First Quarter Diary

I. Ancient Greek Music Theory

Although the sources for what we now call Greek music theory is sparse, with the earliest extant sources being pieces of works by Aristoxenus, the story begins with the Pythagoreans, starting in the 6th-century BCE. Mathiesen identifies three intellectual traditions of Greek music theory: the Pythagoreans, the Harmonicists, and the Aristoxenians. There is however, as Mathiesen argues, much overlap between these traditions, especially in the later Roman authors; in fact, many of the innovations of Aristoxenus seem to derive from the Harmonicists.

The Pythagorean tradition first appears in the Division of the Canon (often attributed to Euclid), and later in the works of Plato, Aristotle, Nicomachus, Thoen of Smyrna, Ptolemy, and Aristides Quintilianus. In general, the tradition was concerned with quantizing the elements of nature, arguing that the essence of nature lies in abstract truths that can be represented with numbers. Such idealism played heavily in the thinking of Plato, and would later influence the later neo-Platonists and Christians, as best exemplified by the worldview often described as the ‘harmony of the spheres’.

The Pythagoreans developed a mathematics to handle the ratios that resulted from the divisions of the monochord. The ratios involved were either multiple, superparticular, or superpartient, and these ratios could be added and subtracted simply by multiplication and division. Three types of ‘means’ were applied to ratios—arithmetic, harmonic, and geometric—

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1 Concerning the extant sources of ancient Greek music theory, see Thomas Mathiesen, “Greek Music Theory,” in CHWMT, 113.
2 Ibid., 109-35.
of which the first two were particularly important for generating intervals.\(^3\) A general predilection of low integers gave rise to a hierarchy of intervals, preferring intervals that could be produced by the *tetractys* of the decad.\(^4\) By combining these basic intervals, other intervals are generated; the whole step (9:8) is formed by two fifths, and the fourth is defined as two whole steps plus a *leimma*.

Aristotle’s student, Aristothenus, rejected the Pythagoreans’ approach and proposed instead a science of music based on an empirical phenomenology, for which he developed a terminology and system of categories to accurately describe the nature of music. Aristothenus was the son of a musician, and it is probable that much of his system is borrowed from a pre-existing music performance culture and from those that he calls the Harmonicists. Aristothenus argued, however, that the Harmonicists had come short in their investigation, and that they discussed music “without giving explanations or demonstrations, and without even properly enumerating the perceptual data.”\(^5\) Nevertheless, the *tonoi* (*harmoniai*) and the Greater and Lesser Perfect System seem to come from the Harmonist tradition.

Aristothenus defined seven categories for the study of harmonics: genera, intervals, notes, *systemata* (built from intervals and notes), *tonoi*, modulation, and melodic composition. He classified the genera (tetrachords) into three main archetypes—diatonic, chromatic, and enharmonic—each built on the fourth with the outer two notes being fixed. Tetrachords of the same type were joined together to form a larger system, but since there was the option of having a conjunct or disjunct connection at the *mese* (adding a whole tone or not) there were two systems, the GPS and the LPS.

\(^3\) Under the arithmetic mean the octave is divided at the fifth (12:9:6), and under the harmonic mean the octave is divided at the fourth (12:8:6).
\(^4\) The numbers 1 through 4, whose sum is equal to 10. The intervals are the fourth, the fifth, the octave, the twelfth and the double octave.
\(^5\) Aristothenus, *The Elementa Harmonica*, 149.
The Latin and Greek writers in the first centuries of the common era continued both the Pythagorean and Aristoxenian traditions, mixing them and creating a hybrid of the two. Ptolemy and Gaudentius, for example, both extended the number of genera, and applied Pythagorean mathematics to derive them.

II. The Transmission of Greek Theory into the Middle Ages

With the Roman authors music scholastics was placed alongside a handful of other fields, forming a body of knowledge that any elite citizen should know. The liberal arts, as they were called, was first signaled by Cicero (1st-cent. BCE), and continued all the way into the Middle Ages. Varro, writing in the same century as Cicero, placed music as one of nine liberal arts. Later Martianus of Capella, writing in the 5th-century CE, lowered the number to seven, where it would stay for quite some time.

The originators of the liberal arts had intended the body of knowledge to be studied by elites, but after a wave of Christian humanism, starting with Augustine and his conversion to Christianity in 387, the liberal arts became a means for the common man to connect with heavenly knowledge. In *The Marriage of Philology and Mercury*, Martianus recounts the story of the marriage as to symbolize the union of human and godly intellect. The Roman rhetorical tradition thus transformed into a scholastic field to be studied by any follower of God. With such a position, music theory was able to find its way into the monasteries when the Roman empire finally collapsed, despite its separation from a strong performance tradition.

After the collapse of the empire, there was an enormous need for compiling the works of the ancients. Perhaps the most important of such compilers was Boethius (c. 480-525/6), whose

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6 Much of the present discussion comes from Calvin Bower, “The transmission of ancient music theory into the Middle Ages,” in CHWMT, 136-67.

7 For a full diagram on the place of *musica* in the liberal arts, see Bower, 139.
goal was to translate all of the main Greek writers into Latin. Boethius continued the seven liberal arts, but made a division between the *quadrivium* and the *trivium*, holding the former in higher regard, and attempted to write whole treatises on the four fields of the *quadrivium*, of which his treatise on music would become one of the most copied texts well into the Middle Ages. Boethius made the distinction between *musica mundane* (cosmos), *musica humana* (soul), and *musica instrumentalis* (earthly music), thus giving special priority to the abstract study of music without necessarily taking into consideration music as performed. *Musica* as such was more of a science than as an art, and Boethius thus regarded the adjudicator of music (*musicus*) as superior to performers and poets (composers).

Boethius carried both the Pythogorean tradition (the monochord and its divisions) and the Aristoxenian tradition (the tetrachord and the GPS/LPS) into the Middle Ages. However, it was only the diatonic genus that survived.

Two other important compilers of knowledge after the fall of the empire are Cassiodorus (c. 485-580) and Isidore of Seville (c. 570-636), both of whom wrote encyclopedic works that covered a variety of topics. Cassiodorus intended to build a Christian university in Rome, but was unable, and instead built a monastery in southern Italy. The second volume of his *Introduction to Divine and Human Readings* focused on secular learning. Isidore, a bishop in the land of the Visigoths, wrote on numerous topics in his *Etymologies*, attempting to bring learning to his rather unruly civilization. Both writers were influenced by the Augustinian doctrine, and both were sympathetic to the singing of psalms. Their work addresses both singing and *musica*, thus beginning the long journey of integrating the singing tradition with ancient Greek theory.
III. The Mediation of Greek Theory and the Singing Tradition

By the turn of the ninth century, with Charlemagne’s coronation, the Holy Roman Empire had unified Europe. Clergymen, such as the Englishman Alcuin and Theodulf of Orléans (d. 821), disseminated many manuscripts to remote lands, including manuscripts of Martianus and Boethius. However, at some unknown point before the ninth century, the Byzantine singing tradition passed westwards to western Europe, bringing along with it the *oktoechos*, the system of 8 modes based on four pitches, each with an authentic and plagal variety. The four pitches (today’s D-G) form a tetrachord with the pattern ‘t-s-t’, unlike the ‘t-t-s’ of the ancient Greeks, thus standing markedly against ancient Greek theory. In fact it was at this time that the term *tonus* used to describe the 8 modes started to cause so much confusion, as it began to react with Boethius.

Along with the rise of the Carolingians in the late 8th-century strong centers of learning arose where ancient Greek theory could be addressed and synthesized into modern practice. Tonaries were the backbone of the singing tradition—e.g. the St.-Riquier Tonary (c. 800) and the Carolingian Tonary of Metz (c. 825-55)—and much of the research involved classifying and categorizing chant. For this, both the new 8 modes and Greek theory (according to Boethius) were applied. However, new trends of analysis were sprouting along with the singing tradition, trends that involved more rhetoric than Boethian theory. Aurelian of Réome and Regino of Prüm are associated with this time. In *Musica disciplina*, Aurelian borrowed somewhat from

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8 For the ancient Greeks, the tetrachord was built downwards. However, since the tetrachord of the *oktoechos* is symmetrical, it becomes difficult to see precisely when the switch from building downwards to upwards takes place.

9 For a full discussion on the confusion involving *tonus*, see David Cohen, “Notes, scales, and modes in the earlier Middle Ages,” in CHWMT, 312-3.
Boethius, like the notion that the *musicus* was superior to the *cantor*, but he did not include the monochord or ratios. Rather he used a qualitative language derived from grammar, like the different accents (acute, grave, circumflex).

The *Enchiriadis* tradition (late 9th-cent.) attempted more fully to negotiate the work of Boethius and the singing tradition, including the *oktoechos*. The *Enchiriadis* manuscripts describe a system built by disjunctly adjoined Byzantine tetrachords, naming them *graves*, *finales* (tetrachord of finals), *superiores*, and *excellentes*. The periodicity of the fifth was highlighted, and a Daseian notation was used to show this (also to be found in Hucbald). The octave was also recognized, but was considered as sounding equal (*acquisonae*) rather than just well together (*consonae*). The octave thus underwent a *mutatio mirabilis*, correcting itself against the fifth-based system.

Hucbald, associated with the Saint-Amand monastery around the turn of the 10th-century, also used the four *Enchiradis* tetrachords, but added the *synemmenon*. However, the range of Hucbald’s system spanned from A to aa, now with four tetrachords connected conjunct-disjunct-conjunct. Hucbald’s system instead highlighted octave periodicity. But like the *Enchiradis* manuscripts, Hucbald did not use the monochord or ratios, but taught with chant, using musical examples in a Daseian notation. Furthermore, Hucbald used a diagram representing strings to illustrate pitch motion, as well as letters, as did Boethius, although it was still a proto-notation used as an illustration. Hucbald also recognized finals—again, like *Musica*

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10 The term *cantor* was not used by Boethius.
11 It seems that the use of grammar may have had an effect on the conception of musical space, moving towards the modern notion of high and low. See Cohen, p. 325-6.
12 For a full diagram, see Cohen, p. 320. Cohen also shows the similarity between Hucbald’s system and a reconstructed Byzantine tetrachordal scale, as well as a similar ‘Spanish’ scale. Also, Hucbald used the greek note names, with A being the *proslambanomenos*. 
Enchiriadis—but added the notion of affinities (socialitas), which would play a larger role with Guido d’Arezzo.

Around the same time as Hucbald, three anonymous authors wrote Alia Musica. The first of the authors attempted to define the 8 modes using mathematical means. The second author resurrected the octave species from Boethius, and applied them to the 8 modes, importing also the ethnic names. It is here that the tonus/modus/tropus terminology of Boethius (used to describe the tonoi) caused confusion, as the author associated Boethius’s modi/toni with the 8 modes (chant ‘tones’), and thought that Boethius’s modes were equivalent to the octave species. The confusion resulted in a reversal of the ethnic names. All eight of Boethius’s modes were kept, including the overlap, which now laid on A and a. The third author reordered the modes, alternating between authentic and plagal, as to better align them with the oktoechos-based system, now with the fourth octave species assigned to both modes 1 and 8.

Later, in the 11th and 12th centuries, there was a South German tradition that continued and extended the tradition as hereto described, including the writers Berno of Richau, Hermanus Contractus, Wilhelmus of Hirsau, and Theogerus of Metz. Their work lead to what would become known as the modal system, still working however with the Enchiriadis tetrachord. They catalogued the species of the fourth (3) and fifth (4), which together built “modal octaves”, either authentic or plagal.

IV. The Italian Tradition

The impact of the Italian tradition of the 11th- and 12th-centuries is rather extraordinary, that in one swift blow would forever change the history of music theory. It points back to two particular writers: pseudo-Odo, and Guido d’Arezzo. Both the Dialogus de musica and Guido’s

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13 I am following Chailley’s division of Alia Musica into three authors. See Cohen, p. 331-8.
14 For a diagram of the species, see Cohen, 352.
Micrologus start with the monochord, showing a new pedagogical trend to develop a system that maximized the acquisition of singing and composition skills. And like Hucbald, both authors stressed octave equivalence. In the Dialogus, by which Guido was influenced, pitch space was defined from G-aa, now named with the letters that we use today, though including hard b and soft b. Guido extended the range to dd and added the names graves and acutae for the two bottom octaves, and superacutae for the upper fifth.

Guido expanded the tetrachord to the hexachord, of which there are only three types: soft, hard, and natural. The system then was made up of 7 overlapping hexachords. By using the hymn Ut queant laxis as a mnemonic device, each position in the hexachord was given a name: Ut, re, mi, fa, sol, la.\textsuperscript{15} The singer could then sing from one hexachord to the next via a mutation, occurring at some locus, or pivot point. Between these hexachords, Guido recognized affinities, that is, analogous members of different hexachords related by fifths. These pairs of pitches shared a similar surrounding interval pattern above and below.\textsuperscript{16}

Guido is also credited for being the first to advance a notation system that used both lines and spaces. Guido used this notation in Prologue to an Antiphoner, including also the letters C and F before the staff, in yellow and red.\textsuperscript{17}

V. The Rise of Polyphony – Organum and Discantus

The first discussions on polyphony are found in the Enchiriadis manuscripts, where it describes the singing of symphoniae at the 4th, the 5th, and/or the octave to create organum.

\textsuperscript{15} Syllables like Nomanoane and Noeagis had been used before, derived from the Byzantine singing tradition.
\textsuperscript{16} G has no affinities. For Guido’s explanation, see Guido, 63-5.
\textsuperscript{17} See Cohen, 345.
However, since the ME scale was fifth-based, there were inherent problems when singing the organal voice a 4th above the cantus.\(^{18}\)

In *Micrologus* Guido discussed the convergence to the final (*occursus*), adding more detail to what already had been recognized by Hucbald and the *Enchiriadiis* tradition, and gave examples that show how voices approach to the unison. Also in *Micrologus* Guido describes two practices of polyphonic singing, strict (*durus*) and flexible (*mollis*), the former adhering to parallel motion, and the latter more freely woven.\(^{19}\) The strict fashion of singing was more for the amateur and less artful than the freer style. After Guido, in the 12th and 13th centuries, there were really two traditions living side by side, an *organum* tradition and a *discantus* tradition. The latter used less parallel motion, allowing for more independence in the second voice. The Englishman Anonymous IV made the distinction between *plani* discantors and true discantors, being discantors in the old and new styles, respectively.

Progress was made in the 13th century towards a classification of the interval types used in polyphonic music. John of Garland is significant here for his development of a hierarchy of concords and discords, separating among perfect, medial, and imperfect types. Also in the 13th-century, there was a massive undertaking towards a theory of mensuration. Thus moving into the 14th-century, all of the pieces were in place (notation, mensuration, modal system, etc.) for the development of a sophisticated *contrapunctus* tradition.

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\(^{18}\) In SE the organal voice at the fourth is said to follow its own ‘natural law’. See Sarah Fuller, “*Organum-discantus-contrapunctus* in the Middle Ages,” in CHWMT, 481.

\(^{19}\) *Micrologus*, 78.
Bibliography

Primary Sources


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