

**HISTORIC CASE STUDIES REFLECTING
SOURCES OF CHANGE IN THE THEORY OF
MUSICAL SCALES AND MODES IN THE WEST**

BY

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the degree of Doctor of Philosophy at the University of Cape
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Abstract

This thesis seeks to co-ordinate two approaches to the study of state and modernities in the Western tradition. First, through a selection of eleven case-studies, it traces the influence of state and change in that theory. The selection, ranging from
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Abstract

This thesis seeks to co-ordinate two approaches to the study of scale and mode theories in the Western tradition. First, through a selection of eleven case-studies, it isolates instances of significant change in that theory. The selection, ranging from ancient Greek to contemporary theories, is intended not only to cover a broad chronological sampling, but also to demonstrate different sorts of change—change as conscious synthesis of available materials, change as intensification, change as repristination, change as personal innovation.

Second, each case-study attempts to locate the theory dealt with (and the changes observed) within the context of broader currents of contemporaneous thought; to show the mutual influences operating between musical thought and other fields; and to suggest thereby the function and meaning of these divisions of tonal space in wider climates of thought and feeling.

Thus, the three chapters devoted to ancient Greek theory (1-3) place the various theorists dealt with against a background of expanding Greek mathematics, in particular the shift from arithmetical to geometrical approaches. The links with Greek religion and philosophy are also sifted, in a search for the likeliest determinants of theory. Additionally, though this is largely an “ideal” tradition, the relations between theory and practice are discussed.

Two chapters (4-5) deal with scale/mode theory in the early middle ages. In line with the more optimistic understandings of pre-1200 culture, the first argues for a demonstrable synthesis of theoretical ideas—closely conditioned by both liturgical practice and educational goals—in the most important Carolingian treatises, a synthesis that provided the framework for much later theorizing, both in content and style. The second chapter—chiefly by means of a collection of texts

(with translations)—investigates the centrality of musico-theoretical terminology in early medieval discourse, especially the question of musical “affects”.

Two chapters (6-7) are devoted to Renaissance themes. The first, in juxtaposing the figures of Franchino Gafori and Johannes Kepler, highlights two areas common to them: cosmic conceptions of music and the “doctrine” of proportions. The conclusions drawn are (i) that these otherwise distant figures stand together in the tradition of the “rational artist”; (ii) that their association in this chapter may stand as a symbol of the intimate relations between art and science in this period (approximately 1480-1620).

Chapter 7 considers the High Renaissance revival of modal theory against the background of the series of eruptions that commonly go by the names “Reformation” and “Counter-Reformation”. It is argued there that the 8- and 12-mode schemes were appropriated by a tradition (traced back to the early 1400s) of musical works being used as “emblems” of political, social or religious affiliation. The after-life of the modal schemes—they were a spent force in music by c.1630—is traced in other art forms.

Finally, four chapters (8-11) are devoted to the creative theorizing, both explicit and occult, of four modern composers—Debussy, Messiaen, Bartók and Xenakis. All four offer much material in the area of scale/mode innovation. The chapter on Debussy concentrates on his use of the whole-tone scale, in particular the evidences of its systematic application and the possibility of its functioning as a musical symbol.

Messiaen has installed “mode” as a central category in his musical thought. The lengthy case-study devoted to him endeavours to highlight both the expansion of the idea in the course of his career and the preservation of certain of its aspects through his various stylistic renewals. The definition of mode also involves a consideration of parametric analogies in his thought.

Bartók’s polymodal chromaticism is a widely-used analytical tool, but its relation to his unusual habits of notation has been largely ignored. By focussing on this problem, details omitted by Bartók from the general explanations of his chromatic technique can be fixed. Xenakis’s idea of “sieving” brings the thesis up to the present. In detailing his approach to the formalization of scale structures, his links with—and precedents in—modernist thought are clarified.

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List of Abbreviations

- CSM* *Corpus scriptorum de musica*. Rome: American Institute of Musicology, 1950-.
- CSS* Coussemaker, Edmond de. *Scriptorum de musica medii aevi novam seriem a Gerbertina alteram*. 4 vols. Paris, 1864-76; reprint edition, Hildesheim: Georg Olms, 1963.
- GR* *Graduale sacrosanctae Romanae ecclesiae de tempore et de sanctis*. Tournai: Desclée, 1938.
- GS* Gerbert, Martin. *Scriptores ecclesiastici de musica sacra potissimum*. 3 vols. St Blasien, 1784. Reprint edition, Milan, 1931.
- MGG* *Die Musik in Geschichte und Gegenwart*. Edited by Friedrich Blume. 17 vols. Kassel: Bärenreiter, 1949-86.
- MMA* Reese, Gustave. *Music in the Middle Ages*. London: Dent, 1941.
- MWC* Lang, Paul Henry. *Music in Western Civilization*. London: Dent, 1942.
- NOHM* *New Oxford History of Music*. Edited by Egon Wellesz and others. 10 vols. London: Oxford University Press, 1957-1982.
- NG* *The New Grove Dictionary of Music and Musicians*. Edited by Stanley Sadie. 20 vols. London: Macmillan, 1980.
- ODCC* *Oxford Dictionary of the Christian Church*. Edited by F. L. Cross. Oxford: Oxford University Press, 1974.
- PG* Migne, Jacques Paul. *Patrologiae cursus completus. Series Graeca*. 166 vols. Paris, 1857-66.
- PL* Migne, Jacques Paul. *Patrologiae cursus completus. Series Latina*. 221 vols. Paris, 1844-55.
- SSR* Strunk, Oliver. *Source Readings in Music History*. London: Faber and Faber, 1952.

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Introduction

What follows might best be described as a “polyphonic” thesis. Each chapter in it serves to introduce a distinct “voice”, but all are intended to cohere in a unified study. It uses different approaches to its material: some are analytical in a strictly musical way, others arise from a “history-of-ideas” perspective. It begins with scale and mode theories, and passes them through the prism of their historical contexts in an effort, not to read meanings into them, but to draw from them their functional richness—the richness that must often be forfeited in a purely musical history.

There are other reasons why this is not presented as a history of “the division of tonal space in the West”.¹ Such an account would require the collation of a multitude of sources scattered from one end of Europe to the other (and beyond); besides the sheer physical difficulty, the linguistic ability necessary for such a survey is a formidable obstacle. Still, this selection of case studies follows a broad chronological sweep in order that the chosen topics may in some sense be representative of the Western tradition.

Further criteria of selection must be addressed. The thesis forms itself into four main constellations of theories or theorists: ancient Greek, early medieval, Renaissance and modern. It might be thought that these choices are sanctioned merely by tradition (though it would be a young tradition that gave “early medieval” this sort of prominence), or promoted by the personal biases of the researcher. Without denying the influence of such factors, I would prefer to offer these constellations and their subdivisions as periods in which changes in theory are both demonstrable and indicative of wider re-orientations.

¹C. M. Atkinson, review of *Das Tonsystem der abendländischen Musik im frühen Mittelalter*, by M. Markovits, in *Journal of Music Theory* 23 (Spring 1979): 135.

The nature of change at both levels—the musico-theoretical and the broader intellectual and even social—is discussed in the course of each chapter. The sources of change in some cases are predisposing climates of opinion; elsewhere the contribution of an individual thinker has played a more definitive role. Accordingly, explication has sometimes invited greater attention to strictly technical considerations; but, as often, it has demanded an inter-disciplinary enquiry.

The field of ancient Greek music theory is a well-turned one. The connections between music and philosophy are familiar, but not without obscurities; the first three chapters endeavour to alleviate these by their emphasis on musical debts to an expanding Greek mathematics. In addition, they survey a threefold source (Pythagoras/Plato/the Peripatetics) on which later theorists would call, not only for discrete topics and titles, but also as a general authority and yardstick. Together with the age of the apostolic Church, the Greek flowering would provide that most potent generator of change in the Christian West: the periodic hunger for *renovatio*, renaissance.

Early medieval scale theory is one of the first of these attempts at repristination, though the model is ancient Rome and the borrowings are from Byzantium. In the realm of modal theory, it is habitually asserted that the tenth century witnessed a decisive misunderstanding of the Greek material then known to theorists;² the chapter on these early experiments seeks to establish how much of a misunderstanding that opinion may itself be.

The second of the medieval studies focusses on literary imagery and on iconography as they relate to the terms of medieval musical theory, and the modes in particular. The aspect of change, in the sense of alteration, is muted here; instead, the discussion takes up evidence of change as intensification and concentrates on the period c.1050 to c.1200. This is not to say that post-Carolingian culture was not innovative in comparison with the preceding era: indeed, the opposite appears to be the case.³ But the profound social changes that occurred around 1000 are inscribed in the monumental sculpture of the Languedoc and Burgundy abbeys, and in the heady culmination of long-standing

²Erwin Panofsky (*Renaissance and Renascences in Western Art*, 2d ed. [Uppsala: Almqvist and Wiksell, 1965], 52) deems it “a mistaken but fruitful theory of modes”; Reese (*MMA*, 155) calls it “another example . . . of the occasional fruitfulness of human error”.

³A searching re-appraisal of Carolingian periodization and its effects on historical thinking has recently appeared in the form of Richard E. Sullivan’s article “The Carolingian Age: Reflections on Its Place in the History of the Middle Ages”, *Speculum* 64 (April 1989): 267-306.

exegetical traditions. These attempts to express in art the ideas of a world system seem inevitably to lead back to social considerations.⁴

Changes rather than change—the play of conflicting forces rather than a single historical advance—underlie the chapters concerned with scale and modal theory in the Renaissance. The first adverts to cosmology, into which music was centrally drawn; it is an attempt to show how the near-obsession with world systems—whether as the outcome of idealistic impulses or of sheer uncertainty over the conditions of life—affected two musical thinkers as rationalists and religious men. The second is an examination of the role played by modal ideas amid the heated doctrinal broadsides of the sixteenth century. In fact, it amounts to the exploration of a curious paradox (the quickening of interest in the modes just as musical practice was emerging from their grip) and its somewhat strange corollary (the adoption of this once-influential musical idea in the “diaspora” of the sister arts).

The work of four composers—Debussy, Messiaen, Bartók and Xenakis—provides the focus for the study of modern thinking about scales and modes. Xenakis has claimed a line of intellectual descent from Debussy, through Messiaen, to himself; since he neglects Bartók’s contributions, these have been purposely included as part of the corrective process. For the thread that links these figures is rather the problematic aesthetic task of creating *de novo*, of fulfilling Ezra Pound’s famous exhortation to “make it new”. Change as pure innovation forces this section of the thesis to examine artistic products from the point of view of the individual composer (elusive as that can be), and then to search for plausible links in the background of his “times”.

Though Debussy was reticent on questions of theory, his use of the whole-tone scale—a possession of other composers as well—has given rise to theorizing that needs critical scrutiny and expansion (chap. 8). Bartók’s explanations of his own musical thought about scales and modes are not exhaustive, but they provide important clues which his works further unfold. The most useful commentaries are also incorporated. Messiaen and Xenakis are theorists in their own right, but of spectacularly different kinds. Where Messiaen has accepted diverse means to stimulate his creative vitality, Xenakis has stuck doggedly to a few key theories, invariably expounded in the clinical language of mathematics. Perhaps there is between them a common urge to frame in sound a transcendent or commanding

⁴One of the finest expositions of the fruit of this venture is Emile Mâle’s *Religious Art in France—The Twelfth Century: A Study in the Origins of Mediaeval Iconography*, Bollingen Series 90, no. 1 (Princeton: Princeton University Press, 1978).

vision; but it is worked out in a type of regardless counterpoint between teacher and pupil that highlights the special affinities and dissonances of our era.

Chapter I

Ancient Greek Theory I: Pythagoras and the Pythagoreans

The study of the history of music is a subject of great interest and importance. It is a subject which has attracted the attention of many of the greatest minds of our race. The history of music is a subject which has attracted the attention of many of the greatest minds of our race. The history of music is a subject which has attracted the attention of many of the greatest minds of our race.

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Chapter 1

Ancient Greek Theory I: Pythagoras and the Pythagoreans

That the saying “Sense is an uncertain guide: numbers cannot fail” is usually attributed to Pythagoras but not granted him without hesitation, is an indication of the scholarly debate about whether or not this remarkable man ever existed or not. Obviously our contemporary experience of schools of thought has not settled the question, though it is hard to imagine Freudian or Marxist schools without flesh-and-blood founders. Nor does the witness of the ancient historian Herodotus count decisively, though it is unequivocal:

For myself, I have been told by the Greeks who dwell beside the Hellespont and Pontus that this Salmoxis was a man who was once a slave in Samos, his master being Pythagoras son of Mnesarchus. . . . [B]ut I think that he lived many years before Pythagoras.¹

In the cases where scholars accept his historical existence, complains Howard Baker,² he has all too often been drawn as a shaman, cloaked in cultic mystery. While these sceptical approaches highlight vital questions—How did the Pythagorean school develop and diversify? How was Pythagoras understood by the ancient world? What sort of religious cult did he belong to?—yet it is possible, without stretching evidence or imagination, to see in Pythagoras a gifted but

¹[*Works*] 4.95, trans. A. D. Godley, Loeb Classical Library, 4 vols. (London: William Heinemann, 1921), 2:297.

²“Pray Thee, Who Was the Artificer? What the Fabric?”, *Michigan Quarterly Review* 14 (Summer 1975): 243-44.

normal human being who, as a mature person, left Miletus when the intellectual life there was threatened by war and sailed to the Greek settlements in southern Italy, finally settling in the city of Croton. The particular stimulation there centred on the medical training-school-cum-guild, which produced physicians whose place in society was a highly respected one. It is no wonder, then, that Apollo of Croton was above all the Healer, and that a first principle in Pythagorean doctrine was health.

This reconstruction can be taken further, to the founding of a community by Pythagoras devoted (in Baker's happy phrase) to the mathematical life, which involved not only mathematical thought but ethical precepts as well. If Lippmann's description is anything to go by,³ the Pythagorean brotherhood chose a life of abstinence, asceticism and speculative thought: "[T]heory was substituted for sonority [as a merely sensory or theurgic phenomenon]".⁴ Beyond this, the story is confused, dealing not with the man but with his school. This divided into at least two factions, and only one of these is reckoned as having survived under the name "Pythagorean". Some of their ideas are labelled "early thought", others are called "late" or "Platonic"; there seems little chance of isolating any unified body of teaching.⁵

However, there are two factors which serve as coordinates in establishing the setting of the Pythagorean scale. The first is Pythagoras's own background in Milesian natural philosophy and especially in the cosmology of Anaximander. Jaeger gives a succinct account of the latter,⁶ which may be further summarized: In Anaximander's eyes, the world is a symbolic (or, better, transposed) expression of the idea of proportion. Moving away from sense data as his reference point, he sees the universe as constructed on the basis of mathematical ratios. Sense data

³E. A. Lippmann, "The Sources and Development of the Ethical View of Music in Ancient Greece", *The Musical Quarterly* 49 (April 1963): 191-92.

⁴*Ibid.*, 191.

⁵Walter Burkert, in his compendious study *Lore and Science in Ancient Pythagoreanism*, trans. E. L. Minar, Jr, with revisions (Cambridge, Mass.: Harvard University Press, 1972), discards the "Pythagoras of tradition" precisely because "there is no single tradition" (10). He recommends instead the study of the strata and transformations within the differentiated traditions; for him, "the original phenomenon cannot be grasped directly" (11). Yet it appears that at least one of those traditions—the literary practice of "spiritual biography" (whose specialized study is called aretalogy)—has little difficulty in discerning the actual human presence within the aura of the preternatural in which it has been swathed; see Moses Hadas and Morton Smith, *Heroes and Gods: Spiritual Biographies in Antiquity*, Religious Perspectives 13 (New York: Harper and Row, 1965), 42-45, 47, 105-7.

⁶Werner Jaeger, *Paideia: The Ideals of Greek Culture*, 2d ed., trans. Gilbert Highet, 3 vols (New York: Oxford University Press, 1943-45), 1:156-61.

serve as a means by which intuitive thought perceives that in all things there is a foundation of the Infinite, the *apeiron*. Out of this come all things, and to it go all things; and this endless process has its own in-built morality. As Anaximander himself says,

It is necessary that things should pass away into that from which they are born. For things must pay one another the penalty and compensation for their injustice according to the ordinance of time.⁷

Modern science recognizes that nature is subject to universal laws, but perceives no morality in this fact; Anaximander's cosmology holds that the forces and oppositions of nature are subject to a moral law. Thus, for him, *kosmos* means not simply "an ordered universe" (which is amoral), but rather "a community of things under law".⁸ Likewise, cause or *aitia* means, not the mechanical reason or impulse behind an effect, but the demands of retribution. The terminology is actually borrowed from the field of law.⁹

The second factor may be gauged by a comparison of what we know about Pythagorean mathematics with later Greek scientific thinking, especially the musical theory of Aristoxenus. This comparison has been expertly done by Richard Crocker, whose work will be referred to at some length.¹⁰ But to answer first the vital question "In what terms was the Pythagorean scale conceived?", it is appropriate to quote a key sentence from Aristotle's *Metaphysics*, in his discussion of the ideas of the Pythagoreans:

Since it seemed clear that all other things [besides justice, soul, mind and opportunity, which could be represented analogically by numbers] have their whole nature modelled upon numbers, and that numbers are the ultimate things in the whole physical universe, they assumed the elements of numbers to be the elements of everything, and the whole universe to be a proportion [*harmonian*] or number.¹¹

Aristotle notes that this reduction of all things to numbers superseded the earlier practice of reducing them to expressions of fire, air, water or earth. The

⁷Ibid., 1:159.

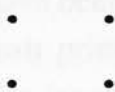
⁸Ibid., 1:160. The doxographical writings hold that Pythagoras invented the term, but this is unlikely, given the presence of such axiomatic ideas in Anaximander. See Burkert, 309-10.

⁹Jaeger notes that "[t]his transference of the concept of retribution from the legal and political sphere to that of the physical universe was not a single act of one philosopher, but was long basic in Greek thought on the problem of causality" (1:455, n.59).

¹⁰"Pythagorean Mathematics and Music", *Journal of Aesthetics and Art Criticism* 22 (Winter 1963): 189-98; (Spring 1964): 325-35.

¹¹*Metaphysics*, 985B-986A, in *The Metaphysics: Books 1-9*, trans. Hugh Tredennick, Loeb Classical Library (London: William Heinemann, 1933), 33.

strangeness of this earlier conception to the modern mind—it strikes us as wildly poetic, while it actually functioned scientifically, i.e. explanatorily—warns us that the use of the term “numbers” conceals a way of thinking different from ours. Indeed, the Pythagorean mind did conceive numbers differently, always representing them as points. For instance, four was indicated:



This figure was indivisible in its atoms or points, and it illustrates the first law of Pythagorean arithmetic: it knows only of integers (whole numbers). The next most simple operation was the generation of numbers in a series. For instance, the number three, arranged in a triangle,



could readily be extended:



Applying this to “square” or “oblong” numbers, we begin to see the fundamental place of ratio:

Figure A

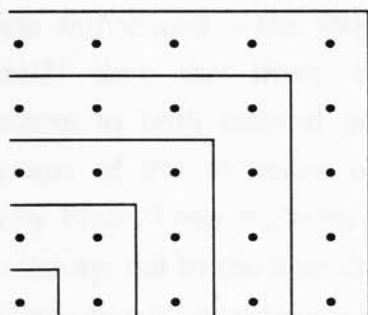


Figure B

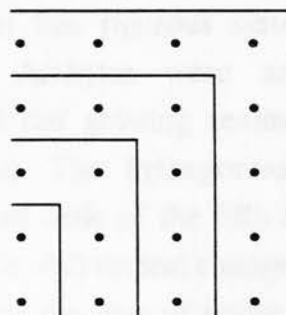


Figure A contains a square number within each division—1, 4, 9, 16, 25—whose ratio can be expressed 1:1, 2:2, 3:3, 4:4, 5:5. Figure B contains an

“oblong” number within each division, whose ratio can be expressed 1:2, 2:3, 3:4, 4:5. Integer arithmetic of this sort yielded six different types of ratio (first terms are respectively 1:1, 1:2, 2:3, 2:5, 3:5, 3:8) which were hierarchically evaluated. This affected what intervals in music the Pythagoreans could deal with: for example, our tempered scale of twelve equal semitones cannot be expressed in integer ratios and would therefore have been considered “irrational”. In terms of evaluation, Pythagorean thought dealt primarily with small-number ratios (1:2, 2:3, 3:4), in which lay the consonant intervals of octave, fifth and fourth; the tetrad became the limit of Pythagorean consonance.

Since intervals could thus be expressed as ratios, they could also be combined by arithmetical operations. The model combination was no doubt based on the equation fourth + fifth = octave, which is expressed as $3:4 + 2:3 = 2:3:4 = 1:2$. Another example, involving an extra step, is: fourth + tone = fifth, i.e. $3:4 + 8:9 = 6:8 + 8:9 = 6:8:9 = 2:3$. The task of combining intervals also comes into play in ascertaining the divisions within the fourth. 8:9 was taken as the basic measure, being a common occurrence in working with small-number ratios, e.g. the excess of two fifths over the octave, the excess of the octave over two fourths, and the difference between a fifth and a fourth. When this tone was projected into the fourth, it gave 2 tones and a small remainder, the *leimma*, thus:

$$\begin{array}{r}
 \text{tone} \quad \left[\begin{array}{cccc}
 8 & 64 & 192 & 3 \\
 9 & 8 & 72 & 216 \\
 & 9 & 81 & 243 \\
 & & 256 & 4
 \end{array} \right] \text{leimma}
 \end{array}$$

Thus was the groundwork laid for the Pythagorean scale—a scale built from ratios of whole numbers and partaking therefore of a very specific nature. Later Pythagoreans introduced some changes within this rigorous system. Crocker demonstrates¹² that the three means of Archytas were an important accommodation to both musical practice and the growing realisation among mathematicians of the existence of irrationals. The Pythagorean scale, first mentioned by Plato,¹³ was probably the standard scale of the fifth century B.C., certainly in theory; but by the time of Archytas (c.400) radical changes were being introduced into music, especially with regard to the size of scalar intervals. In response to this, Archytas formulated an alternative way of dividing the fourth.

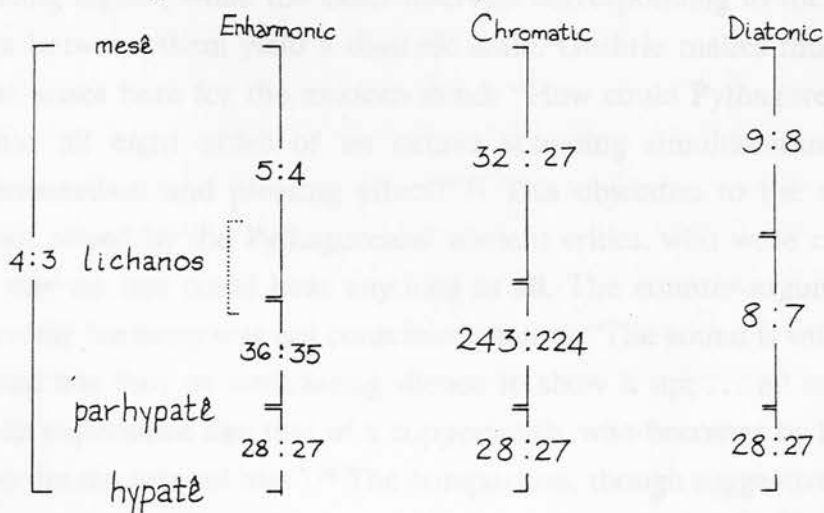
¹²“Pythagorean Mathematics”, 326-29, 332-33.

¹³*Timaeus* 36B.

His method seems to have sprung from a concern with the practicalities of music and the unmusical effects of earlier arithmetic, especially the arithmetic mean as a way of dividing intervals. The tone 8:9, when treated in this way, yields 16:17:18; but these two hemitones¹⁴ are of unequal size—16:17 and 17:18—and (what is worse) the larger is above the smaller. The “unharmonious” effect of this is perhaps better illustrated by the arithmetic mean of the octave, i.e. 2:3:4. The placing of the fifth on top of the fourth evidently did not satisfy the ear and led Archytas to produce another type of mean, which kept the epimore ratios but inverted the order of the intervals. Crocker argues convincingly, with due respect to the changing meaning of *harmonia* in Greek music, that this new type of mean was called “harmonic” for the simple reason that it related three different pitches in the most harmonious way. “In applying the subcontrary mean to musical intervals and calling it the harmonic mean, the Pythagorean theorist was clearly seeking a basis for rightness, true proportions in the arrangement of musical sounds.”¹⁵

In his innovation of the three *genera*, Archytas was struggling to combine the Pythagorean theorems and operations with contemporary practice; this may be read in the clever but arithmetically awkward plan of ratios he formulated.

Figure 1-1 Ratios of Archytas's *Genera*



His three *genera* are obviously intended to be a set, for they share a common bottom interval which is a simplified version of the older *leimma*. This is the interval between *parhypatê* and *hypatê*. The intervals *lichanos* to *parhypatê*

¹⁴The term “hemitone”, while literally meaning “half a tone”, may at least serve to remind us that the semitones involved are not the same as ours.

¹⁵“Pythagorean Mathematics”, 329.

and *mesê* to *lichanos* undergo size changes in the three *genera*, but since the positions of *mesê* (boundary note), *parhypatê* and *hypatê* all are fixed, it is clear that only *lichanos* (“forefinger”) changes its place. This is probably the explanation for its striking etymology: the forefinger, sliding up or down the string, changed both pitch and *genus*. The crucial point in all this, however, is that although these divisions of the fourth (and, hence, the scale) are increasingly remote from the earlier Pythagorean model, they can still be expressed in ratios: by using the harmonic mean, the sounds of which the ear approves can still be explained.

The doctrine of the music of the spheres fits snugly into the beliefs of Pythagoreans about the numerical character of the universe and its application to music theory. The correspondence between scale and heavenly bodies hinges, as we might expect, on ratios—in the latter case, the ratios of the distances between the planets. The commentary by Alexander of Aphrodisias (fl. c.200 A.D.) on the passage from Aristotle’s *Metaphysics* quoted above reports the claim of the Pythagoreans “that the whole universe is constructed in accordance with a certain harmony . . . because it consists of numbers and is constructed in accordance with number and harmony”.¹⁶ The phenomenon of musical sound is explained by the varying speeds of the heavenly bodies, the slower producing lower sounds, the faster producing higher, while the exact intervals corresponding to the ratios of the distances between them yield a diatonic scale. Guthrie makes much of the problem that arises here for the modern mind: “How could Pythagoreans have supposed that all eight notes of an octave sounding simultaneously would produce a concordant and pleasing effect?”¹⁷ This objection to the combined sound was not raised by the Pythagoreans’ ancient critics, who were concerned rather with why no one could hear anything at all. The counter-argument held that this heavenly harmony was not consciously heard: “The sound is with us right from birth and has thus no contrasting silence to show it up; . . . all mankind is undergoing an experience like that of a coppersmith, who becomes by long habit indifferent to the din around him”.¹⁸ The comparison, though suggestive, is really a weak one: a coppersmith could always choose to listen to the din if he wished.

¹⁶Translated in *The Works of Aristotle*, ed. Sir David Ross, 12 vols. (Oxford: Clarendon Press, 1928-52), 12:143.

¹⁷W. C. K. Guthrie, *A History of Greek Philosophy*, 5 vols. (Cambridge: Cambridge University Press, 1962-78), 1:298.

¹⁸Aristotle, *On the Heavens [De caelo]* 290B, trans. W. C. K. Guthrie, Loeb Classical Library (London: William Heinemann, 1939), 193-94.

The problem as it posed itself to the ancient mind was simply that mankind could not hear the sound, yet Pythagoras reputedly could. In panegyric accounts of Pythagoras's life such as that of Porphyry, the cult leader's ability to hear the "harmony of all things" was attributed to his singular moral nature, an explanation that effectively precluded further argument.¹⁹

Consideration ought to be given to the question whether Pythagoras came to his "discovery" by means of a scale already in use. The positive evidence for this is nil. Instead, scholars have attempted a reconstruction that follows this general pattern: A scale covering an octave and possibly including the intervals of fourth and fifth was in use and gave Pythagoras a framework for his arithmetic. He discovered by experiment (possibly using a monochord) that there was a ratio sequence (1:2, 2:3, 3:4) in these basic delineations which could be used to determine the intermediate intervals as well, at least in theory. The model of the scale was linked to the universe as a microcosm is to a macrocosm, through ratios which corresponded in a miraculous way. This contains many unproved (and probably unprovable) assumptions, but this style of thinking is exhibited in the Philolaus fragments in which the five "stuff elements" make a proportion of 1:2 with the ten "world elements". This *harmonia* encompasses the other ratios. Likewise the proportion in man of "stuff elements" to "world elements" is 4:8 or 1:2.²⁰

This linking of macro- and microcosmic levels is crucial if we are to settle on a positive Pythagorean concept of the scale. The usual questions of chronology—Which came first, scale or planetary model?—probably cannot be settled, though I favour the scale-pattern being first formulated and then fitted to astronomical data, because of the Pythagoreans' belief in number and *kosmos*.²¹ A comparison might be ventured between this and metaphor: this literary device links two discrete objects by referring to some quality which transcends them both, but in which both share.²² In this case, that quality is *harmonia*. I find this

¹⁹Porphyry, *The Life of Pythagoras*, 30, trans. Morton Smith in *Heroes and Gods*, 117 (see n.5).

²⁰F. M. Cleve, *The Giants of Pre-Socratic Philosophy: An Attempt to Reconstruct Their Thoughts*. 2d edition, 2 vols (The Hague: Martinus Nijhoff, 1969), 2:478.

²¹This is also Aristotle's view (*Metaphysics* 986A); he accuses the Pythagoreans of ransacking number theory for "facts" that could be projected onto the heavens, e.g. the number of moving celestial bodies.

²²For a slightly more elaborate account of metaphorical function, see 120.

idea interestingly corroborated in Flora Levin's monograph,²³ though her emphasis on its poetic quality is unfortunate, since it diverts attention from the primacy of the mathematical turn of mind. Cicero remarked that, through the doctrine of musical spheres, "learned men . . . have gained for themselves a return to this region", i.e. to the divine.²⁴ Perhaps it can be differently stated: the correspondence of models (scale and heavens) is an expression of the status of Number as divine. In this sense, it is the divine that "gains for itself a return" into the created world and can be perceived and recognized by humans in the ratios of the scale. It is not going beyond our evidence to regard the complex of scale ratios as a religious symbol within the Pythagorean world-view.

Since scientific and religious thought have become such antipathetic fields in contemporary thought, it is necessary to note that in early Greek philosophy they were considerably overlapped.²⁵ Besides the divine and naturalistic elements among the *theologoi*,²⁶ Greek medical thinking showed a tolerance of traditional beliefs, such as the therapeutic powers of amulets, spells, prayers and music. Since Pythagoras was credited with expertise in the last of these,²⁷ he (or his teachings) must have held a place in the state religion that incorporated various forms of treatment (herbs, drugs; surgeon-barbers, gymnastic teachers, midwives; temple medicine). On the matter of research into acoustics, Lloyd makes the point that the accounts of the famous hammer experiments²⁸ expressly mention varying the conditions of the test—an empirical concern that is curiously contradicted by the "results".²⁹ Still, while the experiment with hammers may be

²³F. R. Levin, *The Harmonics of Nicomachus and the Pythagorean Tradition*, American Classical Studies 1 (New York: American Philological Association, 1975), 4-5.

²⁴*De re publica* 6.18.18-19, trans. C. W. Keyes, Loeb Classical Library (London: William Heinemann, 1928), 273.

²⁵See, besides Burkert, G. E. R. Lloyd, *Magic, Reason and Experience: Studies in the Origin and Development of Greek Science* (Cambridge: Cambridge University Press, 1979).

²⁶Aristotle's term for the Milesian natural philosophers, with whom he groups Pherecydes, Epimenides and Alcman.

²⁷Porphyry, *Vita Pythagoricae* 33, recounts that Pythagoras

had songs that were remedial even for bodily illnesses and that raised the sick from their beds when he sang them. And he had others that produced forgetfulness of sorrow and mollified anger and destroyed untoward desires.
(Trans. Lloyd, 42, n.173)

For other reflections of this common belief, see Ps-Plutarch, *De musica* 1146B-C; Athenaeus 14.624A-B.

²⁸See below, 16, and Appendix 1.

²⁹*Magic, Reason and Experience*, 144, n.95.

awry, those with lengths of pipe or the monochord are pertinent to deductive reasoning. The problem remains one of determining not whether scientific thought was present in Pythagoreanism, but to what extent it served the function of mere corroboration.

Whether or not a similar eight-note scale existed apart from the theorizing described above—Nicomachus insists that Pythagoras was responsible for introducing an eight-note octave on the familiar seven-stringed lyre³⁰—there is much evidence pointing to the fact that the more detailed aspects of Pythagorean theory were by no means original with Pythagoras (or the group he represents), but that the proportions, the ethos and number theories and the doctrine of the spheres, far from being ancient Greek inventions, were bequeathed by the ancient Near East.

If we accept the testimony of Pythagoras's biographers, as well as the less partisan comments of Plato, Herodotus, Diodorus Siculus and Plutarch,³¹ we are forced to consider at least three possible sources for these borrowings: Egypt, Babylon (Plutarch prefers the term "Chaldaea" which evidently refers to Assyria and Babylonia) and Persia. In addition, Werner has pinpointed what he considers to be Hittite influences,³² and behind Persia stands India whose possible influence also cannot be ruled out.³³ Such speculation leads inevitably to Greek Orphism (an import from Thrace), with which Aristoxenus was eager to associate Pythagoras, very probably to counter the notion of debts to foreigners; but the claim may have more solid foundations. The result of such "open-mindedness" has led a modern biographer of Pythagoras, Peter Gorman,³⁴ to depict him in part as a kind of philosophical rag-and-bone man, who initiated himself into a bewildering array of Mediterranean cults and appropriated from them whatever

³⁰*Enchiridion harmonices* 3; see Burkert 391-94.

³¹The debts of Greece to Egypt and the Near East are argued in various contexts, e.g. Herodotus 2.48-49 (worship of Dionysus), 2.50 (names of the gods), 2.123 (transmigration of souls), 2.44 (worship of Heracles—in Phoenicia as well); Diodorus Siculus 1.81 (Egyptian education in "geometry", arithmetic, astronomical observation), 1.98 (method of sculpture using proportions), 1.69 and 1.98 (Pythagoras' visit and absorption of teachings). This last is mentioned also by Plutarch, *De Iside et Osiride*, 354E. Plato draws attention to the great antiquity of Egyptian tradition (*Timaeus* 21-25) and lauds the Egyptians of his own day for their high educational aims in the arts of sculpture and music as well as their elementary schooling in arithmetic (*Laws* 656-67, 819).

³²E. Werner, "The Oldest Sources of Octave and Octoechos", *Acta Musicologica*, 20 (1948): 2.

³³The classic study is Leopold von Schroeder's *Pythagoras und die Inder* (Leipzig, 1884).

³⁴*Pythagoras: A Life* (London: Routledge and Kegan Paul, 1979).

practices, sayings or concepts fitted the philosophic vision he was constructing, without himself “going native”, or, as Gorman puts it, “without [his] becoming religious in an oriental sense”.³⁵ Gorman insists, too, on the man’s individual genius; this is perhaps lent some support by Rudolph Anthes’s insistence that, whatever similarities of detail there may be between Egyptian and Pythagorean thought, they are still essentially distinct ways of thinking.³⁶ On this view, the Pythagorean genius lay precisely in the ability to create an understanding of the universe that was both rational and poetic, using in the process the most varied myths and methods the ancient world had to offer. Two fragments by Heraclitus, a contemporary, may well be an attack on this eclectic manner:

Much learning does not teach understanding; if it did, it would have taught Hesiod and Pythagoras.³⁷

Pythagoras, son of Mnesarchus, of all men practised inquiry the most, and making a selection he composed as his own a system of “wisdom”, a collection of much knowledge, a low deception.³⁸

The notion that Greece owed a good deal to the Semitic Orient is one that has been imperfectly explored by music historians and positively opposed by certain classical scholars, even though the ancients themselves were forever pointing out that Greek music and religion were nurtured in the Chaldaean empire. A crusading spirit in this matter has been H. G. Farmer whose researches³⁹ form the basis for the following explorations of the Pythagorean debt to Mesopotamia. We also pay heed to the rather more confident assertions of E. Werner in this matter,⁴⁰ whose articles were being published at about the same time as Kurt Sachs’s famous book *The Rise of Music in the Ancient World: East and West*.⁴¹ Anyone viewing the evidence in these works in the fields of art, philosophy, language and mathematics cannot fail to see startling connections among the cultures of the Eastern Mediterranean and the west of Asia Minor.

³⁵Ibid., 67.

³⁶“Affinity and Difference between Egyptian and Greek Sculpture and Thought in the Seventh and Sixth Centuries B.C.”, *Proceedings of the American Philosophical Society* 107 (1963): 60-81.

³⁷Fragment 40, quoted in E. Hussey, *The Pre-Socratics* (London: Duckworth, 1972), 63.

³⁸Fragment 129, *ibid.*

³⁹“The Music of Ancient Mesopotamia”, *NOHM* 1:235-53.

⁴⁰“The Oldest Sources”. This article (see n.32 above) is condensed from a longer version, “The Origin of the Eight Modes of Music (Octoechos)”, *Hebrew Union College Annual* 21 (1948), 211-55.

⁴¹New York: Norton, 1943.

However, the concept of an “orientalizing period” in Greece (about 750 to 650 B.C.) is a rough one that needs careful refining.

That there was an important overall influence on Greek culture from the Middle Near East and Phoenicia during the period 750 to 650 is plain to see. Semitic loan words, mainly those connected with material culture (trade, sailing, clothing) suddenly appeared; vase design in Greece was markedly influenced by Eastern naturalism. Literacy and the Greek alphabet made sudden strides and religious myths also made the journey westwards, e.g. the Adonis cult which was transmitted from Byblos to Greece.⁴² Not only were these trends the results of Phoenician sea power in the eastern Mediterranean, but they were also the perhaps inadvertent outcome of Greek colonisation (734-c.580), starting in southern Italy and finally extending to the north Aegean coasts of Macedon and Thrace, the entrance to the Black Sea and Cyrene in North Africa. Adding some credence to the tradition of Pythagoras’s alleged visit to Egypt are the close links that were forged between the Egyptian ruler Amasis (reigned 570-26) and Polycrates of Samos who supplied him with military aid. Amasis established Naucratis, a factory city west of the Nile delta, for the Greek arrivals.⁴³ The fact that Egypt fell to Persia in 525 is the main historical argument in favour of Pythagoras’s reputed journey from Egypt to Babylon, possibly as a slave.⁴⁴ It may also explain the presence of a Persian-type dualism in his thought. Iamblichus alone mentions a journey through the Levant en route to Egypt.⁴⁵ If it ever took place—and there seems no reason why this should be any more or less credible than the accounts of his other journeys—it was in all likelihood made in the face of a Persian advance that caught up with him in Diopolis.

The first “borrowing” by the Pythagoreans that merits consideration is the oft-repeated tale of the discovery of the link between musical consonances and the relative weights of the hammers in a smithy. It is recorded as a moment of profound revelation for Pythagoras who verified that the weights of the four hammers could be represented by the numbers 6, 8, 9 and 12.⁴⁶ Every possible

⁴²See Oswyn Murray, *Early Greece* (Brighton, Sussex: Harvester Press, 1980), chap. 6.

⁴³For details, see M. M. Austin, *Greece and Egypt in the Archaic Age*, Supplement to *Proceedings of the Cambridge Philological Society*, vol. 2 (1970), 22-33.

⁴⁴Gorman, 48-49.

⁴⁵*Ibid.*, 51.

⁴⁶The tradition, beginning with Nicomachus (*Enchiridion harmonices* 6), may be followed in Iamblichus (*De vita Pythagorica* 26.115-21), Gaudentius (*Harmonica introductio* 11), Macrobius (*Commentary on the Dream of Scipio* 2.1.9-12) and Boethius (*De institutione musica* 1. 10).

objection to this has been raised, from the contention that the differences in tone would be caused rather by the differences in the anvils than the hammers to the equally well-founded point that such a set of weights, when attached to identical strings (as in the experiment Pythagoras is supposed to have conducted to corroborate his findings) would not yield perfect consonances. The pitch in fact varies according to the square root of the weight.⁴⁷ The only workable form this “proportional music” could have taken was string lengths on a monochord—the instrument traditionally associated with Pythagoras. Because of these discrepancies, the scene in the smithy has been adjudged folkloric, and the roots of musical proportion thus shrouded in the mists of legend.

But, claims Werner,⁴⁸ this legend may be of importance, since, according to him, it can be traced back to the Hittite empire at its height in the thirteenth century, the time of the reign of Rameses II in Egypt, and of the worship of the fertility goddess Kumbaba. Later known as Cybele, she had in her service *daktyloi* (“dwarfs”, as Werner calls them):⁴⁹

These gnomes discovered in the rhythms of their hammers and in the different tone of their anvils the essence of music, namely the mathematical basis of rhythm and tone.⁵⁰

Werner appears to have followed Jacob Grimm⁵¹ in the identification of the Idaean Dactyls with the troll-like figures of German, Danish and Icelandic folklore. There are certainly suggestive connections between them, but the argument is ultimately a difficult one to sustain.⁵² This having been said, there remains a distinct possibility of Phrygian influences on early Pythagoreanism. For instance, one of the titles allegedly given Pythagoras was Hyperborean Apollo, which means “Apollo of the Northern People”. There is a close connection

⁴⁷Burkert, 376, n.24.

⁴⁸“The Oldest Sources”, 2.

⁴⁹Ibid.

⁵⁰Ibid.

⁵¹*Teutonic Mythology*, 4th ed., trans. J. S. Stallybrass, 4 vols. (London: George Bell, 1883), 2:447.

⁵²The dwarfs of Teutonic legend are often smiths, living and working in caves. Their size varies from that of a four-year-old child to that of a span or thumb; hence, “Däumling” (Grimm 449-52). The Dactyls of Mount Ida were also famed in Greece as the first workers of metal. Why they were called *daktyloi* (“fingers”) is the question. Strabo surmises that they were so named because they lived at the extremity of the mountain (*Geography* 10.3.22; he is undecided whether at the top or the bottom); he also mentions a work of Sophocles (now lost) in which their name is attributed to the fact that they were five in number. I can find no ancient evidence attesting their dwarfish stature. Interestingly, Porphyry records a meeting between Pythagoras and the Dactyl Morgos in Crete; here the Dactyl was a cult priest (*The Life of Pythagoras* 17).

between the Phrygian Cybele and music in the person of Marsyas, a “follower and intimate” of hers and fabled inventor of the reed flute.⁵³

In general, Phrygia and Thrace—Strabo treats them practically without distinction—were significant places in Greek musical legends. Here the Muses were first worshipped, and the legendary musicians Orpheus, Musaeus, Thamyris and Eumolpus (“good song”) were all deemed Thracians. Furthermore, there is clear evidence of Semitic or Akkadian backgrounds in the names borrowed by the Greeks for their instruments—*nablas*, *sambykê*, *barbitos*, *magadis*, etc. No wonder Strabo sums up: “From its melody and rhythm and instruments, all Thracian music has been considered to be Asiatic”.⁵⁴ Besides these musical references, there are similarities between Phrygian and Orphic religion (the point made by Aristoxenus) and a remarkable coincidence of healing associated with purification rites⁵⁵—the very hallmark of the Pythagorean cult.

Yet this source provides no suggestion of musical proportion. In the end, one must accept as more helpful the suggestion given by Iamblichus:

They say that it [musical proportion] is an invention of the Babylonians, and it came to the Greeks through Pythagoras first of all; at least, it is found to be the case that many Pythagoreans use it.⁵⁶

Precisely how the blacksmith story came about, then, must remain a puzzle. Rhys Carpenter mentions Homer’s practice of using myths to create plausibility, which may be useful in taking the argument further.⁵⁷ He shows that Homer and an unidentified author whose material is used in the *Odyssey* both give a sense of veracity to an ancient and powerful story by introducing actual geographical details. Perhaps, on a less epic scale, Nicomachus inserted the mathematical details into the more widely-known account of the Idaean *daktyloi* who were believed to have been the first to mine and work iron⁵⁸—hence the smithy setting—in order thus to make use of the aura of musical origins which attached to that part of the world. Far from creating an implausible fable (as we may see it), he was seeking to strengthen the plausibility of this contribution of his

⁵³M. J. Vermaseren, *Cybele and Atys: The Myth and the Cult* (London: Thames & Hudson, 1977), 19. See Diodorus Siculus 3.58-59.

⁵⁴*Geography* 10.3.17.

⁵⁵Diodorus Siculus, 3.58.

⁵⁶*Commentary on Nichomachus’s “Introduction to Arithmetic”*, 168.

⁵⁷*Beyond the Pillars of Hercules: The Classical World Seen through the Eyes of its Discoverers* (New York: Delacorte Press, 1966; London: Tandem, 1973), 43.

⁵⁸Strabo, *Geography* 10.3.17.

master's.⁵⁹ Further possibilities in connection with the smithy and the hammers are presented in Appendix 1.

While the available evidence points to Mesopotamia as an important source of Greek music theory, the fact is that there are practically no Mesopotamian documents relating to music; rather, astronomy and mathematics are well documented, and the references to Chaldaean music are confined to later Greek and a few Persian sources. But these are unanimous in crediting Babylon with some of the cardinal features of early Greek theory—the harmony of the spheres, the doctrine of ethos, and even the theory of numbers that was developed in the later Eleatic schools (Italy, fifth century) as well as among the Pythagoreans. It can also be shown that many Phrygian instrument names are derived from Oriental languages (Akkadian, Aramaic, Persian, Syrian) which suggests that one of the paths of the diffusion of Mesopotamian musical knowledge was through Ionia. The details of these debts are set forth by Farmer.⁶⁰

Babylonian mathematics had reached its peak of sophistication by around 1000 B.C. and remained essentially unchanged thereafter. Arithmetical and geometrical progressions, the rules for the areas of squares, rectangles, right triangles and trapezoids, the solution of linear equations—all these were known to Babylonian mathematicians long before the sixth century. Part of this knowledge must have concerned proportions, and Plutarch specifically mentions this:

The Chaldaeans assert that spring turns out to be related to autumn in the ratio of the fourth [3:4] and to winter in that of the fifth [2:3] and to summer in that of the octave [1:2].⁶¹

This mathematical system also treated numbers as more than mere units of calculation: numbers possessed in themselves active form, and had properties that resembled sacred attributes. Seven had greater efficacy than most, and it is not difficult to see why: there were seven planets (the five known to the ancient world plus sun and moon); and seven comprised the sum of quadrangle and triangle, both used in the auguries. Ten and its multiples had divine significance. Thus, Marduk (Jupiter) was associated with the number ten, Shamash (the sun) with twenty, Sin (the moon) with thirty, Ea (water) with forty, Enlin (the earth)

⁵⁹Similarly, Plato “gives verisimilitude to Myth by making it explain facts, or what he accepts as facts, and bringing it, as far as possible, into conformity with the ‘modern science’ of his day”. See J. A. Stewart, *The Myths of Plato* (1905), ed. G. R. Levy (Fontwell, Sussex: Centaur Press, 1970), 112-19.

⁶⁰NOHM 1:252.

⁶¹*De anima procreatione* 31.1028F, trans. H. Cherniss, Loeb Classical Library, 17 vols. (Cambridge, Mass.: Harvard University Press, 1976), 13:329.

with fifty and Anu (the heavens) with sixty. Interestingly, this identification of gods with numbers reappears in later Pythagorean writings.

Finally, Babylonian mathematics was developed through a scientific and exact approach to astronomical phenomena. Not surprisingly, their mathematics was linked to star-worship, the result, in Cumont's opinion, of the intrusion of exact observation on an older theology.⁶² Thus, planets received the names of gods: Jupiter, Marduk; Venus, Ishtar; Saturn, Ninib (Ninurta); Mercury, Nebo (Nabu); Mars, Nergal. Time, bound up with the revolutions of the heavens, was also deified, and gods were associated with numbers—e.g. the moon-god, Sin, was called “Thirty” from the conventional length of the lunar month. “Four” and “Seven” may not have been separate deities, but merely two aspects of the moon-god—the four phases of the moon and the seven-day week.

The reverberations of all this in Pythagorean doctrine could hardly be clearer. Though Pythagoras did not worship the planets or fixed stars as gods—the later Pythagoreans did, while Pythagoras himself appears to have rejected even the traditional Greek gods—they remain the critical symbols of his *kosmos*. Yet, though it seems likely that Babylonia was a major source of theory for him, we cannot assert that the diatonic scale form came from that region, nor that it even possessed the concept of an eight-note scale bounded by the octave (*diapason*) proportion.⁶³

From the point of view of the music historian, the influences on Pythagoras from Persia, India and Egypt are not of particular importance, except as further support for the view that he did incorporate the wisdom of the barbarians. Having noted these factors and the likelihood of Mesopotamia's possessing “a theory of music which was actually the starting point of our present system”,⁶⁴ it remains only to assert that Pythagoras's vision of *kosmos* has its own integrity and inner logic. Adolf Stöhr has attempted a reconstruction of this mathematical universe which suggests that Plato (whose *Timaeus* is usually accepted as a résumé of Pythagorean doctrine) did not know all the facts, and that the Philolaus

⁶²F. Cumont, *Astrology and Religion among the Greeks and Romans* (London: Putnam, 1912), 29-35.

⁶³Burkert (316) expresses doubt that Pythagoras or other pre-Philolaic Pythagoreans could have been the transmitters of this knowledge, simply because no evidence of such knowledge can be detected. Democritus and Philolaus must have arrived at their orders of planets from a common source; Babylonia seems the likeliest possibility. But the intermediaries remain unclear.

The order of planets attributed to Pythagoras by Pliny (*Natural History* 2.84), being built around the sun as *mesê*, seems to Burkert to date from the time of Archimedes (*ibid.*).

⁶⁴Farmer, *NOHM* 1:253.

fragments, generally considered the earliest Pythagorean writings, may afford reliable evidence.⁶⁵ On another level, I would wish to argue, somewhat against Werner, that there was every reason for Pythagoras to arrive at an eight-note scale, not on acoustic grounds, or even under Near-Eastern religious influences such as the calendar and astronomy, but from mathematical-philosophical ones. This is surely not attributing too much to the man and his school, considering the consistency of some of their thought (as defended by Stöhr) and their considerable mathematical achievements—Neugebauer’s view⁶⁶—while still acknowledging their debts to foreign sources.

The pattern of their reasoning is indeed based on the main consonances 1:2, 2:3 and 3:4.⁶⁷ While the tone 8:9 is not a consonance, it is a crucial element in the system. Not only does it appear to be operationally significant, but symbolically it occupies a place of eminence within the decad. The decad is, not surprisingly, closely identified with the tetrad (*tetraktys*), since in the generation of numbers 10 is its sum:



Moreover, the interval 8:9 has the advantage over all the other “oblong” (superparticular) ratios in the decad (4:5, 5:6, 6:7, 7:8, 9:10) of being arithmetically the most “perfect”, since its constituent numbers are the first two square numbers, viz. 2²:3². A ratio that presents so many advantages naturally tends to impose itself as a primary subdivision of the larger consonances, or, more properly, an interval fit to be projected into them. This kind of criterion seems not without justice and is certainly appropriate to the Pythagorean cast of mind. I am here putting aside the fact that 8:9 is present with 2:3 and 3:4 as a basic ratio-tool when the harmonic and arithmetic means are inserted into 1:2 patterns, as is done in *Timaeus* 36B. This strengthens the argument but represents a sophistication of method which may well be a later—say, fifth-

⁶⁵Stöhr’s reconstruction is presented by Cleve, *The Giants*, vol. 2, chap. 4.

⁶⁶O. Neugebauer, *The Exact Sciences in Antiquity*, 2d ed. (Providence, R. I.: Brown University Press, 1957), 148.

⁶⁷For an account in outline of this reasoning as found in the Philolaic fragments, see E. A. Lippmann, *Musical Thought in Ancient Greece* (New York: Columbia University Press, 1964), 13-14.

century—development. Perhaps this refining of thought is reflected in Plutarch's comment:

Consequently the Platonic *tetraktys* [in *Timaeus*] is much more intricate and consummate in organisation than is the Pythagorean.⁶⁸

Possibly the projection was made only into fourths—this is the case in *Timaeus*—but the result is in any case always the same: the 1:2 octave embracing two fourths and a tone, or five tones and two *leimmas*. If these proportions are made to correspond to the notes of a scale, a prototype diatonic octave is produced, though with some uncertainty as to arrangement: most probably the fifth was placed above, the fourth below. This is the only meaning I can safely attach to the report of Pythagoras's having added an eighth note within the octave.⁶⁹

The argument of this chapter is that the theoretical scale of Pythagoras can be traced to Near-Eastern sources, but cannot be explained in those terms alone. It is unlikely that the processes of transmission, diffusion and assimilation of ideas can be charted in detail with any accuracy, but generalisations are possible and, indeed, defensible.

Supporting this assertion is a body of scholarly opinion which seems worth referring to, if only to find the same conclusion upheld by a variety of approaches.

G. R. S. Mead finds the connections between Greece and the Near East to predate Hesiod (800) and to be of a religious kind:

Both "Plato" and "Pythagoras" [the quotation marks refer to a tradition in each case rather than the man himself] on their mystical side are strongly tinged with "Orpheus". Now, Orphicism was the revival of pre-Hesiodic Orphism[,] initiated by Onomacritus under the Peisistratidae. Original Orphism was, in my opinion, a blend of Hellenic bardic lore with "Chaldaean" elements. It is not surprising, therefore, that when the "Books of the Chaldaeans" collected for the Alexandrian library, were turned into Greek, great interest should have been taken in them by Hellenistic scholars, who found therein confirmation of the Greek wisdom of Orpheus, little suspecting that the Wisdom was in origin partially from the same source.⁷⁰

H. G. Farmer's conclusions—essentially those of a philologist—have been adduced already, as well as the less careful but provocative comparisons of E.

⁶⁸*De anima procreatione* 1019B, trans. Cherniss.

⁶⁹See n.30.

⁷⁰*Thrice-Greatest Hermes: Studies in Hellenistic Theosophy and Gnosis* (1906), reset ed., 3 vols. (London: John M. Watkins, 1964), 1:274.

Werner, whose approach is anthropological and concerned with the perspectives of comparative religion.

A recent history of the pre-Socratic thinkers by E. Hussey weighs the early Pythagoreans' contribution to Greek science afresh and makes a cautiously positive contribution to the debate:

There is no overwhelming necessity to include the early Pythagoreans under either head [Babylonian knowledge in Greece; and the foundation of Greek mathematics]. All that can be said is that they were well-posted, in time and space, to be influential in the developments of Greek mathematics, and that a number of small indications, each of little separate value, converge to suggest they were so. . . . A polymath of this time, such as Pythagoras, would discover that numbers and proportions were of immense importance in several apparently unconnected fields of experience: in music, metallurgy, the visual arts and medicine.⁷¹

Finally, the historian Toynbee provides an overarching view. He points out that the two geographical cradles of the "higher religions"—the Oxus-Jaxartes basin and Syria—are historically decisive by virtue of their physical likeness: each was a "roundabout where traffic coming in from any point of the compass could be switched to any other point of the compass in any number of alternate combinations and permutations".⁷²

The Syrian centre of encounter, bounded by the North Arabian steppe, the Mediterranean, and the southern escarpments of the Anatolian and Armenian plateaux, would have been the crossroads for routes from the Nile basin, the Mediterranean, Anatolia (Phrygia) and its south-eastern European hinterland. He classifies the "currents" of influence in the area as having been Syrian, Babylonian, Egyptian, Hellenic and "fossil-remnant" Hittite⁷³—a list that accords precisely with the possibilities we have surveyed.

⁷¹*The Pre-Socratics*, 66. In Hussey's opinion, Babylonian astrology reached Greater Greece through Ionia.

⁷²Arnold Toynbee, *A Study of History*, 12 vols (London: Oxford University Press, 1934-61), 8:91.

⁷³*Ibid.*, 8:92.

Chapter 2

Ancient Greek Theory II: Plato and the Scale

Chronologically, Plato is the next step in this enquiry; coincidentally, his musical thought is also a step, but a very significant one, away from that of the Pythagoreans. Even so, in considering his thoughts on the scale, it is of prime importance to recognize his continuity with and indebtedness to the natural philosophy of the earlier school. When he undertook a tour of the Greek cities in Italy in 388 B.C., he came into contact with the wellsprings of Pythagorean doctrine, and must have been much attracted to Archytas, the mathematician-philosopher of Taras, who looked a likely candidate for leadership in Plato's projected republic. Considering the enthusiasm with which he collected and adapted for his own use various precepts of the Pythagoreans, Plato indeed can be regarded as one of their chroniclers. Obviously Plato did not build his later dialogues on this data—he had access in Athens to a long-standing tradition of natural philosophy—but rather subsumed Pythagorean teaching into his own thought. However, it is likely that there was one major distinction between the philosophical tradition on the Greek mainland and that in Italy. By the mid-fifth century B.C. the school of Athens was concerning itself more and more with ethical philosophy—the search for the good. In Plato's writings it is clear that fourth-century society—a post-war one—was changing drastically to new ways, and the philosopher found himself in the midst of a critical battle of ethics: essentially, the question of whether practical ethics was based on absolute

transcendent standards or changing human conventions. In Italy, life was quiet enough for the earlier speculative thought to continue freed of the constant need to formulate ethics.

Inevitably, in an ethically-oriented system, the speculations of natural philosophy would be utilized insofar as they served the goal of wise behaviour: it is noteworthy that Plato draws on musical imagery to provide him with some telling metaphors to illustrate his points. For instance, in a discussion of justice (*Republic* 443D-E), he stresses that this quality has to do with the “inward man” and with the regulation of the several elements within a person:

[T]he just man will not permit the several principles within him to do any work but their own, nor allow the distinct classes in his soul to interfere with each other, but will really set his house in order.¹

[A]nd when he has bound together the three principles within him, which may be compared to the higher, lower and middle notes of the scale, and the intermediate intervals—when he has bound all these together, and is no longer many, but has become one entirely temperate and perfectly adjusted nature, then he proceeds to act.²

The fact that the phrase *horous treis harmonias* (which Rouse translates as “the three chief notes of the scale”)³ is rendered rather obscurely by Davies and Vaughan as “three chords of a harmony”⁴ actually helps to throw into relief its Pythagorean background. The word *horos*, translated as “note” or “chord”, is the revealing one: “The single notes of a *harmonia* could be called *horoi* because they were in reality terms in a proportion and depended on the relative length of the string”.⁵ *Horoi* has behind it the meaning of “fixed boundary” or “definition by rule”—in short, the location of *hypatê*, *netê*, *mesê* and other fixed or “boundary” notes by means of proportion. Thus, Adam suggests a translation thoroughly Pythagorean in spirit: “[H]aving harmoniously joined together three different elements, just like three terms in a musical proportion or scale, lowest, highest and intermediate . . .”.⁶

¹*The Republic of Plato*, trans. J. L. Davies and D. J. Vaughan (London: Macmillan, 1881), 149.

²*The Dialogues of Plato*, trans. Benjamin Jowett, 3d ed., 5 vols. (Oxford: Clarendon Press, 1892), 3:137.

³*Great Dialogues of Plato*, trans. W. H. D. Rouse (New York: Mentor, 1956), 244.

⁴*The Republic of Plato*, 149.

⁵*The Republic of Plato*, ed. James Adam, 2d ed., 2 vols. (Cambridge: Cambridge University Press, 1902; reprint ed. 1963), 2:263, note to 443D, line 24.

⁶*Ibid.*, 2:263. The idea that the soul is actually a “harmony” is not Platonic but Pythagorean, in which context it is part of a cosmological pattern. It is clear that Plato is here

Crocker discusses two other important passages (*Republic* 529-31; *Timaeus* 35B-36B), in order to illustrate how Plato makes use of Pythagorean methods.⁷ The passage in *Timaeus* looks at first glance like a reference to a musical scale, but it needs to be interpreted cautiously. There is certainly a correspondence between the number-series listed in *Timaeus* and the interval ratios of Pythagorean doctrine; but Plato is more interested in the means (arithmetic and harmonic), which were for him “the most powerful dividing operations of modern science”.⁸ These reinforced by symbol his description of the world’s creation, which consisted basically in God’s “dividing up” of the world-soul “into as many portions as was fitting . . .”.⁹ Crocker sums up Plato’s relation with the earlier school thus: “Clearly it is the principles of the Pythagorean operations that concern him; he is interested in such lower science only insofar as it points towards a higher truth”.¹⁰

Crocker is correct in pointing to the allegorical dimension in these examples; in fact, he has not sufficiently stressed how fundamental to Plato’s aesthetic the idea of number was. He may be forgiven this, however, since many of the mathematical jests and allegories with which Plato peppered his dialogues have left classicists baffled as to their meaning in his unfolding dialectical drama. Unfortunately, the opaque having been equated with the unimportant, many students of the philosopher have been left with a poor grasp of the nature of “Plato’s mathematical imagination”.¹¹ Some of the fruits of recent research into this question will be examined later in this chapter.

speaking by analogy. The three notes would appear to correspond, on one hand, with Plato’s tripartite division of society (Guardians, Soldiers and Craftsmen) and, on the other, with his three “classes” of the soul (*Republic* 441D). These are themselves linked, since they both refer to a similar triad of virtues: wisdom (the reasoning faculty), courage, and temperance (the control of desire).

⁷Richard Crocker, “Pythagorean Mathematics and Music” (Part 2), *Journal of Aesthetics and Art Criticism* 22 (Spring 1964): 329-31.

⁸*Ibid.*, 331.

⁹Jowett, 3:454.

¹⁰“Pythagorean Mathematics”, 331. The passage in *Republic* (529-31) deals with “harmonists”—satirized by Glaucon—and another group described by Socrates as those who “search for the numbers in the concords which are heard, but do not come up as high as problems, so as to discover which numbers are concordant and which not, and why in each case” (Rouse, 331). The common assumption identifies this group as Pythagoreans. But there are snags in this interpretation; see André Barbera, “*Republic* 530C-531C: Another Look at Plato and the Pythagoreans”, *American Journal of Philology* 102, no. 4 (1981): 395-410.

¹¹This is the title of a ground-breaking book by Robert Brumbaugh published in 1954 (Bloomington, Ind.: Indiana University Publications).

Crocker's mention of "higher truth" brings us to a consideration of one of the distinctive notes in Plato's writings: the search for the good (*to kalon*). If anything were worthy of the adjective "divine", it is this theme of the good: its frequent form, "idea of good", signifies universal goodness, "the unity of all goodness in contrast to the various objects which we call 'good'".¹² Knowledge of the good is crucial to anyone who would act virtuously and live happily, in accord with his true nature. The method of education called habituation which trains a man toward this end opens up an opportunity for music to play a part in his understanding of the good: this explains why music so often appears bracketed with other elements of education. However, since music (or whatever other English words are used to translate the Greek *mousikê*) has a Pythagorean dimension too, we are faced with a double focus which is brilliantly superimposed in Plato's own thinking, but which tends to be separated out in studies on him. The following argument will survey these two foci individually before describing their interdependence.

The validity of music (*mousikê*) in the first, generic sense, i.e. a group of disciplines including reading and writing (jointly *grammata*), athletics (*gymnastikê*) and music (in the narrower sense of a citizen's elementary training in the choric studies of movement and rhythm, kithara-playing, etc.) rests, in Plato's thought, on what may be broadly termed an "ethical" understanding of this educative method. He inherited a tradition of such thought running back through the dramatists and poet/composers to Homer and through "political" philosophers to Pythagoras. The tradition was rooted in archaic Greek musical magic, the orgiastic uses of music in Dionysiac and Orphic rites, but most clearly in the ideals of education—*paideia*—that passed from Odysseus to the aristocratic elite during the sixth century B.C. and from them to the ordinary citizens of the democratic *polis*.

Of Plato's more direct debts, the theories of Damon of Athens (fl.430-400), a friend of Pericles and the foremost musical authority of his age, must be singled out. His views—which represent the earliest worked-out theory of ethos—lean in all probability on Democritus, Pindar, Philolaus and Pythagoras and were adopted, with reservations, by Plato.¹³ Damon the *harmonikos* ("musical specialist"), descended from the *akousmatikoi* of Croton, was concerned with the

¹²W. Jaeger, *Paideia: The Ideals of Greek Culture*, 2d ed., trans. Gilbert Highet, 3 vols. (New York: Oxford University Press, 1943-45), 2:281.

¹³W. D. Anderson, "The Importance of Damonian Theory in Plato's Thought", *Transactions and Proceedings of the American Philological Association*, 86 (1955): 88-102.

ethical-political implications of musical training. The Platonic Socrates would have accepted without reservation the following two statements attributed to Damon (the first by Plato himself):

Musical styles (*tropoi*) are nowhere altered without changes in the most important laws of the state.¹⁴

Song and dance necessarily arise when the soul is in some way moved; liberal and beautiful songs and dances create a similar soul, and the reverse kind create a reverse kind of soul.¹⁵

Two more Damonian sayings are recorded with which Plato would have agreed in part:

Through similarity, the notes of a continuous melody create a character that did not exist in boys and in those more advanced in years, and also bring out the latent character.¹⁶

In singing and playing the lyre, a boy ought properly to reveal not only courage and moderation, but also justice.¹⁷

Plato's theory of *mimêsis* does not countenance musical tones having the innate power to shape a man's soul: the modes (*harmoniai*) are an imitation of "the tone and voice changes of a brave man in battle action" or "of a man engaged in peaceful, nonviolent and willing action".¹⁸ Also, Plato reduces Damon's triad of virtues to courage and moderation: for him, justice subsumes both of these. Though these are more than mere academic differences, the outlooks of these two men are remarkably similar.

Another ingredient in Plato's heritage was the example of Sparta. Here, Jaeger adds some words of caution to the effect that the constitution of Sparta had become a highly idealized affair, whose praises the poet Tyrtæus sang, and whose drastic methods of education in order to produce people willing to fight in defence of the city-state were documented by Xenophon in *The Lacedaemonian Constitution*. Plato (having experienced democracy) criticized the ideals of Sparta, but accepted the notion that in education lay the means by which the state might guide its citizens to "the ultimate standard of human virtue and

¹⁴*Republic* 424C, translated in Anderson, 91.

¹⁵Diels, *Vorsokratiker* 37B6, trans. Kathleen Freeman, *Ancilla to the Pre-Socratic Philosophers* (Cambridge, Mass.: Harvard University Press, 1957), 71.

¹⁶*Ibid.*, 37B7, trans. Anderson, 89.

¹⁷*Ibid.*, 37B4, trans. Freeman, 71. I have emended her phrase "a boy will be likely to" on the recommendation of Anderson, 89, n.4.

¹⁸*Republic* 399A-B, trans G. M. A. Grube, *Plato: The Republic* (Indianapolis, Ind.: Hackett, 1974), 69.

perfection”.¹⁹ Jaeger warns too that Plato had espoused certain Spartan theories out of the exigencies of his own day, when Athens as a democratic city-state was crumbling into a chaos of uncontrolled individualism. “He had come to the tragic conclusion that laws and constitutions are mere forms, which have no value unless there is a strong moral core in the nation so that they can be protected and respected.”²⁰

The musical heritage of Sparta is to a degree obscure, but from Pratinas (as recorded by Athenaeus) we learn of two important musical practices which were taken up by Plato. The first has to do with musical forms:

Of all the Greeks the Spartans have most faithfully preserved the art of music, employing it most extensively, and many composers of lyrics have arisen among them. Even to this day, they carefully retain the ancient songs, and are very well taught in them and strict in holding to them.²¹

Plato echoes this in *Laws* 802 in his comments on musical education: “If a man has from childhood to the age of sobriety and discretion been familiar with austere, classical music, he is repelled by the sound of the opposite kind and pronounces it unmanly”.²² But his clearest statement on the issue appears a few sentences earlier: “There are many ancient compositions and dances which are excellent, and from these the newly-founded city may freely select what is proper and suitable”.²³

The second practice mentioned by Pratinas has to do specifically with modes. The terms Aeolian and Dorian were associated with Terpander (as well as Alcaeus and Sappho, who also came from Lesbos) and broadly with Spartan music. Athenaeus distinguishes Aeolian from Dorian, but it seems that with time the Aeolian dropped out of use; the Spartans, of Dorian stock, were closely associated with Doric music which exhibited “the quality of manly vigour, of magnificent bearing, not relaxed or merry, but sober and intense, neither varied nor complicated”.²⁴ By the end of the fifth century, this came to be contrasted with the Phrygian style, though in a way which allows Plato to permit these two

¹⁹Jaeger, 3:220.

²⁰Ibid., 2:238-39. Parallel changes in the field of athletics are detailed in Vera Olivová, *Sports and Games in the Ancient World*, trans. D. Orpington (London: Orbis, 1984), 95-144.

²¹*Deipnosophistae* 14.632F, translated in SSR, 54-55.

²²*The Laws of Plato*, trans. A. E. Taylor (London: Dent, 1934), 186.

²³Jowett, 5:183.

²⁴Athenaeus, *The Deipnosophists*, trans. C. B. Gulick, Loeb Classical Library, 7 vols. (London: William Heinemann, 1937), 6:367.

modes to be used in his utopia.²⁵ He mentions some other modes, mainly in order to show their unsuitability for helping men to virtue. The Dorian style (which promotes the manly trait *andreia*) is a spur to a warlike frame of mind which meets danger and misfortune alike with courage and endurance. The Phrygian (yielding *sophrosynê*, or discretion) is favoured for peacetime, when there is freedom of action, because it directs men to moderate deeds and prudent instructions.²⁶

Besides this notion of ethos-by-association (Dorian virtue resembling the courage of Doric people), an independent witness to Plato's source is to be found in Lucian's description of the pyrrhic dance which derives from Sparta:

The boy precedes, doing the steps and postures of young manhood, and those which later he will use in war, while the maiden follows, showing how to do the women's dance with propriety; hence the string is beaded with modesty and with manliness.²⁷

The striking contrast of language and concept found here, in *Republic* 399A-C (on the two modes mentioned above) and in *Laws* 814-15 (Plato's description of the pyrrhic and the peaceful dance) seems unlikely to be fortuitous:

I do not know the musical modes, I said, but leave me that mode which would suitably imitate the tone and voice changes of a brave man in battle action or any violent deed, also when he is failing and on his way to wounds or death, or falling into some other misfortune, and is, in all these circumstances, fighting off his fate steadily and with self-control. Leave me also another mode, that of a man engaged in peaceful, nonviolent and willing action, either persuading someone and asking a favour, either from a god in prayer or from a mortal by teaching and exhortation; or again, on the contrary, submitting himself to the supplications of another who is teaching him or wanting him to change his mind, and in all these circumstances acting as he thinks he should, without arrogance, but reasonably and moderately, and being content with the consequences. Leave me those two modes, the violent and the willing, which will best imitate the accents of brave and moderate men both in misfortune and prosperity.²⁸

The proper term for most of the other movements [i.e. besides wrestling] that can be executed by the body as a whole is "dancing". Two varieties, the decent and the disreputable, have to be distinguished. The first is a representation of the movement of graceful people, and the aim is to create an effect of grandeur; the second imitates the movements of unsightly people. . . . Both have two subdivisions. The first subdivision of the decent kind represents handsome, courageous soldiers locked in the violent struggles of war; the second portrays a

²⁵*Republic* 399C.

²⁶*Ibid.*

²⁷Lucian, [*Works*], trans. A. M. Harmon, Loeb Classical Library, 8 vols. (London: William Heinemann, 1936), 5:227. The passage is found in the book *Peri orchêseos* ("On the Dance").

²⁸*Republic* 399A-C, trans. Grube, 69.

man of temperate character enjoying moderate pleasures in a state of prosperity, and the natural name for this is “dance of peace”.²⁹

In all likelihood the two dances correspond with Dorian and Phrygian styles, as Plato insisted they should: “[The Guardian] must combine the dance sequences with the other musical elements [i.e. words and instrumental accompaniment], and allocate each sacrifice and feast in the calendar the style of dance that is appropriate”.³⁰ The demand is that words, movement and music all be *emmelos*, “in harmony”.³¹

We are ready now to return to the subject of musical training, having noted in investigating Plato’s philosophical background how the subject *mousikê* always involves a type of moral education, a process exemplified in the *Republic* and the *Laws*. Granted that Plato worked into his own thought the conclusions of earlier thinkers and traditions, what, then, is his special contribution?

His definition of education sets the stage for his criticism and revision of cultural ideals:

By education, then, I mean goodness in the form in which it is first acquired by a child. In fact, if pleasure and liking, pain and dislike, are formed in the soul on the right lines before the age of understanding, thanks to an early discipline in appropriate habits—this concord, regarded as a whole, is a virtue.³²

Plato’s selection of some modes as suitable comes within a discussion of poetry, since *mousikê* consists of poetry (the “word”), harmony and rhythm. This lyric poetry was generally regarded as lying at the heart of culture and knowledge, and the Greeks up to Plato regarded poetic utterances as a standard for admiration. Plato, however, measures them against a far higher standard—in fact, against the highest standards of moral conduct as embodied in the good. By this measure, some of the standards formerly regarded with admiration now appear contemptible; this is why he rejects some modes and accepts others. In fact, he applies this scale to all kinds of art and craft, assuming that graceless, disproportionate and disharmonious representations, even in weaving,

²⁹Plato: *The Laws*, trans. Trevor J. Saunders, rev. ed., Penguin Classics (Harmondsworth: Penguin Books, 1975), 307.

³⁰*Laws* 816 (Saunders).

³¹A discussion of this from a choreographic perspective may be found in William Mullen, *Choreia: Pindar and Dance* (Princeton: Princeton University Press, 1982), especially 46-57 and 61-64. Mullen highlights the social roots of the two styles and the precise meaning of imitation in this context.

³²*Laws* 653 (Taylor).

embroidery, architecture and furniture building, feed corruption to a man's soul and shape it accordingly. Hence, he summarizes:

[M]usical training³³ is a more potent instrument than any other, because rhythm and harmony find their way into the inward places of the soul, on which they mightily fasten, imparting grace. . . . [H]e who has received this true education of the inner being will most shrewdly perceive omissions or faults in art and nature . . . and when reason comes he will recognize and salute the friend with whom his education has made him long familiar.³⁴

Thus, Plato's insistence on strict artistic canons in the new state is not to be regarded solely as tyrannical control over individual "creative expression", but the necessary condition for the virtuous life to become a common possession. That is why he comments that changes in musical modes imply changes in the laws of the state, and it helps to explain his criticism of the poets of his own day:

Afterwards, in course of time, an unmusical licence set in with the appearance of poets who were men of native genius, but ignorant of what is right and legitimate in the realm of the Muses, possessed by a frantic and unhallowed lust for pleasure. They contaminated laments with hymns and paeans with dithyrambs . . . and created a universal confusion of forms.³⁵

At this point, Henderson's suggestion is useful:³⁶ she argues that, on linguistic grounds, the references to Dorian, Lydian, Phrygian, etc. in *Republic* 398D-399A can be taken to mean "in the Dorian idiom", etc., which points to musical resources less formalized than simple, regular scale patterns. The argument depends for its strength partly on her appeal to word function in classical Greek,³⁷ but it has other points to commend it. In particular, she notes a more fundamental relation than that between *harmonia* and pitch—that of *harmonia* to specific occasions (funerals, drinking parties) or specific musical forms (hymns, paeans, dithyrambs). This seems to be confirmed by Plato's reference to a "total confusion of styles".³⁸ She draws the conclusion that *harmonia* can easily imply "a whole melodic idiom".³⁹ While this may complicate

³³This implies training in the perception of harmoniousness, and applies to the arts generally.

³⁴*Republic* 401D-402A (Jowett).

³⁵*Laws* 700 (Taylor).

³⁶*NOHM* 1:384-85.

³⁷It is helpful to note that the simple adjectival forms Dorian, Lydian, etc., are sometimes used to translate what in Greek are adverbial forms—*Doristi*, *Lydisti*, etc. These are then more accurately rendered "in the Dorian style or idiom", etc.

³⁸*Laws* 700 (Saunders).

³⁹*NOHM*, 1:385.

efforts to reconstruct a system of scales using Plato, it does not rule them out, but offers a more flexible way of understanding Plato's references.⁴⁰

Clearly, a survey such as this is forced to ask whether any imaginative reconstruction of early Greek scales is either possible or useful. Leading scholars in the field tend to be less than enthusiastic about the chances of assembling a pre-Aristoxenian "system" from the surviving fragments of evidence.⁴¹ Those who swim against the current must contend with statements, such as this from Aristoxenus:

The account of the tones given by the harmonists closely resembles the observance of days according to which, for example, the tenth day of the month at Corinth is the fifth at Athens, and the eighth somewhere else.⁴²

This is a clear warning against the endeavour to reconcile too many conflicting voices. Yet the temptation to scholars to do so has proved irresistible, and has turned up a number of interesting hypotheses.

The claim of Aristides Quintilianus to know the scale structure of the modes mentioned by Plato in *Republic* 398-99 is a convenient starting-point.⁴³

⁴⁰This view is summarized by R. Winnington-Ingram, *Mode in Ancient Greek Music* (Cambridge: Cambridge University Press, 1936), 81:

At least up to the fifth century B.C. (and probably the fourth) Greek music knew many styles of melodies differing in emotional character and named after Hellenic or barbarian tribes. The notes required for each constituted a *harmonia*, or tuning of the lyre. We have little evidence for the forms of these; but such as we have suggests considerable diversity, and it may not have been easy to combine them in a logical scale system, or possible without sacrifice of their individualities.

⁴¹See Winnington-Ingram, *ibid.*, especially 46, and his article on "Ancient Greek Music", *NG* 7:659-72; W. D. Anderson, *Ethos and Education in Greek Music* (Cambridge, Mass.: Harvard University Press, 1966), introduction.

⁴²*Harmonic Elements*, trans. H. S. Macran (Oxford: Oxford University Press, 1902), 192.

⁴³Winnington-Ingram, *Mode*, 22.

Table 2-1 Platonic Modes as Recorded by Aristides Quintilianus, *Peri mousikês**

Modes ⁴⁴	$B\bar{B}c\bar{c}d\bar{d}e\bar{e}f \quad g \quad a \quad b\bar{b}c'c'd'd'e'e'$
Lydian	$\quad \quad \quad \bar{e}f \quad \quad a \quad b\bar{b}c' \quad \quad e'e'$
Dorian	$\quad \quad d \quad e\bar{e}f \quad \quad a \quad b\bar{b}c' \quad \quad e'$
Phrygian	$\quad \quad d \quad e\bar{e}f \quad \quad a \quad b\bar{b}c' \quad d'$
Ionian	$B\bar{B}c \quad \quad e \quad \quad g \quad a$
Mixolydian	$B\bar{B}c \quad d \quad e\bar{e}f \quad \quad \quad b$
Syntonolydian	$B\bar{B}c \quad \quad e \quad \quad g$

*Note: The horizontal strokes above the letter names indicate the *diesis* interval which is approximately the same as a quarter-tone in the tempered scheme.

The antiquity of these singular systems is generally accepted, for a variety of reasons: their structural similarity with other primitive modes, the appearance of the first six Phrygian intervals in a notated fragment of *Orestes* (possibly

⁴⁴Most writers assume an element of continuity between the old *harmonia* and the Aristoxenian modal species, if only because the ethnic names were taken over and, in some cases, the term *harmonia* as well. Mountford ("Greek Music and its Relation to Modern Times", *Journal of Hellenic Studies* 40 [1920]: 13-42, especially 25-28) emphasized the resemblances between Cleonides' octave species and the interval structures of Aristides' set. The results are as follows:

Table 2-a Comparative Table of Cleonides' and Aristides' Tunings

1. Mixolydian	Cleon	$\frac{1}{4} \quad 2 \quad \frac{1}{4} \quad \frac{1}{4} \quad 2 \quad 1$	
	Aris.	$\frac{1}{4} \quad 1 \quad 1 \quad \frac{1}{4} \quad 3$	
2. Dorian	Cleon.	$- \quad \frac{1}{4} \quad \frac{1}{4} \quad 2 \quad 1 \quad \frac{1}{4} \quad \frac{1}{4} \quad 2$	
	Aris.	$1 \quad \frac{1}{4} \quad \frac{1}{4} \quad 2 \quad 1 \quad \frac{1}{4} \quad \frac{1}{4} \quad 2$	
3. Hypolydian	Cleon.	$\frac{1}{4} \quad 2 \quad 1 \quad \frac{1}{4} \quad \frac{1}{4} \quad 2 \quad \frac{1}{4}$	
Lydian	Aris.	$\frac{1}{4} \quad 2 \quad 1 \quad \frac{1}{4} \quad \frac{1}{4} \quad 2 \quad \frac{1}{4}$	
4. Phrygian	Cleon.	$1 \quad \frac{1}{2} \quad 1 \quad 1 \quad 1 \quad \frac{1}{2} \quad 1$	(Diatonic)
	Aris.	$1 \quad \frac{1}{4} \quad \frac{1}{4} \quad 2 \quad 1 \quad \frac{1}{4} \quad \frac{1}{4} \quad 1$	("Enharmonic")
5. Lydian	Cleon.	$1 \quad 1 \quad \frac{1}{2} \quad 1 \quad 1 \quad 1 \frac{1}{2}$	(Diatonic)
Syntonolydian	Aris.	$- \quad - \quad \frac{1}{4} \quad \frac{1}{4} \quad 2 \quad 1 \frac{1}{2}$	("Enharmonic")
6. Hypophrygian	Cleon.	$1 \quad 1 \quad \frac{1}{2} \quad 1 \quad 1 \quad \frac{1}{2} \quad 1$	(Diatonic)
Ionian	Aris.	$- \quad - \quad \frac{1}{4} \quad \frac{1}{4} \quad 2 \quad 1 \frac{1}{2} \quad 1$	("Enharmonic")

Cleonides lists Hypodorian as well, whereas Aristides gives only six scales. However, Athenaeus 624E remarks that the Hypodorian had previously been called "aeolian"; Aeolian is omitted by Aristides presumably because Plato never mentions it.

The accord in some instances is remarkable, in others far less so. But Aristides' Lydian has always been suspect: it appears out of the (reverse) Platonic order of the modes, it contains anomalous tetrachords of the sort Aristides claims to be demonstrating, and it is bounded, most strangely, by two *pykna*. Winnington-Ingram suggests that this might be an Aristoxenian substitute for a lost "slack Lydian". Further, the pairing of diatonic forms with proto-enharmonic ones seems to owe a good deal to Mountford's own convictions about early *genera*, particularly his argument that the earliest enharmonic form (Spondeiasmos) was actually a type of diatonic Dorian.

In all this, the continuity is hard to trace.

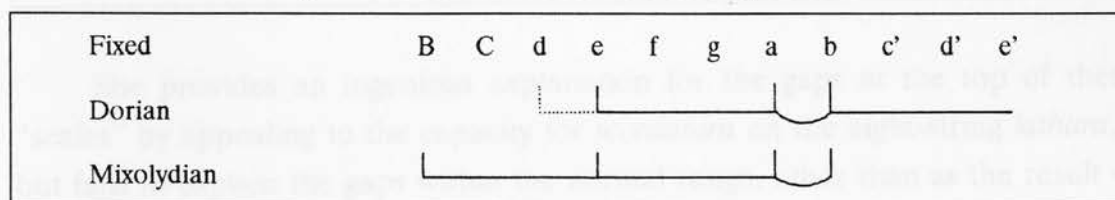
Euripides' own score), and the relationship of descent that can be postulated between these scales and the patterned Aristoxenian series. All the above show the typically enharmonic interval of *diesis*, which may be construed as a sign of incipient schematizing in the transition from a ragged early series to the regular later forms. However, only if that descent can be incontrovertibly proved can one safely say: "One may observe how, in the course of musical history, a multiplex order of scales tends to give way to some simpler system of a few scales".⁴⁵

Pseudo-Plutarch's reports on early scale forms are suggestive, but capable of varying interpretations. In the case of the Mixolydian, he writes:

In their historical accounts the writers on harmonics say that the inventor was Pythocleides the *aulêtês*, and that later Lamprocles of Athens [start of the fifth century B.C.], observing that it [the Mixolydian] does not have its disjunction at the point where nearly everyone had supposed, but at the upper part, shaped it to resemble the passage from the *paramesê* to the *hypatê hypaton*.⁴⁶

This could well refer to the result of standardizing the old form, with its strange tritone, by alignment with the central, Dorian *systema*. In terms of diatonic octave species (which one must then assume to have been in use as well), the disjunction of the fixed system does lie at the upper end:

Figure 2-1 Relative Position of Disjunction



It is curious that, in her reconstruction, Henderson comes to the same conclusion by a different route.⁴⁷ She argues, with good linguistic sense on her side, that the early modes were differentiated not only by intervallic distinctions but also by relative pitch relations. Thus, she reads straight-forwardly the terms "slack (*aneimenê*) Lydian", "high, taut (*syntonon*) Lydian", "deep-voiced

⁴⁵M. Shirlaw, "Music and Tone Systems of Ancient Greece", *Music and Letters* 32 (April 1951): 134.

⁴⁶*De musica* 1136D. It is hard to know where "nearly everyone" thought the disjunction fell, since the lower intervals suggest two conjunct enharmonic tetrachords (B-e and e-a).

⁴⁷I. Henderson, "The Growth of the Greek *harmonia*", *Classical Quarterly* 36 (1942): 94-103.

(*barybromos*) Aeolian” as referring to tuning and tessitura.⁴⁸ By “negative” definition, Mixolydian turns out also to be a high mode in its aboriginal form:

They say further that the lower-pitched [“slack”] Lydian, which is the opposite of the Mixolydian and similar to the Ionian, was invented by Damon of Athens.⁴⁹

Plato appears partly to corroborate this by grouping the Mixolydian with the Syntonolydian (a threnodic mode), and by opposing these to the Ionian and the slack Lydian:

What are the lamenting modes, then? You tell me for you are musical.

–The Mixo-lydian, the Syntono-lydian, and some others of that kind, he said.

–Shall we ban those? . . . Which are the soft and drinking modes?

–The Ionian, he said, and some Lydian are called relaxed.

–Could you ever make use of these for warriors?

–Never, he said, and I fear that the only modes left are the Dorian and the Phrygian.⁵⁰

Thus, Henderson suggests the following alterations to Aristides’ layout:

Table 2-2 Proposed High Modes⁵¹

Modes	$B\bar{B}c\bar{c}d\bar{d}e\bar{e}f$ g a $b\bar{b}c'\bar{c}'d'\bar{d}'e'\bar{e}'$
Mixolydian	$b\bar{b}c'$ d' e' $\bar{e}'f'$ b'
Syntonolydian	$b\bar{b}c'$ e' g'

She provides an ingenious explanation for the gaps at the top of these “scales” by appealing to the capacity for *scordatura* on the eight-string *kithara*,⁵² but fails to explain the gaps within the normal range, other than as the result of adapting “barbarian” i.e. non-Greek melodies to Attic instruments. It is fascinating but pure conjecture.

⁴⁸Ibid., 94.

⁴⁹Ps.-Plutarch, *De musica* 1136E, trans. B. Einarson and P. H. de Lacy, in *Plutarch's Moralia*, Loeb Classical Library, 15 vols (London: William Heinemann, 1967), 14:387.

⁵⁰*Republic* 398E-399A, trans. Grube.

⁵¹“The Growth of the Greek *harmonia*”, 94.

⁵²Ibid., 97. Her tuning is:

d e_f g a b_c d' e'_f g'

It uses the pentatonic suggestions of Curt Sachs (*The Rise of Music in the Ancient World: East and West* [New York: Norton, 1943], 219-21), the semitones being obtained by stopping the strings.

Clearly, her version of the high Mixolydian requires the g' string to be tuned up to b', yielding the tritone that had occupied Lamprocles. The accommodation of the Ionian on this obliging *kithara* would also require retuning—of the d string down to B.

Another problematic area is that of the *genera*. Aristides' scales all show the enharmonic *diesis* (a fourth part of the 9:8 tone): this is not surprising, since he belongs to the Aristoxenian tradition which favoured this *genus* for its uncompromising nobility and its great tonal subtlety.⁵³ In the view of Aristoxenus, both these qualities were being ignored by the late fourth century. But from Plato—two generations earlier—those “harmonists” who were trying to fix points empirically on the pitch continuum by using the smallest audible intervals, came in for a blast of scorn:

They talk of something they call a *diesis* and lay their ears to their instruments like someone trying to hear what the neighbours are saying; then some say they hear a sound in between and that this is the shortest interval by which they must measure, while others argue that the sounds are the same. Both place the ear before the mind.⁵⁴

Despite Plato's supposed regard for Archytas, it is widely assumed that he disdained his novel tetrachords, and adhered, like later neo-Pythagoreans, to the pre-eminence of the diatonic *genus*. At least, that is the *genus* that appears in the Myth of Er and the *Timaeus* story of creation. (Still, it is doubtful that Plato is attacking the actual enharmonic “style” in his send-up of “those worthy persons who make life unpleasant for gutstrings”;⁵⁵ rather, Plato is attacking their empirical approach and contrasting it with the true apprehension of harmony by reason and thought.) Mountford goes so far as to suggest that Aristoxenus superimposed a doctrine of watertight *genus*-compartments on a previously more flexible “system” in which, owing to the considerable variation in small interval sizes proposed by various theorists, the *genera* tended to merge imperceptibly into each other. Henderson argues that the *genera* rather than the modes might have had separate histories; that the various modes of each *genus* were derived from a single basic scale, e.g. the ultimate form of the enharmonic

⁵³See *Harmonic Elements*, 19.

⁵⁴*Republic* 531A-B.

⁵⁵*Republic* 531B (Rouse, 330).

scale—e' c'bb a fēe (Dorian)—was “cut up into other modes”.⁵⁶

The “archaeology” of the preceding section has been the approach most frequently adopted in the study of ancient music; it is still being practised with evident rewards.⁵⁷ It is philological, the fruit of antiquarian interests dating from the Renaissance. With the recent waning of classical education generally and the resultant ignorance of the Greek language in particular, the conscious tradition of Hellenism has become the exclusive province of a relatively small group of scholarly aficionados; arguably, it has lost the power it might have had to draw “culture . . . back to its sources to be clarified and corrected”.⁵⁸

This makes two recent books by Ernest G. McClain particularly interesting, though, as will be explained, their status is hard to determine.⁵⁹ The first—a broad study of the relations of number and tone in ancient Near-Eastern cultures—provides the background for the second, which is a closely argued account of some puzzling numerical references in four of Plato’s later dialogues; it can, however, be read on its own without loss.

In it, McClain proposes that one of the ways in which the enigmatic passages may be interpreted—there have been many attempts—is as a progressive contemplation of possible “constitutions”, i.e. orders of arrangement of human

⁵⁶“The Growth of the Greek *harmonia*”, 95. But see Crocker’s understanding of the *genera* as expressions of mathematical ideas (in “Pythagorean Mathematics and Music”, *Journal of Aesthetics and Art Criticism*, 22 [1964]: 325-29). His conception is diametrically opposed to Henderson’s, and possibly Mountford’s too.

⁵⁷See, for example, Jon Solomon, “The Diastaltic Ethos”, *Classical Philology* 76 (April 1981): 93-100; also the panel discussion chaired by Claude Palisca, “The Ancient *Harmoniai*, *Tonoï*, and Octave Species in Theory and Practice”, *Journal of Musicology* 3 (Summer 1984), 221-86.

⁵⁸Walter Pater, in “Winckelmann”, the final essay in *The Renaissance* (1873); see *Walter Pater: Three Major Texts*, ed. William E. Buckler (New York: New York University Press, 1986), 196. Pater’s is, of course, a “high view” of ancient Greece, though it is not far removed from the enthusiasm that he claims was “the secret of his [Winckelmann’s] divinatory power over the Hellenic world” (*ibid.*, 191)—an enthusiasm such as had induced gentlemen like Charles Townley and Lord Elgin to assemble their collections of marbles. The subsequent “museumification” of Greek culture was an important influence in Victorian sensibility, but the phenomenon of popular Graecomania appears to have been smothered in the process; see Fani-Maria Tsigakou, *The Rediscovery of Greece: Travellers and Painters of the Romantic Era* (London: Thames and Hudson, 1981), 20.

⁵⁹*The Myth of Invariance: The Origin of the Gods, Mathematics and Music from the R̥g Veda to Plato* (Stony Brook, N.Y.: Nicholas Hays, 1976) and *The Pythagorean Plato: Prelude to the Song Itself* (Stony Brook, N.Y.: Nicholas Hays, 1978). The latter is based on a series of previously published studies in Platonic mathematical allegories; see *ibid.*, viii for details.

society, and hence as political theory mediated by numerical organization. The numbers involved, however, are precisely those of Pythagorean integer ratios, a fact that introduces the question of mathematics as it had developed up to Plato's time, but also forges a link with the theory of musical consonances and scales. McClain sees in the allegories four basic numerical models that correspond to what we know as tuning systems: Pythagorean, just, tempered and a system derived from Archytas. Plato names each model after a "city" and alludes to the characteristic political arrangement in each city by analogy with properties of the particular number-generating system being used.

For example, the city of ancient Athens, which McClain regards as being progressively treated in *Republic*, *Timaeus* and *Critias*, is the ideal city: it is a utopia of justice generated from four numbers typical of Pythagorean teaching, viz. the ratios 1:2, 2:3 and 3:4. Because the ratios are limited to the *tetraktys*, Plato describes the "healthy" city as one limited to the bare necessities.⁶⁰ In response to Glaucon's suggestion that a more luxurious city be envisaged, Socrates proposes one stuffed with "inessentials":⁶¹ this receives its outworking in *Critias*, in the myth of Atlantis, where Plato adds the number five to the generative "stock".⁶² This means that the ratios 4:5 and 5:6 are also used for generating intervals, with predictably more numerous results.⁶³ But even in the healthy city, there arises a fundamental problem of "musical politics": however one goes about constructing intervals within the octave—whether by the system of fifths alone, brought into

⁶⁰*Republic* 373B.

⁶¹*Ibid.*

⁶²In the allegories, One is the divine number, indivisible (since the system works only with integers) and the source of creation; Two is a feminine principle ("wives"), creating with One (1:2) cyclic octaves (1:4 is, of course, simply 1:2², 1:8 is 1:2³, etc.). But these octaves are "barren" (empty) until fertilized by a masculine principle ("husbands"), which, in the number series, is Three: by the projection into the octave of the fifth (2:3), the process of generating a scale is begun. The words that open *Timaeus*—"One, two, three . . ."—show that this set of "essentials" is the generating stock in the dialogue.

⁶³Six is not a new element here but a result of the introduction of the prime number five; thus, 4:5:6 amounts to the division of a fifth (2:3 multiplied by two in order to avoid fractions) by its arithmetic mean. In the same way, the division of a fifth by its harmonic mean requires multiplication by five in order to avoid fractions—thus, 10:12:15. In order to accommodate both means, these smallest integer forms (4:5:6 and 10:12:15) must be multiplied by five and two respectively (the lowest common denominator being 30)—thus, 20:24:25:30. In musical terms, this implies division of a fifth, say C to G (equal temperament) at points slightly flatter than D[#] (harmonic mean) and exactly midway between D[#] and E (arithmetic mean). However, such small integers will not appear in Pythagorean/Platonic calculations, since—going back a step—neither octave containing this fifth (15:30 or 20:40) will permit division of itself by arithmetic and harmonic means without creating fractions. The divisions of the octave are the primary calculations.

the octave, or by a combination of fifths, fourths and tones⁶⁴—these necessary ratios create the problem of the syntonic comma (80:81), the tiny interval by which they differ from the true octave when summed.⁶⁵

In integer arithmetic, the solution to this—the equal division of the octave, or “tempering” of intervals—was not available, though there were geometric ways of dealing with irrationals. Plato, fully aware of this “flaw”, seems to have grasped the concept of acoustic temperament quite clearly and incorporated it into his theory of the state as a fundamental political concept: that of limitation. Either one limits the generative series, or one accepts that it produces more and more ill-attuned intervals—the fate of the luxurious city. Plato calls these compounding errors “unmusical children”.⁶⁶

In fact, there is no possibility of perfect tuning without tempering: the limitation of generative numbers simply keeps the problem within the bounds of easy regulation. I take this to be the meaning of the passage (*Republic* 617E) describing the casting of lots for human destinies. Each begins with “another cycle of mortal life that leads to death” (the octave invariance); thereafter, there is an element of necessity (the inevitable appearance of harmonic discrepancy) and of choice (the control of discrepancies by limitation of generating numbers, and tempering of intervals). Thus, in describing the quality of various kinds of lives—and the types he names allude back to what McClain calls “musicalized genetic theory”⁶⁷—Plato asserts that

the state of the soul was not included, for this unavoidably depended upon the kind of life one chose. The other qualities [the pre-ordained conditions of a life, or “luck”] were mixed with wealth and poverty, with health and disease, and some too were moderate in these respects.⁶⁸

The usefulness of more or less dissonant tunings as a means of portraying the variety of human lives, especially in their moral aspect, allows the following statement to be applied both to acoustic facts and to “life”:

⁶⁴Tones (8:9) arise from the procedure of dividing the octave by both arithmetic and geometric means, i.e. 1:2 has to be expanded to 6:12 to accommodate the divisions in integers: 6:8:9:12.

⁶⁵The arithmetical way of handling small discrepancies (intervals such as the *diaschisma*, 2025:2048) is to increase the size of the lowest common denominator. An important one in Plato—called the “sovereign number” because it embraces a particular set of integer ratios—is 12 960 000.

⁶⁶*Republic* 546D.

⁶⁷*The Pythagorean Plato*, 12.

⁶⁸*Republic* 617E-618A (Grube, 260).

Many temperaments are theoretically possible. Each is characterized by the preservation of some principle at the expense of others. The system depends on the choice one has made, on style.⁶⁹

Plato's image of tempering is embodied politically in the principle that a well-run city (the Greek *polis* means also "state") requires that every citizen, i.e. integer, be prepared to sacrifice a small part of his due for the sake of the common good.

The requirement of perfection in the realm of the gods and, hence, their practice of "temperance" is symbolized in the myth of Er by the function of the three Fates who attend Necessity and turn the spindle to which are fixed the spheres.⁷⁰ Since the spheres—each with its attendant Muse—are a divine musical creation, they are mathematically ordered by the simplest ratios: these create the framework of a Dorian octave (d -A -G -D).⁷¹ According to the relative distances between the planets (expressible as integer ratios), the two tetrachords are filled with a descending Dorian pattern (d -c -B^b -A) and its ascending **reciprocal** pattern (D -E -F[#] -G). The implication of the planetary spheres being set in counter-motion to the sphere of the fixed stars is simply that the celestial music consists both of the descending Dorian scale (the upper tetrachord repeating itself) and its ascending reciprocal scale (which happens to resemble the modern major):

Table 2-3 Dorian Scale with Its Reciprocal

smallest integers	384	432	486	512	576	648	729	768
falling (Dorian)	D	C	B ^b	A	G	F	E ^b	D
rising (reciprocal)	D	E	F [#]	G	A	B	C [#]	D ⁷²

It is the work of two of the Fates, Clotho and Atropos, to maintain these two movements, to the right (the fixed stars) and to the left (the planets), while Lachesis "takes hold of either [the outside orbit or the inner ones] in turn, with one or the other hand".⁷³ What does Lachesis do in this way? The problem with

⁶⁹Siegmund Levarie, review of *The Pythagorean Plato*, in *The Musical Quarterly* 64 (July 1978): 405.

⁷⁰*Republic* 617C.

⁷¹McClain uses D as his reference tone because on the keyboard its role as a centre of symmetry is visually reinforced.

⁷²See McClain, *The Pythagorean Plato*, 52.

⁷³*Republic* 617C.

the tuning of Pythagorean fifths has already been mentioned: “starting from D, the tones A E B F# C# are progressively too sharp, and the tones G C F B^b E^b are progressively too flat, to co-ordinate perfectly with cycles of octaves [invariant and hence divine structures symbolized in the spherical form of the universe]”.⁷⁴ In his human constitutions, Plato uses this fact to emphasize the problem of “boundlessness”—which is another way of speaking of injustice.⁷⁵ But his celestial constitution can show no musical discrepancies; hence, Lachesis tempers by turn the scale and its reciprocal. The fact that tempering is implied here seems to be underlined, in addition, by the way the three Fates are themselves seated “round about at equal distances”:⁷⁶ the only way in which their divine circle (1:2) may be equally divided is by means of an irrational value— $\sqrt{2}$ —which may stand for the irrational values that are always required in order to temper a tuning.

The city of Atlantis is the luxurious city; its tuning system is just tuning, and the addition of five to the generating number series creates a total of 121 tone values in the octave, “the integers $2^p3^q5^r$ being understood tonally and given reciprocal functions”.⁷⁷ Finally, in *Laws*, Plato works with another tuning model, derived from Archytas; the structure of society in Magnesia is generated by the integers $2^p3^q5^r7^s$.⁷⁸ McClain’s study is in effect an extended series of glosses on a selection of the most intractable passages in Plato, but one which is remarkably self-consistent.

McClain’s claims are bold but undogmatic. He stresses that his interpretation, even if it is “the likely one”, is not the only level at which these allegories may be received. However, inasmuch as his calculations are, as a systematic explanation, either valid or invalid, his work purports to have unlocked enigmas “apparently for the first time since early medieval theorists, separated from classical Athens by many generations and misunderstandings, began to worry a text that had originally been very clear to Plato’s friends and disciples”.⁷⁹

⁷⁴McClain, *The Pythagorean Plato*, 53.

⁷⁵“The question before us is not simply how a city comes into being, but a luxurious city. That’s not a bad notion, perhaps. A city of that sort might show us possibly how justice and injustice grow up in states. . . . Then we must make the city larger again . . . for that healthy city is not enough now; it must be swollen and filled with people and things which are not in cities from necessity” (*Republic* 373B; Rouse, 169).

⁷⁶Ibid., 617C.

⁷⁷McClain, *The Pythagorean Plato*, 87.

⁷⁸Ibid., 97-115.

⁷⁹Levarie, 406.

In a review of *The Myth of Invariance*,⁸⁰ Fred Fisher predicted that its notions—of the importance of musically-derived philosophical ideas infusing the intellectual outlook of antiquity—would be only slowly assimilated by “the musical world”. *The Pythagorean Plato*, in tackling the near-sacrosanct Platonic corpus, stands the chance of being ostracized in classic Athenian fashion: the few reviews I have traced suggest that scholars in the philological tradition—or the editors of their journals—may well be uninterested.⁸¹ To musicians, though, the book may well seem promising: I find its perspective refreshing and suggestive, though I claim no special expertise in the field of Platonic studies.

The two foci of Platonic music—education and mathematics—may now be rejoined. For the theory of musical education surveyed above is only the start of a soul’s dialectical pilgrimage: “the ‘lower’ general education offered in the *Republic* could promote a moderate and fairly rational egoism”,⁸² but a higher discipline of thought was required to lead the soul into the fullness of reality.

The direct contribution of music to this “ascent” is mentioned briefly in *Republic* 531C and *Timaeus* 47C-D. Both passages suggest an antipathy on Plato’s part to sense experience as a guide to the best life. His real point, however, is that musical phenomena may all too easily serve the end of irrational pleasure; in order to benefit spiritually from them, their unchanging basis in number must be grasped. So he speaks of ascending from heard phenomena “to generalized problems and the consideration which numbers are inherently concordant and which not and why in each case”.⁸³ In *Timaeus* 47C-D, he asserts that

music . . . is granted to us for the sake of harmony; and harmony, which has motions akin to the revolutions of our souls, is . . . regarded . . . as meant to correct any discord which may

⁸⁰*Journal of Aesthetics and Art Criticism* 36 (Fall 1977), 123-24.

⁸¹This would not be the first time that an attempt of this kind has been cold-shouldered: Albert von Thimus’s *Die harmonikale Symbolik des Altertums*, 2 vols. (Cologne: M. Du Mont-Schauberg, 1868-76; reprint, Hildesheim: G. Olms, 1972) might have been forgotten entirely had not Hans Kayser taken up his ideas in a universalized form in the 1920s. It is from admirers of Kayser, in particular Levarie and Ernst Levy, that McClain has found inspiration and guidance.

The search for Plato’s meaning, however, continues. I mention a recent treatment of the “nuptial number” that frowns on the arithmetical interpretation of the passage (Edit Ehrhardt, “The Word of the Muses: Plato, *Rep.* 8.546”, *Classical Quarterly New Series* 36 [1986]: 407-20).

⁸²Iris Murdoch, *The Fire and The Sun: Why Plato Banished the Artists* (Oxford: Oxford University Press, 1977; Oxford Paperback, 1978), 43.

⁸³*Republic* 531C, in *Plato: The Republic*, trans. Paul Shorey, Loeb Classical Library, 2 vols. (London: William Heinemann, 1935), 2:193.

Chapter 3

Ancient Greek Theory III: Aristotelian Musical Science

The fragment *STOCHEION HARMONIKON* (*Harmonic Elements*) provides so firm a foothold in the bog of ancient Greek musical theory that one wonders immediately whether it and its author have not suffered historical dislocation. At least, it is something of a surprise for the musicologist to witness the revered Aristoxenus accorded peremptory treatment in a survey such as Grayeff's.¹ Certainly, he is granted the honour of having established the science of music.² But a note on the library of the *peripatos* adds an unusual perspective:

It is often assumed that those Peripatetics of whose works fragments have been preserved were the principal members of the school, but this may well be a wrong assumption. For men like Dicaearchus, Aristoxenus and the others whose fragments are found in Wehrli's edition all wrote for a wider public and for this reason became well known; whereas those who contributed to the evolution of the Peripatetic philosophy within the school, have largely remained obscure—with one or two exceptions, notably that of Strato. The rest are shadowy, and only their names, compiled by Diogenes Laertius, have come down to us.³

¹Felix Grayeff, *Aristotle and His School* (London: Duckworth, 1974).

²*Ibid.*, 51. Grayeff makes no comment on a phrase that still catches the attention of the layman.

³*Ibid.*, 82, n.1.

Zeller's treatment is more generous, both in its length and because it accepts the laudatory tradition of antiquity.⁴ The epithet *Ho Mousikos*—"musician"—is a welcome one, since it suggests that the Aristoxenian material is truly worthy of renewed study. However, the present approach is concerned equally with another set of factors. If Aristoxenus did not actually teach beneath the covered colonnade of the Lyceum,⁵ he certainly wrote in the shadow of Aristotle, and has often been depicted over against the Pythagoreans. A reconstruction of the setting in which Aristoxenus propounded his ideas seems to be an indispensable starting point in determining how radical a contribution his was, and in evaluating the authority with which scholars, ancient and modern, have invested his thought.

First, his background was thoroughly Pythagorean, since he had come from Tarentum in South Italy and had studied under Xenophilus, a Pythagorean, in Athens. His move to the Academy brought him into the world of Aristotle, who stands at a crucial point in philosophical history, a point he created himself by joining in his thought two streams which had up until then flowed their separate ways—the formalist type and the materialist type.

To use broad generalities, the formalist group held that the universe that presented itself to human senses was not "all that there is". Its source (and, in that, its unity) lay beyond it. Behind the changing face of the world with its growth and decay, its flux, was a permanence that remained unaffected, an absolute order that, in its unchanging presence, forbade men to say of the sensible world, "This is reality". The materialist group, on the other hand, held that matter was the whole of reality, that the smallest constituent particles of man and mouse were essentially the same, and that the difference in the identity of various sensible objects was the form in which these particles were cast. It seems that, because the materialist view contends for the sameness of substance, it thereby highlights the differences in the forms of sensible things. By the same token, the formalist view, in distinguishing the physical world from the Real World, throws into relief the interrelatedness, the underlying identity, of physical objects in their transitory nature, simply because the vital differences between objects are located in the world of Forms. Aristotle constructed, instead, a philosophy that would do

⁴E. Zeller, *Aristotle and the Earlier Peripatetics*, trans. B. F. C. Costelloe and J. H. Muirhead, 2 vols. (London: Longmans, Green, 1897), 2:429-38.

⁵*Peripatos* means "a place for walking". It refers to the manner of Aristotle's teaching, the master instructing his pupils as they walked up and down the covered way that connected the temple of Apollo to a shrine of the Muses. The grove sacred to Apollo Lyceus, outside the Athenian city limits, was allotted to Aristotle because of his metic status. See Grayeff, 38.

justice to both claims—those “of systematic unity and those of independent plurality”.⁶ In this, the way was opened for the type of empirical method that Aristoxenus would later use.

This synthesis operates more specifically in Aristotelian mathematics in bringing together the formalist emphasis on abstract measurements and classifications with the materialist emphasis on a type of physics. Brumbaugh puts it nicely, showing, by some careful phrasing, that the balance between the two emphases is a delicate one:

Mathematics has to do with unchanging quantities—numbers, figures, ratios—which the mathematician treats as having independent existence. In fact, however, such things as a square do not exist apart: it is by an operation of intelligence that the mathematician abstracts the ideal square from various concrete squares in his experience. Instead of a physical matter, he envisages the square in a mathematical space which is an intelligible matter.⁷

Going further, one may see how the tools which Aristoxenus inherited for his work were forged only in the fourth century B.C., in the form of the “new geometry”. It was not that the new geometry did not use the measuring methods of the old: it did, but it used them to explore the areas between integers, the fractions that were not expressible in Pythagorean arithmetic, because they were ir-ratio-nal. Crocker again supplies a very lucid commentary on the meaning of fourth-century geometry for the musical theorist.⁸ The *Harmonic Elements* reflects something of Aristotle’s synthesis and is therefore not pure empiricism.

This issue may fruitfully be regarded as a problem of modes of apprehension, i.e. the nature of the mental acts involved in locating the all important *archai*, the basis of every Aristotelian science.⁹ Lee’s article traces the parallel between Plato’s upward and downward movements in dialectic (*noësis*, the intuitive stage of grasping genus, and *dianoia*, the deductive stage of detailing species) and Aristotle’s ideas of *nous*, the exercise of intuitive reason in locating

⁶Robert S. Brumbaugh, *Philosophers of Greece* (London: George Allen and Unwin, 1966), 174.

⁷*Ibid.*, 193.

⁸Richard L. Crocker, “Aristoxenus and Greek Mathematics”, in *Aspects of Medieval and Renaissance Music: A Birthday Offering for Gustave Reese*, ed. Jan LaRue (Oxford: Oxford University Press, 1967), 96-111.

⁹The ideas of this and the following two paragraphs build on the suggestions of H. D. P. Lee in his article “Geometrical Method and Aristotle’s Account of First Principles”, *Classical Quarterly* 29, no. 2 (1935): 113-24. He argues that Aristotle’s entire doctrine of first principles rests on geometrical thought about “elements”, as conveyed most clearly in Euclid. Some of the distinctions among these *archai* will become clear in our discussion.

the premisses, and *epistêmê*, the demonstrative faculty of finding conclusions by deduction. Quite as pertinent is the mathematical model contained in Plato's formulation of dialectic (*noêsis* reduces geometry to its principles, *dianoia* re-erects the various deducible theorems in a single chain), since Aristotle seems, directly or indirectly, to have used geometrical thought as the model for the *Posterior Analytics*, particularly. The similarity of their thinking extends to both terminology and function.

In addition, Aristotle regards first principles as amenable to *epagôgê*, a mode of perception whose procedure involves a review of instances given to sense perception, in order to proceed, by means of similarities, from particulars to universals. The method of natural science is unmistakable here. The procedure implied by the word seems to be broader than in the case of *nous*, though, from the account in *Prior Analytics* (B23), a mathematical setting would be perfectly plausible, if not preferable. However, Lee feels that it is derived more closely from Aristotle's study of biology. In any event, the two forms of mental exercise are complementary, *epagôgê* being the first phase of development from sense through memory and experience, and *nous*, the final step of insight into the general principle involved.

Finally, there is the method of dialectic, which again resembles but broadens the Platonic model. As handmaid in the task of reaching the *archai*, dialectic implies a few sub-methods, or general principles of endeavour, e.g. dialectic reasons from *endoxa*, "common opinion", but with perfect logic; it has no premisses of its own to start from, unlike a science, and involves no specialised knowledge of any particular field; it pursues inquiry in any and every field; it proceeds by question and answer, by a two-person discussion of an accepted definition. Most important, it frequently begins, in Aristotle's hands, "by surveying either the opinions of previous thinkers or generally current beliefs, to examine them and bring out their contradictions, and to discover some underlying principles on which, in spite of superficial contradictions, they are in real agreement, or which will effectively solve the problems they raise".¹⁰

Thus, in order to advance his version of the genera within the new mathematical praxis, Aristoxenus begins by defining basic concepts such as "sound" and "pitch", and he is critical of those who simply begin with scales, the stuff of musical practice, and fail to draw up any consistent picture of their

¹⁰Lee, 123.

constituent elements.¹¹ From Aristotle's *Physics* comes the important idea of continuity which Aristoxenus applies to music. Sound, he argues in full agreement with the Pythagorean definition, appears in two forms: a) the "continuous" sound of the spoken voice, which modulates through pitches like a siren or a glissando on a stringed instrument; b) the separate sounds of a song or scale. However, contrary to Pythagorean thought, he does not believe pitches to be the product of numerical ratios, but conceives of them as points on a continuum of potential sounds delineated by their functions in a melody. Consequently, he does not refer to pitch as a function of the length of a monochord string, but of its tension. Relaxation of the string yields a graver note, tensioning yields an acuter. This fits rather well the idea of mathematical continuity, i.e. "the continuity of an infinite number of points on a line, each occupying a position but no space".¹² Aristoxenus's own definition of an interval as "a space capable of containing pitches greater than the lesser pitch and lesser than the greater"¹³ illustrates his choice of continuous rather than discrete sound as a starting point; his empirical technique allows him to work with an infinite number of musical intervals (perhaps, more practically, we can simply say "all musical intervals") rather than only those justified by number ratio. In the same breath, however, we must affirm the most significant conclusion to which his empiricism leads him: he must take seriously contemporary musical practice, for this is where raw sound takes on intelligible shape. This observation suggests a brief consideration of Aristoxenus's relationship with the music-making of his time.

From all accounts, the music of the Hellenistic age was a far cry from its classical ancestor. With the autonomy of the artist *qua* artist beginning in the sixth century B.C., the years that followed saw the explosion of musical virtuosity and the brushing aside of the old "rules and regulations" in favour of experimentation. The unity of the arts expressed in the concept of *mousikê* was done for, and specialisation in both musical roles and technique flourished. Obviously the overall picture of musical culture was a confused one, and Aristoxenus, aware of this as he began to theorize, saw his task, at least in part, as the ordering of this chaos, for instance with regard to keys (*tonoi*):

¹¹Aristoxenus's castigations of his predecessors' inadequate endeavours are scattered liberally through his text, e.g. 2-3, 7, 32-33, 36-37, 37-38, etc. The numbering refers to Meibom's divisions of the text, which are reproduced in both H. S. Macran's translation (*The Elements of Harmony* [Oxford: Clarendon Press, 1902]) and the edition by Rosetta da Rios (*Elementa Harmonica, Scriptores Graeci et Latini* [Rome: Typis publicae officinae polygraphicae, 1954]).

¹²Crocker, 100.

¹³Macran, 176.

No one has told us a word about the keys, either how they are to be arrived at, or from what point of view their number is to be determined. Musicians assign the place of the keys very much as the different cities regulate the days of the month. . . . Some authorities on music (*harmonikoi*) say that the Hypo-dorian is the lowest key, the Mixo-lydian a semitone higher, the Phrygian a tone above the Dorian, and similarly the Lydian a tone above the Phrygian. Others add the Hypo-phrygian flute at the lower end of the list. Others, again, . . . separate the three lowest keys, viz. the Hypo-phrygian, Hypo-dorian, and Dorian, by the interval of three-quarters of a tone, but the Phrygian from the Dorian by a tone, the Lydian from the Phrygian again by three-quarters of a tone, and the Mixo-lydian from the Lydian by a like interval. But as to what determines the interval between one key and another they have told us nothing.¹⁴

In order to test the nature of Aristoxenus's treatise in the broadest way, it is useful to begin by asking what sort of treatise Aristotle himself might have produced on the subject. He did, in fact, compile a work—*Peri mousikês*—but it is lost.¹⁵ D. W. Lucas has suggested that its subject was the mathematical aspects.¹⁶ From the *Harmonic Elements*, it is clear that Aristoxenus gave no quarter to the Pythagoreans—it is surely they who are referred to—whose theory of numerical ratios and relative rates of vibration he describes as “extraneous reasoning”.¹⁷ Aristotle himself debates with Pythagorean thought (or his versions of it) periodically: the closing chapters of the *Metaphysics* contain his refutation of numbers as causal agency, and in discussing what of value the school had offered, he admits nothing further than that “the attributes and the ratios of the musical scales were expressible in numbers”.¹⁸ The material in the *Problemata* (Book 19) on music is inconclusive, in the sense that it is considered to be at most a derivation from Aristotle's own book of that title. Still, it is a useful reference, being imbued with Peripatetic doctrine. Most of the problems arise from observation and only a few resort to mathematical solutions. Even the sensation described as “concord” is interpreted in metaphysical categories:

[W]e delight in concord because it is the mingling of contraries which stand in proportion to one another. Proportion, then, is order, which, as we have said, is naturally present. Now that which is mingled is always more pleasant than that which is unmingled, especially if, being

¹⁴Ibid., 192-93..

¹⁵From “compile”, it may be inferred that the work was part of the esoteric group of lecture-records used in the school but never published, i.e. *akroamatika* (“works for listening to”).

¹⁶See his edition of Aristotle's *Poetics* (London: Oxford University Press, 1968), xiii.

¹⁷*Harmonic Elements*. 32.

¹⁸*Metaphysics* 985B32, trans. W. D. Ross in *The Works of Aristotle*, vol. 8 (Oxford: Clarendon Press, 1908).

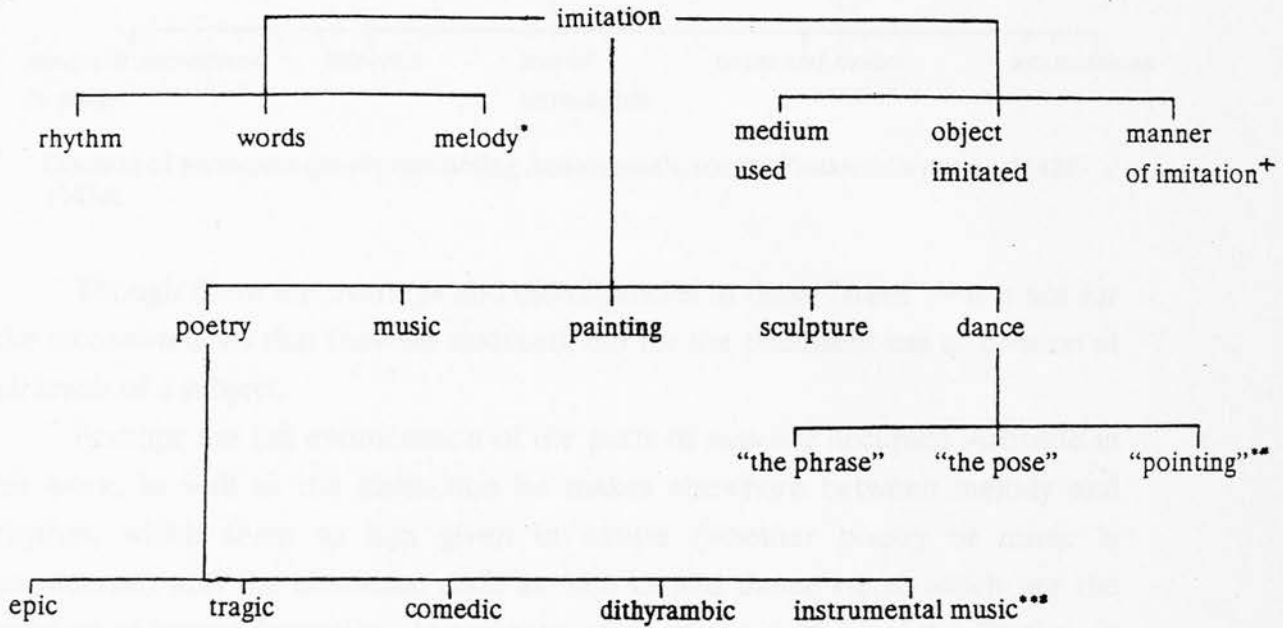
perceived by the senses, it contains equally the force of both extremes; and in a concord the proportion has this characteristic.¹⁹

In any event, the original, rational account of music would probably have been closer to the ground-breaking nature of the *Poetics* than to the compendious summary of the *Rhetoric*: Aristoxenus reflects both the extent of prior discussion and its lack of scope. Theophrastus's work on harmonics presumably post-dated Aristoxenus's, to judge from the absence of all mention of it in the *Harmonic Elements*.

The *Poetics* achieves its greatness in the course of a display of method that is proposed in the *Analytics* books. This, as will be shown, is no less true of the *Harmonic Elements*. Now, the *Poetics* touches on music only briefly, but enough to remind the reader that, in Greek experience, music and dance, as such, were considered to be important adjuncts of poetry, the entire complex bearing the name *mousikê*. By classifying this again as the major part of *poiêtikê*, Aristotle can characterize the respective "arts" as forms of imitation, this being the central theme in Greek theories of aesthetic production. Interlaced with this tree of classes is the threefold division of sciences—harmonics, rhythmic, metrics, etc., constituting the productive sciences, whose knowledge is aimed at the making of something. Thus, though imitation is not mentioned in the *Harmonic Elements*, the careful placing of the various sub-sciences (e.g. 1-2; 32) implies this derivation:

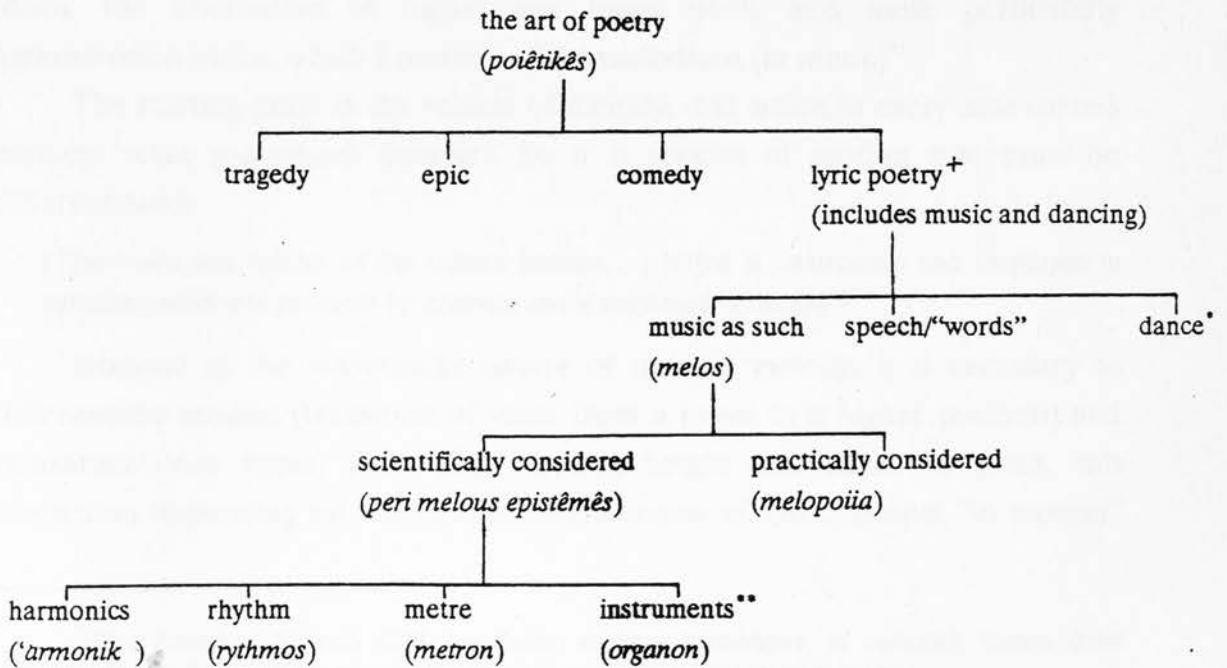
¹⁹*Problemata* 921A1-5, trans. E. S. Forster in *The Works of Aristotle*, vol. 7 (Oxford: Clarendon Press, 1927).

Figure 3-1 Overview of Mimetic Divisions



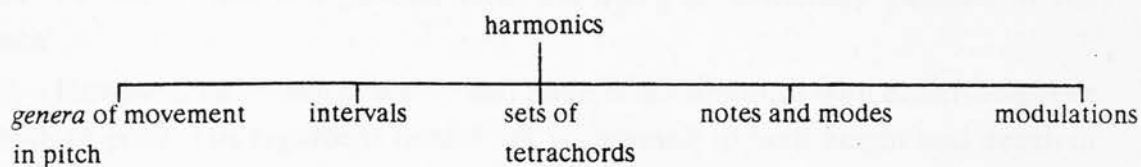
- + All "imitation" may be distinguished thus.
- * General means of imitation.
- ** "Elements" of dance; see Plutarch, *Table-Talk* 747B-C.
- *** Aristotle's categories of poetic imitation; *Poetics* 47A15-20.

Figure 3-2 The Subdivision of the Separate Genus



- + Aristotle's division of the genus; *Poetics* 47A.
- * Traditional association of words, music and movement, often referred to as *mousikê*.
- ** Aristoxenus's division of music; *Harmonic Elements* 32.

Figure 3-3 Possible Divisions of Harmonics*



* Division of harmonics closely resembling Aristoxenus's; see Ps.-Plutarch *De musica* 1142F-1143A.

Though there are overlaps and discrepancies in these “trees”,²⁰ it is not for the inconsistencies that they are adduced, but for the persistent use of division at all levels of a subject.

Perhaps the full enumeration of the parts of *mousikê* occupied Aristotle in his work, as well as the distinction he makes elsewhere between melody and rhythm, which seem to him given in nature (whether poetry or music is considered) and the elements, such as metrics and dance steps, which are the product of human invention. At any rate, much of the method of the *Poetics*—in particular that of *diairesis*, the division of a subject through differences—is echoed in Book 1 of the *Elements*.²¹ The point of the “enumeration of parts” is the fixing of definitions from which may be deduced the attributes of each species. These will necessarily be the attributes of the genus, though they will not appear in its own definition. Aristoxenus clearly begins, not from genus, but with species: *melos*, the alternation of higher and lower pitch, and more particularly *hermosmenon melos*, which I render as “the melodious (in music)”.

The starting-point is the vehicle of melody, that which in every case carries melody: voice movement (*synesis*). So it is species of motion that must be differentiated:

[T]here are two species of the voice's motion. . . . [O]ne is continuous and employed in speaking, while one proceeds by intervals and is employed in singing.²²

Because of the diastematic nature of musical melody, it is necessary to differentiate tension (transition of voice from a lower to a higher position) and relaxation (vice versa) from their results, height and depth of pitch, this distinction depending on the mutual exclusiveness of the concepts “in motion”

²⁰For instance, Macran (223) produces another breakdown of *mousikê*, drawn from Aristides Quintilianus, that arranges the divisions in a more patterned manner.

²¹A handy summary of the process is to be found in James Hutton's introduction to his translation of the *Poetics* (New York: Norton, 1982).

²²*Harmonic Elements* 10.

and “at rest”. Pitch is a general term indicating a “stationary position of the voice”.²³

However, Aristoxenus insists that pitch is not identical with either height or depth of pitch. His argument runs: Pitch is common to both height and depth of pitch. Height (or depth) of pitch cannot be common to both height and depth. Therefore, pitch must be a phenomenon distinct from height and depth of pitch.²⁴

Besides this characteristic piece of reasoning (which, in this strict form, seems to militate against the equally Aristotelian habit of identifying, say, pitch only in its specific instances), the emphasis on motion and rest recalls the discussion of nature in *Physics*, Book 2. It would seem that voice, having this source of movement in itself, must be said to exist by nature; perhaps this is why Aristotle regards melody as a natural capacity. Nature as movement, or “innate impulse to movement”, is clear enough here; nature as attained form—its mode of structure—is reflected in the nested definitions (note/interval/ scale/melody) that follow.

That we are dealing with notions drawn from the *Physics* is confirmed in the digression as to “whether distance on the line of pitch admits of infinite extension or diminution”.²⁵ It is true that infinite extension or diminution are rejected on the basis of mechanical, physiological and psycho-physical limitations, not in principle. Yet the question of infinite divisibility of the line of pitch remains: it is clear from later discussions (e.g. 68-69) that the idea underlies his theory of functions, as it does in Aristotle.²⁶

In precisely this context, Aristoxenus argues for a recognition of functional finality over theoretical possibility:

In making any musical phenomenon the object of scientific knowledge, its definite side should be insisted upon, its indefinite features left in the background. Now in respect of the sizes of intervals and the pitch of the notes, the phenomena of melody are indefinite, while in respect of functions, common qualities, and orders of arrangement, they are definite and determined.²⁷

²³Macran, 173.

²⁴*Harmonic Elements* 12-13.

²⁵*Harmonic Elements* 13-15.

²⁶“No extension is at any one time actually divided into an infinite number of parts, though it may be alternatively or successively divided at an infinite number of points.”; see Ross’s translation of the *Physics* in *The Works of Aristotle*, vol. 9 (Oxford: Clarendon Press, 1952), 85.

²⁷*Harmonic Elements* 69.

Richard Crocker has traced this type of thought to its background in geometrical method, that freed it from the shackles of integer ratios, i.e. from an extra-musical framework. His observation is that such an approach uses its logic in order to account for the largest possible number of musical instances.²⁸ Aristoxenus knew full well that, logically speaking, a line (continuum) cannot consist of innumerable points (indivisibles): for this reason, any such idea is suppressed in the work.

Consideration ought to be given at this point to the question of whether the Aristoxenian assertions are indeed as self-evident as he claims, or whether unmentioned factors are at play. Hopefully, this is not prompted by mere tendentiousness. Alan Blum has, for instance, suggested that there is a great deal left unsaid—and unconsidered—in Aristotle’s play with the thought of his predecessors.²⁹ It is a means of establishing “the standard of true speaking in terms of which they [the predecessors] fall short”; further, the author claims a “concrete superiority”, a “genius” in the “same milieu of convention, opinion and falseness”.³⁰ In Blum’s view, this radical differentiation disguises “the essential conflict which thinking experiences in its efforts to re-think what needs thought”. Thus, if Aristoxenus seems to be asking the question “What is music?”—which is Flora Levin’s summary of his intentions, see 57—then the question which Blum feels is avoided, by the way in which the Aristotelian method secures for itself a part of being without investigating being as such, is “What is science?” What is musical science? What is respectable thought on the subject? These questions follow from it.³¹ Aristotle claims to be investigating the “whatness” of each genus chosen as topic; “whatness”, he says, is the primary sense of being.³² But “in limiting whatness to the whatness of that which it subjects it segregates whatness from that to which it is subject . . . that which gives the part its character as a part of whatness . . . and makes its subject something other than whatness . . . science speaks about what is other than whatness because science limits itself to a subject

²⁸“Aristoxenus”, 101-102; cf.: “[W]e . . . not only assert that there is a plurality of lichani in each class [of genus and shade], but even declare that their number is infinite” (*Harmonic Elements* 26).

²⁹*Theorizing* (London: Heinemann, 1974).

³⁰*Ibid.*, 34.

³¹See Blum, chap. 2.

³²*Metaphysics* 1028A.

which is only produced through an act that violates whatness. . . . Science then submits not to whatness at all, but to canons of clarity and reasonableness".³³

Crocker has stressed how careful the author is to avoid wandering from the leading idea of continuity in voice-movement, until he arrives at the concords, which, he claims, are underived. The Aristotelian system deals with divisions of this kind by "naming" the concepts anterior to any science, and operative in more than one science, axioms (*ta koina*), and the characteristic *archai* of each science are termed hypotheses and definitions. This may be perfectly necessary in a contemplation of how to create something—Aristotle's definition of an art—but Aristoxenus's panegyric emphasis on the "marvelous orderliness" of art as evidence of a "natural law" operative in the "right constitution of melody" should alert us to the possibilities inherent in the scientific method of creating conclusions about the nature of its subjects. Again, while the special laws of collocation are clearly enunciated in the treatise, the nature of the principle of collocation in general is not described in the sections extant. May it not have been a tight definition, like Aristotle's of the essence of tragedy, that gathered up attributes already dealt with?³⁴ Would it, too, have been tied to melody in a classic Greek style, or would it have been applicable to Gregorian chant and Romantic lieder as well?³⁵

³³Blum, 44-45.

³⁴Tragedy, then, is a process of imitating an action which has serious implications, is complete, and possesses magnitude; by means of language which has been made sensuously attractive, with each of its varieties found separately in the parts; enacted by the persons themselves and not presented through narrative; through a course of pity and fear completing the purification of tragic acts which have those emotional characteristics.
(*Poetics* 1449B, trans. G. F. Else).

³⁵This is not a vague generalisation. In the last part of his introduction (see n.20), Hutton traces the historic fortunes of the *Poetics* and reveals its varied influences. Interestingly, these are minimal in antiquity and profound in the Renaissance. They also show, almost invariably, how partial the readings of Aristotle were: they fed critics and playwright-poets a range of impetus. Inasmuch as Aristotle's thought could be remoulded in accordance with the aspirations of the times—e.g., catharsis understood, moralistically, as a means of moral betterment; the three unities, those of time and place serving that of action; the neo-classical insistence on the proper codification of literary forms, etc.—it encouraged the deep rooting of these features of the tragic art. In other words, the core ideas of the *Poetics* were shown to be applicable as standards of art. The same cannot be said of Aristoxenus's treatise. A book such as George Steiner's *The Death of Tragedy* (London: Faber and Faber, 1961) explores the breadth and persistence of the *Poetics* tradition.

The only clue we have is the suggestion that “the order that distinguishes the melodious from the unmelodious resembles that which we find in the collocation of letters in language. For it is not every collocation but only certain collocations of any given letters that will produce a syllable”.³⁶ This analogy harks back to part of the *Sophist* dialogue (253A-B), where correct collocation depends on knowledge of grammar (*tês grammatikês*). Flora Levin has drawn out this relationship in a persuasive argument.³⁷ For her, the kernel of Aristoxenus’s work is the identification (“naming”) of the mental faculty that orders music: *synesis*. The brace of laws adduced for ensuring melodious collocation are “the basic elements conceptualized by the mind of the composer in terms of which his musical utterance is formulated”.³⁸ The two fundamental activities involved in this musical “intuition” are those of the trained ear and the instructed intellect. On the grounds of this primacy of “thought”, she claims for him the rationalist outlook, in contradistinction to the empiricist.³⁹ Indeed, she clothes her explanation of the ancient writer’s method in the language of transformational grammar. *Synesis*, “musical intuition”, implies a “total musical competence”: she models this on Chomsky’s idea of underlying competence, or, more exactly, “the ideal speaker-hearer’s intrinsic competence”.⁴⁰

There can be no question that Aristoxenus refers to an underlying, unseen capacity of the “soul” as the source of all visible activity, music not excepted. Yet to regard performance as an “objectification” of a psychic grid, rather than the effect of a variable (thus, to a degree, unpredictable) play of abilities, is to assume a great deal. In the first place, modern understandings of the structuralist sort posit significant differences between the grid (deep structure) and the performance (surface structure). “The central idea of transformational grammar is that they are, in general, distinct and that the surface structure is determined by

³⁶*Harmonic Elements*, 37.

³⁷“*Synesis* in Aristoxenian Theory”, *Transactions and Proceedings of the American Philological Association* 103 (1972): 211-34.

³⁸*Ibid.*, 233.

³⁹This is an old distinction, of which a new statement may be noted: “The rationalist approach holds that beyond the peripheral processing mechanism [i.e. in the receptor system or in lower cortical centers], there are innate ideas and principles of various kinds that determine the form of the acquired knowledge in what may be a rather restricted and highly organized way. . . . Empiricist speculation has characteristically assumed that only the procedures and mechanisms for the acquisition of knowledge constitute an innate property of the mind. . . . The form of knowledge, however, is otherwise quite free.” These are a rationalist’s statements—Noam Chomsky’s—in his *Aspects of the Theory of Syntax* (Cambridge, Mass.: MIT Press, 1965), 48, 51.

⁴⁰*Ibid.*, 4.

repeated application of certain formal operations called *grammatical transformations* to objects of a more elementary sort.”⁴¹ The nature of the determination depends on the transformational operations. Nowhere in Aristoxenus is this idea broached.⁴² Aristotle refers to the difference between *dynamis* and *kinêsis* or *energeia*, potential and actual, but transitions between them are all that can be deduced.⁴³ Again, where he distinguishes activities from ends, he prefers the ends, for these are the aim of the things we do:

[T]he ends of the master arts [*mimêsis*] are to be preferred to all the subordinate ends [*melopoiias*]. . . . It makes no difference whether the activities themselves are the ends of the actions, or something else apart from the activities, as in the case of the sciences just mentioned [i.e. medical art—health; shipbuilding—a vessel; strategy—victory; economics—wealth].⁴⁴

There is conceivably a case to be made for the idea that, even at the level of the subordinate art of Harmonics, there is a process of imitation going on. Under “instruments”, Aristoxenus writes that

there is a certain marvelous order which belongs to the nature of harmony in general; in this order every instrument, to the best of its ability, participates under the direction of the faculty of sense-perception on which they, as well as everything else in music, finally depend.⁴⁵

This may seem a rarefied version of *mimêsis* indeed. Yet, according to Lucas, the word was made to serve in various contexts, for want of other, distinguishing terms.⁴⁶ But if this conformity with the nature of harmony (or the naturally melodious) stands in a description of knowledge, what has it to do with art?

To be strictly logical, sense-perception cannot harmonize any instrument with itself, but only with the other aspect of *synesis*, the intellectual grasp of the

⁴¹Ibid., 16-17.

⁴²His insistence that “we [should] place the supreme and ultimate, not in the thing determined, but in the activity that determines” (41) summarises his rejection of notation (of melody) as the heart of harmonic science, on the grounds that the signs indicate nothing more than the magnitudes of the intervals.

⁴³*Metaphysics* 1048A. I do not claim any authority for this parallel; the deep and surface structures might be looked upon as illustrating potency and actuality by analogy, which method of approximation Aristotle himself uses.

⁴⁴*Nicomachean Ethics* 1094A, trans. Harris Rackham, Loeb Classical Library (London: William Heinemann, 1939).

⁴⁵*Harmonic Elements* 42.

⁴⁶*Poetics*, Appendix 1.

art. It is clear from other references⁴⁷ that either from “insufficient theory” or a “faulty” one, other theorists had produced conflicting impressions of music. Intuitions seem not to have come into the matter. Levin’s idea of “underlying [musical] competence” comes far closer to a generalised musical talent (which must be presumed to be suppressed or neglected in societies in which not everyone practises the musical art). For her, the operations of sense-perception and intellect do not account for another element in *synesis*, the most fundamental: “the composer’s ability to image music in his mind” and, by extension, “the listener’s ability to react to its affective mental power”.⁴⁸ Lucas mentions just this capacity, *phantasia*, “a mental image, or the power of forming such”; he concludes that it “belongs to the theory of knowledge rather than of art”.⁴⁹

A final objection must be raised to her interpretation of Aristoxenus. His entire system, she claims, is a group of “rules underlying melodic progression, these rules being intuited by the musically competent mind”.⁵⁰ She compares

⁴⁷For example, *Harmonic Elements* 5 on Eratocles and his school, and 7 on the Harmonists with their “close-packed” scales.

⁴⁸Levin, 230.

⁴⁹*Ibid.*, 258. But for Chomsky, too, competence (linguistic) is a matter of knowledge possessed by individual members of a linguistic community, and a grammar is a description of this competence and, therefore, a model of competence. At this level, the analogy drawn with reference to Plato is fitting. At this level, too, Aristoxenus’s treatise is perfectly comprehensible. The issue of performance, which has been touched on (see 57 above), is quite different, since it concerns the use of language in concrete situations. Chomsky is clear that a grammar, though using the evidence of performance, nevertheless is not an account of performance which will include “grammatically irrelevant conditions”, such as memory limitations and simple errors.

All this has been noted by J. A. Dane, in “The Defense of the Incompetent Reader”, *Comparative Literature* 38 (Winter 1986): 53-72. In addition, Dane discusses the problems inherent in constructing literary theories based on these elemental ideas. It is interesting to note that the attempt to which he gives most attention, Jonathan Culler’s *Structuralist Poetics* (London: Routledge and Kegan Paul, 1975), actually avails itself of Saussurian ideas, despite its claim to use “Chomsky’s theory of language . . . to see what structural linguistics were actually doing” (quoted by Dane, 57). The problems this process gives rise to, the modifications in the meaning of “competence” that ensue, cannot be covered here. But it is significant to note that Levin, too, must depart from Chomsky’s rigid classification, when she tries to elaborate on the generation of music in the Aristoxenian matrix.

⁵⁰Levin, 233. Here, precisely, is the nub of the problem. As Dane has pointed out (see n.49 above), the distinction between competence and performance is important because of its consequences for the meaning of acceptability. “Incompetent” as to competence implies that a sentence (the particular structure interpreted by the grammar) is ungrammatical. But in the case of an utterance—a performance that requires on-the-spot interpretation by individuals—“grammaticalness is only one of many factors that interact to determine acceptability” (Chomsky, *Aspects*, 11). Thus, grammaticalness, as used by Chomsky, is a technical term that does not imply that ungrammatical sentences are illegitimate, or a “poor performance”. In fact, he holds that “grammaticalness cannot . . . coincide with the intuitive notion of deviance” (*Aspects*, 158). Levin, it seems, is here proposing exactly that, though she does draw attention to Aristoxenus’s exclusion of physically unproducible or inaudible sounds.

them, first, with the rules of chess, which not only regulate the game but also, in some sense, create it.⁵¹ Then she adduces the “rules of collocation” of the whole-tone scale that, in Debussy’s hands, generate progressions of chords (e.g. unresolved dominant sevenths and ninths) which tend to “obscure central tonalities”. An attempt is made elsewhere (chap. 8) to evaluate the role of the whole-tone scale in Debussy’s music: her approach is to an extent corroborated there. Aristoxenus, however, is involved in a process quite different from these suggestions.

Levin’s approach has been discussed at some length for the simple reason that it seems highly plausible. Moreover, at first glance, her view appears to be confirmed by a recent demonstration of the applicability of Aristoxenian concepts of analysis to an actual remnant of Greek music.⁵² Solomon uses the nested definitions of “parts” to explore the structure of the melody, and even to suggest, in a manner not unlike the application of figures of rhetoric to a Baroque

⁵¹Thus, Levin (like Culler) resorts to another type of theory, that of John Searle’s speech acts, to carry her propositions over into a description of made music. Searle actually differentiates regulative rules which “regulate a pre-existing activity, an activity whose existence is logically independent of the rules” and constitutive ones which “constitute (and also regulate) an activity the existence of which is logically dependent on the rules” (*Speech Acts* [Cambridge: Cambridge University Press, 1969], 34). For instance, in chess “the knight may move NSEW only, by a corner of three squares, the last being either to left or right”: this is regulative, i.e. has an imperative or concessive form. But “the aim of the game is that one player should win [by capturing his or her opponent’s king]” is no less a rule, a constitutive one, i.e. has the form of analytic description. “Constitutive rules do not merely regulate, they create or define new forms of behaviour” (Searle, 33). Levin’s transplant of these terms to Debussy can be done only on the assumption that music, like chess (or language?), is a rule-governed form of behaviour. In terms of “genus”, speech acts (language) are usually understood as a part of **communication** (cf. *mimêsis*). Is it a more rigorous explanation of communication as speech acts to concentrate less on rule-function (à la Searle) and more on the process leading from regulative to constitutive rules? This apparently upholds a distinction between meaning and communication: “What is represented [‘meant’ in words of speech] is a state of affairs, but what is communicated is not a state of affairs, but, one might say, the representation of a state of affairs” (John Searle, “Meaning, Communication and Representation”, unpublished paper quoted in R. L. Lanigan, *Speech Act Phenomenology* [The Hague: Martinus Nijhoff, 1977], 36).

⁵²Jon Solomon, “The Seikilos Inscription: A Theoretical Analysis”, *American Journal of Philology* 107, no. 4 (1986): 455-79. As Solomon points out, such attempts have been rare. That in itself reveals something of the preoccupations of those who have studied the ancient theorists: in attempting historical reconstruction, scholarly emphasis has predictably been on the harmonization of the maximum amount of material which is plentiful from a theoretical standpoint but scant from a practical one. Solomon limits his own task to the application of “Aristoxenian musical theory . . . to a musical fragment” with a view to enhancing appreciation of the aesthetic qualities of the music itself (457). This is in line with Aristoxenus’s own indication of the limits of harmonics (*Harmonic Elements* 2). Naturally, this cannot preclude the use of other “systems” of analysis to achieve the same end.

composition, how concepts of melic composition might be identified.⁵³ Even if his dissection does not demonstrate the terms of actual musical generation, it convincingly illustrates the influence of Aristoxenian ideas. Unfortunately, it uses only a single genus (diatonic) and *tonos* (Iastian) throughout, so that the more complex aspects of modulation do not arise.

But Levin may have fallen prey to the goal of her own mind: “a delineation of the basic elements conceptualized by the mind of the composer in terms of which his musical utterance is formulated”.⁵⁴ It would not be the first time that Aristoxenus’s theory has been misguidedly taken up;⁵⁵ and suggestions such as Winnington-Ingram’s that the extreme systemization of Aristoxenus’s view “may well reflect an actual process of regularization that had been taking place in practical music since the late fifth century”⁵⁶ do not promote caution in the task of “reading” the *Harmonic Elements*. It seems to me that the aura of logicity arising from the systematic approach of Aristoxenus **plus** his insistence on the judgement of the ear (*aisthêsis*) easily diverts minds schooled in scientific functionalism from the question “What is harmonic science?” to “What is music as determined by harmonic science?” and thence to “What is music?” Blum’s warning remains pertinent: we are forced to ask ourselves to what degree the practitioners of Aristotelian science might themselves have slipped from one to another.

To underline this, a few “difficulties” of the Aristoxenian text may be isolated. The division of the fourth has been mentioned; another problem concerns the genera.⁵⁷ Having admitted only the three types known to him from Greek musical tradition, Aristoxenus proceeds to delineate the *loci* of their

⁵³Ibid., 472-76, where he treats *agôgê* (“the succession of consecutive notes”), *plokê* (“weaving”, i.e. some form of non-consecutive movement), *petteia* (“repetition”) and *tonê* (“prolongation”).

⁵⁴“*Synesis*”, 233.

⁵⁵Malcolm Litchfield (“Aristoxenus and Empiricism: A Reevaluation Based on His Theories”, *Journal of Music Theory* 32 [Spring 1988]: 51-73) points to the long-standing belief—originating in the fierce tuning debates of the late Renaissance—that Aristoxenus’s writings upheld equal temperament. It is not surprising that, with the subsequent ascendancy of that temperament, the misapprehension has been perpetuated. The division of the fourth (the octave being of minimal structural importance to Aristoxenus) into two-and-a-half tones caused ancient and medieval controversy, since the theorist’s proof by fourths and fifths (the “principle of concordance”, *Harmonic Elements* 56-57) squares with neither the equivalent arithmetical computations nor practical experiment (Litchfield, 64). The significance of this discrepancy is addressed below.

⁵⁶NG 1:592.

⁵⁷See *Harmonic Elements* 21-27.

moveable, i.e. characteristic, notes by specifying distances involving quarter-, third- and half-tones. In the simpler presentation of Cleonides,⁵⁸ these are expressed on a division of the fourth into thirty equal units. The geometric background is perfectly clear; the expression of these *loci* as **pitches** was, however, beyond the means of Greek mathematics of that period. It requires a logarithmic division of the octave, so that each 1/30 unit can be expressed as a constant amount, viz. $\sqrt[30]{4:3}$ or 1.0096355. Being mathematically impossible, this quantification was therefore also aurally indemonstrable.⁵⁹ In short, it is a logical construct without an empirical basis.⁶⁰

Neither Litchfield nor Barker use these facts to belittle the *Harmonic Elements*: the writings, “as a theoretical treatise ... [are] consistent and persuasive”.⁶¹ Moreover, their historical significance has been sufficiently (though only relatively recently) clarified: they represent not only a major advance on the limited efforts of the Aristoxenian predecessors,⁶² but also a refocussing of peripatetic concerns.⁶³ What this chapter has tried to indicate are the “elements” of this early scientific approach to musical analysis, as well as its attendant difficulties. It may not be inappropriate to add that, in the modern musico-analytical burgeoning, the same issue—theory of music/theory of knowledge—remains central.

⁵⁸*Introductio harmonica* 6-7; see *SSR* 38-40.

⁵⁹See Litchfield, 54-55.

⁶⁰The same difficulty has been discussed in greater detail by Andrew Barker in “Music and Perception: A Study in Aristoxenus”, *Journal of Hellenic Studies* 98 (1978): 14-16; he concludes that “in crucial respects [Aristoxenus] mistook the proper direction of his science, and overstepped the limits which his methodological principles laid down” (16).

⁶¹Litchfield, 67.

⁶²See Andrew Barker, “Hoi kaloumenoi harmonikoi: The Predecessors of Aristoxenus”, *Proceedings of the Cambridge Philological Society* 204, new series 24 (1978): 1-21.

⁶³See, in addition to the comments above (50), A. B. Gottschalk, “The *De audibilibus* and Peripatetic Acoustics”, *Hermes* 96 (1968): 435-60.

Chapter 4

The Early Middle Ages I: Mode, Gamut, Scale

One need not read far in the recent literature on the Middle Ages to realize that scholarship has drastically revised its opinions, especially its negative ones, on the millennium from roughly 300 to 1300. There can be little argument about the beauties of Romanesque and Gothic architecture, since the evidence is plentiful and stands among us as an elegant rebuke to the sterility of much contemporary art. But equally, there exists a general willingness to call the "Dark Ages" by a less condescending name—the early Middle Ages—and to regard its cultural efforts with sympathy and even insight: sympathy, since changing political patterns were the source of frequent social turbulence, and insight, which flows from a new level of optimism about the integrity of early Christian civilization.

The visual and plastic arts of the early period (about 300-1050) have been documented with scholarly sensitivity and the help of modern photographic techniques; this scrutiny encompasses studies of art against its social background and the careful analysis of the "layering" in styles—barbaric/Germanic, Roman, Christian—and their various syntheses.¹

¹John Beckwith, *Early Christian and Byzantine Art*, 2d ed., Pelican History of Art (Harmondsworth: Penguin Books, 1979) is invaluable as an example of the sociological approach. See also D. Talbot Rice, *Art of the Byzantine Era* (London: Thames and Hudson, 1963; reprint ed., 1977). For the layering of styles and a greater concentration on Western European sources, see George Henderson, *Early Medieval*, rev. ed., Studies in Civilization and Style (Harmondsworth: Penguin Books, 1977).

Similarly, careful reappraisals of musical documents, while not overturning the contention that ancient i.e. pagan musical learning slumped drastically with the decline of the empire, demand a modification of the “benighted centuries” approach. The “blackout” of pagan learning in the early Christian era and its re-appearance around 1000, and particularly the culpability of the Church in the former, is an overdramatized picture emanating understandably from the devotees of classical antiquity. It is more true to say that what was preserved of Greek and Roman classical writings was in a sense superfluous to the needs of “church musicians”, at any rate; they began to generate their own theory of music which can be traced in the writings of Aurelian of Réôme, Regino of Prüm, Hucbald, the anonymous treatises (*Alia musica*, *Anonymus IV*, *Musica* and *Scholia enchiriadis*), Adelboldi, Bernelinus, Pseudo-Odo, Guido, Hermannus Contractus and John of Afflighem. The nature of that theory will be examined in some detail later.

Protests against this general consensus of historians have come either from those with too high a respect for antiquity, such as H. G. Farmer,² or from those who have perceived a genuine weakness. William Stahl’s complaint that early medieval scientific thought was practically moribund must be allowed to stand:³ recent findings of technological change and technical achievements in the medieval era highlight its “high” or late period (approximately 1050-1300).⁴

Robert Hoyt grants to critical scholarship the honour of this great revision of opinion:

Almost all of the texts available now were known a century ago, but most of them were not yet critically edited and their meaning and significance were less certain than now. The advance in historical knowledge has been primarily qualitative; but this qualitative advance has also produced a quantitative increase in knowledge, in the sense that many views or interpretations that were hitherto speculative or impressionistic may now be considered either firmly established or at least better founded on a critical understanding of what evidence has survived.⁵

²H. G. Farmer, *Historical Facts for the Arabian Musical Influence* (London: William Reeves, 1930), especially 41-47.

³Martianus Capella, *The Marriage of Philology and Mercury*, trans. W. H. Stahl, R. Johnson, and E. L. Burge, 2 vols. (New York: Columbia University Press, 1977), 1:232-40.

⁴Jean Gimpel, *The Medieval Machine: The Industrial Revolution of the Middle Ages* (London: Gollancz, 1977).

⁵R. Hoyt, ed., *Life and Thought in the Early Middle Ages* (Minneapolis: University of Minnesota Press, 1967), 4. Hoyt characterizes the period both as a “transition” and a “transformation”.

One consequence of this refocussing has been the blurring of the sharp line that was formerly scored across Western history at the start of the Italian Renaissance; in itself, this constitutes criticism of those votaries of classical culture who revelled in the classical world that the Renaissance had fashioned. Further, this revision has allowed ideas of continuity between medieval and modern periods to emerge; indeed, the concept of the individual as the “unit of social discourse” that underlies Western civilization, and which is so often automatically associated with the Renaissance, has its birth in the maligned Middle Ages.⁶

These ages were called “dark” because of a paucity of documentary remains; musical writings are certainly rather thin on the ground prior to 1000. In addition, there are the usual difficulties in dating and in determining which way currents of thought flowed.⁷ Thirdly, the study of the genre of treatises—their intellectual style, purpose and concomitant regulation of content—is a relatively new field, in which Lawrence Gushee has done some provocative work.⁸ But quite as much “darkness” arises at the modern end of the investigation. By over-

⁶J. B. Morrall, *The Medieval Imprint: The Founding of the Western European Tradition* (New York: Basic Books, 1967), chap. 1. It is commonly assumed that the Renaissance and, more particularly, the rise of capitalism are the creative forces of individualism; that in medieval times, “man was conscious of himself only as a member of a race, people, party, family, or corporation—only through some general category” (Jacob Burckhardt, *The Civilization of the Renaissance in Italy*, trans. S. G. C. Middlemore [Oxford: Phaidon Press, 1945], 81). Later, man becomes conscious of himself as, simply, “himself”.

A particularly telling refutation of the notion that the medieval artist was “essentially anonymous”, because he was willingly submerged in a corporate endeavour is marshalled by John Harvey, *The Medieval Architect* (London: Wayland, 1972), especially 32-43. Certainly, early modern experience brought with it important changes in subjective perception. But objectively, the medieval person had an imparted sense of function and significance through social structures which allowed a perception of society as analogous to a human body, and actually afforded greater opportunities for fraternization—and with it security and personal honour—than can be enjoyed in the rigidly stratified societies that have grown up since then.

⁷A neat example of both difficulties combining to confound is provided by ninth-century scale theory. E. J. Grutchfield (“Hucbald: A Millenary Commemoration”, *The Musical Times* 71 [August 1930]: 705) assumed that the anonymous *Musica enchiriadis* was of later date than Hucbald’s *De institutione musica*, and concluded that its scale of disjunct tetrachords represented a “progressive mind” i.e. one freed from strict adherence to Greek models. More recent investigations suggest that Hucbald, writing c.890, may actually have followed the anonymous author in time (c.860?); in any case, the reasons for the disjunct tetrachords arise from organum theory. (The Daseian notation favoured in the treatise is the only chant notation which adheres so closely to tetrachordal structure.) This “progressive mind” had no followers and drew only derision from Hermannus Contractus. Closer examination shows that Hucbald also made some changes to the Greek model (see below, 83); it was his version which was influential.

⁸Lawrence A. Gushee, “Questions of Genre in Medieval Treatises on Music” in W. Arlt, E. Lichtenhahn and H. Oesch, eds., *Gattungen der Musik in Einzeldarstellungen: Gedenkschrift Leo Schrade* (Bern: Francke, 1973): 365-433.

simplifying medieval music as being either *speculativa* or *practica*, and by using the idea of “*auctoritas*” far too freely, a good deal has been obscured that was clear when it was written. In scale theory particularly, changes made between Greek theory and Boethius, and between his writings and later modal theories, are customarily called “misunderstandings”.⁹ However, this assumes a continuity of thought, complete with mistakes, that is hard to prove. Despite the borrowing of nomenclature and some discrete concepts, the two tonal systems, Greek and Medieval, are essentially different.

A key to understanding early medieval theory is the nature of education as it developed from the late Roman period up to the Carolingian expansion. The first, pervasive change was the eclipse of the Greek language in the West from the third century A.D. to the sixth century. Despite its widespread use by the early Church in writings, liturgy and administration, it became finally the preserve of Roman patrician families, many of them pagan. The final links in the cultural chain between Eastern and Western Churches were broken by the barbarian invasions of the fifth and sixth centuries. However, the later invasions of the Eastern empire by Moslem armies helped, as we shall see, to squeeze the last drops of fruitfulness out of the former alliance of Eastern and Western sectors of the Church.

This drastic change of language and, with it, sensibility, was manifest in a radical shift of emphasis in the study of the liberal arts in the Roman schools. In Hellenic Greek estimation, summed up in the *Republic* 523-34, treatises in the liberal arts, whether the *eisagogê* (introduction) or the *protreptikon* (exhortation), were stepping stones on the way to a goal of perfection—philosophy, the study of the Good. By contrast, Roman education emphasized Ciceronian oratory as its goal. Grammatical treatises proliferated and the subjects of the *trivium*—rhetoric, dialectic (logic), grammar—pushed quadrivial studies to one side. Even Greek authors were studied more for their usefulness as oratorical models than for their intrinsic or propaedeutic value. In prefacing his translation of Aristotle’s *Categories*, Boethius (c.480-524) mentions this divergence indirectly:

⁹This view holds sway in the standard introductions to medieval music. Reese holds to it (*MMA*, 52, 134-40, 154-55) and it is echoed by Hoppin (*Medieval Music* [New York: Norton, 1978], 69). It is a difficult issue, depending on whether one feels the Carolingians were “misinterpreting” or “re-interpreting” the Greek ideas they rehabilitated. It is worth noting that they discarded or ignored as many elements of the Greek teaching as they adopted. The new theory worked by selection of likely-looking parts which may have seemed “true” (in the sense of “applicable”) to the later writers. This seems to be a typically medieval approach to pagan learning (see 69); the evaluation of it as either “misunderstanding” or “originality of synthesis” may be in each case a narrowly modern procedure.

In far distant ages, other cities transferred to our state alone the lordship and sovereignty of the world; I am glad to assume the remaining task of educating our present society in the spirit of Greek philosophy.¹⁰

That education never happened; but, together with Martianus Capella¹¹ and Macrobius,¹² he preserved Greek musical learning from being extinguished in the West. Not only would his work on music be read for a thousand years, but his translation of Aristotle's *De interpretatione* and *Categoriae* would serve to facilitate the incipient Aristotelian renaissance of the eleventh century. His writings, despite his self-appointed task of educating society, seem not to have been aimed at any audience in particular, nor to fit into any educational programme. While in outline his projected writings fit the quadrivial scheme, that does not seem to govern the contents too closely. Bower has argued convincingly that the *De musica* is in fact a translation-cum-adaptation of a lost work by Nichomachus, *Introduction to Music (Enchiridion)*, of which we have only fragments, and of Ptolemy's *Harmonics*.¹³ Like the pagan writers of the Theodosian epoch—Capella, Porphyry, Eutropius, Symmachus, Macrobius—Boethius conserved ancient learning in and for an indifferent society. However, since Latin Christian writing made a slow start, and the needs of schools meant pagan authors had to be used as school texts, some continuity with the older tradition was maintained, despite the objections of men like Tertullian. Most of the Church Fathers of the third to the fourth centuries were in fact not rabidly opposed to pagan learning: Gregory of Nyssa, for instance, was directly influenced by Philo Judaeus and the neo-Platonists. But they were predictably hesitant to adopt the liberal arts *en bloc* with the philosophical cornice replaced by a theological one. That might well have happened, since the two great shapers of Christian education, Jerome (d.419) and Augustine (d.427) were both deeply imbued with the pagan system of letters.

Despite Augustine's inability to read much Greek, his *De musica* (written 387-91)—six books on rhythmic which were to be rounded off by another six on *melos*—constitutes an essentially Greek framework, based very possibly on

¹⁰*Principles of Music*, trans. Calvin M. Bower (Ann Arbor, Michigan: University Microfilms, 1967), 4.

¹¹*The Marriage of Philology and Mercury*, Book 9.

¹²*Commentary on the Dream of Scipio*, Book 2, chaps. 1-4.

¹³See his comments in Boethius, *Principles*, 360-64. For more detailed argument, see his "Boethius and Nichomachus: An Essay Concerning the Sources of *De Institutione Musica*", *Vivarium* 16, no. 1 (1978): 1-45.

Aristides Quintilianus.¹⁴ In any event, he was building on a fusion of Aristoxenian thinking (basically less directly mathematical) with Pythagorean number theory (the *Timaeus* tradition). "The severity of Augustine's doctrine . . . seems to be the result of a deliberate attempt to restore a purely musical science of rhythmic against the usages of a whole tribe of grammarians and theoreticians".¹⁵

It was, however, the spread of monasticism, born in Egypt and promoted by St Benedict's communities in Rome in the 500s, that was to set the West off in a rather different direction. The development of thought in the monastic schools is by no means an easy matter to describe: what is clear is that, alongside the liberal arts that had been accepted by the Church through dint of effort by such men as Cassiodorus (480-575) and Isidore of Seville (d.636), as well as Augustine, there was another body of thought developing with the organization of religious life in communities. It must, however, be noted that even these writers were responsible not only for preserving the old teaching but also for setting up the new. If Augustine, Cassiodorus and Isidore stand together in a line, then it is one which tends increasingly to argue for the subordination of secular learning to Scriptural knowledge. They were not at all ill-disposed towards pagan writers, but their approach holds that the truths scattered by general revelation in pagan wisdom are all contained, distilled or unexpanded, in the special revelation of the Bible. Some skill in pagan disciplines was, therefore, desirable for the interpretation of "Bible science".

Cassiodorus's ill-founded reputation as a humanist transmitter has recently been effectively challenged.¹⁶ His influence on subsequent medieval thought stems from the convenience of his extremely thin "liberal arts" compilation that constitutes Book II of his *Institutiones* and which was almost certainly intended to amplify aspects of his magnum opus, *Expositio Psalmorum*.¹⁷

The same can be said for the "liberal" matter in Isidore's *Etymologies*, which is lifted largely from Cassiodorus. His approach is that of a transcendental etymologist, and the encyclopaedic form of his work, with its many heads, conceals a contracted interest and shallow level of explication.¹⁸

¹⁴Augustine, *De Musica*, ed. R. C. Taliaferro, in *Writings of St Augustine* 2, Fathers of the Church Series, no. 4 (New York: Cima Publishing, 1947).

¹⁵Taliaferro, *ibid.*, 162.

¹⁶J. J. O'Donnell, *Cassiodorus* (Berkeley: University of California Press, 1979), 205.

¹⁷A section of the *Institutiones* on music appears in *SSR*, 87-92.

¹⁸E. Brehaut, *An Encyclopedist of the Dark Ages* (New York: Columbia University Press, 1912), 31-34.

It is, in my opinion, more than a little misleading to speak of speculative and practical studies as if they were entirely distinct orbits.¹⁹ That sort of dichotomy would only reappear in the later Middle Ages. In the run-up to the Carolingian revival, however, encouragement was given to a kind of practical theorizing, centred on the growing body of chant, rather than to the purely speculative branches of study. R. W. Southern has described the dynamics of this process admirably.²⁰ The liturgically-ordered life of the religious communities provided “an impulse to thought which transformed the whole intellectual framework in the later Middle Ages by making the difficulties of practical life a starting point for the study of problems of universal significance”.²¹ A feature of Benedictine study in particular was that it avoided “an endless, systematic articulation of details [the encyclopaedist touch] and worked rather by extraction from sources and arrangement in a new book”.²² This cut-and-paste approach is exemplified in the first medieval treatise known to us, Aurelian of Réôme’s *Musica disciplina* (ninth century) which Gushee locates in “an intellectual milieu dominated by words”²³—in other words, the *trivium*, with the special Carolingian emphasis on grammar. Nevertheless, the treatise has been shaped by everyday needs, and the clearest expression of those shaping forces is the appearance of a quite new type of compilation late in the eighth century: the *tonarius*. This handbook of “chant connectors” was to become an important part of theoretical treatises soon afterwards (e.g. Regino’s), as well as being written or bound into service books for daily use. Since Huglo’s work on the tonary,²⁴ it is acknowledged that the tonary has a bifocal quality: it explains music as “a theory made manifest in tonal

¹⁹A. Seay, *Music in the Medieval World* (Englewood Cliffs, N.J.: Prentice-Hall, 1965), 3, tries to avoid the simplism of thought introduced by the Aristotelian terms *musica practica* and *musica speculativa* (which originally possessed precise philosophical meanings) by suggesting a symbiotic relationship between what he clearly conceives as two equal partners. But is this not another distorting idea? The nature of medieval theory is far more subtle and varied (or—alternatively—our understanding of it may be so now), and is distinct from practice in certain precise ways at different times. This is not to deny that much medieval theory is part of a speculative tradition; but loose generalizing in premises leads to corresponding conclusions such as “theory always follows practice”, theory has to “catch up” and “accommodate”.

²⁰R. W. Southern, *The Making of the Middle Ages* (London: Macmillan, 1953).

²¹*Ibid.*, 170.

²²*Ibid.*, 190.

²³“Questions of Genre”, 392.

²⁴Michel Huglo, *Les tonaires: inventaire, analyse, comparaison* (Paris: Heugel, 1971).

modes and . . . catalogue(s) chant melodies according to mode".²⁵ Thus, it has a didactic and philosophical use as a book of theory, while also being a manual of practice.

Another stimulus to a pedagogy related to practice, at a less advanced level, was the consolidation around 600 by Gregory the Great of the *schola cantorum* near the Lateran in Rome. His foundation brought to a culmination the efforts of various popes since the fourth century to provide sound elementary training for singers involved in daily liturgy. Once again, it is imperative to understand Gregory's motivation aright, as music historians have been quick to castigate this revered figure for his indifference to music, often linking the accusation with his failure to stimulate learning.²⁶ If it was indifference, it must be judged relative to his high concern for other aspects of church life. He removed the responsibility of chanting the liturgy from the only people who might have indulged in speculative thought, so that they could devote themselves to sermon and sacrament. If it fell to the minor orders to take over the musical duties of the liturgy, then we should reflect that this arrangement bore lasting fruit—the present cathedral choir-schools and monasteries such as Solesmes whose aim is the finest practice of chant. Though his antipathy toward pagan learning cannot be sidestepped, his overall effect on its by now jaded state should not be overestimated. In the light of the uncertainty, indeed scepticism, over Gregory's precise contribution to the chant which now bears his name, the *schola* seems to be his most lasting monument. In it, he established a model of education—chants taught by rote, but later aided by neumatic notation—on which Charlemagne capitalized.

The Carolingian revival itself has been variously interpreted. Some see in it nothing but a dictatorial urge to unite a massive section of Europe in fealty to one man, achieved partly through the manipulation of the liturgy.²⁷ A more generous view gives Charlemagne credit for a genuine love of learning and a sincere desire to see it spread far and wide.²⁸ His suppression of Gallican chant—a vain effort

²⁵C. W. Brockett, review of *The Southern French Tonary in the Tenth and Eleventh Centuries* by C. T. Russell, in *Current Musicology* 13 (1972): 107.

²⁶Hoppin's assertion ("Gregory seems not to have been interested in music for its own sake"—*MM*, 43), like Lang's ("[T]he pope did not care much for music in general, only acknowledging its existence and necessity for worship"—*MWC*, 64), summarizes the general chilliness of opinion.

²⁷Farmer, 209, 212.

²⁸For a brief appreciation in tune with the view presented here, see A. G. Dickens, ed., *The Courts of Europe: Politics, Patronage and Royalty, 1400-1800* (London: Thames and Hudson, 1977), 13-17 and his references (328).

that appeared to succeed in France only because the final Roman-Gallican mixture was dubbed “Roman”—as well as his personal supervision of the palace school and the patterning of his coronation by Leo on that of the Byzantine emperor all suggest yet another possibility: that he was seeking to recreate the old Roman *imperium* in a new, Christian splendour.²⁹

It seems that while succeeding in stimulating learning in his new schools, he failed—fortunately—to impose too uniform a curriculum on them. What he did achieve in that regard drove them initially even further from the liberal arts. He ordained for the whole kingdom a series of *capitula* whose content derived from the vocational training of monks evolved over centuries in Egypt. They were *psalmos* (liturgy), *notas* (writing), *cantus* (singing), *grammaticam* (reading), “catholic” books (Scripture and commentaries on it) and *computum* (“telling time”, the calculation of the church calendar and the changing hours of divine office).³⁰ The practical-liturgical slant is unmistakable. Yet Alcuin’s modest writings on the *trivium* and Aurelian’s treatise—Gushee suggests others like the *Enchiriadis* pair—hint at a watered-down version of the old trivial disciplines. In addition, with the growth of the schools during the ninth century, a specialization in teachers appeared—grammarians, *cantores* (teachers of old song), notaries, computists—which, although this did not imply a classical system or content, yet by its nature would open education once more to that possibility.

It is in the context of the *renovatio imperii romani* that the first strand of medieval scale theory appears—the eight-fold modality—and ironically it seems to have come from Byzantium. The increasing political antipathy between Rome and Constantinople only highlights how much they owed to each other. In the matter of liturgy, the flow is from the elaborate rite of the Eastern church to Rome. The history of this movement is unclear, but it is rooted in the earliest

²⁹The “archaic ultramontanist” of Pepin III and his son (Charlemagne) is interestingly dissected in A. Milner, “Liturgy and Politics in the Carolingian Empire”, *Studies in Music* (University of Western Ontario) 5 (1980): 23-24. Pepin III sought to impose on his dominions chant emanating from Rome. Charlemagne continued the attempt, but extended it to include the notion that the Emperor’s powers derived from Rome. Finally, the Frankish bishops, threatened by the imperial consolidation, used the power of Rome for their own ends: they passed off forged “papal decretals” as documents of ancient canon law which placed them under ecclesiastical authority rather than that of the emperor.

³⁰C. W. Jones, “An Early Medieval Licensing Examination”, *The History of Education Quarterly* 3 (1963): 19-29. See also P. H. Lang, *MWC*, 64, for the suggestion that these *capitula* had been current since the time of Gregory or not long after.

chant of Rome which was sung in Greek until as late as c.370; some bilingual chants survived the change of language, and the Latin Office and Mass were sometimes juxtaposed with singing in Greek. The distinctly Byzantine Kyrie appeared in the West only after Gregory, and the tradition of his having added four more modes to the original four smacks of Eastern theory which divided the eight modes into two groups of four modes each—the *kyrioi* (authentic) and the *plagioi* (plagal).³¹ Latin theory almost always worked with four binary modes. Byzantine domination in Italy from c.500-700 was emphasized by a line of popes (from c.650-750) who were either Byzantines or Orientals. Finally, Charlemagne's court included a Greek presence in the form of a leading scholar, Paulinus of Aquileia, recruited from this small North Italian patriarchate which owed allegiance to both pope and emperor.

Notker's life of Charlemagne includes an account of a Greek legation whose performances of Greek chant at Aachen prompted the Emperor to have the music notated and adapted to a Latin text.³² Notker's account has not been rated highly as a historical record: Thorpe characterizes it as "an anthology of monkish anecdotes".³³ But Handschin has demonstrated that indeed the Latin antiphons for the Octave of Epiphany—the precise feast mentioned—are shortened forms of Byzantine *troparia*.³⁴ Perhaps Charlemagne was not personally responsible for this, but the source of the chants is clear. Notker wrote at St Gall where some of the migrations of Orthodox monks, driven westwards by the threat of Arab persecution in Asia Minor, had been settled. This is the scattered explicit evidence for a Byzantine influence in Carolingian modal theory whose crude form may be that sketched out in the so-called "Alcuin" fragment:

³¹This 4+4 is apparently the arrangement in the Carolingian treatise *De modis musicis*. The attribution to Gregory, mentioned in Reese, *MMA*, 121, is part of a ninth-century tradition of veneration. See L. Treitler, "Homer and Gregory: The Transmission of Epic Poetry and Plainchant", *The Musical Quarterly* 60 (July 1974): 333-72. Treitler regards this "transferred importance" of Gregory as another instance of Charlemagne's "urge" to pass off his decreed changes as having papal authority and, therefore, of being divinely ordained.

³²Notker, *Charlemagne*, trans. Lewis Thorpe, in *Two Lives of Charlemagne*, Penguin Classics (Harmondsworth: Penguin Books, 1969), 142-43.

³³*Ibid.*, 34.

³⁴See Oliver Strunk, "The Latin Antiphons for the Octave of the Epiphany", in his *Essays on Music in the Byzantine World* (New York: Norton, 1977), 208-19. Strunk pursues an enquiry of Handschin's and comes to the conclusion that "the basis of the Latin melodies is Greek, but without Notker we should never have recognized it in the finished products, so drastically has it been transformed" (217).

Another defence of Notker's historical accuracy is S. J. P. van Dijk's "Papal Schola versus Charlemagne", in *Organicae Voces: Festschrift Joseph Smits van Waesberghe* (Amsterdam: Instituut voor Middeleeuwse Muziekwetenschap, 1963), 21-30.

Every musician must know that there are eight modes (*toni*) in music, for as a result of them all [melodic] combinations of tones (*omnis modulatio*) seem to be held together as glued. The mode is the least part of correct music (*musicae regulae*), just as letters form the least part of grammar. . . . Their [the modes'] names as we are accustomed to call them, have their origin for their authority as well as their sequence. [The *authentici* are so called for their superior authority, as the following sentence indicates, and the modes themselves are named for their sequence or place in the series, *Protus*, *Deuterus*, *Tritus*, *Tetrardus*.] For the first four are called *authentici* because their sound is higher and because they are to be masters and leaders of the other four. For this reason the first ones are higher and the others lie lower. . . . The first one is called *Protus* . . . the second *Deuterus*, the third *Tritus*, and the fourth *Tetrardus* (*tetrachius*) in the order in which they appear. The other four are called *plagii* (*obliqui, seu laterales*). This name is said to mean the lower part of these (*Protus*, *Deuterus*, etc.) because they [the *plagii*] are four in number. They do not completely withdraw from the former and are lower because their sound is more depressed than that of the higher ones.³⁵

But the implicit links suggested by recent research are even more telling. The Western version of the *oktoechos* is chronologically the earliest layer in medieval scale theory, and our earliest sources include syllabic modal cues called *echemata*. In Byzantium, these represented brief intonation formulae that by their characteristic melodic structure served to remind singers of the regular pattern appropriate to the chanting of each *echos*. As they appear in Western MSS, these words differ quite considerably, but orthographically they are clearly related, and have always been assumed to have come from Byzantine sources. Unfortunately, the earliest Eastern documents to include a set are the Hagiopolites treatises of the fourteenth century. Terence Bailey³⁶ feels that, in *De modis musicis* (tenth century), we have a Byzantine set predating that by about 500 years. His conclusions rest on the distinctiveness of the *De modis* set from both current Western ones and the later Byzantine forms which he argues could conceivably have developed from the earlier form (or forms), as well as the similarity of the component cells in the formulas of all three sources, e.g. A(G)IA, NANA, NEAGIE(S), ANE(S), ANANE(S):

³⁵*GS* 1:26-27, trans. R. H. Haggh in his edition of Hugo Riemann, *History of Music Theory: Books I and II* (Lincoln: University of Nebraska Press, 1962; reprint, New York: Da Capo Press, 1974), 350, n.16.

³⁶"De Modis Musicis: A New Edition and Exploration", *Kirchenmusikalisches Jahrbuch* 61-62 (1977-78): 47-60.

Table 4-1 Comparative Table of Syllabic Formulas³⁷

Mode	Paleo-Byzantine*	Standard Byzantine	Western**
I	annaneane	ananeanes, annanes	noanoeane
II	agagies	aneanes, aanes	noeais
III	nannaneagies	neanes	noeanoeane
IV	noeagis	neeanes	noeais
V	aia neagies	aneanes, nana	noeane
VI	nana nagies	aanes, aneanes	anne
VII	nenote anes	agia	noeane
VIII	noeagis	neagie	(noeais)

*From *De modis musicis*

**From *Commemoratio brevis*

Note: The “g” in noeagis, etc., may well be an example of Greek “rough breathing” omitted in Western usage, just as “*plagi*” (plagal) appears sometimes as “*plai*” in Carolingian texts.

There is also the support of Aurelian’s straightforward, if disingenuous, account:

As for words which are assigned to these modes, as is Nonannoene for the first mode, and Noeane for the second, and so on, I used to wonder what meaning they had. And so I asked a Greek what they signified in the Latin Language. He replied that they meant nothing, but were, for them, expressions of joy. And wherever the *vocis concentus* (elevation of the voice?) was greater, more syllables were assigned, just as for the protos authentic, which is the principal one, six syllables were assigned, viz. (Nonannoene); and in deuteris authentic, (Ae?)noeane. For the tritos authentic, since it is less important, only five syllables are set down, namely Noioeane. For their plagal forms the texts are all the same, viz. Noeane, or according to some people, Noeagis. The Greek, as an afterthought, added the following, saying that “in our language they [the words which accompany the tonic formulas] seem similar to those which men use when they are reproving plowmen or servants, except that the expression is one of a man speaking jocularly, not seriously, and involves a modulation of these tones”.³⁸

Bailey’s attempts to plot the progress of these modal formulas suggest that the early NOEANE types, which appeared toward the end of the 700s in the “orbit” of Charlemagne, had the value of relieving uncertainties in cheironomic notation. But in this, their least elaborate form, they were not always precise guides, since they sometimes failed to show crucial features of a mode, such as the position of the semitone. By 900 a similar system using melismatic *neumae*

³⁷Ibid., 56. See also n.31 above.

³⁸Quoted in T. Bailey, *The Intonation Formulas of Western Chant* (Toronto: Pontifical Institute of Medieval Studies, 1974), 20. The divergences between Aurelian’s formulas and those in the *Commemoratio brevis* are an indication of the variety encountered in documents containing the Latin *echemata*; see the table of variants, summarizing the tradition as found in tonaries in Michel Huglo’s article “L’Introduction en Occident des formules Byzantines d’intonation”, in *Studies in Eastern Chant III*, ed. Milos Velimirovic (London: Oxford University Press, 1973), 85.

was known, if not widely current, and by the mid-900s both systems were competing with the *Primum querite* formulas which were rapidly accepted and actually supplanted the NOEANE in the next century.

It is important to note that, if the later Byzantine *echemata* are anything to go by, there were alterations in both form and function in their move westwards, yet there was enough similarity between chant systems to make a borrowing feasible.³⁹ As instances of difference, it is notable that the *echemata* tend to end on the upper fifth in authentic modes; the Western formulas always end on the final. Secondly, the Eastern church used *echemata* for effecting a smooth transition from a psalm verse to the succeeding *sticheron*, *heirmos* or *troparion*; the Western *differentiae* come closest in function to this. The Western NOEANE formulas probably appeared at the end of antiphon and introit verses, in the form of modal vocalises for “investigating” melody: they were an intonation prior to the actual intonation of the psalm itself. The *neumae* seem to have been integrated into antiphons from being sung as *caudae* (“tails”) to chants, in much the same way that an Alleluia was continued in a *jubilus*. The *Primum* melodies were in all likelihood also relevant mainly to antiphons. The following comparative table sets out versions of the formulas discussed for each mode, viz., the Byzantine formulas, the Western vocables, the *neumae* and the *Primum querite* melodies:⁴⁰

³⁹Bailey (*The Intonation Formulas*, 32) comments: “That the formulas were useful at all is probably as much owing to the similarity between Eastern and Western musical procedure as to the judgement of the Frankish scholars who adopted them.” This is supported indirectly by a thought of Wellesz’s on the historicity of Notker’s story (see 72): “The fact that he [Charlemagne] ... was able to listen to Byzantine chant as if it were plainchant shows that he did not feel any stylistic difference between them in sound and execution; otherwise he could not have ordered the introduction of these new melodies into the Latin service of his chapel at Aachen, where the singing was considered a model for all the churches of the realm” (“The Interpretation of Plainchant”, *Music and Letters* 44 [July 1963]: 344).

⁴⁰The table is based largely on C. W. Brackett, “Noeane and Neuma: A Theoretical and Musical Equation”, in *International Musicological Society: Report of the 11th Congress, Copenhagen 1972*, 2 vols., ed. H. Glahn, S. Sørensen and P. Ryom (Copenhagen: Hansen, 1972), 1:304-305. The Byzantine formulas are from Bailey, *The Intonation Formulas*, 12. The Byzantine formula for mode VII has been emended in Bailey (and here) to begin and end on D, rather than the C given by Huglo (90). See Egon Wellesz, *A History of Byzantine Musical Hymnography*, 2d ed. (Oxford: Oxford University Press, 1961), 413.

Table 4-2 Comparative Table of Intonation Formulas

Mode I

a-na-ne-a . . . nes

NO-AN-NO - E - A - NE

Pri - mum que-ri - te re - gnus De - i

Mode II

a . . . ne . . . a - nes

NO - E - A - GIS

ne - a - nes

NO - E - O - NO - E - A - NE .

ne . . . e . . . a - nes

NO - E - A - IS

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Mode V

a. ne. e. e. a. ne. e. e. e. es

NO. E. A. NE

Quin. que pru. den. tes in. tra. ve. runt ad nup. ti. as.

Mode VI

a. a. nes

NO. (A. MNE.) E. A. GIS

Sex. ta. ho. ra. se. dit. su. per. pu. te. um.

Mode VII

a. a. gi. a.

NO. E. O. E. AN. NE

Sep. tem sunt Spi. ri. tus an. te tro. num De. i.

Mode VIII

ne. a. gi. e.

NO. E. A. IS

Oc. to sunt be. a. ti. tu. di. (tu. di). nes.

It is worth mentioning Bailey's contention⁴¹ that the *neumae* and *Primum* formulas were not simply organic elaborations of the NOEANE stereotypes, but reworkings of them, made more comprehensive in application by being built on melodies most frequently encountered in chants of the mode in question.

By the eleventh century the tradition was breaking down, with wide melodic divergences creeping in. The formulas themselves had been made redundant by the precision of neumatic notation. But Bailey goes further in asserting that these were grafts onto Gregorian chant that never took, and that their demise was linked to the end of Byzantine influence in Western Europe.⁴²

There is some reason for suspecting that Charlemagne, far from being conscious of competing Greek influence, authorized incorporations from that liturgy because he believed them to be part of a forgotten Roman stream. Writers on fine art are especially illuminating on this point. Constantinople, for instance, had the status of an El Dorado in the Western mind, since the city symbolized, in Henderson's phrase, "the unbroken continuity of the Roman Empire".⁴³ Bede began his account of the conversion of Britain, "In the year of Our Lord 582, Maurice, the fifty-fourth from Augustus, became emperor; he ruled for twenty-one years".⁴⁴ This fusion of pagan and Christian elements (which, indeed, provided the basis of Constantine's Empire) was to be found everywhere in the Franconian revival. Charlemagne formed an Academy around himself, and gave names such as "Homer" and "Pindar" to its members, while he himself was called "David", an expression of his multifaceted career as shepherd of the people, warrior, protector of the faith, prophet and poet. In the Evangeliary of Prüm, profile heads like those on coins bear the inscriptions "D[avid] Imperator Augustus" and "David Rex Imperator". Panofsky⁴⁵ notes that Carolingian architecture also made no sharp distinction between pagan and Christian antiquity, and the art of illumination used to good effect the illusionistic values of

⁴¹*The Intonation Formulas*, 32.

⁴²*Ibid.*, 40.

⁴³*Early Medieval*, 103. In fact, the city's official title was *Roma Secunda* (see Beckwith, 75).

⁴⁴*Bede's Ecclesiastical History of the English People*, ed. B. Colgrave and R. A. B. Mynors (Oxford: Clarendon Press, 1969), 69.

⁴⁵Erwin Panofsky, *Renaissance and Renascences in Western Art*, 2d ed. (Uppsala: Almqvist and Wiksell, 1965; London: Granada [Paladin Book], 1970), 46-50.

Graeco-Roman art. Given these conditions, the musical borrowings we have been considering are all the more likely.

The nature of modal classification is drastically simplified in the neat tables of ecclesiastical modes endlessly reproduced in textbooks, and is thereby obscured. If the present modal classifications of chant are determined by final, ambitus, tenor and—a later refinement—emotion, they are the end-products of an early medieval process that “made them right” by typing them according to extra-musical categories to begin with. Werner has emphasized the roots of eight-fold modality in astronomical and calendric sciences in ancient Assyria.⁴⁶ He reckons the concept of *oktoechos* to have been planted in the Church through the dependence of liturgy on a calendar which incorporated certain Hittite features, principally the *pentakontad* of fifty days spanning eight Sundays. Liturgy can indeed be shown to have influenced the grouping of identifiable melodic types, e.g. the use of D modes for Byzantine Easter hymns, the exclusive use of plagal G and D modes for Gregorian invitatories, etc.⁴⁷ But the argument is dangerously close to being circular if it is pursued. Treitler ventures the thought of an “old tonality”, embodied in the formulaic patterns of centonization, which was differentiated into tonal categories by its use for specific sorts of chant (introits, alleluias, tracts).⁴⁸

If one subscribes to a formulaic basis of modal classification, then the appearances of melody patterns usually associated with one mode in the context of another have to be explained. Mixed modes (or “modulating chants”) present another aspect of the same problem which is helpful in illustrating the tension between practical tendencies in modal theory and the less accommodating nature of a strict adherence to the eight-fold schema. While the *parapteres* or parapter modes, like the intonation formulas, had a comparatively short lifespan, they seem to have been eclipsed for different reasons. The formulas, as we have indicated, were applied to only certain sorts of chant, but the classification system of the *oktoechos* had to do for all liturgical music. The impossibility of applying it without running into complications underlies this report of Aurelian’s:

⁴⁶E. Werner, “The Oldest Sources of Octave and Octoechos”, *Acta Musicologica* 20 (1948): 1-9.

⁴⁷K. Levy, “Plainchant”, *NG* 14:803.

⁴⁸*Homer and Gregory*, 371, n.2.

A number of the singing masters (*cantores*) claimed that there were certain antiphons which could be accommodated to none of the formulas (i.e. Nonanoeane, etc.). Whereupon the . . . Emperor Charlemagne ordered that four be added, for which the words placed below are used:

ANANNO NOEANE NONANNOEANA NOEANE⁴⁹

The result was emphatically not a prototypical twelve-mode scheme, however. The *parapteres* were never equated with tropes or modes, and (except in Berno's faulty theorizing on them) were not tied to octave species. Instead, they arose from melodic formulas and finals, and related to psalm tones.

The *De modis musicis* has the only explanation of these extra tones:

[They are] called *parapteres* because they prepare a path [*paro*, -are, "to prepare" + *iter*, "a way or path"] for descending into [or out of] verses within antiphons.⁵⁰

In other words, the available *differentiae* for linking antiphons to psalm verses fittingly did not cover antiphons which began in one tone and ended in another.⁵¹ Instead of creating further verse terminations, extra psalm tones were devised, and justified thus:

⁴⁹Quoted in Bailey, "De Modis", 48.

⁵⁰Quoted in C. M. Atkinson, "The *Parapteres*: Nothi or Not?", *The Musical Quarterly* 67 (January 1982): 44.

⁵¹Atkinson attempts to categorize the classification problems being dealt with under each of the *parapteres* tones in *De Modis*. The **first parapter tone** deals with *Miserere mei*, normally allotted to mode I, but containing the mode II intonation pattern in transposition, thus:

Example 4-a First Parapter Tone and Mode II Intonation

Mi-se-re-re me-i De-us et a-de-lic-to so-li pec-ca-vi.

Se-cun-dum au-tem si-mi-le est hu-ic.

This highlights a two-level classification (see Powers, "Mode", *NG* 12:383), that weighs both modal factors (beginnings, endings) and melody types. Most treatments of *Miserere mei* favour the first, adjudging it to be mode I. *De Modis*, however, makes it a special case.

The **second parapter tone** shows that the ending of the antiphon is critical for classification. The B^bs imply a deuterus mode, but the deuterus psalm tones link badly with the antiphon, both by reason of interval and by tonal dislocation. The second parapter tone is borrowed from Ambrosian chant:

Just as there are sometimes four, sometimes three, sometimes two concordances in the Gospel canon, likewise in a chant you will find [several] concordant tones.⁵²

But the opposition to these innovations was categorical, and also appealed to a traditional authority:

And just as no one has the power to increase the eight parts of the discipline of grammar, so can no one increase the number of the modes.⁵³

Example 4-b Second Parapter Tone and Mode III and IV Psalm Tones

The **third parapter tone** shows a fine example of “two-level” conflict. The opening figure and the tonality of much of the chant is *tetrardus*, but the ending is strongly *deuterus*:

Example 4-c Third Parapter Tone

In trying to “make it right”, the Lucca Antiphoner transposes the whole chant down a fourth—thereby electing mode IV—and solves the problems of the resultant F#s, which are non-existent on the gamut, either by rendering them as F-naturals or by omitting them altogether! The imperative is succinctly put in Odo’s *Dialogus*:

But if it suits no mode, let it be emended according to the one with which it least disagrees. This also should be observed: that the emended melody either sound better or depart little from its previous likeness.
(SSR, 111)

The **fourth parapter** deals with chants whose tessitura is far removed from the psalm-tenor. Not modal ambiguity but liturgical elegance is the issue.

⁵²Bailey, “De modis”, 49.

⁵³Aurelian, quoted in Bailey, “De Modis”, 49.

The source of these stillborn extra tones is uncertain. Because they resemble the usual intonation formulas and bear Greek texts after the NOEANE fashion, Atkinson argues for Byzantine roots, especially when he considers the presence of two extra *echoi mesoi* in the Eastern liturgy. Bailey sees in them “a halting step towards a system genuinely based on musical practice”.⁵⁴ He has Regino’s testimony in his favour, in support of a Western origin of the *parapteres*:

In these eight modes are comprised and included not only all the concords of sacred music, but even of all secular song. And it was because the Greeks boasted of their skill in having acquired as many as eight modes that he [Charlemagne] decided to raise the number to twelve. Then indeed the Greeks, that they might be like us and take part in philosophical discussions without being rated greatly inferior to the Latins, added similarly four modes, whose texts I have decided to include here:

NENOTENEANO NOEANO ANNO ANNES⁵⁵

Bailey’s conclusion is, therefore, that abandoning the *parapteres* was a move in favour of eight-mode dogmatism and procrustean methods of classification. It can be fairly argued that what appear to us to be specific impositions of the modal system on chant melodies are nothing more than accommodations to the demands of a liturgy moving toward greater variety of structure. Such could be deduced from instances of alterations to manuscripts of the kind noted by Nicholas Stuart.⁵⁶ But ironing out modal ambiguities also makes classification

⁵⁴Ibid., 60.

⁵⁵Quoted in Bailey, *Intonation Formulas*, 5-6.

⁵⁶Stuart’s survey (“Melodic ‘Corrections’ in an 11th Cent. Gradual”, *Journal of the Plainsong and Medieval Music Society* 2 [1979]: 2-10) of Aquitanian and Beneventan practices shows various “solutions” to ambiguous chants without recourse to extra tones. The communion antiphon “*Dum venerit*” has a distinctly *tritus* authentic opening, but, since the rest is clearly *tetrardus*, GR 249 has mode VIII.

Example 4-d Antiphon, “*Dum venerit*”

Dum ve - ne - rit

al - le - lu - ia, al - le - lu - ia

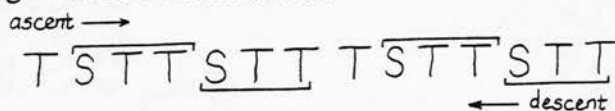
However, the gradual in question presents not only this possibility, but two emendations as well. From a Cistercian source, the whole chant appears reworked in *tritus*, and the monks of St Yrieix opted for mode V too, by simply transposing the last line down a tone:

appear to work better, and the insistence on categorizing chants that to this day are equivocal indicates the potency attaching to the eight-mode idea.

The second strand in medieval scale theory is the presence of ancient Greek musical concepts. We have examined their transmission to the Latin-speaking world, pre-eminently in Boethius. In the Carolingian revival of learning, evidently spearheaded by Northumbrian clerics, it was bound to be his hand which was most firmly felt. But it was a “filtered” influence: far from misunderstanding his teachings, the Frankish scholars selected from it only what they could adapt to their chant-based theory. It is in this sense that Harold Powers, surveying the work of Hucbald, calls it “a brilliant synthesis”.⁵⁷

The fifteen-note Greek gamut, one of the most obvious borrowings, proved, with slight modification, to be one of the most enduring. But it was shown to be adaptable, and the results of its handling varied. In considering the gamuts of Hucbald, the anonymous *Musica enchiriadis*, Pseudo-Odo and Hermannus Contractus, it is possible to speculate on the theoretical/practical motives of the authors.

That Hucbald was not misunderstanding Boethius but deliberately altering his material is evident from the fact that he reproduces the Greek model alongside his restructuring of it. He begins by running the Greek *systema* up as well as down, through diatonic tetrachords:



There is no hint of the Greek notion that the boundary notes of a tetrachord are fixed while the two inner notes shift according to *genera*: his TTS

Example 4-e Same Antiphon with Last Line Transposed



Evidently this mechanical approach is the earlier of the two by some sixty years.

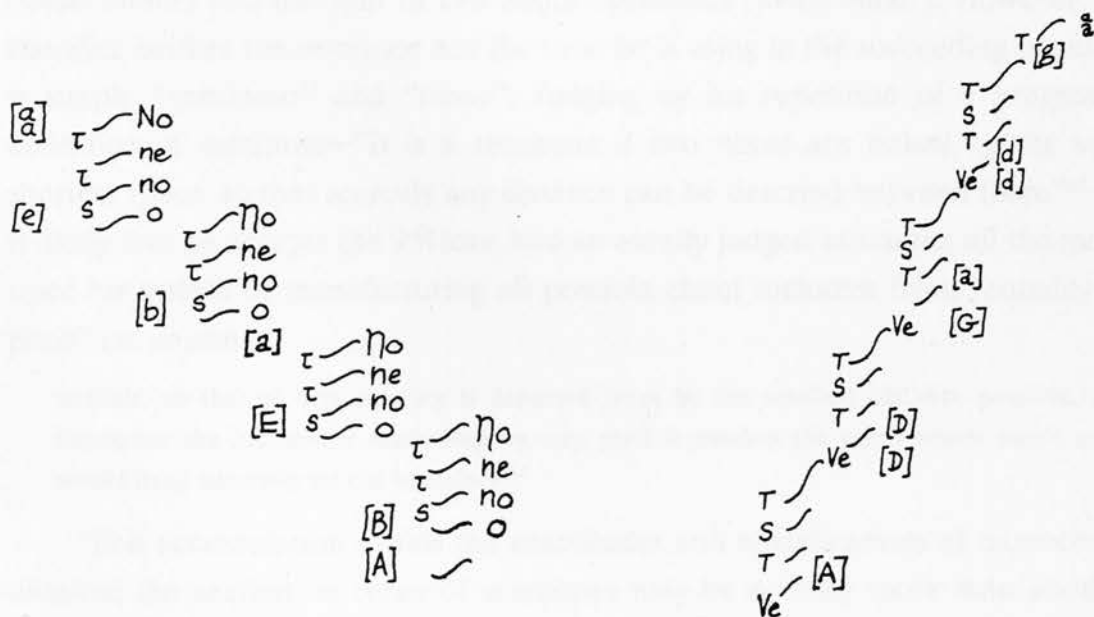
⁵⁷“Mode”, *NG* 12:380.

pattern is a fixed one. As if to confirm this, he points to the scale patterns found on “water organs, etc.,” which begin TTS T TTS and repeat:

But such musical instruments should not for this reason be thought at variance with the understanding, since during long ages they have been handled by so many intelligent men that they now stand tested and approved by the greatest intellects, and since, too, one observes that the pattern of the above arrangement of the notes appertains fully to these musical instruments. For the latter are planned in all respects duly according to those same two kinds [of interval, the tone and the semitone] and one may rest assured that they differ in no other respect than that their starting points are not calculated in the way set forth here, for they begin with the third note of the above arrangement.⁵⁸

Then, at a stroke, he finds another gamut in the Greek framework, which he begins at the lowest limit, taking it up through TST tetrachords, with the added note lying at the top of the range:⁵⁹

Figure 4-1 Two Gamuts in Hucbald’s *De harmonica institutione*



Hucbald, like the Greeks, does not conceive of an octave-repeating system: his use of Greek string-names and letter notation shows that his gamut is also a linearly simple extension. But he recognizes with the Greeks

⁵⁸*De harmonica institutione*, trans. Warren Babb in *Hucbald, Guido and John on Music* (New Haven: Yale University Press, 1978), 24. See *GS* 1:110.

⁵⁹*Ibid.*, 27-28.

that the upper eight notes are the same as the lower, except that the former are like boys' voices, the latter, on the other hand, like men's.⁶⁰

He is more impressed by the "altogether pleasant and harmonious sweetness, as though the sound were one and single" produced between 1st and 8th notes, 2d and 9th, 3d and 10th, etc.⁶¹

Again, in discussing intervals, he is careful enough to introduce the famous antique distinction between *semitonium maius* and *semitonium minus* that constitutes the only mathematical way of splitting the tone as equally as possible. But he refuses to follow the logic any further:

There are, then, two kinds of semitone but only one kind of tone, for at however high or low a pitch a tone is performed, it will contain no more or less distance and will thus remain one and the same.⁶²

There are, of course, three types of tone—the sum of major + minor semitones (*tonus*, 9:8 in terms of string lengths), the sum of two minor semitones (*tonus minor*) and the sum of two major semitones (*tonus maior*). However, he specifies neither the semitone nor the tone he is using in the succeeding pages: it is simply "*semitonus*" and "*tonus*". Judging by his repetition of a pragmatic definition of semitone—"It is a semitone if two notes are linked by the very shortest space, so that scarcely any distance can be described between them"⁶³—it is likely that he accepts the 9:8 tone and an aurally judged semitone; all the more since his system of manufacturing all possible chant melodies from "equality of pitch" i.e. unison

unfolds, so that at first equality is departed from by the smallest distance possible, and thereafter the increase is made step by step until it reaches the point where man's mind would itself naturally set the boundary.⁶⁴

This accumulation avoids the exactitudes and complications of monochord division: the section on types of semitones may be nothing more than another genuflection to Boethius, who regards them as of prime importance. The dropping of semitonal technicalities perhaps reflects Hucbald's intended

⁶⁰Ibid., 25.

⁶¹Ibid.

⁶²Ibid., 22.

⁶³Ibid.

⁶⁴Ibid., 16. The boundary is judged to be the tone + diapente (major sixth). Hucbald's definition of the tone is even more rule-of-thumb: the lowering or raising of a note "by a moderately small interval ... as it were, by one degree, so that the hearing notices the discreteness of the notes quite easily" (21).

readership too—people well acquainted with chant as practised. This coincides with Gushee’s opinion that “the citation of musical examples presupposes a wide command of the repertory on the listener’s or reader’s part”.⁶⁵

Another Greek concept of use to Hucbald was the *synemmenon* tetrachord which prepared his system for the many sung melodies that required a semitone after the eighth note i.e. our B^b; he notes that organs, water or otherwise, lack this feature:

You will find on every hand melodies in the various melodic modes proceeding with now one, now the other of these two tetrachords [the disjunct or *diezeugmenon*, and the conjunct or *synemmenon*].⁶⁶

It is in order to accommodate the *synemmenon* tetrachord in his alternate gamut (that built on TST tetrachords) that he departs from Greek theory, the *synemmenon* beginning on the seventh degree (G) in ascent, thus obtaining a “B^b” on the *paranetê synemmenon*, instead of on *tritê synemmenon*.

The closing sections of the treatise deal with the “target issue” of notational aids—a fact that leads some commentators to consider the work eminently “practical”—and mentions, in connection with the four modal finals, the four octave species that result from the combination of their flanking upper fifths and lower fourths. The *tetrardus* mode boasts a lone lower fifth, spanning a nine-note stretch. But the deep impress of Boethian theory leads Gushee to a different conclusion: “[N]otation was the conceptual tool which could bridge the gap between harmonic science and traditional church music, not merely a practical tool”. He adds that, as an introduction to the study of Harmonics, the *De institutione musica* shows “the very novel and important feature of using ‘practical knowledge’ as an aid to understanding”.⁶⁷

The scale found in *Musica enchiriadis* has always been noted as an oddity, and indeed it is. If one can speak of similarities with Hucbald’s ideas, then the use of TST tetrachords is an obvious one. But the idea of an endless, self-generating system of identical tetrachords, all disjunct, and limited only by “the judgement of custom” to eighteen tones is far from any Greek model. In addition, there are the daseian notation, the labelling of tetrachords (*graves, finales, superiores, excellentes*) and their constituent notes (*archos* i.e. *protos, deuterios, tritos, tetrardus*), and the explanation of the position of the tetrachord finales:

⁶⁵“Questions of Genre”, 397.

⁶⁶Hucbald, *Guido and John on Music*, 29.

⁶⁷“Questions of Genre”, 396-97.

To be sure, therefore, the simple and natural (*legitimus*) chant does not descend lower than the fifth sound to its final.⁶⁸

All these elements seem to indicate the weight of modal considerations with the author. But the implications of the gamut show this to be far from the case: no accommodation is made for the *tritus* “B^b” and the irregular octaves prevent modal melodies moving more than one note into the *graves* tetrachord—an important technical point as we shall see. Interestingly, the chants cited are limited in both number and range.

Figure 4-2 The *Musica enchiriadis* Gamut



The emphasis on organum in the treatise is well known and goes some way to explaining this unadulterated string of perfect fifths (*diapente symphoniae*). This extraordinary equivalence is clearly important in the light of the selection of fourths and fifths as the only proper intervals in early organum theory.⁶⁹ But the

⁶⁸*Musica enchiriadis*, trans. Leonie Rosenstiel (Colorado Springs: Colorado College Music Press, 1976), 3. I take this to mean “to the fifth sound below its final”.

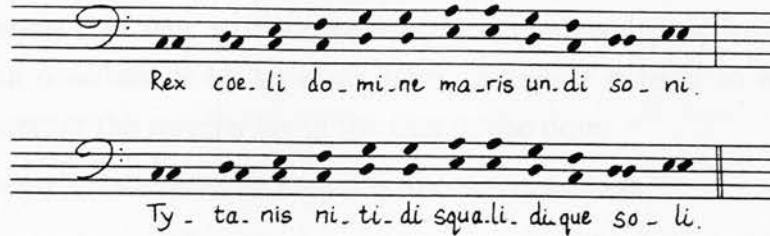
⁶⁹Sarah Fuller, “Theoretical Foundations of Early Organum Theory”, *Acta Musicologica* 53 (1981): 52-84. She points out that the octave is implicitly segregated from the fourth and fifth, being classed as an *aequisonus* (which is Hucbald’s term for a unison). See 88 for the relevant extract from the *Musica enchiriadis*. The objection so often raised to the presence of augmented octaves in the gamut is a misunderstanding of the theory being propounded: only fifths and fourths are referred to the gamut. Octave organum is simply the result of following the *vox principalis* at the distance of a *diapason*. The following, from *Scholia enchiriadis*, is pertinent:

D: How do the parts which are set at the octave harmonize in the same scale, even though the series does not correspond at the octave?

M: But one must know that in this greatest symphony [i.e. organum at the octave] the voice which shall be added to a part above and below does not follow the order of its own position but of that to which it shall respond consonantly. For neither would it show a consonance if a tone should strike over against a semitone, or a semitone over against a tone. (trans. L. B. Spiess, “The Diatonic ‘Chromaticism’ of the *Enchiriadis* Treatises”, *Journal of the American Musicological Society* 12 [Spring 1959]: 2. See *GS* 1:212)

fourths in the system throw up three problematic tritones which have to be avoided by means of a rule forbidding the organal voice from descending below the uppermost note of the adjacent lower tetrachord (normally *graves*).

Example 4-1 Organum on “*Rex coeli*” in *Musica enchiriadis*



Sarah Fuller has posited the function of both *Musica enchiriadis* and the *Scholia* as being “discussion of organum . . . undertaken not for its own sake but in illustration of the properties of *symphoniae*”,⁷⁰ an approach justified, if by nothing else, by the anonymous author’s painstaking explication (chapters ten to fifteen) beneath this introduction:

Now let us pursue what *symphoniae* properly are and are called, that is, how these same pitches relate to each other when sung together. This is indeed what we call diaphonic song, or, customarily, organum. But it is called diaphony because it consists not in singing uniformly, but in the concordant agreement of separate sounds. Although it is common to all *symphoniae*, this name [diaphony] nevertheless applies best to fifth and fourth.⁷¹

In other words, the doctrine of parallelism taught in these treatises rests on the idea that organum as a phenomenon embodies basic relationships of *symphoniae*. The point of both treatises is to explain those relationships, and the extraordinary gamut serves to provide accurate pitch notation tailored to the explicatory goal.

The gamut of Odo carries us forward in time at least a century, to the first decades of the eleventh century:⁷²

⁷⁰“Theoretical Foundations”, 53.

⁷¹Trans. Fuller, 53.

⁷²See the *Enchiridion musices* (or *Dialogus de musica*) attributed to Odo of Cluny in *SSR*, 103-16, from which the translations below are taken. Strunk’s identification of Odo places the work in the early tenth century. Michel Huglo points to Odo of Arezzo as the likely author; at any rate, the provenance of the treatise is North Italian and can be placed in the late tenth century (“Odo”, *NG* 13:504).

Figure 4-3 Gamut of Odo (of Arezzo?)

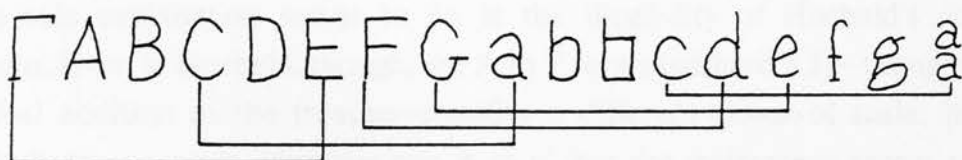
Γ A B C D E F G a b b c d e f g ^a_a

It is widely known, and important, for being the first source to supply the letter notation that was to become standard medieval practice. It extends the Greek span downwards by an extra tone, though it is hard to tell, from Odo's remark, whether the novelty lay in the sign or the note:

This G, since it is a letter rarely used, is by many misunderstood.⁷³

The reason for this extra note is unclear. The gamut contains both of Hucbald's note series and incorporates a third (in ascent: TTS TTS T TTS TTS + TT). Perhaps more relevant is the way in which it rounds out a series of five hexachords, the lowest one (G-E) appearing in the discussion of the modal characteristics of each sound at the end of chapter 10.

Figure 4-4 Interlocking Hexachords in the Gamut of Odo



Another possible reason for the inclusion of the low G is the rule for the limits of the plagal modes in chapter 9:

In lower melodies, as in the second, fourth, sixth and eighth modes, let there be no descent below the final to any sound not joined to it by means of one of the six before-mentioned consonances [semitone, tone, minor 3d, major 3d, perfect 4th, perfect 5th].⁷⁴

• What was the exception to the rule in Hucbald—

When the *lichanos meson* (G) is the final, the beginning is sometimes placed as low as the *parhypate hypaton* (C), a fifth away, but this is very rare with the other finals [D, E, F].⁷⁵

—has become possible in all the modes under Odo's rule of "conjunctions". Just as crucial is the method of constructing the gamut by monochord division. The monochord was a symbol of the numerical, speculative ground of *ars musica*, yet

⁷³SSR, 106.

⁷⁴Ibid., 114.

⁷⁵Hucbald, *Guido and John on Music*, 39. See GS 1:119.

it is used here without any reference to such at all. Odo's scale, therefore, is set in the context of an elementary school textbook, devoid of quadrivial theorizing, and geared to the teaching of rapid and accurate sight-reading:

For indeed, being stationed among you, with God's help alone I taught certain actual boys and youths by means of this art so that some after three days, others after four days, and one after a single week of training in it, were able to learn several antiphons and in a short time to sing them without hesitation, not hearing them sung by anyone, but contenting themselves simply with a copy written according to the rules. With the passage of not many days they were singing at first sight and *extempore* and without a fault anything written in music, something which until now ordinary singers had never been able to do, many continuing to practise and study singing for fifty years without profit.⁷⁶

It is also part of a major advance in modal and, thus, scale theory in the eleventh century which lies outside the range of this study. However, the fixing of an alphabet notation calls for comment.

Alphabetic notations, with one or two exceptions, are theoretical devices for determining the spread of tones and semitones in a gamut. In this, the medieval examples are heirs of Boethius's roman letter series, a relationship underlined by Hucbald's loan of his Greek letter series as well, with some minor alterations whose sole explanation seems to lie in the illegibility of Hucbald's copy of Boethius. Even in Hucbald, though, the A to P series (without a J)—thought to be a scribal addition to the treatise—signifies a different genus of scale: not the Greek diatonic system, spanning our A to a', but the instrument gamut used in organ construction, running from C to c', and found also in the *Scholia enchiriadis*.⁷⁷

The other alphabet form, using the letters A to G only, also took theoretical/"vocal" and practical/"instrumental" forms. The *Musica enchiriadis* is probably the earliest to produce the theoretical gamut ABCDEFG ABCDEFG A (our A to a'),⁷⁸ and it was to this model that the instrumental row was subsequently made to conform: FG ABCDEFG ABCDEFG (our A to b'). Its basis on the third degree of the theoretical series (our C) is still clear. The other distinctive difference between vocal and instrumental forms was the lack of a sign for b (our B^b) in the latter. The only alterations to the vocal system consisted in the use of lower-case letters for the upper octave and extensions of range, down to G in *Dialogus*, and up to ξ and ϛ in Guido's *Micrologus* (or X and Δ, as they are

⁷⁶SSR, 103-4.

⁷⁷See GS 1:209.

⁷⁸Ibid., 1:162.

labelled in Pseudo-Odo's *De musica*, *GS* 1:274). Both of these examples were plotted on the monochord.⁷⁹

The last ingredient in early scale theory that illustrates the fusion of ancient and medieval Greek ideas in the Western crucible is the octave species. The ancient legacy was a consistent set of seven species, the eighth possibility being considered and rejected by Ptolemy, and welcomed again by Boethius.⁸⁰

⁷⁹Hiley ("Notation", *NG* 13:348-49) records only one known instance of actual use of the "instrumental" system in a performing MS—in the Winchester Troper. The notation is A to G, corresponding to our c-b, c'-b'; "majuskeln und minuskeln werden unterschiedslos sowohl für die tiefere wie für die höhere Oktave verwandt" (A. Holschneider, *Die Organa von Winchester* [Hildesheim: Olms, 1968], 89 and pl.1, quoted by Hiley, 349).

Practical use of the "vocal" alphabet is found mainly in Norman MSS of the early eleventh century. Lower-case a to p is used in conjunction with neumes (digraphic notation). Carl Parrish reproduces an example in *The Notation of Medieval Music* (London: Faber and Faber, 1959; reprint ed., 1978), pl. 10.

⁸⁰Bower ("Boethius and Nichomachus", 34) suggests that there might have been a subsidiary ancient Greek tradition which made use of eight modes, and to which Ptolemy was referring.

Table 4-3 The Seven Systems with Octave Species in the Middle Octave

constitutions (systems) of the diatonic double octave

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Ptolemy rejects the hypermixolydian as nothing other than a duplication of an interval series already obtained: for Boethius, it fills out a series of octave species in the disdiapason consonance. The Carolingian writers of the *Alia musica* treatise show the same contrary tendencies as they proceed through the four stages of theorizing:⁸²

Stage 1: Using NONANOEANE formulas, some of the earliest layers can find only seven tones, which suggests that attempts are already being made to integrate tones with ancient species. Two MSS carry an incomplete demonstration of the eighth tone (NOEAYS).

⁸¹See Powers, *NG* 12:379. The diagram is based on Boethius 4.15. The small 'a' in the middle represents the *mesê* of the Greater Perfect System, while the breves show Ptolemy's "dynamic *mesê*" system. The various octave species are articulated in the middle octave.

⁸²The following draws on Jacques Chailley, ed., *Alia musica* (Paris: L'Institut de Musicologie de L'Université de Paris, 1965).

Stage 2: The Principal Treatise sets out eight numbered *modes*, each having an ancient Greek name and each allocated an octave species:

Table 4-4 Modes and Octave Species in *Alia musica*

Mode no.	Name	Species (desc.)	Ptolemaic no.	Modern notation
1	Hypodorian	TTSTTST	(8)	a to A
2	Hypophrygian	TTTSTTS	7	b to B
3	Hypolydian	STTTSTT	6	c' to c
4	Dorian	TSTTTST	5	d' to d
5	Phrygian	TTSTTTS	4	e' to e
6	Lydian	STTSTTT	3	f' to f
7	Mixolydian	TSTTSTT	2	g' to g
8	Hypomixolydian	TTSTTST	1	a' to a

The Greek names are drawn from Boethius 4.15 where they indicated transposed scales (*constitutiones*) rather than octave species. However, the author is at least consistent in locating his eighth mode where Ptolemy said it would be found: an octave higher than the lowest mode, the hypodorian. But the numbering is the reverse of that found in Boethius, who is relaying Ptolemy's system.⁸³

Stage 3: In the second section of the Principal Treatise, we encounter an expansion of the eight tones, now marshalled into authentics and plagals, and the integration of the tones with the old Greek names, thus:

Table 4-5 Tones, Modes and Octave Species in *Alia musica*

Tone no.	Name	Octave species
First tone	Dorian	D to d
Second tone	Hypodorian	A to a
Third tone	Phrygian	E to e
Fourth tone	Hypophrygian	B to b
Fifth tone	Lydian	F to f
Sixth tone	Hypolydian	c to c'
Seventh tone	Mixolydian	G to g
Eighth tone	Hypermixolydian	(a to a')

⁸³Ptolemy details the seven octave species in his *Harmonics* 2.3.50. Considerable confusion has arisen over the interpretation of Boethius's text, especially his exposition in 4.17, but Bower's commentary makes it clear that Boethius himself reverses the numbering of Ptolemy's species on

But the text peters out on the eighth tone for the simple reason that the author has caught himself between two irreconcilable concepts—a) the fact that his eighth octave species is logically the same as the first (A to a) and therefore is located **above** the Mixolydian, and b) the fact that the eighth tone is a plagal mode and is by definition found **below** its own authentic.

Stage 4: The latest section of the work, the *Nova expositio*, solves the problem ingeniously. Discarding the former mechanical adherence to Boethius's modes, but retaining the link already established between the old Greek names and octave species, the author allows that there are indeed only seven different octave species, the eighth a repetition of the first. But noting that they may begin from either upper or lower limits, he finds the four authentics to run up **from** their lower limits (he calls these tropes "*inferiores*") which are also their finals, while the four plagals run up **to** their upper limits ("*superiores*"). Thus eight different tropes are derived from seven species.

Figure 4-5 Octave Species and Tropes in *Alia musica*



The fact that modal finals do not always coincide with the limits of the octaves leads to a further important elaboration of the theory—the notion of medians which divide each octave trope into species of fourths and fifths:

two occasions (see *Boethius' Principles of Music*, 274, 289-90) and can find justification for doing so in other Greek sources.

Figure 4-6 Medians and Median Finals in *Alia musica*



The terminology “*inferiores/finales*” and “*superiores*” recalls the tetrachord system of the *Musica enchiriadis*, both in form (disjunct TST tetrachords) and names. Whether or not this is where the idea comes from, it is the solution to the eighth-tone problem: the eighth mode shares the same octave species with the first (TSTTTST), having been freed from the octave *a* to *a'* (TSTTTSTT), but, being a plagal mode, it has its final on G.

The resolution of this patterning problem yields the system of modal octaves with which we are familiar, synthesizing *octoechos* and various reinterpreted Greek ideas in the process.

Table 4-6 The Ecclesiastical Modes of the Later Middle Ages

The image displays nine musical staves, each representing an ecclesiastical mode. Each staff begins with a treble clef and contains a sequence of notes. The modes are labeled as follows:

- Dorian:** A scale starting on D, with notes D, E, F, G, A, B, C, D.
- Hypodorian:** A scale starting on C, with notes C, D, E, F, G, A, B, C.
- Phrygian:** A scale starting on E, with notes E, F, G, A, B, C, D, E.
- Hypophrygian:** A scale starting on D, with notes D, E, F, G, A, B, C, D.
- Lydian:** A scale starting on F, with notes F, G, A, B, C, D, E, F.
- Hypolydian:** A scale starting on E, with notes E, F, G, A, B, C, D, E.
- Mixolydian:** A scale starting on G, with notes G, A, B, C, D, E, F, G.
- Hypomixolydian:** A scale starting on F, with notes F, G, A, B, C, D, E, F.

Chapter 5

The Early Middle Ages II: Music Theory as Intellectual Currency

It is possible to focus so much on the technicalities of medieval scale theory that its place in wider intellectual schemas is overlooked. Genre studies of treatises seem to be the best antidote to this,¹ but not even they, relating as they do the terms of music theory to the liberal arts curriculum or to cathedral school pedagogy, suggest the centrality of musical thought in the Middle Ages, particularly after 1000, with the vividness of sacred iconography and word imagery in scriptural exegesis.

In order to consider a few examples of these, we must enter the complex world of medieval symbolism:

Allegory and symbolism were to impress the Middle Ages as perhaps no other element of their inheritance. The medieval man thought and felt in symbols, and the sequence of his thought moved as frequently from symbol to symbol as from fact to fact.²

Taylor views symbols as endemic in religious thought of all kinds, holding their apprehension to be either an unconscious process in which “reading” and reality, symbol and referent are fused—presumably the animism of anthropology texts fits this category—or a conscious one in which the two elements are distinguished, as in the elaborate symbolic categories of medieval cathedral building. However, the latter process seems not necessarily to preclude the

¹See the article by Gushee referred to in the previous chapter, n.8.

²H. O. Taylor, *The Medieval Mind*, 4th ed., 2 vols. (London: Macmillan, 1925), 2:69.

former: the doctrine of transubstantiation and its concomitant conception of the Mass as a daily re-sacrifice of Christ's Body and Blood appears to be an insistence "that the symbol is, or brings to pass, that which it represents."³

Granted this element of sacred identification, it must be insisted that the probable roots of medieval symbolic thought involve an unmistakable dichotomy, a cleavage of material and immaterial realms that requires that they be realigned by means of allegory, anagogy or tropology as methods of biblical hermeneutics. The idea of a "spiritual" reading of Scripture quite separate from a historical-literal one owes a good deal to the Platonism of writers such as Augustine: not only could Plato himself make "very pretty allegories"—thus Taylor—but his theory of Ideas as both types and creative intelligences was particularly amenable to Christian reinterpretation.

However, there is another layer in the patristic bent towards allegorical and analogical methods: what is often termed "poetic", "fantastical", "mystical" or "metaphorical" in their writings—suggesting a freedom of fancy and inspiration—is in fact just the opposite: it is the product of minds whose fidelity to literalness of thought deemed it necessary to find a precise relevance for every word in Scripture, however anachronistic the term or incongruous the reading. This arbitrariness is quite obvious, but, since the goal of all reading is charity, a good many interpretations can be justified.

[I]f his [the reader of Scripture's] interpretation tends to build up love, which is the end of the commandment, he goes astray in much the same way as a man who by mistake quits the high road, but yet reaches through the fields the same place to which the road leads.⁴

Despite Augustine's warning that too much of this rambling can lead to grave errors, the permission to interpret variably is unmistakable. And despite this, too, there emerge clear traditions of interpretation which suggest that even in somewhat curious details, people agreed substantially with one another. J. W. Marchand's study of musical allegory in a twelfth-century manuscript called the Old Icelandic Book of Homilies demonstrates this conserving process.⁵ Particularly after Augustine, the ages of the world was a popular theme in exegesis. This really meant the stages of biblical history, which number six in Augustine's explication of the Gospel of John 2.6a: "There were six stone water-

³Ibid., 68.

⁴On Christian Doctrine, trans. J. F. Shaw, in *The Works of Aurelius Augustine*, ed. Marcus Dods, 3d ed., 15 vols. (Edinburgh: T. and T. Clark, 1892), 9:31.

⁵"The Old Icelandic Allegory of the Church Modes", *The Musical Quarterly* 61 (October 1975): 553-59.

jars standing near, of the kind used for Jewish rites of purification”.⁶ The ages ran:

Adam to Noah; Noah to Abraham; Abraham to David; David to the exile; the exile to John the Baptist; John to the end of the world.⁷

By adding the sleep of the saints and the age of eternal bliss, the tradition settled on eight ages; and what better figure could be found for these ages than the eight modes of the chant? Thus, the anonymous homily ties all into a neat pattern, even roughly allying the ethos of each mode with the nature of the person whose name is given to the respective age:

Table 5-1 The Modes and the Ages of the World

Mode	Dominant	Ethos	Age
Primus	a (9)	strong	Adam
Secundus	F (7)	grave	Noah
Tertius	c (11)	hard-tempered	Abraham
Quartus	a (9)	adulatory	Moses
Quintus	C (11)	love song	David
Sextus	a (9)	lachrymose	John
Septus	d (12)	harsh	World Sabbath
Octavus	C (11)	joyful	Heaven

Notes:

- The number in brackets indicates the scale degree of each dominant counting from Γ, i.e. gamut.
- The quality or ethos accorded each mode is part of a much wider, detailed tradition dealt with below. In this sample, all the ascriptions are fairly typical except for that of Septus which is conventionally a sweet mode. Presumably, the number of the mode is taken to refer to the cycle of seven judgements in Revelation, chapters 6-8, and to the culmination of the wrath of God in 8.5: “Then the angel took the censer, filled it from the altar fire, and threw it down upon the earth; and there were peals of thunder, lightning, and an earthquake.” Here, by exception, the age dictates the ethos.

As Marchand notes, the relating of eight ages to the eight modes—in itself a connection hard to imagine even with the mediation of the modal ethos—is not without precedent: the ecclesiastical modes were linked to the seven planets and the zodiac, to the eight parts of speech (both traditions of long standing), the eight Beatitudes, the eight winds and the eight waves of the sea. On the basis that “*nihil vacuum (est) et sine signo apud Deum*”, Taylor’s description of the mind moving from symbol to symbol appears to be confirmed.

⁶The number of water-jars is itself a confirmation of another symbolic text, the account of the six days of creation in Genesis 1.

⁷Augustine, *Homilies on the Gospel of John*, in *Nicene and Post-Nicene Fathers*, First Series, rev. ed., 14 vols (Grand Rapids, Michigan: William B. Eerdmans, 1978-79), 7:65.

Other associations besides octonary ones suggested themselves to theorists. Johannes Affligemensis (c.1100) stresses the quaternary pattern of the modes:

It seems very fitting that as all that is said is contained in eight parts [of speech] so all that is sung may be governed by eight modes. But though they are now eight they were once only four, probably in imitation of the four seasons. For as the ages are diversified by the four seasons, so all song is diversified by the four modes.
(*De Musica*, chap. 10)⁸

De Grocheo (c.1300) reports an inherited idea concerning the binary (paired) nature of the modes:

Just as the masculine universally exceeds the female in skill and virtue, so it seems to be appropriate that the principal modes exceed their plagals in ascent.⁹

Whether this has any connection with ethos is hard to determine, though a look at various ethos lists shows that writers are agreed—if not in detail, at least in the broad notion—that a plagal mode is “almost always darker or softer than its corresponding authentic”.¹⁰ Yet the reasonableness of connecting ethos with a psychologically perceptible quality in the song (such as tessitura) is heavily compromised by the more specific characteristics accorded to each mode, these having been taken over together with the classical names.

Greek music theory was certainly the source of the idea that a particular *harmonia* was tied to a certain emotion or emotional range, and this doctrine was conveyed in the *eisagogê*, which normally included a section on the uses and affects of music. Classical and scriptural examples of affect were mingled in the later treatises,¹¹ while a body of emotional associations grew up that may be traced in the hints of Guido, then through Hermannus Contractus, John, Aegidius of Zamora and Johannes de Muris. Adam von Fulda (c.1445-1505) records a poem, “Omnibus est primus”, attributed to Guido, which summarizes these associations, if somewhat vaguely in some of the lines:

⁸Quoted in H. Powers, “Mode”, *NG* 12:399.

⁹*Ibid.*

¹⁰*Ibid.*, 398.

¹¹See, for instance, Guido, *Micrologus*, chap. 14, or the treatise by John, chap. 17, in Hucbald, *Guido and John on Music: Three Medieval Treatises*, trans. Warren Babb, ed. Claude V. Palisca, Music Theory Translation Series 3 (New Haven: Yale University Press, 1978). The “John” in question is the theorist variously known as “John Cotton” and “John of Affligem”.

The first is good for all moods
 as the second is for grief;
 The third in anger rises,
 whilst the fourth brings sweet relief;
 The fifth is for the joyous,
 and the sixth the pious prize,
 The seventh suits the young man,
 but the last is for the wise.¹²

A fascinating depiction of the modes with suggestions of their ethos is to be seen on the capitals from the ambulatory at Cluny. The sculpture dates from c.1088-95. Each capital face consists of an instrumentalist surmounted by an inscription. In discussing these, it will be useful to list other references to ethos, either roughly contemporaneous or later. I rely here on the extensive work of Schrade¹³ and Abert,¹⁴ as well as Chailley's recent contribution¹⁵ and the shorter article by Whitehill. Schrade insists that the "bridge" between the inscriptions that typify the modes and the sculptured figures is this very "canon" of musical thought about ethos which is presented here with translations.¹⁶

¹²Translated in W. M. Whitehill, "Gregorian Capitals from Cluny", *Speculum* 2 (1927): 385-95 (original in *GS* 3:356).

¹³L. Schrade, "Die Darstellungen der Töne an den Kapitellen der Abteikirche zu Cluni", *Deutsche Vierteljahrsschrift für Literaturwissenschaft und Geistesgeschichte* 7 (1929): 229-66.

¹⁴H. Abert, *Die Musikanschauung des Mittelalters und ihre Grundlagen* (Halle: M. Niemeyer, 1905), 236-44.

¹⁵Jacques Chailley, "Les huit tons de la musique et l'éthos des modes aux chapiteaux de Cluny", *Acta Musicologica* 57, no. 1 (1985): 73-94.

¹⁶Translators: Guido and John-Warren Babb, in *Hucbald, Guido and John on Music*; Hermannus-Leonard Ellingwood, in *Opuscula musica*, Eastman School of Music Studies 2 (Rochester: University of Rochester Press, 1936); Marchettus-Jan W. Herlinger, in *The Lucidarium of Marchetto of Padua* (Chicago: University of Chicago Press, 1985); Macrobius and Cicero-William Stahl, in *Commentary on the Dream of Scipio* (New York: Columbia University Press, 1952); for the sake of uniformity, some modifications of capitalization and punctuation have been introduced. Unless otherwise indicated, all other sources have been translated by myself.

Sources: Nicetius of Trèves, *De laude et utilitate spiritualium canticorum*—*GS* 1:10; Guido, *Micrologus*—*GS* 2:14 (=CSM 4:159); Hermannus, *Opuscula musica*—*GS* 2:148; Aribo Scholasticus, *De musica*—*GS* 2:220; John, *De musica*—*GS* 2:251 (=CSM 1:109); Aegidius of Zamora, *Ars musica*—*GS* 2:387; Marchettus of Padua, *Lucidarium*—*GS* 3:85-86; Engelbert of Admont, *De musica*—*GS* 2:344; Adam von Fulda, *De musica*—*GS* 3:356; Anonymous: *Tractatus de musica carthusiensis monachi* [Carth.]—*CS* 2:448; *Regulae musicae de ignoto cantu* [Regulae]—*GS* 2:39; *Summa musicae*, formerly attributed to Johannes de Muris [De Muris?]-*GS* 3:235, 243; *De modorum formulis et cantuum qualitatibus* [De modorum]—*CS* 2:107; *De inventione synemmênon*—*GS* 2:61.

Non-musical sources: Gregory, [Writings], Book 4, chap. 5—Migne, *PL* 49:291; Rufinus, *In psalmos LXXV commentarius*—Migne, *PL* 21:872.

I (Dorian). A young man with a lute (*citola?*) beneath

*HIC TONUS ORDITUR MODULAMINA
MUSICA PRIMUS*

This tone is the first and begins musical modulations.

gravem vel nobilem
(Herm.)

dignified or noble

morosa et curialis vagatio
(John)

slow and ceremonious peregrinations

*primus tonus est mobilis et habilis, et ad
omnes secundum affectum aptabilis*
(Aegid.)

The first tone is flexible and handy and applicable to all [men] according to mood.

It is easy to assume that the enormous group of chants under mode I has deprived its ethos of any salient characteristic through overextension; that its expressive power has been reduced to a “colourless universal character”.¹⁷ The figure, holding the lute in an expressly unmusical way, admittedly gives little clue. Yet the inherited doctrine surrounding the number One is too suggestive to overlook, especially since its finest medieval formulation appears in a document intimately connected with musical number, Macrobius’s *Commentarium in somnium Scipionis*:

Unum autem, quod monas est unitas, dicitur, et mas idem et femina est, par idem atque impar, ipse non numerus sed fons et origo numerorum. Haec monas, initium finisque omnium, neque ipsa principii aut finis sciens, ad summum refertur deum eiusque intellectum a sequentium numero rerum et potestatum sequestrat: nec in inferiore post deum gradu frustra eam desideraveris.
(Book 1, 1. 38)

[In the first combination of one and six,] one is called *monas*, that is Unity, and is both male and female, odd and even, itself not a number, but the source and origin of numbers. This monad, the beginning and ending of all things, yet itself not knowing a beginning or ending, refers to the Supreme God, and separates our understanding of him [the One, without number] from the number of things and powers following; you would not be so rash as to look for it in a sphere lower than God.

This, and its redactions in Berno’s preface to a tonary¹⁸ and in Jacques de Liège’s *Speculum musicae*,¹⁹ does not solve all the problems; indeed, it introduces the fresh snag of One standing outside of the realm of numbers. But it confirms

¹⁷Abert, 236.

¹⁸GS 2:65.

¹⁹CS 2:223.

two assumptions underlying ethos: first, that One serves as the source of a multiplicity (in fact, in Pythagoreanism, of “all things”) and second, that One partakes of divine being. Thus, from mode I can arise a plurality, even an infinity, of affects: it works to many ends.

*Primus tonus apud musicos ponitur
motivus, id est, habilis ad movendum (hoc
est dictu), quod requirit materiam per quam
animus moveri possit ad varios affectus; et
ergo communiter in historiis, et saepe
tunquam egregius permittitur advocatus.
(Carth.)*

The first is regarded amongst musicians as being emotive, i.e. suited to arousing emotion (so to speak), inasmuch as it seeks the material whereby the mind is able to be moved to various emotions; and therefore it is generally permitted in epics and often as though it were an illustrious advocate.

In addition, its gravity and nobility, borrowed in the first instance from the ancient Doric features, emphasize its elevated connections, “*curialis*” (literally “of the services of the *curia*”) giving it a lofty ecclesiastical shading. “*Morositas*” refers to a general seriousness of the intellect, rather than moroseness, and contrasts sharply with the excitation of the next mode.

II (Hypodorian). A dancing girl with a cymbal (*cymbalum? tympanum?*) in her right hand beneath

*SUBSEQUITUR PTONGUS NUMERO
VEL LEGE SECUNDUS*

The second sound [tone] succeeds by number and rule.

The image of a dancing girl seems to confirm the above doctrine on number: the only female figure in the cycle is linked to the second mode and indicates further neo-Platonic background, planted in Macrobius and reiterated by Marchettus of Padua:

*arithmetici inparem patris et parem matris
appellatione venerantur*

Mathematicians honor odd numbers with the name Father and even numbers with the name Mother.

*Ternarius numerus impar est, et ob hanc
causam significationis attributus est
maribus, quia maioris virtutis est quam par,
qui est infirmiori femineo sexui attributus,
nam numerus par mutabilis et divisibilis est;
numerus vero impar indivisibilis est.*

The number three is odd, and for this reason it is attributed to the masculine gender - since it is of greater strength than the even number, which is attributed to the weaker, female sex. The even number is changeable and divisible, whereas the odd number is indivisible.

A close examination of the plastic form reveals that the woman's body forms itself into a curve, as well as being twisted around an "axis". In this twisting shape Schrade sees depicted three features of mode II:

- a) the sinuous quality of its melodies, called *vagatio*;
- b) its frequent sudden changes of direction:

*alter [modus] vero anfractis saltibus
concinatur
(Regulae)*

The other [mode] assuredly is sung with tortuous leaps.

*Alius vero ut amens in compositos et in
anfractis vexationibus pascitur.
(John)*

Another, as if distracted, feeds on studied and intricate contortions.²⁰

- c) the *Summa*'s quality of *gravitas* that embraces notions of seriousness and anxiety, besides lowness of range, and leads in some witnesses to sadness and lament:

*Praecipites et obscurae gravitates secundi
toni
(De Muris?)*

the precipitous and involved seriousness of the second tone

*Alios rauca secundi gravitas capit
(John)*

Some are taken by the hoarse profundity of the second

*secundus tonus est gravis et flebilis, quia
convenientior tristibus et miseris, ut in
threnis, hoc est lamentationibus Ieremiae
(Aegid.)*

The second tone is solemn and doleful, because according more with sad and pitiable [things] such as the *Lamentations of Jeremiah*.

In this case, the apparently blithe spirit of the dancing maiden is an imposition: the "disfiguring" of her physical appearance is also a reference to pain.

Schrade holds open the possibility that the girl is actually playing on a timbrel (*tympanum*). This would accord well with the theme of suffering alluded to above, since Augustine, for one, sees in the stretched leather of the drumhead a symbol of the crucifixion of the flesh.²¹ If it is a cymbal that she holds aloft in her right hand, it is presumably the pair of another, now defaced, formerly held in her

²⁰This attribution to mode II is Schrade's, not John's, and is based, quite logically, on the key word *anfractis*.

²¹"Nor must we keep back the mystical meaning of the 'timbrel and psaltery'. On the timbrel leather is stretched, on the psaltery gut is stretched; on either instrument the flesh is crucified"—*Nicene and Post-Nicene Fathers*, Series 1, 8:678.

left hand.²² Schrade will not rest with a general explanation—for instance, Origen’s characterization of cymbals as the eager soul enamoured of Christ.²³ He notes that pairs of cymbals have a quite specific meaning in medieval exegesis, emphasizing various symbolic dualities: *musica mundana/humana* has its counterpart in the two Testaments, *musica naturalis/instrumentalis* in the *vita contemplativa/activa*, and *cantus authenticus/plagalis* in the *amor Dei/proximi*.²⁴ Athanasius in a letter to Marcellinus describes them as the thoughts of the soul.²⁵ Two final ascriptions of ethos may be listed; they are so general that one hesitates to harmonize them with any of those given above:

*Per plagin proti orare vel petere aliquid
possumus
(De modorum)*

Through the first plagal [mode] we are
able somewhat to pray or entreat.

*suavem
(Herm.)*

sweet

III (Phrygian). A bearded young man, seated, with a lyre (*cithara*) beneath

*TERTIUS IMPINGIT CHRISTUMQUE
RESURGERE FINGIT*

The third thrusts and represents Christ
rising.

As a pointer to ethos, this motto seems as unhelpful as the previous ones. Again, prior knowledge is required. In the first place, the sculpture portrays a typological theme: David, whose musical abilities were much celebrated in the Middle Ages, is named as the type of Christ.²⁶ The link lies in David’s healing of Saul by means of his harp-playing. Thus, the overcoming of an evil spirit and the calming of a frenzied mind points up the soteriological background to this mode. Since Christ’s saving work is located in his death and resurrection, the motto moves along these lines. The lyre is selected in the light of a specific tradition:

²²Chailley (75) has no doubt that the missing left hand carried the other cymbal: still clearly preserved is the small chain that once linked them.

²³See *MMA*, 62.

²⁴*Die Darstellungen*, 243-44.

²⁵*Ibid.*, 244, n.1.

²⁶It is true that, as Chailley remarks (77, n.26), the figure of David the musician is usually crowned. But this is not always so; cf. the bare-headed depictions, influenced by Hellenistic and Carolingian styles respectively, in David Diringer, *The Illuminated Book: Its History and Production* (London: Faber and Faber, 1958), plates II-12,13; IV-12b.

Sed cum [praedicatores] descendunt, ante se psalterium, tympanum, tibiam, et citharam deferunt: citharam quoque habent, quia gaudere pios pro certitudine aeternorum bonorum edocent. –Cithara autem valde laetum musicum est instrumentum. Quo nimirum instrumento verbum solatii electorum apte figuratur: quia velut ad sonum citharae hilarescimus, quando nos electi praedicatores inter aerumnas praesentis exilii consolantur.
(Gregory 4. 5)

Qui adhuc puer in cithara suaviter fortiterque canens malignum spiritum, qui operabatur in Saulum, compesquit, non quod citharae illius tanta virtus esset, sed quia figura crucis Christi quae in ligno et extensione nervorum mystice gerebatur iam tunc, spiritum daemonis opprimebat.
(Nicetius)

Caro humana patiens cithara est.
(Rufinus)

Citharum percutit, qui cum a mortuis surrexisse et ad coelos ascendisse dicat.
(Gregory)

But when [the heralds] descend, they carry down before them a psaltery, a timbrel, a pipe and a cithara: they have the cithara as well, because they teach the pious to rejoice on account of the assurance of eternal blessing. However, the cithara is an exceedingly joyful musical instrument—by which instrument surely the word of consolation is fitly fashioned: because we cheer, as it were, at the sound of the cithara, when we, the elected heralds, are consoled in the hardships of the present exile.

This boy [David], even, singing sweetly and manfully to the cithara, restrained the evil spirit which worked in Saul, not because the virtue of that cithara was so great, but because the sign of the Cross of Christ, which was mystically carried in the wood and the extension of the strings, even then quelled the spirit of the demon.

The cithara is the suffering human body.

He strikes the cithara who proclaims that he [Christ] has risen from the dead and ascended to the heavens.

A most obvious correlation—“on the third day”—is surely also implied.

The ancient Phrygian mode, at least as far as medieval opinion was concerned, was one designed to incite to wrath and a warlike spirit, to rouse people to joy and a somewhat aggressive “enthusiasm”:

authentus deuterus . . . vocatur . . . phrygius a Phrygia provincia in qua est Troia sita, cuius incolae illius toni cantibus tanquam impetuosus et laetoribus magis insistebant.
(Engelb.)

tertius tonus severus est et ad iram vel bella provocans. unde ipse congrue coaptatur illis materiis, ubi aliquid fortitudinis aut potentiae ostenditur.
(Carth.)

The second authentic . . . is called . . . Phrygian from the province Phrygia, in which Troy was situated, [and] whose inhabitants devoted themselves to songs of that tone just as violent and more joyful.

The third tone is austere and provoking to anger and wars; whence it is itself properly fitted to those subjects in which a degree of strength or power is displayed.

incitatem vel saltantem

(Herm.)

*alios, severa et quasi indignans persultatio
tertii iuvat.*

(John)

wild or dancing

Some are delighted by the austere and almost haughty prancing of the third.

Thus, thoughts of war lead to ideas of courage and power. Aegidius blends these with the characteristic leaps of mode III melodies in addition to the ancient salutiferous qualities:

*et notandum, quod tertius tonus est severus,
incitabilis, in cursu suo fortiores habens
saltus; per hunc plures ad sanitatem
excitantur. Unde Boethius dicit, quod
Pythagoras quamdam adolescentulum per
tertium tonum ad sanitatem excitavit: per
secundum vero reddidit mitiorem.*

To summarize: the third tone is austere, incitatory, having in its motion rather vigorous leaps; by this [motion] many are roused to soundness of mind. Whence Boethius says that Pythagoras returned a certain young man to sanity by the third tone. By the second [tone], indeed, he rendered [the boy] more gentle.

Deftly, this passage has made the bold leaping—the triumphant “thrusting” of the inscription—into a melodic feature that seems to reinforce its “raising of Christ”. As a whole, this passage appears to be a garbled version of a traditional *topos* given by Engelbert of Admont as follows:

Boethius tells in the prologue of his *De Musica* that the Phrygian tone, that is, the third, sung to a musical instrument, aroused one young man listening, the suitor of a certain girl, and provoked him to such rashness that he wanted to break into the girl’s room at once by force. And when the Phrygian tone was changed to Hypophrygian, that is, the third to the fourth tone, the young man calmed down, appeased by the gentleness of the tone.²⁷

Clearly, this is intended to illustrate the difference between an authentic and a plagal “affect”. Aegidius does not have this distinction in mind: he appeals perhaps to his own idea of mode II as a solemn mode. But he has also been careful to alter the story so as to avoid the impression that a church mode could be responsible for putting someone into a mood of frenzy or aggression.

By this stage, it must surely be clear that the view of ethos being outlined makes few concessions to modern perplexity in this matter. I believe Schrade is right in insisting that ethos is not primarily a matter of spontaneous emotional reactions to qualities immanent in the music, but rather a “discussion” of

²⁷Trans. Powers, *NG* 12:398.

abstract, generalized attitudes which are objectified in the chant. This interpretation rests, in turn, on the conviction that in medieval thought music generally was an epistemological pillar which, by its manifold connections with other “vocabularies” of knowledge (mathematics, astronomy, even grammar), served to order the *intellectus* within various disciplines. Another consequence of this view is that it interposes a sophisticated hermeneutic filter between the auditor and the chant, at least as they are conceived outside of the act of listening.

A dual discourse is thus established (which corresponds to the cleavage noted on 98), arising on the one hand from the symbolic associations of music and on the other from the immediately sensible properties of the monody. It seems that medieval writers may have found the former no more credible than we do: Cassiodorus writes admiringly of the therapeutic power of music as practised by David and Asclepiades, yet still has to call them “miracles”.²⁸ And he cannot refrain from concluding his note with a reference to the harmonious structure of the entire universe, of which these are striking localizations.

Chapter 14 of Guido’s *Micrologus*, a *locus classicus* of early medieval ethos doctrine, reveals the same dilemma of thought, and another “solution” of these obstinate elements. The first half is frankly positivistic in its observations: a highly trained person can distinguish the character of one trope (mode) from another; the tropes are as diverse as human sensibilities, and can therefore be expected to appeal to various people in differing degrees; individual receptivity is such that the wide modal spectrum offers a special sort of sensual enjoyment; through these sense experiences one is capable of being profoundly affected. But then Guido proceeds to relate the David and Asclepiades episodes. His pivotal sentence shifts suddenly from range of appreciation to a pleasure-pain scale: “Hence it is that the well-being of both heart and body is lessened and increased, as it were, by particular tastes and smells and even by the sight of certain colours.”²⁹ At least he is honest enough to hint at the intransigence of the problem that he has touched on: “Yet this effect [of calming frenzy] is fully clear only to Divine Wisdom. . .”.³⁰ He returns thereafter to the reasonable cause of emotional reactions: the shape of good melodic lines.

This is in fact merely a restatement of a much older paradox of religious anthropology, fascinatingly focussed in St Augustine. Briefly put, he was highly

²⁸See SSR, 92.

²⁹Hucbald, *Guido and John on Music*, 70.

³⁰Ibid.

susceptible to the pleasures of singing; but the degree of response he felt in himself brought to mind knowledge of the power of sense attractions. Such knowledge included warnings that his scruples could not ignore, and thus was created an anxious wavering "between the danger that lies in gratifying the senses and the benefits which, as I know from experience, can accrue from singing."³¹ The description of his intellectual filter surely refers directly to ideas of ethos, just as his mental anxiety is clearly raised by his functional understanding of music in worship:

I realize that when they [hymns] are sung these sacred words stir my mind to greater religious fervour and kindle in me a more ardent flame of piety than they would if they were not sung; and I also know that there are particular modes in song and in the voice, corresponding to my various emotions and able to stimulate them because of some mysterious relationship between the two. But I ought not to allow my mind to be paralysed by the gratification of my senses, which often leads it astray. For the senses are not content to take second place. Simply because I allow them their due, as adjuncts to reason, they attempt to take precedence and forge ahead of it, with the result that I sometimes sin in this way but am not aware of it until later.³²

This account is part of a longer confession (Book 10, chaps. 29-34) dealing with the problems of sensual life as they confront a pious character. Under this topic, he discusses his susceptibility to dreams full of sensual images, to the daily craving for food and drink, to the pleasures of sound and the delights of the eye. He longs to master them, and to be mastered by God alone. As far as his discussion of music is concerned, one is inclined to think that the snare lies in the power of sensory experience to create inordinate and inchoate episodes of life. But the central problem in Augustine's approach arises from his insistence on the separation of sense and mind, and the resultant failure "to take the peculiarities of aesthetic symbolism as explicit focus for reflection."³³ Thus in his *De Musica*, with its stress on elaborate metrical proportions, Augustine satisfies himself with an attractive depiction of the entire creation modulated by number. This betrays both his love of the material world and the rigid scaffold he constructs around it. The beauty of music, sucked into this antithesis, is experienced both as a heartbreaking communication and as a paralyzing "gratification of the senses".³⁴

³¹*Confessions*, trans. R. S. Pine-Coffin (Harmondsworth: Penguin Books, 1961), 239.

³²*Ibid.*, 238.

³³R. J. O'Connell, *Art and the Christian Intelligence in St Augustine* (Oxford: Basil Blackwell, 1978), 152.

³⁴*Confessions*, 239.

The tension between “a relatively world-affirming aesthetic of ‘totality’ and an ascensional aesthetic of escape from the sensible world”³⁵ is his life’s lot, and release from it in the world to come—so as to behold the “form beyond all grace of created forms”³⁶—is his hope. We find the selfsame forces operative in Plato’s World of Ideas and the search for Ideal participation, called *athanatos*, “immortality”. The doctrine of ethos is quite clearly the province of moralists and theologians. Still, the fact that it is not only musicians who treat the matter makes it that much more important for music itself: the simple fact is that the aesthetic impact of the chant is promoted by its prominently ascetic, “ascensional” style.

IV (Hypophrygian). A young man in short Burgundian drapery, with a bar of small, tongueless bells (*cymbala?*) beneath

*SUCCEDIT QUARTUS SIMULANS IN
CARMINE PLANCTUS*

The fourth follows, representing
lamentation in song.

The difficulty of reconciling disparate evidence is particularly severe here. Hermannus seems surprisingly to align most closely with the Cluny conception:

modestum vel morosum

gentle or lingering

There is no obvious way of connecting the following ascriptions, though Abert detects a revival of the ancient Hypophrygian (Ionic) form which, together with Lydian forms, was considered “soft and fit for a drinking party”.³⁷ Its insinuating sweetness, an enticing quality, he understands to be set in contrast to the restorative vigour of mode III. Perhaps Schrade is still nearer to the truth—that of the binary tradition—in noting the close resemblance of some teachings under mode II (*flebilis/planctus*). He notes the distortions of the body again and is further attracted by the fact that modes II, IV and VI all deal with themes of dejection. Speaking numerically, IV is the “*diapason*” of II, and VI the “*diatessaron*” of IV. This concinnity of ethos ought to be born in mind.

adulatorius sonus
(John)

ingratiating sound

³⁵O’Connell, 114.

³⁶This is O’Connell’s rendering of *formosissime, qui formas omnia*; Pine-Coffin translates this more literally as “the perfect form which shapes all things”. See *Confessions*, 28.

³⁷*Die Musikanschauung*, 239. The phrase is from Plato, *Republic* 398E, in *Great Dialogues of Plato*, trans. W. H. D. Rouse, Mentor edition (New York: New American Library, 1956), 197.

*est autem quartus tonus blandus et garrulus,
adulatoribus maxime conveniens.*

(Aegid.)

*quartus tonus est adulativus et maxime
supplicanti idoneus. unde et morose
egreditur et non statim in altum festinat.*

(Carth.)

*per plagin eiusdem deuteri magnifice aliquid
extollere possumus.*

(De modorum)

The fourth tone, however, is coaxing and babbling, fitting especially for flatterers.

The fourth tone is adulatory, and most suitable for praying: thus it both sets out morosely and hastens [though] not immediately to the high [register].³⁸

Through the plagal of the same second [mode] we are able to extol loftily to a certain degree.

Schrade makes no mention of the set of small bells, perhaps because they lack a tradition of symbolic significance. They proliferated in song schools only in the tenth century, when the term *cymbala* (cymbals) was extended to cover them as well.³⁹ However, they rapidly occupied an important place in musical iconography and are pictorially linked with Pythagoras's "experiments" with musical number. Lacking symbolic references, we can only guess that these high-sounding chimes, as distinct from the larger *campanae*, correspond with the emphasis on sweetness and ingratiating.

V (Lydian). The figures on the second capital are badly damaged. For the fifth mode only the motto is decipherable:

*OSTENDIT QUINTUS QUAM SIT
QUISQUIS TUMET IMUS*

The fifth shows how whosoever is puffed up with pride is the most base.

Of the carvings, this one, with its smashed figure and riddling inscription, is particularly unfruitful. Abert, who does not consider the abbey capitals in his study, blithely notes the general agreement of authors on the benevolent associations of this mode:

*modesta quinti petulantia ac subitaneo ad
finalem casu*

(John)

the well-bred high spirits and the sudden fall to the final in the fifth

³⁸Such a melodic contour may be seen in mode IV antiphons such as "*Asperges me*" and "*Dixit Mater*"; more pointedly still in "*Pater juste*", "*Quid faciam*" and "*Gabriel Angelus*", in which the "hastening" is effected by a leap upwards at the half-verse (see *Liber Usualis* [Tournai: Desclée, 1956], 13, 474, 578, 1016, 1408).

³⁹See Van Waesberghe, "*Cymbala*", *MGG* 2:1831-33.

*et notandum, quod quintus tonus est
modestus et delectabilis tristes et anxios
laetificans et dulcorans, lapsos et
desperantes revocans.*

(Aegid.)

*quintus tonus modestus est et laetificans, id
est multum dulcis propter b molle, quod ibi
fieri consuevit.*

(Carth.)

alii petulanti lascivia quinti mulcentur

(De Muris?)

voluptuosis

(Herm.)

To summarize, the fifth tone is temperate and agreeable, delighting and sweetening the sad and uneasy, recalling the lapsed and despairing.

The fifth mode is mild and gladdening, that is, very sweet on account of a soft b which was usually performed there.

Others are delighted by the wanton playfulness of the fifth.

voluptuous

The motto, however, hints at a long-standing prejudice against sensuality, and a distinction of higher and lower natures: both weaken the connections with classical thought on the Lydian mode. Schrade proffers a useful reference to moral stricture in connection with the number five:

*Intelligamus V. musas V. sensuum noxias
fenestras, per quas anima bibit
temporalium delectationes et musas.*

(Aribo)

We understand the five songs as the harmful windows of the five senses through which the spirit imbibes the pleasures and music of passing things.

This frowning on sensual excitation seems ill-related to the chant, but it usefully reaffirms the objective nature of ethos. The anonymous *De modorum* moves along an oddly metaphysical line:

*per tritum . . . actio uniuscuiusque
exprimitur*

The action of someone is expressed through the third.⁴⁰

VI (Hypolydian). A musician, sans head, playing on a stringed instrument (*psalterium?*) beneath

*SI CUPIS AFFECTUM PIETATIS
RESPICE SEXTUM*

If you desire the mood of piety, turn your attention to the sixth.

Though the theme of tearful devotion is strikingly evident in the writings on the sixth mode, the only figure extant in the second cycle is not depicted as a *figura anfracta*. The instrument accords with this coupling of tears (remorse?) and piety:

⁴⁰The modes number four in this instance, each consisting of an authentic/plagal pair.

lamentabilem

(Herm.)

lacrymosa sexti voce

(John)

et notandum, quod sextus tonus est pius et lacrymabilis, et conveniens illis, qui facile ad lacrymas provocantur

(Aegid.)

Sextus tonus omnium tonorum magis ad pietatem et lacrymas compellit, ut patet in illo responsorio: "Videns Iacob". Unde versus, "Flebilis atque pia ptingi modulatio sexti / Provocat ad lacrimas corda canore suo".

(Carth.)

alii voce sexta veluti quadam dulci amantum querimonia, vel sicut a cantu philomelae moventur.

(De Muris?)

sextus . . . habet saltus lenes et ita est voluptuosus.

(Engelb.)

mournful

the tearful voice of the sixth

To summarize, the sixth tone is pious and tearful, and suitable for those who are easily moved to tears.

Of all the tones, the sixth tone impels more completely to piety and tears, as may be seen in that Responsory: "Videns Iacob". Whence the verse: "The mournful and pious modulation of the sixth tone / Summons hearts to tears by its [own] melody".

Others are moved by the voice of the sixth as though by a kind of sweet complaint of lovers, or as by the song of a nightingale.

The sixth has gentle leaps and is therefore voluptuous.

Schrade is in a position to clinch the "sad devotion" argument with an appeal to the significance of the psaltery:

Caro ergo divina operans psalterium est. — Per carnem suam Dominus duo genera factorum operatus est, scilicet miracula et passiones.

(Rufinus)

Therefore, the psaltery is the active body of God: through its body, the Lord effects two classes of deeds, namely miracles and sufferings.

Evidently, the psaltery and the lyre both are connected with Christ's sufferings: the two instruments come close to being identified in some medieval literature. The lute (in mode I) similarly is an instrument of devotion. There is an illuminating idea, in Philo of Alexandria, of man as an instrument in God's hands:

οργανον Θεου εστιν ηχουν,
κρουομενον και πληττομενον
αορατως υπ αυτου.

He is the vocal instrument of God,
smitten and played by his invisible hand.⁴¹

This may have inspired Eusebius to an embroidered version of the same idea; he was familiar with Philo's writings:

We sing God's praise with living psaltery. . . . For more pleasant and dear to God than any instrument is the harmony of the whole Christian people. . . . Our cithara is the whole body, by whose movement and action the soul sings a fitting hymn to God, and our ten-stringed psaltery is the veneration of the Holy Ghost by the five senses of the body and the five virtues of the spirit.⁴²

In any event, the symbolic function of the instrument is clear. Abert, again, lists the discrepant witnesses (De Muris? and Engelbert) to back his contention that the ancient Hypolydian, a systaltic mode of erotic/threnodic sort, is the source. If that is so, it would seem that the erotic has been radically denigrated and the threnodic diverted to devotional ends.

VII (Mixolydian). A figure with a trumpet (*tuba?*) beneath

INSINUAT FLATUM CUM DONIS
SEPTIMUS ALMUM

The seventh penetrates the reviving
breath with gifts.

The various threads of teaching that intersect in the Mixolydian definition serve as a clear warning that the order of arrangement of witnesses in some of the cases treated above (for example, modes II and III) may itself be the source of any apparent coherence. Even Abert's simple distinction between an earlier (medieval) and a later form of ethos tradition cannot get around the parallel contemporaneous streams we find here.

As a sacred number, seven is associated in Scripture with ideas of completion, fulfillment and perfection. It is from this angle that the Cluny inscription approaches the mode, and the *Summa musicae* supplies the closest exposition of its meaning:

⁴¹[*Works*], trans. F. H. Colson and G. H. Whitaker, Loeb Classical Library. 10 vols. (London: William Heinemann, 1932), 4:417.

⁴²Migne PG 23:1171, translated in *MMA*, 62.

Item alter est in musica septenarius, in quantum in septem articulis cantus acutus fundatur. Sic in ecclesia septem dona Spiritus sancti septenario continentur; est enim Spiritus timoris, pietatis, scientiae, fortitudinis, consilii, intellectus & sapientiae.

Likewise the other septenary [form] is in music, insofar as cantus acutus is founded on the seven divisions. Thus in the church the seven gifts of the Holy Spirit are encompassed by a septenary [form]; for it is the Spirit of reverence, piety, knowledge, fortitude, prudence, discernment and wisdom.

In a similar vein, mode VII is linked to the attainment of bliss and the consummation of earthly labours. One presumes that the final caveat stems from the fact that there is still a mode to come!

per tetrardum beatitudo exprimitur, sed quae adhuc carne gravatur.
(De modorum)

Bliss is expressed through the fourth, which however is still burdened by the flesh.

quem prae omnibus aliis partibus optamus et diligimus. dulcior etenim cunctis fertur et, ut figurate loquamur, cum a primo usque ad sextum labores huius vitae significentur, cum iam ad septimum venit, in quandam transitur theoreticam et contemplativam, sed quae adhuc carne gravatur.
(Ibid.)

We select and value this [tone] before all other parts. For it is regarded as sweeter than all the rest and, to speak figuratively, while from the first all the way to the sixth the labours of this life are signified, [when] now it is come to the seventh, it is crossed over [transformed] into a certain speculation and contemplative life, but [one] which is still burdened by the flesh.

The “early tradition” is not concerned with number symbolism but with structural features:

garrulitas tetrardi authentici
(Guido)

the volubility of the fourth authentic

garrulum
(Herm.)

babbling

quarti garrulitas placet.
(De inv. synemm.)

The garrulousness of the fourth pleases.

alii mimicos septimi saltus libenter audiunt.
(John)

Some like to hear the spectacular leaps of the seventh.

septimus . . . est garrulus propter multas et breves reflexiones, quas habet ille cantus.
(Engelb.)

The seventh is voluble, on account of the many, short changes of direction which that song has.

*septimus tonus est lascivus et iucundus,
varios habens saltus, motus adolescentiae
repraesentans.*
(Aegid.)

The seventh is sportive and joyful, having various leaps, representing the movements of adolescence.

Septimus est iuvenum.
(Adam von Fulda)

The seventh is of the youthful.

Abert's linking of youthfulness with joy of a worldly kind is founded entirely on Aegidius, and his linking of Mixolydian with "the likewise major character produced by the Lydian octave-species" of ancient theory⁴³ flies in the face of the usual classification of Lydian and Ionian, as slack modes with relaxed connotations, and Mixolydian and Syntonolydian, as taut modes specially suited to funeral dirges (Plato, *Republic* 398-99; Aristotle, *Politics* 1340B). Perhaps he is following Cleonides' three-fold system of distinguishing ethos: though he (Cleonides) gives no examples, diastaltic ethos appears to match the Hellenic Dorian, hesychastic ethos the Platonic Phrygian (though not Aristotle's), and systaltic to cover both Mixolydian and Lydian. Yet the systaltic ethos serves no cheerful ends, but rather brings the soul "into dejection and an effeminate condition".⁴⁴ That is surely not the province of the "reviving breath".

From what remains of the statuette it is possible to postulate two further meanings. The figure appears to be caught in a "dancing step", with a marked protrusion of the hip and a leaning, rotated torso—an apt design for a mode characterized by "reflexiones". The earlier writers note the preference of some people for the "chatty" effect of the music; Aegidius builds in another two defining terms (*lascivus*, *iucundus*) which are reflected in later writers like the Carthusian, whose ascription suggests that *lascivus* ought to be translated as "sportive" or "playful", rather than "wanton" or "lascivious":

*Septimus tonus est saliens et multum est
lasciviens; ut patet in illa antiphona:
"Assumpta est Maria" et in illa: "In civitate
Domini". (Et versus) "Lascivie servit
jucundis septimus odis / Autumo plus tales
tale decere melos".*

The seventh tone is leaping and frequently sportive; as is shown in that antiphon: "Assumpta est Maria", and in that [one], "In Civitate Domini". (And the verse) "The seventh is the sportive servant of joyous odes; / I aver that more songs should be such as these".

Instead of ironing out these distinctions, it might be more useful to keep them in clear juxtaposition as a more faithful picture of the "artistic conception".

⁴³*Die Musikanschauung*, 242.

⁴⁴SSR, 45.

Thus, if the instrument is indeed a trumpet, it may well be following a separate tradition.⁴⁵ For instance, Origen's interpretation of the trumpet as a symbol of the efficacy of the Word of God could only be linked to the motto with its pneumatic reference by a mediation such as Ephesians 6.17b: "[T]ake ... the sword the Spirit wields, which is the word of God".

VIII (Hypomixolydian). Nothing remains of this representation. The motto reads:

*OCTAVUS SANCTOS OMNES DOCET
ESSE BEATOS*

The eighth teaches all the saints to be blest.

The last mode of the cycle is probably more important for its serial position than for any other single quality. These, however, we note first:

suavitas
(Guido)

sweetness, agreeableness

hypomixolydius iucundus vel exultans
(Herm.)

the hypomixolydian[,] joyful and exalting

*alii decentum et quasi intonalem octavi
canorem diligunt.*
(John)

Others value the staid and almost matronly strains of the eighth.

*octavus suavior propter morosos et
pauciores reflexus.*
(Engelb.)

The eighth is sweeter on account of its lingering and fewer melodic turnings.

In addition its qualities, though distinct, are closely linked with those of mode VII, sometimes as complementaries (as in the Carthusian witness), sometimes as an intensification and consummation:

*octavus tonus est seniorum, et est morosus
et suavis; ut patet in illa antiphona: "Dum
medium silentium". (Et versus) "Octavus
morulus, gaudiens gradiensque decenter, /
Creditur esse magis gratus in ore sonus".*
(Carth.)

The eighth is the tone of older men, and is lingering and sweet; this is shown in that antiphon: "Dum medium silentium". (And the verse) "The dark-hued eighth, rejoicing and proceeding decently, / Is held to be a more pleasing sound on the lips".

Postremus est sapientium.
(Adam von Fulda)

The last is the tone of the wise.

⁴⁵There is no certainty that it is a *tuba*. The position of head and hand may suggest it; so does a process of elimination of the other common instruments of iconography.

Octava autem pars in omnibus perfecta est et transcendit labores vel aerumnas nec jam dedita est lamentis nisi his qui amore superno fiunt. Unde et difficile et ineptum est ex eodem modo fieri lamentabile carmen. – Per tetrardum autem beatitudo exprimitur, sed que adhuc carne gravatur; per ejus subjugalem eterna quies et beatitudo exprimitur
(De modorum)

However, the eighth part is complete in all [things] and it transcends toils and distresses and is in no way applied to lamentations, unless to these which are created by celestial love. Whence it is both difficult and foolish that a lament be made from the same mode. However, through the fourth mode bliss is expressed, but which is still burdened by the flesh; through its plagal, eternal rest and blessing is expressed.

Since no other mode-pair shows such close correlation, it may be that ancient number theory is again a decisive factor:

Nam cum aetas tua septenos octies solis anfractus reditusque converterit, duoque hi numeri, quorum uterque plenus, alter altera de causa, habetur, circuitu naturali summam tibi fatalem confecerint; in te unum, atque in tuum nomen, se tota convertet civitas.
(Cicero, *De re publica* 6.12)

When your age has completed seven times eight recurring circuits of the sun, and the product of these two numbers, each of which is considered full for a different reason, has rounded out your destiny, the whole state will take refuge in you and your name.

Yet the dominant impression is of the last mode as the goal and fulfilment of the totality of music, hinted at in the *iuvenum-seniorum* couplings, and related to the perfection of eight as the first cube number:

Pythagorici vero hunc numerum Iustitiam vocaverunt.
(Macrob.)

Indeed, the Pythagoreans called this number "Justice".

Amplius in musica octonarius reperitur in tonis, qui fundatur super quaternarium tonorum praedictum: sicut et in ecclesia octo sunt beatitudines, quae radicanur in quatuor virtutibus.
(De Muris?)

Besides, in music the octonary [form] is to be found in the tones, which are founded on the preceding quaternary [form] of tones: just as in the church there are eight beatitudes, which are rooted in the four virtues.

*Sicut enim octava dies nostrae
resurrectionis prae cunctis erit dulcior et
suavior, sic haec consonantia (diapason) in
oatonario constituta prae cunctis dulcior
est, & suavis ab auditu. Per octo suas voces
intelligimus octo beatitudines.*
(Marchettus)

*alii seriositatem octavi quasi generalem vel
primam doctrinam prae ceteris libenter
attendunt.*
(De Muris?)

For just as the eighth day of our resurrection will be sweeter and more pleasant before all [others], so this consonance (diapason) constituted in octonary [number] is sweeter than all [others] and pleasant to the ear. Through its eight voices [notes] we perceive the eight blessings.

Others freely consider the seriousness of the eighth as if [it were] a general or noble doctrine before the others.

In the neighbouring ambulatory capitals, the *ordo numerus* seems to be quite clearly reinforced in carvings of the four virtues, the four seasons, the four streams of paradise and the four trees of Eden. The quaternary association with the modes (see 100 above) ought not to be overlooked.⁴⁶

Finally, we consider an apogee of musical imagery to be found in the exegetical writing of Wolbero of Cologne on the “Song of Songs”.⁴⁷ This work is useful as a summary of diverse traditions of musical commentary, as well as an extreme instance of the amassing of metaphor. It is significant also for its exploration of *canticus*, a discipline related both to the genre of the text—lyric poetry—and to its traditional figurative explanation as an expression of spiritual love.

Truistic though such thoughts may be, it is worth reminding ourselves of some of the dynamics underlying the interpretation of canonical texts. Kermode suggests “secrecy” as a guiding category:⁴⁸ this implies a professional hold on meaning, accessible only to an educated élite. The compounding of language drawn from the various liberal arts in exegesis confirms this. In addition, the interpretive space that has to be filled between text and meaning has a double current running through it.

⁴⁶Schrade, 264.

⁴⁷D. S. Chamberlain, “Wolbero of Cologne (d.1167): A Zenith of Musical Imagery”, *Mediaeval Studies* 33 (1971): 114-26.

⁴⁸See his *Essays on Fiction 1971-1982* (London: Routledge and Kegan Paul, 1983), chap. 8. I borrow the epithet from his related work on the Gospels, *Genesis of Secrecy* (Cambridge, Mass.: Harvard University Press, 1979).

On the one hand, there obtains in exegesis a profusion of signs, of facts with hidden meanings, of polyvalent symbols.⁴⁹ Meaning seems to be saturated by the myriad connections that suggest themselves to the writers, and this abundance of possibilities may be the cause of the arbitrary quality of so many choices. On the other hand there exist checks on disorder which, with time, become traditional alignments of interpretation that serve both a pastoral purpose—the inspiring of the heart to charity, the love of God and sanctity—and a rhetorical one.⁵⁰

A ubiquitous ordering power was that of number. Influenced as much by neo-Pythagorean numerology as by biblical number symbolism, medieval minds built on a mighty extrapolation from just a single verse—“*omnia in mensura et numero et pondere disposuisti*” (Wisdom of Solomon, 11.21)—to elevate number to the status of “a form-bestowing factor in the divine work of creation. . . . From the symmetries and correspondences of the basic numbers there arises a seeming order which is believed to be sacred.”⁵¹ Thus number lodged close to the heart of theology, and not only in the pre-scholastic Middle Ages, when thought forms were arguably less penetrative or subtle.

Wolbero’s epitome of “a long intellectual and artistic tradition of metaphor”,⁵² especially of musical and moral terms in the text, raises questions about the nature of this imagery. Metaphor might usefully be described under three broad aspects:

- a) The **conditions** of metaphor normally consist in two discrete factors which may be linked by a common quality.
- b) The **dynamics** of metaphor involve that link being so made that the direction of transference is clear. (“That man’s a tiger”: ferocity transferred from tiger to man.)

⁴⁹The psaltery, for instance, offers at least three “handles”. Within its broad association of devotion to God, it is viewed from differing angles: its stretched strings represent mortification of the flesh (cf. the discussion of the *cithara* under mode III above, in addition to n.21), its ten strings the Decalogue, and the variety of its notes the modes of virtue required in overcoming Pride, Luxury, Anger and Avarice.

⁵⁰I use the term “rhetorical” here without strict reference to its classical codifications. If a parallel with them were sought, these checks or “stiffenings” of meaning might correspond most nearly to the process of arrangement or *dispositio*. However, the structural principles espoused in ancient oratory are replaced in some Christian writers by less elegant habits, e.g. the *catenae* (chain constructions) used in exegesis, which merely assembled comments drawn from various authorities to cover the possibilities of a text. The later formulation of a fourfold exegesis of scripture might also be regarded as a theoretically undergirded procedure for directing meaning.

⁵¹E. R. Curtius, *European Literature and the Latin Middle Ages*, trans. W. R. Trask (London: Routledge and Kegan Paul, 1953), 504.

⁵²Chamberlain, 116.

- c) The **effect** of metaphor is to infuse a text with novel energy that results from complex changes occurring in the transference. (It is not simply animal ferocity that is being underlined or “doubled” in the human makeup. With the word “tiger”, other adhering resonances are drawn in also, to react with other dimensions of the human being.)

Remarkable in Wolbero’s work is the two-way direction of metaphor, encouraged by the limitation of the discourse to two main fields—music and devotion. Thus, musical concepts serve as the source for the explication of non-musical passages, while the language of devotion serves to adumbrate strictly musical references. It is true that the musical terms require a further interpretative step to achieve theological closure, yet this symbiotic process is so pervasive that one might speak of an incipient de-metaphorizing of the language, as if the urge to edify and exhort were being simultaneously neutralized by the intellectual rhapsodizing.⁵³

Consider the passages 5.10-15 and 7.1-6 in the *Song of Songs*. They are poems of mutual praise, each unashamedly admiring the physical beauty of one of the lovers. Such frankly erotic material could not have been entertained in medieval Christian thought apart from a figurative reading. Wolbero’s entrance to the material is via *numerus*. He counts ten praises in each passage, and regards these as the song of the Shulammite maid to a ten-stringed psaltery, and the ten-fold reply of the “bridegroom”, sounding in a single resonating “*decachordum*”. Her praises begin with her beloved’s head and work downwards, while his proceed up from her feet. This poetic conceit signifies her start on the high strings and his on the low ones. Then the repetition of “gold” in two of the praises eight “strings” apart (applied to the man’s head and feet, 5.11a and 15a) strikes Wolbero as the sounding of the “symphony of *diapason*”; by a curious extension, he reads in the four praises of the girl in 6.9 the “*modulatio*” and “*symphonia*” of the “*diatessaron*”. This interpretation obviously cannot rest there: the musical metaphors have to mediate between these praises and the language of exhortation. Standard associations now come into play, the ten strings referring to the Decalogue, the two melodic directions producing a “*modum gratissimae melodiae*”, the diatessaron representing the four sacraments, gospels or cardinal

⁵³This is not to say that the alternation of direction of transference nullifies metaphor. But the very interchangeability of the two lexia confirms that both are symbolic lists. It is this movement, “from symbol to symbol”, that erodes metaphoric function. Another consideration is the very long tradition of musical imagery that lies behind all the works considered in this chapter, a tradition that creates a predisposition to metaphorical procedure.

virtues. The inelegance of this operation testifies to the contradictory forces at work.

More musical thought appears in his reading of 6.8: “There may be sixty princesses, eighty concubines, and young women past counting, but there is one alone . . .”. The old approach read these as three levels of sanctity—the perfect, the less perfect and the imperfect. But knowledge of musical proportions reveals a further “fact” in the ratio of 80:60, or 4:3. The sesquitercian form points again to the diatessaron which is called after its four notes. Its meaning is the universal church, “spread through the four parts of the world in three degrees of fidelity (4:3) . . . [and] moved to holy religion by the four voices of the New Testament”.⁵⁴ This mechanistic procedure might have struck some exegetes as undisciplined, but it is nothing more than an exhaustive use of methods generally considered authoritative in unlocking the sacred text.

Unconstrained by the particularities of any text, Wolbero expatiates on the “*canticum novum*” in his epilogue. The “*salubris . . . melodia*” is conceived of as sung, in the genus of four modes (compunction, confession, satisfaction, perseverance), and as ending each day on one of their four *finales* (thought, word, deed, habit). The mode of the “new song” begins in lowliness and obedience (at the lower end of the *ambitus*) and ends on the high sounds of joy; that of the “old song” (a phrase invented by the exegetes and representing unregenerate life) begins on the high notes of pride and ends on the low ones of the impenitent’s hell. Again, the seven different notes of *cantus* are the gifts of the Spirit, and the eight species of mode are regarded as the Beatitudes. Citing Ecclesiasticus 39.19 (“in songs of the lips and on *citharas*”), he touches briefly on conventional instrument symbolism.

Lastly, mention must be made of the manner in which this habit of thought plays on the “secondary canon” of selected mythological material. Where others have cited the ancient tales of Orpheus and Amphion as “evidence” of the wondrous power of music, Wolbero finds in them figures of the perfectly rational and worthy operations of eloquence (rhetoric). So, Orpheus taming wild beasts with his singing represents the power of eloquence to educate bestial men, while Amphion’s moving of stones by the sound of his lyre is a picture of reason composing harsh manners. The beguiling song of the Sirens suggests “the foolish persuasion of evil spirits”.⁵⁵

⁵⁴Chamberlain, 121.

⁵⁵*Ibid.*, 117.

How did the terms of medieval scale theory come to exercise such potent symbolic powers? To end the argument of this chapter, we return to the earlier comments on symbolism, in order to redraw Taylor's description, or, rather, to attempt an explanation of the mind moving "from symbol to symbol". The authors of the Middle Ages, in fact, provide important insights into their own overriding habits of mind:

For this whole visible world is a book written by the finger of God, that is, created by divine power; and individual creatures are as figures therein not devised by human will but instituted by divine authority to show forth the wisdom of the invisible things of God. But just as some illiterate man who sees an open book looks at the figures but does not recognize the letters: just so the foolish natural man who does not perceive the things of God sees outwardly in these visible creatures the appearances but does not inwardly understand the reason. But he who is spiritual and can judge all things, while he considers outwardly the beauty of the work inwardly conceives how marvellous is the wisdom of the Creator.⁵⁶

Clearly, beside the canonical text of Scripture is placed the book of Nature which encompasses all created phenomena. The medieval theory of music is to be found in the second "book of God". A debate is suggested in this passage between reason and revelation, one which conceivably was never satisfactorily concluded. What is clear is that the means of reading these two "books" is psychologically similar: the key to understanding medieval symbolism lies not in the symbols so much as in the mentality of the reader. This form of reading exhibits the two antagonistic currents referred to in the discussion of the formation of meaning (120); indeed, primary mental operations are the most likely source of the currents. The first is the tendency to imaginative proliferation in the reader-of-signs, the other is the marshalling of these impulses by association or elimination. Their constant interplay is what constitutes (psychologically, at any rate) the reader's understanding of the text. There is no better summary than part of a poem by Alanus ab Insulis (c.1128-1203):

⁵⁶Hugh of St Victor, quoted in G. Josipovici, *The World and the Book: A Study of Modern Fiction* (London: Macmillan, 1971), 48-49.

*Omnis mundi creatura
Quasi liber et pictura
Nobis est et speculum;
Nostrae vitae, nostrae mortis,
Nostri status, nostrae sortis
Fidele signaculum.
Nostrum statum pingit rosa,
Nostri status decens glosa,
Nostra vitae lectio.⁵⁷*

every created thing of the world is
to us as it were a book
and a painting and a mirror;
a faithful sign of our life, our death,
our condition, our lot.

The rose represents pictorially our state,
a fitting commentary on our state,
a reading of our life.

The pious are understandably positive about this readerly form of life, but they gloss over (as Hugh rather does in his theological concern) the view more commonly propounded now, that the great medieval cleavage is as much between schooled and unschooled minds—a social cleavage—as a spiritual differentiation of worlds. That symbolic reading would involve a high degree of social exclusivity was clear, however, even before the time of Christ. Philo of Alexandria, also attempting scriptural interpretation in the light of philosophy, knew that allegorizing finally rendered texts obscure to the many and plain to the few.⁵⁸

⁵⁷Quoted in F. Ohly, *Vom Geistigen Sinn des Wortes im Mittelalter* (Darmstadt: Wissenschaftliche Buchgesellschaft, 1966), 13.

⁵⁸H. A. Wolfson, *Philo: Foundations of Religious Philosophy in Judaism, Christianity and Islam*, 4th rev. ed., 2 vols. (Cambridge, Mass.: Harvard University Press, 1947; reprint 1968), 1:115, 122.

Chapter 6

The Renaissance I: Gafori, Kepler and the Spheres

It might seem at first glance that Gafori and Kepler have little in common—that, distanced as they are in time, they stand on opposite sides of an invisible line dividing humanistic lore from early modern science. Yet there are a number of reasons for making the association dealt with in this chapter. Kepler and his work are, of course, the subjects of a rich literature; but Gafori, too, has emerged from the shadowy world of incunabula, thanks to the work of a clutch of scholars.¹ These two figures meet naturally on the field of Renaissance cosmology as inheritors of the Timaeian tradition,² and, considering the range of Kepler's thought on the subject, in the discipline of music theory also.³

Franchino Gafori (1451-1522) is now generally recognized, together with Johannes Tinctoris and Ramis de Pareia, as a leading music theoretician of the fifteenth century. The famous frontispiece that provides the focus of this study

¹Clement Miller has produced translations of *Practica musicae* (Rome: American Institute of Musicology, 1968) and *De harmonia musicorum instrumentorum opus* (Rome: American Institute of Musicology, 1977). Subsequent references to these works refer to these translations. In addition, articles by Miller will be mentioned below. Another translation of the *Practica musicae* has been made by Irwin Young (Madison: University of Wisconsin Press, 1969). See also Claude V. Palisca, *Humanism in Italian Renaissance Musical Thought* (New Haven: Yale University Press, 1985).

²S. K. Heninger, Jr., *The Cosmographical Glass: Renaissance Diagrams of the Universe* (San Marino, California: The Huntington Library, 1977), 127-32, 136-38.

³See Michael Dickreiter, *Der Musiktheoretiker Johannes Kepler* (Berne: Francke, 1973).

first appeared in 1496 at the start of his *Practica musicae*, though it is really related to the contents of an earlier treatise, the *Theorica musicae*, which appeared in two editions, 1480 and 1492; it is specifically treated in the later *De harmonia*, published in 1518 though written before that date.⁴ According to a handwritten note in it, the original manuscript was revised in 1514. There is also additional material in the Lodi manuscript (a woodcut and mention of Faber Stapulensis and Jordans) which was probably added between 1514 and the date of publication.⁵

Investigation into this by now familiar woodcut (reproduced on page 127) has taken one of two forms—either attempts to explain the significance of particular iconographic items in it, or attempts to trace its immediate ancestry. (The history of the spheres and their musical associations is, of course, a long and varied one.) It is, however, useful to begin consideration of the woodcut in the context of Gafori's own career and work.

Gafori spent the years of early childhood in the Benedictine monastery of St Peter in Lodi and became a singer at Lodi Cathedral, where he pursued his musical studies. He wrote two treatises between 1474 and 1477 while he was living in Mantua and Verona.⁶ He moved to Genoa in 1477, but the bitter factionalism between the Adorni and Fregosi forced the Doge (Prospero Adorno) and his composer to flee to Naples the following year. There Gafori met Tinctoris, among other musicians, and produced the *Theoricum opus*.⁷ In 1480 he

⁴On the printing history of the treatises, see the introductory remarks to Miller's translations and the comments of A. W. Pollard, *Early Illustrated Books*, 3d ed. (New York: Empire State Book Company, 1927), 132, which place the books in the context of Milanese printing activities.

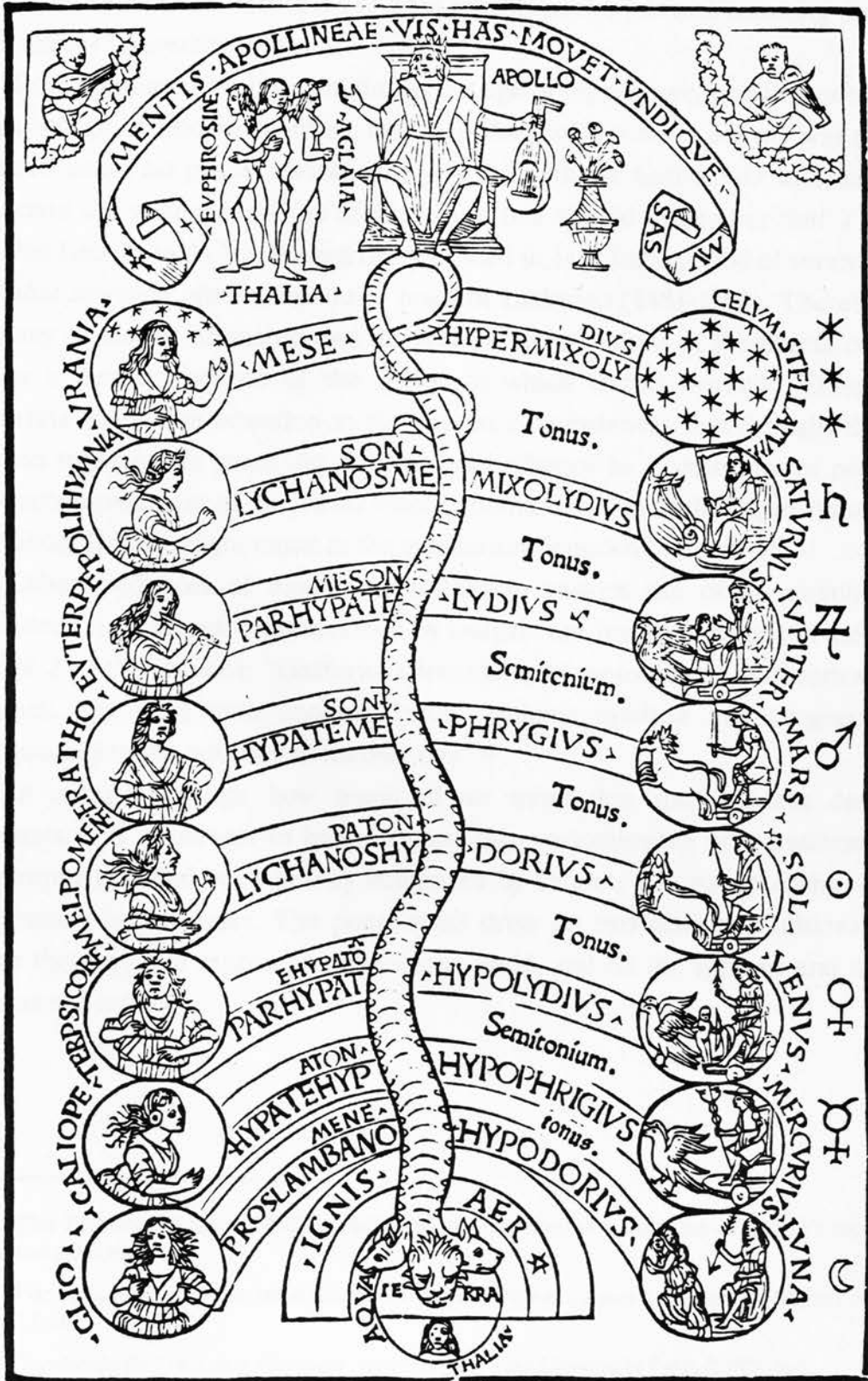
James Haar ("The Frontispiece of Gafori's *Practica Musicae* (1496)", *Renaissance Quarterly* 27 [Spring 1974]: 7, n.4) notes that a MS copy of the *De harmonia* dated 1500 is lodged in the Biblioteca Laudense in Lodi. Another MS, intended for the dedicatee of the printed version of the book and also marked 1500, is in the Austrian National Library: see F. Unterkirchner, "Eine Handschrift aus dem Besitze Jean Groliers in der österreichischen Nationalbibliothek", *Libri: International Library Review* 1 (1950-51): 51-57.

⁵As Miller has shown in connection with the *Practica*, Gafori's works took years to reach their final state ("Gaffurius's *Practica Musicae*: Origin and Contents", *Musica Disciplina* 22 [1968]: 105-28).

⁶See Clement Miller, "Early Gaffuriana: New Answers to Old Questions", *The Musical Quarterly* 55 (July 1970): 367-88.

⁷This was the earlier version of his *Theorica musicae*. Written in 1479, it was originally titled *Theoriae musicae tractatus*. In it, Gafori announced that he would write a treatment of "practice". In the event, he produced a study of musical elements and the eight tones which, in revised form, became Book 1 of the much larger *Practica* (see Miller, "Gaffurius's *Practica Musicae*", 105-7 and 111-18).

Figure 6-1 Frontispiece to Gafori's *Practica musicae* (1496)



returned to Lodi to teach, and began writing the *Practica*. After a year in Bergamo (1483), he was appointed *maestro di capella* at Milan Cathedral, a position he held for the rest of his life. He combined this job with lecturing duties at the nearby University of Pavia.

Both appointments brought him, at the age of thirty-three, into the ambit of the patronage of Lodovico Sforza, called *Il Moro*, whose court activity was (and had been under his predecessors) closely linked with the Cathedral.⁸ In order to appreciate the eminence of the Sforza court, one should remember that it was here that Leonardo da Vinci, aged thirty, settled in 1482 for a period of seventeen years that spanned almost the entire reign of Lodovico (1481-1500). Therefore, the many studies of Leonardo and the related investigations of the Sforza court give us a detailed picture of the milieu in which Gafori worked.⁹ Emanuel Winternitz has drawn attention to the special circumstances that brought these two men together—in particular, Leonardo's brilliance as a performer of poetry to the accompaniment of the *lira da braccio*, in the tradition of the *improvisatori*.¹⁰ In addition, Gafori taught music at the gymnasium founded by Lodovico.¹¹

Other evidences of humanistic influence—besides the often mentioned translations from Greek commissioned by Gafori—are his work on poetic metres in Book 2 of the *Practica*: “Gaffurius's treatment of mensuration is historical in approach, beginning with ancient Greek rhythmic symbols and progressing systematically to the notation of his own day.”¹²

In order to gauge how much of an innovation the woodcut design represents, it is important to keep in mind the predominance of a tradition of iconography that had been heavily influenced by Dante's *Commedia divina*, and the *Paradiso* in particular. The poem itself drew on two distinct traditions: of angelic theology and representation on one hand, and on the spheres and their music on the other.

⁸The *Theorica musicae* (1492) is dedicated to Lodovico, as is also one of Gafori's motets, *Salve decus genitoris*.

⁹For references, see the bibliography in Robert Payne, *Leonardo* (London: Robert Hale, 1979), 321-26.

¹⁰*Leonardo da Vinci as a Musician* (New Haven: Yale University Press, 1982), 6-8.

¹¹In his edition (*De harmonia*, 15) Miller gives 1496 as the date of its foundation.

¹²Miller, “Gaffurius”, *NG* 7:78.

The idea of an angelic order formulated by Dionysius the Pseudo-Areopagite (c.500) may well be an attempt, as Meyer-Baer argues,¹³ to set up a Christian cosmic order parallel to the pagan one that drew on Cicero's *Dream of Scipio* and was taken up by Martianus Capella in his *The Marriage of Mercury and Philology*. However, it is worth remarking that the Pseudo-Areopagitical writings—which include not only the *Celestial Hierarchy* relevant here but also *Ecclesiastical Hierarchy*, *Divine Names* and *Mystical Theology*—are themselves the products of an attempt to synthesize Christian dogma and neo-Platonist thought.

The merging of pagan cosmic ideas with Christian notions of angelic orders had taken place by the eleventh century. What is especially noteworthy is that the iconographic connection of the heavenly realm with music had been achieved as little as a century prior to this, unless one regards earlier depictions of Christ with a seven-stringed lyre as a reference to the harmony of the spheres. The background to these depictions of Christ may well be Orphic: not only did Orpheus have the power to animate and control by means of his music, but when he was dismembered by the women of Thrace, his lyre, like his head, was borne back to Lesbos, and subsequently placed by Zeus among the stars. It has therefore an important place in Orphic mythology. There is also the tradition of representation that shows Apollo with a lyre, in his role as leader of the Muses (*Mousagetês*); hence, in another bit of Christianized classicism, Calderon refers to Christ as *el verdadero Apolo*.¹⁴

It is true that in Dante the spheres, while playing an important structural role, are not directly connected with music, except in the sense that, as Dante mounts from one sphere to the next, music (and dancing) become more and more prominent, until in the Empyrean, or Tenth Heaven, situated beyond the nine spheres (i.e. Moon; Mercury; Venus; Sun; Mars; Jupiter; Saturn; Fixed Stars; sphere of the *Primum Mobile*), he walks among celestial songs and dances much as one would through a medium like air or water—a kind of “comprehensive music”.

In early Greek astronomy, and in Babylonian too, seven is the mystical number associated with the planets. In Plato's “Myth of Er” (in one of two rather different cosmological models to be found in his writings), that is increased to eight.¹⁵ Nine was another number sacred to the Greeks generally, though not,

¹³Kathi Meyer-Baer, *Music of the Spheres and the Dance of Death: Studies in Musical Iconology* (Princeton: Princeton University Press, 1970), 40.

¹⁴*Ibid.*, 195.

¹⁵*Republic*, 616B-617D.

interestingly, to the Pythagoreans. From neo-Platonism, nine became the model for the angelic orders, which were divided into three sets of three (given here with their emblems and attributes):

Table 6-1 The Medieval Angelic Orders, after Dionysus¹⁶

Angels with six wings, the Counsellors:		
Seraphim	Flames	Love
Cherubim	Eyes	Knowledge
Thrones	Wheels	Devotion
Angels with four wings, the Rulers:		
Dominations	Royal Insignia	Nobility
Virtues	Scales	Calmness
Powers	Arms	Activity
Angels with two wings, the Servants:		
Principalities	Sceptre	Law
Archangels	Crozier	Work
Angels	Censer	Prayer

It is in the *De harmonia* (1518) that Gafori gives an explanation of the diagram first used in the *Practica musicae* of 1496. Even before this, he had expounded the Boethian doctrine of *musica mundana* (literally, “world music”) in *Theorica musicae* (1480). When he came to write *De harmonia*, he had had a number of important Greek treatises translated into Latin, the better to equip himself for his theorizing. These exercised a powerful influence on his thinking: Ptolemy’s *Harmonics* is a clear model, and Aristides Quintilianus’s treatise on music (*Peri mousikês*) provides the inspiration for his Book 4, a discussion of modes.

In it, Gafori matches each mode with a planet; then comes the association of the degrees of a scale with the planets/modes, starting from *proslambanomenos*/moon/hypodorian. His “highest heaven” is the sphere of the fixed stars, with which he associates the hypermixolydian in “that sublime and divine harmony . . . free of corruptible properties (which are thought to belong to other modes)”.¹⁷ Haar points out that the octave in question is that of medieval

¹⁶See Meyer-Baer, 39-40.

¹⁷*De harmonia*, 189.

and Renaissance chant theory, ranging from A to a and employing the names of the lower half of the two-octave Greek system.¹⁸ The planet/scale degree association had a long history, reaching back to Nichomachus.¹⁹ Likewise, the order of the planets had been set out by Macrobius,²⁰ and Martianus Capella had made the connection of planets with Muses.²¹ Haar claims that the mode/planet congruence was original with Ramis, whose *Musica practica* had appeared in 1482;²² but Miller has shown that Gafori had all the materials for his diagram by the time of the *Theoricum opus* (1480).²³ Finally, he links each planet with its zodiacal house (in the text of *De harmonia*, though not in the woodcut), a feature taken from Ptolemy. In bringing together these traditional sets of associations, Gafori is himself following a tradition with medieval roots—an “encyclopedic tradition”.²⁴

Ramis’s diagram is also part of this tradition (reproduction on 132). It spans the entire two octaves of the Greek *systema teleion*; it is worth quoting Ramis’s explanation of how the modes are contained in this system of circles:

When therefore we draw a circle from the first, that is, silence, to the last and return, running over the whole harmony as far as the second, we create the Hypodorian.

In the way that we have done this, we judge the others should be done, so that we should not cease making circles until we arrive at the last Muse—from which further stretching would be superfluous since it would be a replica of an earlier one; the stretching Roger Caperon asserted to be *crisis*, that above *nete hyperbolaeon*, and the other *coruph*, under

¹⁸“The Frontispiece”, 11.

¹⁹Meyer-Baer, 72.

²⁰*Commentary on the Dream of Scipio*, Records of Civilization Series, trans. W. H. Stahl (New York: Columbia University Press, 1952), 196.

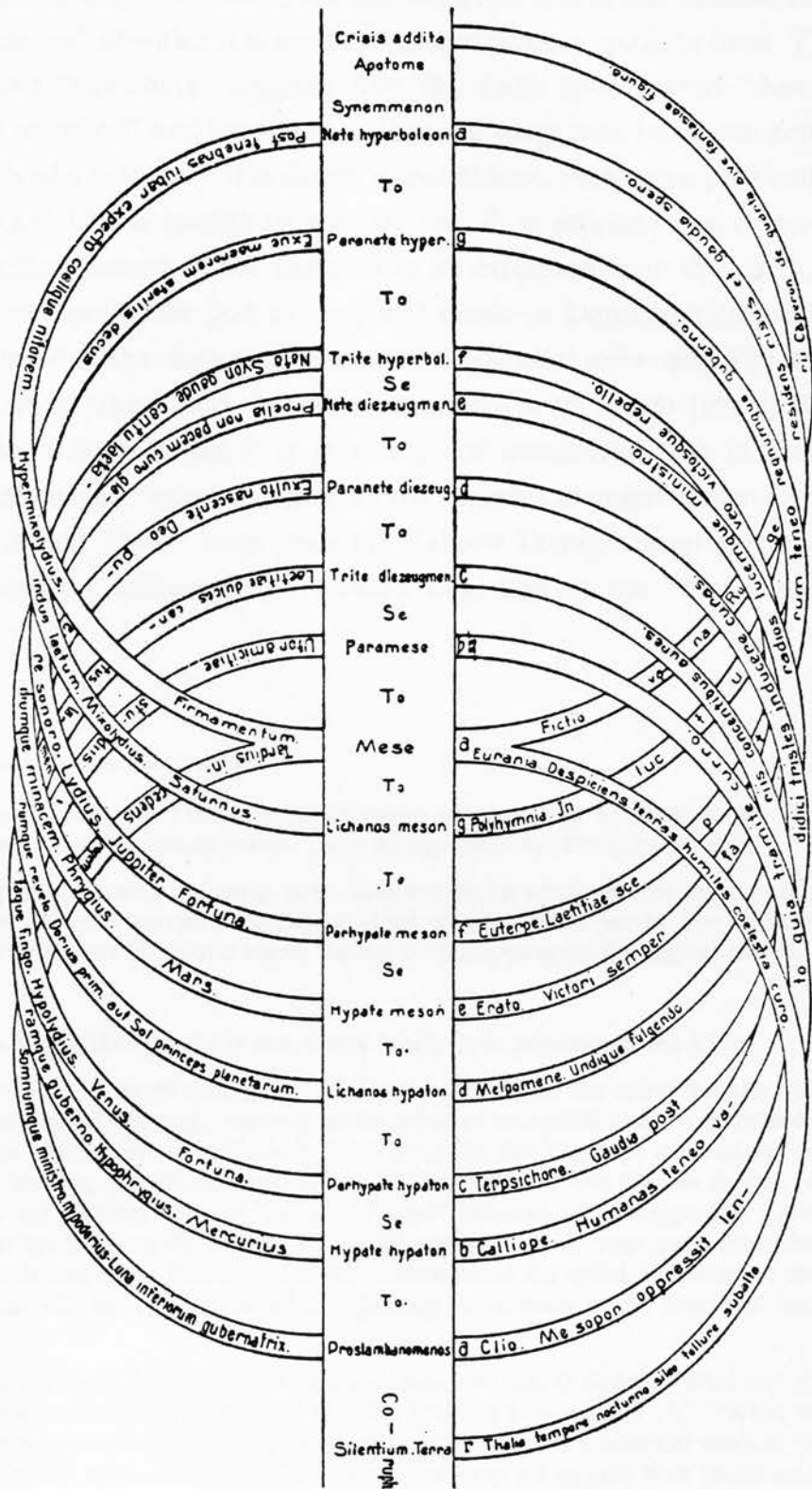
²¹*Martianus Capella and the Seven Liberal Arts*, vol. 2: *The Marriage of Philology and Mercury*, trans. W. H. Stahl and Richard Johnson with E. L. Burge (New York: Columbia University Press, 1977), 1.27-28.

²²“The Frontispiece”, 18. Strictly speaking, Haar claims Ramis as Gafori’s “immediate source” for this matching, because no ancient evidence for it is available.

²³*De harmonia*, 18. By combining order of planets, planets/scale degrees and modes/scale degrees, modes and planets were automatically aligned not according to shared qualities but serially.

²⁴See Jean Seznec, *The Survival of the Pagan Gods: The Mythological Tradition and Its Place in Renaissance Humanism and Art*, trans. Barbara F. Sessions, Bollingen Series 38 (New York: Pantheon, 1953), 122-47.

Figure 6-2 Illustration to Ramis's *Musica practica* (1482)



proslambanomenos. . . . We indeed fear contradicting anything from antiquity; and therefore the first tone will be *proslambanomenos*, the last *nete hyperbolaeon*.²⁵

Attention may be drawn to the following features of this unusual diagram:

- a) The “circles” of which it is constructed are actually spiral in form. The use of the word “stretching” suggests this; the Latin *spira* means “that which is wound or coiled” and it appears in classical usage with particular reference to the coils of a serpent.²⁶ It is clearly a spatial idea, even more physically so than Gafori’s.²⁷ His is spatial in another way;²⁸ it expresses more forcibly the hierarchical nature of the universe in its extension from the earth, which is silent, to Apollo, the god of song and music—a Dantean idea, perhaps, but one purged of the slightest evidence of theological reference. The reason why the earth is silent (and therefore associated with “*surda* [mute] *Thalia*”) is because it is immobile.²⁹ It is surely not immaterial that in Renaissance diagrams of the “musical” universe the topmost element varies: sometimes it is “Deus” or “Dieu”, sometimes the Hebrew Tetragrammaton (usually a sign of cabbalistic influence); in Fludd’s depiction of the “monochord of the

²⁵Trans. Haar, 20. The missing sentences, as translated by Haar in his earlier article “Roger Caperon and Ramos de Pareia”, *Acta Musicologica* 41 (1969): 26-36, are:

He [Caperon], indeed, so I think, must have written his whole treatise in a heretical time, and when he arrived at *coruph* he collapsed along with his whole [work]. For it has been proved that the first Muse [Thalia] is silent, the last [Urania] occupies the highest sound.

(27)

²⁶See Virgil, *Georgics* 2.154 and *Aeneid* 2.217; Ovid, *Metamorphoses* 3.77.

²⁷See Haar, “The Frontispiece”, 21-22. He argues that the spiral doubles back on itself, but, as in most spiral drawings, this may be the effect of an optical illusion, increased in this case by the loops that meet in the centre. The spiral in the diagram is certainly unusual as a perspective drawing, but Ramis’s description of its direction (from bottom to top) can easily be followed. In my opinion, the real “sleight of hand” involved is the suggestion conveyed by the diagram that the notes of the *systema teleion* appear successively from *proslambenomenos* to *nete hyperboleon*; in fact, on a three-dimensional realisation of the spiral, the notes of the lower and upper octaves will be intercalated, each appearing respectively at the front and back of a 360° loop.

²⁸Wind, *Pagan Mysteries in the Renaissance*, rev. ed. (London: Faber and Faber, 1968; reprint, Oxford: Oxford University Press, 1980 [Oxford Paperback]), 267: “What we are given here is a flat map (imperfect as flat maps of solid objects are) of a spherical universe whose centre is occupied by the serpent’s leonine head while the loop [of its tail] both marks and transcends the circumference.”

²⁹Cicero *Somnium Scipionis* 5.2. A translation of *The Dream of Scipio* may be found with Stahl’s version of Macrobius’s *Commentary* on it; see n.20 above.

universe”, it is depicted as a hand emerging from a cloud that “tunes” the universe.³⁰

- b) The use of the two-octave Greek system, while having the appearance of being further humanistic “archaeology”, is in fact to be found in a twelfth-century manuscript (Paris, Bib. Nat. *MS lat. 7203*) dealing with Boethian ideas.³¹ Here “Deus” presides over the universe, and the fifteen scale degrees are occupied by seven orders of angels (there being no notes available for archangels and angels, which are omitted) and seven planetary spheres plus the fixed stars.

A curious difference between the scale in Ramis’s and Gafori’s diagrams and that of later Renaissance musical diagrams, such as Giorgio Valla’s, is a disagreement over the alignment of planets and scale degrees: the earlier theorists identify *proslambenomenos* (our A) with the moon, the earth lying outside the system;³² later diagrams specifically pair *proslambenomenos* and earth.³³

- c) Both these diagrams are open to neo-Platonic interpretation. This means, in essence, the idea of divine “substance” pervading the universe in a downward movement through a number of levels, and its corresponding return from the level of terrestrial imperfection back to celestial perfection. In Proclus’s *Elements of Theology*, this is described as i) inherence in the cause, ii) procession from the cause, and iii) reversion to the cause. With Ficino and Pico, this was to become an elaborate series of triads, illustrating the theme of Love as the means of mediation between gods and men. It is also easy to see

³⁰See Heninger, 85, 93, 133 for reproductions and n.33 below for further discussion of small but significant differences in the designs.

³¹See Jacques Handschin, “Ein Mittelalterlicher Beitrag zur Lehre von der Sphärenharmonie”, *Zeitschrift für Musikwissenschaft* 9 (1927): 193-208; Meyer-Baer, 81.

³²This is also the case in the MS referred to above, n.31.

³³See Heninger, 139-42. Put differently, the entire octave is lowered one notch in relation to the planets; this means that the sphere of fixed stars now falls outside the arrangement. In Valla’s diagram (in *De expetendis, et fugiendis rebus opus*, 1501), it is omitted altogether (reproduction in Heninger, 139); in Eck’s woodcut (to an edition of Aristotle’s *De caelo*, 1519), it is part of a different, ten-sphere conception (Heninger, 141). Heninger refers to similar diagrams in a 1614 edition of Censorinus’s *De die natali* (which I have not seen) and in Thomas Stanley’s *The History of Philosophy*, 2d ed. (London, 1687). Stanley’s diagram is conveniently reproduced in Warren Kenton, *Astrology: The Celestial Mirror* (London: Thames and Hudson, 1974), 100. Its scale degrees have no names, but are distinguished by intervals; their unusual succession, viz. T,S,S,T+S,T,S,S,S, results in an irregular *octotonic* scale copied from Censorinus *De die natali* 13.3-5. It would seem that the traditions embodied in these designs are a clear indication of the individual writer’s learning and sometimes of his personal idiosyncrasies.

how this was adapted to Christian purposes, and resulted in various trinitarian connections.³⁴

- d) Finally, the remarks on Roger Caperon refer to an attempt (not the only one) to extend the medieval gamut to ξ and to build the extension into solmization practices.³⁵ Ramis disagrees with the attempt to improve on Boethius, but makes use of Caperon's Greek term *krisis* ("a separating") to label the final twist of the spiral.³⁶ This discussion serves as an oblique reminder that at this time the universe was still regarded as finite in dimension. That opinion has long since fallen from favour, but then so has the idea of world harmony.

Gafori was a borrower of books. He also returned them with marginalia added, which is a convenient trail for scholars to follow. Thus it is known that he borrowed a copy of Ramis's work belonging to one of the author's students, probably in 1489. The possibility must also be allowed that he borrowed from Ramis the idea of a pictorial summary of the traditions.³⁷ Another annotated book (his own, this time) has survived—part of Marsilio Ficino's Latin translation of Plato's works, containing *Timaeus*, *Critias*, *Laws*, *Epinomis* and the *Letters*.³⁸ It bears the date 1489, so it is probable that Gafori had absorbed the material before the *Practica* came out in 1496. In the same year—1489—Ficino published in Florence an original treatise called *De triplici vita*. It contains "detailed prescriptions" for the "therapeutic and astrological use of music".³⁹ In discussing Ramis, Gafori and Ficino—all contemporaries and all writing around the same time—Walker discounts the possibility that the two music theorists were

³⁴Wind, chap. 3.

³⁵See the article by Haar mentioned in n.25.

³⁶He also includes the terms *synemmênon* and *apotomê* from the same source, where they indicate b^b and b^h . See Haar, "Roger Caperon", 33.

³⁷Seznec, *Survival*, 126-47, sets the frontispiece in the context of monumental and "occasional" encyclopedic art of the latter fifteenth century. The planetary gods are strongly in evidence from c.1450 onwards, and Seznec tries to distinguish between those instances in which "[t]he focus, the ideological center, is no longer to be found in a clerical conception of the Universe, but in the pagan imagination of a humanist" (134; he takes the Tempio Malatestiano as exemplary), and those in which "attempts may be observed to restore the gods to the place which they had rightfully occupied in the medieval encyclopedia—to reduce them once more to the status of mere elements in a Christian universe" (137, where he points to Mantegna's *Tarocchi*). His verdict on Gafori's mythological arrangement is unequivocal: it is a "Cosmos from which every trace of Christianity has disappeared" (140).

³⁸Otto Kinkeldey, "Franchino Gafori and Marsilio Ficino", *Harvard Library Bulletin* 1 (Autumn 1947): 379-82. Each Platonic text is accompanied by a more or less lengthy commentary by Ficino.

³⁹D. P. Walker, "Ficino's *Spiritus* and Music", *Annales musicologiques* 1 (1953), 132.

influenced by the philosopher or his special doctrine of music: their writings are negative evidence—of the lack of acceptance, in the fifteenth century, of Ficino’s version of *spiritus*.⁴⁰ However, like them, he deals with the moral influences of different sorts of music, thus signalling the revival of interest in modal “effects” that had so concerned the Greek classical philosophers. Since he is investigating celestial factors, he explains at the same time the influences of the planets, and how these can be engendered or avoided by the use of appropriate music.⁴¹ He even gives some indications as to how such magical music might be composed.⁴² In other words, he produces a rational demonstration of the joint ethical influence of the planets and modes. Gafori might, of course, have seen this theory prior to publishing his own *Theorica* three years later. Certainly, his annotations of the Plato translations are largely in reference “to moral sentiments or to religious utterances in Plato or in Ficino”.⁴³ More pointedly, the text of *De harmonia*—completed, it will be recalled, by 1500—adds, in its exposition of the woodcut, a layer that has not been incorporated in the illustration itself: the matching of zodiacal signs with the mode/muse/planet arrangement.⁴⁴

The seriousness with which the Renaissance regarded astrology, especially as an indicator of an individual’s moral constitution, may be judged from the use of astrological decorations in such locations as the Palazzo de Schifanoia in Ferrara, the Villa Farnesina in Rome and the Palazzo del Te in Mantua.⁴⁵ The basic purpose of these astrological schemes was to portray the heavens—planets, constellations and zodiacal signs—at the time of an individual’s birth (or, better,

⁴⁰Ibid., 149.

⁴¹While the celestial sphere exercises moral suasion through the planet/mode associations, physical health may be regulated through knowledge of the association of planets with bodily organs, the influences being comprehended through the doctrine of the four humours. See, for example, the diagram and verse in A. Henkel and A. Schöne (eds), *Emblemata: Handbuch zur Sinnbildkunst des XVI. und XVII. Jahrhunderts* (Stuttgart: Metzler, 1978), col.954.

⁴²Walker, 143-45.

⁴³Kinkeldey, 380.

⁴⁴See *De harmonia*, 197-200.

⁴⁵The Ferrarese decorations, in the *Sala dei Mesi*, were done between 1469 and 1471; their (putative) designer was Pellegrino Prisciani. The astrological vault in the Farnesina, attributed by Vasari to Peruzzi, was completed before 1511. Giulio Romano’s work in the *Sala dei Venti* dates from slightly later than this (c.1526). For details, see Ernst Gombrich, “The *Sala dei Venti* in the Palazzo del Te”, *Journal of the Warburg and Courtauld Institutes* 13 (1950): 189-201, reprinted in his *Symbolic Images: Studies in the Art of the Renaissance* 2 (Oxford: Phaidon, 1978), 109-18; Mary Quinlan-McGrath, “The Astrological Vault of the Villa Farnesina: Agostino Chigi’s Rising Star”, *Journal of the Warburg and Courtauld Institutes* 47 (1984): 91-105; Kristen Lippincott, “The Astrological Decoration of the Sala dei Venti in the Palazzo del Te”, *ibid.*, 216-22.

conception, if that was known). In fact, “doctoring” of the celestial picture was allowed in order to align the precise birthdate and its horoscopic prediction with the known facts of a person’s temperament.

In the Farnesina scheme, the twelve zodiacal signs are combined with the seven planets so as to encode a specific date.⁴⁶ In both the Mantuan and Ferrarese examples, the planets are replaced by the twelve Olympian gods, who are each correlated with a zodiacal sign.⁴⁷ The order of the gods is the same in both instances and has been traced to the *Astronomica* of Manilius (fl. c.14 A.D.) which was discovered by Poggio in 1417 and became widespread in MS form after 1450.⁴⁸ The arrangement in Mantua is not strictly speaking a horoscope, the constellations being spaced too evenly among the zodiacal signs. From this, Gombrich has concluded that the turn away from “the ‘vulgar’ planetary astrology to the more esoteric ‘wisdom’ of Manilius” implies that the series is of a more “general didactic character, reminding the beholder of the manifold influences to which man is subject”.⁴⁹ Lippincott has argued that, in addition to this function, the cycle incorporates evidence of a *rectificatio*—an attempt to “remove Federigo’s ascendant from the problematic influence of the Pleiades”.⁵⁰

The matching of gods and signs was a theme of Ficino’s celestial thinking: taking his cue from Plato (*Phaedrus* 246E and *Laws* 8.828) and employing Manilius for detail, he formulated what became an influential god/sign/month correlation, later extending it to include body parts too.⁵¹ Of course, Ficino has a readymade twelfold pattern which was not available to Gafori, who had to allot pairs of astrological signs to five of his planets. Gafori’s planets are not necessarily gods as well; Ficino himself makes this distinction by producing two

⁴⁶See Quinlan-McGrath, 93 and n.14.

⁴⁷See Gombrich, *Symbolic Images*, 116. The connection between these two depictions is presumably familial: the Mantuan one relates to Federigo Gonzaga whose mother came from Ferrara. The pairings are: Juno—Aquarius; Neptune—Pisces; Minerva—Aries; Venus—Taurus; Apollo—Gemini; Mercury—Cancer; Jupiter(Jove)—Leo; Ceres—Virgo; Vulcan—Libra; Mars—Scorpio; Diana—Sagittarius; Vesta—Capricorn. In the Mantuan design, the months of the year are also correlated.

⁴⁸See Lippincott, 217, especially n.5.

⁴⁹Gombrich, 115-16.

⁵⁰“The Astrological Decoration”, 217, 220, 222.

⁵¹The former appeared in his commentary on Plato’s *Symposium* (completed by 1469 and published in 1484), the latter in his *Epitome to Plato’s Laws* (published 1484). It is interesting to note that a classical inscription has been found containing the original correlation in which, however, each zodiacal sign is twinned with one god/month later; thus, Capricorn, not Aquarius, is associated with Juno/January. See Carol V. Taske, “Marsilio Ficino and the Twelve Gods of the Zodiac”, *Journal of the Warburg and Courtauld Institutes* 45 (1982): 195-202.

quite different correlations—gods/planets and gods/spheres.⁵² Gafori's purpose in distributing the twelve signs among the seven planets cannot be irrefutably decided, but, given the probable neo-Platonic context, it is likely to have been the "general didactic" one noted above: a recognition that "the modes participate in celestial harmony".⁵³

This is perhaps no more than a suggestive set of circumstances; however, they suggest an agreement in precisely the area we are examining—*musica mundana*—and offer the possibility that, though all three writers refer to ancient authorities, they might have been doing more than simply repeating traditional formulae.

The very comprehensiveness—indeed, unwieldiness—of Gafori's world-scale suggests an excitement with, and commitment to, the growing humanist project. Palisca has noted how Gafori's writings tend to show more and more humanist features as they appear, at the expense of Christian ones: for instance, the Muses in place of the angels on the spheres.⁵⁴ In comparing the two versions of Gafori's exposition of musical elements and modes, Miller has noted the same trend.⁵⁵ In other words, sometime between the late 1480s and mid-1490s, Gafori became something of a Ficinist.

Gafori's progress seems to me to emphasize that despite the well-attested attempts of many writers (Ficino included) to produce a synthesis of Christian and theologically heterodox ideas, there were choices to be made. This has been underlined, collaterally as it were, in Winternitz's study of representative paintings of angel-concerts dating from precisely the years under discussion, viz.,

⁵²See Taske, 199, who draws the conclusion that

Ficino employs the twelve gods to bridge the gap between the matter of these stars and the soul by asserting that just as these heavenly bodies [i.e. planets] influence our bodies towards a particular vocation, so their tutelary deities [the "souls of the twelve spheres"] influence our souls.

(201)

⁵³*De harmonia*, 184. The affective properties of the modes are treated in 4.4, 4.5 and 4.6 of *De harmonia*. The "harmonization of the seven modes and planets in a Sapphic poem with the Dorian and Hypodorian modes [illustrated]" constitutes 4.10; 4.12 expatiates on the mutual order of muses, constellations, modes and strings.

⁵⁴*Renaissance Humanism*, 170. They were angels in the discussion of *musica mundana* in the *Theorica* (1492) and Muses in the *De harmonia*, completed by 1500; but, as the woodcut shows, the neo-Platonic cosmology had taken effect before that.

⁵⁵These are a manuscript copy, dated 1487 but written in 1483, of what would later become Book 1 of the *Practica musicae*; and the printed version of 1496. The chief indicators of humanist concerns in the printed edition are the extended list of ancient authors and the care taken over the textual style—a clear sign of humanist bibliophily.

the 1480s.⁵⁶ It is clear that an iconography of the spheres with a distinctively Christian content—built around angelic figures—was still flourishing at this date. To be sure, it was itself showing the effects of *quattrocento* developments in painting, which meant a greater basic realism, but the dogmas of tradition remained intact. Sez nec’s point, on the contrary, is that the woodcut in question embodies an “Apollonian” tradition, and that Apollo is conceived as “both the origin and the center of the Universal Harmony”.⁵⁷

In the light of the intricacy of these mutual influences, it is unfortunate that, in the last century, the debate on Renaissance religion should have become mired in a simple theism/atheism opposition. This controversy resulted, first, in the rejection by twentieth-century historians of what they considered a sectarian viewpoint (the unthinking identification of humanism with atheism) in favour of what Charles Trinkhaus has termed a “genetic-modernizing” approach, i.e. the view that, with a welcome inevitability, the modern tradition of free-thinking rooted itself in Renaissance culture simply by supplanting Church-sanctioned viewpoints.⁵⁸

The second result of the controversy has been the defence, in the last two decades particularly, of the piety and sincerity of those humanists who continued to claim firm Christian adherence, while they were absorbing, rearranging and re-presenting ideas from the ancient pagan world. Both these “stages” in the argument have shifted the emphasis of research, and given scholars the opportunity for a degree of consensus on a difficult age.

Clearly, it was no easier to assess the Renaissance while it was proceeding. But people choose, in one way or another, under greater or lesser influences and determinisms, an outlook that may be said to “rule” them, to which they give their energies and perhaps even their ultimate assent. Gafori seems to me to have made a dramatic choice, one heralded by the oddness of including the woodcut in the *Practica*, as if he could not wait to express his new cosmological convictions, despite the “unspeculative” material of the book. I do not want to imply a sudden intellectual conversion in him: he was, in many respects, a conservative thinker.

⁵⁶“On Angel Concerts in the 15th Century: A Critical Approach to Realism and Symbolism in Sacred Painting”, *The Musical Quarterly* 49 (October 1963): 450-63; reprinted in *Musical Instruments and Their Symbolism in Western Art*, 2d ed. (New Haven: Yale University Press, 1979), 137-49. Winternitz also discusses a 1474 painting by Zanobi Machiavelli (*ibid.*, 142-45).

⁵⁷*The Survival*, 142.

⁵⁸“Humanism, Religion, Society: Concepts and Motivations of Some Recent Studies”, *Renaissance Quarterly* 29 (Winter 1976), 685-86.

But if the sincere attempts of some humanists to marry their faith with pagan traditions may be taken as a sign of the authenticity of that faith, then may not the refusal to effect such a combination be read as a rejection of the traditional faith in favour of the new growth? Of course, this was not always asserted openly: one's job at Milan Cathedral might be put in jeopardy. But the terrible instability created by some of Ficino's ideas, e.g. the musical *spiritus*, a word that could and did bear Aristotelian, Stoic, Galenic (medical) and neo-Platonic meanings in addition to the usual Judeo-Christian ones—such instability seems hardly to bespeak a faith at all: at best, it amounted to a fragile construct of beliefs that spelled its dissolution outside the intensity of Ficino's own mind and his Academy. I have alluded already to the fact that some theological ideas were themselves critically shaped by pagan concepts (e.g. the orders of angels), so the work of some Christian Platonists amounts to the compounding of hybridization with eclecticism.⁵⁹

Born near Stuttgart in 1571, Johannes Kepler was educated at seminary schools in Adelberg and Maulbronn.⁶⁰ With the intention of becoming a Lutheran pastor, he went on to study theology at Tübingen, receiving his M.A. in 1591, and in 1594 moved to Graz to teach mathematics at the Lutheran school there. Some of his ideas about cosmic harmony appeared as early as his *Mysterium*

⁵⁹There may even be an element of this instability in the woodcut itself, in the form of the serpent. Originally, it was thought to represent the celebrated python that lived in the caves on Mount Parnassus and was slain by Apollo; hence his epithet "Pythius". But Wind (265-67) is far more convincing in arguing that the three heads of the serpent actually imply that it is Cerberus that is meant. This triple-headed monster was associated with the Egypto-Hellenic cult of Serapis at Alexandria. By the time of the late Renaissance, it had become a "moral hieroglyph": the three heads, focussed respectively on past, present and future, came to stand for the virtue of *consilium* or Good Judgement. Seznec (141-42) recognizes this meaning, but argues that in the woodcut it is employed as an emblem of silence. Heninger (138) reads it as expressing "time under the aspect of eternity"—a reference to the explanation given in Macrobius's *Saturnalia* 1.20.13, which was almost certainly the source of the serpent figure.

It is not without interest that the Serapis cult was a healing one, and that in the Greek healing cult of Asclepius (or Aesculapius), the serpent was a sacred symbol of renovation. In Ovid's *Metamorphoses* (Book 15), a highly patriotic tale is recounted of a pestilence that was ravaging Latium. The Delphic oracle—that of Phoebus Apollo—sent the suppliants to find his son, who turned out to be a huge, golden snake that, after being brought to the healing shrine at Epidaurus, finally made its abode on an island in the Tiber.

⁶⁰Biographical details are drawn from the essay by E. J. Aiton published as the introduction to Johannes Kepler, *Mysterium cosmographicum: The Secret of the Universe*, trans. A. M. Duncan (New York: Abaris Books, 1981), 17-31; also Owen Gingerich, "Kepler", *Dictionary of Scientific Biography*, 7:289-312.

cosmographicum (1596);⁶¹ he began plans for the famous *Harmonice mundi* ("Harmonies of the World") in 1599. He moved to Prague in 1600 to work as assistant to the astronomer Tycho Brahe, who died a year later; Kepler succeeded Brahe as Imperial Mathematician to Emperor Rudolph II, in the process coming into possession of Brahe's accumulated observational data. These he used in correcting his earlier theories of cosmic harmony and ultimately in redrawing them altogether. This burst of astronomical work—he was also occupied in these years with books on vision and optics—produced the first two laws of planetary motion. In 1612, in the midst of severe political upheavals, he moved to Linz where some of his most important writings were published, including the *Harmonice mundi* (1619) and the observational tables compiled from his and Brahe's work. He died in Ratisbon in 1630.

The fact that Kepler's cosmological theories would preclude his being called an orthodox Lutheran has evidently seemed inconsequential to the many people who have studied his writings for their contributions to modern science—in particular, his three laws of planetary motion;⁶² however, in recent years interest in Kepler's philosophical viewpoint has grown again, even if respect for the "non-scientific" parts of his thought is still rather slight.⁶³ Part of the problem—when, indeed, the problem is even noticed—is his readers' habitual dissociation of the empirical and "mythological" mentalities that are combined in his thought; his "mythological" side is assumed to be anachronistic and unimportant for understanding his contribution to astronomy. However, in order to appreciate the character of Kepler's thought—let alone his integration of musical theory with astronomic observation—it is essential to explore its less familiar aspects.⁶⁴

⁶¹A second edition appeared in 1621.

⁶²The three laws are widely reproduced. The following version is from V. H. H. Green, *Renaissance and Reformation: A Survey of European History between 1450 and 1660*, 2d ed. (London: Edward Arnold, 1964), 52, n.1:

1. Planets travel in ellipses with the sun in one focus.
2. The area swept out in any orbit by the straight line joining the centres of the sun and a planet is proportional to the time [taken].
3. The squares of the periodic times which different planets take to describe their orbits are proportional to the cubes of their mean distances from the sun.

⁶³The most thorough survey of this rehabilitation is to found in A. J. Aiton, "Johannes Kepler in the Light of Recent Research", *History of Science* 14 (1976): 77-100. See also the comments of J. V. Field, *Kepler's Geometrical Cosmology* (London: Athlone Press, 1988), xvii-xx.

⁶⁴Rudolf Haase has pointed out ("Kepler's Harmonies: Between *Pansophia* and *Athesis Universalis*", *Vistas in Astronomy* 18 [1975]: 523) that the picture of Kepler as a pure natural scientist is relatively youthful; he traces its origins to P. S. Laplace's *Précis de l'histoire d'astronomie* (1821). By contrast, it is only as a result of the most recent reconstructions of

It is often pointed out that the three planetary laws that dominate the view of Kepler as a modern scientist are, in their original statements, hardly laws at all; they are steps in an argument that appears to be moving through them to some greater conclusion. Indeed, that conclusion is spelled out in the title of Kepler's first book, *Mysterium cosmographicum* (1596)—“Secret of the Universe”. That secret was really an open one: the harmonious nature of the cosmos. What was extraordinary in Kepler's lifelong attempts to explain “the number, sizes and motions of the orbs”⁶⁵ was his conviction that such harmony, emanating from the mind of God, was observable, intelligible and mathematically expressible. Mathematics here implies Euclidean geometry; apparently algebra was at the time held to be a rather lowly, if useful, tool.⁶⁶

Kepler's piety, like that of earlier Renaissance figures, has had its defenders; but it is not always recognized that the supposed split of his thinking into physical and theological branches actually illuminates a coherent conception of God. “[N]ext to the Lutheran God, revealed to him directly in the words of the Bible, there stands the Pythagorean God, embodied in the immediacy of observable nature and in the mathematical harmonies of the solar system whose design Kepler himself had traced—a God ‘whom in the contemplation of the universe I can grasp, as it were, with my very hands’ ”.⁶⁷ The “Pythagorean God” involved Kepler in some neo-Platonic theorizing as well, in his ideas of a deity whose existence is posited on mathematical principles and of a divine “deposit” of geometrical truth in the two “orders” of creation below God, i.e. *natura* (the physical world) and humankind.

The archetype of the mind of God is a three-dimensional sphere (and the three dimensions offer the inevitable parallel with the Trinity). A step down from this is the cosmos (the corporeal world), expressing in its external form the same archetypal idea. Naturally, the spheres themselves offered an obvious manifestation of this perfection, and it was in their mutual relations that the *Mysterium cosmographicum* sought harmony. For this purpose, Kepler used Platonic science in the form of the five convex, regular polyhedra which he

Keplerian history that “Kepler's scientific methods [may be] seen in their most typical form in his work on harmonies” (ibid.).

⁶⁵Preface to *Mysterium cosmographicum*, quoted in Field, 73.

⁶⁶See J. V. Field, “Kepler's Cosmological Theories: Their Agreement with Observation”, *Quarterly Journal of the Royal Astronomical Society* 23 (1982): 557.

⁶⁷See Gerald Holton, “Johannes Kepler's Universe: Its Physics and Metaphysics”, *American Journal of Physics* 24 (September 1956): 351. Kepler's words are found in a letter to Baron Strahlendorf, October 23, 1613.

discovered could be fitted between the planetary orbs.⁶⁸ He later had to revise these ideas, since he discovered with the help of Brahe's computations that the planets moved in ellipses, not circles. But even at this stage, his "feeling for the physical situation"⁶⁹ is in evidence: the orbs in his diagrams (*Mysterium cosmographicum*, chaps. 2, 14) include "only the true path of the planet, and not the circles used to construct it",⁷⁰ as had previously been the case with Copernicus's astronomical model.

The lowest of the hierarchical levels was that of individual souls, which included with human souls the *anima terrae* or earth-soul (an old idea found in Latin writers)⁷¹ and the souls of individual planets. Besides the unmistakable tinge of animism in this conception, the sheer "lowliness" of the subjects in comparison with divine forms has to be faced. Kepler does this by claiming that the human mind bears the same relation to the divine mind as a circle does to a sphere. The trinitarian apportioning of the divine mind consists of a) point—the Father; b) line (i.e. diameter)—the Holy Spirit; c) surface area of the sphere—the Son. This provides the terms for the definition of the human soul, in which the geometrical functions are retained, despite the use of the circle instead of a sphere:

Firstly, the soul has the structure of a point in actuality (at least by reason of its conjunction with its body), and the figure of a circle in potentiality. Now, since it is energy, it pours itself forth from that punctiform abode into a circle. . . . How should it have any other way of going

⁶⁸These are the five regular solids selected in *Timaeus* 54E-55C as the expressions of order brought by God out of the primeval chaos—thus, expressions of the entire creation. Working from equilateral triangles as the fundamental "building blocks", the tetrahedron, the octahedron, the dodecahedron and the icosahedron may be constructed; from isosceles right-angled triangles, the cube.

According to Jowett, *Timaeus's* purpose is to choose "the shapes of his basic stuffs to suit the properties he attributes to them; . . . the obvious properties of matter [the four elements] being associated with the shapes of these solids" (*The Dialogues of Plato*, 3d ed., 5 vols. [Oxford: Clarendon Press, 1892], 3:400).

The importance of these solids for Renaissance minds may be judged from the portrait of the mathematician Luca Pacioli (Naples, Museo di Capodimonte) in which his guiding preoccupations are symbolized by a large, suspended polyhedron and a smaller dodecahedron; the latter may also be seen in one of Leonardo's drawings for Pacioli's *De divina proportione* (1509; reproduced in Field, 40). The strange object that dominates the centre of Dürer's famous engraving *Melencolia I* appears to be a partly constructed polyhedron; beside it lies a sphere. See E. Panofsky, *Albrecht Dürer*, 2 vols (Princeton: Princeton University Press, 1943), 1:157-67.

⁶⁹Holton, 343.

⁷⁰Field, 44. The diagrams are reproduced in Field, 39 and 42.

⁷¹For instance, Cicero *De natura deorum* 2.83, Ovid *Metamorphoses* 15.342 and Seneca *Quaestiones naturales* 6.16.1.

out, being itself both light and flame, than as the other lights go out from their sources, that is, in straight lines?⁷²

This accords most fittingly with the newly-propounded heliocentric cosmos. It is interesting to note that another, much older theory also sought to establish the divine image in humankind by referring to trinitarian ideas: that of St Augustine. His doctrine also assumes the rationality of the human subject as the mark of the image of God, and, like so many Platonically-influenced concepts of “the image of God in man”, it presents an alternative to Christ as a route to salvation. In Augustine, it is a kind of introspection based on memory, understanding and love of self, which **of itself** is “a capacity for the memory, understanding and love of God”.⁷³ In Kepler, it takes the form of an impersonal knowledge supporting one’s belief in the divine creation of the world:

[The] thought of the creator [is] recognized in its nature. . . . For as the eye [is created] for colour, the ear for musical sounds, so is the mind created for the perception not of arbitrary entities, but rather of quantities; the mind comprehends a thing the more correctly the closer the thing approaches towards pure quantity as its origin.⁷⁴

How close does this “thing”, the cosmos, approach “toward pure quantity as its origin”? Kepler never gave up the idea of the five solids and the spheres, but in the preface to Book 5 of the *Harmonice mundi* (1621) he insisted that his discovery “among the celestial movements [of] the full nature of harmony” had occurred “not in that mode wherein I had conceived it in my mind (this is not last in my joy) but in a very different mode which is also very excellent and very perfect”.⁷⁵

Kepler’s theory of a relation of the spheres and music which could be apprehended through ordinary, earthly examples is part of a complex development from his first book to the *Harmonice mundi*, and encompasses music, astrology and astronomy. Much of his writing is still untranslated, though some sections pertinent to this enquiry have appeared in English. One needs a guide through this forest, and of those in English, J. V. Field’s treatment must be one of the most thorough, as well as the most recent.

⁷²*Harmonice mundi*, Book 4, quoted by Wolfgang Pauli, “The Influence of Archetypal Ideas in Kepler’s Theory of the Cosmos”, in C. J. Jung and W. Pauli, *The Interpretation of Nature and the Psyche*, trans. Priscilla Silz, London: Routledge and Kegan Paul, 1955, 179.

⁷³David Cairns, *The Image of God in Man*, rev. ed., Fontana Library of Theology and Philosophy (London: Collins, 1973), 104.

⁷⁴Letter to Michael Mästlin, April 19, 1597, quoted in Holton, 349-50.

⁷⁵*The Harmonies of the World: Book 5*, trans. C. G. Wallis, Great Books of the Western World 16 (Chicago: William Benton for the Encyclopaedia Britannica, 1952), 1009.

Obviously, in any search for “harmony”, consonance is a vital factor. In Book 3 of *Harmonice mundi*, Kepler sets out his ideas on “harmonics”, i.e. he once more tries to discover whether there was a relation between his beloved Platonic solids and the usual numerical account of musical ratios. This raises Pythagorean themes, but Kepler differs in two respects from the Pythagorean viewpoint. As determining factors, he does not accept numbers themselves, but rather geometrical constructions that could be termed “consonant” (and which can, naturally, be expressed in numbers). Nor does he accept the Pythagorean limitation of consonance to octave, fifth and fourth (the *tetraktys*); instead, he follows Gioseffo Zarlino, whose *Istitutioni harmoniche* (1558) had itself followed the musical practice of the day by accepting major and minor thirds as consonances in an authoritative sense. In terms of ratios, this involves two more integers (five and six), making the *senario*. This implies that Kepler accepted the system of just intonation: as such, he aligns himself, in the early seventeenth century, with the musical orthodoxy of, say, Lassus, rather than the Monteverdian avant-garde. What matters most to our argument is the fact that Kepler satisfied himself that there did exist a relationship between geometrical constructions and musical ratios: he eventually settled on circumscribed polygons and then limited these to “those polygons whose sides are most closely related to the diameter of the circle in which they are inscribed”.⁷⁶ And his theory of archetypes gives him corroboration for this: the pleasure that human souls take in a particular interval depends on the “mental and intellectual nature” of the cause of harmony. Consonances can be demonstrated—by which Kepler means “can be inscribed in a circle by means of a straight edge and compasses”⁷⁷—but dissonances cannot. Since consonances are “knowable” in this sense, “they can thus enter into the Mind and take part in constructing the archetype”.⁷⁸ Thus, on a human level consonance is the recognition of a pre-existent “harmony” implanted in the mind.

Book 5 of *Harmonice mundi* tackles the last link of the argument, i.e. how musical ratios and planetary motions, both rooted in a geometrically expressible archetype, can be shown to be commensurable. Like most of Kepler’s books, Book 5 shows all the stages by which he proceeds to his conclusion, including those tests of the hypothesis that draw a blank and have to be discarded. The revision of ideas mentioned in his preface seems to refer to Kepler’s attempt to

⁷⁶Field, 116.

⁷⁷*Ibid.*, 122.

⁷⁸*Harmonice mundi* 3.9, translated in Field, 121.

show the causes of the periods of the planets; the “very different mode” in which he finally located the harmony he was seeking had to do with velocities. In considering the thickness of a planetary orb, Kepler was led on to contemplate “the variable speed at which the planet moves round its orbit”.⁷⁹ It was here that he tested for musical ratios among various possible measures of the orbital velocities. In turn, he discarded:

- a) periodic times;
- b) distances from the sun, where he compares not only the aphelion and perihelion distances of each planet, but also the distances between aphelion and perihelion of neighbouring planets;
- c) daily motion along the eccentric, again using aphelion and perihelion distances, expressed as the degrees and minutes of an arc as seen from the sun;
- d) the actual distance traversed;
- e) finally, angles at the sun, or the apparent arc traversed in a day as seen from the sun. These measurements are expressions of the velocities of a planet at aphelion and perihelion, and afford a comparison of all planetary velocities on a single scale.

The results are, without doubt, impressively close to the values of musical ratios.⁸⁰

Having established this “network” of ratios, he then proceeded to construct musical scales which include notes corresponding to all the pitches associated with the planets. The table of “planetary scales” is actually a further calculation of notes, based on the range of speed of each planet in its orbit. Mercury has the largest compass because its eccentricity is the greatest; Venus and the earth show very little eccentricity; etc.

⁷⁹Ibid., 145.

⁸⁰Kepler’s table of “harmonies” is reproduced by Field (148) and in Wallis’s translation (1031). The continued significance of these findings is explored by D. G. King-Hele, “From Kepler’s Heavenly Harmony to Modern Earthly Harmonics”, *Vistas in Astronomy* 18 (1975): 497-517. Noting that Kepler’s “numerology” demonstrates a regularity, and this law-likeness in turn expresses an “underlying dynamical control” (504), he concludes that two opposite attitudes are possible to Kepler’s theory: either it concerns a non-problem (the harmonies are merely “the inevitable long-term outcome of a random input”), or it remains highly significant (“the outward visible sign of a law of evolution among orbiting systems”) (516).

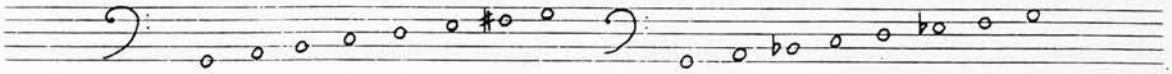
Table 6-2 The Compasses of the Planets

Saturn	♄	
Jupiter	♃	
Mars	♂	
Earth	♁	
Venus	♀	
Mercury	♿	

By assigning a definite pitch to the slowest planetary motion and then arranging all the others at appropriate intervals above it, Kepler also had the resources to create a scale proper—or, rather, a *durus/mollis* scale pair. He brought all the notes into a single octave and from this accumulation separated two scales which clearly exhibited the distinction between modes with a major third above the final and those with a minor third:⁸¹

⁸¹This appellation is used to avoid the terms “major” and “minor”. As Joel Lester has shown (“Major-Minor Concepts and Modal Theory in Germany, 1592-1680”, *Journal of the American Musicological Society* 30 [Summer 1977]: 208-53), the transition from modal ideas to conscious major-minor tonality went through a number of stages in German-speaking territories; these phases are the more distinguishable for the slowness of their acceptance. The scales in question appear to reflect the older theory of Zarlino, whose ideas were faithfully transmitted to the north by Seth Calvisius in the last years of the sixteenth century (see Lester, 220-27).

Figure 6-3 The *Durus* and *Mollis* Scales



Understandably, these scales have been read as a major/minor pair. In fact, the reasoning with which Kepler surrounds them (their roots lie in his own musical theories stemming from many years previously) shows them to be foreign to modern tonality in conspicuous ways: they are, for instance, posited on the interval pairs major third/major sixth and minor third/minor sixth respectively, each pair spanning a perfect consonance (2:3). They are also conceived as melodic scales, in the manner of the medieval modes. However, simple identification of *durus* with Ionian and *mollis* with Aeolian modes is also mistaken, since these modes were part of Glarean's extension of the eight-mode system in which they were regarded as equal partners. In Kepler's thinking, the *durus* and *mollis* forms are archetypes of music, to one or other of which the other modes must adhere.⁸²

This polarity of thought sets these two scales in the sharpest opposition; for *durus* and *mollis* are to him expressions of the division of male and female, and with each he associates contrasting characteristics such as activity and long-suffering, and qualities such as active and passive, penetrative and receptive.⁸³ Kepler finds corroboration of this view in the basis of all his speculation—geometry: the minor third (5:6) and its sixth (5:8) are derived from the figures of triangle and quadrilateral respectively, whose planes are relatable (*effabilium*), whereas the larger third (4:5) and its sixth (3:5) derive from the pentagon whose aspect is “ineffable” (*ineffabili*).⁸⁴

⁸²Dickreiter (164) refers, as precedent, to Zarlino's division of the modes according to the sizes of third and sixth. However, it should be observed that the discussion of the intervals—which seem so characteristic of the later major/minor tradition—is with Zarlino attached not to the formal presentation of the modes but to the question of the affective properties of intervals. He ranges the modes on c, f and g on one side—the joyful—and those on d, e and a—adjudged the sadder—on the other. See the *Istitutione harmoniche* 3.10.

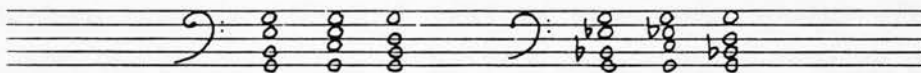
⁸³Kepler does not balk at describing the relation of the two scale-forms thus: “[The *mollis*] crouches like a hen on the ground, waiting for the cock to mount her”. See Dickreiter, 166, for the Latin original.

⁸⁴*Ibid.*, 167. This appears to be a reference to Platonic science as set forth in *Timaeus* 55A-D. In this account, three kinds of triangles serve as the plane figures that generate four of the basic solids (pyramid, octahedron, icosahedron and cube). The fifth and last—the dodecahedron—consists of twelve pentagonal faces: “Timaeus does not remark on the fact that

Clearly, Kepler was working not merely with broad musical notions, but with concepts familiar to him from practice. For instance, he relates the ranges of planetary velocity to the modes, noting that the planets do not sound all the intervening tones, but glide through them along a continuum. Yet, he says, “the signature of two accidentals (flats) in a common staff and the formation of the skeletal outline of the octave by the inclusion of a definite concordant interval are a certain first beginning of the distinction of Tones and Modes”.⁸⁵ He then allots Saturn to modes 7 and 8 (because of its start on G and its perihelion movement to B); Jupiter to modes 1 and 2 in their usual transposed form (because its aphelion is fitted to G; perihelion movement is to B^b); Mars to modes 5 and 6 (because it reaches C with its perihelion; F with aphelion); earth to modes 3 and 4 (because of its semitonal movement); Mercury to any or all of the modes, because of its range; Venus to none, but, since it is brought onto E in the common system, to modes 3 and 4. This neat spread of planets over the modes is complemented by Kepler’s observation that the planetary ranges offer themselves for four-voice harmony: Saturn and Jupiter as bass; Mars as tenor; Earth and Venus as alto; and Mercury as soprano, “the freest, more than all the rest, and likewise the swiftest”.⁸⁶

Not satisfied with these fruits of the harmonious ratios, Kepler looks for concord in the combination of planetary “notes” with one another. Again, he selects from the ranges outlined above and brings the possibilities within the span of an octave. Here, too, the results are assembled according to the *durus/mollis* distinction:

Figure 6-4 *Durus/Mollis* Chord Forms



The incongruous-looking groups are easily explained: the *durus* chords all use either the major third or major sixth (from the bass note) or both, the *mollis*,

[it] cannot be constructed from the basic triangles used for the other four figures, and the dodecahedron is not mentioned when each polyhedron is assigned to one of the elements . . .” (Field, 6). Could this silence be the source of Kepler’s *ineffabili*? At any rate, this discrepancy in construction surely underlies his appeal to geometry.

⁸⁵*Harmonice mundi* V; Wallis, 1040.

⁸⁶*Ibid.*, 1049.

the minor third or sixth or both. What Kepler searches for but cannot find is a conjunction of all six planets such that their various apsides would “sound” in harmony—which would suggest to him that at a given moment they function like the voices of a contrapuntal work, making their concordant close after passing through dissonances. Unfortunately, these conjunctions occur very seldom—the two slowest planets, Saturn and Jupiter, concur in their apsides only once every eight hundred years—and that problem is compounded with each voice that is added. He therefore suggests that such a chord, such a coincidence of harmony, may have happened at some time in the past—in fact, at the dawn of creation.⁸⁷

Can the figures of Gafori and Kepler and their divergent endeavours be linked, as they were at the outset of this chapter, with greater understanding? One of the results of close scrutiny of their work is the conclusion that periodization and the philosophy of modern science have, respectively, smoothed the rough edges off these figures and fixed them under the patina of their “times”. If Gafori represents his times, he does so in the manner of Janus, since he is both a conservative thinker and an eager contributor to the humanist experiment. As a “Renaissance man”, he writes on both “theory” and “practice”, yet his range is the restricted one of the specialist. The appearance of breadth, of connections with non-musical fields in his work, is the result of his determination to take seriously the preoccupations of the ancients—that includes his medieval sources—whose music did span other disciplines. Even in this historical scrupulousness, certain aspects held his attention and were dealt with at particular length. One of these was the study of proportions that constitutes Book Four of the *Practica musicae*.

Written between 1481 and 1483 as a separate treatise (*Proportioni practicabili*), the closing section of the 1496 compilation is “without doubt the least understood and appreciated part of *Practica musicae*”.⁸⁸ Against the frequent interpretation of this arithmetically-based material as abstruse, intellectualistic whimsy, Miller has demonstrated that the organization of Gafori’s discussion is unified, methodologically consistent and written with a practical

⁸⁷Ibid., 1041.

⁸⁸Miller, “Gaffurius’s *Practica Musicae*”, 123.

pedagogical aim in mind.⁸⁹ Furthermore, the preponderance of musical examples in this part of the book emphasizes its importance in its author's eyes.

Although this aspect of Gafori's work may have left later music historians unimpressed, it is clear that he was known more widely among his contemporaries for precisely this knowledge. An oft-quoted account relates that Gafori was consulted over architectural matters in connection with the rebuilding of the *triburio* (the tower over the crossing) of Milan cathedral in 1490.⁹⁰ Wittkower refers more specifically to the frontispieces of *Theorica musice* (the 1492 edition) and *De harmonia*, both of which include the ratios of consonance in their woodcuts.⁹¹ These are mere tokens compared with the details of the proportional study of the collection of ancient opinions on "concordant numbers" found in chapters fifteen to seventeen of *De harmonia*. The true extent of Gafori's grasp of ratio must have been known to the architects belonging to the circle of the Sforza court: Bramante, Francesco di Giorgio, Luca Pacioli, Giuliano da Sangallo, as well as other Italian and German specialists employed on the completion of the cathedral between c.1450 and 1490.⁹²

Clearly, this is a point of contact with Kepler's thought and requires investigation. It would be short-sighted to regard the importance of musical ratios as the only common factor between them, just as it would be dangerous to assume that Gafori's humanist interests (symbolized in the woodcut) had no connection with his arithmetical inclinations. On the second point, the operative

⁸⁹Ibid., 124-28.

⁹⁰See, for example, Peter Burke, *The Italian Renaissance: Culture and Society in Italy*, rev. ed. (Princeton: Princeton University Press, 1987), 152. A survey of the problem had been undertaken by Luca Fanciulli of Mantua in 1487; it was he with whom Gafori was sent to confer. See C. A. Cummings, *A History of Architecture in Italy*, 2 vols (London: Ernest Benn, 1928), 2:223.

⁹¹Rudolf Wittkower, *Architectural Principles in the Age of Humanism*, revised ed. (London: Academy Editions, 1962), 124-25.

⁹²For further details, see Leonardo Benevolo, *The Architecture of the Renaissance*, tr. Judith Landry, 2 vols (London: Routledge and Kegan Paul, 1978), 1.236. Wim Swaan (*The Gothic Cathedral* [London: Paul Elek, 1969], 311-12) discusses the early proportional plans and the difficulties to which these gave rise. The section had initially been designed with Gothic *ad quadratum* geometry, based on the square and double-square, but the piers and buttresses proved too weak to support the original tower. With the help of a mathematician, Gabriele Stornaboco of Piacenza, the section was redesigned on the basis of an equilateral triangle. The concern with proportions shows itself in his rounding off of the height (83.1384 *braccia*, on a base of 96 *braccia*) to 84, conveniently subdivisible into six units of 14 *braccia*. In the end, the two upper divisions were reduced to 12 *braccia* each, a compromise that infuriated the German consultant, Heinrich Parler, who considered the deviation a threat to both the beauty and the stability of the structure.

concept is that of the “rational artist”.⁹³ It is in this sense that Gafori is a “Renaissance man”: he shares in the idea, given brilliant formulation and currency in the writings of Leon Battista Alberti, of *virtú*, that is, the inborn capacity, developed through education and continual practice, to overcome the hazards of fortune and “to cultivate [oneself] by reason, technique, and letters as a well-composed and controlled work of art”.⁹⁴ Whether one was occupied with art or architecture, music or rhetoric, moral life or scientific investigation, one’s approach was the same: first to analyze in the mind the aim of one’s efforts and the means required, and then to execute the conception in a demonstration of intellectual control.⁹⁵

Thus, the “manysidedness” of the typical Renaissance figure actually rests on the notion of a single “attitude” applied in various directions. The correlative of the polymath such as Leonardo is the sense of an activity partaking both of art and science,⁹⁶ and the ease with which a “means”—an intellectual tool—moves among the arts, or between art and science.⁹⁷ As an example of the art-to-art shift, Arcimboldo’s experiment with a colour-scale based on interval ratios, made sometime before 1590 and recorded by the humanist Gregorio Comanini, may be mentioned.⁹⁸ As reported in *Il Figino overo del fine della Pittura* (Milan, 1590), Arcimboldo used black and white as the “intervallic limits” of his continuum and sought to duplicate in gradations between them the intervals of semitone (major and minor), tone, fourth and fifth. Evidently he had no practical purpose in mind:

⁹³Alistair C. Crombie, “Experimental Science and the Rational Artist in Early Modern Europe”, *Daedalus* 115 (Summer 1986): 49-74.

⁹⁴*Ibid.*, 58.

⁹⁵Alberti’s crisp version is found at the end of Book One of *Della pittura*: “There remains to teach the painter how to follow with his hand what he has learned with his mind” (*On Painting*, tr. John R. Spencer, rev. ed. [New Haven: Yale University Press, 1966], 59). The same idea appears in scientific argument as experimentally controlled postulation. A curiously clear example of the principle may also be observed in the astrological *rectificatio* mentioned above, 137 : the celestial picture at birth, assumed to find expression in an individual’s behaviour, is adjusted so as to match the known facts.

⁹⁶J. R. Hale, *Renaissance Fortification: Art or Engineering?* (London: Thames and Hudson, 1977) is an excellent survey of one such “art-science”.

⁹⁷Alberti, best known for his exposition of linear perspective, always treats mathematics as a painter’s aid. See Spencer’s introduction to his translation of *Della pittura*, 21.

⁹⁸See Austin B. Caswell, “The Pythagoreanism of Arcimboldo”, *Journal of Aesthetics and Art Criticism* 39 (Winter, 1980): 155-61.

the demonstration that the musical ratios could be applied to colour optics seems to have been sufficient.⁹⁹

While Kepler's use of ratios in his planetary harmony neatly illustrates the art-to-science shift, there is more to them than that. First, Kepler lived at a time of transition "from the world of the rational constructive artist to that of the rational experimental artist".¹⁰⁰ The common factor was the rational analysis/practical synthesis attitude. Second, music itself was to become the focus of a "science", a systematic investigation of the physics of sound and its effects on the soul. This step eventually led to the complete separation of physical and aesthetic approaches to music. Thirdly, the enshrining of the arts in scientific academies in the seventeenth century rested on the high status they enjoyed in the Renaissance, and that status was intimately connected with the fact that they were amenable to mathematical formulation. This is especially noticeable in the case of painting which, unlike music, suffered from a dearth of historic texts and remains; the books written at the start of the fifteenth century were still essentially workshop manuals. Even Alberti's *On Painting*, for all its erudition, has a distinctly practical bent.¹⁰¹ Leonardo is well known for his bid to free painting of its lowly artisan stamp;¹⁰² but surely the most ambitious—and influential—attempt was Dürer's *Treatise on Proportions* (1528). If it is regrettable that his kind of modular mapping of figures later became the hallmark of academic training, it is worth remembering that codifications such as this were the condition and stimulus of academies: formal education in the arts may have developed far more slowly without them.

⁹⁹The description and the experiment both smack of scientific method—possibly another instance of cross-over.

¹⁰⁰Crombie, 62.

¹⁰¹In this case, the erudition lies not so much on the surface as in the model to which it refers—Quintilian's *Institutio oratorica*. See D. R. Edward Wright, "Alberti's *De pictura*: Its Literary Structure and Purpose", *Journal of the Warburg and Courtauld Institutes* 47 (1984): 52-71. However, the fact that the treatise appeared in both Italian and Latin suggests that Alberti had two groups of readers in mind: adolescent trainees, on one hand, and members of princely circles on the other. His much larger book on architecture, which resembles Vitruvius' *De architectura*, is even more obviously aimed at patrons; its elegance of language and elevated tone explain why Alberti was regarded by his contemporaries as "another Cicero". See the introduction to *On the Art of Building (De re aedificatoria)*, trans. Joseph Rykwert, Neil Leach and Robert Tavernor (Cambridge, Mass.: MIT Press, 1988), x.

¹⁰²His *Trattato della pittura* was widely known in Italy during the sixteenth century in various forms; for its complicated history, see Jean Paul Richter, ed., *The Literary Works of Leonardo da Vinci*, with commentary by Carlo Pedretti, 2 vols. (Oxford: Phaidon Press, 1977), 1.12-47.

While the visual arts may be held to have justified their new stature in various ways,¹⁰³ there is no doubting the power musical ideas had to serve as models for early modern science.¹⁰⁴ It is true that these musical conceptions drew some of their potency from the ideal of harmony, which is to be found in various fields; but, in addition, music presented both a “Pythagorean” aspect (a long history of proportional thinking) and an “Aristoxenian” one (the test of musical intelligence). In other words, it effortlessly embraced the terms of modern science—hypothesis, experiment, conclusion. By taking Kepler’s visionary nature seriously, we are admitted to this perhaps unfamiliar world by its true door.

¹⁰³See Samuel Y. Edgerton, Jr, “Galileo, Florentine ‘Disegno’ and the ‘Strange Spottedness’ of the Moon”, *Art Journal* (Fall 1984): 225-32.

¹⁰⁴An extended examination of this theme is Jamie Croy Kassler’s “Music as a Model in Early Science”, *History of Science* 20 (1982): 103-39. He concentrates on two figures whose researches were prompted by musical considerations—Nicolas of Oresme (c.1325-82) and Kepler. Crombie, 65-67, deals briefly with Mersenne. Both are concerned to show how musical data extended empirical thought by a combination of antecedent theoretical analysis and experimentally controlled observation.

Chapter 7

The Renaissance II: The Modes in The Reformation and Counter-Reformation

It is possible to understand—or, rather, misunderstand—the religious upheavals of the sixteenth century through either of two interlocking views. The first deems Protestantism, born from Luther's personal fervour, to have pressed its juridical version of justification by faith so far as to rob it of the spiritual vigour that was its intention, and set rigour—of belief, of Christian habit—in its place. The counterpart sees Roman Catholicism confronted by a sudden flame of devotion; unable to conform to this inspiration or to reconcile itself to its popularity, the episcopal hierarchy fell into reaction, defended itself by declaring its critics *anathema* and reaffirmed the sanctions of orthodoxy.

Apart from the simplifications invoked, both arguments interpret the course of the century as an asphyxiation—of Protestantism by its own hand, and of Catholicism by the dead hand of tradition. Each is a product of polemic and each contains some truth. Neither is particularly receptive to readings that might divide Christendom differently: for instance, by tracing trajectories of increasing theological sophistication versus declining popular adherence, in the course of the series of reformations that were attempted.¹ The validity of this non-partisan standpoint seems to be borne out by recent studies that have independently reassessed the phenomenon of modal ordering in sacred vocal polyphony in the

¹See Hans J. Hillerbrand, *Christendom Divided: The Protestant Reformation* (London: Hutchinson, 1971), 290-92.

period c.1565-1600. They illuminate, in strictly musical terms, two attempts—Roman Catholic and Lutheran—to assert the confirming authority of “authentic” Christian practice, in this case the practice of musical composition.

Harold Powers’ related articles on modal representation provide evidence of the Catholic enlistment of the system of eight modes in the Tridentine programme of reforms.² The decrees on music formulated in 1563, the last year of the council’s deliberations, were couched in broad terms that sought chiefly to warn against practices that had long been criticized as unsuitable, rather than to propose positive measures. Partly this was the result of differing opinions—two cardinals had sought the complete proscription of polyphonic music—but the effective delegation of authority to diocesan level meant that the council’s general stipulations were only the beginning of a process. It is important to realize, too, that these measures were the mark of a mood of confidence and resurgence. They were made in the expectation that they would be obeyed.

The concrete effects of musical reform took time to appear and did so in various ways and in varying degrees of purity. The goal of uniformity in the recitation of the Office and Mass meant revision of the texts (chiefly by simplification) and the adaptation of standard chant melodies to fit them. Hugo Leichtentritt³ claims that this latter task, undertaken by Palestrina and Annibale Zoilo in 1577, was held up by the protest of Philip II of Spain at the contemplated modernization, though not finally frustrated.⁴ A far more rapid response to the movement for reform can be seen in the works of Vincenzo Ruffo, who in mid-career came under the influence of Cardinal Carlo Borromeo. In his later motets and Masses, he attempted to comply with the Tridentine insistence on the intelligibility of the text.⁵ Parody technique was forfeited, motivic imitation strictly curbed, and an austere homophony cultivated. This was not, however, based on the rhythmic simplicity of the *falso bordone* style, but on a declamatory principle

²“Tonal Types and Modal Categories in Renaissance Polyphony”, *Journal of the American Musicological Society* 34 (Fall 1981): 428-70; “Modal Representation in Polyphonic Offertories”, *Early Music History* 2 (1982): 43-86.

³“The Reform of Trent and Its Effect on Music”, *The Musical Quarterly* 30 (July 1944): 319-28.

⁴Leichtentritt identifies the eventual publication of the collection with the “so-called ‘Medicea’ edition [1614-15] of the Gregorian melodies” (327). It seems that the project must have been abandoned, since what the Medici Press actually published was a revised Roman Gradual that had been worked on by associates of Palestrina’s. Lockwood argues that the results were probably what Palestrina had intended. See John A. Emerson, “Plainchant”, *NG* 14:825.

⁵See Lewis Lockwood, *The Counter-Reformation and the Masses of Vincenzo Ruffo* (Venice: Universal Edition, 1970).

that organized the "single rhythmic dimension in accordance with the natural accentuation of the words".⁶ The debt to humanistic ideals of the relation of words to tone is unmistakable. Leichtentritt suggests that another debt of Ruffo's and of other composers who employed the "Borromeo style" might be to the homophonically simple *laude*.⁷ In that case, the Masses in the reformed manner would have been the fruit of largely Italian impulses.

Palestrina's music, and particularly the *Missa Papae Marcelli*, has often been cited as the perfect solution of the problems posed by the Tridentine strictures. Perhaps the profound serenity of his music is the best reason for this, but it is worth noting that a fairly elaborate counterpoint is a hallmark of his usual style, to which this Mass is a significant exception. It is also noteworthy that there is no post-Tridentine deflection in his evolution: his was a restrained yet individual language that could be adapted to the needs of circumstances.⁸

It is important to stress this adaptability, since it may appear that what follows is an attempt to harness Palestrina's modally-ordered compositions to Counter-Reformation triumphalism. When Powers claims that the first thirty-two motets of Palestrina's offertory cycle (1593) are "the quintessential polyphonic manifestation of Counter-Reformation ideology",⁹ we are to understand from Powers' researches¹⁰ that this is as much a flowering of art as of churchmanship. As noted above, reactions to the Tridentine promptings were varied: Ruffo's is programmatic in a way Palestrina's never was. Further, Lasso, as the other leading Catholic composer of the time, also used modal ordering in compositions, but his dramatic and "expressive" style was far from Palestrina's. The idea of a stylistic norm for post-Tridentine Catholic polyphony is misleading, Borromeo's endeavours notwithstanding.¹¹ Even the ordering of compositions according to

⁶Ibid., 184.

⁷"The Reform of Trent", 328.

⁸As Denis Arnold has pointed out in the prefatory note to the miniature score of Palestrina's *Stabat Mater* (London: Ernst Eulenburg, 1974), iii-iv, the homophony of that work is another example of Tridentine-inspired "intelligibility", rather than of the Venetian influence usually detected in it. On grounds of style, he reckons it to predate the flowering of Venetian multi-choral music.

⁹"Modal Representation", 84.

¹⁰See also "The Modality of *Vestiva i colli*", in *Studies in Renaissance and Baroque Music in Honor of Arthur Mendel*, ed. R. L. Marshall (Kassel: Bärenreiter, 1974), 31-46.

¹¹He actually convened a council in Milan (his own jurisdiction) in 1565 with the express intention of reaffirming the decrees of Trent. In giving them "special application to the Milanese state", the council banished all instruments but the organ from its churches (Lockwood, 182, 192). Another of Borromeo's model composers, Francesco Rosselli, who worked at St Peter's and

the eight-mode system was not adhered to by Catholic composers in the German-speaking areas of the Empire.¹² The fact that some of them chose to give recognition to the twelve-mode system of Glarean simply underlines how important modal consciousness became in the second half of the century.

The detection of reform traits in Palestrina is, in fact, a corollary of Powers' conclusions about the nature of modality in the later fifteen-hundreds. He builds on the ideas of Siegfried Hermelink¹³ in showing that modes were, at least in the era under consideration, a sort of "subset" of a broader group of **tonal types** (*Tonartentypen*). Every composition subscribed to one or another tonal type, which was minimally indicated by three "markers": the presence or absence of a key-signature (almost always one flat or none, the *mollis/durus* distinction), the system of cleffing (either the *chiavette*/high system or the "SATB"/low system) and the final. Hermelink's classification specifies the cleffing and finals for each voice of a work, while Powers uses a type of shorthand.¹⁴ Modes, as they were outlined

the Capella Giulia in Rome, had music sent to the Munich court; it was criticized as being "composed without taste" (Leichtentritt, 325). Since Rosselli was a composer whose work had attracted Palestrina's attention, it seems fair to assume that taste in the Bavarian court—Lasso's home from 1556 to 1594—leaned towards more colourful, Netherlandish writing.

Powers ("Modal Representation", 50-51) suggests that, around the time of the composition of Lasso's offertory motets—to be discussed below—he might have found himself in conflict with the less refined efforts at "reformation" of Dr Walram Tummeler who was involved in the attempts of Duke Wilhelm V *der Fromme* ("the Pious") to align the *Hofkapelle* rite with that of Rome.

Indubitably, there was a type of reforming spirit to whom the wielding of proscriptive powers came easily. François Lesure notes evidence of Jesuit attempts to regulate music in France, through a series of visitations by the Provincial of the Order to a Parisian Jesuit College between 1576 and 1587. Among the severe restrictions put into effect was a prohibition of Lasso's motets and masses ("Latin Church Music on the Continent I: France in the Sixteenth Century (1520-1610)", *NOHM* 4:250). This, however, hardly constitutes the creation of a "style"; rather, it gives ironic weight to the term "Provincial".

For further details, see T. Frank Kennedy, "Jesuits and Music: Reconsidering the Early Years", *Studi Musicali* 17, no. 1 (1988): 80-95. He highlights the usefulness of *falso bordone* to the order, both in appeasing Pope Paul IV who insisted that the order sing Divine Office using a choir, and in meeting the criterion of intelligibility of the Council of Trent (78-79).

¹²See below, 163.

¹³*Dispositiones modorum* (Tutzing: H. Schneider, 1960).

¹⁴For instance, Hermelink classifies two tonal types, both regarded as Hypodorian in his sources, thus:

Signature	Cleffing				Finals			
g	g_2	c_2	c_3	F_3	dd	d	d	D
b	c_1	c_3	c_4	F_4	g	G	G	GG

where g_2 indicates a G-clef on the second-lowest line of the stave, c_3 a C-clef on the third-lowest line, etc.

Powers expresses these as $\text{g-g}_2\text{-D}$ and $\text{b-c}_1\text{-G}$ respectively, using only the highest clef and, as final, the lowest sonority of the last chord.

outlined by contemporary writers, were theoretical constructions; they became musically applicable by being correlated with tonal types, though exactly which type was matched with which mode differed to a degree from one composer to another. Also, more than one tonal type might serve a single mode in a composer's works. In sum, a tonal type will serve to represent a mode, will "stand as the embodiment of a traditional category",¹⁵ but is not thereby tied to a particular mode: a tonal type may elude the theoretical criteria or appear assigned to different modes, and tonal types of distinct aural effect may appear yoked together under one modal designation.

The means of exploring these concepts is most obviously to hand in those works written with the intention of illustrating either the eight- or the twelve-mode system. A further source is the various anthologies whose contents are modally-ordered, though these editorial ascriptions cannot always be backed by independent evidence of composers' intentions. Lasso's setting of the Penitential Psalms fits the first category: written prior to 1560 but only published in 1584, the work expressly refers to the seven psalms plus Psalm 148 (*Laudate Dominum*) as "*modis musicis reddit*", ("rendered by the musical modes"). The full title of Alexander Utendal's *Psalmi Poenitentiales* (Nuremberg, 1570) makes it clear that his treatment of the seven psalms plus five other scriptural extracts was intended to fit the modal categories of Glarean's *Dodecachordon* (Basle, 1547).¹⁶ A further note *ad lectores* represents an apology for the theme of the cycle—it suits the bad times and "the blazing war which almost the whole Christian world must apparently soon undergo"¹⁷—and also offers a defence of the twelve-mode system, which was on the whole slow in being taken up in German territories. It seems that direct stimulus for the work may have come from Archduke Ferdinand whose court in Innsbruck Utendal served as singer, court composer and finally assistant *Kapellmeister* between 1568 and 1591. On moving his court from Prague to Innsbruck in 1567, the Archduke set up an establishment of considerable magnificence in imitation of earlier Renaissance centres. This in itself might account for the currency of Glarean's theories which represented humanistic enlightenment in a particularly vivid way. Bossuyt further suggests that

¹⁵Powers, "Tonal Types", 440.

¹⁶See the detailed study by Ignace Bossuyt, "Die *Psalmi Poenitentiales* (1570) des Alexander Utendal", *Archiv für Musikwissenschaft* 38, no. 4 (1981): 279-95.

¹⁷*Ibid.*, 280. This probably applies to the war with the Turkish empire.

the Archduke might have been seeking “something special” to match (or surpass) the Lasso cycle used at the Munich court of Duke Albrecht V.¹⁸

It is worth noting that cyclical works featuring modal ordering such as these actually create conflict with another aspect of humanistic music theory, i.e. the re-awakened belief in modal ethos that was to issue in the *Affektenlehre* of the following century. Seth Calvisius (*Exercitatio musica tertia*, 2d ed., Leipzig 1611), though an adherent of twelve-mode theory, questioned the reality of modal ethos, pointing, with reason, to the uniformly doleful texts of the Penitential Psalms.¹⁹ A. J. Krailsheimer’s summary remark is worth recalling: “Perhaps the most characteristic feature of the sixteenth century is its boundless enthusiasm. . . . People had a prodigious appetite for learning, and were reluctant to sacrifice any one aspect of what most regarded as a single truth or wisdom . . .”.²⁰

As expressions of lay piety, the modally-ordered cycles of Palestrina and Lasso synthesize keen spirituality with medieval musical tradition. Starting with Lasso’s Penitential Psalms and his *Sacrae Cantiones* (1562), one can trace this thread through three cycles of spiritual madrigals—Palestrina’s setting of eight of Petrarch’s *Vergine* madrigals (1581), his second set of *Madrigali spirituali* (1594), and Lasso’s last work, the *Lagime di San Pietro* cycle (1595).

In the matter of liturgical reform, two works are crucial. The first is a collection of offertory motets by Lasso, written probably between 1581 and 1583 for the Munich *Hofkapelle*. They are clearly intended for liturgical use, being fitted to the four Sundays of Advent and the Sundays and weekdays in Lent. The collection in question remained, however, in manuscript. Various motets from it were published between 1582 and 1585 (some had been published before the collection was made). What is remarkable is that three motet prints of 1582 group their pieces according to two of the markers mentioned above, system and cleffing; and the collection of four-voice motets of 1585, containing twenty-seven of the thirty-one works of this kind in the *Hofkapelle* manuscript, is arranged according to “tonal types”, i.e. by system, cleffing and final.²¹ A later rearrangement, made in Paris in 1587, actually reshuffles forty-four offertory motets à 4 into modal categories, a distinct possibility given the earlier groupings by tonal type but in all likelihood not the composer’s intention.

¹⁸Ibid., 281-83, 295.

¹⁹Ibid., 287. Calvisius includes in his argument Andrea Gabrieli’s setting (1583).

²⁰A. J. Krailsheimer, ed., *The Continental Renaissance 1500-1600*, Pelican Guides to European Literature, (Harmondsworth: Penguin Books, 1971), 21.

²¹Powers, “Modal Representation”, 49-55.

Palestrina's cycle of offertory motets (1593), on the contrary, leaves no doubt that, from the First Sunday in Advent to Trinity Sunday, the calendrical sequence of motets is meant to follow a strict pattern of tonal types representing the eight-mode system.²² Powers proposes that "Palestrina's composition of an offertory cycle was intended to bring the tradition of singing free-style motets to accompany the action around the Offertory better into line with the official language of the divine service by providing motets with texts not only appropriate to the day but also Proper to the liturgy".²³ It is in this context that the supererogatory arrangement according to the eight modes represents an affirmation of "Counter-Reformation ideology".

In order to pursue the question of liturgical reform and the relation of musical theory to it, we must consider another group of motet cycles which appear to have grown from a similar preoccupation, this time the confessional concerns of the Lutheran church.²⁴ By "confessional" is meant the process of delineation by which the Protestant groups of the Reformation declared themselves and their faith, in the process dividing themselves from the Roman church and, indeed, from one another. This process began in conciliatory mood with the Lutheran Confession of Augsburg (1530), but its subsequent course was marked by increasing animosity and intransigence. By mid-century, a vigorous programme of education had been initiated in Protestant territories, marking the irrevocability of the split in a peculiar way. For it was in schools and universities that German humanism had made its home, rather than in courts.²⁵ And it was

²²Ibid., 58-83. Powers proceeds to show what further criteria (such as tessitura) Palestrina used to distinguish the modes from each other, including the Phrygian/Hypophrygian pair, which was often treated as a single, "composite" mode by both theorists and composers.

²³Ibid., 49.

²⁴Craig J. Westendorf, "Glareanus' *Dodecachordon* in German Theory and Practice: An Expression of Confessionalism", *Current Musicology* 37-38 (1984): 33-48.

²⁵See the introduction by Hajo Holborn to *Epistulae obscurorum virorum*, trans. F. G. Stokes (London: Chatto and Windus, 1909; New York: Harper Torchbook, 1964), vii. There were, of course, sodalities as well—the German equivalent of the Italian academies. Werner Gundersheimer maintains that the contribution of Italian humanist educators such as Vittorino da Feltre has been overstressed: in general—Florence was the exception—Italian cities trained their young with an eye on "more immediate social, vocational and professional needs" than are usually associated with humanism (see J. R. Hale, ed., *A Concise Encyclopaedia of the Italian Renaissance*, s.v. "Education"). He further argues that the centralized system of patronage in the north Italian courts ("in which cultural initiatives of all kinds are taken only in response to a specific demand from a ruling élite") could explain their failure to develop a system of elementary schooling. The only other tutelage took place in monastic and conventual schools. Thus, for humanists trained in Italian ways of thinking, Lutheran anti-scholasticism was per se a form of anti-intellectualism. This must have been especially so among the "Basle circle"—first Aeneas Silvius, then later Sebastian Brant, Johannes Froben, Urs Graf, B. Rhenanus, Glareanus,

through the institutions of education that German humanism would lose any "Italian" character it had; indeed, it would lose many humanists too, who, like Erasmus, feared the tone of German anti-scholasticism. Glareanus, to call him by his Latin-styled name, was another who kept his distance from the Reformers; yet, as Westendorf has shown, his carefully argued treatise with its restructuring of modal categories using the species of fourths and fifths had widespread influence in Germany, among both theorists and, in simplified form, schoolmasters. Ironically, his duodecimal system was to become entwined with a central Lutheran musical practice, the composition of Gospel motet cycles.

The Gospel motet has practically disappeared behind the flowering of the German chorale in the sixteenth century. Yet it was clearly an integral part of early Lutheranism, some thirteen major cycles being produced between 1565 and 1681.²⁶ In order to understand the role played by these works of free polyphony, one must appreciate the liturgical soil from which they sprang.

One of the contentious issues involving Luther and some of his early followers was his insistence that, though the apostolicity of the Roman Church was disputed, certain of its codes and practices, stemming from Christian antiquity, could serve the new churches. Thus, he endorsed three traditional creeds (Apostles', Nicene and Athanasian), upheld the sacrament of infant baptism and built into Lutheran services the use of a pericope cycle.²⁷ The Gospel pericopes, in turn, gave rise to a distinctively Lutheran innovation, the *Postille*. These sets of sermons were originally produced as an aid to preachers; each sermon was "usually preceded by the traditional pericope for that particular day",²⁸ so that public preaching and private devotions (reflected in the *Hauspostille*) were regulated in both theme and, in the course of time, dogma.

Paracelsus, Erasmus—where Italian influence was decisive. See Reinhard Paul Becker, *A War of Fools. The Letters of Obscure Men: A Study of the Satire and the Satirized* (Berne: Peter Lang, 1981), 29-35. Another important aspect of the spread of humanism in Germany was the number of scholar/printer collaborations that sprang up.

²⁶Westendorf (44, n.3) lists three additional cycles with variegated texts. Mark P. Bangert, "Gospel Motet: Theme and Variations", *Currents in Theology and Mission* 15 (February 1988): 56-61, stresses their popularity: twenty-nine editions of various cycles were published between 1594 and 1625.

²⁷Originally developed in the Byzantine church and then taken up in the West, pericope collections were calendrical arrangements of Scriptural passages taken from the appointed reading for each Sunday or festival. Typically, such a collection covered a one-year cycle. The brief pericope was intended to convey the nub of the reading and therefore served to summarize the theme for a particular day. The fact that it was Protestant writers of the sixteenth century who first used the word as a liturgical term is an indication of its importance. See *The Oxford Dictionary of the Christian Church*, s.v. "Pericope".

²⁸Westendorf, 41.

Further distillations of the individual pericopes—*Kernsprüche*—provided the texts of the Gospel motets. Westendorf rightly points to the element of formalization that accompanied Lutheran consolidation, and to a preaching tradition that “in essence was subject to only slight variation”.²⁹ This rigidity was doubly unfortunate in view of the forces that had originally motivated the reform of liturgy: the overriding principle of *Sola Scriptura* that sought to clear the debris from the Gospel proclamation, and the allied attempt to return to the norm of the primitive church, “the essence of perfection” (Melanchthon). In these terms, the pericopes were a remnant of the ancient, faithful practice, and their musical settings were intended to complement and heighten their meaning.

The first motet cycle to embody Glarean’s twelve-mode theory was by a Catholic composer, Homerus Herpol;³⁰ the idea then passed to the Lutheran side where three of the cycles mentioned above ordered their contents using the correlation of calender and modes, viz., Andreas Raselius’ *Teutscher Sprüche aus den Sontäglichen Evangelii durchs gantze Jahr* (1594-95), Philipp Dulichius’ *Novum opus musicum* (1598-99) and Christoph Demantius’ *Corona harmonica* (1610).³¹ Predating these cycles—and providing the foundation for them—are works such as Eucharius Hoffmann’s *24 Cantiones 4, 5 et 6 voc. accommodatae ad 12 tonos* (Wittenberg, 1577). Not only do they illustrate the twelve-mode theory, but they are written specifically for use in the teaching of it.³² The importance of

²⁹Ibid., 43.

³⁰*Novum et insigne opus musicum* (Nuremberg, 1565). The cycle consists of four “Dodekaden”, each comprising twelve pieces (illustrating the twelve modes), plus six motets in the *usitatores Modi* (“the more common modes”), these being Dorian, Phrygian, Ionian, Hypoionian and Mixolydian.

³¹Raselius (c.1563-1602), a theorist and teacher as well as composer, produced an anthology (*Dodecachordum vivum*, Regensburg, Prokesch Music Library, MS AR 774) in 1589. As an example of devotion to Glarean’s ideas, it is unrivalled: its 144 works, mainly Latin motets by Raselius and other contemporary composers, are ordered *secundum XII modus*. For each mode, Raselius provides twelve compositions, six for the *Modus naturalis* or *regularis* and six for the *Modus transpositus* (see Bossuyt, 286).

Dulichius (1562-1631) was active as a teacher and composer in Stettin. Demantius (1567-1643), a composer, poet and writer on music as well as other subjects, was a major contributor to the change from Latin to German motets.

³²Another type of precedent appears in the work of Gallus Dressler (1533—between 1580 and 1589), whose *Practica modorum* (Jena, 1561) was the first textbook with an exposition of twelve-mode theory to appear in the German-speaking territories. In addition, he contributed many German-language motets to the Lutheran liturgy, using in addition to Psalms a variety of texts drawn from the Old Testament and the Gospels. It is true that similar variegated collections were subsequently produced by Leonhard Päminger (Nuremberg 1573-1580), the catholic Jacob Handl (Prague, 1586-1591; all in Latin) and Volckmar Leisring (1611). See Westendorf, 44, n.3. But Dressler’s mid-century initiative, at the expense of hymn-writing which evidently never interested him, was surely a sign to other Lutheran composers, as well as a confirmation of

musical (including twelve-mode) theory in schools can be judged from the fact that a number of motet cycles were written for only two voices, e.g. that by Georg Otto (1601); “they adequately served those parishes with boarding schools . . . [and therefore] with choirs composed of unchanged voices”.³³

Glarean’s work is essentially that of repristination:

[He] shared the Erasmian concept that an intensified revival of classical learning was a restoration of knowledge that had been corrupted by the ravages of time rather than a motivation for a new order and a new philosophy. Therefore he declared that the theory of twelve modes was not an innovation but a “proper renewal of antiquity”.³⁴

As noted above, a type of restoration was also explicit in the Lutheran programme; nicely representative of the musical aspect was the work of Lucas Lossius (1508-82) entitled *Psalmodia, hoc est cantica sacra veteris ecclesiae selecta* (Nuremberg, 1553, and many subsequent editions), an application of Gregorian chant melodies and texts to the developing Lutheran liturgy. But whether the adoption of Glarean’s modal theory by German *Lateinschulen* can be regarded as more than an eddy of humanistic influence is a moot point. Catholic observers, especially at the Sorbonne and among the Spanish Inquisitors, regarded Erasmus as Luther’s forerunner and herald; but the division between Luther’s view of “the bondage of the will” and the Christian-humanist’s belief in the possibility of natural virtue set them irreconcilably at odds.³⁵ Perhaps the clearest example of musical humanism in Germany was pursued among Christian-humanist poets—the setting of Latin verse according to *genera carminum* and their respective metres.³⁶ It is perhaps not surprising that the real marriage of humanist rhetorical ideas and Christian devotion actually came to fruition in French-speaking areas where the odes of Horace provided metrical models for Latin and later French versions of the Psalms.³⁷

Luther’s own taste for the motet medium. See Walter Blankenburg, “Gallus Dressler”, *NG* 5:630-31; for Luther’s commendation of *cantus firmus* technique as a kind of “heavenly dance, where all meet in a spirit of friendliness, caress and embrace”, see Walter E. Buszin, “Luther on Music”, *The Musical Quarterly* 32 (January 1946): 82-83.

³³Bangert, 57.

³⁴Clement Miller, “The *Dodecachordon*: Its Origins and Influence on Renaissance Musical Thought”, *Musica Disciplina* 15 (1961): 156.

³⁵Christopher Dawson, *The Dividing of Christendom* (London: Sidgwick and Jackson, 1971), 56-62.

³⁶See Wendelin Müller-Blattau, “Der Humanismus in der Musikgeschichte Frankreichs und Deutschlands”, in *Festschrift für Walter Wiora*, ed. L. Finscher and C.-H. Mahling (Kassel: Bärenreiter, 1967), 298-99.

³⁷*Ibid.*, 299-300.

Twelve-mode theory itself was rapidly taken up in Italy, notably in Zarlino's *Istitutioni harmoniche* (Venice, 1558) and further propounded by Domenico Cerone (*El Melopeo y Maestro*, Naples, 1613) and Lodovico Zacconi (*Prattica di musica*, vol. 2, Venice, 1619). But it was in Germany that it secured itself and persisted into the 1700s as, in the eyes of certain theorists, preferable to the idea of a simple major-minor distinction.³⁸ Lester suggests that this persistence through the seventeenth century may in part be attributed to the prominence of modal chorale melodies;³⁹ the similar persistence of eight-mode theory in organ music of the French Baroque clearly stems from the integration of the instrument in the liturgy.⁴⁰ In contrast to the virtuosic material for the instrument emanating from Germany, Italy and Spain, the French organ was largely confined to versets or couplets, sections played in alternation with the sung parts of the liturgy.

Such a "balancing of the books"—twelve modes vs. eight, humanist vs medieval or theological, German vs. French or Italian—might be extended; but, in concluding this account of some less familiar turns in the history of musical modes during the sixteenth century, I hope to maintain that sense of strangeness in tracing two broader themes, one an antecedent of the modal field covered above, the other an outcome of it.

The first is the understanding of a musical work as an "expression of" something else, here Counter-Reformation ideology or Lutheran confessionalism.⁴¹ If Geoffrey Chew's suggestions are tenable,⁴² then the possibility of a "pre-history" of these sixteenth-century practices must be entertained. Chew argues that, just as two of the isorhythmic motets in the Old Hall Manuscript can be shown by their topical references to have been part of "a quasi-religious cult of the king [Henry V]",⁴³ so the regal references in early

³⁸Joel Lester, "Major-Minor Concepts and Modal Theory in Germany, 1592-1680", *Journal of the American Musicological Society* 30 (Summer 1977): 208-53.

³⁹*Ibid.*, 252.

⁴⁰A. C. Howell, "French Baroque Organ Music and the 8 Church Tones", *Journal of the American Musicological Society* 11 (Summer-Fall 1958): 106-18.

⁴¹I believe the phrase "expression of" does not at all distort the meaning of Powers' phrase "quintessential polyphonic manifestation" ("Modal Representation", 84). Westendorf, of course, uses the term in his title.

⁴²"The Early Cyclic Mass as an Expression of Royal and Papal Supremacy", *Music and Letters* 53 (July 1972): 254-69.

⁴³*Ibid.*, 256.

English cyclic masses could have implied their use at coronations.⁴⁴ What is more significant is the use to which such compositions might have been put in the cause of an embattled papacy.

By the time of the Council of Constance (1414-18), called to end the Papal schism, "conciliar theory" was a widely held opinion, i.e. the idea that papal authority ought to be subservient to the decisions of ecumenical councils. Thus, between the election of Oddone Colonna as Pope Martin V in 1417 and the Council of Basle which began in 1431, a conflict of interests existed into which composers were drawn on the side of papal ambitions. Chew supposes that, both in England and Germany, Benedictine figures were particularly active on the musical front;⁴⁵ when Eugenius IV became pope on the eve of the Council, Dufay—one of his personal musicians—was probably enlisted as well. A pair of mass movements (a Sanctus and an Agnus) by Dufay, designated "*Papale*" in *Trent MS 92-I*, appears to have been written with polemical intent: the intercalated trope in the Agnus is *Custos et Pastor*.⁴⁶

Chew's argument embraces in addition the phenomenon of textual omissions in the Mass Ordinary and the use of military symbolism in sacred music

⁴⁴The usual connection is through typology: the king is celebrated as a type of Christ, while St George—a focus for patriotic feeling at the time of Agincourt—and the Virgin are also invoked. The motet by Damett uses a plainsong that alludes to Palm Sunday; contemporary chroniclers underline "the acknowledgement of his royalty by the crowds as he rode, with great humility, into his capital" (ibid., 256. For details, see Margaret Bent, "Sources of the Old Hall Music", *Proceedings of the Royal Musical Association* 94 [1967-68]: 22-26). This cultic allusion was also applied to the English martyr-kings, Oswald, Edward and Edmund (Chew, 256). Another suggestive theme is that of anointing, found in the anonymous *Veterem hominem* and *Caput mass* cycles. It survives in recent British coronation ritual in the form of Handel's *Zadok the Priest*.

For a detailed study of the cult, criss-crossed with Renaissance learning, as it flourished around Elizabeth I, see Frances A. Yates, *Astraea: The Imperial Theme in the Sixteenth Century* (London: Routledge and Kegan Paul, 1975; Harmondsworth: Penguin Books, 1977 [Peregrine Book]) and Roy Strong, *The Cult of Elizabeth: Elizabethan Portraiture and Pageantry* (London: Thames and Hudson, 1977).

⁴⁵"The Early Cyclic Mass", 257-59. Leonel and Dunstaple were both Benedictines. Chew also considers important the contributions from German Benedictine sources (258, n.24).

⁴⁶See Lia Laor, "Concerning the Liturgical Usage of Dufay's Fragmentary Masses", *Current Musicology* 37-38 (1984): 49-58. Laor's are "preliminary assumptions" that take no cognizance of the possibility of ecclesiastical machinations. Besides interpreting the rubric "*Papale*" as implying that "it [the Sanctus] was to be sung when the Pope himself participated and celebrated the mass in the most important feasts" (52), she locates the movement liturgically by its trope (*Ave verum corpus*). Yet she fails to find the Agnus trope (*Tu es pastor ovium*) specially significant. Moreover, a Gloria with the trope *Resurrexit dominus* may well be designated for Easter (53), but a knowledge of the politics of the time might lead one to read the full trope text—*Surrexit dominus et apparuit Petro, Alleluia*—with less innocent eyes.

Bent (22-23) similarly finds topical significance in the text of a motet by Cooke; by placing it liturgically (Rogation Days, 1415), she is actually able to pinpoint its relation to the precarious state of English-French negotiations at the time.

of the mid-fifteenth century. He contends that the shortened Creeds (and, in three cases, shortened Kyries) characteristic of the late fourteenth and early fifteenth centuries became politically useful around the Council of Florence, when Eugenius was wooing representatives of the Greek Church in the hope of effecting the union of Eastern and Western communions.⁴⁷ The passages invariably omitted from the Creed are the Holy Spirit clauses (likewise, the third section of the Kyrie which was traditionally an invocation of the Holy Spirit). This was clearly diplomacy in liturgical practice, since the question of the Double Procession of the Spirit represented the chief objection of the Orthodox Church to Western doctrine.⁴⁸

The subject of military symbolism is no less curious. Don Harrán has underlined the importance of ideas of conflict and conciliation in Renaissance secular music,⁴⁹ and refers to two sources of imagery and treatment: the French tradition of realism in chansons of the late fourteenth and early fifteenth centuries (chiefly the imitation of bird calls, but also fanfares and *fuga* to represent the idea of flight) and the Italian *caccia* with its evocations of hunting, fishing or scenes of popular life. Both these fed into sacred music, and by mid-century were extended by other symbols of warfare, usually created by punning, e.g. *canones* and *fusae* (detonating fuses or notes twice as short as *semiminimae*).⁵⁰ The point of such devices in sacred music can only be appreciated by understanding the position of the contemporary papacy: in the search to enhance its prestige and in attempts to induce powerful princes to enter the crusade against the Turks, the Church Militant was an obvious choice of theme.

Chew considers the cyclic mass to have lost this accentuated social significance in the following century: the suggestion of this chapter has been that other cyclic forms associated with modal ordering took it up. But two later

⁴⁷"The Early Cyclic Mass", 260-64. The situation concerning these councils is somewhat complex. Eugenius had attempted to dissolve the Council of Basle early on, but was forced to recognize it in 1433. However, its anti-papal attitudes never softened and in 1437 Eugenius transferred the Council to Ferrara; he was looking for a venue suitable to the Greek Church delegation. Those who remained in Basle then elected an anti-pope and were only brought to submission in 1439. In the meantime, Eugenius's Council of Florence—which was where his papacy was based—met in Ferrara (1438-39), Florence (1439-43) and Rome (1443-45). See the *Oxford Dictionary of the Christian Church*, s.v. "Basle, Council of", "Florence, Council of".

⁴⁸*Oxford Dictionary of the Christian Church*, s.v. "Double Procession", "Filioque".

⁴⁹"The Concept of Battle in Music of the Renaissance", *Journal of Medieval and Renaissance Studies* 17, no. 2 (1987): 175-94.

⁵⁰Chew, 264-65.

examples of the political force of a mass (besides the legendary tale connected with the *Missa Papae Marcelli*) are worth noting. Josquin's *Missa Hercules Dux Ferrarie* was written sometime between 1471 and 1505. In its homage to Ercole I d'Este, it uses—indeed, is organized by—an ostinato *soggetto cavato* derived by solmization from the vowels of the Duke's name. Lewis Lockwood⁵¹ has proposed that the work may well initiate a “new type of tribute to a contemporary ruler, whose name is made a part of the fabric of the Mass and becomes a counter-subject to the liturgical text”.⁵² Equally significant is the subsequent recognition accorded this Mass as a means of glorification: not only did it inspire other *soggetto cavato* masses, but the original work reappeared unchanged but for the alteration of its title to *Missa Philippus Rex Castiliae* or *Missa Fredericus Dux Saxsonie*, as the occasion demanded. Lockwood sees in these offspring a depreciation of the original impetus: “What had originally been a fusion of the Mass as liturgy and as political celebration had now become a tradition”.⁵³

Yet one must be cautious in some cases. Lockwood regards the *Missa Tu es vas electionis* by Morales as part of the tradition of homage masses growing from Josquin's minting of the idea.⁵⁴ Like Morales' *Missa Quem dicunt homines*, its text refers directly to Pope Paul III.⁵⁵ But the network of references involved harks back to the early cyclic-mass “homage” methods. Its source is a versicle from a *Liber processionalis* of the Hieronymite order, a reformist group active in Spain and Italy. The versicle derives from the Acts of the Apostles 9:15, part of the account of the conversion of St Paul. But the connection goes deeper than name only, for the sense of the text includes the Apostle's commission to evangelize the Gentiles. In addition to the juxtaposition of St Paul's commission with Paul III's enthusiastic promotion of foreign missions, the use of a Spanish source—an unusual choice in itself—implies other connections: the Order, the Pope and Morales himself as Spaniards, and the reformist work that preoccupied both the Order and the Pope. In addition, this Mass is one of only three by

⁵¹*Music in Renaissance Ferrara, 1400-1505* (Oxford: Clarendon Press, 1984), 247-49.

⁵²*Ibid.*, 249.

⁵³*Ibid.*

⁵⁴*Ibid.*, 247.

⁵⁵Both masses appeared in Morales' *Missarum liber secundus* of 1544. Paul III's reign as Pope ran from 1534 to 1549.

See Jo-Ann Reif, “Music and Grammar: Imitation and Analogy in Morales and the Spanish Humanists”, *Early Music History* 6 (1986): 227-43.

Morales in triple metre throughout.⁵⁶ The drive for reform has evidently breathed new life into a “tradition”, and given a typical homage a renewed topicality.

The question of the effective “life” of a genre, as distinct from the products of mere traditional adherence, may be applied as well to the process of modal ordering. First, it is necessary to reiterate that the “canonization” of such ordering took place against a backdrop of sudden interest in the modes, especially in their affective properties but also in their pedigree of sheer antiquity. As relics in the hands of humanists, the modes were both authoritative and ethically effective, but these aspects were not always kept together. As Calvisius complained, they were employed in certain modally-ordered compositions with flagrant disregard for their various affects. In fact, it is hard to explain how Pietro Aaron’s claim to find in contemporary polyphony the material for an eight-mode classification *a posteriori* came, in less than twenty years, to serve as the ordering principle of various collections of printed music, unless one accepts that humanist debate had made the issue an urgent one.⁵⁷

⁵⁶The *Missa Quem dicunt homines* and the *Missa L’homme armé* are the others. Reif regards the triple metre as a device included for the Pope’s appreciation. The *L’homme armé* tradition is, of course, a *locus classicus* of military connotation. Bukofzer claimed to see no connection between the two texts of the song in its earliest known form, yet he suggested on musical grounds that it was originally composed as a “double chanson”, rather than being the “result of combining two . . . pre-existing melodies and texts” (“An Unknown Chansonnier of the 15th Century”, *The Musical Quarterly* 28 [January 1942]: 20-21).

Subsequent opinion has had no difficulty understanding the linking of the texts. That of the Cantus casts Simon le Breton, a musician of the Burgundian court, as a hero of the war against the Turks (see *The Mellon Chansonnier*, ed. Leeman L. Perkins and H. Garey, 2 vols. [New Haven: Yale University Press, 1979], 2:330-35). And though the *L’homme armé* poem in the Tenor and Contratenor itself is less specific, it can quite easily be seen as a popular broadside describing a recruiting campaign (Chew, 267). The interpolations of “*A l’assault!*” and the fanfare figures support this view. In any event, its topicality seems quite obvious, and its later usefulness in the protracted struggles against the Ottoman Empire was guaranteed.

⁵⁷Aaron’s *Trattato della natura et cognitione di tutti gli tuoni di canto figurato* was published in Venice in 1525. Rore’s first book of madrigals for five voices appeared there in 1542 with a clear eight-mode ordering; Tylman Susato followed suit in his plan of the *Premier livre des chansons à 3 parties* (Antwerp, 1544); a book of modally-ordered motets by Rore followed in 1545 and more five-voice madrigals—by Jacquet Berchem—appeared in 1546, both published by Gardano of Venice. For further details, see Powers, “Tonal Types”, 433-36 and 444-45 (Rore and Susato) and Dale E. Hall, “An Unknown Example of Modal Ordering in Cinquecento Music”, *Studies in Music* (University of Western Australia) 21 (1987): 1-9 (Berchem).

It is noteworthy that, though Glarean’s treatise was only published in 1547, it had actually been completed by 1539, and that two collections—Aegidius Tschudi’s *Liederbuch* (St Gall Stiftsbibliothek MS 463), probably begun between 1517 and 1522, and Glarean’s own motet collection (Munich University Library MSS 322-25), assembled later in the 1520s—contain modal attributions according to the twelve-mode theory. Tschudi was a pupil and friend of Glarean’s. See Miller, “The *Dodecachordon*”, 158-59, 160.

These early examples may well be nothing more than editorial ascriptions.⁵⁸ Even Glarean's request to Gregory Meyer in 1538 to write a piece that would show the connection of Aeolian and Hypoaeolian modes because of a lack of suitable existing examples may be put down to the need of comprehensive illustration of his theory.⁵⁹ Glarean, it must be remembered, wrote the *Dodecachordon* precisely because, like other humanists of his day, he was seeking in contemporary music to revive the ethical force of the art. He acknowledged, as others had, that a "restoration" had begun with Ockeghem, had ripened in the works of Agricola, De la Rue and Isaac, and had come to perfection with Josquin. But, after this ascent to maturity, musical art had declined, giving itself up to *cupiditas rerum novarum*; he believed that "unless composers subordinated themselves to the established ideal nothing but decline would be the result".⁶⁰ Such subordination required a revised modal theory that could reconcile modern achievements with ancient ideals.

Once the exemplification of the modes became an express intention of the composer, a new stage in humanist influence was reached. The dissemination of twelve-mode theory, besides the inroads in Germany and Italy mentioned above (163, 165), may be pinpointed in England by Morley's *A Plaine and Easie Introduction to Practical Musicke* (London, 1597) and in France by a musical treatise of Pontus de Tyard, one of the *Pléiade* poets,⁶¹ Charles Guillet's modally-ordered *Vingt-quatre Fantasies à quatre parties disposées suivant l'ordre des douze modes* (1610; for organ or clavier) and various collections of lute music by Denis and Ennemond Gaultier.⁶²

⁵⁸An exception that appears to have been missed in the studies of modal ordering discussed above is the early *Octo tonorum melodiae quinque vocibus compositae* by Thomas Stoltzer who was *Kapellmeister* to the Transylvanian court in Buda from 1490-1526. These fantasies, one in each of the eight modes, are the earliest preserved example of an instrumental cycle in musical literature. See Gustave Reese, *Music in the Renaissance*, rev. ed. (London: Dent, 1954), 723-25.

⁵⁹Miller, 160-61.

⁶⁰Leo Schrade, *Monteverdi: Creator of Modern Music* (London: Victor Gollancz, 1951; reprint, 1972), 24. Schrade (25) reproduces Glarean's complaint from *Dodecachordon*, Book 3, chap. 13: "[W]e are ashamed to follow the steps of our elders who rigidly observed the rules to be applied to the relationship of the modes, and in deviating from their traces we have produced a different, but distorted, composition that is by no means pleasant except that it is new."

⁶¹See Nan Cooke Carpenter, *Music in the Medieval and Renaissance Universities* (Norman: University of Oklahoma Press, 1958), 151.

⁶²Both the *Pléiade* circle and the salon culture around Anne de Chambré were deeply imbued with humanistic lore. Denis Gaultier's *La Rhétorique des dieux* (Paris, c.1652) is particularly important: "[i]t is divided into twelve parts, each named after one of the Greek

In tracing further the fortunes of the modes, one is faced with the imposing alliance between rhetoric and music, between eloquence and musical expressiveness, that spanned the entire seventeenth century and which, in the case of Germany where interest in rhetorical theories of music was most intense, ran on well into the eighteenth. Because of the degree to which such theories were worked out after c.1620, the preponderance of studies in the field have a Baroque orientation. The effect of this has been a lack of investigation into the role of the modes in this connection.⁶³

In addition, though modes had traditionally been associated with specific affects, the details had become somewhat confused by the end of the sixteenth century. The difficulty was partly the relative inconsistency of affects attributed to a particular mode by different writers, and partly the sophistication of many texts whose contents could not be reduced to a single affective *topos*. In addition, the aspect of a mode might be altered by seemingly innocent factors such as transposition or the manner of performance.⁶⁴ Yet it was precisely this affective

modes, and is illustrated with engravings by Le Sueur" (Monique Rollin, "Gaultier, Denis", *NG* 7:189).

Naturally, the modally-specific compositions by Venetian musicians—Annibale Padovana, Claudio Merulo and the two Gabriellis—remain central monuments of the duodecimal system.

⁶³Gregory G. Butler produced an important study of "Fugue and Rhetoric", *Journal of Music Theory* 21 (Spring 1977): 49-109, that made a point of examining the earlier theoretical sources. George Buelow's article in *NG* 15:793-803 was cautious about extending rhetorical principles backwards in time: however much they may have been in operation, it was "[a]fter 1600 ... [that] the representations of the Affections became the aesthetic necessity of most Baroque composers" (800). There is reason for caution: the sixteenth-century theorists do not, for example, treat modes in any systematic, "rhetorical" way.

What is rather surprising is the absence from Buelow's bibliography of Bernhard Meier's *The Modes of Classical Vocal Polyphony*, trans. Ellen S. Beebe, with revisions by the author (New York: Broude Brothers, 1988; originally published in German, Utrecht: Oosthoek, Scheltema & Holkema, 1974). The entire second half of this magisterial survey is devoted to an investigation of the relation between text and modal handling. Arnold Schmitz ("Figuren, musikalisch-rhetorische", *MGG* 4:180) asserted that as an example of the rhetorical figure *antitheton*, the *clausula peregrina* was "eine der wichtigsten Satzfiguren". Meier devotes a chapter (part 2, chap. 1) to demonstrating what that means: he discusses there the variety of occasions on which a *clausula peregrina* might serve the expression of the text. In so doing, he shows that other figures, such as *pathopoeia*, had modal implications: the use of chromaticism with "pathetic" intent, widespread in Baroque music, entails, prior to 1600, the use of unusual cadences *in mi*. The effect, so far as it depends on the highlighting of the semitone above the final (*mi-fa*), is a purely modal device.

The difficulties created by ignoring modal factors have been underlined by Frits Noske in "Affectus, Figura and Modal Structure in Constantijn Huygen's *Pathodia* (1647)", *Tijdschrift van de Nederlandsche Vereniging voor Muziekgeschiedenis* 32, nos. 1-2 (1982): 51-75. The typically Baroque settings of the *Pathodia*, for solo voice and *basso continuo*, offer passages that seem to suggest "tonal", i.e. major/minor, interpretations. Only from the point of view of modal cadences can the composer's expressive intentions be fully appreciated.

⁶⁴See Meier, 387-92; 403-4.

power that rendered the musical modes serviceable to other arts of the time and ensured that modality, even as it suffered decline in music, was preserved in new guises elsewhere.

Poussin's letter of 1647 to one of his patrons, Paul Fréart de Chantelou, in which he applies musical modes to painting, may serve to introduce this transformation.⁶⁵ Poussin depends for his affective ideas on Zarlino⁶⁶ and appeals as well to the poetic notion of "decorum" to support his argument.⁶⁷ However, his contention that the means of conveying a mood or emotion lies in the style of the painting rather than in gesture was unprecedented at the time, and only became a commonplace of art in the nineteenth century.

It is clear that Poussin was aware of both poetic and musical theory. Their application to painting may fruitfully be seen—against the background of a broader history of the "modal concept"—as a decisive move towards systematized ideas of style.⁶⁸ The term "*modus*" had already been used in medieval poetic theory to indicate different levels of discourse; typically, it was there associated with social differentiation and given its strictest ordering. Thus, Aelius Donatus, commenting on Vergil's works, produced a *Rota Virgilii*, "Wheel of Vergil", whose concentric circles contained respectively:

- a) the *stilus humilis*, found in the *Bucolics*, known by its shepherds (occupation), its meadows (location), its sheep (animal), its shepherd's crook (tool of the trade) and its beech tree (plant);
- b) the *stilus mediocris*, found in the *Georgics*, with its farmers, ploughed fields, cattle, plough and fruit trees;

⁶⁵Text and translation in Anthony Blunt, *Nicholas Poussin*, 2 vols. (London: Phaidon Press, 1967), 2:367-70.

⁶⁶*Ibid.*, 226.

⁶⁷Good poets have used great diligence and marvellous artifice in adapting their choice of words to their verse and disposing the feet according to the propriety of speech, as Vergil has observed throughout his work, because to all three manners of speech he accommodates the actual sound of the verse with such skill that he seems to set before our eyes with the sound of the words the things he is describing.

(*Ibid.*, 370)

The "three manners of speech" refers to the customary rhetorical division into high, middle and low styles.

⁶⁸See Jan Bialostocki, "Das Modusproblem in den bildenden Künsten", *Zeitschrift für Kunstgeschichte* 24 (1961): 128-41; reprinted in *Stil und Ikonographie: Studien zur Kunstwissenschaft* by Jan Bialostocki (Cologne: Dumont, 1966), 12-42.

c) the *stilus gravis*, found in the *Aeneid*, with its horsemen, its castles and cities, its horses, its sword and its laurel and cedar trees.⁶⁹

Renaissance architecture had been quick to take advantage of the Orders offered by Vitruvius, as well as his matching of temples with appropriate gods and goddesses. Alberti produced a rhetorically-influenced classification of buildings (for nobility, for private citizens and for country-dwellers)⁷⁰ and coupled this with the Vitruvian terms “Doric”, “Ionic” and “Corinthian”. These architectural orders were expanded by Sebastiano Serlio (1475-1554) and Giovanni Lomazzo (1538-1600) into “modally-ordered” arrangements.⁷¹ Thus, the “modality” of an architectural genre would be analogous to the theoretical criteria of a musical mode (range, final, *clausulae*, *exordium* patterns); the Orders of architecture would function as a summation of the art-form, as the eight- or twelve-fold systems did in music. The rather academic trend in late Renaissance artistic and architectural theory is usually deplored; however, Ernst Gombrich has pointed out that fledgling forms like landscape painting probably needed pre-existent “moulds” in which to root themselves.⁷²

In general, these ideas were more elastic in their seventeenth-century form, though the theorists of the *Académie Royale de peinture et de sculpture* expended much energy on their theory of *costume* or *bienséance*. Poussin was their touchstone in this, a byword for the mastery of expressive means.⁷³ The casual

⁶⁹Ibid., 130.

⁷⁰He regarded this as applicable to the subjects of painting as well.

⁷¹Since their emphasis is on a theory of ornamental decorum, “modally-ordered” here implies the range of a particular genre. For instance, where Vitruvius had allotted the Doric temple to Minerva, Mars and Hercules on account of their heroic characters, Lomazzo distinguishes Hercules by associating him with the Tuscan style. In its somewhat squat, radically unadorned appearance, it does seem fitting for the god whose attribute, in Roman interpretations, is pre-eminently bodily strength. Each order had already been tied to fixed proportions in Jacopo da Vignola’s *Regole de’ cinque ordini d’architettura* (Venice, 1562). The work of architects in Renaissance theatres meant the further spread of these ideas into stage design, where they were linked to a rhetorical division of drama into tragic, comic and “satyric” plays.

But “modally-ordered” might still have significance as indicating the formal distinctions within an artistic unity. Poussin often grouped his paintings in twos or threes, and his two cyclic representations of the Sacraments, each comprising seven subjects, are especially suggestive in this context, the more so since he was occupied with the second set when he wrote the letter to Chantelou.

⁷²“The Renaissance Theory of Art and the Rise of Landscape”, in *Norm and Form: Studies in the Art of the Renaissance I*, 3d ed. (London: Phaidon Press, 1978), 121.

⁷³André Félibien extolled Poussin in these terms:

M. Poussin was master of all these powers [the modes of painting], and had a perfect understanding of the range and extent of all these various kinds. See how in his picture of

manner in which Poussin had expressed his ideas left much room for private elaboration; unfortunately, the results were often contradictory.⁷⁴ However, his opinion continued to exert much influence in France in the form of a theory of “character” that almost always claimed music as its source,⁷⁵ and can be traced in Turner’s classification of landscapes in the nineteenth century.⁷⁶ In addition, once the human “passions” had been systematically isolated (starting with Descartes’ *Traité des passions de l’âme*, 1649), eighteenth-century writers on mime could set about the codification of gestures, i.e. could lay down the theatrical terms by which each passion (mode) might be expressed.⁷⁷ Finally, these notions are re-applied to music. The idea of decorum lies behind the systematic identification of various passions with the twenty-four keys,⁷⁸ and that of artistic summation behind “tonally-ordered” works such as *Das wohltemperierte Klavier* or Chopin’s *Préludes*, op. 28.

Gombrich suggests another way in which music stands in debt to these traditions: Beethoven’s two named symphonies, the *Eroica* and the *Pastorale*, express a division that can be traced back to Roger de Piles’ “modes” of landscape (1708), the elevated expressed by heroic gestures, and the pastoral by its simplicity and natural truth.⁷⁹ Also derived from this distinction by way of dance is the pattern of “courtly” minuets and “rustic” trios found especially in

Pyrrhus his Mode is that of anger and fury, while his Rebecca exhibits nothing but grace and sweetness; weakness and misery alone are depicted in his Manna, and in his healing of the Blind, only joy and wonder; and so throughout all his Works, for each is so admirable that it shows us the precise quality appropriate to its subject, just as in musical Modes, every note contributes to the expression of sadness or delight.

(*Conférences of the Academy*, 1667, p. 32, quoted in Joseph C. Allard, “Mechanism, Music and Painting in 17th Century France”, *Journal of Aesthetics and Art Criticism* 40 [Spring 1982]: 272)

Needless to say, the attempts to match modes to paintings continues among Poussin scholars to this day. See Bialostocki, 140, nn.47-49.

⁷⁴See Allard, 272.

⁷⁵Bialostocki traces it in the writings of Antoine Coppel, Henri Testelin and Dandré Bardon.

⁷⁶See Gombrich, 121.

⁷⁷See Patrizia Magli, “The System of the Passions in Eighteenth-Century Dramatic Mime”, *Versus (Quaderni di Studi Semiotici)* 22 (January 1979): 32-47.

⁷⁸Marc-Antoine Charpentier’s *Règles de Composition* (c.1692) lists seventeen keys and their corresponding “energies”. All twenty-four are first discussed by Mattheson in *Das neu-eröffnete Orchestre* (1713).

⁷⁹Gombrich, 121. See also Bialostocki, 132.

Mozart's works.⁸⁰ In both these cases, the “modalities”—one might think of them almost as polarities—may be defined by certain well-marked criteria, by “conventions” of artistic method.

The argument of this chapter may be characterized as an attempt not to show that the modes in their most conscious application were capable of being used as dogmatic ammunition in the unhappy conflicts of the sixteenth century—that is taken as established—but rather to show under what conditions that could take place, and to use that description as a basis from which to contemplate the vicissitudes of spirit and form of two crucial ideas: works of sacred vocal polyphony as “expressions of” various power ideologies (divine right of kings, papal absolutism) between c.1430 and c.1600, and the idea of art forms modulated by the categories of music in the two centuries after 1550.⁸¹

⁸⁰Eric Blom, “The Minuet-Trio”, *Music and Letters* 22 (April 1941): 162-80, reprinted in *Classics: Major and Minor* by Eric Blom (London: Dent, 1958), 165-83.

⁸¹The notion of treating two sixteenth-century topics in terms of “spirit” and “form”, of vigour and conformity, I owe in part to Louis Bouyer, *The Spirit and Forms of Protestantism*, trans. A. V. Littledale, Fontana Library of Theology and Philosophy (London: Collins, 1963). However, he is concerned to show that the initial blossoming of Protestant belief was inhibited almost from the start by “negative elements” which continue to hobble it. My perspective involves the transformation of ideas and hence the preservation of essences in the period.

Chapter 8

Modern Scale Theory I: A View of Debussy

It is the opinion of Iannis Xenakis that, in the notoriously confused state of musical art in this century, there is evidence of a profound revival of creative intelligence.¹ Interestingly, he demonstrates his contention most clearly in the area of scale theory, for it is in modal experiments that he discerns an optimistic breach of the more serious tonal impasses of our times. There is another reason for dealing with scale forms: they represent an abstraction of pitch processing, which complex activity takes us to the most basic human responses to the perception of frequency. Before presenting and debating Xenakis's thesis, an explanation of his methodological premisses is offered, as well as his own brief definitions of three key terms.

In his view, human thought, both logical and intuitive, rests universally on a foundation of several irreducible processes, which might be called "categories of mind" and which have the status of laws constantly governing mental operations. Upon this lowest stratum are developed psychological layers which combine the underlying processes (such as ordering, classification and differentiation) in various ways. The "pack" or complex of combinations constitutes the core of a given culture whose expression, at the level of immediate perception, may differ

¹I refer here to his discussions in *Formalized Music* (Bloomington, Ind.: Indiana University Press, 1971, hereafter abbreviated to *FM*), especially 1-10, 155-77, 180-94, 207-11. Corroborative material, somewhat more informal in style, may be found in an interview of Xenakis by Simon Emmerson printed in *Music and Musicians* 24 (May 1976): 24-26.

widely from that of other cultures. It must be added that these disparities between basic human mechanisms of thought and their localized cultural products might, on the one hand, be linked at a more general conceptual level: this he claims for the more conservative musical cultures of the East.² On the other hand, they may be exaggerated, as in the case of Western European music, by the decay of the structural undergirding through undue emphasis on a particular dimension.³

The notation of the underlying structuration at a level which enables the terms of description to cross from one “pack” to another, i.e. to fit more cases than the original selection of phenomena, will represent an “outside-time” structure. Xenakis’s elucidation of this idea may be found in his brief structural analysis of Byzantine music.⁴ It is an analysis of the four-order hierarchy of pitch arrangements and the possibilities of transformation through movements (*metabolae*) from one to another of them, on which rests Byzantine chant and

² “[T]he specialists in the music of the Far East . . . have always remained in close contact with musical practice and, dealing as they were with living music, have been able to look for a harmony other than the tonal harmony with twelve semitones” (*FM*, 191). Note 3 (below) describes the Western European distortion as he sees it: fruitful, but now exhausted. We may supplement his comments on the preferability of possessing, as Asian musics do, a rich abstract framework within which the musical practice occurs. This framework has recently been thoroughly investigated and written up (for instance, N. A. Jairazbhoy, *The Rāgs of North Indian Music* [London: Faber and Faber, 1971]; see also R. Cooper, “Abstract Structure and the Indian Rāga System”, *Ethnomusicology* 21 [January 1977]: 1-32), and now appears on library shelves, separated from the tradition of improvisation of which it is a part. But, as Heikki Nylund points out in a recent article (“Syntactic Structures of North Indian Rāgas”, *The World of Music* 25, no. 2 [1983], 45-56), what has been studied so far are pre-eminently the **cardinal** structures of the music, i.e. the groups of elements (notes). What is lacking is an understanding of its **ordinal** structures, its melodic syntax or “generative transformational grammar”. Only a few syntactic rudiments exist in the traditional theory: initial (*graha*) and final (*nyāsa svāra*) notes, notes as either ascending (*ārohit*) or descending (*avārohit*), oblique (*vakra*) and direct (*sarala*) patterns of movement. Their connection in extemporisation is taught by example and rote in the long process of learning the art-form from a master. This lack of an “in-time” structure, of an articulation of the functional relations between the abstract frame and the realisation in performance, that can be written up and widely diffused, is surely tied to the manner of instruction in the oral tradition. One need pass no judgement, favourable or otherwise, on this, while still seeing the tradition as having limitations; or perhaps sacrificing broad currency in order to preserve creative integrity.

³This is the main thrust of Xenakis’s criticism of serial music. Little enough was left of the abstract thought structure that had persisted, in conjunction with medieval music, well into the Renaissance. A grammar of “functions”, almost exclusively harmonic, was forged for didactic purposes after the final separation of arts and sciences in the eighteenth century, and serial thought initially retained only the abstract strictness of organisation in one aspect—pitch. In the work of the post-war serialists, this was extended in all directions or, rather, to all the layers in one direction. The result, in Xenakis’s view, was a self-defeating complexity, an organisation so pervasive that it sounded irrational and incoherent. The problem, so to speak, was lack of a theory of beauty to give shape to a theory of means.

⁴*FM*, 186-91.

whose “consummation . . . is the most complex and most refined thing that could be invented by monody”.⁵ This description of structuring operations, of a musical “architecture”, is at the same time the description of an outside-time structure.

Xenakis discounts attempts to imitate such models once they have been recognized. Rather, with the basic processes, a formalization must be sought through axiomatization. In *Formalized Music*, he has demonstrated this with respect to pitch at the sensibly pragmatic level of the tempered chromatic scale.⁶ While remaining pessimistic about the general responsiveness of musicians to such an approach, he is convinced of the significance of his mandate:

In depth, . . . the outside-time structures do exist, and it is the privilege of man not only to sustain them, but to construct them and to go beyond them.⁷

Confidence for these tasks is mustered by distinguishing three broad aspects of time:

A given pitch scale, for example, is an outside-time architecture, for no horizontal or vertical combination of its elements can alter it. The event in itself, that is, its actual occurrence, belongs to the temporal category. Finally, a melody or a chord on a given scale is produced by relating the outside-time category to the temporal category. Both are realizations of outside-time constructions.⁸

His historical argument answers to this conceptual frame:

[I]t is in France that the rebirth of outside-time preoccupations occurred, with Debussy and his invention [sic] of the whole-tone scale. . . . This rebirth continues magnificently through Messiaen, with his “modes of limited transposition” and “non-retrogradable rhythms”, but it never imposes itself as a general necessity and never goes beyond the framework of the scales. However, Messiaen himself abandoned this vein, yielding to the pressure of serial music.⁹

This claim—of a traceable movement spearheaded by Debussy and, by implication, culminating in Xenakis’s own formulations—seems on first acquaintance to be either trenchant or singularly presumptuous. Why, for instance, has Xenakis omitted all mention of Bartók’s use of mathematical schemes and modes of folksong? Instead, he mentions, presumably as a precursor, A. de Bertha who around 1870 set up scales of alternating whole- and

⁵Ibid., 191.

⁶Ibid., 194-99. See also chap. 11 of this thesis.

⁷Ibid., 208-9.

⁸Ibid., 183.

⁹Ibid., 208.

half-tones, called "*gammes homotones première et seconde*".¹⁰ On closer inspection, the all-French effort at salvaging music from itself turns out to be a more disordered and less intentioned process altogether. The proof of this, nevertheless, illustrates modern means of manipulating scale structures with extraordinary clarity. Both Debussy and Messiaen, like Xenakis, were fashioning tonal materials for their own expressive purposes, and it is only by outlining the aesthetic stance of each one—they differ radically—that one can finally understand why they arrived at the scales associated with them. In addition, it will be only fair to examine what Bartók has contributed in terms of outside-time structures.

The somewhat impudent comments found in Debussy's conversations with Ernest Giraud are as good a starting point as any.¹¹ In retrospect, the young composer's intentions are prophetically illuminating of his entire output:

Music is neither major nor minor. Minor thirds and major thirds should be combined, modulation thus becoming more flexible. The mode is that which one happens to choose at the moment. It is inconstant.¹²

This is by no means an arbitrary or anarchic procedure: it is rooted in Debussy's determination to come to grips with emotions released from the memory, and the way in which they form trains in the consciousness:

[H]ow much one has first to find and then suppress, to reach the naked flesh of emotion!¹³

I shall always prefer a subject [operatic] where, somehow, action is sacrificed to feeling. It seems to me that music thus becomes more human and real.¹⁴

[S]acrifice dramatic action to an expression of the long exploration of inner feelings.¹⁵

¹⁰*Ibid.*, 267, n.12.

¹¹Edward Lockspeiser, *Debussy: His Life and Mind*, 2 vols. (Cambridge: Cambridge University Press, 1962; reprint, London: Cassell, 1978), 1:204-8.

¹²*Ibid.*, 206.

¹³In a letter of 1911, quoted by Roger Nichols, "Debussy", *NG* 5:309.

¹⁴Letter to Eugene Henry Vasnier, 1885, in Edward Lockspeiser, ed., *The Literary Clef* (London: Calder, 1958), 94.

¹⁵Quoted in Lockspeiser, *Debussy*, 1:152.

I believe that one should never hurry to write but leave everything to that many-sided play of thoughts—those mysterious workings of the mind that we too often disturb, prompted by materialism and even cowardice.¹⁶

Debussy's affinity with Wagner's music has now been forcefully argued;¹⁷ what, then, distinguishes him from German romanticism? It is, I believe, his greater predilection for the aesthetic approach of the symbolists, in particular Stephane Mallarmé. The various attempts to link Debussy with the Impressionist artists, which are not without reason, have deflected interest away from a remarkable congruence of creative goals and methods of these two master symbolists. A few quotations from Hasye Cooperman's lengthy study¹⁸ will support this contention:

Stephane Mallarmé's poetry was highly individual: lyric on the one hand and objective (in the sense of discipline) on the other. This was due to a sensitiveness and a sensibility which he possessed to a very great degree, and which called forth the most ethereal, as well as the sharpest image-contours; it was due to a sort of emotional discipline, which was generally well-sustained and rigorous.¹⁹

The subconscious state is the state of automatic cerebration in full freedom [cf. Debussy's "leave everything to that many-sided play of thoughts"], while the intelligence, which is activity, pursues its course at the extreme limit of consciousness, a little below it and beyond its reach. . . . The harmony of the two states of consciousness brings about . . . a poetry full of doubts, of shifting shades and ambiguous perfumes.²⁰

Symbolism had the power of suggesting; it did not state any realities, subjective or objective; . . . it was founded upon exaggerated memories, registered and expressed by the artist, who did not portray them, but implied them.²¹

The poet "strove to capture the most elusive impressions, to isolate and intensify them" . . . [H]is exquisite strains "succeed in evoking those faint, delicate images which hover on the verge of consciousness".²²

Mallarmé's own testimony to this is typically hyper-scrupulous:

I have found an intimate and peculiar manner of depicting and setting down very fugitive impressions. What is frightening is that all these impressions are required to be woven

¹⁶Letter to Raoul Bardac, 1901, in *The Literary Clef*, 110.

¹⁷In particular by Robin Holloway, *Debussy and Wagner* (London: Eulenberg Books, 1979).

¹⁸*The Aesthetic of Stephane Mallarmé* (New York: Columbia University Press, 1933).

¹⁹*Ibid.*, 7.

²⁰*Ibid.*, 13, quoting Rémy de Gourmont.

²¹*Ibid.*, 11.

²²*Ibid.*, 14, quoting F. Olivero.

together as in a symphony, and that I often spend whole days wondering whether one idea can be associated with another, what the relationship between them may be, and what effect they will create.²³

Yet his ideal is perfectly clear:

To name an object is to destroy three-quarters of the enjoyment of a poem, which is made up of the pleasure of guessing little by little; to **suggest** it – that is the ideal.²⁴

In the conversations with Giraud, Debussy describes his ideal poet-librettist:

One who only hints at what is to be said. The ideal would be two associated dreams. No place, nor time. No big scene. No compulsion on the musician, who must complete and give body to the work of the poet. Music in opera is far too predominant. Too much singing and the musical settings are too cumbersome. The blossoming of the voice should occur only when required. A painting executed in grey is the ideal.²⁵

He, too, comes up with a method, not so much of rarefying and universalizing subjective impressions (as with Mallarmé), but of extending their emotional content:

I have found, and what is more quite spontaneously, a technique which strikes me as fairly new, that is silence (don't laugh) as a means of expression and perhaps the only way to give the emotion of a phrase its full power.²⁶

He is, I suggest, speaking here about the forging of symbols, which can at times be achieved in the simple act of selecting the fitting instrument. His comment on the music of the Annamite theatre brilliantly summarizes this side of his aesthetic:

²³Quoted in Lockspeiser, *Debussy*, 1:152.

²⁴Geoffrey Brereton, *An Introduction to the French Poets*, 2d rev. ed. (London: Methuen, 1973), 208.

²⁵Lockspeiser, 1:205. This bears a curious resemblance to an idea of Flaubert's, as recorded by the Goncourt brothers:

Flaubert said to us to-day: 'The story, the plot of a novel is of no interest to me. When I write a novel I aim at rendering a colour, a shade. For instance, in my Carthaginian novel [*Salammbô*], I want to do something purple. The rest, the characters and the plot, is a mere detail. In *Madame Bovary*, all I wanted to do was to render a grey colour, the mouldy colour of a wood-louse's existence. The story of the novel mattered so little to me that a few days before starting on it I still had in mind a very different *Madame Bovary* from the one I created: the setting and the overall tone were the same, but she was to have been a chaste and devout old maid. And then I realized that she would have been an impossible character. (*Pages from the Goncourt Journal*, trans. Robert Baldick [Oxford: Oxford University Press, 1962; Harmondsworth: Penguin Books, 1984], 58)

Considering the closeness of opera to the novel of action in the middle of the nineteenth century, this view is uncannily prophetic of Debussy's approach. The journal entry is for 17 March 1861.

²⁶Letter to Chausson, 1893, quoted by Nichols, *NG* 5:307.

A small, shrieking clarinet is the guide of the emotions; a tam-tam the organiser of terror . . . and that is all.²⁷

Roger Nichols explains the potency of the opening bars of the *Prélude à "L'après-midi d'un faune"* in terms of its action as a symbol:

The opening flute solo is just such a concentration of diverse emotions [as may be found in Mallarmé], dreamy idleness, good humour and speculative lust. . . . Certainly the chromatic outline of the faun's phrase is no mere imitation or "impression" of a panpipe; it is the primary symbol of the work and one should appreciate the silence that surrounds it.²⁸

Example 8-1 *Prélude à "L'après-midi d'un faune"* (1892), bars 1-4, 11-14

Note:

- a) Mallarmé's response on hearing the *Prélude* is instructive: "I didn't expect anything like that. This music draws out the emotion of my poem and gives it a warmer background than colour".²⁹
- b) The melody itself may be interpreted as adhering to the whole-tone scale (marked by ringed notes) and passed through a chromatic "filter". The opening of *L'isle joyeuse* provides another striking example of this technique:

²⁷Nichols *NG* 5:307.

²⁸*Ibid.*

²⁹In a letter to G. Jean-Autry, 1910; see *The Literary Clef*, 118.

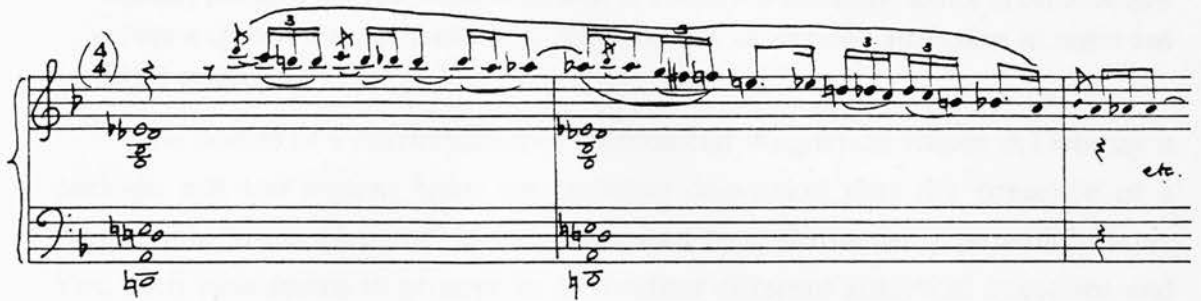
Example 8-2 *L'isle joyeuse*, bars 1-3

A similar filtered melody is found in *Jeux* (rehearsal number 5); here, the whole-tone basis is clearly indicated in the accompanying chords:

Example 8-3 *Jeux* (1912-13), rehearsal no. 5

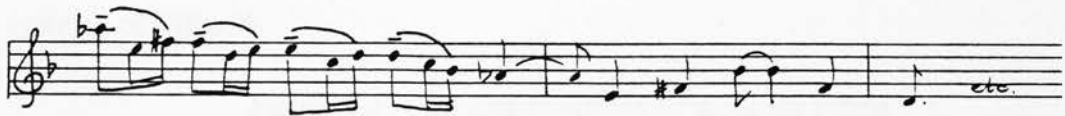
The presence of a whole-tone scale more or less “disguised” may take on an extreme form: *Six épigraphes antiques*, No. 2, provides an instance of the whole-tone scale in full chromatic dress. From the preceding bars (25-27), the whole-tone harmony is manifestly present. Its successive degrees are highlighted by agogic and thetic accents, yet the effect is unforced, like a chromatic tide slowly creeping over whole-tone ground:

Example 8-4 *Six épigraphes antiques* (1914), No. 2, "Pour un tombeau sans nom", bars 28-29



In fact, this is a variant of the whole-tone writing found at the start of the piece:

Example 8-5 *Six épigraphes antiques* (1914), No. 2, "Pour un tombeau sans nom", bars 5-6



- c) The varying tonal relations in the harmonized appearances of the *Prélude* figure (appearing at bars 11, 21, 26, 94 and 100) reflect a symbolic property of a more general kind:

The French Symbolists wanted their symbols fluid because for them each experience was unique, the component parts of a complex of sensation and thought must not be separable from the whole and in a poem representing such a complex the individual words must only exist in and for the poem. To write by these standards a poet must have unusual physical sensitivity [Mallarmé] or a habit of genuinely mystical experience [Rilke].³⁰

What has been asserted above is an emphasis by no means universally shared. For instance, Arnold Whittall sees Debussy's music as "a greater

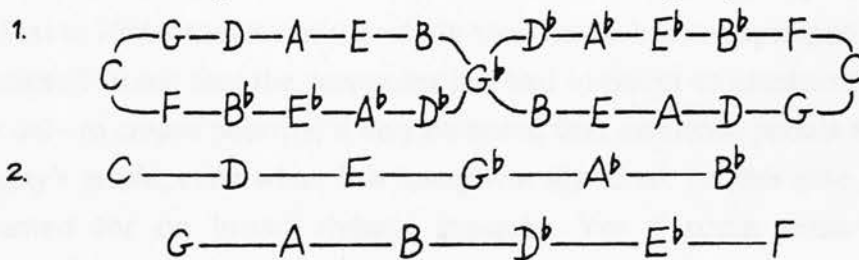
³⁰Louis Macneice, *The Poetry of W. B. Yeats* (London: Oxford University Press, 1941; London: Faber and Faber, 1967 [Paper covered ed.]), 113.

refinement of the essence of Wagner's musical thought than [that of] his German contemporaries":³¹

Debussy normally used the whole-tone scale as a relatively systematic source of chromaticism within a specific diatonic framework, rather than as an exclusive alternative to major and minor scales.³²

The notion of a conservation of transmuted Wagnerian values in Debussy is perhaps not too distant from the intuitive conviction that the presence of a Wagnerian "trace element" is overshadowed by a distinctively personal idiom. Yet, each view seems to prompt its own rather different analytical questions and methods; indeed, the "understandings" of Debussy are proliferating at a heady rate. A selection of recent approaches, that illustrates how dispersed the analytical tradition has become, is surveyed in Appendix 3. The difficulty of reconciling these understandings, in particular Wagnerian and modernist, will probably persist, rather in the manner of Beethoven's dual citizenship of Enlightenment and Romantic spheres. Therefore, I note here only my hesitation at accepting Whittall's reading of an "extended tonality" and his pairing of two systems of fifths:³³

Figure 8-1 Two Distributions of Keys By Fifths



System 2 is intended to show:

- that a pair of complementary whole-tone scales may be represented as an alternative tonal (though non-diatonic) branch and, thereby, an additional resource of the tonal system (system 1);
- that in this branch a key at a tritone's distance (G^b major, for example), clearly the polar extreme in system 1, is actually "nearer" the tonic (C) than the strong dominant or subdominant (G and F).

³¹"Tonality and the Whole-Tone Scale in the Music of Debussy", *The Music Review* 36 (November, 1975): 261-71.

³²*Ibid.*, 271.

³³*Ibid.*, 265.

But this may be a diagrammatic deception. Whittall had previously maintained a lack of tonal hierarchy in the whole-tone scale:³⁴ on that view, the **relative** nearness of G flat to C is dubious, unless one can show that the first whole-tone scale is somehow impervious to invasion from elements of the second that would upset its non-hierarchical nature.³⁵ Further, Whittall plays down other modal resources appropriated by Debussy, such as pentatonic and “white-note” patterns. Such intrusions would seem to weaken his chromatic-within-diatonic hypothesis (which is sometimes applicable) and subvert his belief that what Debussy really sought (and failed to achieve in a piece like *Voiles*) was a new type of chromaticism “controlled by the intersection of diatonic and whole-tone elements”.³⁶ Happily, he has also produced a fine description of Debussy’s harmonic manner:

The sensitivity and precision of Debussy’s musical language make it highly probable that he consciously played off one type of mode or scale against others, building forms from a delicate drama of tensions, oppositions and resolutions. In this process, the whole-tone scale used melodically and chordally plays an important part.³⁷

To just such a harmonic pliability Debussy himself laid claim, as we have noted.

In the refining of analytical tools as regards Debussy, it may be of use to suggest an alternative frame of reference to Whittall’s. By way of answering his idea that in *Voiles* the use of the whole-tone mode has so expunged any sense of a “functional” tonic that the composer has had to resort to assertion—a continuous B^b pedal—to create polarity, it may be noted that extended pedals are common in Debussy’s music, even when it is unequivocally tonal, i.e. this case may better be accounted for on broad stylistic grounds. Yet if some sense of otherwise unobtainable tonal orientation is the result here, it is important to note that it is by means of an **acoustic** tonic, rather than a harmonic one. By this, I mean that the low pedal note grounds the music in the same way as a fundamental grounds its partials—by virtue of its lower frequency. This is in contrast to a **functional**

³⁴Ibid., 261.

³⁵Not only are there other logical difficulties with his proposition—why, for instance, should D major be denied a hierarchical relation with C when they are so closely positioned in the circle of fifths?—but there are practical ones as well: Debussy makes frequent use of shifts of key (and chord) across both major and minor thirds, thereby relating both whole-tone scales (if those are indeed implicated in any way) to a central key. Whittall’s idea requires proof that shifts across a minor third are a greater deflection than those across a major third.

³⁶Ibid., 262. As will be explained, there is a plausible relation between the whole-tone scale/harmony and *fin de siècle* chromaticism, but that is firmly based on the idea of roots, at least in chords of resolution.

³⁷Ibid., 264.

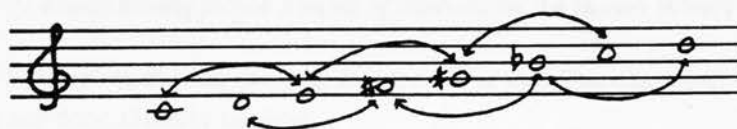
tonic which depends on a combination of rhythmic stress and dominant-tonic relations (hence, voice-leading); these factors may be supplemented by emphatic bass notes, but tonality does not depend upon them.

In illustrating what he considers to be a successful integration of whole-tone elements into a surrounding tonality, Whittall suggests that *Des pas sur la neige* fills the bill both on account of the sudden, dramatic appearance of a single whole-tone chord as a centre point³⁸ and, in a confirmatory role, of the oscillation of keys from D minor to G flat major, both these tonics appearing also in the whole-tone scale in question.

This correspondence of tonics with the notes of a single whole-tone scale may be nothing more than coincidence: it has, at any rate, a fifty percent chance of occurring with each modulation. Further, the use of two complementary whole-tone scales in a single piece, as in *La terrasse des audiences du clair de lune* (bars 21-23) or in *Ce qu'a vu le vent d'Ouest* (bars 10-14 and 19-20), would, according to this theory, admit every modulatory possibility. Add to this pieces such as *Poissons d'or*, in which keys appear that do not fall within its single whole-tone type (bar 39), and Whittall's basis of integration for *Des pas sur la neige* comes to seem distinctly a priori.

His argument from keys is also weakened by Debussy's fondness for key changes across a major-third interval, as much in pieces that are devoid of whole-tone material as in those that feature it. Clearly, this magnetically attractive modulation gap is structurally compatible with a given whole-tone mode:

Figure 8-2 Modulation Possibilities Within Whole-Tone Scales



Theoretically, these thirds yield augmented triads whose usefulness in floating harmonic contexts is well known: by a single semitone shift, each may be resolved onto a more stable triad (major or minor) in one of six directions. But unlike Wagner, Debussy does not always modulate by the expedient of a sliding semitone: his approach is frequently novel, heterodox but effectual, in a number of pieces not cited by Whittall (not all of them contain whole-tone material), in

³⁸Being less confident than Whittall of the pertinence of such structural terms in this piece, I should have preferred "first climax point".

subverting what appears to be a tonally-based harmonic skeleton. In the three *Images*, in *Le vent dans la plaine*, *Brouillards*, *Feuilles mortes*, “*Les Fées sont d’exquises danseuses*”, *La terrasse des audiences du clair de lune* and *Ondine*—to single out only a handful of piano works—the plain intent is to transport the listener through worlds undefined by cadences, preparations, dissonances and resolutions, while touching occasionally on a tonal marker or approaching a key as close as its dominant seventh before veering off again.

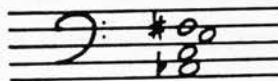
It is not perverse to argue that the form of integration settled for by Debussy in pieces such as these is an unobtrusive but undeniable smudging of tonal definition, which would not be apparent without the shreds of tonality that linger. By this, I mean that the more or less strenuous functional compulsions of tonality are so rarefied, so attenuated, that the use of identifiable keys fails to establish a “logical” tonal structure: instead, major and minor modes are used, like the other modal elements, as a resource in plotting a psychological contiguity of feeling. This dissolving effect is perhaps not as aggressive a move as serial technique, but it serves to perfection the purposes of Debussy’s rather isolated aesthetic.

In extolling the suspension of specifically “functional” propulsions in a work such as *Jeux*, I seem to suggest implicitly that the return to the original A mode at the close smacks of the arbitrary. I cannot claim to know Debussy’s mind on this point, but I do consider that many of the interior shifts of key or mode are arbitrary, in the sense of being elected according to a private logic, not a common harmonic practice. Again, one of Debussy’s youthful conversations predicts this subjective manner:

GUIRAUD: (*Debussy having played a series of intervals on the piano*) What’s that?

DEBUSSY: Incomplete chords, floating. *Il faut noyer le ton*. One can travel where one wishes and leave by any door. Greater nuances.

GUIRAUD: But when I play this it has to resolve.



DEBUSSY: I don’t see that it should. Why?

GUIRAUD: Well, do you find this lovely?



DEBUSSY: Yes, yes, yes!

GUIRAUD: But how would you get out of this?



I am not saying that what you do isn't beautiful, but it's theoretically absurd . . .

DEBUSSY: There is no theory. You have merely to listen. Pleasure is the law.

GUIRAUD: I would agree with you in regard to an exceptional person who has discovered a discipline for himself and who has an instinct which he is able to impose. But how would you teach music to others?

DEBUSSY: Music cannot be learnt.³⁹

What, then, is systematic in Debussy's use of the whole-tone scale? The answer depends on the precise context. *Voiles* has already been referred to. A survey of *Pelléas et Mélisande* shows that here this mode, used both in leitmotif and more broadly in connection with the figure of Golaud, has a consistent emotional referent. Thus, though it may appear both in *animé* passages where the obvious agitation of spirit—the spirit of the music, rather than that of the characters—often prompts the rapid sequential use of a pair of whole-tone scales,⁴⁰ and in more static, sombre sections where one form suffices,⁴¹ the symbolised emotions are similar: intimations of menace arising from a mixture of subjective and objective factors, with premonitions of unhappy fate, but always as a component in a broader canvas of constantly shifting “shades of grey”. Whole-tone harmony provides a vehicle for the morbid reaction that arises in contemplating the limitation of human vision to the “underside of fate”.

Syrinx (1913), on the other hand, evokes by a blend of modality, instrumentation, “geotropic” effects and its unified, economical material, a complex of sensations not unlike the faun's⁴²—sensual vibrations, languorous, fugacious, luxurious—precisely the same field of feeling crystallised in the mythological symbol of Pan among the river-reeds. From a perceptual point of view, this is sufficient, but as a contribution to whole-tone theory, the analysis of

³⁹Lockspeiser, *Debussy*, 1:206-7.

⁴⁰See the Durand vocal score, (pages) 19-20 (*Plus animé*); 87 (*Animé*); 213-14 (*Plus animé*).

⁴¹*Ibid.*, (page) 142 (*Lourd et sombre, même mouvt*); 222 (*Trés lent*).

⁴²It, too, begins with a suggestion of a whole-tone scale through a chromatic filter.

C. K. Baron⁴³ is invaluable. This shows that the whole-tone mode can (at least in a piece of this length) generate its own resources for the purposes of melodic extension, contrast and coherence.

Figure 8-3 Whole-Tone Scale and Its Transposition



At least three major structural principles can be deduced from this diagram:

- a) the **complementarity** of the two forms of the whole-tone scale (its “limited transposition”). The full chromatic gamut arrived at here is a single sound world comprising two modal hemispheres.
- b) the **adjacency** of the note-series, i.e. they interlock to fill all available space. This suggests, as does (a), that the two forms cannot be indiscriminately mixed without sacrificing their identities; but Baron’s description of the tension between the two hemispheres as “polar” is too facile.⁴⁴ The effect, like the structural feature, is rather of delicate shifting to an adjacency, an “equatorial” nuance.
- c) the **lack of closure** indicated by the failure of the system properly to span an octave. (The final C and C# may be considered superfluous but the argument is not altered.) The correlative tonal elusiveness needs no further emphasis.

Baron has discussed the piece in terms of alternating regions of the two whole-tone transpositions, linked by bridge passages (bars 11-12, 20-24), themselves built, according to a logic either incontrovertible or wholly willful, from three-note sections of each whole-tone form, fused longitudinally. These are themselves derived from pentatonic formations.

⁴³“Varèse’s Explication of Debussy’s *Syrinx* in *Density 21.5* and an Analysis of Varèse’s Composition: A Secret Model Revealed”, *The Music Review* 43 (May 1982): 121-31.

⁴⁴*Ibid.*, 122.

Figure 8-4 Bridge Passage Materials in *Syrinx*⁴⁵

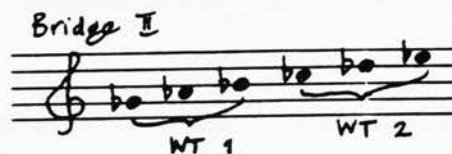


The final five bars dispense with the bridging device: the notes of whole-tone 2 gradually supplant those of whole-tone 1 and appear finally in the summary scale that ends the piece.⁴⁶ In this instance alone can Xenakis be said to be fully borne out: the outside-time properties of the scale loom large.

In the contest between inherited harmonic interpretations of Debussy and avant-garde readings, the whole-tone scale has a curious position. It is unfailingly picked on as an element of Debussyan expression, but it is surely a type of traditionalist mind that sees in its presence the automatic preclusion of tonality. However that may be, there is no excuse for failing to consider the scale in the “light of cold or Wagnerian day”, as Tovey puts it.⁴⁷ In this view, which Tovey indicates as having come to him from Sir Walford Davies, the whole-tone scale is understood as “a six-note chord projected into a single octave and capable, like the diminished seventh, of an enharmonic turn to each of its notes”:⁴⁸

⁴⁵She might have mentioned that the second bridge passage sets the whole-tone 2 section, with an extra note (F), above the whole-tone 1 section—a nice detail:

Figure 8-a Second Bridge Passage Material



This bridge passage is flecked with chromaticisms, but the idea that these bridges are pentatonically related is quite tenable. In fact, the procedure is very close to that of *Voiles*, where the soft whole-tone surges momentarily expose a reef of pentatonicism (bars 42-47) before submerging it again.

⁴⁶Baron, 129-30.

⁴⁷*Articles from the Encyclopaedia Britannica* (London: Oxford University Press, 1944), 69.

⁴⁸*Ibid.*, 68-69.

Figure 8-5 Model Resolutions of the “Whole-Tone Chord”

Indeed, many instances of whole-tone usage can quite easily be construed in this way. Even when not all six notes are present for resolution, the whole-tone “field” is usually clearly sensed. This textbook example, “turning” (to use Tovey’s vocabulary) to the G, suggests that the common notion of tritone relations in Debussy be refined:

Example 8-6 *Proses lyriques*, No. 2, “De grève” (1892), bars 13-14

In order to do justice to both the movement of the bass (C# to G) and the chromatic content of the progression as outlined above (Figure 8-5, B5), the idea of an acoustic tonic (C#) in bar 13 is applicable here too. The following example uses exactly the same harmonic resources, but the effect is (in my judgement) less convincing: the resolution of the converging lines on the dominant seventh is weakened by the premature appearance of the G as an acoustic tonic (second bar):

Example 8-7 *Le martyre de Saint-Sébastien* (1911), vocal score, (page) 36

A musical score for piano accompaniment. It features two staves: a treble clef staff and a bass clef staff. The key signature has three sharps (F#, C#, G#). The music consists of complex chords and arpeggiated patterns. There are some markings below the bass staff, possibly indicating fingerings or specific voicings.

Without complicating the point unduly, we may add that Debussy extends the application of this sort of resolution by leaving one note of the six—that which moves down a tone in the models—where it is, thereby creating his beloved ninth chord. This instance is based on model A3:

Example 8-8 *Chansons de Bilitis*, No. 2, “La Chevelure” (1897), bars 11-12

A musical score for voice and piano. The top staff is the vocal line with lyrics: "et nous é-tions li-és pour tou-jours ain-ci, par la mê-me che-". The bottom two staves are the piano accompaniment. The key signature has three flats (Bb, Eb, Ab). The music shows a whole-tone scale movement in the piano part, with some complex chords and arpeggios. There are some markings below the piano part, possibly indicating fingerings or specific voicings.

The piece is especially striking in this respect, the voice part traversing the whole-tone scale downwards, the piano simultaneously ascending by whole-tones to bar 12 (where the scalewise movements are reversed). The approach to the whole-tone passage also illuminates Debussy’s methods: the prolonged chord (bars 8-9) that “resolves” itself onto the whole-tone harmony is a dominant seventh of F with flattened fifth; like an augmented triad, it is potentially a “gapped” whole-tone chord. With the appearance of the two missing (whole-tone) degrees, it is harmonically transformed; an index of that is the change of roots from tonal (C) to acoustic (F#).

Another “turn” with added ninth—that based on model B1—underlines the usefulness of a resolution procedure that allows root movement **from** any of its notes **to** any of its notes:

Example 8-9 *Images* (Second Set), No. 1, “Cloches à travers les feuilles” (1907), bars 8-9

The image shows a musical score for piano accompaniment, consisting of three staves (treble, middle, and bass clefs). The music is in 2/4 time. The first staff has a melodic line with a slur over the first four notes. The second and third staves have a more complex accompaniment with slurs and ties. A 2/4 time signature is indicated at the top right of the score.

A variation on this structure effects the change from whole-tone to pentatonic scale:

Example 8-10 *Préludes*, Book 1, “Voiles”, bars 39-41.

The image shows a musical score for piano accompaniment, consisting of three staves (treble, middle, and bass clefs). The music is in 2/4 time. The first staff has a melodic line with slurs and ties. The second and third staves have a more complex accompaniment with slurs and ties. A 2/4 time signature is indicated at the top right of the score.

This resolution is an elaboration of model A2:

Figure 8-6 Variation of Model A2

The image shows a chord resolution diagram in two staves (treble and bass clefs). The top staff shows a chord with notes G#4, B4, D#5, and F#5. The bottom staff shows a chord with notes G#3, B3, D#4, and F#4. An equals sign (=) is placed between the two chords, indicating a resolution or transformation. The G# note is held between the two chords.

The G# is the held note already noticed in connection with ninth chords, while the E falls to the added sixth (D#) instead of providing the seventh. The result is another harmonic transformation, here dispensing with the expedient of

fixed “frame” notes and alterable “filler” notes; it suggests that Debussy’s pentatony ordinarily has a root, if not a tonic.

However, there are quite as many instances in which the resolution of the whole-tone chord does not follow the models of Walford Davies. Interestingly, resolution is still frequently onto a dominant seventh or ninth chord, but one whose root belongs to the other whole-tone scale, i.e. the one which is not being used in the progression. This might seem an oddly oblique way of characterizing the chord of resolution, were it not for the impression that Debussy purposely uses this “cross-over” relation in passages whose climaxes are less powerfully articulated. *Pelléas et Mélisande* provides a number of such resolutions; one is immediately reminded of Debussy’s achievement in continuous modelling. The following is typical:

Example 8-11 Pelléas et Mélisande, Act 1, Scene 1, vocal score, (page) 20

The image displays a musical score for Golaud from Act 1, Scene 1 of *Pelléas et Mélisande*, page 20. It consists of two systems of music. The first system features a vocal line in bass clef and a piano accompaniment in grand staff (treble and bass clefs). The vocal line has lyrics: "Vous au-vez peur, tou-te seu - le, On ne sait pas ce qu'il y a i-ci... tou-te la". The piano accompaniment includes a complex rhythmic pattern with triplets and a 7/8 time signature. The second system continues the vocal line with lyrics: "nuit... tou-te seu - le..." and the piano accompaniment.

Furthermore, “cross-over” relations that do occur at critical junctures in a work actually bring to light additional possibilities of whole-tone manipulation:

Example 8-12 *Proses lyriques*, No. 3, “De fleurs” (1893), bars 51-53

The musical score for Example 8-12 consists of three staves. The top staff is a vocal line with lyrics "Ve nez!" and a dynamic marking of *f*. The middle staff is the piano part, featuring a complex texture of chords and arpeggios. The bottom staff is the bass line, providing harmonic support with chords and a steady rhythm. The key signature has two sharps (F# and C#), and the time signature is common time (C).

By skilful use of a strong rising line (may one speak of “acoustic voice-leading”?) and the disposition of notes in chords that suggest inversions of a dominant seventh (with flattened fifth), the impression of a full-close on B major constitutes the essence of this thrilling passage.

Example 8-13 *Six épigraphes antiques*, No. 2, “Pour un tombeau sans nom” (1914), bars 11-13

The musical score for Example 8-13 features a piano part and a vocal line. The piano part is written in a grand staff (treble and bass clefs) and includes dynamic markings such as *pp*, *ppiu p*, and *pp*. The vocal line is in a single staff with lyrics and dynamic markings. The key signature has two flats (Bb and Eb), and the time signature is common time (C). The score shows a complex harmonic structure with chromatic movement.

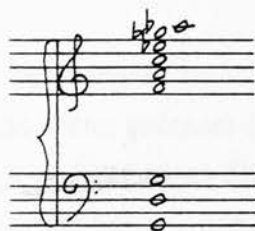
The interpretation of this resolution is complicated by the presence of “chromatic technology” (in Roland Nadeau’s phrase).⁴⁹ Judged by the bass progression and the chord spacing, it is clearly rooted on G; equally clearly, it is a combination of two harmonies with roots a semitone apart (dominant ninth on G, dominant seventh on Ab). Yet it strikes the ear as a type of cluster over the pedal fifth, bearing out Vincent Persichetti’s observation:

⁴⁹“Debussy and the Crisis of Tonality”, *Music Educators’ Journal* 66 (September 1979): 71.

The closer the dissonant tones [of a polychord] are placed to each other, the higher the degree of tension; but unless clearly defined as part of a chordal unit, the different harmonic areas will run into each other and polyharmony cease to exist.⁵⁰

It is surely this “run together” aspect that Debussy exploits here; indeed, it is harmonically underlined by the fact that the two chords may be linked in a chain of thirds (D-F-A-C-E^b-G^b), in which collocation of pitches a third chord, the dominant seventh on F, materializes. Perhaps there is value in setting out the final chord thus:

Figure 8-7 Ninth Chord with “Harmonics”



There is an identical harmony on D, also approached by a whole-tone scale (bars 25-28), with a simple chromatic layer beneath it. The point of this rearrangement is admittedly speculative: the resemblance to an overtone series is suggested by comments of Debussy's such as these:

Les accords de septième regrettent!!! ... But see how successfully the chords of the ninth, equipped with all their harmonics, send the regrettable sevenths about their business and borrow from the colour of the sky some godlike gleams in order to celebrate your beloved birthday, dear *petite mienne*.⁵¹

Regrettably, there are only seventh chords on this fragment, the ninth chords being left to Emma's (and our) imagination. The question is—what is a ninth chord “with all its harmonics”? May it not be one such as is noted here? Schnebel's idea of “composition of partials” is discussed in Appendix 3; there is certainly something to be said for his raising of acoustical dimensions in Debussy's music. (From the lack of it in most commentary, one might assume it was a negligible aspect.) However, it is difficult to analyse, and Schnebel, while keen to call in “partials”, fails to account for Debussy's selection of particular dissonances. In my own opinion, chords such as these create chiefly timbral

⁵⁰*Twentieth Century Harmony* (London: Faber and Faber, 1962), 140.

⁵¹A note inscribed, together with a few bars of music, on a birthday greeting for Debussy's second wife, Emma Bardac, in 1905. See Robert Orledge, “Debussy's Musical Gifts to Emma Bardac”, *The Musical Quarterly* 60 (October 1974): 545-46.

effects, typically cloudy sounds, a soft buzz of vibration. But the analysis of how, on a piano, these take place has not, to my knowledge, been investigated.

As a way of checking the excerpts discussed above, the use of whole-tone figurations within larger contexts forms the subject of the rest of this chapter. The second set of *Fêtes galantes* (1904) to poems by Verlaine provides promising material, partly because of the extent to which whole-tone passages are used there, partly as a not too cumbrous field within which these passages may be related to other compositional practices, in the hope of defining their function more fully.

Of the nineteen songs set by Debussy to Verlaine texts, eight draw on the poet's second published collection, *Fêtes galantes* (1869). Of these, three were set twice; or, rather, the three songs published as *Fêtes galantes* (Series 1) in 1903, though completed some twelve years before, are reworkings of settings that date back to 1882. In other words, the *Fêtes galantes* project spans twenty-two years of Debussy's career. By examining these ten Verlaine settings—the original version of “Fantoche” remains unpublished—one can quite easily sense the changes in his style. But since such a convenient perspective can entail distortions, reference will also be made to songs outside this Verlaine group.

The use of the whole-tone scale in the first set of *Fêtes galantes* can be despatched quite briefly. In “En sourdine”, a song of glowing, chiefly diatonic constructions, the music, for the length of a single bar (35), passes through a whole-tone “field”, whose melody and bass progression are unequivocally aimed at the resolution onto a ninth chord in the next bar; indeed, the passage sounds as “functional”, if not as cadential, as a series of primary triads:

Example 8-14 *Fêtes galantes* (Series 1), “En sourdine”, bars 35-36

Lent

noirs tom-be-ra Voix de no-tre dé-ses-

The emergence from the whole-tone scale involves a cross-over relation, in fact, precisely the same with respect to key as noted in “De fleurs” (see above, 196).

“Clair de lune”, written appropriately in the *mode mineur* of the poem, begins with pentatonic patterns: the tonal implications of giving prominence to D#/F#/A#/C# and secreting the G# within the rhythmic rippling (bars 1-4 and especially 3-4) are quite clearly resolved in the v⁷ - i cadence onto G-sharp minor:

Example 8-15 *Fêtes galantes* (Series 1), “Clair de lune”, bars 4-5

etc.

As the only instance of whole-tone use, by comparison, Wenk cites bar 11;⁵² the scale, however, is defective by two notes:

⁵²Arthur B. Wenk, *Claude Debussy and the Poets* (Berkeley: University of California Press, 1976), 29.

Example 8-16 *Fêtes galantes* (Series 1), “Clair de lune”, bars 11-12

According to Wenk, Debussy is underlining the sadness of “*quasi / Tristes*”, but one has to ask whether the elusiveness signalled in the “*quasi*” is not as much a contributory influence.

As will be shown, all six notes of a whole-tone scale need not be present to “tip the balance” of a harmonic effect in its direction. But in certain contexts the experimental incorporation of the “missing” notes makes a very noticeable alteration in the harmonic sum. This is one such instance. It seems far sounder to account for this expressive pang in the harmony in terms of an abruptly skewed root progression—C#-E-F#-B-D-G-D#—than to postulate the existence of a whole-tone scale in the guise of an enlarged augmented triad. If augmented (or diminished) triads do not in themselves offer much of an analytical handle, they may still afford suggestions of roots, and the part-writing in the voice, left hand and uppermost line of the right hand (the highest of the texture) appears to outline quite unambiguously a dominant seventh chord resolving to its tonic.

The whole-tone material in “*Les ingénus*” (*Fêtes galantes*, series 2), consisting of eight bars of ostinato figures beneath the speech-like melody (bars 16-23) that turn almost imperceptibly towards an F minor chord, can only be appreciated with some knowledge of the harmonic surroundings. At the outset, a falling phrase of skeletal quality appears; it will be amplified twice in the course of the piece:

Example 8-17 *Fêtes galantes* (Series 2), “Les ingénus”, bars 1-2, 3-4, 37-38

The characteristic constructions of this two-bar motif are augmented triads and their derivatives (first bar) and diatonic chords modified by the converging chromatic lines (second bar). They stand as close relations of the whole-tone and diatonic strains of the song respectively. While it would be unwise to claim that they “summarize” the song, it can safely be asserted that they create an environment in which whole-tone writing seems almost inevitable.⁵³

The attentiveness of the young men to glimpses of exposed female flesh finds a direct echo in the music of the G-flat and E-flat major sections (bars 27-36), while the passing of time and nightfall between stanzas two and three of the poem are clearly marked by the second amplification appearing at half speed. Yet one is loath to note these rather obvious translations of the poetry when one suspects that so much more of the setting has been shaped by the text in ways difficult to assess or put into words. In the light of this, it is worth summarising the song’s overall structure for the tonal formality it exhibits:

Table 8-1 Tonal Plan of “Les ingénus”

bars	
1-13	skeleton & first amplification;
14-15	G-flat major (too many glimpses of calves!);
16-23	whole-tone with
23-24	turn towards F minor with added notes;

⁵³Cf. also the deflection of the first chord of bar two (second amplification) in bars 43-45 that creates an unmistakable whole-tone colour, though the harmony lacks an F-sharp.

27-30	G-flat major, pandiatonic (the sight of a neck!), <i>Peu à peu animé</i> ;
31-36	E-flat major, pandiatonic (these treats filled our eyes!), <i>Toujours animé</i> ;
37-41	second amplification, <i>Le double moins vite</i> ;
42-45	whole-tone suggestion;
46-48	C major;
49-51	F-sharp minor (“minorisation” of G-flat), <i>Lent</i> , the opening melodic figure superimposed in the voice part;
52-53	opening chord in fullest amplification.

“Le faune” provides only two bars that can properly be said to comprise whole-tone moments, and the second lacks a B-flat:

Example 8-18 Fêtes galantes (Series 2), “Le faune”, bars 12, 29

The image contains two musical excerpts. The left excerpt shows a piano accompaniment with a melodic line in the right hand and a bass line in the left hand, featuring augmented triads and a whole-tone patch. The right excerpt shows a vocal line with the lyrics "Jus - quia cette" and a piano accompaniment, also featuring augmented triads and a whole-tone patch.

Both are eloquent fragments. The first, built from augmented triads provides, with its rhythmic elongation of the phrase and its ebbing dynamics, an understated punctuation of the opening strain. The second illuminates what may be considered the chief musical means of the song: the way in which the superimposed “voices” of the piano part create a delicate web by the making and breaking of harmonic contact among themselves. In the excerpt, the two upper layers, consisting of the melodic figure and the triads, fuse their independently rising lines in a whole-tone patch (beats two and three) against the pedal fifth. This outcome might seem fortuitous, were it not for the fact that comparable passages in the song—bars 7-11 and 20-23—have middle parts that move in strict parallel. Had Debussy followed that precedent, the harmonies at this point would have formed an insipid progression:

Figure 8-8 Strict Parallelism Applied to “Le Faune”, bar 29



With “Colloque sentimental”, the whole-tone scale $B^b-C-()-E-G^b-A^b$ unmistakably reasserts itself from the first bars of quasi-ostinato and falling left-hand figure. The missing D enters with wonderfully unobtrusive effect in bar 11, when the texture recurs. These passages accompany the narrative portion of the poem; the ensuing dialogue uses an extended pedal and above it the motif from the earlier song “En sourdine” that recalls a love in its bloom:

Example 8-19 *Fêtes galantes* (Series 2), “Colloque sentimental”, bars 20-21



In these appearances of the motif, the original diatonic harmonies are altered to diminished seventh chords (bars 19, 21, 27, 29). These give way briefly to minor sixth and dominant seventh chords (bars 28, 33-36), but revert each time to the melancholy diminished forms (bars 29, 37 and especially 46-47, at the words “L’espoir a fui, vaincu, vers le ciel noir”). A particularly tender memory—“Où nous joignons nos bouches”—is set to chords in “fused style”,⁵⁴ dominant sevenths vertically/whole-tone scale horizontally:

⁵⁴A characterisation of “fused style” would include three chief properties: rhythmic homophony; the fusion of melody, bass and inner parts by the suspension of harmonies “suggested” by the melody (alternatively, the melody, spread through all the parts, is not “explained” but paralleled by them); the movement of parts through a consistent mode of pitches.

Example 8-20 *Fêtes galantes* (Series 2), "Colloque sentimental", bars 38-39

At this point, the problem of "music and text" needs to be more directly addressed. There is no need to underline the common opinion that the music of the songs, particularly in the piano part, "follows the minutest shades of emotional variation in the text".⁵⁵ However, a dilemma faces the analyst of these songs. On one hand, the marked difference of mood from the first to the second series can be attributed to broad changes in Debussy's style.⁵⁶ Roger Nichols has detailed the increasing mastery to be seen in the two versions of "Clair de lune" (1882-84 and 1891);⁵⁷ this includes a move away from the over-employment of short-breathed leitmotifs and a greater attention to the structure of the poem, as well as the important indication that Debussy was shifting his emphasis from the more optimistic elements of the poetry to its hints of disquiet. The greater availability of his style to equivocal harmonic writing is, as we have indicated, a feature of the second series, as are the freely-spun melodic curves.

On the other hand, some of the major alterations may have less to do with style than with fresh attitudes to the poems themselves. It is true that the "Colloque sentimental" is the bleakest of Verlaine's collection, but the consistency of the harmonic language in the second set means that "Les Ingénus", a song of unqualified banter and mockery, and "Le Faune", which introduces a note—but no more—of melancholy, are drawn into what may seem an unduly

In some cases, the same mode regulates both vertical (chordal) combinations and horizontal (melodic) contour; but often, as in this instance, the "axes" are regulated by different modes.

For further discussion and illustration, see 236 and Appendix 4.

⁵⁵Martin Cooper, *French Music: From the Death of Berlioz to the Death of Fauré* (London: Oxford University Press, 1951; Oxford Paperback ed., 1961), 98.

⁵⁶See Christian Goubault, *Claude Debussy* (Paris: Librairie Honoré Champion, 1986), 94.

⁵⁷"Debussy's Two Settings of 'Clair de lune'", *Music and Letters* 48 (July 1967): 229-35.

tense and desolate world. It is worth recalling Romain Rolland's comment on Debussy's harmonic language and its originality: "[I]t is not on account of the peculiarities of Debussy's style [that he is a great artist] . . . but because with Debussy these peculiarities are an expression of his personality".⁵⁸ Put another way, what might seem to be an obvious translation into music of a mood in the poetry may well be an individual response of a high order, a revelation of some essence in the composer's personality. In this case, we are surely faced with what Colette used to call "le noir Debussy".

To show how difficult it is to maintain either of these positions exclusively, another check may be mentioned—that of synchrony. By taking into consideration the *Trois chansons de France*, composed and published in the same year (1904) as the *Fêtes galantes* (series two), we may observe how these very different poems inspire in Debussy a harmonic treatment quite distinct, even distant, from the crepuscular Verlaine settings. Keys are unambiguous, and though "La Grotte" and "Pour ce que Plaisance est morte" are both in the minor mode, the set is full of warm, sunlit progressions. It is natural to look to the verse for the reason: the animation of the salute to spring ("*Le Temps a laissé son Manteau*") and the dripping stillness of the cave seem to warrant positive expression. The Rondel ("Pour ce que Plaisance est morte") deals with a kind of distress, one as formalised as the poetic technique; but does not Debussy underline the sense of the refrain—"because plaisance is dead"—with a whole-tone scale (bars 4, 12, 18-19)? Since the harmonic surroundings are so benign, the implication of such a suggestion is that Debussy will hazard stylistic inconsistency in the cause of word-painting. The "point" of the rising whole-tone scale is musico-poetic, but in another way: just as the poem cycles from one refrain to the next, so the music sets off on its beautiful principal theme each time with the help of a whole-tone "lifter".⁵⁹ The poetic device of refrain finds its musical realisation in a structure of "eternal return". The true harmonic correlate of the poetic diction is the discreet use of "*quelques tournures modales et harmoniques anciennes*",⁶⁰ an observation that applies to the *Trois ballades de François Villon* (1910) as well.

⁵⁸*Musicians of Today*, trans. Mary Blaiklock (London: Kegan Paul, 1919), 242.

⁵⁹I take this term from John Blacking, "Tonal Organisation in the Music of Two Venda Initiation Schools", *Ethnomusicology* 14 (September 1970): 13. In Venda usage, the *thakula* ("lifter") is the note above the *phala* (keynote), and has a function similar to that of the European leading-note. In borrowing the term, I have widened its sense to an entire harmony.

⁶⁰Goubault, 102.

Quite as instructive is the prominence of whole-tone configurations in “Le son du Cor s’afflige”, one of the *Trois mélodies* to poems from Verlaine’s *Sagesse*, that were written in the same year as the earlier *Fêtes galantes* series. It will be remembered how small a part the whole-tone scale played in those songs and how tempting it is to attribute that to “style”. Here, in just one *mélodie*, it is suddenly in high relief, underlining the lugubrious sonnet at every turn (bars 10-11, 18-19, 26-27,⁶¹ and 30-33, where the E-flat is lacking).

Is this then a “black” song? Wenk calls it a “*chanson grise*” and points to the “absence of assertiveness in phrases like ‘une agonie on veut croire câline’ or ‘l’air a l’air d’être un soupir d’automne’ . . .”.⁶² This view seems warranted: though the whole-tone scale can sob (in bar 10, “*Qui vient mourir . . .*”), it also caresses (bars 18-19), falls like gauzy snow (bars 26-27) and quietly pulses in “*un soupir d’automne*” (bars 31-34). The textures of these passages have as much illustrative power as the harmony; the rhythmic manner is also at the heart of the song’s diffuse emotion.⁶³

Finally, the third song, “L’echelonnement des haies”, uses a whole-tone scale for two bars (bars 19-20). It would be hazardous to choose between “word-painting”—“The large sheep, as/Soft as their white fleece”—and a structural interpretation (the already familiar “lifter” to a recapitulation).

A final check from the wider perspective of form may help to illuminate this polyvalent understanding of whole-tone writing, by reinforcing it at another level. Anyone familiar with the songs will have detected a structural pattern common to a number of them, though these instances are widely separated in time.⁶⁴ The

⁶¹This is another instance of “fused style”, the whole-tone scale providing the horizontal axis, major chords (and one minor) the vertical.

⁶²*Debussy and the Poets*, 138-39.

⁶³Wenk claims that here Debussy “generally avoids the regularity of four-measure phrases and eight-measure periods without excluding them altogether” (135). This seems to me almost wholly inaccurate: besides the introductions to quatrain one (bar 1) and tercet two (bars 30-31), the song falls naturally into regular four-bar phrases and even eight-bar periods! The only irregularity is the shortening of bar 29 by one beat, an elision that helps to weld together the two tercets. Wenk seems unable to allow that sometimes the voice initiates a phrase (bar 6 with its anacrusis; bar 32, across a repeated phrase in the piano), and sometimes the piano (bar 22; bars 2-5 seem to me to constitute a phrase of their own, but they might also be regarded as part of the introduction).

In this, “Le son du Cor s’afflige” is far more regular than either of its companion pieces. What does distinguish it is the fact that, over this unexceptional phrase structure, the subdivision of the dotted crotchet beat is fluid, shifting between triple and duple, and sometimes superimposing them in a two-against-three rhythm (bars 19, 23-24, 34, 37).

⁶⁴The clearest examples are “Beau soir” (c.1880), the Wagnerian “La mort des amants” (1887, from the Baudelaire songs), “L’ombre des arbres” (1885) and “Spleen” (between 1885 and

characteristic shape, limited to through-composed songs in moderate or slow triple metre, consists of an initial section, relatively extended, in which the tempo is subjected to a subtle “ebb and flow”, and an animated surge (*peu à peu animé*, *stringendo*, etc.) that drives the music directly to a peak, a release of energy that brings the song, again sharply, to a “standstill” of both movement and dynamics. Quite apart from the explicit connections with other Debussy works,⁶⁵ this suggests the play of the sea, the swells from which a wave arises, crests and breaks, and especially the rapid subsidence of the rolling mass. One of the clearest instances is the early “Beau soir”: not only do the melodic lines (from the middle of stanza one) assume increasingly insistent undulant shapes, but the text to which the music forms its climax and *dénouement* may have provided the original inspiration for what may conveniently be termed “wave-form”:

[E]njoy the pleasure of being alive,
 While one is young and the evening is beautiful,
 For we shall go as this wave goes,—
 It, to the sea; we, to the grave.

Since wave-form is largely the preserve of the songs—“Voiles” is the closest the shorter piano pieces come to it—one feels justified in seeking a lyric basis for it. In the songs in question, the composer has located the moment of passionate intensity late in the poem and, as it were, fashioned his setting around it. This assumes the most intimate connection between poem and music. But it is equally noticeable that the apex of the wave-form can serve a variety of poetic expressions: the exaltation of “Beau soir” and “La mort des amants” is in sharp contrast both to the erotic intensity of “Les ingénus” and the melancholic “L’ombres des arbres” and “Spleen”. The more restrained L’hermite poem introduces a further dimension of elusive romantic mystery. This “serviceability” of the wave-form suggests a rather abstract relation of content and means. Yet this seeming contradiction—of intimate word/music matching versus the detached use of an effective form—can be resolved, if one is prepared to regard the form

1888, from *Ariettes oubliées*), “Les ingénus” (1904) and “Crois mon conseil, chère Climène” (1910, from *Le promenoir des deux amants*).

⁶⁵These connections—of formal proportions—have been most clearly established by Roy Howat in *Debussy in Proportion: A Musical Analysis* (Cambridge: Cambridge University Press, 1983). The particular form discussed here is related to Golden Section (GS) proportions, the peak representing what Howat terms the “primary GS” of a piece. However, while GS proportions play a comprehensive structuring role in “Spleen” (see *ibid.*, 34-36), they mark only the climax of “Beau soir” and seem to be mildly involved in “L’ombre des arbres” and “La mort des amants” (*ibid.*, 36, 38). Thus, Howat would not isolate this particular brace of songs (since not all are GS-specific); he is concerned to show GS relations among works as different as “Spleen”, “Reflets dans l’eau” and *La mer*.

(and, perforce, the particular poem associated with it) as a symbol, and the symbol as a flexible medium.

While the symbolic polyvalence of the whole-tone scale and of wave-form needs no further stressing, it is important to conclude this investigation by noting that, while wave-form relates directly to the broader human experience it synthesizes, whole-tone writing requires other associated factors (leitmotifs, contrastive harmony, instrumentation, text) to produce such a connection. That in itself suggests that wave-form is a true symbol that points to irreducible layers of emotion, while the melodic and harmonic resources of the whole-tone scale are a sort of sub-symbol, functioning at more conscious, "cathected" levels of the personality. Thus, the experience of the musical "wave" is an unambiguous, even obvious one; its force as a symbol derives from the universal phenomenon of energy gathering to overcome gravity, its upward surge, limitation, recursion and containment once again by inertia.⁶⁶ But the whole-tone scale lacks such general application; it relies on its context to feed it with symbolic possibilities.

⁶⁶John Daverio, in his review of *The Tuning of the Word: The Musico-Literary Poetics of the Symbolist Movement*, by David Michael Hertz, in *19th Century Music* 13 (Spring 1990): 259-60, notes: "The physically impossible act of **sighing toward** the sky [in the song "Soupir"] is simply a statement of the thought that lurks behind so many of Mallarmé's poems: though the poet continually strives to emulate the serene infinity of the cosmos . . . he forever falls short".

Chapter 9

Modern Scale Theory II: Messiaen

The strong claim by Xenakis for the “magnificence” of Messiaen’s contribution to outside-time structures¹ has one or two disconcerting features. While it is clear to anyone even slightly acquainted with Messiaen’s *Technique du mon langage musicale*² that the modes presented there with admirable simplicity, and the idea of non-retrogradable rhythms, are indeed explicable “outside time”, i.e. in complete abstraction from any realisation in music, their use in the hands of their inventor has been discreet and integrated with other means: seldom have they been an imperious general necessity. In Xenakis’s view this is no handicap, but he has his own opinion on the significance of these modes; unfortunately, it has never been made public.³

Yet these private convictions—or recognitions, since Xenakis, in any case, is not interested in imitating historical models, but in formalizing them—suggest a divergence of concept and realisation, or, if not a split, a partial dormancy in Messiaen’s thought. Indeed, there is a note of accusation, possibly of betrayed

¹*Formalized Music: Thought and Mathematics in Composition* (Bloomington, Ind.: University of Indiana Press, 1971) (*FM*), 208.

²Paris: Leduc, 1944; hereafter referred to as *TLM*. All references are to the English version, trans. John Satterfield (Paris: Leduc, 1956). *TLM II* indicates the volume of musical examples that accompanies the text.

³See *FM*, 267, n.11. Xenakis mentions that his own “new interpretation of Messiaen’s ‘modes of limited transpositions’” was prepared for publication in 1966, but had not been published. In a private communication (1984), he confirmed that no interpretation exists in print.

faith, in the conclusion that Messiaen has yielded to the pressure of serial music.⁴ A careful study of his works reveals no such deflection. Rather, Xenakis is giving his teacher's methods—particularly those connected with pitch organisation—a “transforming glance”, Messiaen's expression for his own appropriations of musical habits from other composers or traditions, often undertaken with little or no regard for their original contexts or functions. In this case, the glance turns out to be a little myopic.

The modes of limited transpositions⁵ are the most elaborate theoretical entity in *TLM* and appear to have been fully developed early in Messiaen's career. For reference, the seven modes and their transpositions are given in Table 9-1.

Table 9-1 “Modes à transpositions limitées”

⁴FM, 208.

⁵Both “transpositions” and “transposition” appear in the literature on Messiaen in English. In this treatment the original plural form will be used.

Their construction rests on the division of the octave into equal-sized segments, within which the intervals between notes are identically arranged. Not all the resultant possibilities are included, however, since some of them constitute classifiable chord forms (e.g. diminished seventh, augmented triad). Others are rejected on the grounds that they are only truncated versions of fuller modes. Messiaen lists four such, though there are six in all:⁶

Table 9-2 Modes Rejected by Messiaen



Modes a) and b) may be derived not only from mode 2 (as Messiaen notes) but also from modes 4, 6 and 7. Modes c) and d) similarly derive from modes 2, 4, 6 and 7, as well as 5. Mode 5 is itself a truncated form (of either 4 or 7), yet it is allowed to stand as a self-sufficient mode. “Indeed, modes 3 and 7 are the only ones which cannot be derived from any others (excepting the chromatic scale) by Messiaen’s truncation.”⁷ Mode e) is derived from 1, 2, 3 or 6, f) from 7 alone. Messiaen mentions neither of these possibilities.

If the system is not exhaustive, neither is it an entirely original creation of Messiaen’s. He acknowledges the debt to Debussy and others for the whole-tone scale, but the quite venerable history of the octotonic mode 2—sometimes fondly associated with this one composer—may be illustrated by two examples of its self-conscious use:

⁶The following details appear in D. Street, “The Modes of Limited Transposition”, *The Musical Times* 117 (October 1976): 819-23.

⁷*Ibid.*, 819.

Example 9-1 Bartók, String Quartet No. 3 (1927), coda, bars 76-83

10

The musical score is presented in two systems, each with four staves. The first system begins with a boxed measure number '10'. The top two staves are in treble clef, and the bottom two are in bass clef. The first system includes dynamics such as *meno f* and *p*, and performance instructions like *pizz. arco III*, *pizz. arco IV*, and *simile*. The second system includes *p* and *ff marcato* markings. The score concludes with a double bar line.

Example 9-2 Scriabin, Piano Sonata No. 6 (1911), bars 339-61

Note: mode: C[#] D E F G A^b B^b B
_{2²} / D^b / E^{bb} / F^b

Street offers many other instances of its earlier use—in Liszt, as well as Rimsky-Korsakov—and that of other of the modes.⁸ For the most part, these uses

⁸Ibid., 820-23. David Drew's important essay "Messiaen: A Provisional Study" (*The Score* 10 [December 1954]: 33-49; 13 [September 1955]: 59-73; 14 [December 1955]: 41-61) also mentions the unconscious use of mode 2 in music by Scriabin, Ravel, Bartók and others. The examples given here suggest anything but an unconscious use. The three parts of the essay will be referred to hereafter as Drew I, II and III.

do not show systematic applications of the modes. That, it seems, awaited an age of harmonic distress.

The heart of the present enquiry is the question of the extent to which Messiaen's use of the modes does in fact answer to a system—or, differently put, what the meaning of mode is for him. Johnson⁹ differentiates these modes from those of folksong or plainchant on the grounds of their artificiality, though the ecclesiastical modes themselves present many features of “outside-time” conception.¹⁰ In comparing them with the key system of equal temperament, he notes that “a melody which has modal harmonies associated with it could be said to be ‘coloured’ by these harmonies, rather than ‘harmonized’ in the classical sense.”¹¹ This raises the specific problem of Messiaen's colour associations, which are treated more fully later in this chapter, but also suggests that the idea of “colouration harmony”—which embraces rhythm and timbre too—displaces the former practice of functional harmony. The latter, one supposes from Johnson's discussion, involves the determination of the musical complex from the melody; the corollary would be the indivisibility of other factors from the melody. Is, then, the pre-eminent melody somehow separable from the other factors in Messiaen's case, or interchangeable in ways that are not conceivable in classical harmonization? Two remarks of Messiaen's seem to reject such a distinction:

All these investigations ought not to make us forget the natural harmony: the true, unique, voluptuously pretty by essence, willed by the melody, issued from it, pre-existent in it, having always been enclosed in it, awaiting manifestation.¹²

Is a dissonance possible with our complicated chords? Among this accumulation of “added notes” what becomes of the classical inessential notes: the pedal, passing-note, ornament and appoggiatura? They are indispensable to the expressive and contrapuntal content of the music: let us retain them while enlarging them.¹³

Precisely this enlarging is the problem. In the weird counterpoints of *ostinati* (“Les bergers” in *La nativité du Seigneur*, or “Le mystère de la Sainte Trinité” in *Les corps glorieux*, for example), critics find a poor substitute for harmonic progression, which even in Messiaen's earliest published works is deeply

⁹Robert S. Johnson, *Messiaen* (London: Dent, 1975), 16.

¹⁰For discussion of some of these, see chap. 4, “The Early Middle Ages I: Mode, Gamut, Scale”.

¹¹Johnson, 19.

¹²*TLM*, 52.

¹³*Ibid.*, 55.

eroded.¹⁴ It is not only, therefore, the composer's insistence on the continuity of music as an expressive medium in his works, but also the disconcertion of listeners at "lapses of thought" that have to be accounted for. Criticism has often been levelled at Messiaen's indulgence in saccharine harmonies at odds with the luminous chromaticism of the modes. Johnson ends up in an unsatisfactory position, claiming for the colour associations an essential subjectivity¹⁵—which suggests that they are analytically intractable—and on the other hand resorting to the term "colouration" repeatedly in his survey. Yet he defends the weaknesses felt by many against the charge of inconsistency by an appeal to the "global considerations", the complex of constituents that issues in particular harmonies. It may be that this very dilemma is summed up in Messiaen's own words:

My secret desire of enchanted gorgeousness in harmony has pushed me towards these swords of fire, those sudden stars, those flows of blue-orange lavas, those planets of turquoise, those violet shades, those garnets of long-haired arborescence, those wheelings of sounds and colours in a jumble of rainbows of which I have spoken with love in the Preface of my *Quatuor pour la fin du temps*; such a gushing out of chords should necessarily be filtered; it is the secret instinct of the natural and true harmony which, alone, can so charge itself.¹⁶

¹⁴Drew covers this problem at some length (I, 36-38), emphasizing the suspension of typical harmonic gesture rather than the superficial resemblances of quasi-tonal passages. John M. Lee's article "The Earliest Organ Works of Olivier Messiaen: A Microcosm of Stylistic Tradition", *Diapason* 71 (1980): 6-7, 12-13, also deals with the abrogation of tonality, in works from 1928, 1930 and 1932 respectively. In this limited sample, Lee points up those traits that "attest to the composer's awareness of, and ease of dealing with, earlier styles" (6). This may seem a superfluous comment in the light of Messiaen's training (Paris Conservatoire, 1919-30) and the frequency with which gifted composers allow themselves to be "influenced" by their predecessors; but he needs to make it, and repeat it, in order to reassure his reader that "within the short chronological span of four years which these pieces encompass, one may perceive a definitive stylistic evolution" (ibid.).

Yet his analysis suggests that decisive innovations (if that is what is meant by "definitive . . . evolution") have entered the scene at this early stage, a fact surely more remarkable than the presence of "reminiscences". The traditional F[#] major key signature of *Le banquet céleste* is still in use sixteen years later in *Vingt regards sur l'enfant Jésus*; yet already the "tonality" is pervaded by modes 2¹ and 2². The form of the piece, "like [that of] most of Messiaen's works, may be comprehended almost immediately" (Lee, 7). What that says about stylistic evolution is difficult to judge; at any rate, the AA' structure is a type of refrain form that Messiaen exploits throughout his career (cf. the insertion of the couplet sections between those of the "Greek triad"—*strophe*, *antistrophe*, *epode*—in "Le chocard des alpes"). Again, the form of *Diptyque* is "the manifestation of a theological concept as expressed through the manipulation of musical materials" (12). So, it may be added, is the form of "Combat de la mort et de la vie", "Le Mystère de la Sainte Trinité", "L'échange", and so on. To call canon and augmentation examples of Messiaen's "understanding of and respect for the past" is to appear quite blind to the function of such devices in his thought. The weakened tonal references are the true transition.

¹⁵Messiaen, 120, 167.

¹⁶TLM, 52.

Answering to this is his idea of the sympathy with which one ought to receive his music:

[T]o be charmed will be his [the listener's] only desire. And that is precisely what will happen, in spite of himself he will submit to the strange charm of impossibilities: a certain effect of tonal ubiquity in the non-transpositions, a certain unity of movement (where beginning and end are confused because identical) in the non-retrogradations, all things which will lead him progressively to that sort of theological rainbow which the musical language, of which we seek edification and theory, attempts to be.¹⁷

The frankly Platonic-Christian idea of “the natural and true harmony” whose appearance in this world is necessarily “filtered”, i.e. contingent and limited in certain respects, issues in an experience vaguely beatific, almost ineffable (“a certain effect”, “a certain unity”, “a sort of theological rainbow”) and decidedly mystical in tone. Messiaen has remarked that he composes prose, such as his song texts and the numerous introductions to his works, in the same way as he writes music. Indeed, the trenchant, the striking, the violent, the naive lie side by side in both.

No attempt to penetrate the attitude of Messiaen can dispense with his frequent references to Catholicism or, for that matter, take them at face value. He distinguishes “theological” from “mystical” symbolism, his own being the former, but shows quite clearly in his works that these two categories (“truths” and “visions”) overlap and give force to each other.¹⁸ It is also instructive that the majority of his works cannot be accommodated in liturgical services. The suggestion that they are actually part of the surrealistic achievement may be mentioned here. Johnson’s various references to Messiaen’s surrealism concern texts only, either set to music or used as superscriptions. An article by Adrian Evans goes beyond this in setting Messiaen in a “surrealist context”.¹⁹

Messiaen’s distinction of theological and mystical symbolism—which addresses the relation between ideas formulable in words and those in music—has

¹⁷*TLM*, 63.

¹⁸See Johnson, 40. The author’s definition of mysticism, at least in the Christian tradition, is inaccurate when comprehensible. Christian mysticism does not seek the “annihilation of being”: the union of the soul with the Divine “is one of love and will in which the distinction between Creator and creature is permanently retained” (“Mysticism”, *ODCC*, 952). That mysticism is “in its perfection . . . the contemplation of ecstasy” (Johnson, 40) is another popular idea. Ecstasies, while a frequent concomitant of mystical experience, “are not held to be essential to it, and are sometimes considered a hindrance to its proper realization” (*ODCC*, 952).

¹⁹“Olivier Messiaen in the Surrealist Context”, *Brio* 11 (Spring 1974): 2-11; 11 (Autumn 1974): 25-35.

its counterpart in his comment on the text of *Trois petites liturgies de la Présence Divine* (1943-44):

Notwithstanding its surrealistic appearances (I was at the time avidly reading the works of Paul Éluard and Pierre Reverdy), it expresses theological truths, with terms humbly borrowed from the Holy Scriptures.²⁰

The texts of the song-cycles *Poèmes pour Mi* (1936) and *Chants de terre et de ciel* (1938) exhibit the melding of surrealistic gesture and biblical acclamation even more clearly. The greater concentration of the former in *Harawi* (1945) may be a response to the earthly bias of the myth that prompted the work. Messiaen rightly insists that Catholic belief embraces erotic love as an image of the passion of divine love: the use of his customary compositional techniques in *Harawi* also suggests an undisturbed emotional response. This comparability of images is the sign, moreover, of a habit of thought native to Messiaen and detectable in many of his works: each truth—of revelation and life—exists as an essence, a core of self-sufficient potency, a “perfection” from which flows forth, in a wild and abundant radiance, colour and movement as well as sound. In other words, his imagination incorporates a pronounced visual component—of a kaleidoscopic rather than dramatic nature.²¹

²⁰Preface to the score, ii.

²¹That Messiaen is a sonic “landscape artist” of the boldest kind is clear even to the casual listener. In *Trois petites liturgies*, for instance, the commanding idea from which his creative flow begins is Divine Presence. Each piece is dedicated—in both senses of that word—to a different aspect (thus the “flow” begins)—God’s presence in all of us, God’s presence in Himself, God’s presence in all things. “These inexpressible ideas are not expressed, they remain within the organization of the dazzle of colours...” (Preface, ii). An equally clear example is *Chronochromie* (1960), the idea—maybe one should speak of the ideal—being the “colour of time”. Messiaen’s introduction to *Turangalîla-symphonie* (1946-48) captures just as economically the core of the work:

Turangalîla—pronounced with accent and prolonged sound on the last two syllables—is a Sanskrit word. Like all words belonging to ancient Oriental languages, it is very rich in meaning. Lîla literally means play, but play in the sense of divine action on the cosmos, the play of creation, of destruction and reconstruction, the play of life and death. Lîla is also love. Turanga is Time, the time which runs like a galloping horse, time which slips like sand through the hour-glass. Turanga is movement and rhythm. Turangalîla, then, signifies at one and the same time, a love song, a hymn to joy, time, movement, rhythm, life and death. (Messiaen’s sleeve-notes to the recording RCA SB 6761-2)

The nodal idea clearly has a certain diversity, but its various realisations—two “Songs of Love”, the “Garden of Love’s Sleep”, the “Joy of the Star’s Blood” (a dance of joy) and three movements called “Turangalîla”—tend to the identification of love and joy, “a superhuman joy which transcends everything, overflowing, blinding, boundless. Love is presented under the same aspect—a fatal, irresistible love, which transcends everything outside itself, a love such as is symbolized by the love potion of Tristan and Isolde” (ibid.).

While the twin themes of Christian devotion and erotic love are mingled in the two early song cycles dedicated to Messiaen’s first wife, Claire Delbos, in the wider context of his *oeuvre*

The lack of dramatic attitude—of true interplay among “actors”—finds its expression, for example, in the absence of human elements in landscapes. Consider the scenario of “Jardin du sommeil d’amour”:

Two lovers are wrapped in the sleep of love. A landscape has issued from them. The garden that surrounds them is called Tristan; the garden that surrounds them is called Isolde. This garden is full of shadows and lights, of plants and new flowers, of melodious birds of bright colours.²²

The significance of the birds that populate Messiaen’s deserted forests and gardens, canyons and abysses, becomes clearer. They are a transfigured embodiment of human qualities—models, perfections, abstractions. “If you want symbols . . . the bird is the symbol of freedom. We walk, he flies. We make war, he sings.”²³ Messiaen also looks on birdsong as a “symbol of heavenly joy”:²⁴ it reveals part of a transcendental splendour. No different in this respect is his recollection of childhood:

In my childhood, when I was reading Shakespeare, I made some theatre sets in a way that linked with my love for stained glass: as a backcloth I used cellophane which I found in sweet boxes or in cake containers and I would brush it with Chinese ink or just water-colours; then I placed my décors in front of a window-pane and the sun passing through the coloured cellophane would produce luminous and coloured projections on the floor of my little theatre as well as on the *dramatis personae*. Thus I managed to transform my décors just as an electrician controls lighting in a theatre.²⁵

A correlative of this strong visualizing is the role of the eye in the song texts. Despite the surrealist dislocations of meaning, its symbolic function is clear: it stands for the poet himself, not as “personality”, but as instrument of love and site of grace:

L’oeil immobile, sans denouer ton regard,[c’est] moi.²⁶

Other souls, too, are represented by the eye:

they appear to function as two separate germinators. Johnson’s attempt to specify the parallels between divine love and its “emanations” (77) approaches theological absurdity: he claims that Messiaen has left these “Tristan” works empty of Christian symbols so that connections might not be drawn between the love potion and the crucified Christ.

²²Sleeve notes to the recording of *Turangalila-symphonie*, RCA SB 6761-2.

²³Translation in Trevor Hold, “Messiaen’s Birds”, *Music and Letters* 52 (April 1971): 113-22, of Messiaen’s words, quoted in A. Golea, *Rencontres avec Olivier Messiaen*, (Paris: Julliard, 1961), 19.

²⁴Claude Samuel, *Conversations with Olivier Messiaen*, trans. Felix Aprahamian (London: Stainer and Bell, 1976), 96.

²⁵*Ibid.*, 17-18.

²⁶“La ville qui dort”, *Harawi*, No. 1.

Ton oeil de terre, mon oeil de terre, nos mains de terre
Pour tisser l'atmosphère . . .²⁷

Son oeil est désert,
lumière en secret.²⁸

There is in Messiaen also a counter-movement to this pervasive “arborescence” of thought: the “organisation of colours”, which can be seen to interfere occasionally with the more playful and fantastic tendencies. The form of works—by this is meant no more than their sectional outlines—wavers between reasonably simple binary and ternary structures (as listed in *TLM*, chap. 11) and the less well-dressed “strophic” forms, whose roots lie in “Variations of the First Theme, Separated by Developments of the Second”.²⁹

²⁷“Bail avec Mi”, *Chants de terre et de ciel*, No. 1.

²⁸“L’escalier redit, gestes du soleil”, *Harawi*, No. 9.

At the risk of seeming over-critical, I mention other indicators of the essentially non-dramatic nature of Messiaen’s work. His illustration of rhythmic processes (augmentation, diminution on either side of a constant value) inadvertently reveals a conception unusually rigid in so fragrant a sensibility:

Let us imagine a scene in a play: three characters are on the stage. The first acts; it is he who guides the scene. The second is moved, acted upon by the first. The third watches the conflict without intervening; he observes but does not stir. In the same way, three rhythmic groups are presented. The first augments; that is the character who attacks. The second diminishes; that is the character attacked. The third never changes; that is the motionless character. (Sleeve-notes to the recording of *Turangalila-symphonie*)

This could as well represent the observation of a chemical reaction. A more recent demonstration, of enormous proportions, is Messiaen’s refusal to write an opera at the commission of Rolf Lieberman. He at first refused to write anything at all, and finally delivered himself of *Saint Francois d’Assise (Scènes franciscaines)*, written between 1975 and 1983. His explanation—“des scènes qui montrent les différents aspects de la Grâce dans l’âme de Saint Françoise”—links the conception, despite its narrative dimension, to those works devoted to “aspects”, in particular, *L’ascension* (1933), *La nativité du Seigneur* (1936), *Visions de l’amen* (1943) and *Vingt regards* (1944). Two of the early reviews registered a special response to the appearance of the leper (Tableau 4). “One of the few moving parts of the opera was the portrayal of the Saint’s repugnance at the sight of this man, which he finally overcomes; the leper is then miraculously healed” (Raymond Head, in *Tempo* 148 [March 1984]: 19-20). See also the short review by Kenneth Lovelaw in *Music and Musicians* 24 (February 1984): 24. The suggestions of two characters, one “guiding the scene”, the other “acted upon” may or may not be coincidental.

Jann Pasler, (“St Francis at the Opéra”, *The Musical Times* 125 [March 1984]: 149-51) adopts the view that Messiaen is working in a Wagnerian manner in his presentation of “religious emotion in an anti-dramatic form”. For him, the fifth and sixth tableaux are central: “After exploiting the human aspects of his drama, the opposition and reconciliation of man with his fellow men, Messiaen places human existence in confrontation with the divine and then the animal” (150). His complaint is levelled at the inordinate repetition involved in recounting the central ideas of the scenario: “the return of associated themes does not always serve a musical purpose, nor is there always an attempt to integrate these themes” (151).

²⁹*TLM*, 42.

The significant point about this is the fact that it is a compositional procedure rather than a form and so allows of a great deal of variation and flexibility in its application. By alternating the treatment of two different musical ideas Messiaen achieves a sense of continuity and growth across the contrasting sections of the form.³⁰

The idea of using strophe, antistrophe and epode entered Messiaen's work in the late fifties. "Le chocard des alpes", the first piece in the *Catalogue d'oiseaux* (1956-58, hereafter *CO*), proves that these venerable characteristics of the Greek lyric ode are receiving a typical "transforming glance". First, the sections are constructed along near-identical lines using note-rows, "*personnages rythmiques*", and stark two- and three-part chords in Messiaen's best granitic style. Although the antistrophe is slightly differentiated from the other two sections, nothing suggests that he wishes to honour the originally quite different nature of the epode from the strophe and antistrophe.³¹ The insertion of two important couplets, containing the birdsongs, completes the transformation of the lyric ode form into an arch-form; it reappears in "Le merle de roche" (*CO*, Book 6).

Chronochromie, by contrast, emphasizes the alternation of strophe I and antistrophe I, strophe II and antistrophe II, the two components being quite distinct. The epode which crowns the ode appears here as an aviary of ornamental counterpoint which, rather than being a concluding gesture, itself requires the completion supplied by its coda. It is hard to see why the designations are important, other than as formal punctuation of the musical extension. Not only does the experience of the works fail to confirm any obvious link between Greek lyric art and Messiaen's forms, but his Greek rhythms, too, invariably combine to create a suspension of impulse—the arrest of the "turning".³² His colourations provide no special release either. All this serves his

³⁰Johnson, 23.

³¹The Greek meaning of strophe, "turning", refers to its place in the drama: "the Chorus chanted it while moving from one side of the stage to the other. It was followed by the antistrophe, a reverse movement, and then by the epode of a different metrical structure which was chanted by the chorus when standing still" (J. A. Cuddon, *A Dictionary of Literary Terms*, rev. ed., The Language Library [London: André Deutsch, 1979], 662). Johnson takes the use of these words as his cue to assemble all the other pieces in *CO* under their terms, though the composer actually uses them only for the first piece. No harm is done, provided their new meanings are made clear. On the evidence of his analysis, Messiaen intends them to mean nothing more than "stanza" or "division".

³²Drew (II, 72) describes the counterpoint of juxtaposed ostinati of disparate quantity (in *Quatuor pour le fin du temps*, I) as "decorative", with which the kinetic nature of Bachian counterpoint may be contrasted.

purpose as a contemplative artist. Then, like his birds, he is a rhapsodist, whose hand in the formal mosaic is surest when it is lightest.

Another “aspect” of Messiaen is summarised in one of his conversations with Samuel in an aside:

As a Catholic I should have no right to speak of magic; but let’s admit, it’s not devoid of interest. I’m not speaking of black magic and of the people who cast spells—that’s not just a joke—but there does exist a white magic, and that’s a symbolical quest for the power of language, sounds or colours, for the influence of certain things we own or which surround us.³³

A symbolical quest for the power of language describes far more than just the aspirations of the surrealist poets: symbolist writings are full of references to the “power of the word” and the means to increase it.³⁴ But the taste of the surrealists is an obvious confirmation of Messiaen’s desires. Reverdy in an early writing³⁵ speaks of the image of his seeking (in which one may see a bridge to the more widely-known surrealism of the painters):

The image is a pure creation of the spirit. It cannot be born of a comparison but of the bringing together of two realities which are more or less remote. The more distant and just the relationship of these conjoined realities, the stronger the image—the more emotive power and poetic reality it will have.

Messiaen’s own “theory” of the power of musical means is expressed in the phrase “the charm of impossibilities”. “I’ve always thought that a technical process would possess much more power—and (reverting to magic) a quasi-occult power—the more it came up, in its very essence, against an insuperable obstacle.”³⁶

The surrealist movement, however, moved on from theories about images to debates about “art and life” and even “life or suicide”. These indicated the irritability pervading the modern sensibility of these artists—by “modern” must be understood the tradition of mental restlessness and frustration so finely begun by Romantic spirits—which expressed itself rather vaguely as the desire to breach the separation of art from life, “truly to put an end to metaphor”.³⁷ More

³³*Conversations*, 20-21.

³⁴Bely’s famous essay is forthrightly titled “The Magic of Words” (see *Symbolism: An Anthology*, ed. T. G. West [London: Methuen, 1980], 121-43).

³⁵“L’image”, article published in his magazine *Nord-Sud* in 1918. The following passage appears in translation in Patrick Waldberg, *Surrealism* (London: Thames and Hudson, 1965), 22.

³⁶*Conversations*, 21.

³⁷The phrase is Maurice Nadeau’s, from his *A History of Surrealism*, trans. Richard Howard (London: Jonathan Cape, 1964), 230.

precisely, and more conveniently, it took the form of rejection of any attitude that could be labelled “bourgeois” or “patriotic”. Before long, an ideal supplanted this rather nihilistic tendency and the political modality of surrealism formed itself in relation to the international communist movement. Another branch, more closely tied to the early experiments with automatic writing and dream images, championed its members’ psychoanalytical interests. Some artists sought to straddle both. There is manifestly no Christian version of surrealism; Messiaen appears as a Christian whose beliefs do not debar him from experiencing the broadest forces that shape the art of his times.

In a sense, the “insuperable obstacle” before any composer is the flight of time. The masterpieces of music react with the passage of time in different ways, either tracking and reflecting it or distorting it. This, at least, is the view—Pierre Souvtchinsky’s—which Stravinsky presents,³⁸ and which divides music into the kind that “evolves parallel to the process of ontological real time” and that “which dislocates the centers of attraction and gravity and sets itself up in the unstable.”³⁹ Drew regards Messiaen’s technique to be that of “autonomous rhythm”; Stravinsky, he holds, moves from “autonomous rhythm” (*The Rite of Spring*) to follow the flow of ontological time (the Stravinsky of 1955).⁴⁰

There can be no doubt that Messiaen has had a leading part in the assault on traditional concepts of musical time in the last fifty years. He has himself spoken of contributing to “the end of musical time based on the equal durational divisions of classical music”.⁴¹ His is not the only renovation in this area, but his

³⁸*Poetics of Music*, trans. Arthur Knodel and Ingolf Dahl (New York: Random House, 1947), 31-34.

³⁹*Ibid.*, 32.

⁴⁰Drew II, 69.

⁴¹See Johnson, 62, n.3. His is not the only renovation in this area. Though Stockhausen’s immediate categories do not resemble Messiaen’s, there are some significant coincidences in the philosophy and compositional implications of *Momente-form*:

Each Moment, whether a state or a process, is individual and self-regulated, and able to sustain an independent existence. The musical events do not take a fixed course between a determined beginning and an inevitable ending, and the moments are not merely consequents of what precedes them and antecedents of what follows; rather the concentration on the NOW—on every NOW—as if it were a vertical slice dominating over any horizontal conception of time and reaching into timelessness which I call eternity: an eternity which does not begin at the end of time, but is attainable at every Moment.

(Trans. Roger Smalley, in “‘Momente’: Material for the Listener and Performer”, *The Musical Times* 115 [January 1974]: 23-26; original: “Erfindung und Entdeckung”, in *Texte*, by Karlheinz Stockhausen, 3 vols. [Cologne: M. Dumont Schauberg, 1963-71], 1:250)

Smalley notes that *Momente-form* itself

practice certainly bears its own interpretations. Williams⁴² concludes that Messiaen's art is that of juxtaposition, this being the common factor between, on the one hand, Claudel's view of metaphor and the related surrealist practice of juxtaposing "mutually distant realities" and, on the other, the Aristotelian-Thomistic idea of time as "the number of motions relative before and after."

This phrase from Aristotle's *Physics* invites at least the following comment:

Number here appears to mean what is numbered. The now is borne along with the moveable as a point may be regarded as moving and making up a line. So in a sense there is only one now, though in another sense there are many nows. . . . [It is a] very unsatisfactory metaphor. . . . [T]here seems no reason to think that Aristotle was really clear as to the distinction between time and motion.⁴³

Whether or not Aquinas's version of the same idea is any clearer, it does suggest an important correspondence with Messiaen's imagination:

He [Aquinas] draws a distinction between the time in which angels perform their acts and that in which men and matter operate. The time of angels is discrete, that of men continuous; the difference arises from the fact that continuity is essentially connected with matter, while

arises from the totality of possibilities inherent in the diverse materials which the composer brings together for each particular work. It follows, therefore, that a composer must be aware of all the potentialities of his musical material before he actually begins to notate the score. . . . A composer is no longer in the position of beginning from a fixed point in time and moving forwards from it; rather he is moving in all directions within a materially circumscribed world.

("Momente", 26-27)

The "vertical slice dominating over any horizontal conception of time and reaching into timelessness" corresponds very closely to the attempts on Messiaen's part to transcend "ontological time"; the "individual and self-regulated" Moments bear a certain resemblance to what might be called "rhythmic acts" (see below, 224), and the practice of selection from pre-formulated material is a feature of Messiaen's approach. However, Messiaen differs radically from Stockhausen in the reason for his particular "time-frame". Stockhausen's inspiration comes from "polyvalencies" that dissolve bipolar values. His early monistic creed is still present when he confesses: "It's difficult, isn't it, but ultimately I want to integrate everything" (*Stockhausen: Conversations with the Composer*, ed. J. Cott [London: Robson, 1974], 79). It is precisely by forcing his material against its limits that Messiaen feels its potency. Stockhausen's "everything"—his omnivorousness—requires the undirected mysticism that plays so large a part in his works, since this unformed timelessness ("no fixed course between a determined beginning and an inevitable ending") is the only way to avoid contraries. The nature of Messiaen's outlook is far more difficult to typify. His eclecticism implies selectivity. His Platonism inclines him towards essences, his Aristotelian streak towards the existence beyond flux. His Christianity emphasizes a cosmic vision rather than an incarnated one. Such are his aspects.

⁴²G. Williams, "The Theories of Olivier Messiaen: Their Origins and Their Application to His Piano Music", *Miscellanea Musicologica* 11 (1980): 278-80.

⁴³C. D. Broad, "Time", *Hastings Encyclopedia of Religion and Ethics*, 12:344.

angels are separated substances. An instant for an angel is the time occupied by a single act; it may thus correspond to a long period in our time.⁴⁴

The possibility of identifying human and angelic time with Souvtchinsky's ontological and psychological time is a tempting one. Just as important is the notion of time defined by a "single act": rather than the psychological suspension of time, one might speak more positively of works or sections of works as "rhythmic acts", discrete, self-contained, defining the present instant by its prolongation. The musical juxtapositions, both horizontal and vertical, are then instruments of the conception in which an ideal rhythm analogous to the "ideal harmony" disbursts itself through "filters", and reveals the "colour of time". At present, this cannot be checked against Messiaen's long-promised *Traité rythmé*, but it answers to his insistence in *TLM* that harmony and rhythm are related by analogy, and perform the same way in "space" as in time. The actual compositional relation may be demonstrated by an investigation of the term under which both elements are grouped—mode.⁴⁵

Johnson commends the idea that the coherence in Messiaen's later works may be explained by a "concept of mode".⁴⁶ "Broad concept" would be better, since it is a generalised form of several separate evidences of modality, listed as:

- a) the modes of limited transpositions;
- b) the modal use of rhythm;
- c) the more complex melodic modes;
- d) the "mode of values and intensities";
- e) the mode of "statistical equality".

Each of these refers to a distinct manner of writing in the works, but the principles specific to the various "mode" forms are far less clear. The general arrangement of the modes of limited transpositions has been given already: while Johnson might in their case have emphasized the process of selecting a

⁴⁴Ibid.

⁴⁵The marriage of harmony and rhythm now moves into the foreground of this purview, but we ought not to forget the assertion at the start of *TLM* that melody is supreme (but cf. 237, n.70). The question is: which melody? Again, it seems to be an isolated reality, evading capture by both "decoration" and "expression", a fecund cumulus to be sensed in the vocalises and roulades, as well as in the "fused" style of "coloured" passages (see 236). The question that arises is that of limits—to the ideas of melody, of "perfect harmony", of mode—and the actual interference of one factor with another in their common realization. Messiaen himself knows the difficulties of claiming a "work" in our time. "Which are the works of the twentieth century? Have I myself written a single work? Time, again, will settle all that" (quoted in the sleeve-notes to the recording of *Chronochromie* [EMI ASD 639]).

⁴⁶Johnson, 137, in his discussion of *CO*.

determinate grouping of notes from a larger aggregate (a pre-compositional act, in one sense), he prefers to stress their “colouring” purpose. Likewise, when he decides that the rhythmic pedals of “Liturgie de cristal” provide the movement with colouration rather than definition of structure, he dubs this a “modal” use of rhythm.⁴⁷ The separation of rhythm from melody, in the manner of the medieval *talea* and *color*, and the remarkable non-retrogradable succession in the cello part may not be the subtlest of gestures, but to dismiss them from the structural agglomeration seems an unfounded step:

Example 9-3 *Quatuor pour le fin du temps*, “Liturgie de cristal”, cello part

Note: The numbered brackets show a series of interlocked non-retrogradable “phrases”, whose midpoints are marked || for odd-numbered and ||| for even-numbered ones. The F-naturals marked * indicate the midpoints of a second-order non-retrogradability, which lie exactly halfway between the first-order midpoints. The centre of the entire palindrome (which excludes the final

⁴⁷Ibid., 63. Messiaen’s own analysis of the cello part (bars 2-8) makes two points: that it contains two non-retrogradable cells, A and B (the latter’s central value is bracketed); and that it contains an independent five-note melodic pedal (shown here by dotted lines):

Example 9-a Non-retrogradable Rhythms in Cello Part, bars 2-8 (*TLM*, 26)

F-sharp minim) is at Δ . Measured by the established pattern, the B-flat marked † (bars 32-33) has an erroneous time-value: it ought to be a quaver. The whole part is played as artificial harmonics, sounding two octaves higher. Messiaen himself makes no reference to these interrelations.

The “more complex melodic modes” is Johnson’s description of the melismas, in the manner of plainchant, in “Antienne du silence” (*Chants de terre et de ciel*, No. 2). The chosen mode (mode 7) lacks two of its notes and employs one foreign one: also important, “the melodic behaviour of the various notes of the modes becomes specialized so that the mode is best described by a melodic formula rather than by a scale”,⁴⁸ i.e. the mode may approach the chromatic total without losing its character. Johnson mentions plainsong and the rāgas of classical Indian music as related melodic practices, yet he passes over birdsong in silence. In view of its later preponderance—quite unseating the plainchant-type writing—this is a strange omission.

The “mode of values and intensities” refers to the piece of that name and its pre-ordering of pitches, durations, dynamics and, to a less comprehensive degree, attacks, according to a “subharmonic series of proportions”.⁴⁹ According to Johnson, it is the fact that each note (i.e. pitch) is “characterized according to its place in the range of duration, intensity and attack, and not by its position in relation to the other notes” (as in serial music) that qualifies this compositional technique as a “mode”.⁵⁰ This seems to mean that pre-ordering extends to parameters formerly treated freely, but also abolishes predetermined associations

⁴⁸Messiaen, 59.

⁴⁹This is Stockhausen’s terminology for the “added value” series ♩, ♪, ♫, ♮, etc. (“... how time passes . . .”, *die reihe 3* [1957; English translation 1959]: 13). However, he is dissatisfied with a simple identification of twelve different durations with the twelve chromatic notes. If the octave is divided logarithmically, then so should ♩ and ♪, or ♪ and ♫, etc. Accordingly, Messiaen’s pitches should logically follow a series of decreasing proportions (1/2, 2/3, 3/4, etc.). In fact, they do the opposite:

Figure 9-a Added-Value Series Aligned with “Sub-harmonic” Series



The reason would appear to be the capacity of the instrument, on which lower tones quite naturally outlast higher ones.

⁵⁰Messiaen, 106.

of pitches. How this advances from “determinate groupings of notes” or groupings “best described by a melodic formula” is by no means obvious.

The mode of “statistical equality”⁵¹ is a blanket term for Messiaen’s compositions that use twelve-note series. Not only are the notes differently arranged for each twelve-note set, but often the sets are overlapped. *Livre d’orgue* is exceptional in keeping its sets perfectly distinct. The outcome is that “all the notes of the chromatic scale are treated equally so that no one predominates as a modal dominant or final”.⁵² The ideal of avoiding dominants and finals is curiously anachronistic; besides, Messiaen is quite capable of doing that—or its opposite—with the modes of limited transposition.⁵³ Messiaen uses twelve-note styles in ways that relate closely to the earlier modes.⁵⁴

Finally, Johnson arrives at a “definition” of mode at its most generalized—and its least useful: “the idea of shape or morphology (applied to pitch), rhythmic characteristics, texture, register, intensity and tempo as all playing a part”.⁵⁵ By this means, he characterizes the “modes” of *CO*.⁵⁶ The very piece has become the mode, and the term has emptied itself of every drop of meaning.

⁵¹Ibid., 113.

⁵²Ibid., 135.

⁵³Why Messiaen should be interested in “dominants and finals” is itself a mystery. That he weakens dominant-tonic relations (among others) in his early works has been mentioned; he appears to have found substitutes for these in modal transpositions (see the preface of *Trois petites liturgies*, 5, where each transposition “affects” a primary function in A major—mode 2¹ serving for the tonic, 2² for the dominant and 2³ for the subdominant).

⁵⁴See below, 241.

⁵⁵Messiaen, 138.

⁵⁶For example:

- | | | |
|--|---|---|
| (ibid., 141) <i>Le chocard des alpes</i> | : | “atonal, dissonant, violent”; |
| (ibid., 152) <i>La bouscarle</i> | : | “opposition of dissonance and tonality, violence and calm”; |
| (ibid., 156) <i>Le traquet rieur</i> | : | “A major, ecstatic and intense; predominantly homophonic with contrast of thinner texture of black-eared wheatear and spectacled warbler; interruptions of strophes by herring gulls and black-eared wheatear”. |

By this reckoning, *Le chocard* (alpine chough) shares a mode with *Pierrot Lunaire*, and *La bouscarle* (Cetti’s warbler) with the more colourful Renaissance chromatic practices. As for the third, one is thankful for “A major”! This is pseudo-analysis.

The omission of a direct reference to harmony in his definition seems significant, in view of the fact that the three examples cited depend fundamentally on traditional harmonic resources for their effect. One’s desire to be disputatious is only increased by Johnson’s claim that his book is not a “critical” study (7): even as an expository survey, it is unaccountably casual in its treatment of key ideas like “mode”, “surrealism” and “colour”.

Example 9-4 Turangalila-symphonie, "Turangalila I", rehearsal no. 6

6 Très modéré (♩ = 84)

1^{re} Fl. *p*

1^{re} Htb. Solo

W. bl. CENTRAL VALUE

Marac. 2 x *mf*

Gr. caisse *mf* Marac. *mf* Gr. caisse 2 x *mf*

Célesta *pp*

Vibr. *pp*

Piano *pp*

1^{er} Voa Solo

2 C.B. Soli (pizz.) 1. (pizz.) *pp*

gliss. *p*

7

1^{re} Fl. *p*

1^{re} Htb. *p*

1^{re} Clar. La *p*

W. bl. Maracas 2 x *mf* Marac. 2 x *mf*

Marac. Gr. Caisse *mf* 2 x *mf*

Célesta *pp*

Vibr. *pp*

Piano *pp*

1^{er} Voa Solo *gliss.* *p*

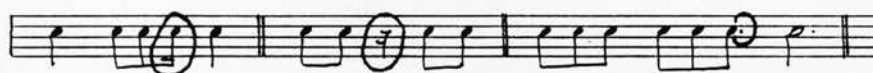
* glissando long prenant toute la valeur de la note. Même chose aux passages similaires.

They meet in the superimposition of a rhythm (on maracas) with its retrograde form (on bass drum). Here, however, there is an unchanging rhythm (on woodblock) set between them: these three elements answer to the requirements of a non-retrogradable rhythm: “[A]ll rhythms divisible into two groups, one of which is the retrograde of the other, with a central common **value**, are non-retrogradable”.⁵⁷

As Forster puts it,⁵⁸ “to reconcile this form as a vertical non-retrogradability with the definition of non-retrogradable rhythms requires only the extension of the concept ‘rhythm’ as a succession of specific durations to general rhythmic structures”. It is at this level that the “rhythmic act” as a discrete operation comes into its own.

The roots of mode lie in Messiaen’s parametrical thought, his effort to balance the materials of pitch and duration by conscious analogies. In his thinking, this isolation of elements is presaged in Machaut’s isorhythmic technique. Messiaen’s materials are determined, moreover, in terms of a strict symmetry, best demonstrated by tracing the pattern of his rhythmic approach. The small note value (most often ♪ or ♪) and its free multiplication underlie all other operations; the reservoir of possibilities is drawn on according to three main principles:

- a) the addition of small values—a constructional principle:




- b) the augmentation or diminution of rhythms—a variational principle;
 c) non-retrogradability, incorporating both a constructive and a variational principle.

Superimposition of rhythms rather than their isolation prevails in practice. The consequence is that rhythm consists either in a “paraphrase of [the] material” (to be used in a work) or a “fixed order of material”:

⁵⁷TLM, 20.

⁵⁸Max Forster, *Technik modaler Komposition bei Olivier Messiaen*, Tübinger Beiträge zur Musikwissenschaft, vol. 4 (Neuhausen-Stuttgart: Hänssler, 1976), 67. This most thorough investigation will be referred to in greater detail. It is surprisingly omitted from Boucourechliev’s bibliography in “Messiaen”, *NG* 12:210.

The use of a material aggregate of tone durations as a mode applies to the cases in which material is selected for the composition according to the basic principles. The mode is then all multiples of the smallest value encountered.⁵⁹

In this way, what appears in the music as a freely formed line may be considered to be written in a semiquaver mode (for example), if that is its smallest value. Thus, a mode of twittering  “colours” the music by presenting the basis of the mode to the ear with sufficient prominence to impress the modal root on it. On the other hand, if ostinatos are the basis of the structure, then the rhythmic orderings of the ostinatos constitute the mode.

All this applies also to pitch, mode representing either the notes of one of the seven modes or a specific note formula.⁶⁰ But in what way is pitch determined by analogy with rhythm? In the first place, Messiaen proposes a “melodicism” shaped according to the traditional categories “Upbeat–Accent–Termination”.⁶¹ Its counterpart in rhythm, using primarily added values, is “Rhythmic preparation–Accent–Rhythmic descent”.⁶² (Another apparent reference to tradition is the ability of the modes to create tonal effects. As Forster remarks,⁶³ these rather superficial links make traditional forms a “special case” within Messiaen’s system of thought.)

The severely arithmetical processes involved in the rhythmic manipulations have parallel outworkings in pitch arrangements. The cadence formula for mode 2 incorporates features of second-mode construction:

⁵⁹Forster, 36.

⁶⁰Forster points out (36) the correspondence between these two views and the twofold meaning of *modus* in medieval theory, as indicating either an octave species (with the later additional idea of a *finalis*) or an interval (*semitonus, tonus, semiditonus*, etc.).

⁶¹*TLM*, 55-56.

⁶²*Ibid.*, 17.

⁶³*Technik*, 37-38.

Figure 9-2 Mode 2 Cadence Formula (TLM II, 50)



Note: Over the pedal B-flat, the inner parts rise through semitone-tone and tone-semitone respectively, outlining the intervals of the mode 2 segments. The frame notes—B-flat and A—complete the mode 2 compass. The melodic formula, D-flat-C-E-flat, also makes up a mode segment.

Further, from all the overtones detected by a “very fine ear” in the resonance of a low C,⁶⁴ Messiaen constructs a chord that comprises all the notes of mode 3; and two diminished seventh chords a semitone apart (one an octave displaced) yield all the notes of mode 2 (given here in its second transposition):

Figure 9-3 Chord of Resonance and Compound Chord (TLM II, 37, 50)



As an example of a horizontally constructed note formula, Forster cites the piano chords in the third movement of *Trois petites liturgies*.⁶⁵ Written in mode 2², they appear as a succession of major and minor chords (A# and C# read as B^b and D^b):

⁶⁴TLM, 50.

⁶⁵*Technik*, 44-45.

Table 9-4 Chord Positions (Figuring)

E	B ^b	E	B ^b	E	b ^b	G	c [#]	G	b ^b	E	B ^b	b ^b
5	6	6	5	6	6	6	6	6	6	6	5	6
3	4		3	4	6	4		4	6	4	3	4

Thus, the “regularity” of employing all the mode notes is outweighed by that of employing all triad positions: “the formulaicism of the subject matter, carried over into the composition, is not breached”.⁶⁶

At the larger structural level, pitches are also organised according to the categories “paraphrase of material” and “strict order of material”. Freely formed melodic/harmonic complexes will make use of the pitch-modes, often superimposing various modes or their transpositions. Superimpositions may well be built into what Messiaen calls “pedal groups”, i.e. a melodic or melodic/harmonic ostinato repeated without reference to the surrounding figures (cf. the “color”), but here, as in the rhythmic ostinatos, the mode is an unchanging order of notes (see, for example, *La nativité du Seigneur*—No. 5, “Les enfants de Dieu”). The slightly awkward designation “melodic/harmonic” has the value of reminding the student of Messiaen’s music that the “rules” of melody can also be applied to harmony, or to both elements together. Thus there are both “beloved melodic contours”—formulas, in effect⁶⁷—and typical chords (such as the “chord of resonance”, the “chord on the dominant”, the “chord in fourths”, all of which exhaust all the pitch possibilities of various scales, respectively, mode 3, the major scale and mode 5). In addition to the cadence formula quoted above, in which melodic and harmonic considerations are both influential, one might raise the nature imagery of *CO* and the use of birdsong in the later works where its “codification” is marked.⁶⁸

⁶⁶Ibid., 45.

⁶⁷*TLM*, 31-32.

⁶⁸In his study of “Messiaen’s birds” (see n.23), Trevor Hold has criticized Messiaen’s claims to authenticity in the transcriptions of birdsong, the composer’s remarks on necessary adjustments (*Conversations*, 62) being taken into account. In questioning, too, the symbolic basis of Messiaen’s obsession with birdsong, Hold points out that such “authentic” elements as “patterns of short ostinato phrases and the superimposition of contrasting strata of sound” are long-established habits with the composer (“Messiaen’s Birds”, 122). He admits that in some cases the general shape of the song might be reproduced. This implies a degree of pre-ordained structure which, in the light of the composer’s claim, must be read as an attempt accurately to reproduce a natural model. However, our present concern is mainly with the use of songs as a sort of leitmotif, rather than with their authenticity.

In fact, the later works are of the greatest importance in revealing the constants in Messiaen's musical imagination. By reviewing a group of compositions from the 1960s and 1970s, it is possible not only to gauge the diversity of elements in his mature technical repertoire, but also to trace what has survived and what has been shed from earlier works.

A point of great significance is the evolution of his monodic style. The importance of monody in his writing is self-evident: it is the argument of this essay that a "single voice" represents for Messiaen a heightening both of sound and of what it may symbolize. He is drawn repeatedly to the concentrated expression—the symbolic distillation—of unaccompanied melody, whether it owes its atmosphere to plainchant or to birdsong.

It may be appropriate here to consider Debussy's possible influence—not simply to confirm the observation that Messiaen's piano writing, in its disposition on the keyboard, often resembles Debussy's, but in order to draw a parallel between their attitudes to melody. The use of pure monody stamps each composer's style in a particular way. Debussy's is succinct and often opens a work, that is, grows out of silence as a kernel of suggestion; then it is taken up in a play of harmonies—its allusions, as it were, are unravelled. Messiaen's monody tends to far greater amplification of its elements. At least, it seldom offers itself as a possibility for integration; rather, it might reappear superimposed upon other, self-contained ideas. Birdsong is self-sufficient monody at its most exemplary, and is "harmonized" in the later works in ways that are both similar to and different from Debussy's.

Broadly speaking, there is in both composers a striking extension of pure monody to what might be called "compound monody", or "sonorized melody", in which harmony appears without harmonic "functions" but rather with the aim of creating a dimension of "resonance", "colour" or, as Messiaen likes to put it, "halo". (He applies this to particularly delicate aureoles of sound, but the same principle applies in chords scored with one conspicuous degree and a penumbra of harmony.) The point is that both composers use a parallelism of mode which, allied to the unimportance of the harmonic direction, creates a monody in layers; in its developed forms, Messiaen's concentration of melody-in-parts might be termed "fused style", i.e. a style in which a harmony (and orchestration) of colour is fused with a primary melodic shape.⁶⁹ The supremacy of melody dictates the form of harmony and orchestration, and draws the harmony through the modal

⁶⁹Besides the examples offered below (Appendix 4), a characterization of "fused style" may be found in chap. 8, n.54.

filter along the path of the melody. In this respect, Debussy's style is very similar. The comparative table of examples (see Appendix 4) attempts to show this major alignment.

A variation of this procedure that is, to my knowledge, exclusively Messiaen's is the practice of "colouring" rhythms. (Are his borrowed rhythms those of songs, i.e. are they abstracted from melody? In their Greek and Indian contexts, Messiaen's rhythmic formulae conceivably were an element of melody. But, as this analysis has stressed, Messiaen prefers to think parametrically: therefore, rhythm remains rhythm. In the orchestral works, this is true in the most literal sense: rhythmic parts are often played by untuned percussion instruments and coloured by block chords on traditionally lyrical instruments.) *Chronochromie*, discussed more fully on 262, offers a clear example of the "primary melodic shape" being supplied by a succession of rhythmic values. This confirms the persistence, in a formalized way, of the idea of "chromatic rhythm" (used strictly in *Mode de valeurs et d'intensités* and more freely in this motif from *Turangalîla-symphonie*):

Example 9-6 Turangalîla-symphonie, Introduction, rehearsal no. 7



It also confirms the parametric equality of pitches and time-values. This fact explains why, having once declared melody to be supreme, Messiaen can go on to say: "Let us not forget that the first, essential element in music is Rhythm, and that Rhythm is first and foremost the change of number and duration".⁷⁰

At this point, the ambiguities involved in Messiaen's use of terms such as "melody" and "harmony" may be clarified. Messiaen appears in *TLM* to be re-interpreting traditional ideas, "enlarging" but never rejecting them.⁷¹ However, all the borrowings—whether from East or West—from tradition or contemporary styles pass "through the deforming prism of our language.... Fantasy and

⁷⁰"Lecture in Brussels", quoted in Johnson, 32.

⁷¹See above, 214.

research will be united to destroy the least resemblance to the model".⁷² He writes further: "Let us always work melodically; rhythm remains pliant and gives precedence to melodic development, the harmony chosen being the 'true', that is to say, wanted by the melody and the outcome of it".⁷³

This credo, written around 1944, must be read in the light of the composer's subsequent work, as well as the earlier offerings that exemplify the teaching of *TLM*. There are plenty of instances in which melody and harmony are discernible as such, not because they are necessarily aurally separable, or on the other hand fused through some exigency, but chiefly on account of a relative simplicity in texture and rhythm. The more complex structures, though they may be quite coherent—to a keen ear and with repeated listening—do not present melody or harmony in ways reminiscent of traditional forms. Messiaen characterizes such complex layering of material as polyrhythm and polymodality.⁷⁴

We have noted that it is in the nature of Messiaen's thought to frame rhythm and pitch analogously; that this allows the separation of the two elements in his orchestral scores, and the "colouring" of rhythms as well as harmonies. Yet such a separation is not entertained in eighteenth- or nineteenth-century music: melody/harmony and rhythm are realised together, and require joint concepts of analysis—such as harmonic rhythm. The crisis of non-tonal music lay, therefore, in the abandoning of traditional melodic-harmonic imperatives (however weakened) while the rhythmic moulds of past practice were not properly dissolved. Messiaen's constructive approach (including his "freely conceived" material) is one of the boldest attempts to exploit the cleavage, to consolidate each element from quite different models and to trust to one's inspiration for the coherence of the whole. "Inspiration" must serve to cover all those impulses that guide the composer to his modulations, i.e. the points at which one polymodality gives way to another.

One available resource—a symbol of freedom, indeed, of the composer's personal vitality—is birdsong: this reservoir of pitch (obviously monodic, except for chance combinations in choruses) and rhythm is, as Messiaen has pointed out,⁷⁵ not only remarkably free of references to human music, but in species practically inexhaustible. It may be thought that even imaginative transcription

⁷²*TLM*, 39.

⁷³*Ibid.*, 31.

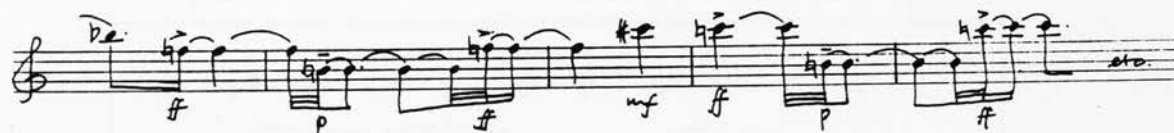
⁷⁴*Ibid.*, 22-27, 68-70.

⁷⁵*Conversations*, 51-65.

represents a severe inroad into originality, but as an answer to an enormous question—"How will my music unfold?"—it is incomparable. Another path available is the virtual pre-planning of an entire piece: the realisation has relatively few problems to solve. It may be contended that pieces based so one-sidedly on pre-formulated material are among the least successful in Messiaen's output; and the literalistic strain in Messiaen's approach is, in a piece such as "L'échange" (*Vingt regards*, No. 3), represented by a "symbolism not sufficiently assimilated to become active on a purely musical level".⁷⁶ "Reprises par interversion" (*Livre d'orgue*, No. 1) repeats the procedure without the symbolism—or, rather, with an abstract version of the theological superscription. The "interventions" play an increasingly large role in succeeding pieces—there, however, always as parts of a more complex layering.

Mode de valeurs et d'intensités is entirely pre-planned as to its material components; ostensibly it is written "in free employment of this material".⁷⁷ But, because each pitch in the three "chromatic" series is associated with a duration, an intensity and an attack, the slightest regularity in the succession of any one of these implies an automatic regulation of the other elements. Thus, the instances of non-retrogradable rhythms imply non-retrogradability in all parameters:

Example 9-7 Mode de valeurs et d'intensités, bars 3-7



Another device, based on a procedure in *L'échange*, divides the mode in half and overlaps one half with the retrograde form of the other:

⁷⁶Drew (III, 46-47) has discussed this "disaster" with perfect clarity.

⁷⁷The three divisions of the piece use a ♩ mode. The pattern of values (expressed as the number of ♩s) is:

Division I	:	1	2	3	4	5	6	7	8	9	10	11	12
Division II	:	2	4	6	8	10	12	14	16	18	20	22	24
Division III	:	4	8	12	16	20	24	28	32	36	40	44	48

Thus all adjacent values of a particular division differ by a constant amount but an ever-changing proportion, while the divisions are proportionally constant among themselves.

Table 9-5 *Mode de valeurs*, top division, bars 24-28

	E ^b	B	D	F	A	B ^b	A ^b	C	G	C [#]	F [#]	E
No. in series:	1	12	2	11	3	10	4	9	5	8	6	7

This is precisely what Messiaen calls *des extrêmes aux centre* in his rhythmic permutations; here it is an “intversion” of pitch. It is, of course, a device to utilize the maximum number of modal possibilities (this amounts to a total utilization in the cases of pitch and duration). Overlapping may be shifted (by one figure), as in:

Table 9-6 *Mode de valeurs*, middle division, bars 58-64

	E	F	E ^b	A ^b	D	B ^b	C [#]	C	B	G	F [#]
(12 omitted)	6	5	7	4	8	3	9	2	10	1	11

The process of *des extrêmes aux centre* may omit degrees regularly:

Table 9-7 *Mode de valeurs*, middle division, bars 39-43

G	F [#]	B ^b	C [#]	F	E ^b	D	A ^b	B	C	A	
1	11	3	9	5	7	8	4	10	2	12	[6]

Another “exhaustion” procedure—a strict one—is:

Table 9-8 *Mode de valeurs*, bottom division, bars 61-80

E ^b	A ^b	D	F	A	B	G	E	F [#]	B ^b	C	C [#]
1	7	2	8	3	9	4	10	5	11	6	12

To say that the material is “freely employed” is not quite true: the examples above illustrate how much use is made of mathematically regular permutations of

the arithmetically-based series of durations. Forster's analysis⁷⁸ shows that the pitch series themselves are not randomly arranged either, but **modally based**, i.e. having a clear relation to the system of pitch arrangements in the earlier modes of limited transpositions.

The way in which a twelve-note series may be related to the modes of limited transpositions depends on the reproduction of the mathematical processes that underlie the modes in their ordering of the chromatic total. The modes proceed from the division of the octave into six, four, three and two equal segments (the basis of modes 1, 2, 3, and 4 to 7 respectively). These segments, of two, three, four and six notes each, provide model arrangements of the twelve chromatic notes according to the order of notes that begin each segment and the order of transpositions of the segments. The whole-tone scale, for example, provides this model:

Table 9-9 Whole-Tone Scale on Model

Order of notes in segments			
	I.	1	2
Order of transposition of segments ("layers")	a	c	d ^b
	b	d	e ^b
	c	e	f
	d	f [#]	g
	e	a ^b	a
	f	b ^b	b

The second mode—which comprises three diminished seventh chords—can be separated out into these constructive features in the same way:

Table 9-10 Mode Two on Model

II.	1	2	3
a	c	d ^b	d
b	e ^b	e	f
c	f [#]	g	a ^b
d	a	b ^b	b

Mode 3 and modes 4 to 7 may be plotted in the same way:

⁷⁸*Technik*, chap. 4.

Table 9-11 Modes Three and Four on Model

III.	1	2	3	4	IV.*	1	2	3	4	5	6
a	c	d ^b	d	e ^b	a	c	d ^b	d	e ^b	e	f
b	e	f	f [#]	g	b	f [#]	g	a ^b	a	b ^b	b
c	a ^b	a	b ^b	b							

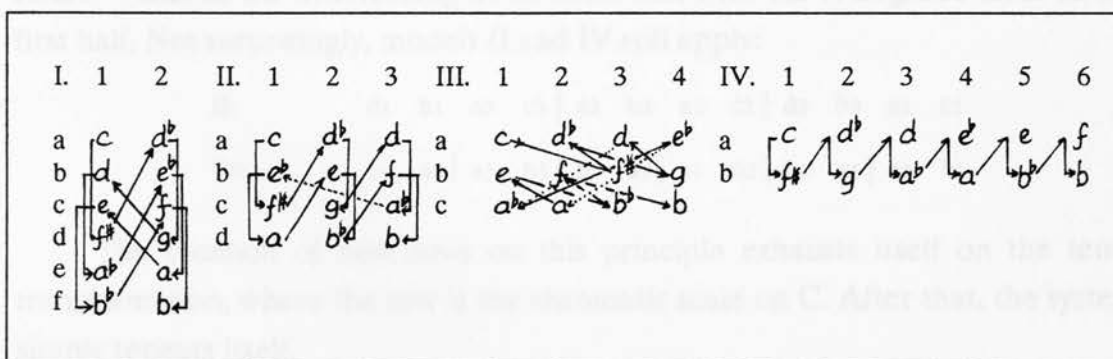
*applying to all modes that divide the octave into two equal parts.

These model arrangements may be used in the analysis of a note-row in a diagrammatic way. Consider the row used in “*Île de feu 2*”:

c f[#] d^b g d a^b e^b a e b^b f b

Picking out this order of notes in the models yields a perfect regularity (as is obvious from an inspection of the row itself):

Table 9-12 Row of “*Île de feu 2*” on Models



In the succeeding examples, the letters and numbers of the model axes will be used for “ciphering” the rows, e.g.:

c[#] g d a^b e^b a e b^b f b f[#] c

on model II: a2 c2 a3 c3 | b1 d1 b2 d2 | b3 d3 c1 a1

Obviously there are few rows as regular as this.⁷⁹ But many more rows can be created which will show a regularity on **one** of the modal models: this in itself will be sufficient to claim a modal basis for such a row. It means, in terms of row ordering, that either the (layer) segments of a chromatic total (i.e. a, b, c, d) are laid down in a perceptibly pre-ordained system, or that the notes within each

⁷⁹Another appears in *Trois petites liturgies*, starting c[#], g, d, a^b, etc.

segment will answer to such a regular system (i.e. 1, 2, 3 etc.). The example above fulfils both these conditions.

The rows introduced at *Interversion 1* of “*Île de feu 2*”—one in the right hand, one in the left—show from the outset a typical interrelationship:

R.H. f[#] f g e a^b e^b a d b^b d^b b c

This is an all-interval row and capable, like the first example, of fitting either model II or model IV:

II: c1 b3 c2 b2 | c3 b1 d1 a3 | d2 a2 d3 a1

IV: b1 a6 | b2 a5 | b3 a4 | b4 a3 | b5 a2 | b6 a1

L.H. a e^b d a^b b^b e d^b g b f c f[#]

This is derived from the R.H. row, on the principle “*des extrêmes aux centre*”—that is, the interlocking of its latter half with the retrograde form of the first half. Not surprisingly, models II and IV still apply:

II: d1 b1 a3 c3 | d2 b2 a2 c2 | d3 b3 a1 c1

IV: b4 a4 | a3 b3 | b5 a5 | a2 b2 | b6 a6 | a1 b1

The creation of new rows on this principle exhausts itself on the tenth transformation, where the row is the chromatic scale on C. After that, the system simply repeats itself.

The all-interval row that begins “*Reprises par interversion*” (*Livre d’orgue*, No.1),

b c b^b d^b a d a^b e^b g e f[#] f,

can be found on either model II or model IV in these forms:

II: d3 a1 d2 a2 | d1 a3 c3 b1 | c2 b2 c1 b3

IV: d3 a1 | d2 a2 | d1 a3 | c3 b1 | c2 b2 | c1 b3

The following row contains an additional factor—a single irregularity—that illustrates a “*deference*” in the conflict of one constructive feature with another:

c a^b b b^b g c[#] d a^b e^b f[#] f e
 II: a1 c3 d3 d2 | c2 a2 a3 d1 | b1 c1 b3 b2

By layers: a 1 2 3
 b 1 3 2
 c 3 2 1
 d 3 2 1

The reason for the obvious disruption of layer b is the presence of another pre-formulated pitch in the piece: in each row, one pitch—that falling in the middle of the *gajajhampa* rhythm (♩ ♪ ♪ ♪ ♪ in its initial form)—is repeated. These repeated notes are found to coincide with a strict rotation of six pitches—A, F, C, F[#], D, A. In the row under discussion, the second-from-last note (strictly b2, an E) coincides with the repeated note: that series, however, requires an F (b3), so the two pitches have been exchanged.

The three rows given in the preformulated material of *Mode de valeurs et d'intensités* provide another interesting instance. The rows of Divisions I and III may both be rendered modally comprehensible by reference to the model arrangements:

Row I e^b d a a^b g f[#] e c[#] c b^b f b
 Model II: b1 a3 d1 c3 | c2 c1 b2 a2 | a1 d2 b3 d3

The regularity of the row shows in the ascent from b1 to b3 and d1 to d3, against the descent from a3 to a1 and c3 to c1.

Row II e^b d a g f[#] c a^b f b c b^b c[#]
 Model III: b1 a4 c3 | c1 b4 a2 | c2 b3 a1 | b2 c4 a3

The regularity consists of the presence of one note from each layer in every subdivision.

The purpose of this explanation is the verification of a link between the earlier and later works, and the vindication of the unity in Messiaen's thought. This evidence stands as a reply to Xenakis's complaint about a supposed capitulation to serial technique, for the rows function quite differently in these two approaches to composition. In the first place, the modal bias of Messiaen's rows implies that they cannot be freely formed from the chromatic total; and, while both Schoenberg and Messiaen hold to the "free composing" of pre-formulated material, Schoenberg thematizes a single row and its derivatives for an entire composition, while Messiaen works from a constructional principle of

various rows.⁸⁰ One should note, however, that the modal rows do differ importantly from the seven modes of limited transpositions themselves, in the sense that they are preformed material and can only be used in compositions as such. The modes may appear in scale form, but they allow of a completely arbitrary disposition, following, say, the constraints of ostinatos or motivically varied melody.

Still, the extent to which Messiaen's hands are tied in twelve-note modal technique must not be overestimated. The connection of a composition with a particular pre-formulated row is binding only for the discharge of its twelve notes; after that, the multiplicity of modal rows is available for selection.⁸¹ The issue of relations between the first and succeeding rows depends on the procedures used to rearrange the chromatic total. These range from "free combinatoriality" of rows (in which the means of rearrangement is freshly determined with each row) to the permutation of the chromatic total according to a fixed system of alteration (in which each row is not so much a new product as the same row with different characteristics).

There is further extension of this process in compositions that use twelve notes but not rows. This applies most specifically to the passages of birdsong, in which repetition of elements blurs the row to a greater or lesser degree and may result in free atonality. Finally there is—in *La bouscarle* (CO, Book 5), for instance—a pictorial dimension to row technique: in the sections marked "l'eau reflète les saules et les peupliers", the rows are not kept scrupulously distinct, but overlap frequently; nor is pitch rearrangement fitted to any pattern. The "colour" of harmony here corresponds to the composer's interpretive marking "liquide et fluide".⁸² In the same piece there is an analogous device in the sections marked "la rivière", which are characterised by ever-changing chords, built from the transpositions of mode 3. The proximity of row and mode techniques of this sort are outward evidence of the coherence of Messiaen's musical means.

⁸⁰Forster, 113.

⁸¹Ibid., 112.

⁸²One might mention, however, that not only is the opening row a regular modal one (on model III, each layer appearing in every segment), but the apparently random rhythm is a pre-formulated "pedal" structure using a sequence of durations and its "augmentation" (the addition of one time unit, ♩, to each value):

R.H.	4	2	2	4	4	2	4	3	3	3	4	etc.
L.H.	5	3	3	5	5	3	5	4	4	4	5	

This is underlined by another set of factors linked to the colour associations mentioned earlier. Messiaen has spoken candidly about these,⁸³ not in order to impart the secret of his “kind of synopsis”⁸⁴ to listener-experimenters, but in order to remove misunderstandings as to the nature of these associations. In the following, an understandable scholarly mistrust of the viability of studies in an extravagant “private logic” will be challenged, for that may well be no more than a disguised snobbery—the refusal to take seriously a habit of mind that often smacks of musical illiteracy. It is true that the debate on the matter has been inconclusive,⁸⁵ and appears to confirm the hopelessness of treating “the

⁸³*Conversations*, 15-21.

⁸⁴The medical condition known as “synopsia” is characterized by the production of sensations of colour when the individual hears certain tones; the secondary response sometimes replaces the normal one completely.

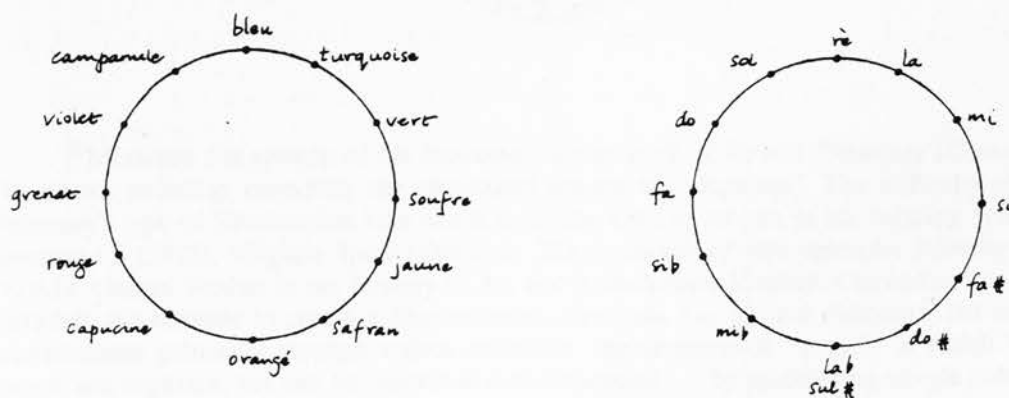
⁸⁵H. MacDonald (“Colour and Music”, *NG* 4:585) mentions as an instance of “analogy” Newton’s observation of the similarity of the light spectrum to the scale. He also notes that “superimposed colours blend into a new single colour, whereas the ear is able to distinguish more than one simultaneous note or timbre in a chord”. Messiaen speaks of juxtaposed colours thus:

[A] stained glass window was in the first place a lesson by images. . . . When the window is viewed at a distance . . . one is dazzled by colours. . . . [A] window dominated by blues and reds . . . produces in the eye a sensation of an enormous violet.

(*Conversations*, 95)

Yet the colours of his imagination are also highly variegated. Touzé’s suggestions (“Les sons et les couleurs”, *La Revue Musicale* 202 [October 1946]: 319-24) appear to have gone unnoticed by both MacDonald and Wellek (see the latter’s articles “Farbenhören” and “Farbenmusik”, *MGG* 3:1803-22). Touzé rejects two common “errors”, that of identifying notes of the diatonic scale with the colour spectrum (which ignores the “irregular” and incomplete range of notes in a diatonic scale), and that of juxtaposing the entire range of audible sound with the colour spectrum (which ignores the periodicity of pitches at the octave). He suggests as comparable these two spectra:

Figure 9-b Matching Cycles of Colours and Fifths

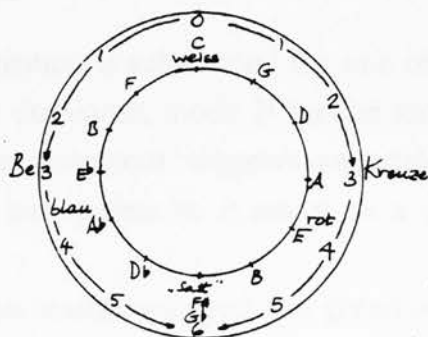


subjective” with any great rigour. Messiaen is aware of the singularity of his synaesthetic capacity, and the unsatisfactory nature of previous sound-colour theories. Yet colour has remained part of his creative core: the primary scientific difficulty lies, therefore, in proving a strict relationship between sound and sensed colour.

On the other hand, if it is assumed to exist in Messiaen’s case, then its applications may be explored for consistency. Again, such investigation may be subverted by the feeling that, the connections of mode and colour once made, the system of associations remains a fixed quantum, without further interest. This overlooks considerations which drive deep into a more sophisticated analysis of Messiaen’s work than is often encountered. In the first instance, the modes are not, like keys or the chords of keys, indivisible sound elements: they are harmonic possibilities, equally able to highlight a major or minor chord construction or to dissolve such polarities into tonal “ubiquity”. Nor is Messiaen attracted to primary colours (except as theological symbols); his preference is for mixtures of colour, in which one hue or another may dominate or in which striking contrasts are welded together.⁸⁶ Yet, while simple key/colour correlations are insufficient

Wellek (ibid., 1809) reports a similar attempt—a matching of the cycle of fifths with colours by F. Daub (1937):

Figure 9-c Daub’s Colour/Tone Wheel



⁸⁶Messiaen has spoken of his fondness for the work of Robert Delaunay (*Conversations*, 21), whose paintings exemplify the movement known as “Orphism”. The difficulty of putting Delaunay’s type of Simultanism into words is severe. On the subject of his painting *Soleil, Lune. Simultané 2* (1913), Virginia Spate (*Orphism: The Evolution of Non-figurative Painting in Paris, 1910-14*, Oxford Studies in the History of Art and Architecture [Oxford: Clarendon Press, 1979]) describes the attempt to retain a discontinuous structure, i.e. distinct elements, but to achieve interrelations primarily through colour contrasts, the creation of “a unity in which ‘sun’ and ‘moon’ are separate, but can be perceived simultaneously . . . by modulating simple colour areas with striations, patches, scumbles, and glazes of contrasting or related colour” (220). In other

to explain Messiaen's experiences, there are cases of such habits, especially the linking of A major to blue. (Negatively, one may mention his experience of the clash of G major with violet tones, recorded in *Conversations*, 19). To assert this, however, is to assert nothing more than that major and minor structures have a place in Messiaen's harmonic resources.

Colour/mode correlations of a consistent sort, drawn from works widely separated in the composer's output and marked by different techniques and levels of sophistication, yield the following:

Mode 2 "revolves around certain violets, blues and violet-purple" (*Conversations*, 19). Messiaen appears to be speaking here of the mode in its first transposition. Elsewhere he gives a more elaborate account of the colour mixture:

General colour of mode 2¹ = blue violet rocks, sprinkled with small, grey cubes, cobalt blue, dark Prussian blue, with a few reflections in violet, purple, gold, ruby-red, and stars in mauve, black and white.

Dominant colour = blue-violet.⁸⁷

The other transpositions yield quite different mixes:

General colour of mode 2² = golden and silver spirals, on a background of brown and ruby-red vertical stripes.

Dominant colour = gold or brown.

General colour of mode 2³ = leaves in light green and meadow-green, with spots of blue, silver and reddish orange.

Dominant colour = green.⁸⁸

In addition, "each transposition is substituted for one of the primary degrees of A major—mode 2² for the dominant, mode 2¹ for the tonic, mode 2³ for the subdominant".⁸⁹ This curious statement suggests an analogical understanding of these chord relations. It also points to A major as a chief "colouring" in the harmonies of mode 2.

Mode 3 "corresponds to an orange with red and green pigments, patches of gold and also a milky white with iridescent opal-like reflections" (*Conversations*, 19).

words, the spatial distinction may be distorted, even obscured, because the elements are so sunk in colour contrasts that they appear not simply to be related but to be different from what they are. This, at least, is how Messiaen regards the rose windows: contemplation leads through "instruction"—enumerative delights—to a fused awareness of the single colour of the rose (see the preface to *Trois petites liturgies de la Présence Divine* [Paris: Durand, 1952], iii).

⁸⁷Preface to *Trois petites liturgies*, v.

⁸⁸Ibid.

⁸⁹Ibid. See above, n.53.

Unfortunately, the preface lacks a description of the first transposition of this mode for comparison, but the fact that the two other transpositions emphasize other blends (or other aspects of the same blend) implies that the summary statement again refers to the first transposition.

Mode 3² = horizontal stripes—from bottom to top: dark grey, mauve, light grey, and white with mauve and light yellow reflections—with flamboyant golden letters, in an unknown handwriting and a large quantity of small red or blue arcs, very thin, hardly visible.

Dominant colour = grey and mauve.

General colour of mode 3³ = broad vertical stripes, alternatively cobalt and rather dark blueish-green. On the background, rare and well-spaced red-orange lilies, and a few silver creepers.

Dominant colour = blue and green.⁹⁰

The remaining modes are not described, except for:

Mode 4³: General colour—yellow and violet.

Mode 6¹: large golden letters on grey background, with orange spots and rather dark green branches with golden reflections.⁹¹

In sum, a close reading of Messiaen's comments on colour vis-à-vis composition reveals another grand analogy, along the lines of that treated by Forster. In fact, nothing could be clearer than this explanation, particularly if the reader is equipped with the expanded concept of mode discussed above:

For me certain sonorities are linked with certain complexes of colour and I use them as colours, juxtaposing them and putting them in relief against each other, as a painter underlines one colour with its complementary.⁹²

These complexes of colour could quite legitimately be termed "colour modes". If colours are tied to modes, is the converse true? May not a modal passage evoke for Messiaen associations that have nothing to do with colour? If so, then it is surely because his imagination works not only with colour (though, as in some abstract painting, it may be given a decided preference over all other aspects of composition) but also with an ambience, generally suggested in a text or title (e.g. in *CO*, the habitats of birds), in which colours constitute only one dimension among others.

⁹⁰Ibid., iv, vi.

⁹¹Ibid., vi, iv.

⁹²*Conversations*, 17.

The following examples point up both the logic and the perplexities of Messiaen's colourful world.

Example 9-8 [F]lèche bleue-verte du Martin-pêcheur—CO, Book 5, “La bouscarle”, pages 1, 21



Note: Mode 3³ is identified with its “dominant colour”. The flourish is written in “fused style”: the entire mode appears in layers.

1. However, the “vol nuptial du Martin-pêcheur”, which has the indication “tres rapide, scintillement d’un bijou bleu et vert” in its extended form (CO, Book 5, page 16), superimposes two pentatonic modes in the R.H. (G-A-C-D-F; F#-G#-B^b-C#-D#) with dominant seventh chords in the L.H. (on E, G and B), these closing on an A major arpeggio. The effect of this tonal destination is further emphasized by the rearrangements of modal functions in the R.H.: beneath the continuing pentatonic upper part, the two lower layers create alternate major and minor triads (in first inversion). Yet their interval structure shows that they happen also to be built from pentatonic forms:

upper : T[one] - m[inor] 3d - T - T - m 3d- T - m 3d etc.
 middle : T - m 3d - T - T - m 3d- T - m 3d etc.
 lower : m 3d - T - T - m 3d - T - m 3d - T etc.

Example 9-9 *Vol nuptial du Martin-pêcheur*—CO, Book 5, “La bouscarle”,
 page 16

1st Pentatonic Scale

The score consists of two systems. The first system is labeled "1st Pentatonic Scale" and features a treble clef staff with a melodic line and a bass clef staff with a bass line. The second system is labeled "3 Pentatonic Scales in Layers" and includes a tempo marking "Très vif (♩ = 144)". It shows three overlapping pentatonic scales in different registers, with fingering numbers (1-5) and accents above the notes. A "Red." marking is present below the first system.

Change of Pentatonic Scales

The score shows a transition between two pentatonic scales. The upper staff has a melodic line with a bracket indicating the change. A note in the upper staff is marked with a curved arrow and the text "altered note". The lower staff has a bass line with a "Red." marking and an asterisk (*) at the end.

Example 9-10 [L]a mer bleue – CO, Book 1, “Le merle bleu”, pages 5, 9, 18-19,
23

Très lent (♩ = 46) (*doux, harmonieux et contemplatif*)
(*la mer bleue*)

2. Mode 2¹ appears throughout. The left-hand chords show the constructive features of the mode segments:⁹³

E - F# - G

C - D^b - E^b

The relationship of mode 2¹ to the blue sea is made clear in Messiaen's preface to the piece: he mentions both Prussian blue and sapphire blue. Although the dominant colour of the mode is not referred to, the wording makes the association clear. What is also clear, from the preface, is that the blue of the bird featured in this piece “est d'un autre bleu que la mer: bleu violacé, ardoisé, satiné, bleu noir”.⁹⁴ These shades are not to be found in the standard colour references that we have: predictably, the “blue” of the birdsong is shaded by a different harmonic combination:

⁹³Cf. 235.

⁹⁴Messiaen, *Catalogue d'oiseaux*, 7 vols. (Paris: Leduc, 1964), introductory note to vol. 1, part 3.

Example 9-11 *Le merle bleu*—CO, Book 1, “Le merle bleu”, page 3

The leading part (R.H.) is restricted to harmonies of A major with added 6th and 9th—a pentatonic form again. In the first half of the piece, the L.H. adds a “halo of blue” above the main part, creating its effect entirely with chromatic notes absent from the five-note chord. It does not use all the missing notes and does not always refrain from using a chordal note, but the basic idea is clear: the L.H. outlines the melodic part in a silvery register, but displaces the sound by a semitone or tone from the octave. Later the L.H., in a lower register, begins to mix chordal and non-chordal tones in quiet pedal chords. In imitation of “les grands gongs, les tambours allongés de Bali” (page 11), the pentatonic birdcall is accompanied by percussive chords: the entire complex uses all twelve chromatic notes, but very freely. The L.H. then assumes the original chordal notes themselves, in a “résonance tournoyante”, to evoke the compounding of echoes. Finally, it reverts to the “halo of blue” line.⁹⁵

These metamorphoses leave the R.H. part untouched and allow the connection of its A major (chord) with blue of this kind to be made. (The song of the blue rock thrush is again linked with A major structures, in *CO*, Book 7, “Le traquet rieur”.⁹⁶) But Paul Griffiths has made a confusing identification of A major with mode 2¹ (in which, of course, an A major triad may be found) from a somewhat naive equation of major and minor chords with simple colours. He is tempted to divide the notes of mode 2¹ into a “combination of two major-minor chords separated by a semitone”.⁹⁷

⁹⁵Messiaen offers his own description—very similar—of the means used in this piece, in *Conversations*, 75.

⁹⁶See Johnson, 120.

⁹⁷“Catalogue de couleurs”, *The Musical Times* 119 (December 1978): 1035-37.

Figure 9-4 Mode Two Divided into Classifiable Chords



He then seeks correlations (in *Couleurs de la cité céleste*) of A major with blue, and E-flat major/minor with red.⁹⁸ All this seems promising in the light of Messiaen's explanation of his favourite colour, violet, as a blend of blue (cold) and red (warm). The result is a violet that may tend to purple (the red end of the scale) or to hyacinth-blue (the blue end). The ascription, in medieval colour symbolism, of the Love of Truth to the former and the Truth of Love to the latter, is enough to explain the charm this shade has for the composer. Yet, a polarity of two major or minor triads at a tritone's distance is distinctly a feature of the traditional diatonic system, and anachronistic in Messiaen's scheme. The polar opposite of tonal distinction (as in a major triad) is more likely to be a completely indistinct harmony.⁹⁹

Example 9-12 *Lever de soleil rose et mauve*—CO, Book 4, “La rousserolle effarvatte”, pages 11-15 passim



3. Chords of the two upper systems consist entirely of mode 3¹. The whole is in “fused style”. Orange is probably the dominant colour of the mode.

Chords of the two lower systems consist entirely of mode 2¹. The “rose and mauve” of first light must refer to the “stars in mauve”—a splendid touch—in the definition. “Rose” must derive from the pure redness in violet. Judging by the “setting-sun” colours near the close of the piece, the entire complex is simply toned down to fit the description. (The same modes—3¹ and

⁹⁸Ibid., 1036-37.

⁹⁹See below, 258, for discussion of the chords in *Couleurs*.

2¹—appear, this time climbing downwards [pages 38, 40-41.] Here, the 2¹ chords are marked “rouge et violet”). With the progress of dawn, the colours change, and, with them, the modes:

Example 9-13 Lever de soleil rose et mauve—CO, Book 4, “La rousserolle effarvatte”, pages 38, 40-41

In the upper systems (*pp*), mode 6¹ appears entire in fused style. The golden hue is fundamental to the mode 6¹ description.

In the lower systems (*mf*), mode 4⁵ appears entire in fused style. The ascription of “mauve” is noted here for the first time.

Both these modes appear again with the sinking sun; this time, the mode 4⁵ passages are altered to “violet” and “violet sombre”:

Example 9-14 Coucher de soleil rouge et violet—CO, Book 4, “La rousserolle effarvatte”, pages 38-41 passim

4. The complementary mixture blue and orange is mentioned by Messiaen several times, particularly as “those flows of blue-orange lavas” which he seeks to capture.¹⁰⁰ In the same book,¹⁰¹ he analyses this effect as it appears in *Quatuor pour le fin du temps* (movement 2, rehearsal letter D): the violin and cello parts sing a quasi-plainchant melody in mode 3¹, while the piano

¹⁰⁰TLM, 52.

¹⁰¹Ibid., 51.

produces the colour element—“drops of water in a rainbow”—in chords which alternate four different harmonic constructions: superposed fourths, the chord of resonance (containing all the notes of mode 3, here in its second and third transpositions), chords in mode 2² and a set of chords which the composer leaves undescribed.

Johnson¹⁰² claims that the harmonies associated with the rock thrush (*CO*, Book 6, *Le merle de roche*)—marked by Messiaen as having a “sonority akin to a stained-glass window with orange dominating and complemented by specks of blue”¹⁰³—are derived from the “chord on the dominant”, with appoggiaturas:

Figure 9-5 a) Chord on the Dominant; b) and c) “Appoggiature” Versions

The image shows a musical score with three examples (a, b, and c) of a chord on the dominant with appoggiaturas. Example (a) is in G major and shows a chord on the dominant (D) with appoggiaturas. Example (b) is in G major and shows a chord on the dominant (D) with appoggiaturas, marked 'ppp' and 'Quatuor... II, letter D'. Example (c) is in G major and shows a chord on the dominant (D) with appoggiaturas, marked 'f' and 'Merte de roche'. The score includes a reference to 'C.O. vol. 6 p. 9'.

It is possible to extract from examples (b) and (c) “gapped” forms of the “chord on the dominant” and to explain all the other tones as appoggiaturas, but the composer’s silence is preferable.¹⁰⁴ It may be more important to

¹⁰²Messiaen, 120.

¹⁰³See footnote on page 9 of the score (Paris: Leduc, 1964).

¹⁰⁴Besides, Johnson is taking liberties in his interpretation of this harmonic form. The “chords on the dominant” suggested by the L.H. forms require the following R.H. complements:

observe that Messiaen's "blue-orange" mixture involves a labile compound of harmonic structures.

5. Later orchestral colours. Two works of the sixties—*Sept haïkai* (1962) and *Couleurs de la cité céleste* (1963)—extend the ideas on colour while confirming the previously established connections. The designations "bleu violet", "orangé", "or", "blanc laiteux" and "violet"¹⁰⁵ are obvious pointers: indeed, they use the notes of modes 2¹, 3¹ and 4¹ respectively. (Thus 4¹, 4³ and 4⁵ all are connected with violet.) But "topaz jaune, chrysoprase vert clair, et cristal", "émeraude verte, améthyste violette", "rouge, orangé, et or" (figure 13), or "sardoine rouge", "émeraude verte, bleu saphir, et or" and "rose, mauve, et gris" (figure 24) obviously owe a great deal to the description of the heavenly Jerusalem in Revelation 21.18-20.¹⁰⁶ In addition, the chords so marked turn out to be twelve-note complexes, divided so that eight notes are found in the wind parts and the remaining four in the piano.

Messiaen speaks¹⁰⁷ of the twelve-note series used in *Mode de valeurs et d'intensités* as a grisaille that requires the modifications of the other parameters. He says: "The complete mode constitutes ... a colour of durations and intensities, the purpose of which is to vary the "greyness" of the

Figure 9-d Regular Forms of Chord on the Dominant



¹⁰⁵See *Couleurs*, rehearsal nos. 75-76.

¹⁰⁶The wall was built of jasper, while the city was pure gold, clear as glass. The foundations of the wall of the city were adorned with every jewel; the first was jasper, the second sapphire, the third agate, the fourth emerald, the fifth onyx, the sixth carnelian, the seventh chrysolite, the eighth beryl, the ninth topaz, the tenth chrysoprase, the eleventh jacinth, the twelfth amethyst.

(Revised Standard Version)

¹⁰⁷In *Rencontres*, 251; trans. Johnson, 135, n.7.

durations and intensities, the purpose of which is to vary the ‘greyness’ of the sound-series and to create the search for other colourations”.¹⁰⁸ The forms of pitch organisation used in the piece have been discussed already. It is pitch, too, that prompts Johnson to observe that twelve-note sets in free permutation serve to describe “the more colourless aspects of nature”—the white of a glacier, the grey of descending fog.¹⁰⁹

In *Couleurs*, by contrast, the colours are rich, translucent and sparkling, the very opposite of grisaille. How, then, is the search for colouration prosecuted here? In a form, it seems, both systematic (division of the rows into 8 + 4; a new permutation of the row for each chord) and free (notes grouped under one colour show no positive congruence). The pitch contents are presented in Table 9-13.

Their significance, however, is increased by a comparison with the “colours” indicated by Messiaen at the start of movement 5 (“Miyajima et le torii dans la mer”) of *Sept haïkai*. Again, the appellations are not prima facie references to the colour associations of the seven modes. Indeed, again, twelve-note complexes provide the basis of colour, though in a slightly less obvious way than is the case in the later work. The pitch material in question appears in Table 9-14.

¹⁰⁸Ibid.

¹⁰⁹Messiaen, 135.

Table 9-13 *Couleurs de la cité céleste*, Pitch Content of Twelve-Note Series

fig. 13 'topaz jaune, chrysoprase vert clair, et cristal'

chord

I

II

III

'émeraude verte, améthyste violette'

I

II

'rouge, orangé et or'

I

II

III

fig. 24 'sardaine rouge'

I

II

'émeraude verte, bleu saphir, et or'

I

II

'rose, mauve, et gris'

I

II

III

fig. 74 'rouge, taché de bleu'

I

Table 9-14 Sept haikai, Pitch Content Relations

Chord I 'gris et or'

Chord II 'rouge'

Chord III 'orangé'

Chord IV 'bleu'

Chord V 'vert pâle et argent'

fig. 11

thème tpe, trbn

ob. 1

ob. 2

cur ang.

clar. 1

clar. 2

bssn. 1

bssn. 2

1. *a o ba ho a o ba ho*

2. *ba ho ba ho a ba ho*

3. *a ba ho ba ho ba ho*

4. *a ba ho a ba ho ba ho*

5. *a ba ho a ba ho*

6. *ba ho ba ho a ba ho*

7. *a ba ho ba ho ba ho*

8. *a ba ho a ba ho*

9. *a ba ho a ba ho*

10. *ba ho ba ho a ba ho*

11. *a ba ho ba ho ba ho*

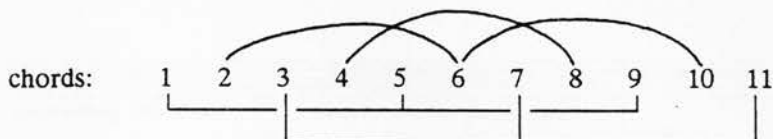
related

Here, the idea of complementarity (an analogy with the painter's practice, as indicated) is exploited (a) by the division of chromatic series into 8 + 4, the eight notes played by strings, the four again by the piano; (b) by the extended use of only the eight-note portions, on woodwind and brass, in a way that can justly be called "modal". First, "colours" are created from both twelve-note and eight-note complexes. In fact, it appears that the appearance of a complementary set of notes may quite radically alter the colour of the harmony. "Gris et or", for instance, comprises a twelve- and an eight-note series. The completion of the latter is designated "vert pâle et argent", and changes the eight-note part to "orangé". Likewise, the twelve-note set under "gris et or" changes to "rouge", when its complementary "colour" is not sounded. The conclusion is important for understanding the colour of the two refrains—"rouge, lilas, et pourpre violacé"—which is created exclusively from eight-note sets (chords). The twelve-note set making "rouge" and "bleu" is noteworthy on two counts: it contains, in the "bleu" segment, an A major chord which, as Griffith notes, harks back to the blue colourings in *CO*,¹¹⁰ and it reproduces exactly the note-sets at rehearsal no. 74 in *Couleurs* which are marked, appropriately, "rouge, taché de bleu". Another curious fragment of evidence is the eight-note set in *Couleurs*, under "topaz jaune, chrysoprase vert clair, et cristal" (chord II in Table 9-13). It comprises the pitches of mode 4³, whose general colour, noted above, is yellow and violet. Unfortunately, there is no other eight-note set that reproduces the intervals of one of the modes of limited transpositions, to allow this branch of enquiry to be taken further.

The suggestion that the refrains may be written in "fused style" entails investigations of mode that go beyond the earlier discussion of the term. Horizontally, each voice in the eleven-chord opening progression uses a different stock of pitches: the key to the coherence of this passage lies in the vertical accumulations which form consistent diastematic groupings when brought into the same octave. Only the intervals of semitone, tone and minor third appear in this form: the reason for excluding the major third—and, by extension, the perfect fourth—which appears in other eight-note sets is surely to increase the number of chromatic possibilities. Another method is to reduce the set by doubling one of its notes. The diastematic summaries are, of

¹¹⁰"Catalogue", 1037.

course, not affected. On the contrary, they form a discernible pattern of inter-relations:



There are two inconsistencies that must stand against this view—the D-natural instead of D-flat in set 1, and the F-sharp instead of E-natural (or a doubled pitch) in set 2. However, a careful appraisal of the sets shows that these divergences are not nearly so great as those which distinguish unrelated rows from one another. The music of both refrains is built entirely of eight- and seven-note sets of this sort, which give colour to phrases of eleven, thirteen, eleven and seventeen chords respectively. The mode in operation might best be expressed in terms of the strict use of eight or seven pitches whose scalewise relations are confined to semitones, tones and minor thirds. An additional touch is the deployment of the sets in the phrase analyzed in Table 9-14 in an interlocking sequence that, from a structural point of view, can only be termed “non-retrogradable”.

6. Multiple colourations. In the two strophes of *Chronochromie* (1960), Messiaen has incorporated three forms of colour, which are described in both *Conversations*¹¹¹ and the sleeve-notes to the recording¹¹² in much the same terms. The mode of rhythm may be said to command these movements, since the three colour elements—the sub-division of note-values, timbre and strains of chords—all aim at clarifying the extended, superimposed lines of shifting rhythms (thirty-two different note-values in various permutations). The most effective are the colour chords in the strings, which are further divided into three groups: “chords of contracting resonance” (seven-note) in violas and cellos, “chords on the dominant” (seven-note) in 2d violins (sounding with bells, and not, as Messiaen says in *Conversations*, gongs) and eight-note chords in 1st violins which he does not characterize. Table 9-15 shows the pitches of the first eight chords in each strand, brought into one octave.

¹¹¹*Conversations*, 90-91.

¹¹²EMI ASD 639.

Table 9-15 *Chronochromie*, Strophe 1, Pitch Content of Colour Chords

The musical score consists of three staves. The top staff is for Violas and Cellos (3/4 time), the middle for 2nd Violins (7/4 time), and the bottom for 1st Violins (8/4 time). The first two measures are labeled 'chords of contracting resonance' and the remaining six are 'chords on the dominant'. Each measure contains a sequence of notes with various accidentals (sharps, flats, naturals) and some notes are marked with asterisks (*, **, +, ++, +++) or arrows indicating the root note.

*, ** and +, ++, etc. indicate repetitions or transpositions of the same chord; when the asterisks are bracketed, the transpositions appear in the pitch summaries as rotations of the set. Arrows indicate the “root” note of each chord.

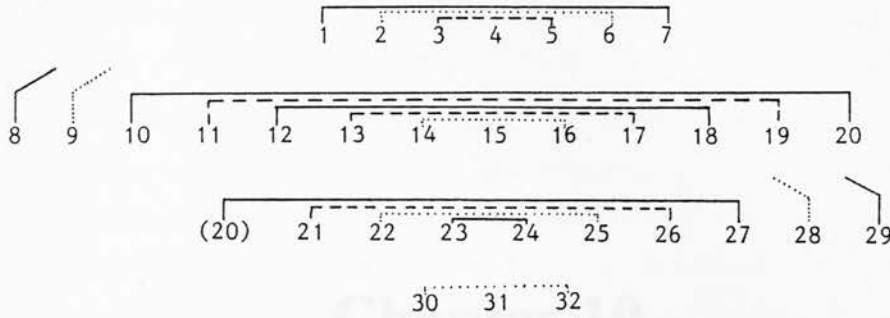
The eight-note collections on 1st violins resemble the eight-note segments of the two later works; their actual disposition in chords, moreover, relates them to some of the colour-specific chords in *Sept haikai*, e.g. the two chords marked “gris et or” serve in transposed versions as chords 1 and 3 of *Chronochromie* (1st violins). Chords 1, 2 and 3 of Strophe 1 also share the same pitch collections (in transposition) as the chords marked “rouge, orangé et or” in *Couleurs*; but here their actual arrangement in chords differs. In fact, while *Sept haikai* and *Chronochromie* have several colour-chords in common, those of *Couleurs* are quite distinct and, in addition, are more variegated within the work itself.

Two of the three layers of colour-chords in *Chronochromie* show a particular kind of regularity. The “chords of contracting resonance”—they appear to have nothing in common with the Chord of Resonance itself (see 233)—appear in two forms (A and B) which alternate with each other. There are, however, repetitions of A on chords 15-16 and 22-23, and the order of the last two chords is reversed (B, A). In Strophe 2, the pairs of chords (B, then A) are consistently alternated.

In the middle layer, the “chords on the dominant”, which are structurally identical in the pitch summaries of Table 9-15, actually appear in the music disposed in four different vertical arrangements. The succession of these chords shows no evident pattern, though the four types appear 7, 11, 7 and 7 times respectively. This may well be a reference to the prime numbers favoured by Messiaen for their link with non-retrogradability. In this case, Strophe 2 provides no confirmation, the four types occurring there 9, 9, 8 and 5 times respectively. (Was five chosen

because it is the sum of the two cubed numbers involved? This is not impossible, since Messiaen has, exceptionally, used 31, not 32, chords in this succession.)

The uppermost layer of chords shows the most complex ordering procedure: the thirty-two chords, vertically arranged in three different types, appear in a series of non-retrogradable patterns:



The solid, dotted and broken lines indicate the three different chord-types.

Again, there is a suggestion of prime numbers: besides the first and last patterns (7 and 3 chords respectively), the 23 remaining chords consist of a “frame” of two chords on either end containing two non-retrogradable segments. They total 18 chords together, but they share a common chord; they actually consist of 11 and 7 chords—two more primes.

The non-retrogradable patterns of Strophe 2 are more fragmentary and account for only 30 of the 32 chords employed. Nonetheless, there are clear signs of non-retrogradable primes: the discernible patterns consist of 13, 3, 5 and 3 chords respectively.

The colours of twelve-note sets and others derived from them seem, on fragmentary evidence, to be related to the earlier colour-sound system, but also have distinctive ways of colouring themselves. One such is “complementarity”; another involves the use of pre-formulated sets with a broad consistency of construction and a strict consistency in the sequence of sets.

The argument of this approach to Messiaen’s thought is that Xenakis has not acknowledged the extent to which outside-time structures have occupied the composer. His statement that the rebirth of outside-time preoccupations “continues magnificently through Messiaen, with his modes of limited transpositions and non-retrogradable rhythms, but . . . never imposes itself as a general necessity and never goes beyond the framework of the scales”¹¹³ is far from true. Messiaen never “abandoned this vein”¹¹⁴ (as Xenakis would have it) but worked it for the possibilities it held in extending his fundamental concepts—of mode and of colour—in metamorphoses and renewals of his thought, in which its basic forms and dynamics would nonetheless remain discernible.

¹¹³FM, 208.

¹¹⁴Ibid.

Chapter 10

Modern Scale Theory III: Bartók

As previously mentioned, Xenakis has failed to include Bartók among those renovating the “outside-time” category of music.¹ The following survey seeks to rectify that omission, at the same time keeping in mind Bartók’s isolated position in twentieth-century music. Energized by folk music and the “impressionists” in France, he has spawned no school, and his musical thought has to a large extent died with him. But his stature is now so great that it is an important task in its own right to attempt a penetration of his complex scale manipulations as they appear in his works, as he has explained them and as commentators have elaborated them.

To begin with the last of these, we note that in the late seventies, Somfai still acknowledged Lendvai’s theories as the most complete exposition of Bartók’s tonal “system”;² in Lendvai’s description it amounts almost to a “tonal

¹Perhaps his brief tribute to Bartók (*Tempo* 136 [March 1981]: 5) should be taken into account. The most distinctive phrases in the “homage” are, however, really reflections of Xenakis’s own preoccupations: “*le connaissance des formes et des formules des traditions de diverse cultures des peuples*” bears a direct relation to formalizations—a doubtful concept in Bartók’s case—and “*l’effort d’abstraction qui seul peut conduire à une universalité planétaire*” reflects the inference of a “monolingualism” arising from generative theories such as Xenakis’s.

²See the article “Bartók” in *NG* 2:205-18. The section on style and technique is by Laszlo Somfai. In the updated version of this article (see Vera Lampert et al, *The New Grove Modern Masters: Bartók, Stravinsky, Hindemith* [London: Macmillan, 1984], 1-101), Somfai qualifies this judgement to a degree. At the same time, he expresses significant reservations about the work of Mason, Babbitt, Treitler, Perle, Antokoletz and Waldbauer (*ibid.*, 46).

philosophy". Bartók himself explicitly held open the possibility of theories being developed in his wake:

Now that the greatest part of my work has already been written, certain general tendencies appear—general formulas from which theories can be deduced. But even now I would prefer to try new ways and means instead of deducing theories.³

But there are opponents of Lendvai's closely argued schematization, reacting perhaps against its omniscient thoroughness, perhaps against its arcane drift and excited sense of "code cracking". There are mistakes and assertions based on lax thinking in his work; but the careful correction of some of these, in a review-article by Roy Howat,⁴ serves only to strengthen the thought that number series based on the *sectio aurea* (golden section or GS) are operative in the formal disposition of a number of Bartók's most important works. Noting the problem of advocacy, then, and granting that these formal operations may be unconscious (a supposition that might to some minds make the theory yet more incredible), one must attend to Lendvai's writings,⁵ which feature predominantly tonal analysis written in an accessible style. To the complaint that there is no mention of Fibonacci numbers in any of Bartók's published writings, it might be replied that his writings are thin on any detailed theoretical exposition of his own works; he prefers to deal with his art in general terms. To claim that the Harvard Lectures—a *locus classicus* for his thinking on modes—represent a formal explanation of his procedures is manifestly untrue: they throw out useful but guarded hints which require much expansion in order to serve as tools for analysis. The reader of the lectures is left with a strong feeling that a good deal of information has been kept in reserve. For this reason, too, Lendvai's approach must be considered.

A recapitulation of his three-axis system in its entirety would, however, be too lengthy to reproduce here. For our purposes, the essential points are Lendvai's claims that it is a logical culmination of the "classical" harmonic system;⁶ that it constitutes a system of tonal closure (within a closed tuning

³Harvard Lectures, in *Béla Bartók Essays*, ed. Benjamin Suchoff, New York Bartók Archive Studies in Musicology, no. 8 (London: Faber and Faber, 1976), 376.

⁴"Bartók, Lendvai and the Principles of Proportional Analysis", *Music Analysis* 2 (March 1983): 69-95.

⁵The basic text is *Béla Bartók: An Analysis of His Music* (London: Kahn and Averill, 1971), referred to hereafter as *BB*. This includes most of his earlier English article "Duality and Synthesis in the Music of Béla Bartók", *New Hungarian Quarterly* 3 (July 1962): 91-114. An important postscript is "Modality: Atonality: Function", *Soundings* no. 6 (1977): 1-41.

⁶*BB*, 8.

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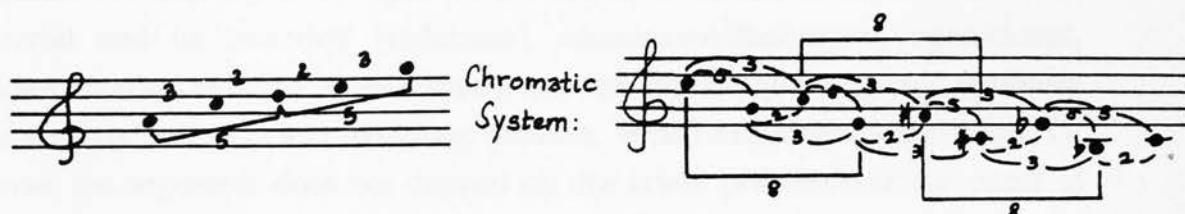
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⁶*BB*, 8.

system), whereas both classical and, even more, romantic harmonic practice use keys in exploratory ways;⁷ that it is rooted in natural laws of acoustics, in particular “the principle of interconnection between roots and their overtones” in cadential relations;⁸ and that the symmetrical functions of dominant and subdominant (for example, F→C→G) are now found in a new distribution (A^b→C→E). Each of these axial representatives possesses a counterpole at a tritone’s distance (D, F[#], B^b) that may at times function in its place.⁹

Onto this base, Lendvai grafts a superstructure consisting of two realms, which are in fact complementary tonal hemispheres. The **chromatic** hemisphere is based on the Fibonacci series—which is widely regarded as a convenient simile for the GS proportions—as applied to intervallic distances (each integer standing for a semitone; hence, 5 = perfect fourth, 8 = minor sixth, etc.). These intervals tend to be used in delineating chromatic melodies and produce a series of “synonymous” chromatic harmonies. But—and Lendvai names this fact as the “very gist” of the chapter—by the mediation of the Fibonacci numbers, the chromatic system shares affinity with—indeed, finds “a pure musical expression” in—the anhemitonic pentatonic scale, “perhaps the most ancient human sound system”:¹⁰

Figure 10-1 Anhemitonic Pentatonic Scale



This cultural atavism is important to Lendvai since in his view it shows that the GS principle, far from being an intellectual imposition of Bartók’s, arises naturally from the organic qualities of the music. The implication is that Nature herself validates this music: “[T]his is why the form-world of Bartók’s music reminds us most directly of natural pictures and formations.”¹¹

⁷Ibid., 8-9.

⁸Ibid., 10.

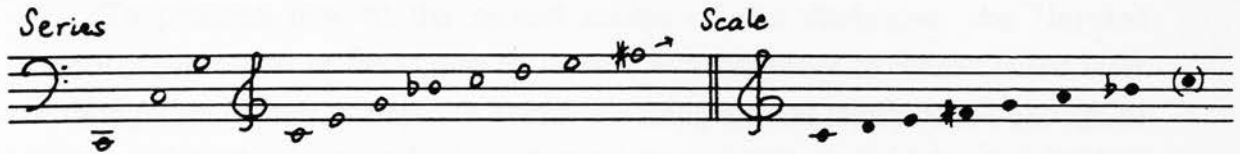
⁹Ibid., 14-15.

¹⁰Ibid., 48.

¹¹Ibid., 29.

The other hemisphere is a “diatonic” one—the quotation marks are Lendvai’s.¹² It arises from acoustic sources: that is, from the natural overtone series. A scale often to be found in Bartók’s works may be deduced from the series:

Figure 10-2 The “Acoustic Scale” Derived from Overtone Series



The characteristic intervals—major third, perfect fifth, “natural” seventh, with the augmented fourth and major sixth, are set over against the intervals generated by the GS—minor third, perfect fourth, minor sixth (3, 5, 8). These two natural tone systems embody polar relations: the GS-based or chromatic employs the **dynamic** proportion of the geometric mean (the equivalent of a point of musical tension); the acoustic or diatonic uses the **static** proportion of the arithmetic mean (the equivalent of a point of musical balance or release). The relations between these two spheres are conceived in the form of antinomies: material and its inversion (reflection), consonance/dissonance, open/closed, fundamentality/centrality, expansion/contraction, symmetry/asymmetry, optimism and serenity/unreason and demoniac passion, West/East, instrumental/vocal. Of course, the argument does not depend on this crude presentation: for proof of the theory one is referred to the music itself. It is possible to experience the Sonata for Two Pianos and Percussion (1936), as it moves from “chromatic” patterns to “diatonic” ones in the course of the work, as a single, rising line, just as *Duke Bluebeard’s Castle* (1911) creates the palpable sensation of the music and drama spiralling outwards from darkness (F#) to light (C), and then retracting back around the spiral to darkness again (F#). Thus these two rival elements may be harnessed to artistic production, and rendered tractable to synthesis. “They constitute contrast in unity: affirm and deny, presuppose and exclude each other.”¹³ Bartók himself modestly claims a synthetic power, but does not actually

¹²Ibid., 67.

¹³Ibid., 82.

speak of duality: "In my work . . . appear impressions derived from the most varied sources, melted—as I hope—into unity."¹⁴

-If Lendvai were completely correct—and he is correct in some of his observations—there would be little more to say. But this is far from the case.¹⁵ Renewed examination of Bartók's own published analyses, to say nothing of the material in the New York Bartók Archive, shows that there are more corrections to be made and new approaches to be assumed.¹⁶

To proceed now to the second source of this discussion: the Harvard Lectures (delivered in 1943) may be viewed as a summary of characteristic ways of thought embodied in Bartók's works, outlining a tonal policy broad enough to accommodate "various methods and principles [which] cross each other."¹⁷ The following appear to be the cardinal self-revelations:

- a) Bartók considered the major/minor system he inherited to be an exhausted medium; hence, his early enthusiasm for atonal explorations. His subsequent renewal of tonal resources came from the modes of folk music: drawing as he did on a vast demographic area, he encountered numerous scale forms, highly variegated and quite different from major/minor patterns. His scale "pool" included modes strictly comparable to medieval types, more unfamiliar patternings (some with clear oriental tendencies), the old Hungarian form of anhemitonic pentatony, and—though these are not given in the lecture—short scale sections of Arabic provenance that inspired his "chromatic" thought:

¹⁴*Essays*, 395.

¹⁵Besides the corrections proposed by Howat (n.4 above), a bruising review of Lendvai's *The Workshop of Bartók and Kodály* has been published by Malcolm Gillies in *Music Analysis* 5 (July-October 1986): 285-95. Here, far from the corrections appearing to strengthen Lendvai's case, the inaccuracies and suppressions noted amount to a damaging indictment of his methods.

¹⁶Some of the Archive's material has been published in their series "Studies in Musicology".

¹⁷*Essays*, 370. The Harvard Lectures appear on 354-92. We are here concerned especially with Lecture 2.

Figure 10-3 Examples of Scale Forms¹⁸



- b) The renewal effected from these bases still respects a fundamental psychophysical “law”, which appears to be transgressed in atonal or polytonal writings: the principle that a particular note (or succession of notes) will emerge from **any** musical texture as a home towards which the other notes tend (or from which they “arise”, or radiate). “When we hear a single tone, we will interpret it subconsciously as a fundamental tone. When we hear a following, different tone, we will—again subconsciously—project it against the first tone, which has been felt as the fundamental, and interpret it according to its relation to the latter.”¹⁹

Thus, an unavoidable perceptual process acts upon musical sounds, reducing even polytonal textures to a single principal key. Bartók chooses to respect this tendency in his own writing, i.e. he eschews polytonality and retains “keys”; his innovation is the expansion of the idea of key to accommodate more than one diatonic mode in a single scale. The close juxtaposition or simultaneous superimposition of predetermined materials never obliterates a home tone; rather, these force into the interstices of the standard heptatonic modes new notes whose status is not that of alternative chromatic tones but of diatonic essentials.

- c) The use of unusual modes challenges the “old” rules of progression. Bartók himself feels that the modes blur the all-important tonic/dominant relation, and that pentatony tends to remove it altogether. How, then, do the notes of his own “art chromaticism” create in the end a sense of resolution to the fixed fundamental tone? He notes himself: “[T]he single tones of these melodies

¹⁸Examples 1, 2 and 3 are unusual forms cited by Bartók, *Essays*, 363; 4 is editorially supplied to illustrate the anhemitonic pentatonic scale (*ibid.*); 5 and 6 are Dalmatian bases, while 7 is Algerian: they are presented in B. Bartók with Albert B. Lord, *Serbo-Croatian Folk Songs* (New York: Columbia University Press, 1951), 62-63, quoted in Malcolm Gillies, “Bartók’s Notation: Tonality and Modality”, *Tempo* 145 (June 1983): 6.

¹⁹*Essays*, 365.

are [also] independent tones having no interrelation between each other.”²⁰ But he does not answer this directly in the lecture; instead, he presents a technique quite foreign to the Arabic chromatic sources, by which the closely packed notes are stretched over a diatonic framework, thereby effecting “the change of the chromatic degrees into diatonic degrees . . . levelling them over a diatonic terrain.”²¹ Whether this levelling involves a greater sense of harmonic function is not discussed, but Bartók welcomes the fact that together with melodic variety “the unity will remain undestroyed because of the hidden relation between the two forms.”²²

In considering the works themselves, we are forced to resort to commentary and analysis other than the composer’s. Yet there is one way in which the consciously conceived intentions of the composer have appeared in his music and have so far proved to be baffling—the problem of Bartók’s idiosyncratic notation. To take one example, Stevens finds an interpretation for the unusual accidentals in the second of the *Three Burlesques* (1911);²³ but the lack of discrimination in his thought is revealed in the two further examples he lists—the viola theme from the *Concerto for Orchestra* (1943; 3d movement, 62-72), and the opening of the *Music for String Instruments, Percussion and Celeste* (1936), where quite different sorts of chromatic writing are involved.²⁴ Other writers have considered Bartók arbitrary and impractical in this matter, and have assumed too much from his early statement regarding the frustrations of traditional notation:

It would be desirable to have at one’s disposal a notation with twelve similar symbols, where each of the twelve tones would have a comparably equivalent symbol, in order to avoid the necessity of notating certain tones exclusively as alterations of others.²⁵

The connection between this statement and the final point in section b)—the idea of the expanded key—lends support to the probability that the strange notations are connected with polymodality. An idea seems to have come

²⁰Ibid., 381.

²¹Ibid.

²²Ibid.

²³Halsey Stevens, *The Life and Music of Béla Bartók*, rev. ed. (New York: Oxford University Press, 1964), 117.

²⁴See the analyses presented below, 280-81.

²⁵*Essays*, 459. The statement appears in the article “The Problem of the New Music” (1920).

to Bartók from his notation of Dalmatian folksongs, in which he tried to show the independence of closely packed chromatic notes by writing them with different note names. This necessitated the use of sharps **with** flats, as well as double sharps and double flats.²⁶ Also, where it was not possible to avoid doubling a note-name, it was still possible to regard each degree as an independent member of a twelve-hemitone scale: a rationale for this was provided in polymodality. Finally, Bartók found his device of chromatic/diatonic extension to be operative in these selfsame, ancient Dalmatian melodies.²⁷

To illustrate polymodality, Bartók refers to the dual form of the minor mode as a prototype. The upper tetrachord may appear as either Lydian (the ascending melodic sort) or Phrygian (descending melodic):

Figure 10-4 Lydian and Phrygian Tetrachords, *Mikrokosmos* No. 118, bars 26-29



The extension of this duality to the lower pentachord was a logical step, and this specific fusion became an important one for Bartók:

Figure 10-5 Lydian and Phrygian Pentachords, *Mikrokosmos* No. 115, bars 1-6



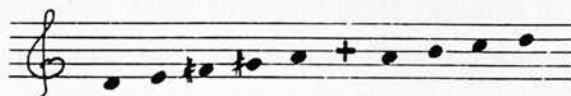
²⁶See Gillies, "Bartók's Notation", 7-8.

²⁷"When I first used the device of extending chromatic melodies into a diatonic form, or vice versa, I thought I invented something absolutely new, which never yet existed. And now I see that an absolutely identical principle existed in Dalmatia since Heaven knows how long a time, maybe for centuries."

(Harvard Lectures, *Essays*, 383)

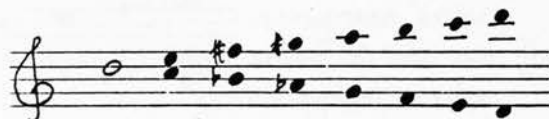
As Somfai notes,²⁸ the “acoustic” scale of Lendvai may be deduced from a polymodal combination of a lower Lydian pentachord with an upper Mixolydian tetrachord:

Figure 10-6 “Acoustic Scale” Using Lydian and Mixolydian Segments



Remarkable use is made of this scale at the close of the *Cantata Profana*, where it balances the opening scale form in a mirror construction:

Figure 10-7 “Acoustic Scale” with Mirror Form



It is on the basis of mirroring propensities like this one that Ilkka Oramo has posited a theory of modal symmetry as the most useful approach to—in particular—the notational difficulties in Bartók’s music.²⁹ Oramo’s article reveals not only that Bartók favours certain “mirrors” more than others, but that the very idea of inverting modes is a means (except in the case of Dorian) of creating new modes. As Ramon Fuller has noted,³⁰ this structural transformation has never been exploited within the diatonic system, in which the degrees of third, flattened seventh and tritone above the tonic have acted as the axial notes, taking the music from one scale to another. In the mirror transformation, the tonic itself acts as the axial note.

Interestingly, Oramo makes a distinction that overlaps Xenakis’s definitions (see 178 above), between inversion (in the sense of horizontal mirroring) of a melody or note-row and that of a scale. For a start—here he restates the outside-time concept—a melody is a structure whose disposition of notes and intervals is a temporal one, whereas the scale is a theoretical concept describing the

²⁸NG 2:215.

²⁹“Modale Symmetrie bei Bartók”, *Die Musikforschung* 33, no. 4 (1980): 450-64.

³⁰“A Structuralist Approach to the Diatonic Scale”, *Journal of Music Theory* 19 (Fall 1975): 186.

diastematic structure of the tonal areas used in melody. It is not temporal in the disposition of its notes, but a logical abstraction, based on the principle that adjacent sounds within the tonal field may in general be represented as a note-series rising from or falling to a “finalis”. This fact conditions another: that the inversion of a melody or note-row uses as its axis the initial note, whose position in a scale is unimportant, while that of a scale radiates from its logical first tone, taking no account of the actual disposition of its notes in melody. Another factor, arising from the constraints (variables) of direction and arrangement common to melody and scale, is that in addition to the simple retrograde the inverted mode provides another retrograde order of the intervals:

Figure 10-8 Modal Inversion (Phrygian/Ionian)

order of intervals from tonic: 1 2 2 2 1 2(2)
 retrograde order: (2) 2 1 2 2 2 1
 order of intervals from tonic: (2) 2 1 2 2 2 1
 retrograde order: 1 2 2 2 1 2 2

Before proceeding further with these “mirrors”, we should examine more closely the combination of Phrygian and Lydian elements which plays an important role in Bartók’s thought. The two modes are, indeed, not symmetrical in the bilateral fashion just explained, but there is a second-order symmetry built into their conjoint form that is definitely perceptible as well as theoretically demonstrable:

Figure 10-9 Relation of Lydian and Phrygian Modes

The structural significance of the only note common to these modes (besides the shared “finalis”)—the dominant—lies in its demarcating the two sectors of

symmetry. In this example,³¹ from the *Cantata Profana*, Bartók steadily increases the frequency of change in the scale segments he uses, and ends the choral part by piling up Phrygian tetrachords; but he adheres strictly to the directions inherent in the pentachords and tetrachords mentioned above: the Lydian sort always rising to the axial note or tonic, the Phrygian always falling.

³¹The following examples, other than those drawn from the *Music for String Instruments, Percussion and Celeste*, are so selected as to corroborate Oramo's ideas, rather than duplicate them. Unfortunately, I have not had access for comparison to the lengthier study in Finnish, *Modaalinen Symmetria: Tutkimus Bartokin Kromatiikasta* (Helsinki: Suomen Musiikkitieteellinen Seura, 1977) on which the *Musikforschung* article is based.

poco rallent. - - - - *Mosso, ♩ = 168* 115

poco rallent. - - - - *Mosso, ♩ = 168* 115

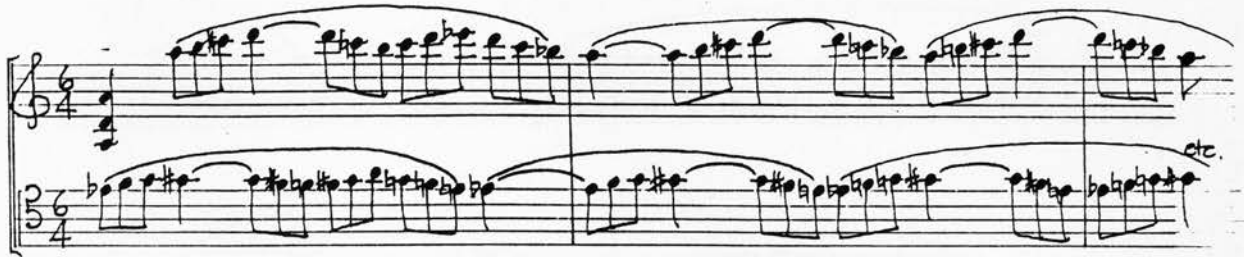
Mosso, ♩ = 168 115

Mosso, ♩ = 168 115

These wheeling figures offer an interesting instance of the way “various methods and principles cross each other” in his work:³²

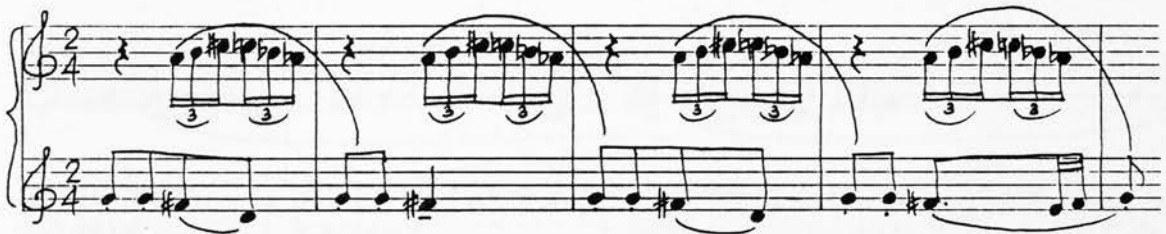
³²This example shows the first violin and cello parts, the inner voices simply sustaining D’s and A’s. It contains a revealing peculiarity of notation: though the passage is aurally canonic, the

Example 10-2 Fifth String Quartet (1934), first movement, bars 56-58



Here the mirror functions of upward and downward tendencies operate as the rhythmic motive-force to yield the effect of “switching”. The *Improvisations*, op. 20, contain a contracted version of the same tendencies, allied with an insistent rhythmic ostinato:

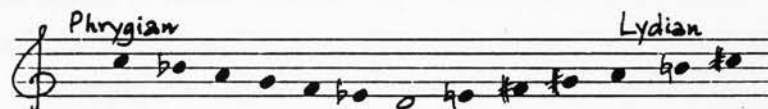
Example 10-3 *Improvisations*, op. 20 (1920), No. 4, bars 1-4



In the *Suite*, op. 14, for piano, the contraction is yet narrower, and the metrical impulse achieved in the first example (first movement, bars 58-61) is exploited in the third movement, together with a simpler mirror form:

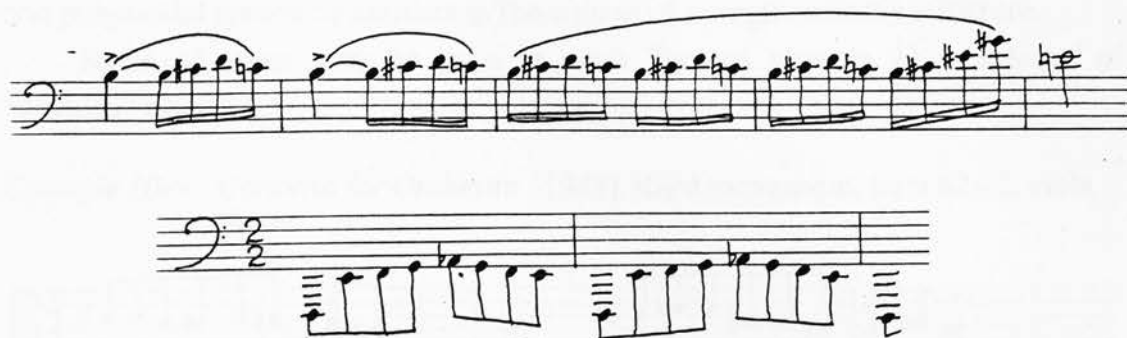
“answer” to A-D in the upper part is written as E^b-G[#] (rather than E^b-A^b) in the lower. The reason is the use of combined Phrygian and Lydian modes on D:

Figure 10-a Polymodal Notation (Phrygian/Lydian)



Within this system, the canonic parts operate at a tritone interval. This means that while the lower part creates aural Lydian/Phrygian patterns a beat before the upper part, it simultaneously creates notational patterns, among the notes of the two lower pentachords (with the limits D-A), which run in directions precisely opposite to the usual, i.e. Phrygian rising and Lydian falling. It is as if the A marks the position of a linear notational mirror, both within the two parts and between them. See the remarks of George Perle, 288.

Example 10-4 *Suite*, op. 14, first movement, bars 58-61; third movement, bars 1-2



This form of chromaticism involves a shift in the axis of symmetry from the horizontal to the vertical; concomitantly, the symmetrical function changes from a mirror (inversion) to a palindrome. Instances of writing occur in which the two axes (horizontal and vertical) are operative simultaneously:³³

Example 10-5 *The Miraculous Mandarin*, rehearsal nos. 66-67, oboe part



Symmetrical combinations of mode forms may comprise a scale and its symmetrical retrograde (four types), or a scale and its inversion (three types), or, in one instance, of both forms (the Mixolydian/Aeolian pair). Oramo has shown³⁴ that in the application of polymodal frames to Bartók's music further light is shed in the form of "difficulties of analysis": the difficulty of establishing which tone is the central one (as a rough guide, it is usually the first note of a melodic structure, a circumstance which at times appears to be contradicted by aural impressions); the difficulty of disentangling the constituent threads when they are not stratified in the music, but appear mingled and changing "from bar to bar, or even from

³³The horizontal mirroring is distorted somewhat from the fourth bar on. Though other instruments share this unison figure, the oboe part, which carries the figure with flute and B^b clarinet, is the one which suggests a possible reason for the adjustment of the intervals: the lower limit of the instrument's range. However, other "imperfect" symmetries may be found, e.g. the viola part at rehearsal no. 26 of *Duke Bluebeard's Castle*.

³⁴"Modale Symmetrie", 459-63.

beat to beat in a bar”;³⁵ and the difficulty of spotting points of modulation from one polymodal system to another in the course of a single melodic structure.

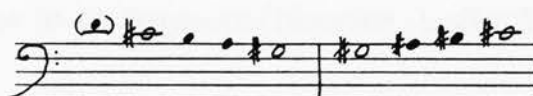
Some of these may be seen in what Stevens regards as a passage of “devious” notation:

Example 10-6 Concerto for Orchestra (1943), third movement, bars 62-72, viola theme



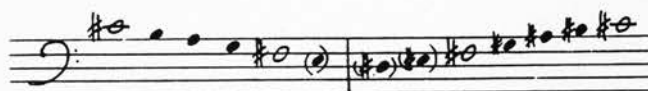
The opening C# is the tone common to two tetrachords, one Phrygian (with an upper extension to D) and one Lydian, their elements intermeshed in a melody whose theoretically sophisticated sinuosity does not at all disguise the folk origin perceptible in the phrase-rhythms and the overall passage from a higher node to a lower.

Figure 10-10 Phrygian/Lydian Tetrachords on C#



The intrusive B^b in bar 66 signals a modulation that is confirmed by the G-natural/G-sharp in the following bars. This appearance of a new tone indicates, also, that the new “key” is not G-sharp, as the close might suggest, but F-sharp, again using Phrygian and Lydian forms in lower pentachord combination (with “subtonium” degrees):

Figure 10-11 Phrygian/Lydian Pentachords on F#



³⁵Harvard Lectures, 370.

It is interesting to note that the tremolo chords in the violins harmonize this chromatic melody with straightforward diatonic triads (F# major, A major, C major, C# without 3d).

The opening bars of the Third String Quartet present an obviously chromatic melody and, in all four parts taken together, a total of thirteen different notes:

Example 10-7 Third String Quartet (1927), *Prima Parte*, bars 1-6

The image shows a musical score for the first part of the Third String Quartet, bars 1-6. The score is for Violino I, Violino II, Viola, and Violoncello. It is marked 'Prima parte', 'Moderato' with a tempo of quarter note = 88, and 'con sord.' (con sordina). The music features a chromatic melody in the violins and tremolo chords in the lower strings.

Oramo's chart of combined modes suggests that the two modes involved are the Lydian and its inversion, the Locrian. Indeed, using C# as the central tone, the chromatic constituents resolve themselves into these two mirror-modes:

Figure 10-12 Polymodal Notation (Lydian/Locrian)

The image shows musical notation for the Lydian and Locrian modes. The Lydian mode is shown as a scale of notes: C#, D, E, F#, G, A, B, C#. The Locrian mode is shown as a scale of notes: C#, B, A, G, F#, E, D, C#. The notes are arranged on a staff with a treble clef.

The famous fugue subject from the first movement of the *Music for String Instruments, Percussion and Celeste* has been so much the object of enquiry that there are even divergent polymodal explanations of it.³⁶ However, the Lydian-Locrian symmetry, based on A, makes the best sense of the compact opening, where the lower pentachord of both modes is used:

³⁶See Oramo, 461.

Example 10-8 *Music for String Instruments, Percussion and Celeste* (1936), first movement, bars 1-5



Figure 10-13 Modal Constituents of Theme (Locrian/Lydian Pentachords)



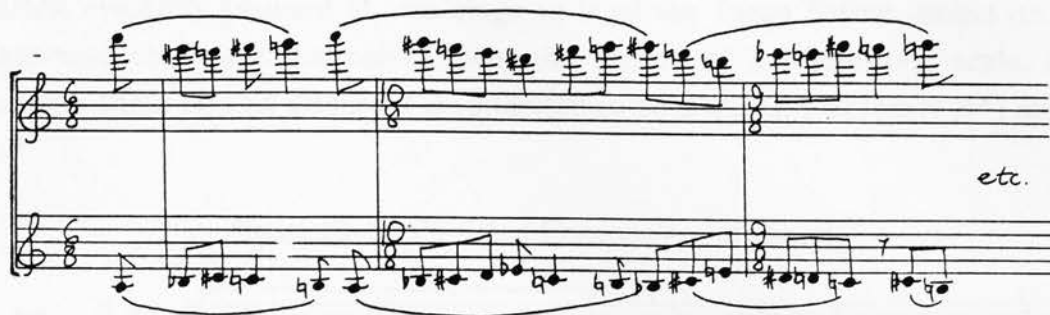
This mode combination also serves for the inverted form of the theme, which begins at the upper end of the twin-mode range and works downward:

Example 10-9 *Music for Strings etc.*, first movement, bars 68-70



Finally, the simultaneous sounding of theme and inversion, filling two pentachords (A up to E, A down to D), shows all the notes of the Lydian-Locrian combinations:

Example 10-10 *Music for Strings etc.*, first movement, bars 78-81



The final appearance of the theme is “levelled over diatonic terrain”,³⁷ in the expanded range of an octave. The mode is the “acoustic scale” on A^b:

Example 10-11 *Music for Strings etc.*, fourth movement, bars 203-7



These stimulating new findings are the result of taking Bartók’s notations seriously, rather than reading them with unwarranted enharmonic equivalences. They finally allow the genuine perplexities in his notation to be examined. For example, the close of the fugue referred to above shows two pentachords (A up to E^b; A down to D[#]) with the superimposed voices reversed:

Example 10-12 *Music for Strings etc.*, first movement, bars 86-88



The problem centres on the composer’s ironing out of the expected diminished ninth (D[#]/E^b), a detail which deviates from the pentachord models. Gillies has

³⁷Essays, 453.

turned up a similar “correction” in the sketches for the *Sonata for Solo Violin*.³⁸ Bartók evidently planned at one stage to level the fugue theme, based on an eight-note chromatic succession, over the terrain of a whole-tone scale. His sketches show that he altered a B (intended to be a modally accurate B[#]) into a C:³⁹

Figure 10-14 Detail of Compositional Sketch



Gillies suggests, I think correctly, that the B[#] struck Bartók as too blatant a contradiction of the tonal centre C. (Yet this constraint does not obtain in the *Music for String Instruments, Percussion and Celeste*.) In all probability, Bartók backed down on this occasion, because he realised that his highly original tonal/modal system was pushing at the logical limits of the older notation.

It is useful to pursue further the matter of symmetry in Bartók’s music insofar as it generates special scalar constructs. In this regard, we may note Elliot Antokoletz’s assertion that “the ‘Bagatelles’ had already at their early date (1908) juxtaposed, transformed, and to an extent synthesized most of those elements that were to be basic to Bartók’s musical language throughout the various stages of his compositional evolution.”⁴⁰ Indeed, the following phrase provides a very early instance of symmetrical patterning in an astonishingly diagrammatic form:

³⁸“Bartók’s Notation”, 7.

³⁹The autograph sketch is reproduced by Gillies, 5. The alteration is quite obvious; so, too, is the space left by Bartók in front of the B for the sharp sign, before he changed the note.

⁴⁰“The Musical Language of Bartók’s 14 Bagatelles for Piano”, *Tempo* 137 (June 1981): 8.

Example 10-13 14 Bagatelles, op. 6, No. 2, bars 3-5



The melodic thrust is a straightforward radiation, like ripples on a pond, from the implied axial note A, the stone that has sunk to the bottom! This looks very like the polymodal mirrors discussed above, but it is in fact similar in only one respect—the idea of “tonal centrality”. Its base is the chromatic scale and, considered as an outside-time structure, that particular form (like the whole-tone scale) exhibits no preference for one note rather than another as an axial (or a “home”) tone. Election for that role takes place “inside time”: the centre-note used later in the piece, E^b (bars 19-21), happens to be the last of the symmetrical series on A.⁴¹

Based as they are on the chromatic scale, these remain in-time constructions. Yet it might be said that they are an important catalyst in polymodal writing, since in such writing their full chromatic base is subsumed to various degrees (sometimes completely, as in the Lydian/Locrian configuration); in addition, they share a symmetrical appearance with the true outside-time forms.

What these in-time patterns do not share with outside-time construction, according to Bartók, is the diatonic (tonic-based) nature of polymodal chromaticism. This nature seems to me to derive chiefly from its theoretical “look”, and also from the aural precedence of an axial note (at the start of the melody, in most cases). Oramo allows that aural impressions are sometimes at

⁴¹Late in his life, Bartók was still using the arrowhead pattern, as this flourish shows:

Example 10-a Second Violin Concerto (1937-38), first movement, bars 270-71



Its potential in differentiated motivic writing is tapped conclusively in the last movement of the Fifth String Quartet. For a detailed analysis, see George Perle, “Symmetrical Formations in the String Quartets of Béla Bartók”, *Music Review* 16 (1955): 302-6.

variance with the implications of the notation.⁴² Despite Bartók's own insistence, based on the argument (from the capacity of the ear) that "key" perception is inevitable, some of his densely chromatic passages continue to be interpreted as "dodecaphonic". The most notorious is probably the second subject in the first movement of the second Violin Concerto:⁴³

Example 10-14 Violin Concerto No. 2, first movement, bars 76-87

For his part, Stevens rightly rejects any suggestion of twelve-tone technique, stressing that "the fact of the **presence** of the twelve tones in each phrase ... [constitutes] its thematic identity", in contrast to the importance of ordering in the Schoenbergian approach.⁴⁴ He has not detected the clear polymodal base (confirmed in Bartók's notes for the third Harvard Lecture⁴⁵), which is a Lydian/Locrian mirror on A. Since he finds the chromaticism, furthermore,

⁴²"Modale Symmetrie", 459-60. A related example is the first of the *Bagatelles*, the only instance I know whereof Bartók's remarks (*Essays*, 433) hint in any way at the curiosity of his notation. Aurally, this piece seems to justify the bitonal label that was early given to it: at least, the "Phrygian coloured C major" is not as self-evident as Bartók makes out.

⁴³Even a relatively recent analysis of the work (Harald Budweg, "Fortspinnung und Erstarrung: Neue Kompositionstechniken im Schaffen Béla Bartóks", *Neue Zeitschrift für Musik* 4 [July-August 1981]: 375-79) adheres to this reading.

⁴⁴*The Life and Music*, 247. Cf. Milton Babbitt's comments on Bartók's "serial" technique: "[S]erialization in Bartók is but one of many integrative methods in the small, and its specific character is determined by the context in which it occurs. Never does it create the context." ("The String Quartets of Bartók", *The Musical Quarterly* 35 [July 1949]: 382-83).

⁴⁵*Essays*, 380, n.1.

something of an intrusion in so tonal a work, he judges this to be Bartókian satire at the expense of the serialists. In the light of the foregoing discussion, that may be an unreliable judgement.⁴⁶

Thus if there is an underlying connection between the 1908 chromatic gestures and the later polymodal writings—motivated by the strong desire “to utilize as means in artworks an ever-increasing number of elements of this material [pitch]”⁴⁷—it is marked by increased complexity of treatment, as well as more direct survivals from the earlier processes.

Along with this chromatic saturation, we must consider symmetry itself in greater detail. The distinction has already been drawn between a first- and second-order symmetry in polymodal practice. The second sort, an outside-time creation used directly in time, seems also to represent the fulfilment of another earlier trend: the ostinato use of rising-and-falling figures that “complement” each other appears, in the *Cantata Profana* example, in lyrically flexible lines whose melodic strength owes much to the diatonic constraints of the modal sources. A further comparison may help to exemplify this transformation more clearly:

⁴⁶*The Life and Music*, 248. A sudden satirical episode in a work of such remote emotion might seem perversely frivolous, but remains a possibility; cf. the satirical eruptions in the Fifth String Quartet (Finale, bars 699-720) and the *Concerto for Orchestra* (IV, bars 75-119). However, by suggesting that the parody consists in the interpolation of dodecaphony in an “otherwise very tonal work” (ibid.), Stevens situates himself badly: for this is only **roughly** a tonal work—its harmonic components are multifarious—and the twelve-note section, that might appropriately represent the suspension of key, is audibly founded on two insistent “key-creating” notes, A and D.

Stevens feels that the satirical interpretation is confirmed by the “baying” of the ensuing bars (92-95) and the flutter-tonguing on trombone (bar 113) which ends the section—a “blatant disrespect” (248). That this effect, with the immediately preceding trumpets trills (bars 111-12), represents a musical climax is not disputed; but Budweg’s understanding of the formal patterns of the work accords to these bars a significance considerably higher than that of a couple of catcalls and a raspberry. The reappearance of the “derisive” whinnying in the recapitulation (bars 280-83, in inversion) illustrates its structural importance as demarcating the transition, in the first appearance, from second subject to development and, in the second, from an altered treatment of the auxiliary theme, still chromatic but not consistently twelve-note, to the first cadenza.

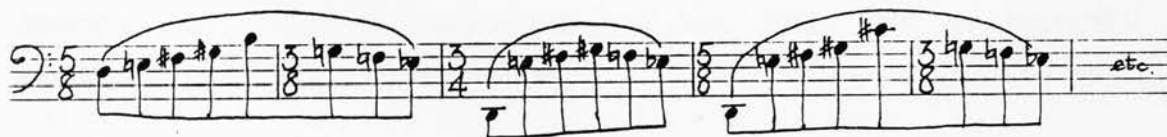
⁴⁷Bartók, “The Problem of the New Music”, in *Essays*, 458.

Example 10-15 Suite, op. 14, second movement, bars 95-100



This pungent passage is cast entirely in a whole-tone scale (save for some ornamental notes). It resembles the Lydian/Phrygian device only in the switching of direction; its intervallic content is symmetrical about the C, but this is a purely in-time arrangement.⁴⁸ The left hand part of the “Barcarolla” (from *Out of Doors*, 1926) shows a transitional practice. The sinewy line is an accompanying figure, responsible for a mildly irregular rhythm, but it uses the Lydian/Phrygian segments of an incomplete lower pentachord, and has a restrained, expressive quality:

Example 10-16 *Out of Doors* (1926), No. 2, “Barcarolla”, left hand, bars 30-34



Perle has drawn an important distinction between vertical symmetry (occurring among multiple simultaneous lines) and horizontal symmetry (referring to interval strings within a single voice, and often manifesting itself as scalar writing). Both are constructed in time. Perle has charted an extended symmetrical chord progression in the last movement of the Fifth Quartet.⁴⁹ Using his notational method, an abstract symmetry to be found in the Fourth String Quartet (first violin against cello; second violin against viola) may be reproduced. The whole complex centres on a B^b/B[♯] dyad:

⁴⁸In this, it resembles the use of the chromatic scale: see above, 285. The establishing of C as the home note (bars 71-80) is a model of its kind: not only is C sounded at the start of the section as a pedal, but the R.H. “encircles” it while the L.H. decorates it with flourishes in the Locrian mode.

⁴⁹“Symmetrical Formations”, 306.

Figure 10-15 Vertical Symmetry in Fourth String Quartet (I, 54-57)



50

Perle ends his survey with this caution:

Bartók's symmetrical formations are only an incidental aspect of his total compositional means. Even in those few works where they perform a significant structural role they do not ultimately define the context, which is determined by a curious amalgam of various elements, by an eclecticism seemingly inconsistent with the overwhelming unity of design and intensity of expression of the musical effect.⁵¹

This seems to me to be still the most intelligent general position on Bartók analysis. What this section has tried to demonstrate in addition is the certainty that Bartók, no less than other modernist creators, supported the primacy of his instincts with theoretical pre-formulations that make him an important contributor to the new musical wisdom.

⁵⁰I hesitate to recommend as a supplement to Perle's study, which passes over the Third String Quartet, the analysis by Wallace Berry ("Symmetrical Interval Sets and Derivative Pitch Materials in Bartók's String Quartet No. 3", *Perspectives of New Music* [Spring-Summer 1979-80]: 287-379), on account both of its prolixity and the basis of its approach. The counting of notes arranged symmetrically as to interval sequence seems to concur to a degree with some of the abstract rigour of the work. Berry here misses the polymodal significance of the opening phrase (see above, *Example 10-7*) owing to the familiar tendency to reduce less usual accidental forms to their enharmonic equivalents; the result is that the essential theoretical function of the F^{\sharp} is masked by its being read as a G. The author then proceeds to ignore the well-known modal bases of the "Seconda Parte" (the first theme) and Coda (from rehearsal no. 11) in his search for a more unified basis to the tonality—a search he himself recognizes to be inconclusive (379). Such wilful avoidance of material that offers itself to the analyst seems unwarranted. The comments of J. Kárpáti ("Bartók's String Quartets", trans. Fred MacNicol [London: Barrie and Jenkins, 1975], 200-208) are more conventional but also rather general. Bartók's modal usage strikes me as more subtle than Kárpáti acknowledges.

⁵¹"Symmetrical Formations", 312.

Chapter 11

Modern Scale Theory IV: Xenakis's "Greekness" And Modern Thought

Xenakis has been selected for this study (a) because his scale theory is particularly prominent in *Formalized Music*; (b) because it encapsulates all the important trends in his thinking not only up to the time of the book's publication (1963 in French; enlarged version in English, 1971) but beyond it as well.

It is important to recognize at the outset that, just as scales may be understood as an abstraction from composed melody and harmony, the chromatic scale being the abstract form in the case of atonal or twelve-note music, so the structure generated by the axiomatics to be examined in this chapter is itself an abstraction, i.e. the "displacement" or unitary interval need not necessarily be a semitone, nor indeed need the scale of values refer only to pitch. In order to avoid confusion of terms, "scale" will be used to signify the abstracted string of notes (or pitch degrees) and "grid" (borrowed from Vriend¹) will signify the underlying structure, which may be expressed algebraically, that has then to be translated into a pitch scale or some other parametric configuration to constitute musical material.

¹Jan Vriend, "Nomos Alpha for Violoncello Solo (Xenakis, 1966)—Analysis and Comments", *Interface* 10 (1981): 15-82.

Xenakis's "axiomatics"² is simply an expression of the notion that every scale can be conceived as a constellation of pitches drawn from a continuous sequence of equal-stepped "shifts"—a set of points on a straight line, to speak graphically—whose size is neither "predetermined [n] or related to an absolute size".³ The means of generating a grid, i.e. that sequence of shifts that defines the degrees of a particular scale chosen from this totally ordered sequence is what Xenakis calls "sieving". By the use of the idea of congruence modulo m , notes may be sieved from the full gamut to comprise a specific "architecture" or mode. The important part of this procedure for Xenakis is the need, in constructing scales other than regular ones that resemble the full gamut in structure (e.g. a scale of whole tones or of thirds or fourths), to make use of operations drawn from group theory: union, intersection and complementation.⁴

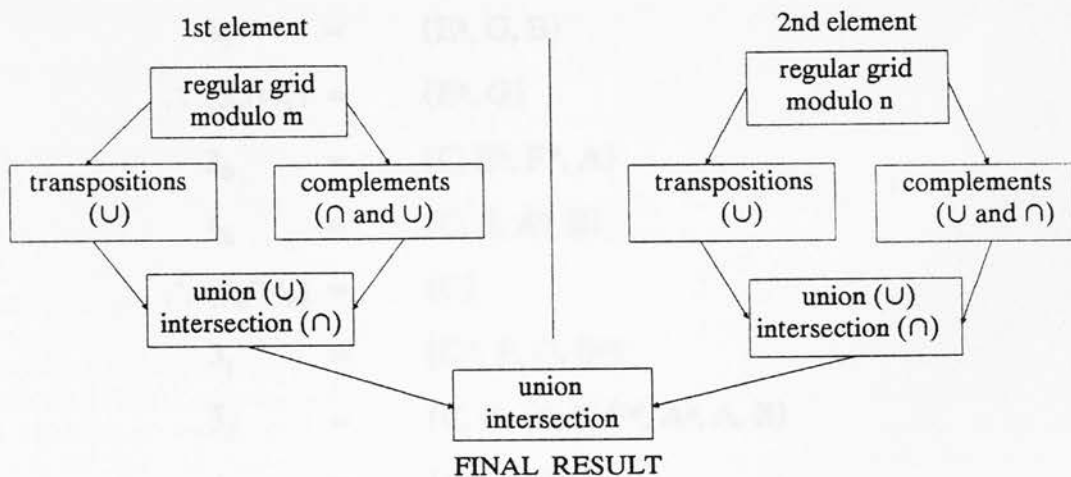
For example, the whole-tone scale would be expressed by a residual class in every modulo of two, i.e. one note in every two semitones, assuming a tempered chromatic note pool:

²FM, 194-95.

³Ibid., 195.

⁴Vriend ("Nomos Alpha", 78, n.14) supplies the following table of possible operations by which Xenakis proceeded from his starting point (an even-stepped gamut on which is inscribed a pitch-grid with a regular interval of size m) to a final pitch function which combines the results of the options chosen on the left with those on the right.

Table 11-a Generalized Procedures in Sieving



The table, with its two elements, refers specifically to *Nomos Alpha*, which is discussed below. See 294 for the final function in algebraic form and n.14 for its first version in the work itself. The rationale behind this "protocol" is outlined on 294-96.

$$\text{residual class 0 modulo 2} = \{C, D, E, F\#, G\#, A\# \dots\}$$

where the chromatic continuity happens to start from C, this first "stop" always having the value 0.

$$\text{residual class 1 modulo 2} = \{C\#, D\#, F, G, A, B \dots\}$$

The residual class 2 modulo 2 would entail the scale starting on D: this is equivalent to the residual class 0 modulo 2, in the sense that it is a simple transposition. Modulo 2 implies that there will be only two possible transpositions of the scale.

The process of constructing a major scale from a chromatic continuity illustrates the use of the other logical operations. The general form of the scale may be expressed as

$$(\bar{3}_n \cap 4_{n+2}) \cup (\bar{3}_{n+2} \cap 4_{n+3}) \cup (3_n \cap 4_n) \cup (\bar{3}_{n+1} \cap 4_{n+1})$$

where the subscript indicates the residual class and the numbers which take the subscript indicate the modulo. For example, beginning on C and $n = 0$,

$$\begin{aligned} 3_0 &= \{C, E^b, F\#, A\} \\ \bar{3}_0 &= \{C\#, D, E, F, G, A^b, B^b, B\} \\ 4_2 &= \{D, F\#, B^b\} \\ \therefore (\bar{3}_0 \cap 4_2) &= \{D, B^b\} \\ 3_2 &= \{D, F, G\#, B\} \\ \bar{3}_2 &= \{C, C\#, E^b, E, F\#, G, A, B^b\} \\ 4_3 &= \{E^b, G, B\} \\ \therefore (\bar{3}_2 \cap 4_3) &= \{E^b, G\} \\ 3_0 &= \{C, E^b, F\#, A\} \\ 4_0 &= \{C, E, A^b, B\} \\ \therefore (3_0 \cap 4_0) &= \{C\} \\ 3_1 &= \{C\#, E, G, B^b\} \\ \bar{3}_1 &= \{C, D, E^b, F, F\#, A^b, A, B\} \\ 4_1 &= \{C\#, F, A\} \\ \therefore (\bar{3}_1 \cap 4_1) &= \{F, A\} \end{aligned}$$

$$\begin{aligned}
\therefore (\bar{3}_0 \cap 4_2) \cup (\bar{3}_2 \cap 4_3) \cup (3_0 \cap 4_0) \cup (\bar{3}_1 \cap 4_1) \\
&= \{D, B^b\} \cup \{E^b, G\} \cup \{C\} \cup \{F, A\} \\
&= \{D, B^b, E^b, G, C, F, A\} \\
&= \text{major scale.}
\end{aligned}$$

It may be objected that such an oblique approach to a scale that might be more simply described in terms of tetrachordal functions or even as part of a diatonic structural group⁵ is “inelegant”, i.e. uneconomical. However, the terms and procedures employed can embrace every conceivable scale—certainly every known scale—provided the gamut is regarded as a conceptual standard. This assumption is not always the case in practice, where the “standard” might undergo considerable distortion, not merely through the quirks of a performer but quite often as a result of dynamic, structuring factors of performance.⁶ Xenakis’s disregard of these empirical difficulties is typical of the intellectualist bent of structuralism; the universal applicability of his solution is another structuralist trait. Moreover, his rationale is more profitable as a generator of new scales than as a way of analysing existing ones. For this reason it is more helpful to examine the sieve theory in use in one of his own works, *Nomos Alpha*.⁷

The actual sievings are not in themselves of great interest: in their method, they follow the example given earlier but are greatly complicated by using either quarter-tone or three-quarter-tone gamuts. The laborious task of plotting the sieves, one by one, on graph paper before turning the completed grids into musical notation has given rise to errors, both with Xenakis and Vandenbogaerde. In addition, Xenakis has made his own, privately motivated

⁵See Ramon Fuller, “A Structuralist Approach to the Diatonic Scale”, *Journal of Music Theory* 19 (Fall 1975): 182-210.

⁶In *FM*, 198, Xenakis offers a formalization of an Indian rāg, based on the notation of Alain Daniélou whose approach attempts to explain modern Indian practice in terms of ancient musical theory. N. A. Jairazbhoy suggests that this is an unjustifiably unproblematic approach (see *The Rāgs of North Indian Music* [London: Faber and Faber, 1971], 34-36 and 164-69), though he is forced to accept the twelve-semitone standard as a starting point for his theory (*ibid.*, 36). A great deal of his book illustrates the convenience of doing so, as well as the incompatibilities that then arise. The correlate of this tension is, not surprisingly, a strongly evolutionary understanding of rāgs: the conceptual model symbolizes for him the control of the rate of change by tradition, while the incompatibilities symbolize the instability of the rāgs, the “stimulus for evolution” (*ibid.*, 179).

⁷Xenakis has helped to spawn a number of analyses of this spectacular work for solo cello by presenting his own pre-compositional material in *FM*, 218-36. I draw on Vriend’s article especially. See also Thomas DeLio, “Iannis Xenakis’ *Nomos Alpha*: The Dialectics of Structure and Materials”, *Journal of Music Theory* 24, no.1 (1980): 63-95; F. Vandenbogaerde, “Analyse de *Nomos Alpha* de I. Xenakis”, *Mathematiques et sciences humaines* 24 (1968), 38-53.

adjustments⁸ that render a detailed knowledge of this outside-time structure imperfect. The fact that the adjustments were made for the sake of “interest”—an instinctive judgement—ought not to prompt cynicism about the method so much as alert the analyst to the pervasive influence of the composer’s intuitions on his material, even at this *a priori* stage. Vriend suggests pertinently that these theoretical dissatisfactions might be rewarded by adopting a different technique of pitch selection (he mentions stochastics, which is perfectly appropriate in Xenakis’s case) or by realising the data more precisely, presumably by electronic means.⁹ However, he defends Xenakis’s technique as a “source of inspiration”. More important, perhaps, it is evidence of his intentions.¹⁰

In order to comment on these intentions, analysis of the pitch grids must go beyond the sieving (whose logic has been outlined already) to its implications, for in this work the sieves are allied to other operations that determine the pitch outcome. To step behind the sieves, so to speak, their general form is expressed algebraically:

$$L(m,n) = (\overline{n_i \cup n_j \cup n_k \cup n_l}) \cap m_p \cup (\overline{m_q \cup m_r}) \cap n_s \cup (n_t \cup n_u \cup n_w)$$

What is the source of this grid generator?

This standard form ... is nothing but the result of many tentative operations by hand, shiftings and rearrangements of modules and their transpositions until a grid was finally generated which obeys a few demands which Xenakis adhered to: “to be not too symmetric (regular) nor too empty, interesting from the point of view of scale, that is”.¹¹

What are the specific options for generation? “Its moduli are taken from the subset formed by the prime residual classes modulo 18, with multiplication, and reduction modulo 18”.¹² The decision to use modulo 18 presumably refers back to the string of subdivisions of the piece which amount to 18 in the main “path” of the piece, each group of 3 subdivisions being distinguished from the succeeding by an intermezzo. Just as each subdivision represents a transformation of its predecessor, these transformations being a selection or subset of an original octahedric group linked by means of a rule of concatenation,

⁸See Vriend, 64 and 79, n.15.

⁹“*Nomos Alpha*”, 64-65.

¹⁰The problems of his technique and its realisation have been touched on by others. Tim Souster, in “Xenakis’s *Nuits*” (*Tempo* 85 [Summer 1986]: 5-18), remarks on “the wholly individual gaucheness of instrumental writing” (6) in *Achorripsis*, an early work.

¹¹Vriend, 78, n.14. No source is given for Vriend’s quotation of Xenakis.

¹²*FM*, 230.

so the “metabola”, or transformations of the initial sieve, are determined by a similar rule from the group of residual classes (of numbers primely relative to 18) obtained “by ordinary multiplication followed by reduction relative to the modulus 18”.¹³ The appearance of parity between the methods of generating total sound complexes on the one hand and specifically pitch complexes on the other ought not, however, to conceal the fact that the admittedly arbitrary choice of sound complexes (e.g. “stochastic field of sliding sounds”, “relatively ordered field of sustained sounds”) still provides a link in the imagination with musical results, albeit fragmentary, whereas the choice of a subset of prime numbers seems to offer little connection with the musical outcome at all. Perhaps {1, 5, 7, 11, 13, 17} struck Xenakis as being “interesting from the point of view of scale”, but the distinct impression is that “scale” here is non-musical scale, i.e. grid element. Since none of these primes is a factor of 24, their use implies a deliberate avoidance of octave periodicity, but the final pitch pools are in any case compounded with a high degree of artificiality.¹⁴

The extra-musical qualities hinted at in the sieve idea itself are manifest in the elaboration of sieves called “metabola”. The idea of transformation is native to group theory and Xenakis bases his generation of grids on a specific group (the prime numbers) and specific operations (multiplication with reduction modulo 18). By a rule of concatenation (the continuous application of the operation to the last two elements, thus: 11, 13→17; 13, 17→5; 17, 5→13; 5, 13→11) a closed string

¹³Ibid., 232.

¹⁴Paul Griffiths, in “Xenakis: Logic and Disorder” (*The Musical Times* 116 [April 1975]: 329-31, estimates that the set resulting from the departure function

$$L(11, 13) = \underbrace{(13_2 \cup 13_5 \cup 13_7 \cup 13_9)}_{\dots} \cap 11_2 \cup \underbrace{(11_4 \cup 11_8)}_{\dots} \cap 13_9 \cup (13_0 \cup 13_1 \cup 13_6)$$

recurs every 143 quarter-tones, i.e. about every six octaves. Practically speaking, even with *scordatura*, the limits of cello range are in the region of six and a half octaves, which ensures an effect of asymmetry (aperiodicity). However, Griffiths (331) has his own version of the “stops of origin” which differ for the two sections of the function marked with dotted brackets. Xenakis proposed a difference of two quarter-tones between these sections, calling this a “special metabola”, but, as Vriend has pointed out, it is not a metabola: as a simple transposition of the function, it can be indicated by adding or subtracting two to the indices 0, 1 and 6. The problem is that it is not possible to decide by studying the score which are pitch adjustments and which are mistakes, since not all the notes generated by the subset are actually used! It is possible to conceive of a number of grids that would thus approximate the actual scored pitches. Vandebogaerde proposes one with the indices 6, 7 and 12 for the second bracketed term “pour une meilleure utilisation des résultats”. Griffiths sticks to the original indices 0, 1 and 6, but places their origin one quarter-tone higher than that of the first term. He regards Xenakis’s two quarter-tone difference ($A_3^\#$ and A_3) as a misprint. As it happens, Griffiths’ own version of the departure function has a \cup sign in place of the second \cap sign. Whether this is his error or a printer’s, it exemplifies the propagation of inconsistencies that make the “reconstruction of the grids and checks in the score . . . a frustrating job” (Vriend, 64).

or "loop" of transformations is generated in a way similar to the octahedral transformations of the total sound complexes. The question is, are there properties intrinsic to the transformation operation that also have musical significance?

From Vriend's work (61-63) it is clear that there might be: average interval size, periodicity, interval characteristics, among other factors, might all be taken into consideration in the transition from one grid to another. These statistics might be integrated into an expression of the degree of affinity between grids (or their rate of change). It is precisely these factors that are ignored in the operation of group transformation. This arbitrary collection of grids is, in Vriend's view, the product of "symbolic actions [performed] on the musical material".¹⁵ Symbolic of what? Judging from Xenakis's admiring comments on *metabolae* as found in Byzantine monody,¹⁶ his approach aims at "a harmonic language that is much more refined and complex than that of the syntonon diatonic and its scales in octaves, . . . [an] abstract and sensual architecture, both complex and remarkably interlocking (harmonious)".¹⁷ All one can say positively about the choice of group structure in this instance is that it provides criteria of selection and variation of material.

There is no question of the attraction that this statistical orientation holds for contemporary composers: it is familiar from the work of Stockhausen, for instance. The question of its source of attraction remains. Is it an inspiration drawn from the teeming anthills that constitute the modern metropolis or is it a rationalisation of mass phenomena, a "long view" that claims to make sense of the nonsensically haphazard? Perhaps if one viewed music as a conduit of sensuously perceived knowledge, one might hope for the former. In fact, it seems to be ever purer ratiocination that is the lure: it is not surprising that Vriend should sneer at "higher-level inspiration . . . and all that nonsense" and recommend "the invention or discovery of new techniques or new materials . . . as legitimate a source of inspiration as any other".¹⁸ He is here scoring rather cheap points for "skinny rationalists", as he jokingly calls them. It is interesting to note,

¹⁵"*Nomos Alpha*", 63.

¹⁶*FM*, 190-92.

¹⁷*Ibid.*, 191-92.

¹⁸"*Nomos Alpha*", 80, n.17.

however, that precisely the word “statistics” originally applied “to such data as of importance to the political state as population, yield of taxation, value of trade, and mortality; and to the study and interpretation of such data. As commonly understood nowadays, statistics is a mathematical discipline concerned with the study of masses of numerical data of any kind”.¹⁹

The significance of mathematical disciplines in the process of composition is discussed below (298-99): the general drift of mathematics from empirical to aesthetic criteria is noted there. The conclusion is, therefore, that Vriend is justified in claiming for rationalistic procedures the power to mould artistic responses. What is not justified is his attempt to play off the “new” (embodied in mathematical concepts) against the “old” (implied in his derision of Dionysian aesthetics). The suggestion that such procedures might offer a check on intuition or even an alternative to it is, thus, highly suspect. De-empiricized concepts represent, in aesthetic terms, an even greater retreat into subjectivity than ordinary Romantic intuition.

Xenakis has made much of the “dialectic” of reason and intuition which he considers to dominate his work as a composer.²⁰ He states it in predictably grand terms: he works, as he sees it, between the poles of immutable order (cf. Plato’s perfect world of ideas) and irresistible flux (Heraclitus’s vision), constructing “architectures” or “orders” from the promptings of vision and reinforcing that inspiration by the energy that accompanies his rationalizing of those promptings. It seems a pity to disturb the equilibrium of these ideas, but the focus of this section on analysis and, hence, on the analysable prompts a degree of hesitancy in accepting the second term of this “equation of creation”. The objection to Xenakis’s belief that he is pinning down human thought in sound arises from the nature of post-classical mathematics, his axiomatisation and formalisation procedures resting, as they do, almost exclusively on modern thought. The problem is succinctly put in John von Neumann’s essay, “The Mathematician”.²¹

¹⁹*Encyclopaedia Britannica*, 11th ed., s.v. “Statistics”.

²⁰Since *Nomos Alpha*, he has quite often attributed the writing of a work or a dimension thereof to intuition. It is important to note that this is not, however, a return to “originality”: he writes freely but on the basis of thorough acquaintance with his stochastic methods, i.e. he has developed stochastic “habits”.

²¹In R. B. Heywood, ed., *The Works of The Mind* (Chicago: Chicago University Press, 1947; Phoenix Edition, 1966), 180-96.

In the first place Von Neumann is concerned to show that mathematics has long had a two-edged aspect, possibly from Euclid's Fifth Theorem on: that is, its undeniably empirical bases have often been obscured by movements away from and sometimes back to the natural sciences, but their traces have been perceptible until quite recently. In the same generation in which general relativity was discovered, Euclid's axiomatic method was at last completely de-empiricized by modern axiomatic-logical mathematicians. This historic ambivalence has been only one factor, a cardinal one, in the modern re-evaluation of the exactness of proof, i.e. of mathematical rigour. Nowadays it is not possible to justify classical mathematics in its own terms, but neither is it practicable to abandon it. The relation of mathematics to philosophy, therefore, entails a built-in degree of uncertainty.

But more problematic is the drift of modern mathematics away from the slightest empirical roots:

The symbolism of algebra was invented for domestic, mathematical use, but it may be reasonably asserted that it had strong empirical ties. However, modern, "abstract" algebra has more and more developed into directions which have even fewer empirical connections. . . . [T]he mathematician's subjective criterion of success of the worth-whileness of his effort, is very much self-contained and aesthetical and free (or nearly free) of empirical connections.²²

Algebra shows the problem from one viewpoint; a comparison of theoretical physics and mathematics yields another:

[T]he attitude that theoretical physics does not explain phenomena, but only classifies and correlates, is today accepted by most theoretical physicists. This means that the criterion of success for such a theory is simply whether it can, by a simple and elegant classifying and correlating scheme, cover very many phenomena, which without this scheme would seem complicated and heterogeneous, and whether the scheme even covers phenomena which were not considered or even not known at the time when the scheme was evolved.²³

As Von Neumann concludes, such a criterion is largely "of an aesthetical nature". Where theoretical physics differs from mathematics is in the objectively given problems facing the physicist: he must formulate theory to cope with experimental problems or, at times, to resolve contradictions within existing theory. No such concentration of theoretical enterprise binds the mathematician:

The mathematician has a wide variety of fields to which he may turn, and he enjoys a very considerable freedom in what he does with them. To come to the decisive point: I think that it is correct to say that his criteria of selection, and also those of success, are mainly

²²Ibid., 191.

aesthetical. . . [T]he existence of some underlying empirical, worldly motif in the background—often in a very remote background—overgrown by aestheticizing developments and followed into a multitude of labyrinthine variants—all this is much more akin to the atmosphere of art pure and simple than to that of the empirical sciences.²⁴

Such assertions are highly damaging, I think, to Xenakis's view of the modern mandate: to set art on a scientific foundation and to ally the two traditions. It seems clear that the Theory of Probability underlying his stochastic music, and his own Sieve Theory answer precisely to Von Neumann's descriptions. If his approach is in itself a practice characterised by personal design, arbitrary "inspirations" and originality generally, then the composer has hardly moved, despite his protestations, from the *l'art pour l'art* consciousness of many a humbler person. After all, he is not the only one to be drawn to models of modern thought—information theory has been highly productive for Stockhausen—but an historical reminiscence may serve to underline how emphatically private, how esoteric this most "public" of artistic credos may actually be.

There can be no doubting the importance of the catalytic friendship between Schoenberg and Kandinsky between 1911 and 1913.²⁵ From the stage works written by both men at this time—in particular, *Die glückliche Hand* and Kandinsky's *Der gelbe Klang*—there emerges a prophetic "formalisation of parameters", though without the mathematical dimension found in Xenakis. This formalisation is, moreover, realised in the visual-spatial product as well as the music, in much the same way that Xenakis's conceptual foundations have been translated into visual as well as aural results.

Der gelbe Klang (c.1909-12) and the short essay "On Stage Composition" published with it form a quasi-theoretical background to the works.²⁶ Kandinsky's

²³Ibid., 192.

²⁴Ibid., 194-95.

²⁵This has been fascinatingly documented in J. Hahl-Koch, ed., *Arnold Schoenberg—Wassily Kandinsky: Letters, Pictures and Documents*, trans. John C. Crawford (London: Faber and Faber, 1984).

²⁶This is not the place to add to the incipient dispute between Hahl-Koch and Crawford on the question of influence. Hahl-Koch insists that no documentary evidence shows that Schoenberg knew Kandinsky's texts before writing his own. Crawford is equally convinced that the ordering of colours in Scene 3 of *Die glückliche Hand* is indebted to Kandinsky's scheme of colours and their psychical effects as detailed in his book, *Über das Geistige in der Kunst* (1912); failing that, that "both were influenced by a common, earlier source" (Hahl-Koch, 198, n.86). Did Schoenberg know of Mme. A. Sacharinsky-Unkowsky's attempts to transcribe music from the colours of nature, not to mention Scriabin's efforts in this area, which Kandinsky considered

main thrust was a criticism of nineteenth-century art as being “far removed from inner creation”.²⁷ In the case of theatre works (drama, opera, ballet), the century’s output was dominated by external happenings (material phenomena) and their forms answered to the external unity of the action, i.e. an external connection among its individual parts. *Der gelbe Klang* therefore eschews narrative connections and “additive emotions” almost entirely. What it seeks to embody is “inner necessity” or “one’s feeling for the necessity of the inner unity”.²⁸ Were *Der gelbe Klang* to be performed—Thomas von Hartmann’s music for it is lost—it would present a series of, at best, tenuously related scenes that correspond to the artist’s interior vision.

Two significant problems arise from this doctrine. The first is the tendency of the audience, in the absence of more familiar “cues”, to construct a meaning for the events of the music drama by reading details symbolically. Schoenberg tries to counter this in his 1928 lecture on *Die glückliche Hand*:²⁹ such details are merely “a line of demarcation”, an “outer husk” whose totality is more than their accumulation:

None of these [details] is meant to symbolize anything but that which is usually symbolized by tones. All of it is intended to mean no less than sounding tones mean.³⁰

This ought not to be considered merely cryptic: Kandinsky, for instance, had been struck by the example of music which “could express itself completely without using external forms”.³¹ In his attempts to go beyond visual imitations of nature, even Cubist ones, he wanted to ensure that “the non-imitative forms he intended to use to give plastic expression to his own inward world should not be the result of imitations of chance forms”.³²

Precisely this desire for coherence was the other problem, this time the artist’s. For both Schoenberg and Kandinsky, the logic of their approach lay in somehow treating the stage media (sound, gesture, colour) as equal, more or less independent elements. The compositional challenge was to arrange these elements so that, regardless of seemingly disparate paths, they led together to one

“very elementary”? See Crawford’s article “*Die glückliche Hand*: Schoenberg’s *Gesamtkunstwerk*”, *The Musical Quarterly* 60 (October 1974): 583-601.

²⁷Hahl-Koch, 112.

²⁸Ibid., 116.

²⁹The so-called “Breslau Lecture”. See Hahl-Koch, 102-7.

³⁰Ibid., 107.

³¹See G. di San Lazzaro, *Painting in France, 1895 - 1949* (London: Harvill Press, 1949), 90.

³²Ibid.

summit. Kandinsky faced this challenge by asserting that separate colours had different spiritual effects—"vibrations"—on the soul, and by adding to the expected effect the instrumentation that might produce the same effect.³³ This is tantamount to a description of his type of abstraction, his theory of plastic harmony. Schoenberg was generally more moderate, less schematic in his thinking, which is summed up in the Breslau Lecture:

[S]ince this capability [of creating spiritual impressions] is certainly not present in tones alone, it should also be possible, under certain conditions, to bring about such effects with other media; that is to say, if they were treated like tones; if, without denying their material meaning, but **independently** of this meaning, one managed to combine them like tones, by measuring them as to time, height, breadth, intensity and many other dimensions; if one knew how to bring them into relationship with each other according to deeper laws than the laws of the material—according to the laws of a world rationally constructed by its creator.³⁴

I consider this to be a remarkable divination of Xenakis's intentions. The idea of treating a medium independently of its meaning is synonymous with "the virtual architectures", the outside-time constructions. The combination achieved in the *a priori* structures by means of the measurement of the "many dimensions" of a medium foreshadows Xenakis's use of parametric specifications of the elements of his works. The "deeper laws" correspond precisely to those of the logical operations used in group transformations. Only Schoenberg's theism and his world model distinguish his views from Xenakis's cosmic atheism.

Naturally, there are other differences, as any perusal of the relevant documents shows. But, though Xenakis works in the "medium" of rational models and Schoenberg, in his search for "deeper laws", plumbs inner processes that are by nature only personally accessible until they are offered as a composition, yet the two figures can be seen to be striving with the same basic issue, that of "causality" in music (Xenakis) or "inner necessity" (Kandinsky, Schoenberg).

³³The colour/effect associations are for the most part unremarkable: the colours follow a "spectrum" from black to white, the psychical content rising practically in parallel from "eternal silence without future or hope" to "silence, which is not dead, but full of possibilities". Nor does the attribution of parallel musical characteristics hold many surprises: the emphasis is on timbre, commonly referred to as "colour". Less palatable are the free references to "vibrations of the soul" and the "spiritual". This is partly a translation problem that has been recently highlighted in a psychoanalytic context in Bruno Bettelheim's book *Freud and Man's Soul* (London: Chatto and Windus, 1983); see n.43 below). But it was a problem of fashion, too, as is illustrated by Schoenberg's remark: "This kind of art . . . has been called expressionist. . . . [H]owever, I said that it is the art of the representation of inner processes. But I must not say that loudly, for all that is despised today as romantic" (Breslau Lecture, Hahl-Koch, 105).

³⁴Ibid.

Die glückliche Hand was written along with those works of Schoenberg's that renounce a tonal centre but do not qualify as serial. It seems fair to understand these works as gropings forward that cleared the ground for his "Method". But there is ample evidence of the satisfactions that this renunciation yielded at the time, even to the extent of its appearing to render "coherence" itself obsolete:

It should not be said that order, clarity, and comprehensibility can impair beauty, but they are not a necessary factor without which there would be no beauty; they are merely an accidental, a circumstantial factor. For nature is also beautiful even when we do not understand her, and where she seems to us unordered.³⁵

Kandinsky characteristically puts the case—on Schoenberg's behalf—in a more extreme way:

This inner beauty [i.e. that occasioned by the demands of internal necessity] naturally appears ugly to those not accustomed to it, since man in general inclines towards the external, and does not willingly recognize internal necessity.... The Viennese composer Arnold Schoenberg, with his total renunciation of accepted beauty, regarding as sacred every means that serves the purpose of self-expression, goes his lonely way unrecognized, even to-day, by all but a few enthusiasts.³⁶

Kandinsky's enthusiasm takes him beyond Schoenberg's position. He quotes from *Harmonielehre* ("Every chord, every progression is possible. And yet I feel already today that even here there are certain conditions that govern whether I choose this or that dissonance"), only to explain that these governing or limiting conditions are the marks of the age, "its own particular measure of [absolute] freedom":

But this measure must be—and will be—exhausted every time. The obstinate cart may struggle as it will! Schoenberg also seeks to exhaust this freedom, and on the path of internal necessity he has already tapped the veins of gold of the new beauty. Schoenberg's music leads us into a new realm, where musical experiences are no longer acoustic, but purely spiritual. Here begins "the music of the future".³⁷

Schoenberg's relation to absolutes of any kind is considerably more subtle,³⁸ and his dedicatory paragraph in Kandinsky's copy of *Harmonielehre* notes that the

³⁵*Harmonielehre*, original (1911) ed., 31, as quoted in Roy Carter's translation of the third (1922) edition, *Theory of Harmony* (London: Faber and Faber, 1973), xvii-xviii.

³⁶*On the Spiritual in Art*, in K. C. Lindsay and P. Vergo, eds, *Kandinsky: Complete Writings on Art*, 2 vols (Boston: G. K. Hall, 1982), 1:149.

³⁷*Ibid.*

³⁸See John F. Spratt, "The Speculative Content of Schoenberg's *Harmonielehre*", *Current Musicology* 11 (1973), 83-88.

book “almost perhaps leads away from *On the Spiritual in Art*, whereas it would really like to lead toward it”.³⁹ Underlying Schoenberg’s view of musical history is a strong urge to unite its seemingly disparate products by means of “truistic reasoning” and “the abstract view that culture evolves from the implicit to the explicit”.⁴⁰ The term he finally came to as an explanation of the orderly expansion of tonality into music without tonal centres was monotonicity, a principle, rather than a law, sufficiently broad to encompass various tonal manners.⁴¹

Yet it is Kandinsky’s description of the anti-logic of internal necessity that best suits the moods, the fits and groans, of *Die glückliche Hand*:

Clashing discords, loss of equilibrium, “principles” overthrown, unexpected drumbeats, great questionings, apparently purposeless strivings, stress and longing (apparently torn apart), chains and fetters broken (which had united many), opposites and contradictions—this is our harmony.⁴²

In the final analysis, Schoenberg’s self-confidence sustained him through this time: he felt justified in using *Ausdrucksgewalten* to guide him, because he assumed the reality of “inner necessity”. Perhaps the most succinct explanation of the term can be found in these words from the *Harmonielehre*:

In composing I decide only through feeling, through the feeling for form. This tells me what I must write, all else is excluded. Every chord that I put down answers to a compulsion: a compulsion of my need for expression, but perhaps, too, the compulsion of an unsolicited and unconscious logic in the harmonic construction.⁴³

³⁹Quoted in Hahl-Koch, 172.

⁴⁰Spratt, 87.

⁴¹See Arnold Schoenberg, *Structural Functions of Harmony*, rev. ed., ed. Leonard Stein (New York: Norton, 1969), 19: “Monotonicity includes modulation—movement towards another mode and even establishment of that mode. But it considers these deviations as regions of the tonality subordinate to the central power of a tonic. Thus comprehension of the harmonic unity within a piece is achieved.”

⁴²*Complete Writings*, 1:193.

⁴³Third edition, 502, quoted in Alan Lessem’s article “Schoenberg and the Crisis of Expressionism”, *Music and Letters* 55 (October 1974): 431, n.8. The article provides a useful survey of the social and intellectual background of the “free atonal” works. Though Lessem touches on dreams and “a return to the deeper recesses of the psyche . . . [to] tap afresh the sources of artistic order” (435), he makes no overt reference to the psychoanalytic movements of the time. This is all the more surprising in the light of Schoenberg’s collaboration with Marie Pappenheim on *Erwartung*. Anglo-Saxons tend to forget, if they ever knew, that “psychology” in German has never had the clinical ring it has in English. We are largely unfamiliar with the distinction between *Naturwissenschaften* and *Geisteswissenschaften* or, at best, regard the latter as less than scientific. This seems to arise from the English background in positivism, which accords positivistic-pragmatic meanings to ideas that might equally well be considered hermeneutic-spiritual, an added factor whose presence in the German mind is guaranteed by a long tradition of Idealism. For Freud, the terms “psyche” and “soul” were interchangeable; by virtue of the same

In this way, Schoenberg expressed his faith in the “miraculous contributions of the subconscious”, and “a centralizing power comparable to the gravitation exerted by the root” operative in the so-called atonal works. In the light of these beliefs, it is clear why he rejected the word “atonal”: it implies a rootlessness of the tones, a senselessness of the music. On the contrary, these proto-expressionist theatre pieces accepted a relative disorder of the immediate surface of a work—indeed, revelled in it—in the belief that the true order, having arisen in the unconscious mind, gripped the work at that level too.

Having detailed Xenakis’s debt to modernism, we may mention more briefly his close relation to structuralist thought. In *Formalized Music* he acknowledges the importance of the work of Piaget, particularly the latter’s study of time perception in children. Xenakis himself emphasises two particular aspects of perception that occur widely in Piaget’s theories: the “underlying forms of thought beyond the senses and the immediate perception”⁴⁴ and their validity not only for musical time but also pitch and timbre. In the introduction to this section (chap. 8, 176-77) an attempt was made to describe the differentiation of a mental substratum—consisting of certain primordial intellectual operations—from the more or less complex structures of conscious thought. Structuralists argue that these products—“co-ordinations” in Piaget’s term, “transformations” in Chomsky’s—remain reducible to the underlying operations, whose characteristic trait, according to Piaget, is reversibility, either by inversion or negation (cf. the addition or subtraction of numbers) or by reciprocity (cf. a change of order of two numbers).⁴⁵

The connection Piaget sees between the primitive ordering and classifying structures of children’s thinking and the “mother structures” of mathematics as

background, Schoenberg used the terms “unconscious” and “spiritual” synonymously. See Bettelheim, 41-44.

⁴⁴Simon Emmerson, [“Interview with Xenakis”], *Music and Musicians* 24 (May 1976): 26.

⁴⁵Jean Piaget, *Genetic Epistemology*, trans. Eleanor Duckworth (New York: Columbia University Press, 1970), 21-22. In fact, Xenakis appears to equate a child’s (unsocialised?) use of the ordering operation with differing verbal descriptions of pitch, such as high/low, sharp/flat, little/big. Children, he notes, “often turn things upside down; that is the property of ... structures” (“Interview”, 26). But are the verbal forms as arbitrary as that? Can a person schooled in “high” and “low” sounds not also appreciate the “little/big” language (cf. piccolo/bassoon, short string/long string)? Their common referent is not simply “ordering” but “spatial ordering”, and that is not an arbitrary realm. Children, after all, quickly learn to differentiate what may and what may not be arbitrarily turned on its head. This carelessness is typical of structuralist thinking: it tends to play down content in its emphasis on form. For an interesting examination of this problem, see Peter C. Wason, “The Theory of Formal Operations: A Critique”, in Beryl A. Geber, ed., *Piaget and Knowing: Studies in Genetic Epistemology* (London: Routledge and Kegan Paul, 1977), 119-35.

determined by the Bourbaki group in their quest for the structural isomorphisms that link the various branches of mathematics, has been adduced by Xenakis as the very basis of music, which “may be defined as an organization of these elementary operations and relations between sonic entities or between functions of sonic entities”.⁴⁶ Such a definition necessarily alligns music with mentalistic preoccupations; indeed, Piaget insists that knowledge of an object “means constructing systems of transformations that can be carried out on or with this object. Knowing reality means constructing systems of transformations that correspond, more or less adequately, to reality”.⁴⁷ Xenakis would have it that “to make music means to express human intelligence by sonic means”.⁴⁸ His appeal to mathematical theories—set and group theories in particular—as being appropriate expressions of the primitive psychological operations in structures connects him also with Chomsky. The following comparative table is intended to underline selectively Xenakis’s more overt affinities with structuralist premisses and procedures.

The ear does not hear. It is the mind that hears.⁴⁹

[W]e must look beyond the conscious and the affective to find behind it the unconscious and the intellectual.⁵⁰

No rupture exists between the sciences and the arts. The age of Scientific and Philosophical Arts has begun. . . . [M]usical thinking has been, and is, far behind thinking in physics and mathematics. We must make up the lag. . . . [M]usicians could have created the abstract structure of the Kinetic Theory of Gases, solely for the purposes [of] and by means of music.⁵¹

We shall have the hope of overcoming the opposition between the collective nature of culture and its manifestations in the individual, since the so-called “collective unconscious” would in the final analysis, be no more than the expression on the level of individual thought and behaviour of certain time and space modalities of the universal laws which make up the unconscious activity of the mind.⁵²

⁴⁶FM, 4.

⁴⁷*Genetic Epistemology*, 15.

⁴⁸FM, 178.

⁴⁹Xenakis, quoted by Maurice Fleuret, “Xenakis: A Music for the Future”, *Music and Musicians* 20 (April 1972): 20.

⁵⁰Simon Clarke, *The Foundations of Structuralism* (Brighton, Sussex: Harvester Press, 1981): 226. This statement is a summary of Levi-Strauss’ anthropological outlook.

⁵¹Xenakis’s sleeve-notes to the recording of *Metastasis* VCS 10030.

⁵²Claude Levi-Strauss, *Structural Anthropology*, trans. C. Jacobson and B. G. Schoepf (London: Allen Lane, 1968), 202-3, quoted in Clarke, 182.

Musical syntax has undergone considerable upheaval and today it seems that innumerable possibilities coexist in a state of chaos. We have an abundance of theories Yet [a] sub-stratum exists, and it will allow us to establish for the first time an axiomatic system, and to bring forth a formalization which will unify the ancient past, the present, and the future; moreover, it will do so on a planetary scale⁵³

In order to understand the universal past and present, as well as prepare the future, it is necessary to distinguish structures, architectures, and sound organisms from their temporal manifestations. It is therefore necessary to take "snapshots", to make a series of veritable tomographies over time, to compare them and bring to light their relations and architectures, and vice versa.⁵⁵

The alternative [to positivism] adopted by structuralism is a relativist rejection of the evaluation of theories by reference to reality. . . . [T]he task of the scientist is to purify the logic of the theory, to formalize and axiomatize it, to create a closed logical theory of an ideal object. . . . A theory which is adequate is one that can provide a coherent and logical framework for discourse⁵⁴

The belief that it is possible to isolate cultural systems that have an objective meaning leads directly to the conception of society, adopted by structuralism, as a series of systems of representations which exist independently of and prior to individual actions and beliefs These autonomous systems of representations exist quite independently of their application, they can be studied even if they are never applied, they continue to exist even if the societies that practised them have died out.⁵⁶

⁵³*FM*, 182.

⁵⁴Clarke, 103.

⁵⁵*FM*, 192, 208-9.

⁵⁶Clarke, 100-101.

Starting from certain premises we should be able to construct the most general musical edifice in which the utterances of Bach, Beethoven or Schoenberg, for example, would be unique realisations of a gigantic virtuality, rendered possible by this axiomatic removal and reconstruction.⁵⁷

The problem [Chomsky] set himself was that of generating logically the grammatical sentences of a natural language, while neo-positivism had set itself the problem of translating natural languages into the formal system of an artificial logic. The mathematical logic developed by the latter provided a means of achieving this translation. Thus Chomsky used the same logic to achieve the reverse result . . . to generate the grammatical sentences of natural language.⁵⁸

The conclusion to be drawn from the foregoing is quite simply that Xenakis's claims need adjustment. His idea that outside-time structures have been most highly developed in the high cultures of Asia shows an indifference towards certain important qualifications.⁵⁹ More important, his appeal to the pre-Socratic Greek outlook—what he calls the “Pythagorean-Parmenidean field”⁶⁰—as the basis of his thought, and to post-classical mathematics as the best vehicle for its realisation, seems to ignore the possibility that his creative soil, like that of many other contemporary composers, is modern thought, and that his Greek titles, evocative when explained, are little more than indicators of his personal points of departure.

⁵⁷*FM*, 207.

⁵⁸Clarke, 142.

⁵⁹See chap. 8, n.2, and this chapter, n.6.

⁶⁰*FM*, 209.

Appendix 1

The Scene In The Smithy: Further Notes

The tale of Pythagoras in the smithy is a well-known anecdote, often assumed to have no purpose beyond the hagiography of Nicomachus and Iamblichus—interested parties, to put it mildly. However, the possibility of a far more intricate, indeed, honourable pedigree for the story has been raised by Jørgen Raasted, who has applied a fine-tooth comb to its variants and commentaries, and explored corroborative evidence in Plato.¹ The following draws largely on his study.

The “lineage” of the account can best be represented as a kind of double tradition whose branches each are headed here by the material objects that figure in their respective accounts.

Disks, Spheres, Hammers

1. According to Aristoxenus, as recorded in the Scholion to Plato, *Phaedon* 108D, the early Pythagorean, Hippiasos (fifth century B.C.), performed proportional experiments:

¹“A Neglected Version of the Anecdote about Pythagoras’s Hammer Experiments”, *Cahiers de l’institut du moyen âge grec et latin* 31A (1979): 1-9. Raasted notes in passing that only in 1634 (in Mersenne’s *Questions harmoniques*) was the discovery in Nichomachus’s famous tale shown to be impossible in physical terms.

Hippasos prepared four bronze disks [*diskoi*] in such a way that their diameters were equal, while the thickness of one was $\frac{4}{3}$ that of the second, $\frac{3}{2}$ that of the third, and double that of the fourth; when struck, they made concordant intervals.²

2. The version that features Pythagoras's personal discovery in the smithy is originally Nichomachus's. Here the effective differences are in the weights of the hammers (*sphyrarai*):

[H]appening by some heaven-sent chance to walk by a blacksmith's workshop, he heard the hammers beating iron on the anvil and giving out sounds fully concordant in combination with one another, with the exception of one pairing: and he recognised among them the consonance [*synôidia*] of the octave and those of the fifth and the fourth. He noticed that what lay in between the fourth and the fifth was in itself discordant, but was essential in filling out the greater of these intervals. Overjoyed at the way his project had come, with god's help, to fulfilment, he ran into the smithy, and through a great variety of experiments he discovered that what stood in direct relation to the difference in the sound was the weight of the hammers, not the force of the strikers or the shapes of the hammer-heads or the alteration of the iron which was being beaten.³

3. In the so-called "Hagiopolites" treatise (Paris *MS Ancien fonds grec 360*), mention is made of only one hammer "playing on" several pieces of metal. Here, Pythagoras comes to the conclusion that pitch varies with the weights of *ton sphairon*. At first sight, a scribal error seems likely—*sphyrarai/sphyrion* in Nicomachus appearing here as *sphairon/sphairas*. However, since the treatise is clear about the one (or "one sort of") hammer, the effective differences must lie in *ta chalkeuomena*, i.e. "what was being forged", the work on the anvil. Was this "*ai sphairai*" used with one of the usual meanings of *sphaira*, "ball", "globe", "sphere"?
4. In Ptolemy's treatment of the monochord, he lists among the faulty methods of registration sounds produced by hammers or disks—*sphyrion he diskoi*—of different weights, and with empty and filled vessels. A well-attested variant reading, *sphairon*, was perhaps altered elsewhere to fit the MS tradition; indeed, it is lent extra weight by a Scholion comment in the very same MS:

²Translation in Burkert, *Lore and Science*, 377. The physical specifications here appear to be correct.

³Trans. Andrew Barker, in A. Barker, ed., *Greek Musical Writings*, 2 vols, Cambridge Readings in the Literature of Music (Cambridge: Cambridge University Press 1984, 1989) 2:256-57.

Spherical [Ptolemy has used *sphairikas* to describe the bars of the monochord] is improperly used for a body which is oblong and rounded, exactly as he [Ptolemy] has just used *sphairon* and *diskon* about the same thing.⁴

The suggestion of synonymy between these last two terms (“sphere” and “quoit”) is a further noteworthy “intersection”.

5. Porphyry’s commentary on Ptolemy appears to connect disks of brass (*diskous chalkous*) with Ptolemy’s original “hammers or disks”.

Vessels, Cups, Heavenly Spheres

1. Burkert suggests⁵ that, behind the proportional experiments of Hippasos and Lasus of Hermione with vessels filled to various levels with water—an arrangement no more workable than the Nicomachean hammer and weights—there may be a physically sound set of resonance laws, based on experiments with e.g. hollow theatrical vessel resonators. Within the resonators, columns of air would be excited by pitches whose relationships are reflected in the lengths of the air columns.

2. Asclepiades of Myrlea (first century B.C.) propounds a mundane/celestial connection in these terms:

The ancients, who were the first to ordain for men the things pertaining to civilized life, being convinced that the universe is spherical in shape, and deriving distinct mental images from the shape of the sun and the moon, thought it was only right to make the things pertaining to their own food like the element which encompasses the earth, according to the shape it seemed to have. Hence they made a table round . . . [also tripods, round cakes, bread]. Hence, too, the cup, which contains liquid food, they made circular in imitation of the universe. But Nestor’s cup is even more characteristic. For it has stars also, which the Poet likens to studs, because stars are round just as nails are, and are fastened to the sky.⁶

Raasted comments: “Isn’t it more likely that the celestial sphere was named after its being similar to a bowl than that these bowls got their name from their likeness to the firmament?”⁷

3. The myth of Er (*Republic* 616C-617E) refers to the celestial spheres as eight whorls fitted on the Spindle of Necessity:

⁴Raasted, 5.

⁵*Lore and Science*, 378.

⁶*Deipnosophists* 11.489C-D (Loeb edition).

⁷“A Neglected Version”, 9.

The shape [of the whorl] is like ours of this earth; but to judge from what he said, it is as if there were one great whorl⁸ hollow and scooped out right through, and another one smaller fitting exactly within it, and a third and a fourth and four more, fitted into each other like a nest of boxes [*kadoi* also means “jars or vessels for water or wine”], for there were eight whorls in all fitting each into the next, and they showed their rims from above in circles, forming together one solid whorl around the shaft; and the shaft was driven right through the eighth.

On these accounts, “sphairai” seems to belong to the oldest tradition; the scholiast called them *diskoi*. Credited to Pythagoras as spheres, they were later copied as *sphyrai*, “hammers”, and from this a separate synonym for “hammers” appeared—*raisteres*. This is what Nicomachus uses; Ptolemy kept the two older forms. Evidently, the fact that they were synonyms escaped Porphyry’s notice.

⁸Rouse notes: “Almost like a sphere sliced through the middle, and showing a flat surface there” (*Great Dialogues of Plato* [New York: New American Library, 1956], 417, n.4).

Appendix 2

Some Symbolic Functions in the Visual Arts of the Sixteenth Century

The attempt to show how musical works in the Renaissance might express various ideologies in relation to particular conditions of society, and thereby to restore to them a richness of background that they otherwise lack, appears to be part of a broader stream of work of this kind. Two studies in the area of the visual arts have served as a particular encouragement: Roy Strong's *The Cult of Elizabeth: Elizabethan Portraiture and Pageantry*¹ and André Chastel's A. W. Mellon Lectures (1977), *The Sack of Rome: 1527*.²

It is clear from both these treatments that the use of painting, sculpture, architecture and court spectacles as symbolic media in the sixteenth century was pervasive, highly detailed and influential on both individual and period style. While genre studies are invaluable in showing broad tendencies and developments, they tend to ignore the peculiar details of individual examples and encourage formal interpretations. Thus, A. L. Rowse, whose contribution to the understanding of Elizabethan England is otherwise unrivalled, is aware that the famous miniatures of the period are vehicles of "messages" as well as likenesses,

¹London: Thames and Hudson, 1977. This is set in the European context by Strong's broader study, *Art and Power: Renaissance Festivals 1450-1650* (Woodbridge, Suffolk: The Boydell Press, 1984), which is a substantially rewritten version of his 1973 book, *Splendour at Court: Renaissance Spectacle and the Theatre of Power* (London: Weidenfeld and Nicolson).

²Trans. Beth Archer, Bollingen Series 25, no. 26 (Princeton: Princeton University Press), 1983.

but he considers all but the simplest to be “too esoteric” to be understood.³ Yet, as Strong insists, they were created precisely to be understood, i.e. interpreted: “Like a Renaissance medal, an Elizabethan portrait miniature, with its likeness, emblematic attributes and motto, is meant to be read as a single statement expressing the ideals and aspirations of one particular person at a moment in time”.⁴ It is sufficient to point out that Rowse’s verdict on the portraits of the Queen—that they embodied the “impression of regality”⁵—underplays the fact that this regality consisted of a number of distinct themes, some in apparent contradiction (e.g. the amorous and chaste aspects of the cult), that were purposely exploited in the interests of ruling a divided realm and one that was being re-feudalized at the same time.

Chastel’s book is intended to show that the Sack of Rome was as much an event in the history of art and architecture as it was in the unhappy relations of the spiritual and secular authorities in the Renaissance. The years just prior to the May 1527 assault show, in some of the outstanding painting undertaken in Rome, two unmistakable themes: the unassailable primacy of the pope (unassailable because of the providential protection of the church, as well as the sealing of the Holy Alliance with the French forces), and the express link of the papacy with artistic creation. The first of these is an old theme, but it was given renewed impetus not only by the twin pressures of conciliar and imperial thinking but also by the virulent anti-papist propaganda stirred up in Lutheran quarters. Such decorations as those of Giulio Romano in the Sala di Costantino (one of the great *Stanze* in the Vatican) represent an exalted defence of the papacy: they involve an early use of allegorical figures, “rhetorical formulas translated into images intended to enhance the supreme dignity of the institution, which exceeds by far that of its titular”.⁶ The second theme is an oblique reference to the reign of Pope Adrian VI (1522-23) which had been a barren time for artists in Rome. The “Clementine Style” of the years 1523-27 is shown by Chastel to have been shattered by the fall of the citadel and the pillaging of the city. The subsequent period, covering the end of the reign of Clement VII and running into that of Paul III, i.e. until about mid-century, produced an art geared to the altered political situation. It stressed the redress of the papacy, since the holiest city of

³*The Elizabethan Renaissance*, 2 vols. (London: Macmillan, 1972; reprint, London: Sphere Books, 1974 [Cardinal edition]), vol. 2: *The Cultural Achievement*, 192.

⁴*The Cult of Elizabeth*, 57.

⁵*The Cultural Achievement*, 192.

⁶Chastel, 60.

Christendom had been defiled, and settled on a note of penitence, this being the only way the calamity could be reconciled with a providential understanding of history. One of its more curious products appears in portraits of the older Clement: he is depicted with a long beard, a traditional sign of mourning that had been quite out of fashion at the time of his accession (1523). But beyond that, the iconography of reliefs and engravings illustrates the new “partnership” of emperor and pope, in the process exonerating Charles V of blame for the Sack itself.⁷

The point at which these studies intersect with the arguments on modal representation and, I believe, give them a broad credence is, not unexpectedly, the question of the public display and reinforcement of religious affiliations. Chastel points out that in the years between Luther’s initial attack on indulgences (1517) and the year of the Sack, the very imagery that Rome was using to bolster its pre-eminence was also used by Lutheran, or rather, anti-papist publicists to illustrate the decadence of the established church. Cranach’s *Passional Christi und Antichristi* (1521) and his illustrations to Luther’s *September Testament* (1522) summarize the oldest objections to the papacy, but do so with great precision: the face of the pope in the former is clearly that of Leo X and *The Destruction of Babylon* in the latter is a “direct transposition of Hartmann Schedel’s *imago Romae* of 1493” into an apocalyptic scene, for the purposes of polemic.⁸

The pageantry and painting of the Elizabethan court was in itself a secular phenomenon: it revived medieval chivalric habits (the enthusiasm for genealogy and heraldry, tilts and tournaments, and for the romances expressed in the epics of the age, of which Spenser’s *Faerie Queene* represents the pinnacle), but it overlaid these with the achievements of the Renaissance mind. The crucial point, however, was the ability of this amalgam to command the loyalty of a populace divided not least by religious adherence—Catholic, Protestant and Puritan. All the ritual of state, embracing progresses, masques, tilts and knightly orders, all the ceremonial of weddings and funerals, was designed to “re-focus pre-Reformation loyalties and enthusiasms in a different direction, not toward God so much as to the Crown, or rather to God through the Crown as embodied in the Queen as the Lord’s Anointed”.⁹ Strong has traced the roots of the cult in popular tracts and

⁷Not surprisingly, Strong’s researches overlap with Chastel’s on the subject of Charles’s royal entries into Bologna (1529) and Rome (1536), though neither mentions the other’s work. See *The Sack of Rome*, 183-84, 209-15 and *Art and Power*, 78-83.

⁸*The Sack of Rome*, 73-74.

⁹*The Cult of Elizabeth*, 114.

ballads as they referred to the annual celebration of the Queen's Accession:¹⁰ it appealed to broad anti-papal sentiment and in the hands of writers like John Foxe—in particular, his *Actes and Monuments* (1559 in Latin; expanded English version, 1563)—took on historiographic significance. Foxe's account of universal history was a Protestant-imperial one, locating in Elizabeth a double triumph: the legacy of the last world empire (the Roman), according to the principle that every monarch *est in patria sua imperator* ("emperor in his own land"), and the biblically-revealed restoration of true religion through the defeat of the Antichrist.

One might ask what, if any, significance may be attributed to Thomas Morley's advocacy of the twelve-mode system against this complex backdrop. Morley's life coincided almost exactly with Elizabeth I's reign and therefore with the ascendancy of Protestantism. But the problem of Catholicism persisted, in the form of Recusants—of subjects loyal to the State but looking to Rome as their spiritual authority—and, after 1568, of well-trained priests produced by the English College in Douai. Byrd's Catholicism was quite obvious, and earned him the title "seducer", i.e. of souls to the popish heresy.¹¹ Morley's position was far less clear, but it seems that, whatever accommodations, even deceits, were involved in his career, he was brought up in the Catholic faith and was moved to compose an unusual amount of music to Latin texts, either in veneration of the Virgin or of a penitential, even remorseful nature.¹²

A Plaine and Easie Introduction has often been regarded as conservative in its teaching; what it appears to convey in its account of extemporized counterpoint and the many illustrations that draw on Latin church music from the fifteenth and sixteenth centuries is the schooling that Morley himself had, some of it under Byrd.¹³ The treatise shows acquaintance with Glarean's material, citing numerous composers whose works are known through this source alone. The modal theory may well have been appropriated without any knowledge of its use in continental Europe as an item of controversy. It has at any rate been remarked that this section of the book is far scantier in detail than the other, obviously

¹⁰Ibid., 122-28.

¹¹E. H. Fellowes, *William Byrd*, 2d ed. (Oxford: Oxford University Press, 1948), 44.

¹²See David Brown, "Thomas Morley and the Catholics: Some Speculations", *The Monthly Musical Record* 89 (March 1959): 53-61, and Thurston Dart, "Morley and the Catholics: Some Further Speculations", *The Monthly Musical Record* 89 (May 1959): 89-92.

¹³Dart, 92.

painstakingly researched sections.¹⁴ It is also possibly the most obsolete in comparison with contemporary practice and a reflection of the very different character of polyphonic “tonality” in England.

However, there can be little doubt that certain music by Tallis and Byrd is directly linked with their Roman allegiance. Two of Tallis’s most sumptuous motets, the six-part antiphon *Gaude gloriosa Dei mater*, and the seven-voice Mass *Puer natus est nobis*, are traced by Paul Doe to the years of Queen Mary’s reign.¹⁵ The former, ostensibly in praise of the Virgin, is in fact addressed to the queen herself, “extolling her as the restorer of the true faith”.¹⁶ The Mass, written for use in the joint Spanish and English royal chapels at the time of the residence of Philip II in London, may refer to the news—false, as it proved—that the queen was expecting an heir.¹⁷

Just as Chastel understands Michelangelo’s *Last Judgement* as a representation of the meaning of the Sack of Rome—“not . . . directly, but . . . in a manner characteristic of the Renaissance, by a symbol powerful enough in itself to be commensurate with the event”,¹⁸ so Paul Doe regards late Tallis compositions as “infused with the penitential mood of his . . . generation”.¹⁹ Doe takes issue, though, with the view that Tallis’s settings of the *Lamentations of Jeremiah* represent “a Catholic Englishman’s nostalgia for the glories of the devastated shrines of his own nation”.²⁰ Polyphonic settings of the *Lamentationes* had originated in the previous century: Tallis might have composed his without conscious purpose.²¹ Still, when Edwards reads in Byrd’s motets for Easter and All Saints “a tribute to the enduring faith of his suffering fellow Catholics”,²² he

¹⁴See Philip Brett, “Morley”, *NG* 12:582. Robert Stevenson (“Thomas Morley’s ‘Plaine and Easie’ Introduction to the Modes”, *Musica Disciplina* 6, no. 4 [1952]: 177-84) stresses that, compared with continental teaching, Morley’s is inexact and perfunctory. Dowland’s version of modal doctrine as embodied in his translation (1609) of Ornithoparcus’s *Micrologus* is pitched at an elementary level and is in that sense no better.

¹⁵“Tallis”, *NG* 18:543. See also his earlier *Tallis*, Oxford Studies of Composers 4 (London: Oxford University Press, 1968).

¹⁶*Ibid.*

¹⁷*Ibid.*

¹⁸*The Sack of Rome*, 200.

¹⁹*NG* 18:545.

²⁰David L. Edwards, *Christian England*, 3 vols (London: William Collins, 1981-84), vol. 2: *From the Reformation to the Eighteenth Century*, 104.

²¹See Doe, *Tallis*, 163.

²²*Christian England*, 2:104.

appears to be echoing Joseph Kerman's conviction that the cultivation of the Latin motet by Byrd during the 1580s—the most difficult period for English Catholics—was a clear indication of religious loyalty. The motet texts are frequently laments for Jerusalem from the time of the Babylonian captivity or some version of the “coming of God” theme.²³

²³“Byrd”, *NG* 3:541. See also his detailed treatment of the matter in *The Masses and Motets of William Byrd* (London: Faber and Faber, 1981), 21-54.

Appendix 3

Problems in Debussy Analysis

In Debussy commentaries, “personal idiom” is almost always synonymous with “idiosyncrasy”: Boulez, for instance, writes of Debussy’s “incommunicable experiment and his sumptuous reserve”,¹ but this accolade might well be a refuge from criticism rather than a strut in it. Other interpretations of his individual stamp involve appeals to the “broad French tradition” (clarity, grace, wit, resistance to motivic-thematic development). Robin Holloway, however, suggests that it is a “non-tradition”,

... a culture where every composer of outstanding gifts has had to make it new. In French music, nothing is handed down, every major figure is a law unto himself. . . . Newness in a history without inherited traditions tends towards the odd and even the grotesque. . . . [T]here is something about his newness which in the end compels the acknowledgement of a certain insubstantiality. . . . Debussy’s possession and transformation of Wagner gives him substantiality, significance, and depth.²

This is provocative argumentation, but it is all the same extreme generalising, and the “something” that compels, even the concept of insubstantiality, are both highly subjective reactions.

The most insistent appeal, however, has been to aspects of modernism in Debussy. Authoritative opinion takes various shades. Concluding his survey, Lockspeiser claims that the music “broke down the rigidity of the tonal order a

¹Sleeve-note to Columbia MS 7361.

²*Debussy and Wagner* (London: Eulenberg, 1979), 234.

little more effectively, but the principles of tonality were not relinquished.”³ This is a kind of double-dealing: after all, by the 1880s and 1890s the tonal system boasted as one of its “principles” an outrageously accommodating flexibility. Debussy’s impact is surely tied to more than his assistance in the dissolution of tonality, in company with Wagner, Mahler, and Scriabin. I should be tempted to argue quite the contrary: that in a situation of increasingly fluid tonality, he managed to “stiffen” it in an individual way, to create new “principles” for it rather than overthrow what was left of the old ones.

Roger Nichols represents another line of argument:

The details of Debussy’s technique are easy to catalogue but, as with catalogues, they give little idea of the quality of the product. His desire to free himself from tonality led him to use the church modes and melodic lines inspired by plainsong, the whole tone scale and chords, synthetic modes such as the major scale with sharp 4th and flat 7th and parallel 9ths and triads in which each chord is no more than a colouring of the melodic line.⁴

Clearly, Debussy has evaded the net of empirical studies.

The argument remains unsettled for want of a decisive demonstration of the manner in which these elements are synthesized into a “language”. Debussy’s lack of clear musical progeny suggests that this untangling is no mean feat. Yet, the difficulty of maintaining a major, post-Wagnerian deflection in Debussy’s music—the frustration of plotting a syntax that decisively undoes earlier forms of compositional habit—may lie chiefly in the paucity of new analytical concepts. Whittall’s antithesis, for example, takes its bearings from a tonal case. Others have tried to marshal and interpret the scattered empirical impressions—of Debussy’s chords appearing as sound “entities”, suspended in space, as it were, or of his form as an agglomerative construction; their efforts may be adjudged either more satisfactory than Whittall’s, or less.

Our concern is the selected testimony of composers who claim, or are accorded, a place in the contemporary pantheon, and who have attempted to analyse Debussy from non-traditional standpoints. It is instructive that of the four treatments under consideration, viz:

1. Karlheinz Stockhausen: “Von Webern zu Debussy” (1954), in *Texte*, ed. Dieter Schnebel, 3 vols (Cologne: M. Dumont Schauberg, 1963-71), 1:75-85;
2. Herbert Eimert: “Debussy’s *Jeux*”, *die reihe* 5 (1959): 3-20;

³Debussy: *His Life and Mind*, 2 vols (Cambridge: Cambridge University Press, 1962; reprint, London: Cassell, 1978), 2:230.

⁴NG 5:310. Strangely he has omitted pentatony from his catalogue.

3. Dieter Schnebel: "*Brouillards: Tendencies in Debussy*", *die reihe* 6 (1960): 33-39;
4. Roger Smalley: "Debussy and Messiaen", *The Musical Times* 109 (February 1968): 128-31,

three are studies of single works, and a different group of three finds little to say about tonal abstractions such as the whole-tone scale, presumably because its identification suggests little to the analyser. While the question of tonality remains a moot one, the hopeless inapplicability of traditional formal schemata in Debussy—what Eimert calls "administrative" or "bureaucratic" forms, thereby delivering his judgement on anything vaguely old-fashioned—provides a cleared bomb-site on which to erect new suggestions. We take these formal studies into account for the possible light they may shed on other dimensions of the music, as well as for their probing into problems of form *per se*.

The term "agglomerative" might, in Smalley's view, fit the problematic section-juxtapositions of much of Messiaen—"essentially static forms"⁵—and would encompass the bare connection, the mere parallelism, of the basic idea and its musical realisation. Debussy, by contrast,—and *Jeux* is cited—**suggests** rather than realizes: the formal counterpart is "the continuous morphology of the musical material".⁶ Morphological form is evidently Debussy's invention, "a form in which nothing is fixed but which evolves itself by the continual morphology of its own self, constantly dissolving and recreating its own being".⁷ Though this is meant to be of general application, it is certainly an apposite description of *Jeux*. This view demotes reiteration of material and dramatic contrast, together with symmetries that create expectancy, from their high place in *Formenlehre*. It posits instead an incremental dynamic, a self-inflected extension of material (to use a phrase from grammatical morphology), a style of minimum recurrent, meaningful items (to use one from philology), which yet claims as much coherence, unity, "substantiality", as the older sonatas or symphonies. Eimert chooses a botanical image of the form as an ornamental-vegetative growth from the merest opening material. In the words of Monsieur Croche, "one thinks of a legendary tree, whose buds all suddenly open."

⁵"Debussy and Messiaen", 131.

⁶Ibid.

⁷Ibid. The term "morphology" is of course a neutral one, denoting the science of form. Smalley uses it apparently to mean morphological elaboration or extension. In the case of *Jeux*, the process clearly has ludic associations.

The overstressing of differences between older forms (“rhetorical”, “imposed”, “artificial”, “psychologizing”) and Debussy’s (“intimate”, “organic”, “respiratory”, “acoustically essential”) is understandable in a concentration on a single work which in these analyses is uniformly understood as a prophecy of new music. But it may also be helpful in isolating more clearly the tonal issues at stake. For, if these formal ascriptions are the outcome of purely subjective perceptions—how the musical experience feels, a pre-analytical point of reference—may they not also be applied to the harmonic practice that contributes to the experience? Aural evaluation of the “harmonic climate” is, however, a neglected task: only Eimert comments on the unemphatic polytonality in *Jeux*, and the stasis engendered by sustained parts (“like pedal points”) against which “parallel displacements” of key may be set.⁸

Both Schnebel and Stockhausen seem to me a touch too eager to find in Debussy precedents for procedures brought to fruition in the fifties in West Germany. Stockhausen’s remarks on statistical form view *Jeux* (again!) at arm’s length, that is, he attempts to fix the essence and nature of coherence of sound-complexes by simplifying their dense, detailed fecundity into broader, graspable lineaments, boiling down the extremes of each analytical parameter (density, timbre, intensity, duration, etc.) to an average determination (*Bestimmung*) which, he believes, corresponds to the overall auditory impression. If the envelopes of his electronic studies are not very far away—and similar thought presages Xenakis’s idea of clouds (see *FM*, 8, 12)—they become central in Schnebel’s reading of *Brouillards*, which

1. understands scale-forms and rhythmic elaborations as the composition of “partials”, which pushes the sounds-in-combination toward tone mixtures and noise;
2. views the disposition of musical details as leading on to true composition with sound masses. Debussy’s music aims “towards vertically-arranged units”.⁹

The presence of so much technical jargon may be lamented, but its occasion—the arrival of the electronic studio—cannot be overlooked. The early opinion of Debussy as the “real revolutionary”¹⁰ is in these readings, however partial they may be, underlined a hundredfold.

⁸“Debussy’s *Jeux*”, 20.

⁹“*Brouillards: Tendencies in Debussy*”, 39.

¹⁰For instance, by Constant Lambert in *Music Ho! A Study of Music in Decline*, 2d ed. (London: Faber and Faber, 1937), especially 24-38.

A voice lately added to the discussion is Roy Howat's. From his dissection of Bartók's forms, he has proceeded to Debussy where—lo and behold!—the Fibonacci numbers appear again. His thesis in *Debussy in Proportion*¹¹ suggests that, though Golden Section proportions are traceable in various works of the past two centuries, in the modern age they assume a commanding role, at least for these two composers. Presumably, if they are conscious devices of construction, they are as imposed as the forms Eimert rejects; but if they are arrived at by creative intuition, then they are arguably expressions of the "natural" as distinct from the "naturalistic", with which their nineteenth-century predecessors are credited.

¹¹Cambridge: Cambridge University Press, 1985.

Appendix 4

From Monody to “Fused Style”: Debussy/Messiaen

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