Pepusch presented in 1730 had found a wide audience within scholarly communities in subsequent periods of musicological studies over more than 200 years. There are four sections in his work: "Guido's Tonal Space," "Solmization Theory after Guido," "The Syllables as Space Definers," and "The Renaissance Notion of Hexachordum." These sections explain to readers the developmental levels of hexachord theory from the early Middle Ages to the late Renaissance periods.

First, Mengozzi describes how Guido was considering tonal space through the medium of hexachord theory. Guido's main goal, thus, was to close the gap between theoretical approaches to music and its practical aspects between cantor and musicus. For this goal, Guido constructed a mindset of octave equivalences. Octave equivalences were in use before the 11th century as the general approach to the music theory that was being specified with the feature of the tetrachordal

descriptions of the music system that comes from mainly Ancient Greek. Guido, in the beginning of the 11th century, devised a system in consideration of tones in an octave which are identical with tones that are octave apart that are called modi vocum. Accordingly, these tones which are denoted by using seven symbols were the regulative diatonic segments in "Micrologus" which includes Guido's criticism against the system devised in "Musica Enchiriadis" and "Musica Scholarum." For a further remark to octave equivalences in Guido's system, Mengozzi underlines two conceptualizations that are both "consoni," the consonant sounds in a range of scale, and "acquisoni," sound an octave apart through the scale in a given range. These two concepts were in use until the late medieval period. Herlinger also pointed out that the basic scale of the 14th and 15th centuries was considered the three registers which Guido'd Arezzo introduced in his works, which works compatible with the 7 deductiones.

Low	(Graves)	:	Γ-A-B-C-D-E-F-G
High	(Acutae)	:	a-bb-b-c-d-e-f-g
Very high	(Superacutae)	:	a'-bb'-b'-c'-d'-e'

> The music theory of the fourteenth and early fifteenth centuries inherited a basic scale extending from G at the bottom of our bass staff to E at the top of our treble staff and including all the natural notes in that range plus Bbs a second below and a seventh above our middle C (but not the Bb on the second line of our bass staff). (Herlinger, 2001, p.246)

Then, the moral of Guido's system is introduced by Mengozzi who explains why Guido brought six syllables to pedagogical studies by elaborating medieval music theory. First and foremost, the six syllables provide a mental image to diatonic space helping to performers in sight singing. In this respect, though, the importance of the tetrachord comes back in the function that Mengozzi presents two conceptualizations: "almost perfect affinity" and "perfect identity." While the former refers to the relations between the tones a fifth apart, the latter is epitomized by the identical tones at the octave. Mengozzi states that, in the first appearances of the system, Guido used ut-re-mi-fa-sol-la syllables as an aid to the performers without much

emphasis of them in his "Epistola," but he emphasizes functions of monochord divisions, interval species, and the modes in this work.

Mengozzi, then, follows the path of how the hexachord system in the current state of our understanding started to emerge through the term from the 11th to 15th centuries. Thus, he presents two understandings of "hexachordum," by taking the late 15th century as a paradigm shift. In earlier times, hexachordum was recognized as part of the gamut, and these parts were rather represented by letters than syllables. In this term, proprietas was regarded as a distinct context of a tone series depending on parts of that it is represented. And since the 13th and 14th centuries, hexachord theory was described with aspects which is close to the understanding we know. Then, Mengozzi's main argument appears, accordingly, hexachordal proprietas were seen as the virtual measurement that is associated with octave equivalence, however, it had always an ambiguity in terms of the practice of the syllables in the theory. After all, Mengozzi (2006) states that

> "In short, my claim is that the six-note patterns existed only in the mind of the singer who is using Guido's syllables. They represented nothing more than the virtual segmentation of the diatonic space that a singer performed in his mind when resorting to the thoroughly optional tool of solmization. Paradoxical as this might sound; the proprietas were thus a mnemonic paradigm for navigating the gamut, but without imposing a hexachordal logic onto the gamut itself." (p.450)

After discussing how proprietas was being regarded as the virtual segment, Mengozzi, then, elevates the topic to the cognitive abilities of performers in the medieval term, and how they were approaching performance practices with a mindset to achieve it, appropriately. At this point, interlocking conceptualizations of gamut gave rise to hard times for scholars who wanted to unfold the perceptional aspects of music in medieval terms from theoretical works. Accordingly, deductiones, proprietas, claves, letters, and mutations as parts of the hexachord theory have always slight differences in terms of the practice. This was not only confusing for scholars in our time but there were also various approaches that it seems contemporary scholars in the medieval period hadn't been in a consensus for these interlocking and sometimes equivocal conceptualizations. However, after his studies to unlock

difficult questions of theoretical understanding of medieval theorists, Mengozzi (2006) concludes that

> Yet I believe it is possible to conclude that these authors' treatment of the concepts of deduction and proprietas—or punctus, in Salomon's case—is in line with the "two-tier" hypothesis that I wish to propose in this study, in that they consistently posit, directly or indirectly, the existence of two unequal diatonic cycles of seven letters and six syllables that are functionally related to, yet independent from, each other.
>
> Without a doubt, however, the reconceptualization of the Guidonian system operated by Garlandia and Magister Lambertus set the tone for the subsequent of this topic during the next 200 years. (pp,457-458)

Mengozzi, then, clarifies some contradictions in this period. The proprietas that are initially represented by respectively Γ, F and G claves and their octave equivalence don't mean necessarily that these claves always belong to those particular proprietas; however, proprietas are the mental tool to think about the voices in a sight-reading process. In terms of different understandings of relationships between proprietas, syllables and octave equivalence, Mengozzi compares some contemporary and modern readings by Marchetto of Padua, Bonaventura de Brescia, Johannes Tinctoris, Karol Berger and Margaret Bent. For Marchetto of Padua and Bonaventura de Brescia, there are some incongruities to explain aspects of the hexachord theory as to how to differentiate proprietas and letters with each other. Then, by reference to Johannes Tinctoris's "Expositio Manus," Mengozzi mentions Karol Berger and Margaret Bent's works. Accordingly, Mengozzi states that "Expositio passage is unlikely to suggest that the syllables themselves impose or determine the distance between claves" (Mengozzi, 2006, p. 462) as opposed to Berger's conclusion hexachordal syllables were essential to indicate distance between sounds of the gamut by referring Tinctoris. Similarly, because Margaret Bent shares the same opinion about early music that pitch letters are to be defined by syllables, Mengozzi states that the current understanding of Hexachord theory depends on the opinion of the time after the 14th century, the contemporary sources may often be controversial with such approaches. Finally, Mengozzi presents two controversial points which are positioning of the mi-fa syllables, and modal categories or diatonic

species that represent his opposition to the ongoing tendencies in pre-tonal music. Thus, the Importance of semitone mi-fa wasn't an answer given to singers of medieval terms, but they regarded the octave equivalences as the main parameter in thinking of music. For this point, Mengozzi presents some details; first, hexachordal solmization might be reconsidered depending on the diatonic contexts mi-fa syllables might be applied to, and medieval performers paid much more attention to modal categories or diatonic species than deductiones.

In the final section of his work, Mengozzi evaluates the paradigm shift of the hexachord theory in Renaissance terms with the advent of Ramos de Pareja's treatise. Pareja's work was not only a terminological innovation in the 15th century, but a new approach to Guidonian diatonic space which introduces six segments superior in the hexachordum. At the end of his work, Mengozzi concludes that

> Our overall picture of the function and significance of hexachordal theory in the Middle Ages and Renaissance may change significantly, once it is realized that the modern understanding of the hexachordal system—as well as the modern historiography of Guido of Arezzo that is inextricably intertwined with it—was shaped by a handful of enormously influential treatises that were in the end only distantly related to the mainstream tradition of the first half of the Guidonian millennium. (Mengozzi, 2006, p.467)

For the question that Mengozzi raises in his *The Ciconian Hexachord*, Margaret Bent, in his work in 2003, gave a little place why it is appropriate to apply rules of solmization system to the Ciconia's compositions.

> In the case of Ciconia, we are in the fortunate position of having a theoretical point of reference that is not only close to him in time and place, but offers quite a good fit with his own music. Unfortunately, this is not his own treatise, Nova musica, a massively learned work presumably written sometime after his first documented appearance in Padua in 1401. Nova musica contains no discussion of hexachordal solmization, nor does it discuss counterpoint in any way that bears on our present enquiry. It sheds little direct light on the contrapuntal craft of Ciconia's own compositions, but nevertheless gives some encouragement to the present view of how music

> was construed. … Practical testimony of the kind we seek, however, is forthcoming from another Paduan treatise written in the year of Ciconia's death, Prosdocimus's Contrapunctus. Although there is no evidence of direct contact between Ciconia and the professor of quadrivial arts at Padua University, Prosdocimus de Beldemandis, it is not often that we can draw on relevant theoretical testimony with such a close fit in time and place.
>
> Prosdocimus's treatise also exists in a revised form, dating from 1425-8, the last three years of his life, in which he amplifies some points, and attacks Marchetto's use of the natural or "cross" sign and his division of the whole tone into five equal parts. Marchetto is dismissed as a mere practicus; one wonders what Prosdocimus thought of Ciconia's treatise, which long antedated Prosdocimus's sharpest criticisms of Marchetto. Is his silence significant? Paradoxically, Prosdocimus's Contrapunctus is unabashedly practical, and is one of the most important treatments of counterpoint between those of Johannes de Muris and Johannes Tinctoris, some sixty years earlier and later respectively. Prosdocimus admits that there is controversy, "rejecting some things customary among modern writers"; it is unlikely that this could be an attack on Ciconia's treatise, which does not deal with counterpoint. (Bent, 2003, pp.68-70)

First of all, Bent thinks that Prosdocimus's "Contrapunctus" is more applicable to Ciconia's repertoire because Nova Musica doesn't contain contrapuntal organization of pieces in line with the solmization system. Secondly, there is not only no evidence of a direct relation between Prosdocimus and Ciconia, but Prosdocimus directed his criticism to Marchetto of Padua who is the scholar from which Ciconia widely benefited from Marchetto's works in *Nova Musica*, however, there is also no a direct evidence Prosdocimus was aware of or interested in Ciconia's testimonies.

All these threads demonstrate to us the principles of GPS and hexachord theory were two main theoretical tools in the term which led to various controversial claims between scholars. As we have seen in this section, in the 9th century as the birth of medieval European culture, there was an ambiguity in the interpretation of Boethius' Greater Perfect System, especially, in terms of the Boethian modes. In this term, new

tonaries (Protus, Deuterus, Tritus, and Tetrardus) that were attested to chant repertoire were also able to classify a vast body of corpus, however, there were several points to develop for a substantial music theoretical method which helps singers in performance practices. At this point, Guido'd Arezzo presented his groundbreaking method which is certainly considered the main tone scale of the GPS, but that's it all. Instead, some new acquisitions of musical thinking started to be at the forefront of the performance and compositions of the polyphonic repertoire. Accordingly, while Oliver Ellsworth informs that coniuncta which is affiliated with the solmization system is one of the concepts that was applied to the repertoire in the 14th century onwards, it is important to search for if any relation of the concepts with the tetrachords of GPS.

> We know now that the doctrine of coniuncta was fully developed in 1375, but was it a product of early 14th century – of current assumption of my hypothesis (Ellsworth's emphasis) – or do its origins go back even further?" (Ellsworth, 1973, p.97)

Calvin Bower demonstrates the general paradigm change from GPS to solmization system

> What of the ancient tradition has been lost in the resolution? What new has been achieved? While the new reflections about music treat chants of the divine liturgy, little consideration of the transcendent nature of liturgical song or of music itself is preserved, and thus much of the Platonic tone of musical thought is lost. The new matter of music theory is hardly preparation for the study of philosophy, and thus the place of music in the quadrivium is substantially compromised. In the final lines of his Letter to Michael, Guido again cites Boethius as the model according to which he has fashioned his musical system, but he closes with the remark that Boethius's book, useful only to philosophers, is useless for cantors. Yet, at the same time, a discipline has been reformulated: while it maintains its roots deep in the matter of Pythagorean arithmetic and unfolds its pitches and intervals with the absolute security of mathematical ratios, its principal subject has become actual contemporaneous music. The subjects of music theory have become the character of liturgical chants, the pitches and intervals that determine their

> character, the modes into which they fall the structures of their sub phrases and phrases, and even the basic techniques of polyphonic singing. Musica and cantus have been synthesized into music theory. (Bower, 2002, p.164)

In terms of the psychological basis of the solmization system Dolores Pesce concludes that

> Guido provided his singers with aids by which they could internalize a sense of a pitch's proprietas or property: Ut queant laxis and Alme rector. This stage resembles Boethius's "grasp[ing] its shape in the mind." Then, when the singer sightreads or hears a new song, he or she perceives and recognizes the property of the tone on which the song ends as being similar to the property of one of the tones that have been ingrained in the mind's memory. This stage resembles Boethius's "readily recognizing the object when it reappears, for every image mediated by the senses is capable of generating a likeness of this type." Guido's singer thus sings knowingly, fueled by a combination of sensory perception and intellect. When Guido instituted his pedagogical approach based on Ut queant laxis, he offered for those of his time, and of the future, a concrete realization of Boethius's last phrase in the above citation: "The mind, when it engages in understanding, reasons through such forms." (Pesce, 2010, pp.32-33)

2.5.2 Bentian rule system for Early Music analysis

Having translated Old Hall Manuscript, of the late 14th and early 15th centuries, into the modern notation in 1969, Margaret Bent shared her experiences with the scholarly community in her *"Musica Recta and Musica Ficta"*. Bent shed light on some principles which turn out the essential workings of grammar in early music editing and performance. In this work, it is crucial to see foundations as to how to approach to musica ficta in translation of the early music that is closely related with the contrapuntal settings which are organized around tenor in melodically successive ways, and how these settings re-shaped couple of lines, namely, tenor and discantus lest it prevents some undesirable or unlicensed sonorities. These principles provide some nicer chromaticism which is instructed in contemporary theoretical sources. In addition, theoretical and manuscript evidence from the term are complementary to

provide a pragmatic solution to approach to the early music analysis. In her hypothesis, Bent cautions that in any insight into the musical grammar in early music, scholars must not allow themselves to be puzzled with the practices of tonal music that conflicts with practice of medieval music performance. In other words, Bent admonishes that we need to understand their language in their contemporary sources and tools.

In the first place, Bent underlines the importance of the theoretical evidence of the successive counterpoint, notably the harmonic disposition of chromatic inflections. In a compositional procedure, three- and more-part polyphonic settings require researchers to know how individual contemporary scholars were approaching these kinds of compositions. Bent introduces several pieces of historical evidence to explicate this procedure and concludes that at least one upper part of the piece must agree with the tenor with the permitted consonances. While the tenor is the main reference in terms of the disposition of the successive counterpoint, Bent says that there has been no evidence of antipodean consideration. In some instances that the dissonant pairs show off, the inflections are helpful to provide desirable sonorities, it is always that upper parts are inflected. Such instances are the main playground of musica ficta.

Bent, then, explains counter arguments of some authors who support the view that these inflections are disposed of in compositions with harmonic reasons, and demonstrates by presenting two pieces of evidence in which harmonic consideration was not the essential paradigm of this term: the melodic treatments, - that are outlined in the later part of the present section - and the matter of differing concerns of individual composers/choirmasters and singers lead them to approach to the compositions, differently. While composers and choirmasters are mostly interested in harmonic consideration with melodic criteria, this process is upside down in the case of singers. Finally, Bent supports her hypothesis that is application of melodic rules which are supplemented by harmonic adjustments, with two concepts causa necessitatis (harmonic reason) and causa pulchritudinous (melodic reason.)

Having presented the values of the theoretical evidence for the successive counterpoint, Bent underlines the aspect of the solmization system and explains principles about how to interpret the manuscript accidentals. The manuscript

accidentals have two important considerations, disposition of b mollis (♭) and b durum (♮), and unwritten accidentals on manuscripts that are generally well understood though have some ambiguities and inconsistencies in some rare circumstances of compositions.

The b durum (♮) was always being positioned either with sharp (#) or natural (♮) signs. The usage of the # sign usually brought to some dichotomies about whether to be a major or minor semitone; however, these circumstances were rare occurrences of complex placing of recta and ficta tones. The commonly held view is, in evaluation of the manuscript symbols, however, clear. Bents refers this procedure to Prosdocimus: whenever ♭sign is seen, it is interpreted as fa, and all # signs on the manuscript should be evaluated as mi. In an ascending interval, while
♭sign diminishes the ascent note, # sign augments it that is applicable to major semitones. Jan Herlinger translated how Prosdocimus explains it,

> Item sciendum quod hec duo signa sunt signa totaliter opposita, eo quod modo opposito totaliter operantur, quoniam si sit in ascensu b rotundum sive molle ascensum diminuit, et ♮ quadrum ipsum augmentat. Si vero sit in descensu fit e contrario, quoniam tunc b rotundum descensum augmentat et ♮ quadrum ipsum diminuit; et non addunt vel diminuunt ista duo signa nisi semitonium maius, quod semitonium est excessus quo maior combinatio ipsammet minorem excedit, ut supra dictum est.
>
> It must be known, too, that these two signs are totally opposite signs, because they work in totally opposite ways. If round or soft b occurs in ascent it lessens the ascent; square b augments it. In descent, on the contrary, the situation is reversed. Round b augments the descent and square b diminishes it. The two signs do not augment or diminish intervals except by a major semitone, and this semitone is the amount by which a major interval exceeds the corresponding minor interval, as stated above. (Herlinger, 1984, p.76-77)

The last sentence points out the major semitone when a minor interval occurs i.e. b-f is formed as b-f# for the necessity of the perfection of the dyad. The f-f# change indicates the major semitone.

As the second major historical performance tradition, unwritten accidentals, when a performer knows the place where the mi-fa pair exists which is always implied with the soft ♭ and square ♮, for contemporary performers, no need to write the accidentals in which they are trained in the solmization system about how to shift the related hexachord by way of mutatio or coniuncta. However, Bent admonishes one important exception though rarely appears in compositions. In a part that consists of several flats and sharps in the same hexachord, both of them shouldn't be called either mi or fa depending on the accidentals, but the more extreme one should be taken into consideration to apply to mi or fa syllables.

From now on, Bent presents harmonic and melodic rules that are closely related principles with causa pulchritudinis (melodic reason) and causa necessitatis (harmonic reason). Fig.2.10 outlines these rules with some numbers.

> "Dyadic" probably conveys better to a modern reader the essential features of medieval counterpoint. It is not a corollary of dyadic procedure that it limits what can be heard or conceived in the mind." (Bent, 1998, p.33)

> To say that the musica11anguage is based not on triads but on dyads does not deny that three-part configurations exist, nor does it mean that they could not hear or conceive them; it just means that we don't have to go to triadic harmony to explain them, any more than we have to devise a system of quadratic harmony to explain four-part chords within the language of tonal triadic harmony. (Bent, 1998, p.34)

Having explained the dyadic nature of 14th and 15th-century music, Bent demonstrates how theory and practice in early music are compatible with each other to falsify proposals in which historically informed studies are not sufficient to fulfill the expectation of scholars in modern analysis. Even if we accept the proposal that early music theory may be insufficient, it has still an advantage over looking at early music through the glasses of modern music.

MELODIC RULES		
M1.	When a la-sol-la takes place in the piece, the la is augmented with a sharp, and all phrases are solmized as fa-mi-fa.	
M2.	When a sol-fa-sol takes place in the piece, the fa is augmented with a sharp, and all phrases solmized as fa-mi-fa.	
M3.	When a re-ut-re takes place in the piece, the ut is augmented with a sharp, and all phrases solmized as fa-mi-fa.	
M4.	Melodic Tritone: an f may be concluded with a c by to be mediated by a b. The last melodic tritone which occur to f-b voices are permitted in this instance.	
M5.	Each note which exceeds the region of an hexachord, namely those tones exceeds the la is called as fa. In this case, the last note of the hexachord is mutated as mi. Therefore, it is solmized as mi-fa-mi	
HARMONIC RULES		
H1	The vertical Intervals, Unison, fifth, octave and octaves of these intervals should be perfect.	
H1.1.	The vertical Intervals, Unison, fifth, octave and octaves of these intervals may, first of all, be perfected by recta;	
H1.1.1.	If it is not possible to make these intervals perfect by recta, it is provided by ficta. Tenor precedence is the main consideration for the inflection.	
H1.2.	In the perfect consonances in H1, the sounding of mi contra fa prohibition is the controlling factor.	
H2	When the imperfect intervals are solemnized, and a mi contra fa occurs, flatten the b as fa in the non coniuncta hexachords. However, tones are still the same that B natural is pronounced without an alteration.	
H3	If mi and fa sound simultaneously, it is an implication of two faults.	See the fig.x and related explanation.
H3.1	The intervals which must be perfect may be diminished or augmented.	
H3.2	Even if the interval is perfect, it might be approached by a diminished or augmented intervals that is the another instance of the error. "This could result from two simultaneous applications of accidentals	
H3.2.1	which are incompatible, and the sounding of mi contra fa on the cadence chord ("closer adhesion" prescribed by Ugolino.) (Bent, 2002, p.82)	
H3.2.2	"Mi would incidentally sound against fa on the antecedent chord, but only because each was a semitone away from the final chord." (Bent, 2002, p.82)	
H4.	Directed Progressions. Because *Musica Recta and Ficta* had been published before the related contrapuntal relations for this rule was called "Directed Progressions" by Sarah Fuller, Bent explains these relations in detail.	see further explanation below, about the causa necessitatis, major semitone and causa pulchritudinis, minor semitone.
H5.	the pre-penultimate chord is made closer to the penultimate and thus to the final perfect interval. (Bent, 2002, p.87)	

Figure 2.11 Rules for Early Music Compositions (After completing analysis of "Venecie," I will insert related examples to the related rooms in the table)

Accordingly, what the modern analysts should do is to extend the boundaries of the theory for our purposes in early music's own foundations rather than imposing our modern understanding to this music. In order for demonstrating some misunderstanding or false interpretations, Bent presents some elements of the early music: accidentals, parallel fifths and octaves, and mi contra fa occasions in texture, and clarifies that how these components were being considered by contemporary theorists.

Bent evaluates accidentals under title of partial signatures which we have seen in the preceding section. Having presented different stances of authors i.e. Willi Apel, Edward Lowinsky, Richard Hoppin. Bent suggests that the contrapuntal necessity of works may clarify how medieval theorists were taking the partial signatures into consideration.

> Instead, taking a signature as weakly prescriptive, it is easily overruled by contrapuntal necessity, while a proper understanding of the nature of notation and signatures, the truly accidental nature of accidentals, and the irrelevance of mode to fixing actual pitches, can all soften many of the apparently immovable conflicts raised in that debate. (Bent, 1998, p.36)

In medieval music analysis, despite the principles of prohibition of the parallel perfect and octave sonorities, that we have frequently seen these structures led some scholars to claim that theory and practice in medieval period was inconsistent. Bent explains why these surface inconsistencies were at work in early music. In some instances, like double leading cadences, these parallel fifths are considerable, after all, Bent clarifies the most essential points that it is allowable some perfect intervals on the upper parts, if these lines agree with the tenor without making a parallel perfect structure, this is sufficient condition for contemporary theorists.

> They (parallel perfect motions) can then be negatively classified as deliberate defiance or incompetence, or they can become a positive addition to our vocabulary of licenses, as we show how the rules are extended in practice, in larger musical textures, and what other considerations affect relationships with parts other than the tenor. (Bent, 1998, p.38)

After the parallel perfect structures, Bent deals with the mi contra fa prohibition in analyses. Bent states that the mi contra fa prohibition is limited with the perfect intervals widely ignored in modern studies, and it led to some false readings of the early music theory.

> Rules governing the avoidance of one or the other (diminished fifth or augmented fourth) and further restrictions on simultaneous or horizontal usage only make sense when the distinctions are precisely observed. Their theorists cannot be blamed for our careless reading. A more attuned reading of the theorists can help in setting priorities between ficta rules and in defining more precisely the circumstances in which diminished intervals were tolerated. …The fault in these cases is not that of the theorists, but ours, in failing to understand sufficiently the context of the statement and failing to qualify it as carefully as they did. (Bent, 1998, p.38-39)

In the part of the article that includes the importance of performance and authentic listening, Bent compares various modern semantic attributions to early music with several examples. These meanings are imposed on the homonymous structures of 14th and 15th-century music in which Bent practiced it with performance studies in another work in 2003.

Since Margaret Bent had presented her ideas about pre-conditions in early music analysis, the first collaborative study came from Elizabeth Eva Leach in 2000 with her *Counterpoint and Analysis in Fourteenth-Century Song*. Then, in 2003, Margaret Bent supported her practical rules with some additional historically informed principles in the case of Ciconia' motet analyses in her Ciconia*, Prosdocimus, and the Workings of Musical Grammar as Exemplified in O felix Templum and O Padua.* Bent analyzed these motets with some additional rule system that is derived from Prosdocimus de Beldemandis's *Contrapunctus*. (see the fig.2.3)

In 2000, Elizabeth Eva Leach, in consideration of Margaret Bent's preconditions in music analysis, applied Bent's ideas to Machaut's two-part ballads in the 14th century. In this work, Eva Leach adopts the directed progression into her work as Sarah Fuller's contribution to the field. However, Eva Leach thinks that Fuller didn't use the concept diagnostically to operate a set of considerations of semitones to

realize the musical text, and she approached three-part sonorities as if they were a whole entity. While Fuller takes her conceptualization about three part sonorities from two-part textures rather crediting twentieth-century approaches to interpret these structures than recognizing musica ficta interpretations at the point where unwritten accidentals in mensural notation.

In terms of the analytical procedure, Eva Leach applied directed progressions to Machaut's ballad works with some practical processes. First of all, counterpoint analysis is a precondition in the analytical diagnosis, and parsing the surface structure of the piece in consideration every minim might be subdivided consonances and dissonances. The former might be further divided as perfect and imperfect ones. This procedure turns to be a style analysis of the term that considers only consonance alignments of the autonomous lines that are meaningful for compositions. However, it should be careful with the ornamental consonance treatments, because adjacent tenor notes can support several more fundamental and structurally important consonance sonorities, and voices closely related with the rest of the composition must stay in the parsed form of the piece. Directed progressions don't always finalize pieces because there have been various types and functions of the concept. They shouldn't be used as a synonymous concept with the cadence. Perfect consonances should be approached correctly as it is revealed by Bent, therefore a perfect interval is completed with a semitone either above or below with compatible some set of tenor forms in the piece. Finally, the expectation of the tension-resolution pattern of directed progressions might sometimes be diminished when half step approach of the directed progression is removed if proximity to the target perfect dyad is optional.

In 2003, Margaret Bent analyzed several motet pieces by Johannes Ciconia and extended her analytical stance to early music compositions with some additional historically informed principles. In Bent's analytical approach, recognition of cadences or sense of breaks and their appropriate inflections are some of the key points to indicate the boundaries of parts of compositions. In these parts, counterpoint was mainly related to the succession of dyads. Then, she gives intervallic properties of voices in line with Prosdocimus's Contrapunctus. Accordingly, Unison, fifth, and octave are perfect consonances. Octave is superior to fifth, and its status is equal to the unison. Thirds and Sixths are consonance but

inferior to perfect eights and fifths. Fourths are counted as discord but less than the other discords. Second, seventh, diminished fifth and octave are discords that are not used in counterpoint. These intervallic qualities and their dispositions on the composition are the main considerations in a reduction process.

From this point on, Margaret Bent presents some elucidating details of the six rules of Prosdocimus. At the point where not to be a closure, directed progressions signify strong punctuation, and some cadential points are occasioned by a closure. Ends of pieces or sections are obvious cases that are phrase endings in most songs, where musical and poetic units correspond. Length of the sonorities doesn't necessarily specify a closure of arrival sonority; it is specified more by its context e.g. whether it corresponds to some structurally important part of the text, and approach e.g. whether it approaches a perfect dyad with a directed progression or with a non-semitone approaching dyad either above or below part. Thus, all perfect intervals being approached by an imperfect one can be recognized as a strong arrival point. Margaret Bent (1986) states that

> Held chords, then, must be evaluated as to whether they have the status of arrival points or of anticipations, and if anticipations, which ones are directed, which ones are ambiguous, which are left hanging, perhaps for longer-term resolution, and which are deliberately softened or side-stepped. (p.86)

Another important point, the adjacency of tenor notes is the building block of the reduction, avoiding prejudging or imposing long-term tonal goals, the priority of which tenor has to do with the upper parts provides the grammatical background of the composition, and the priority of primary parts needs to be taken into consideration. In all these operations, each part relates independently to the tenor.

In consideration of our main point as to how to analyze the contemporary repertoire, there are a plethora of examples and testimonies about how to apply principles of the solmization system to medieval and Renaissance music. In terms of the ancient music theory which Ciconia reconsidered in his book, there haven't been contemporary witnesses on how to devise a system and apply its rule to the repertoire; in addition, the system which is devised in Book 4 in *Nova Musica* had some certain boundaries in which it only considered the basic polyphonic settings in

Musica Enchiriadis and Musica Scholarum. Another point, Ciconia was likely to be unaware of the transmission problems of Boethius's testimonies to the Carolingians. Francis Gallicus for the first time was aware of the fundamental differences between Church and Boethius modes after two decades when Ciconia had already passed away. This is the point to ask to what extent Nova Musica represented the revival of the ancient sources, and to what extent the belief of Ciconia he thought of himself as a Boethian-dominated scholar reflected the truth about the real system of which Boethian was thinking about the music. Even in this case, it is self-evident that Ciconia's individualism represents a high-quality work for the first time seen in the music-theoretical scene. It undoubtedly requires modern scholars to re-organize the principles of the book and devise a full-fledged analytical tool. Even if, in this case, the form of the re-consideration of the system may trigger the anachronism debate, it seems to be still promising to give the composer credit for his right. However, there is something obvious in the case of our current knowledge, Ciconia's work does not to belong to mainstream major theoretical systems that might be applied to its music period unless there would be found some historical evidence to provide scholars to re-think the system which is proposed by the composer.

1.6 From Composer and Style/Genre Centric Music Analysis to Analysis of Spontaneous Act of Listener and Performer in Music Performance

In the preceding two sections, I presented a quick survey about some of the debates in musicological and music-theoretical communities, and their historical basis in the case of two musical systems that are the greater perfect system and hexachord theory. At this point, I want to discuss to what extent the goal of the present study goes along with the aforementioned studies, and in what aspects this study brings about a new perspective to questions that have already been asked for. From the evidence of the historically informed studies, the general paradigm approaching music analysis is exhaustively composer and genre-centric.

This vein of research programs tells us very little about the *hic et nunc* act of the individuals that including composers, performers, and experienced and inexperienced listeners. This spontaneous act of individuals is a potential question that might elicit an awareness of retrieving performance in early music, and some general cognitive capacities of the human musical mind that are distributional in all timeless

(whether to be a medieval or 20th-century performance) performative acts in music. This principle of the present work may also be a “recurrent redistribution” in which some universal and timeless aspects of the music may be applied to historical periods retrospectively which agrees with Daniel Leach Wilkinson’s determination

> And ultimately, however much we may be able to recapture of a period view - using such evidence as notation, theory treatises, literary sources and archives - what we then see in the music has still to be expressed in terms which make sense to us. Thus analyses of surviving works, while taking careful account of what we know of period techniques, have to proceed from, and to seek to explain, what we currently see and hear in the music. There is no other view available to us. (Wilkinson, 1984, p.9)

Even if Crocker admonishes that rather than imposing our understanding to medieval works, it is important to understand how they conceived them, and this point turns out the main precept of these studies in historical musicology, Wilkinson further clarifies what he means to say

> Analysis is ultimately no more than an extension of the act of listening. To listen is already to analyze. Like the speaker who processes grammatical constructions to determine meaning, the listener processes what he hears in an attempt to create order; and as with language, much of that processing will be automatic, based upon experience, and so not wholly conscious. Listeners and analysts believe that order perceived by them arises out of order composed into the piece; but whether it is composed into the piece consciously, unconsciously, or inadvertently, is of interest only in so far as these can be distinguished - and without the composer's testimony (which may or may not be true), they cannot. As to the communication of his or her perception, the analyst's task is to describe what is found and to do so in whatever terms may seem most appropriate given the nature of the findings. In the case of a fourteenth-century song, these must include fourteenth-century terms wherever they provide the best description of an analytical perception. The range of available terms must also include those that evolved more recently whenever explain plain perceptions of which there

> appears to have been no awareness in the fourteenth century. (Wilkinson, 1984, p.11)

From all these works, the question that arose is what the consciousness of medieval musicians is in music making. In my view, if any concern about explicating musical structures in terms of how they operate in the minds of composers and listeners, there shouldn't be any need to remain resistant to some tendencies that are freed from the historical phenomenon in music. Furthermore, these approaches might be more or less functional to understand some aspects of early music, where principles of tonal music were being implicitly and/or unconsciously at work in these earlier musical pieces, as long as modern conceptualizations of music might not amputate the already existed historical musical nomenclature in the pre-tonal music. Finally, if the concern of scholars is to find out how principles of the human mind work in music making and listening process, even the conceptualizations of modern music might be at stake in which they might be instrumentalized for the ultimate goal in music cognition studies. However, this doesn't necessarily mean to call some authentic conceptualizations with modern alternatives, say, any finalis tone or reciting tone in pre-tonal music might be called a tonic or dominant/subdominant. The latter is nothing but imposing our current knowledge onto the authentic periods in history, at the end, it might slowly devastate our views of the biographical level of earlier terms. In reference to Jorge Louis Borges' illustration which is mentioned by Jean Baudrillard in his *Simulacra and Simulation*, the map we draw in modern times shouldn't exceed the real territories that send modern people into a simulated world which is not desirable to save our partial reality in earlier periods neither functional act to understand work of art in these terms. On the other hand, in terms of early music analysis, modern research methods might be even more important in collaborating with interdisciplinary studies. As long as these endeavors provide us to devise new tools and concepts to clear the picture of the pre-tonal music without both deconstructing the authentic works in a simulated reality and replacing the acquired concepts with the authentic ones, these methodologies might be invaluable investigations to support to and collaborate with current research in pre-tonal music.

This point of inquiry may be well related to the cognitive aspects of the human mind in music which is the central concern of the present work. If I concisely state

what are the similarities and differences between the present work with the works that discuss the historical consciousness of tonal and pre-tonal music, the present work has very little to do with the editorial concerns that translate and interpret the manuscript evidence for transmitting the authentic setting of the pieces to modern performers and listeners as much as certainty, and it takes the outcome of editorial studies in pre-tonal music as the last product to apply some computational models to translations of the manuscripts in line with the modern cognitive studies, notably, generative grammar in music and language. Thus, any potential paradigm changes for editing of early music wouldn't have any impact on the principles of the present work, it means if objects of this research program may change, it modifies itself according to possible new acquisitions of the editorial interpretations. As similar concerns with editorial studies, in its analytical procedure, the present work conserves the external factors that are the historical lexicon of music and technical and methodological utilities of music i.e. time perception in technical ways, and scribal methods to write the music notation. In terms of the historical lexicon, while human computational aspects in music remain unchanged as a physical rule which might also be observable in electrophysiological studies, the individual definitions of a phenomenon in music by words (lexicon) modify themselves in each historical period in music.

Richard Crocker was one of the authors who spoke out about these differences and expressed his opinion that early theorists were more interested in the compositional process than in explicating how elements of music interact in the human mind.

> As a further rebuttal, let me point out that the discant treatise does not describe what the listener hears, any more than does the treatise on traditional harmony. In both cases the teacher tells the student how to proceed; he does not analyze the result as it strikes the ear. The typical discant treatise is a collection of practical precepts on how to make music, not a theory of aesthetics. The instructions of discant, therefore, do not imply that the listener hears two separate melodies; at most, these instructions imply only that the composer proceeds by combining two melodies. (Crocker, 1962, p.9)

Jason Stoessel also realized this point when he asked for grammatical variables in which Margaret Bent presented in her work in 2003.

> Authors like Margaret Bent have described the rules of counterpoint as a musical grammar. Although one might ask to what extent this grammar remains central to written compositions, the relation of literary grammar to oration is analogous to the relation of counterpoint to polyphonic composition. Each supposes intermediate steps of learning, mastering, extemporisation and finally the writing down of a result that is distinct from everyday utterances. (Stoessel, 2017, p.325)

Stoessel casts a doubt on how the process of counterpoint-composition relation reflects the relation between grammar and everyday utterances. In other words, while derived grammatical rules from Prosdocimus' Contrapunctus might well represent the compositional thinking of a composer that may allow several corrections in a writing process to make it proper for the rules of counterpoint, it is impossible to apply the same process with the same accuracy to an improvisation act in everyday utterances of music.

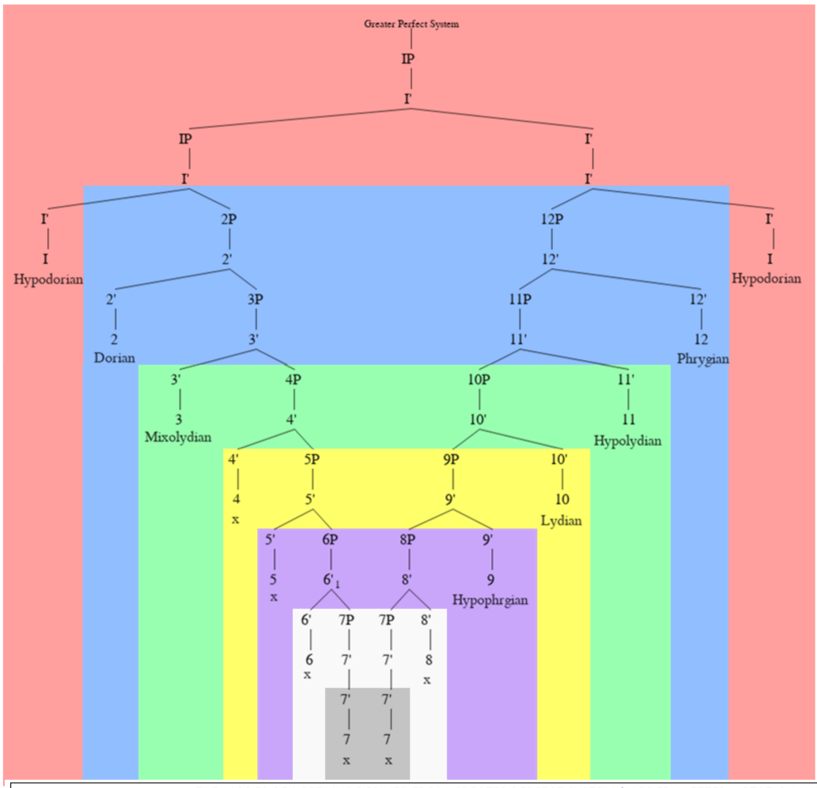
1.6.1 Hierarchical Representation and Comparison of Greater Perfect System and Hexachord Theory

In this part, first, I will represent the hierarchical nature of the GPS and hexachord systems, and then I will compare individual concepts of the systems to each other. Our quick survey has demonstrated that principles of GPS and hexachord theory were two main theoretical tools that led to various controversial claims between scholars, GPS and hexachord theory.

We have also seen that there is a current smoldered debate about how to approach to the analysis of the motet piece of Johannes Ciconia, while Margaret Bent systematically presents historically informed methods in line with the solmization system, Jason Stoessel comes up with a novel analytical method, meanwhile, Stefano Mengozzi cautions that the Ciconia never considered the solmization as a tool in his compositions. As I have discussed above, if Stoessel's further works show some direct evidence in which Ciconia was using a rhetorical method which is borrowed from Vergeria, it may be much more meaningful to evaluate his analytical stance as a promising investigation for pre-tonal music analysis. As for the Mengozzi's approach, unless Stefano Mengozzi demonstrates an analytical practice which is

derived from the GPS in Ciconia's compositions, there wouldn't be a comparative analytical ground that is comparable with Bent's analytical approach in practice. Therefore, despite the potential future outcome of Mengozzi's research program, at present, Margaret Bent's approach is the most coherent analysis system to apply to the early music compositions, including Johannes Ciconia's repertoire. In addition, even if there had been two methods taken essential from solmization and Greater Perfect System, this wouldn't have declined the main arguments of the present work. Accordingly, this work proposes that while the individual lexicon of the two-music analytical system may externally change, the internal computational aspects of the human mind remain unchanged in the operating variables of the two systems. Moving forward on this point, I will present the main schemes of the two systems.

Fig.2.11 illustrates the modes of GPS which is presented by Boethius. I represented it in hierarchical order. From left to right, tones, which modes are constructed on, follow the cycle of fourth. When we compare the ancient modes with the church modes and modern tones, we can observe that the same tone series, in some cases, have been referred to different modal nomenclature. Accordingly, the hypodorian of the ancient modes remains unchanged in the medieval term, and it refers to A minor scale in the modern tonal system. While hypolydian and hypophrygian are homonymous words that the different voices refer to the same tone series in ancient and church modes, it is called B minor scale in the modern tonal system. There are no counterparts of hypophrygian and Lydian modes in church modes, these two modes are called C# minor and F# minor scales in the modern tonal system. Dorian, Phrygian, and Mixolydian are synonymous in the church modes, and these modes refer to D, E, and G modern minor scales. At the left side of the system, we have seen "x" signs that indicate some potential modes that do not exist in the GPS which may be derived from the application of the two-octave scale intervallic pattern onto the C, F, Bb, Eb, and Ab notes. In this general framework, appendix B further presents the individual lexicon of the GPS which are octave species of seven modes, diapente and diatesseron species, and the tetrachords which are derived from modes of the system.



THE MODES OF BOETHIUS DERIVED FROM GREATER PERFECT SYSTEM (MODERN LETTER NOTATION WITH INTERVAL ALIGNMENT)																															
Ancient Modes	Church Modes	Modern Tones														MESE															
Hypodorian	Hypodorian	A Minor	A		B		C		D		E		F		G		a		b		c		d		e		f		g		a
				T		ST		T		T		ST		T		T			T		ST		T		T		ST		T		T	
Hypolydian	Hypophrygian	B Minor	B		C#		D		E		F#		G		a		b		c#		d		e		f#		g		a		b
				T		ST		T		T		ST		T		T			T		ST		T		T		ST		T		T	
Hypophrygian	/	C# Minor	C#		D#		E		F#		G#		a		b		c#		d#		e		f#		g#		a		b		c#
				T		ST		T		T		ST		T		T			T		ST		T		T		ST		T		T	
Dorian	Dorian	D Minor	D		E		F		G		a		bb		c		d		e		f		g		a		bb		c		d
				T		ST		T		T		ST		T		T			T		ST		T		T		ST		T		T	
Phrygian	Phrygian	E Minor	E		F#?		G		a		b		c		d		e		f#		g		a		b		c		d		e
				T		ST		T		T		ST		T		T			T		ST		T		T		ST		T		T	
Lydian	/	F# Minor	F#		G#		a		b		c#		d		e		f#		g#		a		b		c#		d		e		f#
				T		ST		T		T		ST		T		T			T		ST		T		T		ST		T		T	
Mixolydian	Mixolydian	G Minor	G		a		bb		c		d		eb		f		g		a		bb		c		d		eb		f		g

Figure 2.11 : Hierarchical Order in Modes of GPS. [_Greater_Perfect_System[IP[I'[IP[I'[I'[I Hypodorian]][2P[2'[2'[2 Dorian]][3P[3'[3'[3 Mixolydian]][4P[4'[4'[4 x]][5P[5'[5'[5 x]][6P[6'[6'[6 x]][7P[7'[7'[7 x]]]]]]]]]]]]]]]][I'[I'[12P[12'[11P[11'[10P[10'[9P[9'[8P[8'[7P[7'[7'[7 x]]]][8'[8 x]]]][9'[9 Hypophrgian]]]][10'[10 Lydian]]]][11'[11 Hypolydian]]]][12'[12 Phrygian]]]][I'[I Hypodorian]]]]]]]

As we have seen in this observation of the ancient modes, it demonstrates the first premise of the present work that is the lexicon of systems is different. The second premise is the computational aspects of these lexicons stay constant, which I will demonstrate in the last section of the present work. Now, let's look at the main scheme of the hexachord theory in the "two-tier" system in Mengozzi's terms.

In his work in 2006, Stefano Mengozzi stated the proprietors were the intervallic relations between pitch classes that distinguish one set from others, diapasons, as opposed to hexachords, were still the most important consideration of compositions. Accordingly, six-note patterns are the mindset of singers in which they

apply it to the performance practices at the critical points i.e. tonicization. In this respect, Mengozzi presented his two-tier hypothesis that refers to six syllables ut-re-mi-fa-sol-la surpasses the seven letters of the hexachord system that are Γ-A-B-C-D-E-F-G and their octave equivalences.

> …it is possible to conclude that these authors' treatment of the concepts of deductio and proprietas—or punctus, in Salomon's case—is in line with the "two-tier" hypothesis that I wish to propose in this study, in that they consistently posit, directly or indirectly, the existence of two unequal diatonic cycles of seven letters and six syllables that are functionally related to, yet independent from, each other. (Mengozzi, 2007, pp.457-458)

In this work, I aim to develop this idea by separating the first and second tiers of the solmization system. Having demonstrated the hierarchical structure in the case of C natural deductio centric scheme, I attain the ultimate scales which are diapason species into the analysis of the 14th century compositions. In the case of the present work, I will practice it in the Ciconia's "Venecie Mundi Splendor."

The first tier of the system is the general definitions of deductiones. Fig.2.12 shows the C natural centric representation of six note patterns in a hierarchical order from left to right; it follows the cycle of fourths. I call it the C natural centric, because if maximal projection at the top of the tree changes, the central deductio of the system changes, and it generates new hierarchical orders in the notion of a cycle of fourths from left to right. For example, as we practice it in the Venecie Mundi Splendor, I will change the maximal projection to soft deductio, and then the natural deductio will be transferred to the other side of the tree before duplication of the soft deductio at this side.

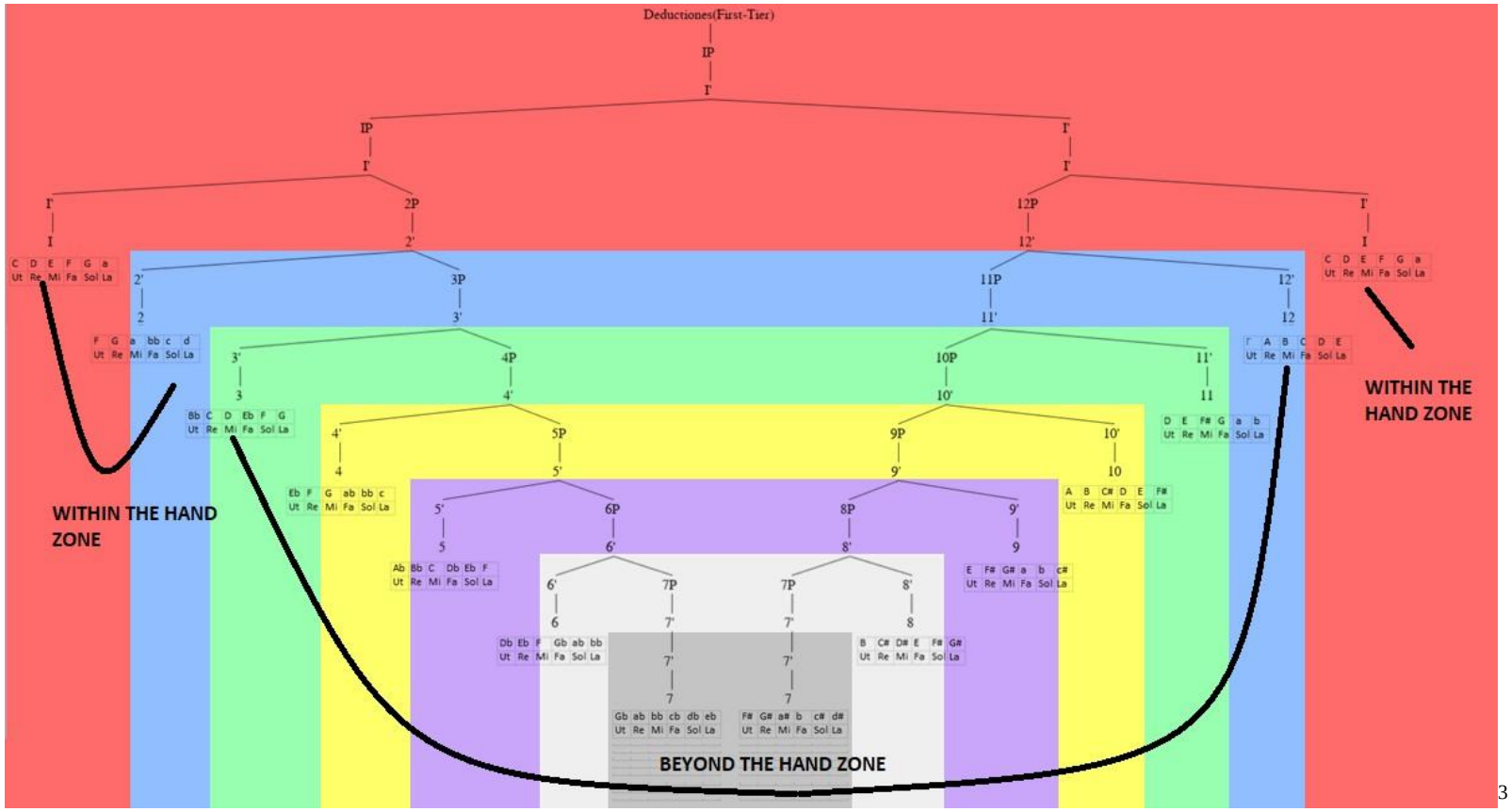
In figure 2.12, it demonstrates the first tier of the system in which we have seen two zones that are within the hand and beyond the hand regions. Names of these regions are inspired by the title of Karol Berger's work *Musica Ficta*. Within the hand, regions include C, F, and G deductiones and their octave equivalences, and any interactions in these zones are called mutatio. As for the beyond the hand zone, all other claves (tones) are potentially and theoretically able to have the same proprietas of C, F, and G proprietas in the same intervallic pattern which is derived from ut-re-mi-

fa-sol-la. Interactions of sets beyond the hand zone which are constructed on claves other than C, F, and G are referred to as coniuncta. Where Bent underlines how some different usage of accidentals has an impact on the meaning of the hexachords is an important point for how Bent regards deductiones,

> However, when theorists attempt to cover both meanings in a single sequence, confusion arises. For example, when the Paris anonymous constructs a hexachord on a with the semitone position shown by c# and d♭,
>
> is he talking about the hexachord on a ♮with c# , or the hexachord on a♭ with d♭, or both? Similar problems arise with the hexachords on b, e and d, which are available in ♮and b forms. (Bent, 2002, p.75)

I see that it is obvious when a ficta occurs i.e. c#, Bent, in this instance, interprets it as mi that belongs to the hexachord "a ♮" which the latter is solmized as ut, or i.e. d♭that is interpreted as f that belongs to the hexachord a♭that the latter is also solmized as ut; thus, Bent states that "on a ♮hexachord with c#, or the hexachord on a♭with d♭." Herlinger also advocates this historical understanding.

> The presence of mi on C (i.e. C#) implies ut on A, just as the presence of fa on E (i.e. Eb) implies ut on Bb, and, indeed, as early as 1375 the Berkeley treatise uses the term coniuncta to refer to "the mental [intellectualis] transposition of any property or hexachord from its own location to another location above or below" and explicitly describes hexachords built on various Ebs, As, Bbs, and Ds in addition to hexachords gradually became the



[3]

Figure 2.12 C Natural Centric Deductiones (First Tier) [Deductiones(First-Tier)[IP[I'[IP[I'[I'[I C-D-E-F-G-a]][2P[2'[2'[2 F-G-a-bb-c-d-e]][3P[3'[3'[3 Bb-C-D-Eb-F-G]][4P[4'[4'[4 Eb-F-G-ab-bb-c]][5P[5'[5'[5 Ab-Bb-C-D-Eb-F]][6P[6'[6'[6 Db-Eb-F-Gb-ab-bb]][7P[7'[7'[7 Gb-ab-bb-cb-db-eb]]]]]]]]]]]]][I'[I'[12P[12'[11P[11'[10P[10'[9P[9'[8P[8'[7P[7'[7'[7 F#-G#-A#-B-C#-D#]]]][8'[8 B-C#-D#-E-F#-G#]]]][9'[9 E-F#-G#-a-b-c#]]]][10'[10 A-B-C-D-E-F#]]]][11'[11 D-E-F#-G-a-b]]]][12'[12 G-a-b-c-d-e]]]][I'[I C-D-E-F-G-a]]]]]]]

[3] In the printed version of this work, this figure is published in a A3 paper size. In the digital version, the contents of the figure may observable by zooming on the related points.

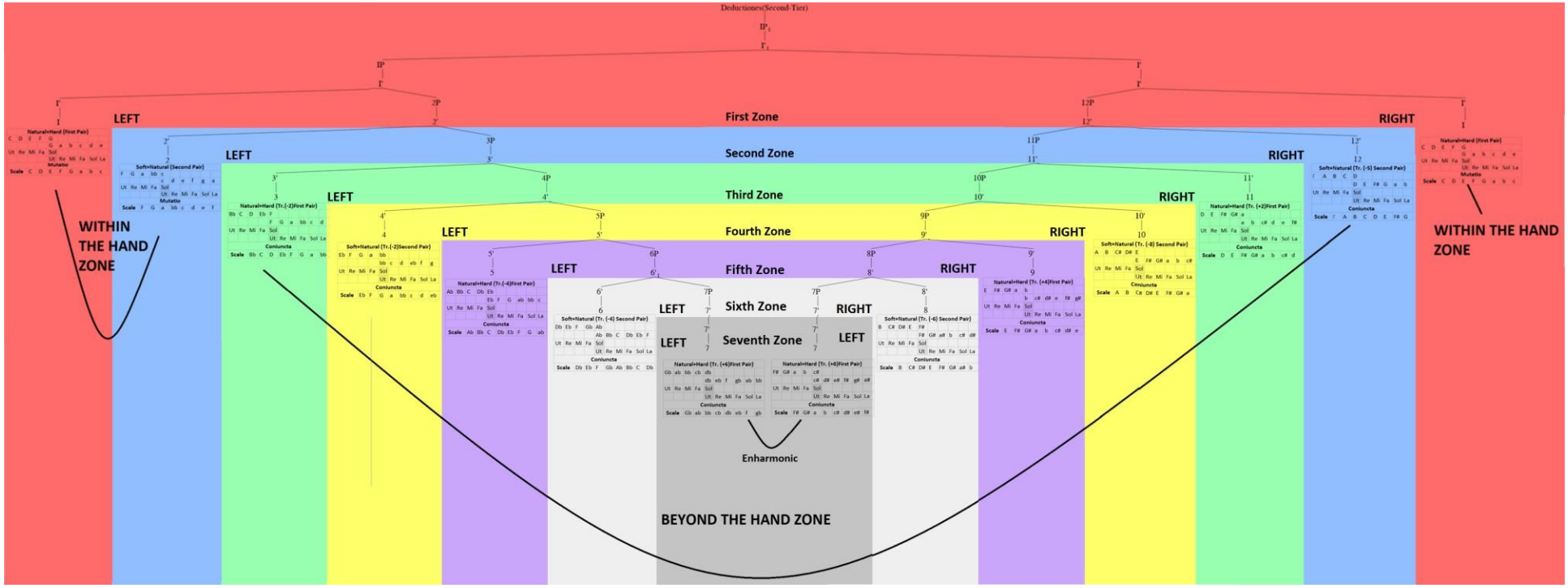


Figure 2.13 C Natural Centric Deductiones (Second Tier), [Deductiones(Second-Tier)[IP[I'[IP[I'[I'[I'[I C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]][2P[2'[2'[2 C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]][3P[3'[3'[3 C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]][4P[4'[4'[4 C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]][5P[5'[5'[5 C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]][6P[6'[6'[6 C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]][7P[7'[7'[7 C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]]]]]]]]]]]]]]][I'[I'[12P[12'[11P[11'[10P[10'[9P[9'[8P[8'[7P[7'[7'[7 C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]]]][8'[8 C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]]]][9'[9 C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]]]][10'[10 C-D-E-F-G-a-b-c-d-e-c-c-c-c]]]][11'[11 C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]]]][12'[12 C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]]]][I'[I C-D-E-F-G-a-b-c-d-e-c-c-c-c-c-c]]]]]]]

4

[4] In the printed version of this work, this figure is published in a A2 paper size. In the digital version, the contents of the figure may observable by zooming on the related points. con. = coniuncta, +/- signs show the step of the coniuncta.

> the common stock of music theory, as did the term coniuncta, which eventually was used to designate any musica ficta note. (Herlinger, 2001, p.256)

Figure 2.13 demonstrates the second tier which is the conjunction of either natural plus hard deductiones or soft plus natural deductiones. However, it is never possible to connect soft and hard deductiones. These conjunctions provide both modes in the GPS with octave species in diapason and tones in the modern tonal system. In the appendix section of the present work, I listed the individual lexicon of these three different systems of music which were active in different historical periods.

Partial signatures which is hypothesized by Bent is another evidence of the present work that the epistemological basis of tonal music came into existence in Greek Music Theory and transmitted to the medieval term with some new appearances and finally derived from the pre-tonal theory which depends on the hexachord system. This is provided by the translation of the hexachord signatures to modern key signatures. However, the terminology of these terms significantly differs from each other which might be the individual lexicon of these periods, however, lexical items have been in close relations as we will see it by observing fig.2.11, 2.13, and fig.5.37.

Bent, first of all, underlines that the musica recta treatment which is derived from the g, c, and f hexachords rules other derivations of the hexachords in terms of the application of editorial accidentals. To apply a practical procedure, because it is not legitimate to apply some modal considerations, it requires editors to have a possible interpretation of Medieval and Renaissance music theory. In this respect, it is applicable that a signature part might be interpreted as the signature of the lowest part at work at the upper parts. (See the Venecie Mundi Splendor (fig.2.8,) while tenor is signature with bb, other parts have no signature)

> Absence of a flat signature would not restrain the application of bb, since it forms part of the normal scheme for an unsignatured part, and may be sung flat or natural without prior claim by the uninflected form. (Bent, 2002, p.87)

Then, Bent raises the question, how a bb signature plays a role on parts without a signature. First of all, this application legitimates the eb ficta notes in the system. When a bb signature removes one of the recta notes (b natural,) two recta hexachord remains to be applicable to the compositions that are f (f-g-a-bb-c-d) and c (c-d-e-f-g-a-) hexachords, and bb signature brings about eb tone, this also eliminates the another recta hexachord c (c-d-e (eliminated)-f-g-a). For this consideration Bent puts forward her hypothesis,

> Yet it is along these lines that the following suggestion is made: a flat signature serves to define the limits of musica recta, and the point at which ficta takes over. The set of three hexachords on c, g, and f represents a set of relationships. The terminology of natural, hard, and soft reflects these relationships, for the arrangement of each individual hexachord is identical in terms of tones and semitones. Elimination of one or more of the recta hexachords would severely restrict the available mutations and the exercise of priority for recta, as well as producing a very different pattern of inflection for a part with a signature. If, however, we see "key signatures" as what might be termed "hexachord signatures," this effect is overcome, and the essential set of relationships preserved. By this reckoning, flat signatures bring about a transposition of the basic recta system of three hexachords one degree flat wards for each note flattened in the signature. Ficta involves the transposition of isolated hexachords for the purpose of creating chromatic notes, but transposition of recta implies that the whole structure is shifted, together with its built-in rules for applying accidentals. (Bent, 2002, p.87)

In Bent's explanation about hexachord signatures, we haven't seen that conjunctions of different deductiones constitute diapason species and different modes; they obviously do so according to Mengozzi. However, Bent explicitly states that proprietas of C, F, and G claves serve as a model for other claves. Fig.2.13 is the synthesis of Mengozzi's claim about the reception of seven letters in the 14th century and Margaret Bent's transposed deductiones in line with partial signatures. This representation is conjunctions of deductiones that form particular diapasons that are organized around the C natural

deductio. Conjunctions are made by either natural plus hard or soft plus natural deductions, and their coniuncta form on the system of cycle of fourth. Thus, there are twelve different representations of this system which are centralized on 12 tones. Accordingly, coniuncta hexachords and hexachord keys play an important role for the derivation of tones in "beyond the hand" zones.

The first zone includes both the within the hand zone that consists of authentic hard, natural, and soft deductiones and two diapason in which the first one C diapente+G diatesseron generates third octave species of the GPS that is (C-D-E-F-G-A-B-C,) and the second one originates the F diapente+C diatesseron which constitute the third octave species of the Dorian mode in GPS. As we have seen at this account for the diapason, we haven't used the individual conceptualizations of the solmization system, and we are not able to refer these octave species to the church modes that are classified under the protus, deuterus, tritus, and tetrardus because of their elusive features. For instance, the denotation of two scales, like G-a-b-c-d-e-f-g, and G-a-bb-c-d-eb-f-g, refer to the same mode Mixolydian that has various problems that cripple and shut down a proper analysis of medieval music. Therefore, whenever I couldn't find an appropriate concept in the solmization system to define the diapason and octave species, I would consult to GPS to define some individual scales generated in the solmization system by way of conjunctions of deductiones.

There are two "within the hand" systems at the left and right-hand sides, while the first at the left initiates generating the system around the cycle of fourths, the one at the right provides the closure of the overall cycle that generates 12 coniuncta systems as the beyond the hand zones. These 12 tones are theoretically possible areas that the general notion of the system can generate, however, certainly, some tonal regions were not active in the medieval period. Beyond the hand regions are exact twins of the "within the hand system" except that they are constructed on 11 other tones than the C tone. Thus, the first zone which is represented with the red color is hierarchically the most prominent scale in the system. The second superior zone is the blue area which consists of coniuncta F deduction acting to have a natural property of C at the left, and G deduction acting to have a natural property at the right. F and G coniuncta regions (blue area/second zone) are

hierarchically equal to each other because there is only one difference of each area with the central region (red zone.) Thus, the F coniuncta area's only difference is "eb" which is the altered form of the "e" in the central zone which is the red region, and f# is the differing tones between the red and blue region. In terms of observing these alterations, it needs to look at the appendix of the present work which shows the lexicon of the solmization system.

Bb and D coniuncta regions (green zone/third zone) are hierarchically equal to each other because there are two differences of each area with the central region (red zone.) Thus, differences of Bb coniuncta area are eb and ab which are the altered form of the "e" and "a" in the central zone which is the red region, and f# and c# are differing tones between the red and blue region.

Eb and A coniuncta regions (yellow zone/fourth zone) are also hierarchically equal to each other due to three differences between each area with the central region. Thus, differences of Eb coniuncta area are eb, ab, and db that are the altered form of the "e", "a" and "d" in the central zone, and f#, c#, and g# are the differing tones between red and green zone.

Ab and E coniuncta regions (purple area/fifth zone) are hierarchically equal to each other due to four differences of each area with the central region. Thus, differences of Ab coniuncta area are eb, ab, db, gb that are the altered form of the "e", "a", "d", and "g" in the central zone, and f#, c#, g#, d# are differing tones between the red and green zone.

Db and B coniuncta regions (grey area/sixth zone) are hierarchically equal to each other due to five differences of each area with the central region. Thus, differences of Db coniuncta area are eb, ab, db, gb and cb that are the altered form of the "e", "a", "d", "g", c in the central zone, and f#, c#, g#, d#, a# are differing tones between the red and green zone.

Gb and F# coniuncta regions (purple area/fifth zone) are enharmonic two regions, and they are equidistant from the first zone/red region.

Guido's general paradigm was developed by various medieval theorists (Guidonistae) and their contributions to theory expanded the scope of the original array of the hexachord system by coniuncta and generated musica ficta notes. In the 14th century, Berkeley treatises were one of the earliest witnesses to explain this process in detail. At the end of this period in 17th century, the striking fact was that GPS and Hexachord Theory had come to a conclusion with some common rules that use quite different languages from each other. However, as the general tendency in the field so far, deems that two systems are fundamentally different than each other. This is, to some extent, undeniably right, if only these differences are attributed to some external necessities, e.g. tetrachords, pentachords, octave species, modes of GPS against loca, voce, deductio, mutatio, coniuncta of hexachord theory. However, in terms of how these seemingly different building blocks are operated in the human mind, the two systems have presumably shared the same computational operation. In terms of the comparison of the two systems, when we observe the same color regions in the GPS and solmization system, we can see that the contents of these regions consist of the same elements which are called different lexicons. Thus, while the general organization and derivation of individual lexical items share the exact internal notion of the music, the environmental/external factors assign these elements some intrinsic nomenclature.