# Music in Medieval Medical Practice: Speculations and Certainties

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In its most cherished formative texts, both sacred and secular, the medieval world encountered the notion that music had measurable therapeutic value. From the story of David and Saul, perhaps the oldest account of applied music therapy that we possess, through Cato, Cicero, Macrobius, and of course Boethius, music was viewed as an integral element of the healing arts. While David's efforts were in the realm of psycho- logical healing,[1] Cato's *De Agricultura* [2] offers us an application of music to physical healing. In Book CLX, discussion of the procedure for mending a dislocated hip pre- scribes the dual application of a splint and an incantation. While the splint (made of a split and rewoven reed) immobilizes the injured limb, we are informed, the incantation serves to sustain the morale of the patient during healing.[3] This particular recipe for healing, song included, is found twice more in Pliny's *Naturalis historiae*[4] and reappeared in the Middle Ages with variations on the incantation and with Christian prayers.[5]

Of course, inquiry into the healing properties of music began much earlier than the Roman imperial period. The ethical character of music was a notion found throughout the ancient East, as records from Egypt, Mesopotamia and China attest,[6] and Western attempts to systematize the connection between music and ethos date back before Pythagoras (6th century B.C.E.) and his school. With Plato's (428-348 B.C.E.) *Republic* and Aristotle's (384-322 B.C.E.)*Ethics*, which devoted considerable attention to the place of music in the body politic, one finds relative consensus concerning the ethical character and the medical application of the different musical modes. These theories were transmitted to the Latin West primarily by Boethius (ca. 480-524) and Cassiodorus (ca. 485-580), although familiarity with Pythagorean musical cosmology was also avail- able both through Cicero's *Somnium Scipionis* and Macrobius' (4th century) commentary on the *Somnium*.[7] The authority of Plato and Aristotle on these matters was accepted by the medieval West, as it would be generally with the rise, in the 12$^{th}$ and 13$^{th}$ centuries, of scholastic thought.

But what use did the West make of these theories in the healing arts? The treatises by Hucbald, Guido d' Arezzo and Hermanus Contractus codifying European modal theory in the 10$^{th}$ and 11$^{th}$ centuries reveal that compendia of Platonic and Aristotelian pronouncements about the ethical properties of melody were available to physician.[8] But these pronouncements were perforce abstract, in addition to showing considerable disparity among themselves, and do not lend themselves readily to practical application. The entire medieval period, in contrast to the Renaissance, offers us little textual evidence on the question, and it is indeed only at the end of

the 13th century, and in particular domains, that we can glimpse how the work of the Ancients was applied.

Renaissance scholars, particularly in Italy, effected a fusion of astrology and practical magic with medicine and music, developing applications of music to medicine which built directly upon neoplatonic models of the cosmos. A direct line of development can be traced from Boethius to the musical medical constructs of 16th century physicians such as Gentile da Foligno, Marsilio Ficino and H. Cornelius Agrippa. These have entered the canon of musicology and history of science, and it is tempting, as Madeleine Pelner Cosman has done in an otherwise laudable article,[9] to assume that their constructs informed the practice of physicians as early as the 14th century. The assumption of a continuum between "Machaut's world" and Ficino's, however, obscures the genuine alterity of the medieval approach to the issue of music and medicine, while at the same time taking too much for granted the radical newness of the ways in which Renaissance physicians applied music therapeutically.

The question which remains unanswered, in the literature on medical music, is how and to what extent the Middle Ages prepared the way for the great synthesis of music, medicine and magic effected after 1482. Did the Middle Ages have access to many of the notions incorporated by Renaissance medical magicians into their theories, or do they represent a conceptual gulf across which Late Antiquity and the Renaissance are linked but through which they do not pass? By reviewing first the neoplatonic legacy inherited by the medieval world and tracing it forward to Renaissance applications of that legacy in medicine, I propose to create a frame in which to view the Middle Ages. It will be my task, focusing on three principal sources - the musical treatises of the 10th and 11th centuries, the medical writings of Hildegard of Bingen (ca. 1151-1158), and Peter of Abano's Conciliator of 1303[10] - to assess the differences between the medical-musical mindset of the Middle Ages and that of the Renaissance and determine what we can state with certainty about medical music in the Middle Ages. In general, we can distinguish two periods in the evolution of medical practice. The first, extending to ca. 1200, is dominated by monastic medicine, while the second, beginning with the founding of the universities, is the period of scholastic medicine, marked by increasing familiarity with Galen (ca. 131-ca. 201 C.E.) and his Arabic successors.

## The Classical Legacy

For the Greeks and Romans, disease was a disharmony of the component elements of one's nature, and music (which, as the art of the Muses, included poetry, singing, playing, and interpretive dancing) was essential to restoring harmony. Pythagoras 's work quantifying the relation between microcosm and macrocosm by means of mathematics and music had profound effects on Western thought through the end of the Renaissance. The Pythagoreans established a direct link between the intervals of the scale and distances between the heavenly spheres.[11] Consequently, the practice of music enabled man, on a microcosmic level, to order his being according to the patterns of harmony of the universe. To the extent that *musica humana* reflects

celestial music, it becomes a channel linking the human soul with the celestial one, reestablishing the harmony which existed prior to one's birth. Pythagoras instructed his disciples in mathematics and music not as an end in themselves, but as a means to ethical perfection. By a practice of music and diet, the Pythagoreans sought to attune themselves to the harmonies of the spheres and thus achieve the order, proportion and measure which were the essence of life.

Pythagorean musical cosmology is, of course, only one manifestation of a musical- cosmological framework which appears to be universal in the ancient world. Yet it is a framework which informs all subsequent Greek writings on the educative, religious and psycho-biotic functions of music. Plato[12] applied the proportions found in the celestial monochord to the construction of his World-Soul, a model of the physical universe as *harmonia*, or tuning, deriving in turn from this the image of the World-Lyre, or stringed instrument of the human soul.[13] The harmonizing of the World-Lyre with the World-Soul remained a fundamental concern of Greek philosophy through the Alexandrian period. The World-Lyre and World-Soul were transmitted by Ptolemy as cosmic and psychic harmony, respectively, and appeared in their final manifestation, as far as the medieval West is concerned, in Boethius, as *musica mundana* and *musica humana*. Boethius added a third category, *musica instrumentalis*, which is the practice of audible musicitself.[14] Cribbing from Plato, Boethius asserts in his *De institutione musica*[15] that "music is associated not only with speculation but with morality. When rhythms and modes reach an intellect through the ear, they doubtless affect and reshape that mind according to their particular character.[16] In a modern paraphrase of Boethius, John Hollander[17] underscores the theoretical nature of both *musica mundana* and *musica humana*: "Microcosmic man, imitating in *hismusica instrumentalis* the ideal order of the *harmonia mundi*, can regain in some small way the *musica humana*, the ordering of his being, that characterizes the music of the spheres and the prior good state of his soul."

Next to this cosmic musical model, the most significant legacy that the medieval West received from Boethius was his compendium of ancient Greek descriptions of mode characteristics.[18] Preserved and delivered to medieval European scholastic thought, these were the pronouncements that had a profound effect on Renaissance medicine. Of course, Greek music had not remained static for the long period during which philosophers made uniform pronouncements about it. The reality described by Plato and Aristotle was not the same as that described by later Greek and Roman ethicists, yet at a distance of 500 years, the latter offered in essence the same appreciations of it. Indeed, though the very existence of such ethical characteristics were by no means universally accepted in the ancient world,[19] the Middle Ages granted to Boethius and Cassiodorus the unquestioned authority which it accorded all ancient texts.[20] In this way, the Pythagorean musical cosmos along with Platonic musical ethics were received by the West essentially unchanged and unchallenged.

There necessarily persisted a conceptual gap between cosmic harmony and musical ethics on the one hand, and actual medical practice on the other, which did not begin to be closed until the 9$^{th}$ and 10$^{th}$ centuries, and at first largely outside of Christian Europe. Beginning with the Arab

medical writers of the 9th and 10th centuries, who transmitted to the West the complete works of Galen and Hippocrates, as well as the balance of the Platonic and Aristotelian corpus, a synthesis was gradually made of Pythagorean cosmology, astrology, church modes, and Galenic medicine.

## MUSIC IN MEDIEVAL MEDICAL PRACTICE

This synthesis comes dramatically into full flower only in 1482, with the publication, in Italy, of Ramos de Pareja's *Musica Practica*.[21] Ramos's work synthesizes a centuries-old tradition of Islamic neoplatonist writings, which he would have encountered in his native Spain. As far back as the ninth century, the philosopher al-Kindi proposed a correlation between the four strings of the 'ud and the four elements, the four humors, the faculties of the soul, the seasons, the planets, and the quarters of the zodiac.[22] His work was continued in the next century by the sect known as the Brethren of Purity, or Ikhwan al-Safa', in whose *Epistle on Music*[23] we find a direct precursor to Ramos's equation linking modes and humors. For the Ikhwan, the strings of the 'ud were effective in both increasing and decreasing the presence of the humors, and were moreover directly linked to the zodiac.[24] Ramos, for his part, systematically linked the four authen- tic modes, Dorian, Phrygian, Lydian, and Mixolydian, with the four humors, phlegm, yellow bile, blood, and black bile, respectively, and asserted, drawing on both Plato and the Ikhwan, that the authentic modes increased the effect of the humors which they governed, while their plagal counterparts, the Hypodorian, Hypophrygian, Hypolydian, and Hypomixolydian modes, served to decrease those effects. He also promoted the direct integration of music into astrology by assigning the final tones of the eight modes to specific planets.[25] Ramos's pairings opened up new possibilities for the application of music to astrology, and represented something entirely new for Western thought.

> The effect of this linking of modes and planets was to pervade with music the correspondences often perceived by astrologers between the planets or stars and various constituents of the sublunar world-elements, humors, moral characters, colors, seasons, and so on. ... In the context of western musical writings, at any rate, Ramos's planet/mode pairings seem unprecedented. Their subtle effect was to shift speculation about planetary harmonies from the physical to the metaphysical plane. As long as each sphere was accorded a single pitch, the cosmic music could be explained in simple mechanical terms, as a result of the proportionate distances between the spheres or of the planets' relative speeds of revolution, for example.[26]

Ramos's ideas were adapted and developed almost immediately by philosopher- physicians who also had the merit of being trained musicians. Marsilio Ficino[27] patently had Ramos's modal-planetary equations in mind when he proposed three rules for com- posing planetary songs:

> But to come now to the rules for fitting our song to which stars: the first is, to discover what powers these have in themselves, which star, planet, and aspect has what effect on them, which ones take them away and which ones bring them. Then we add these to the

> significations of our words, detesting those which take away and approving those which bring. The second rule is, to consider which star especially dominates which kind of place and which kind of man. Then to observe which tones and songs are used in these regions and by these persons, so that you might use similar words spoken with the same significations, which you are wont to associate with these same stars. The third rule is, pay attention every day to the location and aspects of the stars, and under these explore which speeches, songs, movements, dances, customs, and actions usually excite people, so that you might be able to imitate such things for the sake of the powers that are in these songs, which please some similar heavenly object.[28]

Though Ficino does not prescribe specific modes, he does offer detailed descriptions of the type of music characteristic of each planet. He shows, furthermore, the perspicacity of an experienced music therapist when, in his second rule, he prescribes both knowledge of the stars which rule a given region, and familiarity with the types of song which are practiced by the locals. 20th century music therapy has established, in support of Ficino, that the patient's familiarity and positive association with the melodies employed are the most significant factors in selection. Ficino's third rule, moreover, in its assumption of the intimate connection between regional styles and behavioral patterns, validates Plato's account of the origin of mode names.

Ficino's discussion of planetary music is full of tantalizing suggestion, yet success- fully eludes efforts to read it as prescriptive magic. Such a practical therapeutic instru- ment was in the making barely ten years after *De vita*, however, in Heinrich Cornelius Agrippa's *De occulta* philosophia.[29] Agrippa produced a treatise on practical magic which synthesized Ramos's work on occult modes (encountered largely through the writings of the Milanese music theorist Franchino Gafori) and Ficino's planetary songs with astrology, the study of which was undergoing a profound renewal. Music became with Agrippa the means to channel astrological influence. The infusion of astrology into all branches of scientific inquiry is visible in the abundance of late-medieval images depicting *homo signorum* or Astrological Man, who illustrates the doctrine that the parts of our anatomy are governed by particular zodiacal signs. Thus Aries controls the head, Taurus the throat, Gemini the shoulders, Leo the heart, etc. As a practical tool, bloodletting calendars were available to physicians which showed not only the precise phlebotomy points, but allowed, through the zodiacal linkage, to calculate the most pro- pitious times for bleeding.[30]

The mechanistic connections between music, physiology and the stars which the scientific community now promoted made it a matter of astrological calculation of onset time of illness, as well as a diagnosis of the humoral imbalance responsible, to determine the requisite melodies for channeling the proper celestial benefits.

We thus see a direct line of development from Boethius to Agrippa in the creation of a scientific branch of medical music. But this synthesis is achieved sufficiently late in history that certain of its key notions must have been unavailable to the healing arts in the Middle Ages. Ficino and

Agrippa are so thoroughly products of their age that the question arises how many of their fundamental constructs could have been operative in medieval medicine

## The Medieval Period

Examining first of all the question of the practical interpretation of the Pythagorean- Ciceronian legacy, Boethius, in transmitting Cicero's *Somnium scipionis* did suggest actual pitches for the planets (though Macrobius had refrained from doing so). But as Cicero's model was based on the periodicity of the planetary revolutions rather than their relative distances, it was plain that these periods, ranging from 28 days to 30 years, were not expressible as a diatonic scale. The order of planets on the scale would also differ considerably from that of a scale based on interplanetary distances, and even in the Ciceronian model, would differ depending on whether the speeds of revolution were calculated with respect to the fixed earth or to the zodiac. The Middle Ages was thus predisposed to treat all planetary scales symbolically, and even physicians of a strong astrological bent did not incorporate music into their planetary calculations.

On the question of modes and their effect, terminological imprecision led early medieval musical theorists to confuse the ancient modes with their own native modes, which were Byzantine in origin.[31] As the ancients had discoursed at length on the physiological benefits of music, particularly in cases of sciatica, ischialgia, gout, and epilepsy,[32] it would be plausible to assume that the West applied its own music to the cases Boethius anthologized, unaware of the incompatibility of the two musical systems. In fact, the physician seeking to apply given melodies to given medicinal ends would not find a very good match between theory and the tools available for treatment. For the descriptions made of the church modes in the early 1 1th century by Guido of Arezzo, Hermanus Contractus and the anonymous author of *Quomodo de arithmetica* have little in common with the ethical attributes of Plato and Aristotle as presented above.[33] As is not surprising, we do not find any evidence, in this period, of systematic application of the melodic modes to healing.

This begins to occur only toward the end of the 12th century, in the regulation of the humors. The West had of course inherited the cosmos composed of fours - four elements, four forces, four qualities, four humors, four temperaments - from anthologists of the classical world such as Isidore of Seville (ca. 560-636 C.E.). The practical application of these constructs grew however, with the spread of medical education, which itself grew concomitantly with the dissemination of the writings of Hippocrates and Galen after 1100. By the end of the 12th century, some forty treatises bearing Hippocrates's name, and considerably more than that attributed to Galen, were available in Latin. These, however, were incomplete; indeed, large portions of Galen's anatomical works remained unknown until the 14th century. The complete works of Galen and Hippocrates were not in the possession of the West until the 16th century.[34]

Humoral regulation as inspired by Galen was indeed not integrated into medical practice until the rise of the universities in the late 12th century, as the works of Hildegard of Bingen reveal quite

clearly. As one of the most significant medical writers of the 12th century,[35] Hildegard is an exemplar of a tradition of medical practice which until 1 130 was officially the propriety of the monasteries.[36] Of her two medical treatises, *Physica* and *Causae et curae*[37] it is the latter which accords the humors their customary place in the presentation of illness and treatment[38] and significantly, her discussion shows only the most tangential obligation to Galen's works. Rather than describing the humors as composed of blood, phlegm, bile, and black bile, Hildegard informs us that the humors are made up of four types of phlegm - dry, moist, foamy, and lukewarm - which derive from fire, air, blood (water) and flesh (earth), respectively. The humors are arranged in a hierarchy such that the term 'phlegm' is reserved for the two dominant ones, while the two subordinate humors are denoted as 'slime'. While Hildegard appears to favor a balance of humors consisting of dry and moist phlegms dominant over foamy and lukewarm slimes, this is only one of several possible healthy arrangements. For each ailment, mental as well as physical, in her encyclopedic presentation, she establishes which humors act as phlegm and which as slime, and explains the particular imbalance responsible for the pathological state; all such states result from a dominance of slime over phlegm. In her discussion of the four temperaments, she does employ the Galenic classification of sanguine, phlegmatic, choleric, and melancholic, but the statements she makes about them reveal Hildegard as a shrewd observer of human nature rather than as a scholar of classical medicine. Not only does she describe the strengths and weak- nesses, physical characteristics, behavior in relationships, suitable occupations, and prognosis for a healthy and long life which are characteristic of each temperament, but she reviews each temperament twice: once for men and once for women.

In parts of *Causae et curae* as well as in her *Liber Divinorum Operum*,[39] Hildegard treats the humors on a metaphysical rather than a physical level, and it is here that she makes her most revealing statements about music. She does not mention music overtly in any of her discussion of cures, in either *Causae et curae* or *Physica*. Rather the place of music in her medical cosmogony must be deduced from her theosophical dis- course on the Fall, in which the humors figure as exempla of the human condition. Hildegard offers us a syncretism of humoral physiology and Augustinian theology[40] when she states that blood is the only positive humor, and represents the body in its Edenic state of purity . The other humors entered into the body through a contamination of the blood, as a result of Original Sin.[41] Melancholy, in particular, developed "in Adam and in all his posterity" due to "the first attack by the devil on the nature of man,"[42] as banishment from Eden severed him from the heavenly choirs, with whose voices his had hitherto been in harmony. When we read this passage in conjunction with a letter Hildegard wrote to the prelates of Mainz toward the end of her life,[43] we understand the power music held for Hildegard as a psychic force capable of countering the spiritual ill which is embodied in melancholy.

Music in this letter is presented as a gift of the Spirit designed to soften the memory of exile and recover the primeval unity which harmonized human voices with those of the angels. Psalms, hymns and musical instruments came into being, she asserts, through imitation of the inspired prophets, which enabled humans to "sing in joyfulness of heart. . . .And in this way, they

imitated Adam, too, for he was educated by God's finger, the Holy Spirit, and before the Fall his voice carried in itself, in full, harmonious sound the loveliness of every musical art."[44] Music appears, then, as both a manifestation of spiritual wholeness and a means by which to achieve it. In Hildegard' s plea to have the interdict lifted, it is clear that by being deprived of the divine office, her community has been assailed by melancholy, and she fears that the inability to sing will make her sisters vulnerable to greater temptations.[45]

The conceptual framework for music therapy certainly exists in Hildegard' s works, and it was perhaps only her lack of formal training in music which can account for music's absence from her medical treatises.[46] The problem seems to be more general, however, and can be situated at the level of metalanguage. While refreshingly free of the superstitious baggage which accompanies so many pre-H* century monastic medical texts,[47] Hildegard's *Physica* reveals a naturalistic, herbal approach to healing which, when viewed in conjuction with *Causae et curae*'s metaphysical assessment of the humors, sets the 12th century markedly apart from the 13th. Without a firm grounding in Galenic physiology and both ancient and contemporary modal theory, therapeutic applications of music in the monastic world were perforce impressionistic, holistic. Though monastics of Hildegard's time can be thought of as natural music therapists, they lacked the theoretical apparatus available to scholastic medicine in the next century. The development of a quantitative model of music therapy which leads to the Renaissance really begins in the 13th century, and focuses for the entirety of that period on the musical regulation of pulse.

## Pulse Music

The association of pulse with musical rhythm dates back at least to Galen, in whose works pulse is given a place of primacy as a diagnostic tool. For pulse constituted, along with urine, one of the few readily discernible phenomena in the study of disease, and became a principal focus of medical examination and treatment. Physicians were expected to develop sensitivity to minute variations in pulse,[48] and classified these on scales of intensity, regularity and duration. Without a clear understanding of the circula- tion of the blood,[49] however, pulse remained a mysterious phenomenon, and efforts to explain it focused on assimilating it to universal and human harmony. For Galen, who devoted four major and several minor treatises to the topic, the pulse was circular in nature, and could be understood by comparing it to the movements of the heavenly bodies. He expressed the intensity and duration of pulse beats as numerical proportions- “double, triple, quadruple, and so on" and "5:2, 7:2, 9:2, 1 1 :2"-which resemble the planetary and musical proportions of the Pythagorean universe. Though Galen was very circumspect about asserting that these proportions actually constituted a musical series, he implied that the language of music was useful in understanding pulse, and that comparisons between the two aided diagnosis. Many later writers chose to interpret this analogy literally, and disagreement on the actual workings of pulse permeates the vast literature on the subject.[50]

It was the Italian medical writer Peter of Abano (1250-1316)[51] who gave the Middle Ages an epistemological home for the study of "pulse music." His massive Concilia- tor of 1303, which attempted to reconcile all of the major medical and astrological treatises in circulation in his day,[52] inspired two centuries of scholarship whose authors, among them Gentile da Foligno (d. 1348), Jacopo da Forli (d. 1414), Ugo Benzi of Siena (d. 1439) and Pietro Vermiglioli (fl. 1480),[53] are all indebted to him. In the *Conciliator*, Peter revised Boethius's tripartite classification of music by creating a subcategory of *musica humana*, termed *musica organica*, in which he placed pulse music. In his vigorous defense of this field of study, he cited as his authorities Boethius, St. Augustine and Guido of Arezzo, and in the process provided his readers with a detailed description of music theory and practice. Both Peter and Jacopo da Forli a century and a half later describe pulse in terms of metrical rhythm, but Peter is unique in suggesting a direct application of contemporary music to the regulation of pulse, through his claim that the pulse beats in different meters at different ages.

Though the description itself is fanciful-that the pulse beats in trochees in infants, in spondees in mature adults, and in iambo-trochees[54] in the aged, Peter's claim has the merit of expressing pulse in terms of the rhythmic modes of contemporary polyphony. In the *ars antiqua* motet, which flourished in Peter's adopted Paris, the various voices are written in one of six rhythmic modes, the most common being the trochaic (or mode 1), the iambic (or mode 2) and the spondaic (or mode 5). By Peter's day, dance music was also recorded in mensural (Franconian) notation, as were the monophonic songs of Adam de la Halle, one collection of trouvere poems, the *Chansonnier Cangé* (indicating that music hitherto notated without rhythm was being rewritten in the modern style),[55] and others. These rhythms thus permeated contemporary practice, and Peter had at his disposal a wide repertoire of vocal and instrumental sources with which to regulate arterial pulse.

The rhythmic modes are ternary, consisting of three-beat units, and in the spondaic mode in particular, the melody is composed of repeating patterns of long notes of three beats each, followed by a two- or three-beat rest. The trochaic and iambic meters in medieval French mensural music, moreover, receive equal stress on their short and long beats, unlike in the modern English prosody with which we are familiar. We thus have a musical model which is applicable, in the case of the spondee, to the periodicity of the pulse, and in the trochee and iamb, to the alternation of diastole and systole. One need only select the proper meter in order to increase a sluggish pulse, regulate a rapid or erratic pulse, or adjust (for Peter) a pulse which was simply inappropriate for one's age category.[56]

Peter was not alone in equating contemporary polyphonic music with the movement of pulse, for we find the same type of discourse a century later in the writings of Jacopo da Forli (d. 1414),[57] who compares the measurement of pulse with the mensural choral music of his day. Neither Jacopo nor any writer after Peter, however, make any use of the latter' s metrical models, and this is hardly surprising. Compositional styles evolved rapidly after 1400, with considerable divergence between the French and the Italian styles, and Peter's older metrical models would

not have been serviceable to Jacopo in the regulation of pulse, as they were not part of his experience of music.

## From Medieval To Modern

Pulse music offers us the earliest genuinely medieval example of the application of music to European medicine. However imperfect medieval physicians' understanding of pulse may have been, their notions are more consistent with the way modern research approaches music medicine, than are the ideas of the Ancient world or the Renaissance Current research on the influence of musical rhythmicity on physiological rhythmical events[58] shows this field of inquiry to be one of the few aspects of medical music in which it is clear precisely what musical phenomena bring about what physiological effects. Rhythms in the mechanical world such as pendulums have been found to synchronize with each other when placed in proximity, and the pulsations of our natural rhythms of heartbeat and breathing can be effectively altered under anesthesia in order to enhance the safety of surgical interventions. It is the pulsations inherent in music which have also proven to be an effective tool in evoking response from autistic[59] and depressed[60] patients, and music can be of invaluable aid in physical rehabilitation.[61]

The ancient belief in the inter-relatedness of body and mind, revalorized by current research, suggests that music is also an effective stimulus of immunological response. Music has been found to enhance medical treatment in a variety of procedures and cases in addition to surgery, among which are burn treatments, chronic pain, respiratory impairment, kidney dialysis, cerebral palsy, cardiac disease, and terminal cancer.[62]

Accounts of musical ethos and music medicine have always struggled, in Gary Tomlinson's words, "against a debilitating ambiguity as to just what musical phenomena might bring about [what] effects."[63] Current research in music medicine reveals that our frustrations with this ambiguity have been misplaced, and that the most quantitative accounts are not the most useful. Studies repeatedly show that in the selection of music for treatment, the single most important factors in the effectiveness of the therapy are affective ones: 1) the patient's familiarity with and response to the piece chosen, and 2) the bond between the patient and the therapist.[64] A link can thus be established be- tween modern science and the qualitative mystical approach of Marsilio Ficino.

The evidence leads me to posit two continua in the history of medical music. The first bridges the classical world and the European Renaissance, while the second joins the medieval period with the 20$^{th}$ century. Music was certainly used in healing by monastics, but unsystematically, and with little evidence of method. The late Middle Ages progressively acquired the cognitive tools and textual experience necessary to make the synthesis which marks the break between the Middle Ages and the Renaissance, but did not themselves make the intuitive leap. It is thus only in the Renaissance that we find a complex, mechanistic model of application of music to medicine. At the same time, it is the Renaissance, of all the periods in question, which offers the

most convoluted, least flexible doctrine of medical music. Rather, we must unravel the complex puzzles woven by Renaissance humanists to reveal a simpler, intuitive practice whose truths can illuminate us and reinforce the ties which draw us closer to our medieval past.

## Notes

[1] David's status in the Middle Ages as a paragon of minstrelsy was thus assured. He is regularly portrayed as a crowned harper in liturgical manuscripts, and is even depicted, in Cluniac tonaries, as the head of the octave scale; see Jacques Chailley, "Les huit tons de la musique et l'ethos des modes aux chapiteaux de Cluny," *Acta Musicologica* LVII/1 (1985), 73-97.

[2] Marcus Porcius Cato, *De Agriculture*, Loeb Classical Library (Cambridge, MA: Harvard University Press, 1934).

[3] While applying the splint, Cato instructs us, "Begin to chant 'motas uaeta daries dardares astataries dissuna piter' and continue until [the reeds] meet. Brandish a knife over them, when the reeds meet so that one touches the other, grasp with the hand and cut right and left. If the pieces are applied to the dislocation or the fracture, it will heal. And nonetheless chant everyday... in this manner if you wish: 'huat haut haut istasis tarsis ardannabou dannaustra.'" The language of all such incantations was archaic and likely corrupt. Transmission in such form suggests faith in the power of the words regardless of whether they were understood.

[4] Pliny the Elder, *Naturalis Historia*, 10 vols. (Cambridge, Mass: Harvard University Press), 1938-1962.

[5] One such formula, found in Sloane ms. 475 in the British Library and described by Lynn Thorndikey4 *History of Magic and Experimental Science*, vol. I, (Chicago: University of Chicago Press, 1923), 725-6, prefaces the incantation with the sign of the cross and follows it with the Lord's Prayer. In the latter case, crosses and cryptographic inscriptions of various sorts are inscribed in the text. As Marie-Therese d'Alverny, "Une baguette magique," in *Melanges Alexandre Koyré* (Paris: Hermann, 1964), 1-11, points out, most medi- eval formulae make of Cato's splint an instrument of sympathetic magic, as the joining of its split center is intended to effect the rejoining of the separated hip.

[6] Rita Steblin, *A History of Key Characteristics in the Eighteenth and Nineteenth Centuries* (Rochester: University of Rochester Press, 1983), chapter 1.

[7] John Hollander, *The Untuning of the Sky. Ideas of Music in English Poetry, 1500-1700*, (New York: W.W. Norton, 1970).

[8] Steblin, ibid., 20-29; Oliver Strunk, ed., *Source Readings in Music History*, (New York, W.W. Norton, 1962), 211-218.

[9] Madeleine Pelner Cosman, "Machaut's Medical Musical World," in Cosman and Chandler, eds., *Machaut's World: Science and Art in the Fourteenth Century*, (New York: New York Academy of Sciences, 1978), 1-36.

[10] Pietro d'Abano, *Conciliator*, Venice, 1496 (Facsimile Edition, Padua, 1985).

[11] The distance from the earth to the moon (calculated by Pythagoras to be 126,000 stades, or around 13,000 miles) represents one whole tone. The remaining intervals, whole and half tones, symbolize the distances between the rest of the spheres - Joscelyn Godwin, *Harmonies of Heaven and Earth*, (Rochester, VT: Inner Traditions International, Ltd., 1987).

[12] Plato, *Timaeus*, tr. Francis M. Crawford, (New York: Liberal Art Press, 1959).

[13] Stringed instruments are favored by Plato (who objected to anything Dionysian) over wind instruments, particularly the *auloi* for the positive effect they have on the listener. This endorsement, reinforced by the association of harps and lyres with David and Orpheus, assured the primacy of stringed instruments in poetry and iconography.

[14] *Musica* as a discipline remained theoretical throughout the Middle Ages, and it was its neo-Pythagorean foundation which accounted for its place in the quadrivium. When treatises on practical music appear, it is denoted by the term *cantus*; there is thus at the heart of the discussion about *musica*, and in the medieval reception of this tradition, an impediment to the *mise en pratique* of the ideas it espouses.

[15] Manlius A. S. Boethius, *Fundamentals of Music*, tr. Calvin Bower, (New Haven: Yale University Press, 1989).

[16] In Strunk, *ibid*., 3

[17] *Ibid*., 30.

[18] The names of the Greek modes derive, as Plato makes clear, from the ethnic groups with which they were originally associated. In general, the native Greek modes - the Dorian, Ionian and Aeolian, were ascribed positive characteristics while the foreign modes - the Phrygian and Lydian, were not. The association of the Dorian with Apollo and the Phrygian with Dionysios (see footnote 13) further underscores these ethnic/ethical pairings.

[19] Gustave Reese, *Music in the Middle Ages*, (New York: W.W. Norton, 1940), 45, cites the case of Philodemus, a writer of the first century B.C.E., who refutes the notion of musical ethos. An excellent discussion of the vagaries of ancient Greek musical practice and of its transmission can be found in Gary Tomlinson's *Music in Renaissance Magic*, (Chicago: U. Chicago Press, 1993), chapter 3.

[20] Ernst Robert Curtius, *European Literature and the Latin Middle Ages*, tr. Willard R. Trask, (New York: Pantheon Books, 1953).

[21] Bartolomeo Ramos de *Pareja*, *Musica Practica*, (Leipzig: Johannes Wolf, 1901).

[22] Tomlinson, *ibid*., 82.

[23] Ikhwan al-Safa', The Epistle on Music, tr. Amnon Shiloah, (Tel Aviv: Tel Aviv University Press, 1978).

[24] Henry George Farmer, *The Influence of Music. From Arabic Sources*, (London, 1926),

[25] Matching the Dorian mode with the sun, Ramos paired the remaining authentic modes with Mars, Jupiter and Saturn. Likewise, he paired the plagal modes (as their range extends a

fifth below that of their authentic counterparts) with the lower spheres of moon, Mercury and Venus. The Hypomixolydian mode, finally, is paired with the starry firmament above Saturn, as its final is one tone above that of the Mixolydian.

[26] Tomlinson, *ibid*., 79-83.

[27] Marsilio Ficino, *The Book of Life*, tr. Charles Boer, (Woodstock, CN: Spring Publications, 1994).

[28] Ficino, *ibid*., Book III, chapter 21.

[29] H. Cornelius Agrippa, *Three Books of Occult Philosophy*, (Chicago: Hahn & Whitehead, 1898). Agrippa had composed the preliminary version of his masterwork by 1512, though his two sojourns in Italy gave him occasion to make extensive revisions in the manuscript. The final version was therefore not published until 1533.

[30] Cosman, *ibid*.

[31] Steblin, *ibid*., 19.

[32] Bruno Meinecke, "Music and Medicine in Classical Antiquity," in Dorothy Schullian and Max Schoen, eds., *Music and Medicine*, (New York: Henry Schuman, 1948), 47-95.

[33] For a careful delineation of the mode description belonging to each period, consult Rita Steblin, 1983, chapter 2. Medieval descriptions of the modes are noteworthy in that they seem to be drawn from observation and experience, and reveal cognizance of the distinguishing structural features of each mode. Attention is drawn, in dicussing the latter, to the sweetness (*suavitas*) imparted to the Lydian by its use of $B^b$ (pointed out by Johannes Gallicus), the intermittent leaps (*fractis saltibus*) of the Phrygian (occasioned by its avoidance of the tritone - author's interpretation), and the garrulousness (garrulitas) of the Mixolydian, referring perhaps to its frequent step-wise wanderings around the reciting tone (author's interpretation).

[34] Nancy Siraisi, *Medieval and Early Renaissance Medicine*, (Chicago: University of Chicago Press, 1990).

[35] Heinrich Schipperges, *Hildegard of Bingen. Healing and the Nature of the Cosmos*, (Princeton: Markus Wiener Publishers, 1997), 65, refers to her as "the most outstanding representative of the spirit of medieval medicine."

[36] At that time, the Council of Clermont prohibited members of religious orders from practicing medicine. This did not of course result in the cessation of monastic interest in healing, as Hildegard's major medical treatises were produced in the 1150s, and clerics continued to seek medical training in the universities through- out the Middle Ages and Renaissance. For the poor, furthermore, holy men and women continued to be the only recourse available for cures, and miraculous healings from beyond the grave facilitated the process of canonization for the saintly person in question, thus blurring the line separating medical *interventionante* and *post mortem*. Such miraculous cures, of which Hildegard took credit for her share, were something which no council could seek to regulate.

[37] Hildegard of Bingen, *Holistic Healing*, tr. of *Causae et curae* Manfred Pawlik and Patrick Madigan, S.J., (Collegeville: The Liturgical Press, 1994); *Physica*, tr. Priscilla Throop (Rochester, VT: Healing Arts Press, 1998).

[38] In *Physica*, H. focuses on the regulation of the qualities of heat, moisture, cold, and dryness rather than on the balancing of the humors. For she describes the whole of the natural world in terms of these qualities, and all disease, including humoral imbalance, results from their deregulation. For example, in section CXXII, she describes the virtues of columbine. "Columbine (*agleya*) is cold. A person on whom *freislich* begins to spring up should eat raw columbine, and the *freislich* will disappear. And one on whom scrofula is developing should eat raw columbine, and it will decrease. But one who ejects much phlegm should soak columbine in honey and eat it often. It will diminish the phlegm, and he will rid himself of it. One with fever (a *diseasesic,* which is inherently hot and thus susceptible to cold columbine-author's note) should pound columbine, strain its juice through a cloth, and add wine. He should drink this frequently, and he will be well."

[39] *Book of Divine Works*, tr. Bruce Hozeski, (Santa Fe: Bear & Company, 1987), Book III, 9.

[40] St. Augustine, *The City of God*, (Garden City, NY: Image Books, 1958), chapter 9.

[41] The blood "changed into the poison of semen by which human children are generated. Because of that his flesh is full of ulcers and sores. These ulcers and sores produce disturbances and vapors in people. Out of them comes the phlegm which brings various diseases to the human body" (1994, 33); toil, illness and death thus become humankind's lot after the expulsion from Eden (Genesis 3). Hildegard's theologization of disease, in its attempts to fuse empirical science with the biblical view of history, characterizes, actually, strange as this seems to us, a rationalist bent which exemplified the finest minds of her day.

[42] *Causae et curae*, 35.

[43] At the end of her life, Hildegard's abbey was placed under interdict for her refusal to disinter from the abbey cemetery a young nobleman who had been excommunicated but reconciled privately with the Church before death. She likens the silent choir of her church to Adam bereft of the angelic hymns, an argument which assimilates the stubborn prelates to Satan, who by tempting Adam broke the bond which united humankind in song with Heaven.

[44] *Book of Divine Works*, 357.

[45] The role music played in spiritual health is elucidated in the *consuetudines*, or books of customs, surviving from 11th century Cluny (see Frederick S. Paxton, "Liturgy and Anthropology. A Monastic Death Ritual of the Eleventh Century," *Studies in Music Thanatology* II (1993), 1-20) in their presentation of rituals for the care of the dying. From the moment of his ritual purification in preparation for death, the dying monk was never alone, but rather attended by the singing of psalms, in particular the seven psalms of penitence. It would be a small step to extend this palliative care from the deathbed to the infirmary, despite the paucity of prescriptions for the use of music there.

[46] Hildegard claims (*Vita*, quoted in *Holistic Healing* p. x) that she has had no formal training in music, and that she is not learned in the modes, though this is surprising coming from one who composed highly original chant.

[47] Thorndike, *ibid*., 719-741.

[48] Galen claimed to be able to distinguish at least twenty-seven varieties of pulse (see Nancy Siraisi, "The Music of Pulse in the Writings of Italian Academic Physicians of the Fourteenth and Fifteenth Centuries," *Speculum* 4 (1975), 689-710), although his Arab commentators only claimed to distinguish ten.

[49] The first public challenge to Galen's authority on this question came only in 1543, with Andreas Vesalius's *De Humani Corporis Fabrica*. Reaction to Vesalius was so critical that he was forced to abandon his research. William Harvey, considered the "father of the circulation of the blood", was able to promote his ideas successfully only three generations later, in 1628. Harvey was refuted by the Galenists of his day, notably Jean Riolan and James Primrose, but their hold on medical science was waning by that time.

[50] While potentially rich in implications, the arguments about the musical nature of pulse are among the most maddeningly circular in all of ancient and medieval physiology. Writers disagree, first of all, about whether the connections between 1) intensity and pitch, and 2) rapidity and motion vs. rest, are to be understood literally or metaphorically. On a quantitative level, more significantly, they do not agree on what constitutes a pulse beat, i.e., whether it is to measured from diastole to diastole, systole to systole, or yet from diastole to systole. They fail to agree, furthermore, whether diastole plus rest is equal to systole plus rest.

[51] Peter was educated at Bologna and taught medicine, philosophy and astrology at Paris for some years before taking an appointment at Padua in 1303, which he held until his death.

[52] It is significant that Peter, though an ardent champion of astrology, does not discuss music in connection with it, and we do not find in the *Conciliator* any argument which could be viewed as a precursor to Ramos.

[53] Siraisi, 1975, ibid., 960.

[54] It is possible that by "iambo-trochee" Peter is referring to the dactylic or anapestic modes, which John of Garland classified as modes 3 and 4, respectively. The dactylic mode consists of a long (three count) beat, followed by a single beat plus an "altered" short beat consisting of two counts; in the anapestic mode, the two halves are reversed. In modern notation, both are best adapted as a single measure in 6/8 time. Peter would then be making use of five of the six rhythmic modes, and the curious omission of modes 3 and 4 is resolved. As it is not reasonable to simply dismiss Peter as frivolous, this is a reading which makes sense out of the internally contradictory "iambo-trochaic" beat.

[55] Theodore Karp, "The Trouvere Manuscript Tradition," in Albert Mell, ed., *Twenty-fifth Anniversary Festschrift*, (New York: Queens College Press, 1964), 25-52.

[56] The motet stands out as a showcase of rhythmic modes, as the tenor is usually spondaic while the upper voices are written in one of the other five, the most frequent being the trochaic

and iambic modes. The motet's value as a pulse regulator, however, is questionable, as a given composition uses more than one mode and their effects would presumably cancel each other out. In addition, the logistical difficulties of assembling a two, three or four voice schola at a patient's bedside make the full motet an unlikely choice for music therapy. Nothing prevented the motet parts from being sounded consecutively, however, as the manuscript tradition of the genre suggests - see Wyndham Thomas, Robin and Marion Motets, (Devon: Antico Edition, 1985), Introduction. In any case, there is no dearth of monophonic mensural music in the late 13th century.

[57] Siraisi, *ibid*., 1975.

[58] Flatischler, Richard, "The Influence of Musical Rhythmicity in Internal Rhythmical Events," in Spintge and Droh, eds., *Music Medicine*, (St. Louis: MMBA Music, Inc., 1992), 241-248.

[59] Juliette Alvin, *Music Therapy*, (London: John Clare Books, 1975).

[60] Suzanne Hanser, "Music Therapy with Depressed Older Adults," in Spintge and Droh, eds., *ibid*., 222- 231.

[61] Alvin, *ibid*.

[62] Cheryl Maranto and Joseph Scartelli, "Music in the Treatment of Immune-Related Disorders," in Spintge and Droh, eds., *ibid*., 142-154.

[63] Tomlinson, *ibid*., 68.

[64] Alvin, *ibid*.