THE DIVINE VINA AND THE WORLD MONOCHORD:

MUSICAL COSMOLOGY FROM THE RG VEDA TO ROBERT FLUDD

by

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ABSTRACT

Title of Dissertation: THE DIVINE VINA AND THE WORLD MONOCHORD: MUSICAL COSMOLOGY FROM THE RG VEDA TO ROBERT FLUDD

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The Music of the Spheres tradition, the idea of the universe as a musical structure, along with the concept of the Great Chain of Being, has been a major component of Western thought from its earliest glimmerings until the scientific revolution of the seventeenth and eighteenth centuries, when this concept finally disappeared from the mainstream of our culture.

It is an extremely ancient tradition, coming from, among others, Egyptian, Babylonian, Sumerian, Jewish, and Indian sources, later filtering through to the ancient Greeks via the mythological figure of Orpheus and the semi-

mythological figure of Pythagoras. This theme is clearly expressed in the writings of Plato, specifically the cosmogony of the *Timaeus,* and the vision of the universe described in The Myth of Er at the end of *The Republic*. An analysis of both these sources reveals multiple layers of symbolism, from Pythagorean number theory to mythological archetypes.

Within these texts and elsewhere in his writings, Plato outlines an ontology and an epistemology that are essential to the understanding of his musical cosmology. Rejected by Aristotle, misunderstood by many subsequent writers, revived by others, these doctrines became muddled and distorted until, by the seventeenth century, an enormously subtle idea had been reduced to a statement of mere physical fact that does not hold up under empirical examination. Consequently, it has been banished from the mainstream of thought and occupies a tenuous position in the realm of the occult.

Now, however, the realization is growing that various dimensions of knowledge have been jettisoned in the search for empirical certainty. One of the victims has been a comprehensive understanding of music, which continues to elude theorists to this day. The core components of Plato's musical cosmology, in the form of a world-view that incorporates consciousness as well as matter, is essential for the correct understanding of music as well as many other phenomena, particularly in the humanities and the social sciences.

Frontispiece - The Spindle of Necessity and the Fates, Florence, 1589

For John Richter

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CHAPTER I

THE MUSICAL UNIVERSE

In 1589, at the marriage celebrations of Ferdinand de' Medici and Princess Christine of Lorraine in Florence, during a series of *intermedii* specially composed for the occasion, a series of extraordinary tableaux were presented. One of these found, disposed among several clouds, singers representing the Sirens, the Planets, the three Fates, a group of heroes, and, at the center, the figure of Necessity with a spindle clasped between her knees. (See fig. 1.) They intoned the following chorus:

> We, by whose singing the celestial spheres
> are sweetly made to turn around,
> have on this happy day
> taken leave of paradise
> to sing the greater wonders
> of a beautiful spirit and a comely face.[1]

---

[1] *Noi, che, cantando, le celeste sfere,*
Dolcemente rotar facciam intorno,
In così lieto giorno,
Lasciand' il Paradiso,
Meraviglie più altere
Cantiam d'una bell'alma, e d'un bel viso.
Una Stravaganza Dei Medici: Intermedi (1589) per La Pelligrina, performance edition by Hugh Keyte, Avril Bardoni, trans., Taverner Consort et al., (London: EMI/Teldec 7 47998 4, 1988), liner notes, p. 5.

Fig. 1: The Harmony of the Spheres, Florence,1589

On February 24, 1607, at the Accademia degl'Invaghiti in Mantua, Claudio Monteverdi and Alessandro Striggio presented *L'Orfeo:* one of the earliest surviving operas. In the prologue of this work, the figure of La Musica steps forward to declaim the value of music for the human soul:

> Music am I, who with sweet accents
> can charm and comfort the most
> despairing spirit:
> now with noble anger's fire, and now
> with rage of desire
> the coldest heart inflaming.
>
> I with my lyre of gold and with my
> singing
> sometimes beguile men's mortal senses,
> and by these charms I awaken desire
> for the heavenly lyre's immortal music.[1]

The musical settings of both these sets of verses represent an entirely new style of composition that was emerging at the turn of the seventeenth century. Yet the verses themselves perpetuate a traditional view of music, one that had entered Europe centuries earlier via the Classical

---

[1] *Io la Musica son, ch'a i dolci accenti*
Sò far tranqillo ogni turbato core,
Et hor di nobil ira, hor d'amore
Poss' infiammar le più gelate menti.
Io su cetera d'or cantando soglio
Mortal orecchio lusingar tal'hora,
E in questa guisa a l'armonia sonora
De la lira del Ciel più l'alme invoglio.
"L'Orfeo: Favola in Musica," English singing version by Anne Ridler, in Nicholas John, ed., *The Operas of Monteverdi* (London: Calder Publications & English National Opera, 1992), p. 35.

world. "Of all the musical conceptions handed down from the ancient Mediterranean world," Gary Tomlinson tells us, "two more than any others have captivated European minds: the ideas of music's ethical power to affect man's soul and of the presence of harmony in the cosmos."[3] The first of these conceptions, the idea of the affective power of music, has formed a recurrent theme in writings on music theory over the centuries. The second, however, went much further.

The Music Of The Spheres

The idea, best known as the music, or harmony, of the spheres, and defined as "the blending of astronomy with musico-mathematical theories into the concept of a harmoniously ordered universe,"[4] comprised an essential part of early music theory. But it also stands as one of the most important themes of Western thought. According to Hans Kayser, it is

> . . . as old as the first wakening of mankind to consciousness. First in myth, then in astral symbolism, and as the integrating constituent of nearly the whole of mankind's poetry, this concept

[3] Gary Tomlinson, *Music in Renaissance Magic* (Chicago & London: University of Chicago Press, 1993), pp. 35-36.

[4] James Haar, *Musica Mundana: Variations on a Pythagorean Theme*, Ph.D. Dissertation, Harvard University, 1960, p. 71.

> became the presupposition for astrology and the first astronomical inquiries of all ancient peoples.[5]

Jamie James links the idea of a musical universe with another enormously influential concept, the Great Chain of Being, the view of the world as consisting of multiple, interwoven, ontological levels.[6] Together, these two ideas constitute for him "The Great Theme" of Western thought. As he explains, these concepts

> . . . originate in the classical bedrock of our culture, flow through the Christian tradition, and remain firmly centered in the Renaissance and the Age of Reason. They are at the core of the culture.[7]

Musical Cosmology in Art, Architecture, and Education

The idea of a universal order based on music has touched upon every aspect of our cultural history; it is represented in numerous examples of cosmology, poetry, architecture and iconography, penetrating deeply into scientific and educational institutions. It was a major influence on the curriculum of medieval universities, where

[5] Hans Kayser, *Akróasis: The Theory of World Dynamics*, Robert Lilienfeld, trans. (Boston: Plowshare Press, 1970), pp. 58-59.

[6] See Chap. VIII, notes 48-56, pp. 522-527.

[7] Jamie James, *The Music of the Spheres* (New York: Grove Press, 1993), p. 4.

music, considered one of the seven liberal arts, was seen as a central subject of mathematical and cosmological study, along with arithmetic, geometry and astronomy. Such a study may seem far removed from the practicalities of music making, but, in the ancient and the medieval world, music was seen as having both practical and philosophical aspects. This approach is reflected in the well-known categories established in the writings of the sixth-century Roman statesman Boethius: *musica mundana*, the mathematical harmony of the cosmos; *musica humana,* the harmony of the human soul and body; and *musica instrumentalis,* music as we normally hear and understand it.

> Thus, at the outset, it seems proper to tell someone examining music what we shall discover about the kinds of music recognized by those schooled in it. There are three: the first is cosmic, whereas the second is human; the third is that which rests in certain instruments, such as the kithara or the aulos or other instruments which serve melody.
>
> The first kind, the cosmic, is discernible especially in those things which are observed in heaven itself or in the combination of elements or the diversity of seasons . . . If a certain harmony did not join the diversities and opposing forces of the four elements, how would it be possible that they should unite in one mass and contrivance?
>
> Whoever penetrates into his own self perceives human music. For what unites the incorporeal nature of reason with the body if not a certain harmony and, as it were, a careful tuning of low and high pitches as though producing one consonance? What other than this unites the parts of the soul, which, according to Aristotle, is composed of the rational and the irrational?

> The third kind of music is that which is said to rest in various instruments.[8]

The relationship between these three aspects of music is summarized by Peter J. Ammann: "The commonly known and practiced music, *musica instrumentalis,* is only the shadow of the true and deeper music, of *musica mundana* and *musica humana,* both of which have reference to the order of the world, the place of man in the cosmos, and his own inner structure."[9]

Such a view of the relationship between macrocosm and microcosm is an essential feature of all musical cosmologies. It is reiterated, for example, by the twelfth-century cleric John of Salisbury. "The soul is said to be composed of musical consonances," he observed, and through the laws of musical proportion "the heavenly spheres are harmonized and the cosmos governed, as well as man."[10]

As Bishop of Chartres from 1176 to 1178, John presided over much of the construction of the great cathedral, the

---

[8] Boethius, *De institutione musica,* trans. Calvin M. Bower as *The Fundamentals of Music,* Claude V. Palisca, ed. (New Haven & London: Yale University Press, 1989), pp. 9-10.

[9] Peter J. Ammann, "The Musical Theory and Philosophy of Robert Fludd," *Journal of the Warburg and Courtauld Institutes,* No. 30 (1967), p. 198.

[10] Edward Rothstein, *Emblems of Mind: The Inner Life of Music and Mathematics* (New York: Times Books/Random House, 1995), p. 21.

design of which reflects a mathematical canon of proportion, often referred to as sacred geometry, that is closely linked with musical cosmology. This influence can be found in many famous buildings in Europe, from the Gothic era to the Italian Renaissance and beyond and is reiterated in mosques and temples throughout the Middle East and Asia, in a form designed to reflect the divine rather than the personal.

> Sacred art of any kind is art attached to and dependent on a metaphysical doctrine, from which it receives not only its subject matter, but also rules for the composition of images and the treatment of form. Such art does not exist for the sake of its own achievements, but for the sake of realization of transcendent Truth . . . It will not therefore deal with the varied aspects of phenomenal life for the sake of their own emotional and pictorial interest, but only in the sense in which they are the mirror of divine Reality.[11]

Such an emphasis imbues sacred art with a universal quality:

> Truly sacred art, whether it be architecture or painting, poetry or music, pierces through the veils of temporal existence to confront the beholder with a reality which shines from the other shore of existence, from the Eternal Order. When one stands before the Himpi temple near Madras, in the interior of the Jāmi' Mosque of Isfahan or before the portals of the Chartres cathedral, one is not only standing in India, Persia or France but at the "center" of the cosmos joined by the forms of the sacred art in question to that Center

---

[11] Alice Bonner, "The Symbolic Aspect of Form," *Journal of The Indian Society of Oriental Art*, Vol. 10 (1942), p. 42.

> which is beyond time and which is nothing other than the Eternal.[12]

It will be seen in a later chapter that the image of the cosmic "center" is of great significance to musical cosmologies; in fact, it has a direct bearing on the significance of the spindle held by the figure of Necessity in figure 1.[13] Here, suffice it to say that such an approach to cosmology appears to be a tradition of universal application. While it is seen as the "Great Theme" of Western culture, for example, it is by no means restricted to Europe; it has many Arab and Jewish sources;[14] it is an important feature of Oriental thought, particularly in India; and it flourished in China as long ago as 400 B.C.E.[15]

<u>The Literary Canon</u>

Returning to Europe, we find the idea of musical harmony as a recurrent literary theme as early as Chaucer:

> Thanne shewede he hym the lytel erthe that here is,

[12] Seyyed Hosein Nasr, *The Need for a Sacred Science* (Albany: State University of New York Press, 1993), p. 35.

[13] See Chap. VI, pp. 360-380.

[14] Haar, iv-v.

[15] See Chap. IV, pp. 211-248.

At regard of the hevenes quantite;
And afterward shewed he hym the nyne speres,
And after that the melodye herde he
That cometh of thilke speres thryse thre,
That welle is of musik and melodye
In this world here, and cause of armonye.[16]

and as late as Dryden:

From harmony, from heav'nly harmony,
    This universal frame began:
    From harmony to harmony,
Through all the compass of the notes it ran,
The diapason closing full in man.[17]

The influence of musical imagery on literature reached a climax during the sixteenth and seventeenth centuries,[18] when perhaps the most famous literary representations of this theme can be found in the work of Shakespeare and Milton. First in *The Merchant of Venice*:

How sweet the moonlight sleeps upon this bank!
Here we will sit, and let the sounds of music
Creep in our ears. Soft stillness and the night
Become the touches of sweet harmony.
Sit, Jessica. Look how the floor of heaven

---

[16] Chaucer, *The Parliament of Fowles*, II. 57-63, in Geoffrey Chaucer, *Works*, F. N. Robinson, ed. (Boston: Houghton Mifflin, 1957), p. 311.

[17] John Dryden, "A Song for St Cecilia's Day," in *Library of World Poetry, being Choice Selections from the Best Poets*, compiled and with intro. by William Cullen Bryant (New York: Avenel Books, MCMLXX), pp. 588-589.

[18] See S.K. Heninger, Jr., *Touches of Sweet Harmony: Pythagorean Cosmology and Renaissance Poetics* (San Marino, CA: Huntington Library, 1974).

Is thick inlaid with patens of bright gold.
There's not the smallest orb which thou behold'st
But in his motion like an angel sings,
Still quiring to the young-eyed cherubins.
Such harmony is in immortal souls,
But while this muddy vesture of decay
Doth grossly close it in, we cannot hear it.[19]

and in Milton's *Arcades*:

But els in deep of night, when drowsines
Hath lockt up mortal sense, then listen I
to the celestial *Sirens* harmony,
That sit upon the nine enfolded Sphears,
And sing to those that hold the vital shears,
And turn the Adamantine spindle round,
On which the fate of gods and men is wound.
Such sweet compulsion doth in musick ly,
To lull the daughters of *Necessity*,
And keep unsteddy Nature to her law,
And the low world in measur'd motion draw
After the heavenly tune, which none can hear
Of human mould with grosse unpurgéd ear.[20]

Iconography

The Divine Monochord. Along with its influence on poetry and architecture, the musical universe has its own iconography. One of the most famous examples appeared in print just ten years after the time of Monteverdi's *Orfeo*.

[19] William Shakespeare, "The Merchant of Venice," Act V, Scene 1, from *Complete Works of Shakespeare*, Stanley Wells and Gary Taylor, general editors (Oxford: The Clarendon Press, 1986), p. 505.

[20] John Milton, "Arcades," Frank Allen Patterson, ed., *The Student's Milton* (New York: Appleton-Century-Crofts, Inc., 1957), pp. 39-40.

This is the illustration known as the Divine Monochord (fig. 2) that appeared in the *Utriusque Cosmi Maioris*[21] of 1617, the *magnum opus* of the British scholar and physician Robert Fludd. This frequently reproduced engraving presents a musical cosmology in its purest form: a universe represented as the vibrations emanating from a plucked string, with elements, planets and angels given order by musical relationships.

Fludd devoted many years to the development of a universal system of knowledge, much of which includes lengthy and elaborate descriptions of different kinds of music. For Fludd, the ratios of music were parallel to the relationships of darkness and light that he saw as the fundamental components of the universe, emanating from earth and heaven respectively. The string of the monochord thus represents the Great Chain of Being linking together all levels of creation. The range of creation is divided into three main realms in Fludd's schema, the empyrean, the ethereal and the elemental. Each of these has its own internal divisions: the empyrean into the three levels of the angelic hierarchy; the ethereal into seven planetary orbits; and the elemental into four major realms, *Terra,*

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[21] *Utriusque Cosmi Maioris scilicet et Minoris Metaphysica, Physica atque Technica Historia* (Oppenheim), Vol. I, i, Book 3 ("De Musica Mundana"), Chapter 3, p. 90.

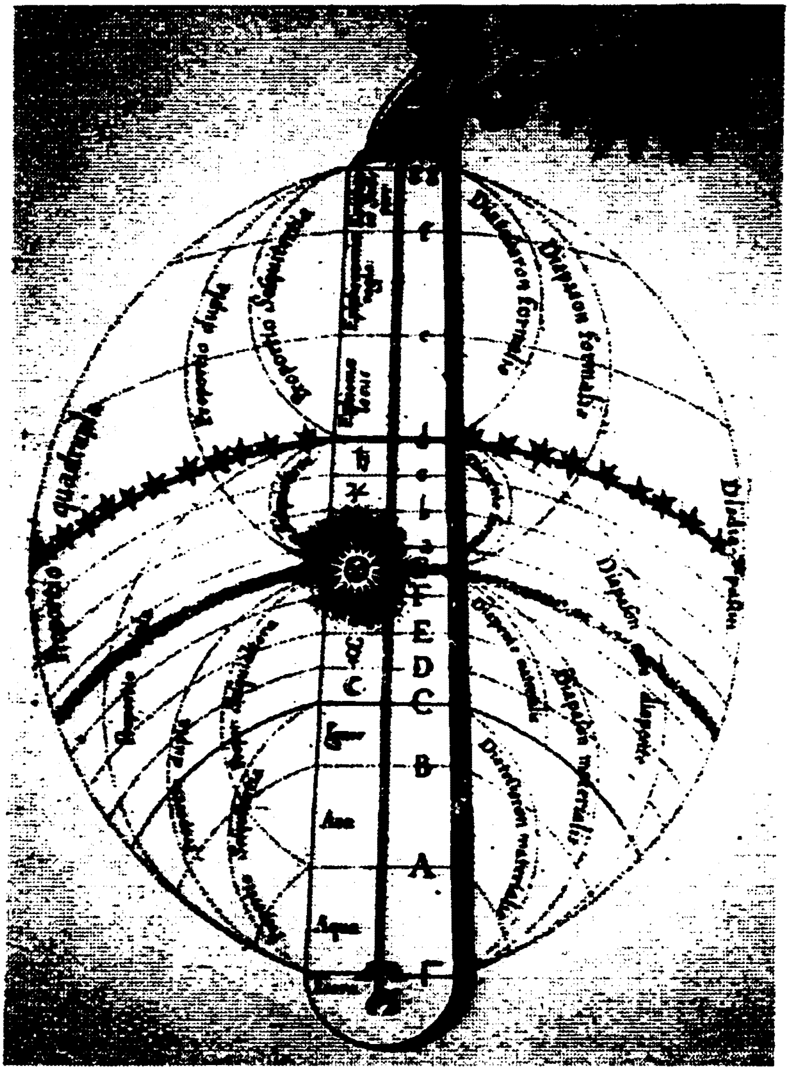

Fig. 2: The World Monochord, Robert Fludd, *Utriusque Cosmi Maioris*, i, Tract I, 1617

Aqua, Aer, and *Ignis*. Each of these realms and sub-realms is related through the basic musical intervals resulting in a two-octave scale, extending from low G (written as Γ, the Greek letter gamma) assigned to the earth, up to gg at the highest level of the empyrean. At the junction of the two octaves, and thus at the center of this universe, Fludd places the sun.

Presenting a schema in which everything in the universe is seen as internally related through an elegant plan of musical proportions, Fludd's diagram is a clear representation of *musica mundana*. It is accompanied by two further engravings representing *musica humana* and *musica instrumentalis*. The Human Monochord (fig. 3) presents the same proportions seen on the World Monochord, but projected onto the human form, thus demonstrating the connection between microcosm and macrocosm. A link with the divine is represented in each case; the hand of God is seen tuning the Divine Monochord, while the Human Figure is crowned with the hebrew form of the word "Jehovah." *Musica Instrumentalis* is represented by the Temple of Music (fig. 4), a largely didactic construction demonstrating scales, tetrachords, notation and the Pythagorean Lambdoma. (See Chapter V.) In an alcove below, Pythagoras walks past a blacksmith's shop,

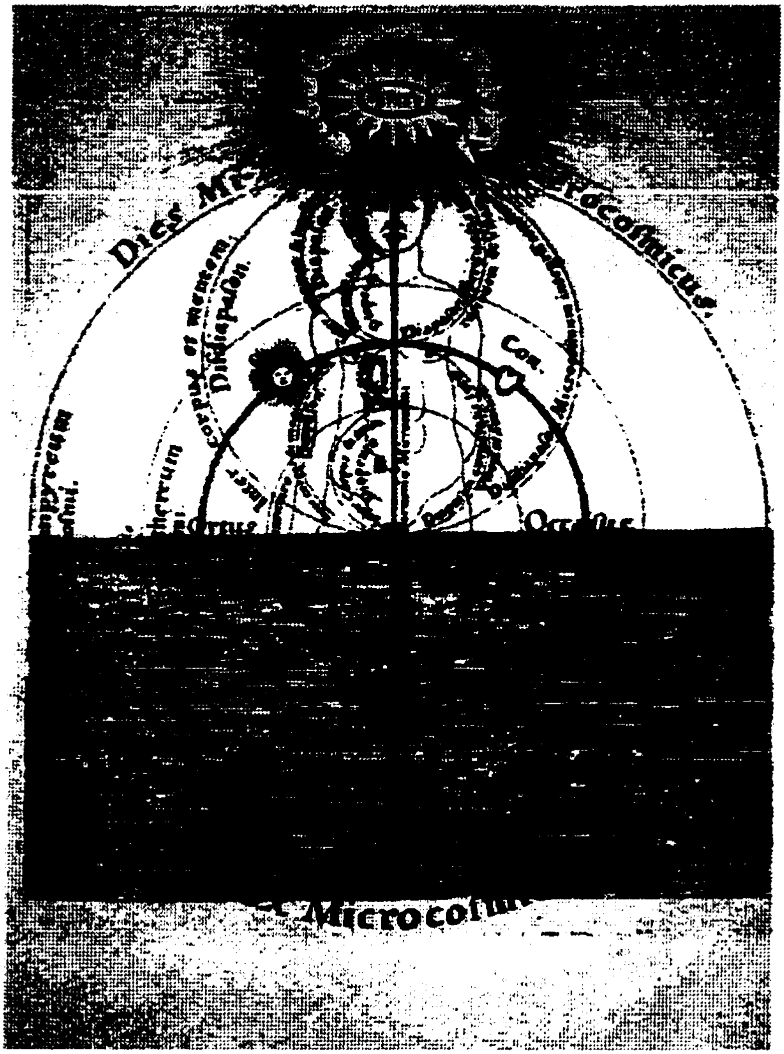

Fig. 3: The Human Monochord, Robert Fludd, *Utriusque Cosmi Maioris*, ii, Tract I, 1617

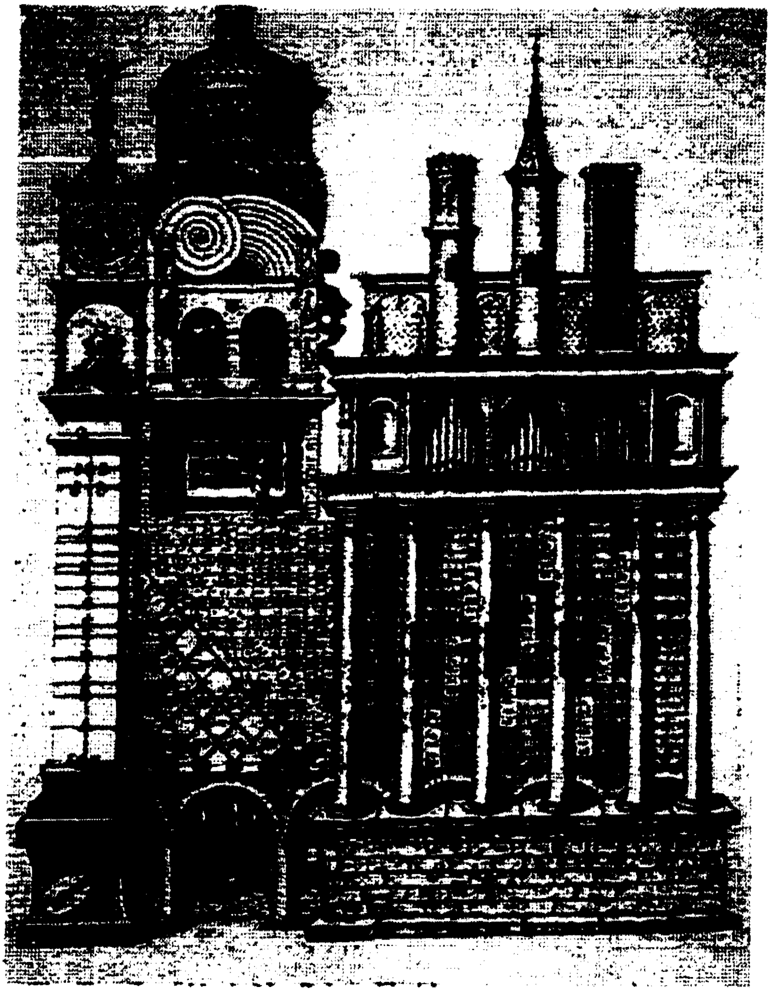

Fig. 4: The Temple of Music, Robert Fludd, *Utriusque Cosmi Maioris*, i, Tract II, 1617

illustrating a famous story that we will examine in Chapter III.

Gafori's Frontispiece. Almost as well known as these engravings is the woodcut (fig. 5) that appeared as the frontispiece of a 1496 treatise, *Practica musicae*, by the music theorist Franchino Gafori (fig. 6). Again we see a depiction of celestial harmony. In this case, the elements, the planets and constellations, the Muses, and musical notes and modes are seen as parts of a mutual order arranged around a three-headed dragon symbolizing Time. The four elements, *terra, aqua, aer* and *ignis,* are seen at the bottom of the diagram, and from this basis rise the eight musical notes of the diapason coupled with eight modes.

The mythical and cosmological significance of these musical phenomena are established by their systematic linking with the muses and the planets; the planets, each with its presiding deity, are pictured on the right-hand side of the diagram, the muses on the left. Thus, for example, Venus is associated with the note Parhypat, the Hypolydian mode, and the muse Terpsichore, while Mars is associated with Eratho and plays upon the Phrygian mode and the note Hypateme. There being only seven planets, the realm of the fixed stars is added to accommodate the eight notes, while the ninth muse, Thalia, is incorporated by association

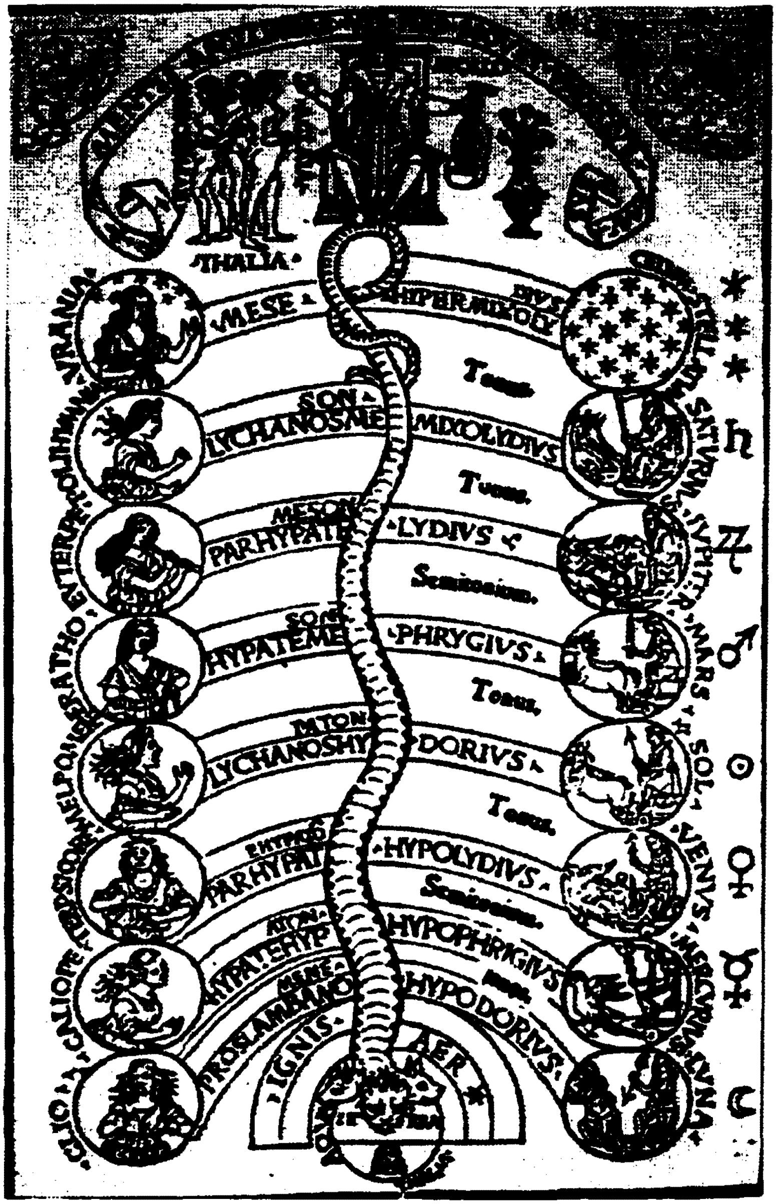

Fig. 5: Tones, Modes, Planets, and Muses. The Frontispiece of Gafori's *Practica Musicae*, Milan, 1496

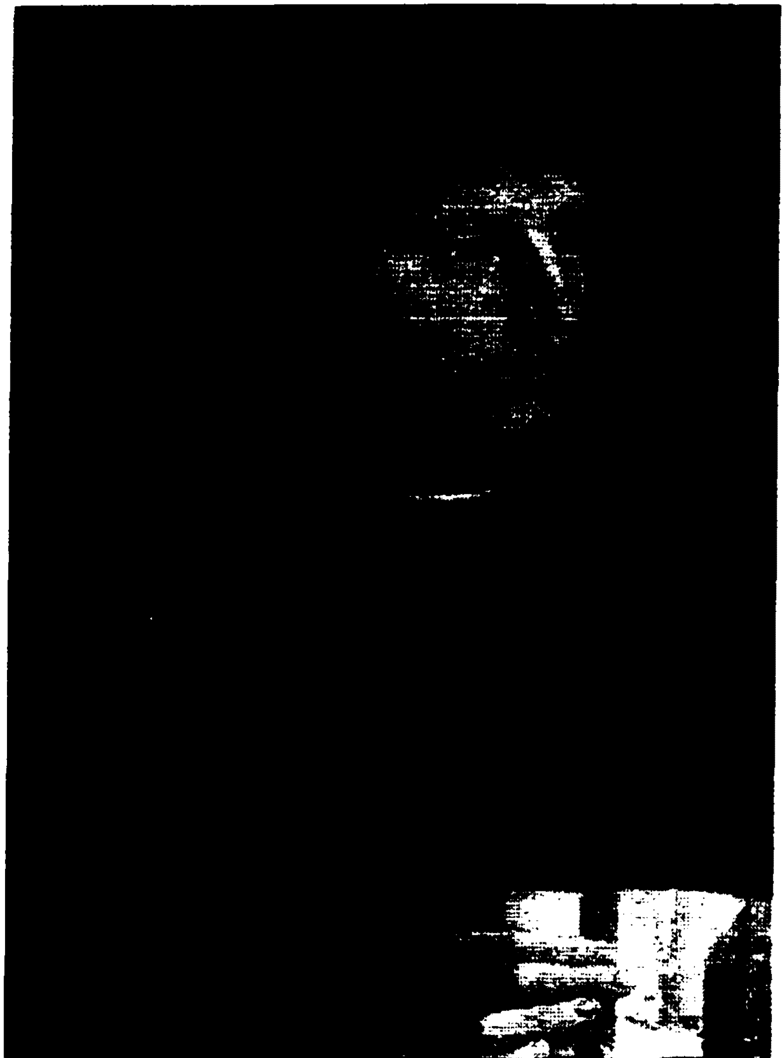

Fig. 6: Franchino Gafori. *Il Musicista,* School of Leonardo. Milan, Pinacoteca Ambrosiana

with the element of Earth, or Terra, at the bottom of the diagram. At the top, we see the presiding deity of the whole pictured cosmos, Apollo. Holding a lute, or a lira da braccio, he is attended by the three Graces and sits beneath a banner that reads "The power of the Apollonian mind completely controls these muses."[22] "The intention is clear," writes S.K. Heninger; "each Muse, each note, each planet, though playing an individual part, contributes concordantly to a larger whole, represented in the single figure of Apollo."[23]

Both Fludd's engravings and Gafori's woodcut contain elements common to musical cosmologies. The universe is seen to be created by musical vibration and given order by the structure of a musical scale. Relationships between the notes of the scale and the planets are explored in a systematic way, and the relationship between God and the world is explicitly demonstrated. In the Gafori, it is Apollo who represents the deity, while Fludd's diagrams show both the hand of God and the name of God. Above all, the universe is presented as a unified and integrated whole in which each element occupies its assigned place and fulfills its divine purpose.

[22] See James Haar, "The Frontispiece of Gafori's *Practica musicae* (1496)," *Renaissance Quarterly*, 27 (1974), pp. 7-22.

[23] Heninger, p. 38.

The Modern World

While recent scholarship[24] has revealed just how extensive an influence this kind of thinking has had upon Western history, the idea of a universe governed by musical forms is almost completely alien to the contemporary mind. It is still represented in the work of some modern theorists, particularly Hans Kayser and Rudolph Haase in Europe and Joscelyn Godwin, Ernst Levy, Ernest G. McClain and Siegmund Levarie in the United States.[25] Nevertheless, notions of an explicitly musical cosmos no longer represent the mainstream either of music theory or of cosmology. It is the first time in our history that this is so. "That music is bound up with speculative thinking," Manfred Bukofzer tells us, "is true not only of the Middle Ages but of all periods of history with the single exception of modern

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[24] See James, op. cit., and Joscelyn Godwin, *The Harmony of the Spheres: A Sourcebook of the Pythagorean Tradition in Music* (Rochester, VT: Inner Traditions International, 1993).

[25] Joscelyn Godwin states that the combined bibliographies of his books *The Harmony of the Spheres* (Rochester, VT: Inner Traditions International, 1993), *Music, Mysticism and Magic* (London: Routledge and Kegan Paul, 1986), and *Harmonies of Heaven and Earth* (Rochester: Inner Traditions International, 1987), along with Kenneth Sylvan Guthrie's *The Pythagorean Sourcebook* (Grand Rapids, MI: Phanes Press, 1987), contain as full a guide to the literature of speculative music as is currently available.

times."[26] Clearly, a significant change has occurred in our thinking:

> It was not until the nineteenth century that the perspective shifted decisively to the earthly, the tangible. Materialism and sensuality, qualities that had been deeply mistrusted throughout most of the Western tradition, emerged ascendant.[27]

This process may have reached its culmination in the nineteenth century, but it began many years earlier. In fact, we can pinpoint a specific moment in the early seventeenth century when key events clearly demonstrate this fundamental shift of emphasis. One of these, the publication of Robert Fludd's monumental work of 1617, has already been discussed. Within two years, two other events illustrate a major turning point occurring in the history of the West.

The Watershed

In 1619, two years after Fludd's *Utriusque Cosmi Maioris* appeared, Johannes Kepler published his equally famous work, *Harmonice Mundi,* which has been called "the supreme treatise on the musical universe."[28] In *Harmonice*

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[26] Manfred F. Bukofzer, "Speculative Thinking in Medieval Music," *Speculum,* XVII, No. 2 (1942), p. 165.

[27] James, p. 4.

[28] James, p. 140.

Mundi, Kepler builds upon an earlier treatise, *Mysterium cosmographicum* (1596), in which can be found another famous cosmological image (fig. 7). In both these works Kepler sets forth his vision of a world given order by elegant geometric structures which themselves reflect distinctly musical relationships. His writing was so imbued with musical values that he was able to entitle one chapter: "In the Celestial Concord, Which Planet Sings Soprano, Which Alto, Which Tenor and Which Bass." As several writers have described,[29] this wonderfully baroque vision did not, for the most part, survive the test of empirical verification that occupied Kepler for thirty years. Nevertheless, it did lead to the discovery of the three laws of planetary motion, without which Isaac Newton could not have produced his *Principia* and which are fundamental to the subsequent development of celestial mechanics.

Appearing so close together in time, both Fludd's and Kepler's treatises would seem to spring from the same *Gestalt,* if not the same tradition. Ironically, this is not the case; the two cosmologists engaged in a lengthy and bitter dispute about their work. Perhaps more surprising, the music of the spheres tradition itself, after reaching

[29] See, for example, Max Caspar, *Kepler,* C. Doris Hellman, trans. (London: Abelard-Schuman, 1959), and Arthur Koestler, *The Sleepwalkers* (New York: Macmillan, 1968).

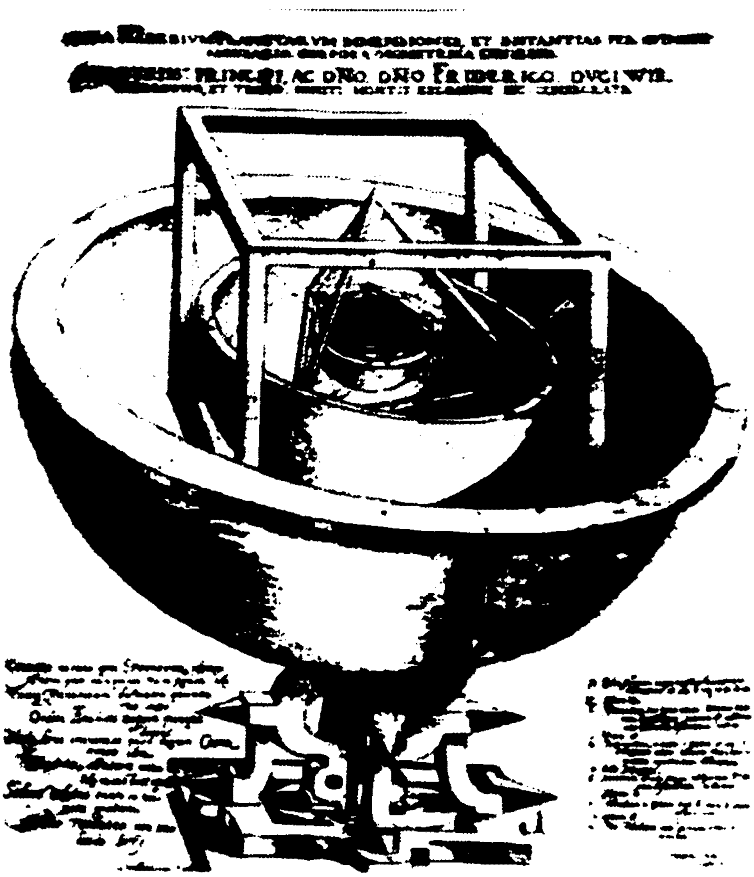

Fig. 7: Johannes Kepler, *Harmonice Mundi*, 1619

such a high point, went into a sudden and precipitous decline. For this and other reasons the early seventeenth century has been deemed a watershed in the history of the West. Indeed, in a book of the same name, Arthur Koestler calls Kepler himself "the watershed."[30] James uses a similar image:

> . . . to choose another aqueous metaphor, he might be likened to the dike separating the placid waters of the classical age and its renaissance from the first flow of the treacherous waters we may finally call the modern age.[31]

The shift in Western consciousness has proved to be significant, for the history of science as much as for the history of music. However, it is important to realize that the mainstream of Western thought has never been entirely homogeneous. On the contrary, it has always consisted of a mixture of competing and interacting influences entering Europe from a variety of traditions. Of these, among the most important emerge from the Greeks.

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[30] Arthur Koestler, *The Watershed* (New York: Anchor Books, 1960).

[31] James, p. 140.

The Three Strands of Greek Thought

Many elements of the modern world view that emerged and were assimilated into our culture during the critical years between 1500 and 1700 were the result of a gradual rediscovery of Greek science that took place between the twelfth and sixteenth centuries. While this process was complex, historians have argued that the key to interpreting its origins and its course lies in seeing two or three distinct trends within Greek philosophy and science that have contributed to the Western intellectual tradition in varying degrees at different times. Historian Richard Tarnas identifies two general sets of assumptions or principles within Greek thought.[32] One set is essentially both idealist and rationalist in nature and was "especially visible in the Platonic synthesis."[33] The other "gradually evolved out of the bold, many-sided intellectual development that dialectically impelled that synthesis--namely, the Presocratic philosophical tradition of naturalistic empiricism from Thales, of rationalism from Parmenides, of mechanistic materialism from Democritus, and of skepticism,

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[32] Richard Tarnas, *The Passion of the Western Mind: Understanding the Ideas That Have Shaped Our World View* (New York: Ballantine Books, 1991), pp. 69-71.

[33] Tarnas, p. 69.

individualism, and secular humanism from the Sophists."[34] The idea of both a mystical and an empirical impulse emerging from the Greeks has been echoed elsewhere. The English historian Hugh Kearney adds another dimension to this view. Rather than attributing a dualistic vision to the Greeks, he finds that European sensibilities were influenced by three main paradigms or "strands" of Greek thought, the Organic, the Mechanist, and the Magical, originating in Aristotle, Archimedes and Plato, respectively.[35] It is the last of these strands, the Magical view, that is most frequently associated with a musical cosmology. We shall find, however, that all three of these strands of knowledge, and the interactions among them, are essential for a complete understanding of the music of the spheres tradition and its emergence and eventual disappearance from Western thought.

The Organic Tradition

The Organic tradition, while influenced by Galen and Ptolemy, stems mainly from the work of Aristotle and was particularly influential during the mediaeval centuries. Even though Aristotle was Plato's student for many years,

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[34] Tarnas, p. 71.

[35] Hugh F. Kearney, *Science and Change 1500-1700* (New York: McGraw Hill, 1971), pp. 22-48.

his scientific work was based on an approach that turned away from the essential core of Plato's teaching. Plato regarded the world of phenomena as mere reflections of an underlying world of archetypal forms, or "Ideas," but Aristotle rejected this aspect of his former master's teaching. In its place he introduced an emphasis on the categories of experience as the basis for building a picture of the physical world.

> By replacing Plato's ideals with universals, common qualities that the mind could grasp in the empirical world but that did not exist independently of that world, Aristotle turned Plato's ontology upside down. For Plato, the particular was less real, a derivative of the universal; for Aristotle, the universe was less real, a derivative of the particular. Universals were necessary for knowledge, but they did not exist as self-subsistent entities in a transcendental realm. Plato's Ideas were for Aristotle an unnecessary idealist duplication of the real world of everyday experience, and a logical error.[36]

On the basis of such a view, the systematic study of nature became a worthwhile undertaking, and Aristotle built up a description of natural phenomena through empirical observation and systematic classification. From this approach a picture of the world emerged that drew much of its language and terms of reference from the study of living organisms. It is for this reason that Kearney calls it the

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[36] Tarnas, p. 57.

Organic tradition. But, as he notes, this was more than a collection of scientific observations:

> It was also a philosophical system, extending into metaphysics, ethics and logic, which within most European universities during most of our period (1500-1650) was thought to provide the only acceptable synthesis of human knowledge, even though it might be open to modification in detail. Thus the organic tradition served two inter-connected purposes; it was the source of scientific information and it provided a pattern of intellectual coherence.[37]

Aristotelian thought not only dominated the European universities, it was also extensively incorporated into Christian philosophy through the work of such theologians as St. Thomas Aquinas (1226-1274), forming a vast synthesis that came to be known as scholasticism.

> God, man, angels, animals, planets, and elements, all had their place in a world where man and earth were at the centre, and heaven beyond its circumference. This view of the world was emotionally satisfying, religiously orthodox and poetically inspiring, but it was to be overthrown in a remarkably short time. Within less than two centuries almost every assumption which had been accepted since 500 BC and which the west had painfully relearned since the twelfth century was questioned.[38]

Much of this questioning came from other streams of Greek philosophy. A primary reason for Aristotle's widespread influence during the Middle Ages had been that

[37] Kearney, p. 26.

[38] Kearney, pp. 8-9.

his work was more available to scholars than that of other Greek philosophers. (Particularly important were the *Metaphysics*, the *Physics*, and *De Anima*.) Eventually, however, the Aristotelian emphasis was to change as the work of other Greek thinkers became more widely available. Of these, among the most important were the writings of Plato and Archimedes. Both contributed to the reintroduction of mathematics as a central discipline in the sciences, an approach much de-emphasized by Aristotle. Apart from this, however, the ideas of Plato and Archimedes differed fundamentally. In fact, each is associated with another one of the three strands.

The Mechanist Tradition

The Mechanist tradition, according to Kearney, stems largely from Archimedes (287-212 BC), one of the greatest of all Greek mathematicians. In his hands, mathematics was essentially an applied discipline placed at the service of mechanical engineering. When his work was translated and published in the middle of the sixteenth century, it added great impetus to the development of applied mathematics and its use in measurement and analysis. This development, in turn, added impetus to the burgeoning fascination with machinery that emerged in the sixteenth and seventeenth centuries and found an application, for example, in the fantastic stage settings of Baroque opera. Archimedes' work also resulted in the development of the mechanistic analogies that came to dominate scientific thinking and provided one aspect of a two-pronged attack on Aristotle and the Organic viewpoint:

> It was impossible to look upon the universe as a machine and to leave intact the existing Aristotelian assumptions about the nature of God, Christian revelation, miracles and the place of purpose in the world. The mechanist assumption was that the universe operated on the basis of mechanical forces, and, as Mersenne explicitly put it, God was the great engineer. Thus the task of the scientists was to explore the inter-relationship of the various parts of the universe, on the assumption that they would fit together like those of a machine.[39]

Marin Mersenne, whom Kearney cites here, wrote an important work on music theory to which we will refer later. Here it is sufficient to say that, along with Thomas Hobbes, René Descartes and others, he was responsible for articulating the world view that dominates contemporary thought and that has largely rejected the idea of musical cosmology. Before discussing this fundamental shift further, however, we must examine the third strand of Greek thought, since this was the ground upon which the music of the spheres tradition flourished.

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[39] Kearney, pp. 47-48.

The Magical Tradition

The third area of thought described by Kearney, and one of particular interest in discussing Fludd and Kepler, is what he calls the Magical tradition. This mode of thought also stems from Greek sources; in fact, it is often referred to as the Pythagorean tradition, although Kearney attributes it to Plato, mainly in the form of neo-Platonism.

Rather than being patterned on Organic or Mechanistic models, the Magical tradition regarded mind as the basic component of the universe, seeing components of mental activity, particularly mathematics, as essential to an understanding of the world. Such a view was to prove of great importance to the burgeoning scientific revolution, but it also generated notions that are central to the idea of a musical cosmology.

The origin and history of the Magical tradition is considerably more complex than that of the other two strands described by Kearney. While Platonic and neo-Platonic philosophy was its source, there were several other schools that contributed to this particular attitude towards the world. Furthermore, it rarely existed in isolation; on the contrary, it was frequently found co-existing with other doctrines during the long history of European thought. As this tradition gathered a variety of other influences over the course of time, it simultaneously earned a variety of names: the Hermetic tradition, the Rosicrucian tradition, the Alchemical tradition. It will help to avoid confusion if we use Kearney's expression "the Magical tradition" to refer to this whole complex of ideas.

Adding to the complexity of this tradition is the waxing and waning of Platonic influence over time. While the medieval centuries were largely dominated by Aristotle and the Organic tradition, Platonic thought was not completely absent from this era. But it was not known first hand. With the exception of some unreliable copies of the *Timaeus*, none of Plato's dialogues was available during this period. His doctrines were known only through the work of other writers, among them Boethius, Philo of Alexandria, St. Augustine and St. Thomas Aquinas. Through the work of such men, much Christian doctrine had contained elements of Platonic thought since the earliest days of the Church. Indeed, the Neo-Platonic school developed alongside early Christian theology in Alexandria.

> It is indicative of this intimacy between Platonism and Christianity that Plotinus and Origen, the central thinkers, respectively, of the last school of pagan philosophy and the first school of Christian philosophy, shared the same teacher in Alexandria,

> Ammonius Saccas (a mysterious figure about whom virtually nothing is known).[40]

The influence of Plato's philosophy was therefore introduced second and third hand into the West for several centuries.

> Even the high Scholastic tradition of Albertus and Aquinas, although necessarily focused on the challenge of integrating Aristotle, was nevertheless still deeply Platonic in disposition. But this had always been an indirect Plato, highly Christianized, modified through Augustine and other church fathers: a Plato known from afar, largely untranslated, passed on by digests and references in another language and mind-set and seldom in his own words.[41]

In many instances, it was in the application of mathematics to problems of physical research where the Platonic influence came to be most clearly felt, particularly as the impetus towards science was gaining momentum in the late Middle Ages:

> ... Scholastics in England such as Robert Grosseteste and his pupil Roger Bacon were performing concrete scientific experiments (moved in part by esoteric traditions such as alchemy and astrology), applying the mathematical principles held supreme by the Platonic tradition to the observation of the physical world recommended by Aristotle.[42]

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[40] Tarnas, p. 103.

[41] Tarnas, pp. 211-212.

[42] Tarnas, p. 200.

Eventually, however, Plato's work had a direct influence. With the fall of Constantinople to the Turks in 1453, many scholars escaped into western Europe, bringing with them a wealth of Classical treatises, as well as knowledge of the Greek language. Many of these manuscripts, including several of Plato's dialogues, were translated into Latin by scholars such as Marsilio Ficino, who was the head of a revived Platonic Academy in Florence and who worked under the patronage of Cosimo de' Medici. As well as that of Plato, several other influences were to enter the Magical tradition by the same route.

The Corpus Hermeticum. As influential on the thought of the Renaissance as Plato's dialogues proved to be, in the short term they were given a lower priority by Cosimo than the writings of a much less well-known figure, at least in the modern world. As James explains, Hermes Trismegistus was thought to be a sage from ancient Egypt who wrote over a dozen treatises on cosmological and philosophical subjects.

> Hermes Trismegistus was supposed to have been an inspired Egyptian seer who lived and wrote at the very dawn of antiquity: he was indeed the inventor of writing with hieroglyphics, and thus the father of human civilization. While the true authorship of the Hermetic texts (it is from this Hermes that the word originated) will never be known, the important point is that until the seventeenth century they were universally believed to date from the earliest era of human history. In *The City of God (De civitate Dei)* Augustine affirms this notion unequivocally: "For as for morality, it stirred not in Egypt until

> Trismegistus's time, who was indeed long before the sages and philosophers of Greece."[43]

As for the content of the Hermetic literature, James gives the following description:

> The two big books ascribed to Hermes, the *Asclepius* and the *Corpus Hermeticum,* amounted to an occult encyclopedia that dealt systematically with astrology, the secret powers of plants and stones, talismans to summon forth airy spirits and demons of the underworld (and charms to ward them off), as well as philosophical literature of a distinctly Pythagorean cast.[44]

So influential was Hermes Trismegistus in the fifteenth century that Cosimo ordered Ficino to put aside Plato until he had translated the *Corpus Hermeticum*, a task Ficino completed directly before Cosimo's death in 1464.[45] Eventually, it was discovered that these tracts were from a much later era than previously supposed, being the work of Neoplatonists from the second century C.E. But in the hundred years it took to make this discovery, and in the climate of reaction against the Organic view that was

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[43] James, p. 116.

[44] Ibid. For the content of the *Corpus Hermeticum* see G. R. S. Mead, *Thrice-Greatest Hermes: Studies In Hellenistic Theosophy & Gnosis, Being a Translation of the Extant Sermons & Fragments of the Trismegistic Literature, with Prolegomena, Commentaries, & Notes*, 3 Volumes (London & Benares: Theosophical Publishing Society, 1906).

[45] See Frances A. Yates, *Giordano Bruno and the Hermetic Tradition* (London: Routledge and Kegan Paul, 1964).

growing in the late fifteenth century, the Hermetic literature became enormously influential. Kearney points to its influence in the work of Thomas Moore, Pico della Mirandola, Copernicus, Kepler and Newton. As he explains:

> In Trismegistus, the Christian Church now had a source of wisdom which went back (or at least was believed to) beyond Plato to the original Mosaic revelation. Trismegistus was thought to have been the recipient of divine revelation about the physical world, as Moses had been about the moral world. From this point of view, the Egyptians were seen as the custodians of secular wisdom, as the Jews were of sacred wisdom.[46]

In the view of fifteenth-century churchmen, this pedigree gave the *Corpus Hermeticum* more legitimacy than could be ascribed to the "pagan" thought of the Greek philosophers, Aristotle notwithstanding.[47] Consequently, the writings of Hermes Trismegistus provided a conduit for Neo-Platonic ideas into the mainstream of Western thought, and it was within this context that the tradition of the music of the spheres was perpetuated.

Neoplatonism and Hermeticism were not the only components of the Magical tradition, however. Once the Hermetic literature had opened the Church's door to Platonic influences, representatives of other traditions were able to

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[46] Kearney, p. 38.

[47] The same impulse was responsible for the biblical figure of Tubal being substituted for Pythagoras in the legends about the discovery of musical relationships.

creep in and become part of a growing matrix of ideas that was to constitute this view of the world. Of these teachings, the most important were Kabbalah and Rosicrucianism.

Kabbalah. Kabbalah, which is Hebrew for "tradition," is an esoteric system of Jewish mysticism that first appeared in its current form in the twelfth century. Largely an oral tradition, it lays claim to secret knowledge of the unwritten Torah, or "divine revelation" that was communicated by God to Adam and Moses.

The earliest roots of Kabbalah are traced to a group in first-century C.E. Palestine involved with ecstatic and mystical contemplation as described in the book of Ezekiel. Over subsequent centuries the tradition gradually expanded to develop a cosmology based on sophisticated numerical and linguistic symbolism. As set forth in its earliest known text, the *Sefer Yetzira* or "Book of Creation," which appeared between the third and sixth centuries, creation was explained as a process involving the ten divine numbers, or *sefirot*, of God the Creator and the 22 letters of the Hebrew alphabet. Taken together, they were said to constitute the "32 paths of secret wisdom."

A later text, the twelfth-century *Sefer ha-bahir*, or "Book of Brightness," had a profound and lasting influence on the development of Jewish esoteric mysticism and, to a certain extent, on Judaism in general. It extended and developed the underlying mystical symbolism, introducing such notions as the transmigration of souls. Further elaboration of the tradition, dealing with mystical speculation about evil, salvation, and the soul, occurred in Spain, where Kabbalah flourished from the thirteenth century until the Jews were expelled in 1492.

By the mid-sixteenth century the unchallenged center of Kabbalah was Safed, Galilee, the home of one of the greatest of all Kabbalists, Isaac ben Solomon Luria. Stressing the importance of an intensely mystical life and unceasing struggle against evil, Luria's teaching was used to justify the Jewish messianic movement of the seventeenth century and also influenced the doctrines of modern Hasidism, a social and religious movement that began in the eighteenth century and still flourishes today in many Jewish communities.

Rosicrucianism. The Rosicrucians are a worldwide brotherhood whose name derives from the order's symbol, a combination of a rose and a cross. Their teachings combine elements of occultism reminiscent of a variety of religious beliefs and practices.

The origins of Rosicrucianism are obscure. Traditional sources date the order from its earliest extant document, the *Fama Fraternitatis*, or "Account of the Brotherhood," first published in 1614, which recounts the journeys of Christian Rosenkreuz, the reputed, but possibly merely symbolic, founder of Rosicrucianism. Rosenkreuz allegedly lived for 106 years, from 1378 to 1484, and acquired secret wisdom on various trips to Egypt and the Middle East. Other stories describe the sixteenth-century Swiss alchemist Paracelsus as the true founder of Rosicrucianism.

Contemporary members of the order suggest that the origins of Rosicrucianism are much older, dating back to ancient Egyptian mystery traditions from as early as 1500 B.C.E. More specifically, they credit Pharaoh Thutmose III, who ruled Egypt from 1500 to 1447 B.C.E., with founding the first of these religious groups. They also mention the later Pharaoh Amenhotep IV, later called Akhnaton, who briefly developed a monotheist religion in Egypt based, in their view, on Rosicrucian principles. From these early beginnings, according to Rosicrucian literature, schools of learning flourished in Egypt for many centuries and conveyed their influence into the Classical world through Greek philosophers such as Thales and Pythagoras, the Roman philosopher Plotinus, and others, who visited Egypt in order to be initiated into their mysteries.

According to this official Rosicrucian view of history, these teachings were conveyed into Europe via Arab translations of Classical texts from the great ancient libraries such as the one at Alexandria. Also, the French philosopher Arnaud is said to have brought the tradition into France at the time of Charlemagne (742-814 C.E.). It thereafter spread into the rest of Europe where its next overt manifestation was its sixteenth- and seventeenth-century revival of the order with the *Fama Fraternitatis*.

In the late seventeenth century, according to this version, Rosicrucianism gained a foothold in America under the leadership of Johannes Kelpius, master of a Rosicrucian Lodge in Europe, who came first to Philadelphia and later to Ephrata, Pennsylvania. During the nineteenth century, the order was active in France, Germany, Switzerland, Russia, Spain and elsewhere. Since this time it has flourished as a semi-secret society in both Europe and the United States, with its headquarters in California and its own site on the World Wide Web.

A key component of this account is that Rosicrucians have suffered persecution at many times and, consequently, have frequently had to function in considerable secrecy. The result is that they claim involvement in a wide range of philosophical and religious movements, sharing ideas with the Egyptians, the Pythagoreans and Neoplatonists, the early Christians, the Alchemists and the Knights Templar. They even claim to have been a major influence on the founding fathers of the United States.[48] As their literature states:

> Rosicrucian ideas and our unique process and method of inner development have been developed over many centuries. Thus, a large number of mystical laws and principles which are explained in our monographs are the product of the ongoing studies and experimentation which mystics of the past have performed to pierce the mysteries of nature and the universe.[49]

The list of historical figures claimed to be Rosicrucians is fascinating. There is no way to authenticate any of the names but the list is worth reproducing in its entirety:

> Leonardo da Vinci (1452-1519), Cornelius Heinrich Agrippa (1486-1535), Paracelsus (1493-1541), François Rabelais (1494-1553), Theresa of Avila (1515-1582), John of the Cross (1542-1591), Francis Bacon (1561-1626), Jacob Boehme (1575-1624), René Descartes (1596-1650), Blaise Pascal (1623-1662), Baruch Spinoza (1632-1677), Isaac Newton (1642-1727), Gottfried Wilhelm Leibnitz (1646-1716), Benjamin Franklin (1706-1790), Thomas Jefferson (1743-1826), Michael Faraday (1791-1867), Marie Corelli (1855-1924), Claude Debussy (1862-1918), Erik Satie (1866-1925), and Edith Piaf (1915-1962).[50]

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[48] As part of this claim, Rosicrucians point to the all-seeing pyramid on the U.S. $1 bill, which, they claim, directly reflects Rosicrucian doctrines.

[49] Rosicrucian web-site: www.rosicrucian.org/rosicruc/mastery/6-history.html#anchor 216739

[50] Ibid.

Elsewhere, it is claimed that Rosicrucian teachings were espoused by such outstanding philosophical and religious figures as Plato, Jesus, Philo of Alexandria, and others. The order claims further sources from as far afield as India, and its doctrines frequently overlap those of other movements such as Kabbalah and Alchemy. The Alchemists in particular figure prominently in Rosicrucian literature:

> Alchemy--the art of transmutation--came into prominence with the Alexandrian Greeks. It was then introduced to the Arabs who then transmitted this art and forerunner of chemistry to Europe. The Alchemists played a tremendous part in the early history of the Rosicrucian Order. While many alchemists were interested in making gold, some were more concerned with the transmutation of human character. European Alchemists and Knights Templar, in contact with the Arab civilization at the time of the Crusades, brought much of this wisdom to the West.[51]

While there is no reliable evidence that would date the order's history earlier than the seventeenth century, its members point to many ancient sources as prototypes for their teachings, even if the actual name of the order, as it is now known, was to come much later. However, the apparent need for secrecy makes it impossible to verify any of the claims made from within the order itself. As Joscelyn Godwin points out, "The subject of esotericism is so new to humanistic scholarship that no conventions yet exist for its

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[51] Ibid.

treatment."[52] This is an important consideration, because whole topics in the history of music, philosophy and science, touch upon traditions whose esoteric elements are ignored. Thus, for example, alchemy can be viewed as a primitive form of chemistry replete with superstitious elements. It appears, however, that alchemy was concerned less with chemistry than with human development:

> In Europe the transcendental alchemists--mystics and philosophers--sought to transmute the base elements of human character into the more noble virtues and to release the wisdom of the divine self within the individual. Some of the renowned alchemists who were also Rosicrucians were Albertus Magnus, Roger Bacon, Paraclesus, Cagliostro, Nicholas Flamel, and Robert Fludd.[53]

A Matrix of Ideas. Finding Fludd's name in this context provides some insight into the multiple sources of his ideas and the complexity of the Magical tradition. The Organic and Mechanist traditions can be described much more simply and quickly than the matrix of ideas that, as we have seen, constitute the Magical strand of thought. With so many competing and interacting ideas from such a variety sources appearing under so many different names (Hermetic, Rosicrucian, Pythagorean, Neo-Platonic, Kabbalistic,

[52] Joscelyn Godwin, *The Theosophical Enlightenment* (Albany: State University of New York Press, 1994), p. xi.

[53] Rosicrucian web-site, op. cit.

Alchemical), this tradition does not lend itself to precise definition, especially since each of its parts tends to subsume the matrix of ideas within that part's own sphere of influence, or to claim to be the original source of the other teachings.

In spite of this, it is possible to identify certain notions as common to this general view of the world: the idea of the world as emanations from a Divine Being; the mathematical harmony of the universe that was revealed to the seer in the form of sacred mathematics; the relationship between the microcosm and the macrocosm; and--of great importance to this study--the idea of the cosmos as a musical structure. Further, all of these traditions rely extensively on systems of symbolism to represent their teachings and to convey them from one generation to another, symbolism such as one encounters in the writings of Robert Fludd. Kepler's work also seems to be centered on symbolism, notably on music as an organizing principle of the universe. Both systems seem to spring from the same seed. Closer examination reveals that they bore very different fruit.

The Magical Tradition and Fludd's Vision

We have seen that music, including the Divine Monochord, is a central image in Robert Fludd's cosmology, appearing in the section of his work called *Musica mundana*. Its significance can be seen in terms of Fludd's underlying theme of the relationship between the higher and lower spheres of existence, or the macrocosm and the microcosm, a notion fundamental both to Rosicrucianism and Hermeticism. Frances Yates finds this relationship to be fundamental to the thought of both Fludd and his contemporary John Dee, leading philosopher of the Elizabethan Renaissance and a practitioner of Kabbalah.[54] It is in Fludd's work, however, that music serves as a central image:

> In Fludd's writings the theme takes a musical form and is worked out in terms of musical proportion. The proportions of the Microcosm and their relation to those of the Macrocosm, of the *musica humana* to the *musica mundana*, are the foundation ideas of Fludd's voluminous works.[55]

In the construction of his thesis, Fludd's musical images owe more to the nature of the analogies he wishes to illustrate than to any emphasis on the accuracy of musical or acoustical structures.

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[54] See Frances A. Yates, *Theatre of the World* (Chicago: Chicago University Press, 1969), and "John Dee: Christian Cabalist," in *The Occult Philosophy in the Elizabethan Age* (London: Routledge & Kegan Paul, 1979), pp. 79-93.

[55] Yates (1969), p. 43.

> Fludd's music theory has been studied by P.J. Amman[56] who finds that it is "antiquated in comparison with other musical treatises of the period but original in its presentation of the subject."[57] The fact is that Fludd was still trying to be a universal man of the Renaissance; his music treatise is but one of his efforts in the volume . . . though doubtless for him the section on music was the most significant and all-inclusive.[58]

As Yates points out, while Fludd flourished in the early seventeenth century, his vision was firmly planted in the Renaissance and thus looked back in time for its inspiration.

> The great forward movements of the Renaissance all derive their vigour, their emotional impulse, from looking backwards. The cyclic view of time as a perpetual movement from pristine ages of purity and truth through successive brazen and iron ages still held sway and the search for truth was thus of necessity a search for the early, the ancient, the original gold from which the baser metals of the present and the immediate past were corrupt degenerations. Man's history was not an evolution from primitive animal origins through ever growing complexity and progress; the past was always better than the present, and progress was revival, rebirth, renaissance of antiquity.[59]

Emerging out of Hermetic and Rosicrucian thought, Fludd's work entirely reflects this viewpoint. But while the content

[56] Amman, pp. 198-227.

[57] Ammann, p. 206.

[58] Yates (1969), pp. 54-55.

[59] Yates (1964), p. 1.

of his cosmology belongs squarely in the Magical tradition, particularly with its emphasis on *musica mundana* and *musica humana* and the macrocosm-microcosm relationship between them, there is a sense in which the spirit of his work looks back as much to scholasticism as to Christiam Rosenkreuz and Hermes Trismegistus, particularly where his methodology is concerned.

> . . .to Fludd's mind there is an essential distinction between things natural and things mathematical, which make the two incommensurable, a view which in the last resort results from his Aristotelian concept of the physical world.[60]

Typical of the approach adopted by Rosicrucian writers, the fundamental concepts underlying Fludd's work, interpenetrating pyramids representing the upper and lower realms of celestial and earthly creation (see fig. 8), hierarchies of angels ordered by musical relationships (see fig. 9), even the world monochord itself, are presented in the form of images which are purely allegorical and not intended to correspond to any observable physical reality. Even the acoustical information used in the presentation of the World Monochord is inaccurate. As Joscelyn Godwin points out:

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[60] Ammann, p. 211.

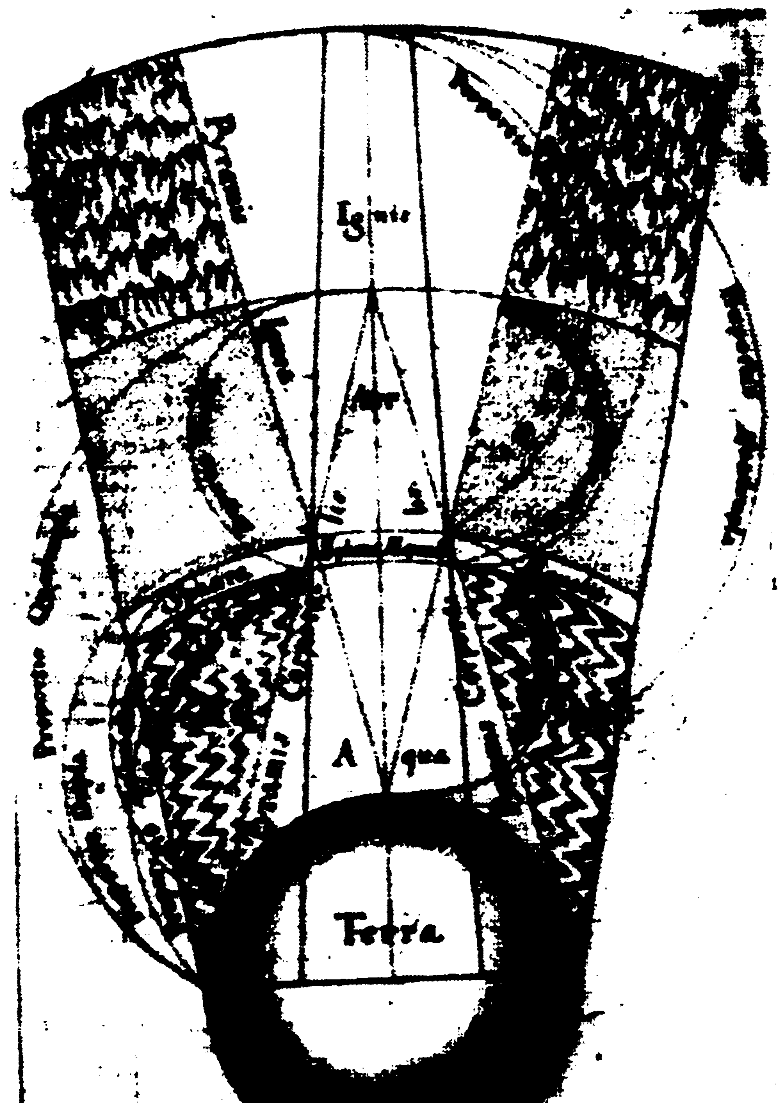

Fig. 8: The Elemental Pyramids, Robert Fludd, *Utriusque Cosmi Maioris*, i, Tract I, 1617

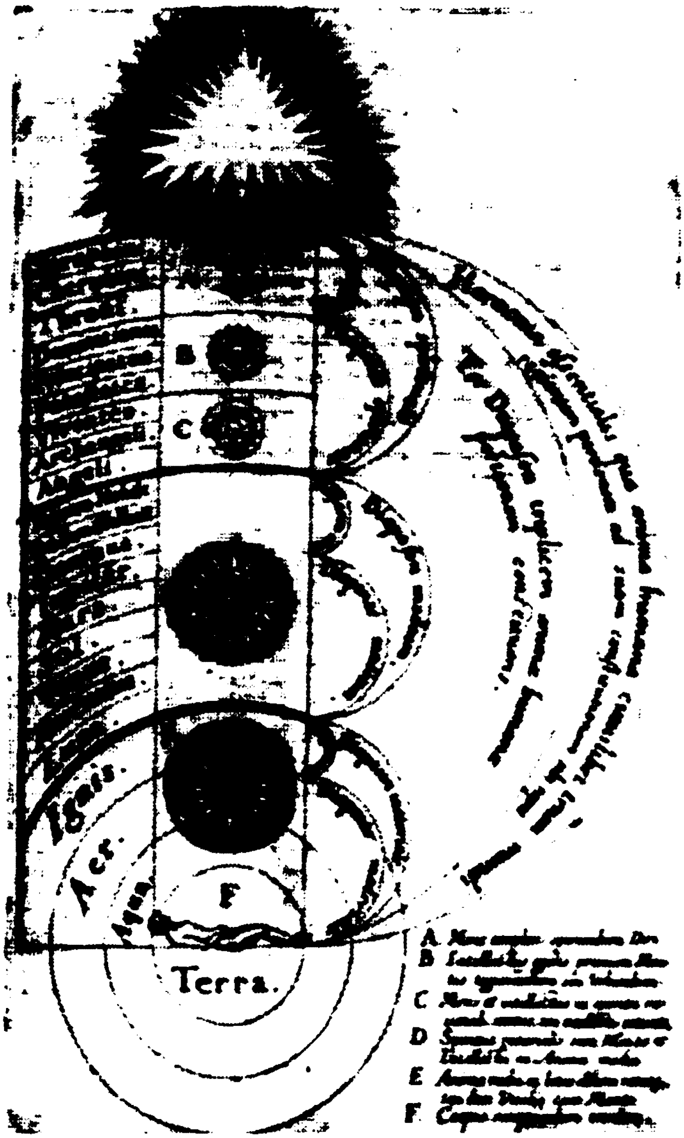

Fig 9: Music and the Great Chain of Being, Robert Fludd, *Utriusque Cosmi Maioris*, ii, Tract I, 1617

> There is an error in the "Diapente materialis": it should join the Sun's G to the C of fire, as should the corresponding *proportio sesquialtera*. And in order for the tones and semitones to be correct (to the right of the string), we have to imagine the Fs as sharp.[61]

While he conforms to acoustical phenomena in the ratios used to divide the octave, "... he does not do so in his geometrical division of the monochord as shown in his illustration. The lengths of the fourth and fifth are arbitrarily adapted to the three regions of the universe which are represented as being of equal length."[62]

If Fludd's allegories fail to reflect observable phenomena accurately in the physical world, they need not be seen as entirely fanciful. All of them are intended to describe abstract phenomena on different levels of existence. Whatever mathematics he uses is intended to support what he describes. The problem, however, according to Wolfgang Pauli, is that "Fludd never distinguishes clearly between a real, material process and a symbolical representation."[63] It is this disregard for physical

[61] Joscelyn Godwin, *Robert Fludd, Hermetic Philosopher and Surveyor of Two Worlds* (London: Thames & Hudson, 1979), p. 44.

[62] Ammann, p. 202.

[63] Wolfgang Pauli, "The Influence of Archetypal Ideas on Kepler's Theories," in C. G. Jung, *The Interpretation of Nature and the Psyche* (Chicago: Bollingen/Pantheon, 1955), p. 193.

phenomena in the construction of a symbolic system of the world that constitutes the crux of the dispute between Fludd and Kepler, a dispute that became a protracted controversy, carried on in a series of publications.[64]

The Magical Tradition And Kepler's Vision

Neoplatonism and the related complex of ideas were extensively elaborated and developed during the Renaissance and were thus fully absorbed into Western thought by the beginning of the seventeenth century. At the same time, the other strands of thought, the Organic and the Mechanist, were also well established. As a result, in the early years of the scientific revolution, all these influences were interacting and competing, and many of the great thinkers who contributed to science in these years did so by attempting to balance and integrate them.[65] It is important to consider this when evaluating their work.

Johannes Kepler is a case in point. Historians of science credit Kepler mainly with the discovery of the three laws of planetary motion that formed the basis of the later work of cosmologists from Newton to Einstein. Kepler's work

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[64] See Ammann, p. 210.

[65] See Penelope Gouk, *Music, Science and Natural Magic in Seventeenth Century England* (New Haven: Yale University Press, 1999).

is considered of great importance because it helped to establish empirical observation as an essential component of scientific methodology and led eventually to the establishment of the mechanistic paradigm of modern scientific thought. However, such an outcome does not necessarily represent Kepler's own priorities or intentions.

For many years Kepler was engaged in painstaking analysis of data compiled by astronomer Tycho Brahe at Brahe's observatory near Copenhagen. All of this work was aimed primarily at substantiating an internal vision of the solar system that had come to him many years previously during a flash of inspiration. He perceived the solar system as built out of a series of concentric spheres, each representing the orbit of one of the planets, their sizes determined by the shapes of the five Platonic solids nestled one within the other. It is a fascinating story that has been well documented elsewhere.[66] What is significant here is, first, that Kepler's vision was just that, an internal, mental perception of the nature of the heavens that he subsequently strove to substantiate through physical observation, and, second, that the vision expressed in *Harmonice Mundi* was an essentially musical one, although on an abstract level of perception. As he himself wrote: "The

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[66] See James, pp. 140-158, Koestler, and Caspar.

movements of the heavens are nothing except a certain everlasting polyphony, perceived by the intellect, not by the ear."[67] These aspects of Kepler's work, both visionary and musical, place him squarely in the Magical, or Pythagorean, tradition. Koestler emphasizes this:

> The *Harmony of the World* is the continuation of the *Cosmic Mystery*, and the climax of his lifelong obsession. What Kepler attempted here is, simply, to bare the ultimate secret of the universe in an all-embracing synthesis of geometry, music, astrology, astronomy and epistemology. It was the first attempt of this kind since Plato and the last to our day. After Kepler, fragmentation of experience sets in again, science is divorced from religion, religion from art, substance from form, matter from mind.[68]

Kearney writes:

> Kepler owed an immense amount to the sustaining power of his Pythagorean belief in the mathematical harmony of the universe. Kepler refused to give up when failure followed upon failure and the facts did not fit his successive hypotheses. This persistence had its origins in his quasi-religious belief that God had created the universe in accordance with the laws of mathematics.[69]

Contemporary accounts of Kepler's work tend to emphasize his dedication to the scientific method and its emphasis on empirical observation. Kepler himself seemed to give greater

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[67] Kepler, *Harmonice mundi*, quoted in James, p. 149.

[68] Koestler (1968), p. 389.

[69] Kearney, p. 137.

weight to the importance of the Magical tradition and its emphasis on inner vision:

> Kepler saw the role of the scientist as akin to that of the priest or seer; the poet, the lover and the scientist were of imagination all compact. He related in *Harmonice Mundi* how:
>
> > I gave myself up to sacred frenzy. I have plundered the golden vessels of the Egyptians, in order to furnish a sacred tabernacle for my God out of them far from the borders of Egypt.[70]
>
> Kepler saw God not as the logician or the engineer but as the playful magician leaving his marks in the universe for us to discover. The world of nature carried signs, or signatures, left by God as clues to indicate their true significance.[71]

In his *Mysterium cosmographicum*, Kepler had set forth the core of a system that is essentially geometric, based on the properties of the five Platonic solids. Later, in *Harmonice Mundi,* he introduced a musical component. It was Kepler's adherence to the Pythagorean tradition that compelled him to link geometry and music with astronomy in accordance with the Quadrivium, the division of mathematics into arithmetic, music, geometry and astronomy that is traced back to Pythagoras by many writers.[72] Kearney, in describing the resulting cosmology, is of the opinion that

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[70] Caspar, p. 267.

[71] Kearney, p. 140.

[72] See Chap. IV, pp. 149-151.

"in the work of the German astronomer, Johannes Kepler . . . the Magical tradition reaches one of its climaxes."[73] At the same time, however, Hans Kayser suggests that "Kepler was the first who gave it [the music of the spheres] that foundation which lifts it out of mere faith and brings it in line with modern scientific thinking."[74] It was in this respect that Kepler differentiated himself from Robert Fludd.

The Fludd-Kepler Dispute

We have seen that the idea of musical cosmology arises out of the Pythagorean tradition and the matrix of ideas that adheres to it. In Chapter III we will, in fact, place the *locus classicus* of the music-of-the-spheres image in Platonic dialogues much influenced by Pythagoreanism. That would appear to establish this theme, and along with it the work of both Fludd and Kepler, as belonging to the Magical tradition. Indeed, as we saw above, Kepler's work is regarded as one of its climaxes. In spite of this, however, an examination of their writings shows that they disagreed bitterly with one another. It is important to understand the reason why.

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[73] Kearney, p. 130.

[74] Kayser, p. 59.

Kepler's world view, like Fludd's, was rooted in the ancient past; it was a Pythagorean vision that provided the very driving force behind his work and kept him going through failure after failure. But it is the very fact that failure was a possibility for Kepler that is central to his criticism of Fludd's work. And it is precisely this feature of his work that is commonly noted by historians of science when they describe him as one of the founders of the scientific era. In contrast to the purely figurative images we find in Fludd's work, the essence of Kepler's research for many years was to correlate his internal vision with external physical phenomena. True science was said to begin when he abandoned one hypothesis because of the smallest discrepancy, only eight seconds of arc, between his theory and observations carried out at Tycho Brahe's observatory. Fludd's response was to condemn the very notion that such a correlation was a worthwhile goal:

> For it is for the vulgar mathematicians to concern themselves with quantitative shadows; the alchemists and Hermetic philosophers, however, comprehend the true core of the natural bodies. . . . He [Kepler] puzzles out the exterior movements of the created thing, whereas I grasp the head; I perceive the first cause, he the effects.[75]

Kepler's criticism of Fludd was the exact opposite:

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[75] Robert Fludd, *Demonstratio analytica,* quoted in James, p. 155.

> It is obvious that he derived his main pleasure from unintelligible charades about the real world, whereas my purpose is, on the contrary, to draw the obscure facts of nature into the bright light of knowledge. His method is the business of alchemists and Paracelsians, mine is the task of the mathematician.[76]

Koestler is quick to qualify Kepler's criticisms, pointing out that "these words are printed in *Harmonices Mundi*, which is buzzing with astrological and Paracelsian ideas."[77] This is true, of course. But it fails to point out a critical difference between Fludd and Kepler.

> He [Kepler] wanted to prove above all that all harmonies exist in the heavens in their true quantitative and measurable proportions, not just as an unverifiable symbolism. . . .
>
> Discussing Fludd's *De Musica mundana* in his appendix, Kepler states that the difference between him and [Robert] Fludd is enormous. The harmonies which Fludd taught are to him mere imagery. Whereas Fludd's music of the world was related to the whole universe with its three regions of angels, planets and elements, his own concept is exclusively concerned with the planetary movements.[78]

Apart from the importance of relating inner conceptions with empirical reality, these two thinkers have radically different views of mathematics, a critical issue in the formation of scientific thought:

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[76] *Harmonices Mundi Libri V* (Linz, 1619), cited in Koestler (1968), p. 397.

[77] Ibid.

[78] Ammann, p. 211.

> Kepler rejects the mystique of numbers because those numbers are abstract and of no use in mathematical arguments, whereas Fludd calls the numbers of vulgar mathematics abstract, because they only measure the accidental quantities of things which are close to the senses, but which in reality are mere shadows.[79]

Pauli also sums up their differences in terms of the use of mathematics:

> Fludd's general standpoint is that true understanding of world harmony and thus true astronomy are impossible without a knowledge of the alchemical or Rosicrucian mysteries. Whatever is produced without knowledge of these mysteries is an arbitrary, subjective fiction. According to Kepler, on the other hand, only that which is capable of quantitative, mathematical proof belongs to objective science; the rest is personal.[80]

He goes on to sum up this famous difference of viewpoint in the following terms:

> From what has been said above, the reader has gained, we hope, some understanding of the prevailing atmosphere of the first half of the seventeenth century when the new, quantitative, scientifically mathematical way of thinking collided with the alchemical tradition expressed in qualitative, symbolical pictures: the former represented by the productive, creative Kepler always struggling for new modes of expression, the latter by the epigone Fludd who could not help but feel clearly the threat to his world of mysteries, already

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[79] Ammann, p. 212.

[80] Pauli, p. 194.

> become archaic, from the new alliance of empirical induction with mathematically logical thought.[81]

Kepler's Vision as Balanced Viewpoint

There have been moments in our cultural history when disparate elements have achieved a balance, creating a whole greater than its parts. Nietzsche provided what is probably the most famous example when he wrote that Greek culture attained great perfection when it was able to create a balance between Apollo and Dionysius, between reason and passion. Similarly, the Renaissance, according to Tarnas, holds a unique position in cultural history "not least from its simultaneous balance and synthesis of many opposites: Christian and pagan, modern and classical, secular and sacred, art and science, science and religion, poetry and politics."[82] In Chapter II, I will suggest that Pythagoras, who was enormously influential upon the thought of the Renaissance, also represents a balance between diverse viewpoints. To give a musical analogy, J. S. Bach's work represents a pinnacle of achievement in the history of Western music because of its perfect balance between the horizontal and vertical, or the melodic and harmonic

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[81] Pauli, p. 205.

[82] Tarnas, p. 229.

elements in his work, as well as between the emotional and technical aspects of composition.

In contrast to such examples of balance, the disparate world views that collided at the beginning of the seventeenth century were much more difficult to reconcile. The Magical tradition seems incompatible with the Mechanistic, as mediaeval and Renaissance thinkers represented the world in terms of allegory and symbolism, while modern thought disregards phenomena that are not available to empirical observation. But the scientific tradition nevertheless reaches one of its climaxes in Kepler's attempt to reconcile these two seemingly opposing viewpoints, the inner value of the soul with the outer values of the observed universe, the Magical tradition with the Mechanistic. From the narrow standpoint of the purely mechanistic paradigm, the three laws of planetary motion are the only results of Kepler's work that appear to have any value for us. That was not the case for Kepler himself.

> [A] little-known fact is that Kepler's third planetary law can be found in the middle of that same fifth book of *Harmonices Mundi* that contains the proof of world harmony. It appears in chapter three as the eighth of thirteen major postulates of astronomy required for his proof.[83] So it was by no means a major premise of the work . . . We even know that this third planetary law only occurred to Kepler shortly before the book's

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[83] J. Kepler, *Weltharmonik*, M. Caspar, trans. (Darmstadt, 1967), p. 291.

> completion: it was inserted late and has little to do with the actual proof, but provided a final confirmation.[84] [85]

There is another aspect of Kepler's work that tends to be overlooked in discussions of its significance; Kepler's own words suggest a different purpose underlying his life's work:

> To find a proper proportion in the sensile things is to discover and to recognize and to bring to light the similarity in this proportion in the sensile things with a certain Archetype of a most true Harmony, which is present in the soul.[86]

The insight expressed here is essential to the understanding of musical cosmology. Kepler's insistence on a link between the archetypes of the soul and the structures of the external world is a key element of the Pythagorean

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[84] Haase, "Marginalien zum 3. Keplerschen Gesetz," in *Kepler Festschrift*, Regensburg, 1971. Also in Haase, *Aufsätze zur harmonikalen Naturphilosophie* (Graz: Academische Druck-u. Verlagsanstalt, 1974), pp. 117-125.

[85] Rudolf Haase, "Kepler's World Harmony and its Significance for Today," in Joscelyn Godwin, ed., *Cosmic Music: Musical Keys to the Interpretation of Reality* (Rochester Vermont: Inner Traditions International, 1989), p. 114.

[86] ". . . Idoneam invenire in sensibilus proportionem, est detegere et agnoscere et in lucem proferre similitudinem illius proportionis in sensilibus, cum certo aliquo verissimae Harmoniae Archetypo, qui intus est in Anima." Johannes Kepler, *Gesammelte Werke*, M. Caspar et al., eds. (München, 1937), Vol. 6, p. 215. Quoted in H. F. Cohen, *Quantifying Music* (Dordrecht & Boston: D. Reidel, 1984), p. 25.

and Hermetic traditions upon which a musical cosmology depends. "As above, so below," goes the Hermetic maxim. Kepler looks forward to modern trends of thought in his determination to make the theoretical constructs match the physical phenomena exactly; his attempt to correlate inner, mental phenomena with the external world through the use of mathematics was to prove critical in the formation of the scientific method. Yet it was this aspect of Kepler's work that Fludd criticised most vehemently.

It is possible that an understanding of such an integrated phenomenon as music could be achieved only in the context of the kind of world view that Kepler was striving for. As two modern music theorists, both imbued with the spirit of Pythagoreanism, point out:

> Music is not, as some acousticians would have us believe, something that happens in the air. It is something that, first and last, happens in the soul. To an outer physical something corresponds an inner spiritual something: tone. Music happens when both are attuned to each other.[87]

Cultural historian Morris Berman relates this observation directly to Kepler's vision.

> For music embodies a crucial tension, being an affective experience that is nevertheless amenable to

[87] Siegmund Levarie and Ernst Levy, *Tone: A Study in Musical Acoustics* (Kent, Ohio: Kent State University Press, 1968), p. 1.

> mathematical treatment. . . Thus Kepler wrote that the true test of consonance (harmonic proportion) was the reaction of the soul, viz., joy; and for him, this was tied to a larger astronomical scheme, in which the same consonance could be found in the numerical relationships that he believed subsisted between the planets.[88]

Kepler's efforts were clearly directed to the end of attuning the inner world to the outer. Other influences were to prove more powerful, however, plunging Europe and the world into the treacherous waters of the modern era.

Treacherous Waters

René Descartes

In 1619, the year after Kepler's *Harmonice Mundi* appeared, on November 10, René Descartes spent the day shut up alone in a stove-heated room near Ulm, in Holland, with nothing to occupy him other than his own thoughts. Seventeen years were to pass before he was to publish a treatise, the *Discourse on Method,* based on the insights that came to him on that day. Nevertheless, during these hours of introspection he arrived at conclusions that were to have enormous impact on the thought of the West, indeed of the entire modern world. Representing, as it did, a major shift

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[88] Morris Berman, *Coming to Our Senses: Body & Spirit in the Hidden History of the West* (New York: Simon and Schuster, 1989), p. 237.

of emphasis in our understanding of the world, Descartes' formulation had a far more devastating effect upon the music of the spheres than any specific criticisms, such as those of Johannes de Grocheo in the fourteenth century, had achieved. Musical cosmologies were thereafter essentially eliminated from the mainstream of Western culture.

The appearance of Descartes' name on a list of supposed Rosicrucians might suggest a sympathy with the Magical tradition, but, in the opening section of his discourse, Descartes appears to disavow that his sympathies lay only in this direction. "As for the other sciences whose principles are borrowed from philosophy," he writes:

> I judged that nothing stable could have been built on such insecure foundations;. . . I thought I knew enough about the false sciences not to run the risk of being duped by the promises of the alchemist, the predictions of the astrologer, the impostures of the magician, by the tricks and bragging of any one of those who profess to know more than they do.[89]

If such a statement implies a rejection of the Magical tradition, it is also true that a fundamental impulse behind Descartes' work was a desire to move beyond the Aristotelian world view. This is not to say that his original impulse was to tear down scholasticism or any other philosophical

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[89] René Descartes, *Discourse on Method and Other Writings,* translated and with an introduction by Arthur Wollaston (Baltimore: Penguin Books, 1960), p. 42.

edifice; his original goal was more modest. In the *Discourse*, while he avers that "it would be truly absurd for an individual to undertake a reform of the state . . . or to undertake a reform of the body of the sciences, or even the established order of instruction in our schools,"[90] he concedes that it is at least reasonable to reform his own understanding in order to give order to his own life:

> I could not do better than to undertake to rid myself, at least once in my life, of all the opinions I had hitherto accepted on faith, in order to either replace them with better ones or to restore them to their former place, once I had brought them to the level of my reason. And I firmly believed that, in this way, I should succeed in ordering my life much better than if I simply built upon the old foundations, and based myself upon principles that I had allowed myself to adopt in youth, without ever considering that they were true.[91]

If he was to replace all his previous assumptions with a new foundation it would have to be one based on certainty. In order to accomplish his goal, Descartes turned to mathematics, the form of knowledge that he felt to be most reliable. As Tarnas writes, ". . .it was the rigorous methodology characteristic of geometry and arithmetic that

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[90] Descartes, p. 46.

[91] Ibid.

alone seemed to promise him the certainty he so fervently sought in philosophical matters."[92]

Descartes begins with the assumptions that God had some plan in mind when creating the universe, and that this plan is embodied both in the universe and in the human mind. It is for this reason that the mind is capable of thought, of appreciating and understanding the external world, and even to have a priori knowledge of nature, because both mind and objective nature are reflections of the same divine plan. This inner capacity of the mind to entertain thought and to gain knowledge Descartes calls intuition. Exactly what this capacity is he does not explain, other than to imply that it is nature itself. Arthur Wollaston comments:

> For we all have this light and in the same degree; that is the meaning of the opening sentences of the *Discourse*, and it is the ultimate significance of the Cartesian Method that it allows us to follow this natural light by acting as a sort of therapeutic of the mind and freeing us from all forms of error.[93]

As described here, the Cartesian method appears to echo the notion of compatibility between macrocosm and microcosm that characterizes the Platonic and Hermetic viewpoints. However, Descartes' picture of the universe takes a turn that severs this fundamental relationship. This viewpoint emerges in the

[92] Tarnas, p. 276.

[93] Wollaston, intro. to Descartes, p. 18.

second of his *Meditations*, where he establishes, through his famous *cogito ergo sum,* that the existence of one's own mind cannot rationally be doubted. It is a first step in establishing certainty. From here he argues to the existence of God and the general reliability of his senses, arguments that have been much criticized over the centuries. But the relevant point for our discussion is the sharp distinction that Descartes draws between mind and matter. The essence of mind, he reasons, is to be conscious, rather than to be spatially extended. Indeed, he argues, anything extended can be divided, but the notion of half an individual mind is absurd. The essential characteristic of matter, on the other hand, is the occupation of space; all of its other characteristics are secondary. Thus the conclusion must be that mind and matter, while they both exist, are completely distinct from one another. The universe that results from this analysis must therefore be dualistic, consisting of two dissimilar substances, mind and matter, presided over by a third component--God, or Infinite Mind.

> Rational man knows his own awareness to be certain, and entirely distinct from the external world of material substance, which is epistemologically less certain and perceptible only as object. Thus *res cogitans*--thinking substance, subjective experience, spirit, consciousness, that which man perceives as within--was understood as fundamentally different and separate from *res extensa*--extended substance, the objective world, matter, the physical body, plants and animals, stones and stars, the entire physical universe, everything

> that man perceives as outside his mind. Only in man did the two realities come together as mind and body. And both the cognitive capacity of human reason and the objective reality and order of the natural world found their common source in God.[94]

Whether or not they come together in man, this separation of subjective and objective destroys the basis upon which so much Renaissance thought depended, especially Pythagoreanism and Hermeticism. As Frances Yates explains it:

> In his eagerness to establish a purely objective view of nature as a mechanism, in his enthusiasm for pure mathematics as the only safe tool for objective enquiry, Descartes was left with the problem of mind somewhat embarrassingly on his hands. He provisionally solved the problem in a very crude way, by his so called dualism, "one world consisting of a huge mathematical machine, extended in space; and another world consisting of unextended thinking spirits. And whatever is not mathematical or depends at all on the activity of thinking substance . . . belongs with the latter."[95] [96]

It is with these steps of logic that Descartes destroys the interdependence of microcosm and macrocosm because the macrocosm comprises the physical universe while the microcosm dwells within the mind. Separating these thus

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[94] Tarnas, pp. 277-278.

[95] Baillet, *Vie de Descartes*, p. 113 (Yates's footnote).

[96] Yates (1964), p. 454.

destroys the ontological ground upon which the Magical tradition had been built.

Descartes' separation of mind and matter was enormously important for the development of the modern scientific approach to knowledge. Matter can now be conceived as a substance in its own right, understandable in terms of purely mechanical, geometric, spatio-temporal laws that do not refer to subjectivity or mind. And this conception of science has led to enormous advances in our understanding of, and mastery over, the physical world. But, when conjoined with the lack of any comparable progress in understanding mind, the successes of modern materialistic science have also led to the view that man is really nothing but a complex material machine, with no soul at all. For the soul would now seem to be, in the philosopher Gilbert Ryle's famous expression, a mere--and completely unnecessary--"ghost in the machine." Thus Yates could remark:

> This strangely inadequate way of dealing with mind did not long remain unquestioned and since Descartes' day many philosophers and thinkers have struggled with the problem of knowledge, of epistemology, of the relation between mind and matter. Nevertheless, this bad start of the problem of knowledge has never been quite made up. About the external world, man has discovered ever more and more. About his own mind, why he can reflect nature in it and deal with nature in this amazing way, he has made much less progress.[97]

[97] Yates (1964), p. 454.

A correspondence between microcosm and macrocosm, between mind and matter, is an essential component of all musical cosmologies. Now, with Descartes, we see a split emerging between these two components of reality. Musical cosmologies break down further with the other effects of the mechanistic world view. As Clause V. Palisca explains:

> ... it is important to keep in mind in analyzing music's relationship to science that music, unique among the arts, is at the opening of the scientific age inseparable from science. It is not surprising under these circumstances that the area of musical thought most affected by the scientific revolution were those bordering on the fields of science that underwent the greatest transformation. These, it will be recalled... were astronomy and dynamics. Astronomy, music's sister-science in the quadrivium, had until the middle of the sixteenth century bolstered the idea that earthly music contained in microcosm the divine harmony of the universe; but now *there was growing evidence that the universe was not a harmony after all*. In the fields of dynamics the studies of the nature of vibration and of sound likewise upset many of the widely held notions of number-symbolism and of the way music affects the senses and the mind.[98] (Author's italics)

In light of these discoveries, and the conclusions made concerning them, astronomy moved away from its former sister-science. Within music itself, the trend, begun in the thirteenth century, for theory to focus exclusively on musica instrumentalis accelerated.

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[98] Claude V. Palisca,"Scientific Empiricism in Musical Thought," in H. H. Rhys, ed., *Seventeenth Century Science and the Arts: William J. Cooper Foundation Lectures, Swarthmore College, 1960* (Princeton: Princeton University Press, 1961), p. 93.

Marin Mersenne

In 1636 a work appeared that clearly showed the new direction in music theory of which Palisca speaks. The title of Marin Mersenne's 1636 treatise *Harmonie Universelle* might suggest another exposition of musical cosmology. On the contrary, by virtue of both content and mode of presentation, *Harmonie Universelle* is very much a work of the scientific, mechanistic paradigm, reflecting the influence of Mersenne's contemporary, Descartes. Proceeding like a work in physics through a series of propositions, and dealing exclusively with *musica instrumentalis*, Mersenne finds the basis of musical phenomena not in any cosmological principles but in the purely physical domain of acoustics. Occurring only one generation after the work of Fludd and Kepler, it clearly demonstrates the direction music theory was beginning to take, following the general direction of the physical sciences.

The chronology here is fascinating and truly illustrates the idea of a watershed between the "placid waters of the classical age . . . and the treacherous waters . . . [of] the modern age."[99] 1616 saw a highly reactionary step, as Nicolas Copernicus' master work, *On the Revolutions*

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[99] See p. 25, above.

of the Heavenly spheres,[100] which pointed towards the modern age by asserting that the earth rotated on its axis and traveled around the sun, was placed on the Church's index of banned books, remaining there until 1835. As Haar points out, even though Copernicus' treatise had been published over seventy years earlier, its influence on musical cosmology was surprisingly limited.

> One might expect the publication in 1543 of Copernicus' *De revolutionibus orbium coelestium* to have silenced permanently this venerable music, so bound up with the Ptolomeic universe. It did not; curiously enough, Copernican theories seem to have had little effect on the doctrine of *musica mundana.*[101]

While Copernicus' forward-looking vision was removed from circulation in 1616, Fludd's work, which faced resolutely toward the past, was published in 1617. Kepler's magnum opus, which attempted to balance elements of the antique and modern world views, appeared in 1619. In the same year, Descartes, whom Hegel would later call "the grand initiator of modern thought," experienced his epiphany. Each of these thinkers had his particular approach to mathematics, along with a particular view on the relationship between Magical, Organic and Mechanistic

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[100] *De revolutionibus orbium coelestium,* Nuremberg, 1543.

[101] Haar (1960), p. 486.

traditions, as well as between subjective and objective realms.

Fludd and Kepler seem to share an allegiance to the realm of the Magical, yet are divided by Kepler's emphasis on balancing internal and external aspects of experience; while Descartes, desiring to establish the existence of the non-material soul and to elevate all knowledge to the certainty of mathematics, established a view that led instead to the current scientific, materialistic paradigm. It is remarkable that while a Pythagorean impulse set scientific thought in motion, the result was to be the elimination of the very essence of Pythagorean thought from the mainstream of our culture. This led one of Kepler's biographers to write of the irony of fate that

> built the mechanical philosophy of the eighteenth century and the materialistic philosophy of the nineteenth out of the mystical mathematical theory of the seventeenth.[102]

Of course, such a transformation did not all happen between 1616 and 1619. But this four-year turning point is more than merely symbolic; it marks a distinct acceleration of the cultural transition that Europe was undergoing. By the time *Harmonie Universelle* appeared, in 1636, the

[102] W. Carl Rufus, "Kepler as an Astronomer," in *Johannes Kepler: A Tercentenary Commemoration of His Life and Work* (Baltimore: Williams and Wilkins, 1931), p. 36.

scientific revolution was gathering momentum. The year 1637 was to see both the death of Robert Fludd, an event symbolic of the old order passing away, and the publication of Descartes' *Discourse on Method,* the work that reflected his insights of 1619 and was so influential for scientific thought. In the same year, 1637, the first public opera house opened in Venice as the Baroque era in music got well under way. In 1638, Galileo Galilei, whose father had played a significant role in the invention of opera, published *Two New Sciences,* the final volume in a sequence of books that had shaken the intellectual establishment to its core. From this point, the work done by Kepler, Descartes, Galileo and others had established the momentum that led inevitably to the other great turning point in seventeenth-century science, the *Principia Mathematica* of Isaac Newton, which was published in 1687.

Isaac Newton

So significant is the *Principia* to the development of modern cosmology that it would be easy to assume that Newton's own vision embraced the mechanistic paradigm characteristic of contemporary thought. On closer examination, however, it appears that, like Kepler's, Newton's work was moved by a more ancient vision:

> From our point of view the significance of Newton lies in his bringing together the mechanistic and magical traditions. In one of them, the world was a work of art and God was an artist. In the other, the world was a machine and God was an engineer. The two world pictures were clearly incompatible but Newton himself managed to meet the difficulty by creating a Deity who combined engineering skill with artistic solicitude. Newton's God was an aesthetic mechanic who was forever tinkering with his creation. This compromise barely survived Newton's death. The general trend of scientists in the eighteenth century was to see the world in terms of a machine. Newton the Great Amphibium managed to span two worlds but his successors could not. Hence the *Principia* came to be regarded as the foundation of a mechanistic view of the universe.[103]

The view Hugh Kearney is espousing here is that Newton, like Descartes and Kepler, was striving for a comprehensive and balanced world view, but his successors were unable to maintain this balance of vision. Two factors contributed to this failure. More than normal ability is required to synthesize seemingly opposing viewpoints, and great geniuses do not appear in every generation. At the same time, the political and religious climate of eighteenth-century England, dominated by the Puritan ethic, did not encourage Platonic modes of thought. Numerous other factors come into play, the adoption of atomism, for example, and the tendency toward secularism and away from traditional religious belief, but the end result was the same. Unable to maintain the comprehensive vision of Kepler, Descartes and Newton,

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[103] Kearney, p. 196.

Western thought turned squarely towards the mechanistic view, a process that gained momentum during the next major development, the Enlightenment.

The Enlightenment

Having argued that the emergence of the mechanistic world view to predominance in the Western world resulted from the abandonment of efforts to integrate opposing strands of thought, it would appear contradictory to observe that the Enlightenment also represented an attempt to unify knowledge. But it was an attempt on its own terms.

> . . . having extracted whatever was useful for its present needs, the modern mind reconceived classical culture in terms respectful of its literary and humanistic accomplishments, while generally dismissing the ancients' cosmology, epistemology, and metaphysics as naive and scientifically erroneous.[104]

With the Enlightenment came a view of history that has predominated for the last two centuries and that sees the modern scientific world as a triumph over ignorance and superstition and the culmination of two thousand years of Western thought.

[104] Tarnas, p. 294.

In recent years, however, a growing number of thinkers have challenged this view. Edward O. Wilson goes so far as to challenge the value of the Enlightenment itself:

> The dream of intellectual unity first came to full flower in the original Enlightenment, an Icaran flight of the mind that spanned the seventeenth and eighteenth centuries. A vision of secular knowledge in the service of human rights and human progress, it was the West's greatest contribution to civilization. It launched the modern era for the whole world; we are all its legatees. Then it failed.[105]

To support this view, Wilson cites the bloody nature of political history during the birth of the modern era, and also the subsequent fragmentation, rather than integration, of knowledge in the Western world. The reasons for these developments are complex, and comprehending them appears to be significant for the future of our culture. A major factor is that, while aiming at an encyclopedic breadth of knowledge, Enlightenment thinkers still based their world view on a Cartesian dualism, effectively banishing the perspective of the Magical tradition. At the same time, "The Enlightenment itself, however, was never a unified movement. It was less a swift river than a lacework of deltaic streams working their way along twisted channels."[106] The eventual

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[105] Edward O. Wilson, *Consilience: The Unity of Knowledge* (New York: Alfred A. Knopf, 1998), p. 14.

[106] Ibid., p. 21.

result has been described by Edward Lowinsky, who wrote that "the present era is characterized by a complete lack of any philosophy which would bind together the multitude of phenomena and of human activities into one meaningful whole."[107] One of the results of this fragmentation has been the disappearance of musical cosmology from the mainstream of Western thought.

The Unmusical Cosmos

It is, then, one of the great ironies of the history of thought that the work of such men as Johannes Kepler and Isaac Newton, whose lives were devoted to the demonstration of the same Universal Harmony that formed the central motif of Neo-Platonism and the magical tradition, should have led eventually to the materialistic reductionism of the twentieth century. Their impulse, as with Descartes, was to eradicate outdated, superstitious thinking. Their approach was to strive for a comprehensive view that balanced and integrated diverse viewpoints. But however successful the systems of thought they created, their vision was lost in the more fragmented viewpoints of their followers. The

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[107] Edward E. Lowinsky, "Music History and Its Relation to the History of Ideas," *Music in the Culture of the Renaissance and Other Essays,* ed. Bonnie J. Blackburn (Chicago: University of Chicago Press, 1989), p. 3.

result provided an impetus for the development of scientific thought in its early years, but now the limitations of this fragmented view are beginning to become apparent. "Among scientists in particular," writes the physicist Wolfgang Pauli, "the universal desire for a greater unification of our world view is greatly intensified by the fact that, though we now have natural sciences, we no longer have a total scientific picture of the world."[108] With the disappearance of a comprehensive world view, the discipline of music has become far more restricted in its scope, relinquishing its goal of comprehensive understanding. For the most part, *musica mundana* and *musica humana* have disappeared as legitimate areas of study, leaving *musica instrumentalis* alone at the center of concern. Yet this development is not without its critics. In particular, Victor Zuckerkandl feels that something very important has been lost:

> Those who believe that music provides a source of knowledge of the inner world are certainly not wrong. But the deeper teaching of music concerns the nature not of "psyche" but of "cosmos." The teachers of antiquity, who spoke of the music of the spheres, of the cosmos as a musical order, knew this. A celebrated English physician and scholar, who lived more than three centuries ago,[109] has left us the beautiful statement that melody, every melody, is "... an

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[108] Pauli, p. 209.

[109] This refers to Robert Fludd.

> Hieroglyphical and shadowed lesson of the Whole World and creatures of God." Only a little more than a century ago, Schopenhauer could still write: "A correct, complete, and detailed explanation of music - that is, a full restatement, in terms of concepts, of what music expresses . . . would also be a sufficient restatement and explanation of the world in terms of concepts, or completely in harmony with such a restatement and explanation and hence the true philosophy."[110] Today we consume music in greater quantities than any previous generation. But we no longer know how to read what stands written. We have forgotten the meaning of the characters.[111]

Zuckerkandl is concerned here with the magical tradition. Since the scientific revolution and the Enlightenment, the magical tradition has largely been discarded. By the seventeenth century, this tradition had become filled with so many misconceptions and inaccuracies that discarding it was necessary and appropriate. But Kepler has a warning for us:

> In 1610, the great astronomer Johannes Kepler published a work that attempted to intervene in a public conflict between a pastor who issued prognostications and a physician who had attacked astrology. The title was:
>
>> A Warning to Sunday Theologians, Medical Men and Philosophers. . . that They, while very Properly Overthrowing Stargazing Superstition, do not Throw out the Baby with the Bathwater and thereby

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[110] Schopenhauer, *The World as Will and Idea* (Zuckerkandl's footnote).

[111] Victor Zuckerkandl, *Sound and Symbol: Music and the External World* (Princeton: Bollingen Press, 1973), pp. 147-148.

Unwittingly Injure Their Profession.[112]

We will argue that a valuable baby was lost when the music of the spheres bath water was thrown out and, while we have no interest in the murky water, the baby itself should be reclaimed, not only for the benefit of a deeper understanding of music, but for a deeper understanding of the universe. First, however, it is necessary go back in time and examine the origins of the music of the spheres tradition during an earlier watershed in the history of the West.

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[112] Jeffrey Mishlove, *The Roots of Consciousness* (Tulsa, Oklahoma: Council Oak Books, 1993), p. 65.

CHAPTER II

THE GREEK SOURCES: ORPHEUS

The question of sources of the music of the spheres tradition is a complex one. Most works on this subject, such as those by Haar and James, begin their reviews with Greek sources, but the idea of a musical cosmology appears to spring from a matrix of ideas of more extreme antiquity.

By tracing the sequence of sources we can better see the evolving nature of musical cosmologies and understand the nature of the tradition when it was encountered, and finally rejected, in the seventeenth century. To accomplish this we will focus first on two early figures from Greece, one mythic, the other semi-mythic--Orpheus and Pythagoras. Then, briefly violating the needs of chronology, we will go back in time to India, where the idea of a musical cosmology is still preserved in a living tradition, as well as to Egypt and China. All of these sources have recently been the subject of new interpretations regarding their ontological and epistemological significance. It will be most interesting to see to what extent their original meaning has been preserved within a modern, Western context.

We will begin by looking at the link between Greece and the more ancient schools, the mystery religions that flourished throughout the Graeco-Roman world and epitomized by the mythical figure of Orpheus.

> Now I'll speak of Orfeo and his sad fortunes --
> Orfeo, whose singing could draw wild beasts to follow,
> great Pluto at his prayer subdued the demons:
> matchless in verse and music, noble Orfeo.[1]

These verses from Monteverdi's *Orfeo* follow closely on those quoted at the beginning of Chapter I. It is no accident that the story of Orpheus occupies the subject matter of not one but all three of the first operas that inaugurated the genre at the turn of the seventeenth century. The underlying purpose of Giovanni Bardi, Girolamo Mei, Vincenzo Galilei and the other Italian humanists of the late Renaissance and early Baroque was to recapture the arts of ancient Greece, and this purpose extended to the content, as well as to the musical setting of their dramas. Thus their interests extended to mythology, as well as to music,

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[1] *Quinci à dirvi d'Orfeo desio mi sprona*
D'Orfeo che trasse al suo cantar le fere,
E servo fe l'Inferno à sue preghiere
Gloria immortal di Pindo e d'Elicona.
L'Orfeo: Favola in Musica, libretto by Alessandro Striggio, English singing version by Anne Ridler, in Nicholas John, ed. *The Operas of Monteverdi* (London: Calder Publications & English National Opera, 1992), p. 35.

and the Orpheus legend was well known to them from a variety of sources. Indeed, the figure of Orpheus is a motif of great antiquity and widespread influence (fig. 10).

Orpheus as Archetype

In the previous chapter, the *Harmonie Universelle* of Marin Mersenne was discussed as an early attempt to apply the scientific method to the study of music. Judging from the frontispiece of the original edition, however (fig. 11), it is evident that the magical roots of music extend even into the dawning scientific age. An Orphic figure is seen singing and playing upon a lyre, charming the birds and beasts in the magical fashion described in many stories. Such illustrations are not always directly related to the content of the work in which they appear. Indeed, the book by Franchino Gafori, whose frontispiece we examined in Chapter I, deals with practical music making rather than musical cosmologies. Similarly, Mersenne's frontispiece, like others of the period, could be considered merely decorative; it is nevertheless an indication of the matrix of ideas--whether inchoate or explicit--that helped to establish the mind-set of Mersenne and the other thinkers of his era, and against which their work must be understood. It

Fig. 10: Orpheus, Roman, c. 100 C.E.

Figure 11: Marin Mersenne, *Harmonie Universelle*, 1637

is just one example of an extensive phenomenon reaching back across many centuries.

The Orpheus motif is not limited to Greek mythology or Baroque opera; it appears in one form or another from antiquity to modern times. It is found in the bible in the form of King David--the subject of the Mersenne frontispiece; Virgil and Ovid both told the Orpheus story in Latin verse; Orphic theology was an important influence on early Christian theology via such figures as Clement of Alexandria; and it entered Renaissance humanism after being revived by Ficino in the fifteenth century. There are numerous examples of the Orphic influence in European poetry, from Spenser and Milton in England to Rilke in the German romantic tradition. The name of Orpheus is kept alive in the names of performance groups around the world, and Orpheus is a common theme in iconography, as can be seen in figs. 12 through 14b.

It is a remarkable range of influence for one figure to exert, but Orpheus is more than that. A mythical figure has an advantage over a historical one in compressing many symbolic functions into one image. As poet, philosopher, priest and musician, Orpheus is one of the most perfect expressions, and certainly a major source, of musical cosmology. But the Orphic legends are not only about Orpheus

Fig. 12: Orpheus, anonymous, seventeenth century

Fig 13 - *Orpheus,* Roelendt Savery, 1628
London, National Gallery

Fig. 14a - *Orpheus*, attributed to Lucas Jordán. Madrid, Prado

Fig 14b - *Orpheus*, Giovanni Bellini, Paris, Louvre

himself; they are also linked to many corresponding mythological archetypes.

> The complex of motifs, themes, and fables we call 'the Orpheus myth' is, apparently, of very ancient origin and almost universal diffusion. Even among the American Indians are many tales of the Orphic type, or various Orphic types. Some Celtic folk-tales that entered Latin culture in the Middle Ages bear the stamp of the same ideas and experiences that are expressed in the classical versions of the Orpheus myth, either because the Celts were originally close neighbours of the Thracians in central Europe or because the experiences themselves are basic to humanity.[2]

Two Aspects of the Orpheus Legend

As Vicari explains, there are essentially two aspects of the classical tale of Orpheus. The later, latinate aspect deals with the heroic human figure venturing into the underworld in search of Euridice after she suffers a fatal snakebite. This is the story portrayed in Latin poetry by Virgil and Ovid, in early seventeenth-century operas by Rinuccini, Peri, Caccini, Striggio and Monteverdi and later by Gluck, Calzabigi, Cocteau, and others. It is a story with which many modern readers are familiar. By contrast, the earlier version of the myth presents Orpheus as "a shaman-theologian, musician of supernatural powers, and Great

[2] Patricia Vicari, "Orpheus among the Christians," in John Warden, ed., *Orpheus: The Metamorphoses of a Myth* (Toronto: University of Toronto Press, 1985), p. 63.

Initiator."[3] In this capacity Orpheus provided the inspiration behind the mystery cults that conveyed a series of religious practices and mythological motifs into the Greek world from more ancient sources.

The Orphic creeds are of particular importance to our topic for two reasons. First, they establish the figure of a musician with magical powers as an essential source of the Western tradition and an echo of more ancient sources. The lyre with which Orpheus is typically pictured[4] reiterates the motif of the vibrating string as an image of the order implicit in the universe. At the same time, his prowess as a singer also harks back to the ancient emphasis on the integration of music and speech; we will encounter both of these images again when we examine the Indian goddess Saraswati. Vicari finds the classical view of Orpheus and Euridice, as explained by the Roman writer Fulgentius, reflecting these same motifs.

> In his *Mitologiae* Fulgentius etymologizes 'Orpheus' from *oraia phone,* 'best voice,' and 'Euridice' from *eur dike*, 'profound judgement,' and says that these two symbolize the two aspects of song: the power of the words to move the listener and the more mysterious power of the harmony of the tones.[5]

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[3] Vicari, p. 64.

[4] In many images, particularly in the Italian Renaissance, Orpheus is shown with a violin, lute, or lira da braccio.

[5] Vicari, pp. 66-67.

Fulgentius here presages the two themes mentioned by Gary Tomlinson in Chapter I, "music's ethical power to affect man's soul" and "the presence of harmony in the cosmos."[6] Apart from their contribution to these universal motifs, however, Orphic creeds are of more direct, historical importance to our theme; they formed the basis of the Pythagorean brotherhood that flourished in southern Italy beginning in the sixth century B.C.; they greatly influenced Plato and later Greek writers; they transmitted the motif of musical cosmology through several centuries, and into the Western world.

The Orpheus Story

Orpheus was said to be the son of Oeagrus, King of Thrace, and Calliope, one of the Muses. He was honored both as the first poet and first inspired singer, and, according to G. R. S. Mead,

> . . . his whole life is the history of the results of divine harmony. Lord of the seven-stringed lyre, all men flocked to hear him, and wild beasts lay peacefully at his feet; trees and stones were not unmoved at the music of his heavenly instrument. The denizens of the unseen world and the princes of Hades rejoiced at the tones of his harp...
>
> His master was Apollo; Apollo taught him the lyre. Rising in the night he would climb the heights of

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[6] See Chap. I, p. 4, note 3.

> Pangaeus to be the first to greet the glorious god of day.[7]

This account is clearly mythical; did Orpheus also exist as an historical personality? He is referred to by Greek writers as a human prophet and teacher best known not so much for his own life as for a body of writings, the hymns and poems of Orpheus.[8] This legacy is by no means a clearly understood one; it has survived only in fragments that scholars have struggled to interpret for many years. Whether these were actually written by Orpheus himself, for example, has been the source of a dispute since the time of Plato and Aristotle:

> Regarding the origin of the Orphic poems the two foremost authorities of classical Greece seem to have been of different opinions. Plato, who often quoted the poems and who attached great value to them, seems never to have hesitated to attribute them to the singer under whose name they went. On the other hand, according to a statement by Cicero in a now lost treatise *De philosophia*, Aristotle is supposed to have denied that there ever existed a poet of the name of Orpheus: *Orpheum poetam docet Aristoteles nunquam fuisse.*[9]

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[7] G. R. S. Mead, *Orpheus* (London: John M. Watkins, 1965), p. 13.

[8] See Apostolos N. Athanassakis, ed. and trans., *The Orphic Hymns* (Missoula, Montana: Scholar's Press for the Society of Biblical Literature, Graeco-Roman Religion Series, # 4, 1977) and M. L. West, *The Orphic Poems* (Oxford: Clarendon Press, 1998).

[9] Gustaf Fredén, *Orpheus and the Goddess of Nature* (Göteborg: Göteborgs Universitets Arsskrift, vol. LXIV, No.

But if the origin of the Orphic literature remains a problem for philologists, scholars have, in M. L. West's view, achieved some "secure results."

> It has long been settled, for example, that the extant Orphic Hymns were composed in the Imperial period, and the Orphic *Argonautica* in late antiquity. But on many more central questions opinions still vary widely. The so-called Rhapsodic Theogony, much the longest and most influential of all Orphic poems, but known to us only in fragments, has been variously dated to the sixth century BC, to the Hellenistic age, or even later. Truly one can only speak of disorientation so long as such a massive uncertainty remains unresolved.[10]

To counteract such uncertainty, Fredén points out that it is the influence of these ancient verses rather than their authorship which is of vital importance. Comparing the philological problems to those surrounding the books of Moses, he argues that

> . . .for thousands of years [... the books of Moses] have been read and quoted and have influenced men's minds, *as if* they had been written by Moses himself at the command of God. The same thing is true of the Orphic writings. Whoever wrote them, they had their authority by virtue of their connection with Orpheus' name.[11]

6, 1958), p. 7. Cf. W. K. C. Guthrie, *Orpheus and Greek Religion*, 2nd ed. (London, 1952), pp. 57ff.

[10] West, p. 1.

[11] Fredén, p. 7.

The influence of these hymns, adding to the extensive diffusion of the Orpheus myth cited by Vicari above, has resulted in a delicate thread extending from the most ancient times into the modern world, and reaching well beyond the boundaries of Western culture. For example, the Orpheus myth is often linked with the more ancient figure of Dionysius, again through the archetypal nature of mythical images:

> The tale of Orpheus' descent and successful ascent repeats an ancient pattern of fertility myths, the rescue of the Maiden of Kore from the dark realms of death, which restores nature to life after a period of barrenness. Ancient authors were quick to note the similarity between Orpheus's descent and that of Dionysius, in one of his aspects a god of vegetation, who descended to the underworld to raise up his mother Semele, probably originally a goddess of the earth and its crops.[12]

Dionysius (or Dionysus) is a figure of great importance in Greek mythology but also provides a link with older traditions. In his book *Shiva and Dionysus*, French musicologist Alain Daniélou traces these links back mainly to Indian, but also to Egyptian, sources. "The parallels between the names and legends of Shiva, Osiris and Dionysus are so numerous," he concludes, "that there can be little

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[12] Charles Segal, *Orpheus: The Myth of the Poet* (Baltimore and London: Johns Hopkins University Press, 1989), p. 9. Cf. Guthrie (1952), p. 61.

doubt as to their original sameness."[13] The reference to Shiva extends our universal musical metaphor, as this ancient deity is also one of the great mythical figures associated with music as cosmology. In the ancient Indian tradition, Shiva receives the knowledge of sound and music from the creator, Brahma, and passes it on through the goddess Saraswati to the first earthly musicians. In describing the nature of Orpheus's influence, Mead also suggests links between Greek and other ancient sources.

> Orpheus was to the Greeks what Veda Vyâsa was to the Hindus, Enoch to the Ethiopians, and Hermes to the Egyptians. He was the compiler of sacred scriptures; he invented nothing, he handed on. Orpheus, Veda Vyâsa, Enoch, Hermes and others, are generic names. Veda Vyâsa means the 'Veda-arranger'. It is said that the hieroglyphical treatise on the famous Columns of Hermes or Seth. . . was the source of the sacred science of ancient Khem, and that Orpheus, Hesiod, Pythagoras and Plato took therefrom the elements of their theology. There was a number of Hermes, the greatest being called Trismegistus, the 'thrice greatest', because he spoke of the 'three greatest' powers that 'veiled the one Divinity'. We also learn from the MS. Of Lascaris that there were no less than six Orpheis [*sic*] known to antiquity.[14]

Such a view goes furthest in placing Orpheus in that category of ancient figures who may have existed in several incarnations, such as Bharata, the writer of the great

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[13] Alain Daniélou, *Gods of Love and Ecstasy: The Traditions of Shiva and Dionysus* (Rochester, Vermont: Inner Traditions International, 1992), p. 50.

[14] Mead, p. 15.

Indian classic *Natya Shastra*. Typically, such a status applies to figures who stand at, or close to, the origin of a religious or philosophical tradition. Mead attempts to clarify the Greek tradition as it emerges out of more ancient schools by placing Orpheus into the context of

> . . . what the Hindus call the Guruparamparâ chain, or succession of teachers, as follows: In things pertaining to theology there were in former times six great teachers expounding similar doctrines. The first was Zoroaster, the chief of the Magi; the second Hermes Trismegistus, the head of the Egyptian priesthood; Orpheus succeeded Hermes; Aglaophamus was initiated into the sacred mysteries of Orpheus; Pythagoras was initiated into theology by Aglaophamus; and Plato by Pythagoras. Plato summed up the whole of their wisdom in his Letters.[15]

Mead's description goes well beyond any hint of historical times. It also provides a link with Hermes Trismegistus and other figures associated with the "magical" tradition that was discussed in the previous chapter. The same problems exist here in pinning down specific teachers, teachings, and links of influence and transmission. But however tenuous these links may be, there is considerable evidence of Orpheus's influence on later schools of thought; the fifth-century neoplatonist Proclus states that "all the theology of the Greeks comes from Orphic mystagogy,"[16] which Mead

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[15] Mead, p. 15.

[16] Mead, p. 9.

takes to mean initiation into the mysteries. Thomas Taylor, the translator of Proclus' *On the Theology of Plato*, describes the changing nature of Greek theology through the hands of successive teachers. In his view it was first mystically and symbolically promulgated by Orpheus, afterwards disseminated enigmatically through images by Pythagoras, and in the last place scientifically unfolded by Plato and his disciples--in which group Proclus presumably placed himself.

There are problems for modern scholars in all of this. Historical exactitude is always difficult to achieve when penetrating so far back into antiquity. Moreover, as West explains, the picture has been complicated by the myriad of Orphic associations:

> The magic of Orpheus' song drew animals and trees; the magic of his name has attracted a more unruly following, a motley crowd of romantics and mystics, of impostors and poetasters, of dizzy philosophers and disoriented scholars. The disorientation of scholars is understandable after so many centuries in which Orpheus was all things to all men.[17]

Two things can be said with certainty, however. First, by tracing the threads of the Orpheus legend back to the most ancient times we move progressively from such mythical figures as Siva, Dionysius and Orpheus to a semi-mythical

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[17] West, p. 1.

figure in Pythagoras, to clearly historical figures in Plato and the neoplatonists. Pythagoras' influence on Plato is not disputed and, as explored below, a variety of sources explicitly mention Pythagoras' debt to Orphic teachings. Second, whatever influence these teachings had on later schools of philosophy or religion, it was conveyed through a specific body of literature; even by the sixth century B.C., Orpheus was known purely by the poems that bear his name, by the cosmology and cosmogony that were passed on by his school, and by his method of expression through inspired song.

> Orpheus, of course, is not just *theologus* but *theologus poeta*. He is the first poet to celebrate the mysterious principles that underlie the universe. It is because he is a poet, because he had skill and inspiration, that he is able to understand and is privileged to tell of these mysteries. . . . He is an artist and this world. . . is a work of art; he has privileged access to its secrets and to the mind of its architect. Here myth and pseudo-history come together; the singer with his lyre is the one who understands cosmic secrets.[18]

Orpheus and Pythagoras

It can be seen from the above discussion that Orpheus and his teachings are frequently linked with the figure of Pythagoras. In fact, in a discussion of musical cosmology and its sources the most important manifestation of Orphism

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[18] John Warden, "Orpheus and Ficino" in Warden, op. cit., p. 93.

is in the thought of Pythagoras. It is a complex relationship. For one thing, they were both attributed with magical musical abilities. The second century C.E. biographer Iamblichus recounts several instances where Pythagoras influences birds and animals through the power of his voice. In one story, he tames a bear in the region of Daumia (fig. 16); in another, he speaks to an ox and dissuades it from eating beans. In a third, he summons an eagle from the sky. "Through such and similar occurrences," Iamblichus concludes, "Pythagoras demonstrated that he possessed the same dominion as Orpheus over savage animals, and that he allured and detained them by the power of his voice."[19]

Such similarities between Orpheus and Pythagoras belong to the mythical aspects of their respective stories, but they are also linked through the transmission of ideas; Pythagoras' biographers make many references to his debt to Orphic thought. Iamblichus, for example, includes the "Orphic followers" among the ancient schools that had helped shape what he calls Pythagoras' "divine philosophy."[20] One

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[19] Iamblichus, "The Life of Pythagoras," in Kenneth Sylvan Guthrie, trans. and ed., *The Pythagorean Sourcebook and Library* (Grand Rapids, Michigan: Phanes Press, 1987), p. 71.

[20] Iamblichus, p. 95.

Fig 15 - Pythagoras and the Daumian Bear. From Stanley's *History of Philosophy,* 1687

passage is particularly significant, although somewhat fragmentary. Kenneth Sylvan Guthrie renders it as follows:

> Pythagoras imitated the Orphic mode of writing, and [pious] disposition, and the way they honored the Gods, representing them in images and in brass not resembling our [human] form, but the divine receptacle [of the Sphere], because they comprehend and provide for all things, being of nature and form similar to the universe.[21]

Here the influence of Orphic writings on the mode of expression adopted by Pythagoras is seen to be of great importance, as is the reference to his imitation of the Orphic demeanor in worship and personal conduct(assuming that the first "they" here refers to followers of Orpheus). This passage also points to the transitional nature of the Orphic mystery schools. More ancient cultures, such as those of India and Egypt, are notable for the representation of their deities in human and animal form. Here, however, we read that Orphic lore adopted a more abstract form of representation, with the end result that Pythagoras could associate the gods with mathematical or geometrical forms rather than with anthropomorphic or animalistic entities. This subtle shift of emphasis demonstrates the gradual but critical transition between the Eastern and Western approach to knowledge and religious expression embodied by the

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[21] Ibid.

figures of Orpheus and Pythagoras and culminating in the work of Copernicus and Kepler.[22] The significance of number in Pythagorean thought also appears to be derived directly from Orphic sources. "From the writings of Orpheus," Iamblichus reports, "Pythagoras learned that the eternal essence of Number is the source of immortality, and from this he reasoned that the fundamental nature of the gods is numerical."[23]

The significance of number is central to Pythagorean thought, so the Orphic influence can be seen as essential. This influence does not go in only one direction, however. There appears to be a consensus among scholars of Greek thought that Pythagoras contributed to the Orphic tradition as well as drawing upon it. Fréden comments upon the closeness of the two schools:

> In early West Hellenic poetry he [Orpheus] seems to have played a particularly important rôle, which is only natural when we consider the close relationship between Pythagorean and Orphic mysticism. Pythagoras himself is said to have used the name of Orpheus as a kind of pseudonym.[24]

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[22] See Otto J. Brendel, *Symbolism of the Sphere: A Contribution to the History of Earlier Greek Philosophy* (Leiden: E. J. Brill, 1977).

[23] Iamblichus, p. 101.

[24] Fredén, p. 5.

Similarly, Mead relates that Pythagoreans partially revived the Orphic brotherhood after their own disappeared, while Plato was to incorporate aspects of Orphic mysticism into his philosophy:

> [French classicist] N. Fréret states that after the dispersal of the Pythagorean School in Magna Graecia, at the end of the sixth century B.C., the surviving disciples attached themselves to the Orphic Communities. . . This for a time vitalized the sacred tradition, which was gradually growing fainter and fainter, and in the days of Plato fell into much disrepute. Then it was that Plato *intellectualized* it as being the only way to preserve it from further profanation. Thus it is that Plato in Greece did for the theology of Orpheus what Shankarâchârya in India did for the theosophy of the Upanishads.[25]

The reference to Shankarâchârya is an interesting one, as is the general parallel that Mead draws between the Indian and Greek traditions. Earlier, he compared Orpheus with Veda Vyasa, the semi-mythical figure credited with arranging the four Vedas into their accepted form and with writing the *Mahabharata* with the help of the elephant-headed deity Ganesha. By contrast, Shankarâ, sometimes known as Shankarâchârya, is a clearly historical figure who lived from 686 to 718 C.E. and does indeed occupy in the Indian tradition a position similar to that of Plato in Greece. For if all Western philosophy, as Whitehead suggested, is

[25] Mead, pp. 22-23.

nothing but a footnote to Plato, it is equally fair to see Shankarâ as the source of the tradition that lies at the heart of modern Hindu philosophy and theology. (Shankarâ is credited with restoring the truths of his tradition after it was challenged by the influence of Buddhism. By contrast, Plato's role was to preserve what had been an oral tradition by committing it to writing.)

Returning to the relationship between Orpheus and Pythagoras, a major source of information comes from Herodotus, who speaks explicitly of a connection between Orphism and Pythagoreanism. Herodotus "contributes not only an indication that Orphism is connected with Dionysius, but a theory about its origin, namely that it comes from Pythagoras, who got his teachings from Egypt."[26] The relationship between Pythagoreanism and Orphism is summed up by Burkert, with due caution about modern interpretations:

> Thus the oldest sources show Pythagoras, unlike Orpheus, as a tangible personality of the historical period, but their doctrines as connected or even identical. There is no support in these sources for the modern attempts to discern a difference in doctrine between Orphism and early Pythagoreanism. It is only too easy for modern notions to intrude. If one believes, with Nietzsche, in a primal opposition of "Apollonian" and "Dionysian," then Pythagoras and Orphism must stand in the same polar relationship; and if, under the influence of later evidence, one regards

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[26] Walter Burkert, *Lore and Science in Ancient Pythagoreanism*, trans. Edwin L. Minar, Jr. (Cambridge: Harvard University Press, 1972), p. 128.

> the philosophy of number and the foundation of exact science as the essential ingredient of Pythagoreanism, the antithesis of Apollonian and Dionysian mysticism fits in very nicely. We must bear in mind, however, that as the Greeks thought of them, Apollo and Dionysius were brothers; the supposed clear differentiation of Pythagoreanism from Orphism is simply not attested to in the oldest sources.[27]

The relationships mentioned here, between Orpheus and Dionysius on the one hand and between Pythagoras and Apollo on the other, are more direct than metaphorical, as Orpheus was associated with the Dionysian mysteries whereas Pythagoras, as we will see below, is linked very clearly with Apollo; indeed, he was held to be Apollo's son in one legend. However, Orpheus was clearly associated with both Dionysius and Apollo and incorporates elements of both archetypal figures in his persona and his school. In the *Birth of Tragedy* Nietzsche describes this dichotomy, emphasizing the balance between the apollonian and dionysian influences as the source of greatness in Greek culture. This balance finds expression in the figure of Orpheus. I will also argue that Pythagoras represents a balanced viewpoint, parallel to the balanced picture of the world that Kepler and Newton were to strive for in later times. Such a view also suggests a most important influence on the way Pythagorean thought was to develop. And it is with the

[27] Burkert, pp. 131-2.

figure of Pythagoras that the story of musical cosmology next appears.

CHAPTER III

THE GREEK SOURCES: PYTHAGORAS

In the first century C.E., the Roman poet Ovid wrote the following verses:

> There was a man here [Pythagoras], a Samian by birth, but he had fled forth from Samos and its rulers, and through hatred of tyranny was living in voluntary exile. He, though the gods were far away in the heavenly regions, still approached them with his thought, and what Nature denied to his mortal vision he feasted on with his mind's eye. And when he had surveyed all things by reason and wakeful diligence, he would give out to the public ear the things worthy of their learning and would teach the crowds, which listened in wondering silence to his words, the beginnings of the great universe, the causes of things and what their nature is: what God is, whence come the snows, what is the origin of lightning, whether it is Jupiter or the winds that thunder from the riven clouds, what causes the earth to quake, by what law the stars perform their courses, and whatever else is hidden from men's knowledge.[1]

On the west portal of Chartres Cathedral, among the icons of the Christian tradition, we find a figure crouched over a musical instrument, engrossed in tuning (fig. 16). The figure is the same as that described above by Ovid in his *Metamorphoses*. He can also be seen in writing in a book

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[1] Ovid, *Metamorphoses*, Book XV, verses 60-72. Frank Justus Miller, trans. (Cambridge, MA: Harvard University Press, 1976), p. 369.

Fig 16 - Pythagoras, West Portal, Chartres Cathedral, 12th Century

in Raphael's famous painting the *School of Athens* (fig. 17). This is Pythagoras of Samos, the first truly historical representative of the magical tradition after the more shadowy, mythical figures at its source.

The Life of Pythagoras

Like Kepler over two thousand years later, Pythagoras represents a true watershed in the history of the West. In this case, however, the stream that flows out of the watershed is Western thought in its earliest formulation, while flowing into it we find a multitude of influences from the ancient and Eastern worlds. The idea of a watershed comes from Arthur Koestler. He applied it to the work of Kepler, but he uses a different image for Pythagoras, one that resonates with our musical theme:

> The sixth century scene evokes the image of an orchestra expectantly tuning up, each player absorbed in his own instrument only, deaf to the caterwaulings of the others. Then there is a dramatic silence, the conductor enters the stage, raps three times with his baton, and harmony emerges from the chaos. The maestro is Pythagoras of Samos, whose influence on the ideas, and thereby on the destiny, of the human race was probably greater than that of any single man before or after him.[2]

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[2] Arthur Koestler, *The Sleepwalkers* (New York: Macmillan, 1968), p. 25.

Fig 17 - Pythagoras, Raphael, *School of Athens*, 1509-1510, detail

Many miracles have been attributed to Pythagoras, to the extent that his classical biographies, particularly those by the Neoplatonic philosopher Porphyry (c. 233-c. 305 C.E.), a student of Plotinus, Porphyry's own student, Iamblichus (c. 250- c. 325 C.E.), and the third-century C.E. writer Diogenes Laertius, have been labeled hagiographies by modern commentators. Yet Koestler, writing in the twentieth century, claims more than mere miracles for Pythagoras. To what can we attribute this extraordinary range of influence?

To make such a contribution to world history, Pythagoras must have been a personality possessed of true genius, an attribute he shared with several of his contemporaries. "In Confucius, Buddha, Zoroaster, Lao-tse, the Jewish prophets, the Greek poets, artists, philosophers and scientists, the sixth century B.C. reaches a zenith of human achievement."[3] But this, in itself, is not sufficient to explain Pythagoras' influence. It is also necessary to consider the source of the enormous range of knowledge that he acquired during the extensive travels that occupied his early years, and through which he absorbed the essence of many ancient traditions. "While accounts of his travels differ," writes Manley Hall, "historians agree that he visited many countries and studied at the feet of many

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[3] Bernard Grun, *The Timetables of History* (New York: Simon & Schuster, 1975), p. 10.

masters."[4] Julius Portnoy emphasizes the Egyptian influence on Pythagoras' thought:

> There is great reason to believe that Pythagoras traveled in Egypt studying the sciences and musical philosophy of the Pharaohs, just as the historian Herodotus did in the fifth century. Pythagoras probably came back to Greece with some elementary acoustical theories as well as definite ethical beliefs concerning music which he acquired from the Egyptian priesthood. He began to teach that mortal music was an earthly prototype of the celestial harmony of the spheres.[5]

While Pythagoras' visit to Egypt was of enormous importance in the development of his thought, it is generally accepted that he visited other parts of the ancient world and absorbed other traditions of knowledge, particularly that of Babylon, but also, possibly, of India. Porphyry reports:

> As to his knowledge, it is said that he learned the mathematical sciences from the Egyptians, Chaldeans, and Phoenecians; for of old the Egyptians excelled in geometry, the Phoenecians in numbers and proportions, and the Chaldeans in astronomical theorems, divine rites, and worship of the Gods; other secrets concerning the course of life he received and learned from the Magi.[6]

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[4] Manly P. Hall, *Masonic, Hermetic, Cabbalistic and Rosicrucian Symbolic Philosophy* (San Francisco: H. S. Crocker & Co., 1928), p. 65.

[5] Julius Portnoy, *The Philosopher and Music: A Historical Outline* (New York: The Humanities Press, 1954), p. 8.

[6] Porphyry, *The Life of Pythagoras,* in Guthrie (1987), p. 124. This is the only surviving fragment of Porphyry's

The exact nature and extent of Pythagoras' travels, like many details of his life, are disputed by scholars. The precise locus of his study seems unimportant, however, if "there is good reason to suppose that in earliest antiquity there existed an intellectual continuum stretching throughout Asia, even into China, and that the wall between East and West was erected at a later date,"[7] as this would suggest that Pythagoras would have been in contact with essentially similar knowledge in any of the ancient centers of learning he was able to visit. Similarly uncertain is the correct attribution of Pythagorean teaching. Little, if any, biographical information about Pythagoras himself is completely reliable, and information about his teaching is interspersed with biographical accounts in the ancient sources. The tendency of ancient writers is to attribute much to Pythagoras which could have come from other members of his school. As a result, many scholars, following the practice of Aristotle, have tended to refer the matrix of Pythagorean teaching to the Pythagoreans, or the school of Pythagoras, in a manner similar to the attribution of painting to the "School of Raphael" or "School of

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History of Philosophy in four books.

[7] Jamie James, *The Music of the Spheres* (New York: Grove Press, 1993), p. 26.

Leonardo."[8] While confirming this tendency among scholars, Burkert also confirms both Pythagoras' travels and his importance in transmitting Eastern and/or ancient wisdom to the West.

> The opinion is widespread that Pythagoras himself, who is supposed to have traveled to the East, brought this astronomical knowledge back to Greece with him and passed it on through his school. In fact, he is thought of as the most important link in the transmission of oriental science to the Greeks. More cautious scholars are more likely to speak not of Pythagoras, but of the early Pythagoreans, who are supposed to be the only Greeks before Philolaus to have any advanced astronomical knowledge.[9]

The Pythagorean Teachings

While the knowledge Pythagoras absorbed was, most probably, extremely ancient, and his presentation of it was in a form remote to contemporary sensibilities, it is widely agreed that his teachings contained several ideas which are absolutely fundamental to Western thought, and that without them our tradition would never have taken the form with which we are familiar. An assessment of the influence

[8] As a case in point, the portrait of Gafori at fig. 6 is attributed to the "School of Leonardo."

[9] Walter Burkert, *Lore and Science in Ancient Pythagoreanism*, trans. Edwin L. Minar, Jr. (Cambridge: Harvard University Press, 1972), p. 316.

Pythagorean thought has had on the West, and the importance of comprehending it, comes from S. K. Heninger:

> Pythagorean doctrine was all-inclusive in its intention and all-permeative in actual effect, and in some fields it retained its potency until well into the modern period. The notion of cosmic order and its corollaries, perhaps better known as universal harmony, stemmed from the school of Pythagoras in the sixth century B.C. It flourished throughout the classical period (most notably in the Academy of Plato and in the Roman circle of Neoplatonists around Plotinus), cross-pollinated with Stoics and Peripatetics, scattered seed as far abroad as the Hermeticists and the Cabalists and the Syrian syncretists and St. Augustine, and came to full bloom in the renaissance. . . . Pythagorean cosmology, though withered, did not die until the acceptance of Newtonian science and Humian philosophy. . . . In the meantime, however, the cosmic order first propounded by Pythagoras had provided the stimulus and the cohesion for the best Western thought through all the intervening centuries. And it must be mastered, I believe, if we wish to comprehend the art of those centuries.[10]

Alfred North Whitehead, himself a mathematician, emphasizes Pythagoras' focus on number:

> Pythagoras is said to have taught that the mathematical entities, such as numbers and shapes, were the ultimate stuff out of which the real entities of our perceptual experience are constructed. As thus baldly stated, the idea seems crude, and indeed silly. But undoubtedly, he had hit upon a philosophical notion of considerable importance; a notion which has a long history, and which has moved the minds of men, and has even entered into Christian theology. About a thousand years separate the Athanasian Creed from Pythagoras, and about two thousand four hundred years separate

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[10] S.K. Heninger, Jr., *Touches of Sweet Harmony: Pythagorean Cosmology and Renaissance Poetics* (San Marino, CA: Huntington Library, 1974), pp. 15-16.

> Pythagoras from Hegel. Yet for all these distances in time, the importance of definite number in the constitution of the Divine Nature, and the concept of the real world as exhibiting the evolution of an idea, can both be traced back to the train of thought set going by Pythagoras.[11]

Daniel Boorstin echoes Whitehead while giving greater emphasis to the musical aspect of Pythagoras' discoveries:

> None of Pythagoras' own work has survived, but the ideas fathered on him by his followers would be among the most potent in modern history. Pure knowledge, the Pythagoreans argued, was the purification (*catharsis*) of the soul. This meant rising above the data of the human senses. The pure essential reality, they said, was found only in the realm of numbers. The simple, wonderful proportion of numbers would explain the harmonies of music which were the beauty of the ear. For that reason they introduced the musical terminology of the octave, the fifth, the fourth, expressed as 2:1, 3:1 and 4:3.[12]

The common ground shared by these writers is the importance of mathematics, or more accurately perhaps, of number, to the thought of the Pythagoreans. Such doctrines represent a fundamental break with previous Greek thought. In their attempts to move beyond traditional mythologies to a rational account of nature, the earliest Greek philosophers sought one essential principle or element as the basis of the phenomenal universe. Thales believed this

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[11] Alfred North Whitehead, *Science and the Modern World* (Cambridge: Cambridge University Press, 1928), pp. 27-28.

[12] Daniel Boorstin, *The Discoverers* (New York: Random House, 1983), p. 298.

element to be water; Anaximenes suggested air; and Heraclitus, fire. Empedocles combined these views, holding that all substances are composed of four elements--air, earth, fire, and water--while Anaximander suggested that a self-existent but vaguely defined entity beyond sense perception was the source of phenomena. As we have already seen, however, the Pythagorean view, derived from the Orphic teachings, is that the essential component of phenomena is number. Heninger puts this view directly: "The primary tenet of Pythagorean doctrine -- indeed, what gave it a unique orientation -- was the belief that numbers are the ultimate constituents of reality."[13] The most famous statement of this doctrine comes from Aristotle:

> . . . the Pythagoreans, as they are called, devoted themselves to mathematics; they were the first to advance this study, and having been brought up in it they thought its principles were the principles of all things. Since of these principles numbers are by nature first, and in numbers they seemed to see many resemblances to the things that exist and come into being--more than in fire and earth and water . . . Since, again, they saw that the modifications and the ratios of the musical scales were expressible in numbers; since, then, all other things seemed in their whole nature to be modeled on numbers, and numbers seemed to be the first things in the whole of nature, they supposed the elements of numbers to be the elements of all things, and the whole heaven to be a musical scale and a number.[14]

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[13] Heninger, p. 71.

[14] Aristotle, *Metaphysics*, 1-5, 985b-986a, in *Complete Works of Aristotle*, Jonathan Barnes, ed., Bollingen Series LXXI-2

Aristotle disagrees with this viewpoint, but the Pythagorean view is echoed by other ancient writers such as Theon of Smyrna, who described numbers as ". . .the principle, fountain, and root of all things . . . that which before all things exists in the Divine mind; from which and out of which all things are digested into order."[15]

This idea, in a modified form, has emerged in the contemporary scientific paradigm as a key theme. For however pragmatic scientific thought may appear to be, however much it may appear to be based on the mechanistic model, the power to describe reality and, indeed, to manipulate the world, rests on an essentially mystical core--the still unexplained correlation between the essentially mental constructs of mathematics and the objective manifestations of the physical universe. It is this correlation that Eugene Wigner calls "The Unreasonable Effectiveness of Mathematics."[16] Other mathematicians and physicists share his view, as William Irwin Thompson points out:

(Princeton: Princeton University Press, 1984), Vol. 2, p. 1559.

[15] Thomas Stanley, *The History of Philosophy*, 2 vols. (London, 1656-60), p. 523.

[16] Eugene P. Wigner, "The Unreasonable Effectiveness of Mathematics in the Natural Sciences," in *Symmetries and Reflections* (Bloomington: Indiana University Press, 1967), pp. 222-237.

> If you listen to Werner Heisenberg lecturing about Pythagoreanism in his own work on the quantum theory, you will hear him emphasize that the basic building blocks of nature are number and pattern, that the universe is not made out of matter but out of music. The historians of science I worked with in the University regarded Pythagoras as a magician, a shamanistic madman from the cults of the Near East; Yet both Whitehead and Heisenberg regarded him as a genius of the highest order who laid the foundation upon which our entire Western civilization is based.[17]

These foundations of our civilization emerged at a time of considerable intellectual tumult, and it was Pythagoras' great contribution to bring order out of the enormous diversity of thought prevalent at the time. Thus it is that Arthur Koestler speaks of him as bringing harmony out of chaos and why he is so often depicted with the tools and instruments of music and mathematics (fig. 18).

Harmonia and *Kosmos*

Koestler's words are well chosen. Pythagoras' teaching did indeed bring harmony from chaos in more ways than one. Indeed, it was the very concept of harmony that formed the central organizing principle of his thought, a concept of great profundity that reflects the influence of Orphism in its emphasis on balance between seemingly opposing viewpoints. In fact, the concept goes beyond this; at its

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[17] William Irwin Thompson, *Darkness and Scattered Light* (London: Anchor Books, 1978), p. 110.

Fig 18 - Pythagoras, J. A. Knapp

essence, the term *harmonia* signifies far more than the modern English word harmony can convey. While eventually it did take on the meaning of a musical scale or mode or, as in Plato, the metaphorical idea of harmony in a broader sense, the Greek root of the word refers to carpentry, or shipbuilding, and signifies the making of a joint, i.e., bringing together disparate elements to make a whole. Research currently underway at Oxford university[16] links this term with the Sanskrit word *yoga*, the etymology of which parallels that of *harmonia* in Greek, through a root that gives us the English word yoke, a parallel that has suggested other similarities between the two traditions that can be revealed through etymology.

Harmonia is one of many terms that have lost considerable levels of meaning through time and translation. Another example is the word cosmos, said to have been coined by Pythagoras himself. Like *harmonia,* the Greek *kosmos* also implies harmony, in the sense of orderliness, but also beauty. Gregory Vlastos explains:

> In English *kosmos* is a linguistic orphan, a noun without a parent verb. Not so in Greek which has the active, transitive verb, *kosmeō:* to set in order, to marshal, to arrange. . . not just any sort of

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[16] John Curtis Franklin, *Harmony and Indo-European Cosmology,* Ph.D. Dissertation, in progress, Oxford University.

> arranging, but one that strikes the eye or the mind as pleasingly fitting: as setting, or keeping, or putting back, things in their proper order. There is a marked aesthetic component here, which leads to a derivative use of *kosmos* to mean not *order* as such, but *ornament, adornment;* this survives in the English derivative, *cosmetic,* which, I dare say, no one, without knowledge of Greek, would recognize as a blood-relation of *cosmic*. In the Greek the affinity with the primary sense is perspicuous since what *kosmos* denotes is a crafted, composed, beauty-enhancing order.[19]

Clearly, we have lost these dimensions of meaning; notwithstanding poetic expressions of awe by contemporary scientists, the modern definition of cosmos, while it retains some sense of order,[20] has lost the aesthetic value, while the latin *mundus* has given us the word "mundane," in many ways the direct opposite of Pythagoras' *kosmos*. It is, in a sense, the value of *harmonia* that would need to be added to the contemporary notions of cosmos or universe to bring its meaning close to the Pythagorean form.

With the loss of its meaning, the concept of *harmonia* is in danger of losing its place as the central concept in Pythagorean thought. The inevitable result has been the fragmentation of his world view, and fragmentation leads to misinterpretation. This is brought out by Francis Cornford.

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[19] Gregory Vlastos, *Plato's Universe* (Seattle: University of Washington Press, 1975), p. 3.

[20] "The orderly systematic universe." *Webster's New Ideal Dictionary* (Philippines: G. & C. Merriam, 1978), p. 112.

> Pythagoras is sometimes described in histories of philosophy as a man who had two separate interests--a religious reformer, who taught the doctrine of transmigration and instituted a cult society, and a man of science who did much to lay the foundations of mathematics, that is to say of arithmetic, geometry, astronomy and music. Transmigration was, until very recent times, regarded by most modern Europeans as a rather crude and barbaric form of the doctrine of immortality. Also, it is not at once obvious to our minds that there is any connection between the immortality of the soul and mathematics. So the historian was disposed to dismiss the religious Pythagoras with brief and apologetic notice, and to concentrate on the scientific Pythagoras and his mathematical doctrine that the essential reality of things is to be found in numbers. But that is not the way to understand a great philosopher's apprehension of the world. The vision of philosophic genius is a unitary vision. Such a man does not keep his thought in two separate compartments, one for weekdays the other for Sundays. We begin to understand Pythagoras when we see that the two sides of his philosophy meet in the conception of harmony--a conception that has a meaning both in the spiritual and the physical world. And the germ of this philosophy was a discovery in the field, not of arithmetic or geometry, but of music.[21]

Pythagoras and the Laws of Music

It should be of enormous interest to many musicologists to find a link between the strands of thought that gave rise eventually to science, indeed to the whole of Western history, and discoveries in the theory of music. Such a link is found in the reports of Pythagoras' insights into the fundamental laws of music. There are a number of different

[21] F.M. Cornford, *Before and After Socrates* (Cambridge: Cambridge University Press, 1966), pp. 65-66.

aspects to this. Some of Pythagoras' involvement with music is of a "mystical" nature, belonging clearly to the magical tradition, to use Hugh Kearney's term. However, it also deals with the discovery of the musical intervals and their mathematical relationships--a story of empirical observation and scientific experiment belonging to the mechanistic tradition. The resulting suggestion is that Pythagoras was not limited to either of these approaches but, like Kepler two millennia later, sought to bridge the gap between them.

Certainly, in their discussion of his approach to music, Pythagoras' biographers emphasize his magical approach. In a lengthy passage,[22] Iamblichus tells us that Pythagoras possessed what have been termed "super-sensory" abilities that enabled him to perceive directly the music of the spheres.

> Not through instruments or physical voice-organs did Pythagoras effect this; but by the employment of a certain indescribable divinity, difficult of apprehension, through which he extended his powers of hearing, fixing his intellect on the sublime symphonies of the world, he alone apparently hearing and grasping the universal harmony and consonance of the spheres, and the stars that are moved through them, producing a melody fuller and more intense than anything effected by mortal sounds.[23]

Similarly, Porphyry reports that:

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[22] Iamblichus, pp. 72-73.

[23] Iamblichus, p. 72.

> He himself could hear the Harmony of the Universe, and understood the universal music of the spheres, and of the stars that move in concert with them, and which we cannot hear because of the limitations of our weak nature.[24]

But there is more to this ability; it is practical as well as mystical, inasmuch as Pythagoras put his perceptions to good use. "He soothed the passions of the soul and body," says Porphyry, "by rhythms, songs and incantations. These he adapted and applied to his friends."[25] Iamblichus goes further, describing in some detail how Pythagoras transformed his perceptions of, to use Boethius' terminology, *musica mundana* into specific melodies and rhythms, through which he "obtained remedies of human manners and passions, and restored the pristine harmony of the faculties of the soul."[26] He is thus creating *musica instrumentalis*, as a mirror of *musica mundana* for the express purpose of bringing about *musica humana*. Iamblichus describes Pythagoras' practices of prescribing specific melodies for specific ailments, as well as various kinds of emotional disturbances, in a way that anticipates Plato's description of the ideal use of music in his *Republic*. It is

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[24] Porphyry, in Guthrie (1987), p. 129.

[25] Ibid.

[26] Iamblichus, p. 72.

also noteworthy, as Iamblichus relates, that Pythagoras designated specific melodies for the different seasons and times of day[27] in a way that suggests the time theory of performance of *rāgas* in the classical music of India.

There is a further parallel with Indian tradition here. It has been clearly understood for centuries, and verified scientifically in recent years,[28] that the practice of *yoga* brings about enhanced perception through the refinement of the physiology. Iamblichus makes a similar observation about Pythagoras, attributing his ". . . peculiar and exceptionally accurate method of seeing, hearing and understanding"[29] to the ". . . peculiar organization of Pythagoras' body, far finer than that of any other man."[30] All of this places Pythagoras squarely within the magical tradition, reflecting the teachings of the ancient wisdom traditions that provided the basis of his education.

But Pythagoras' approach has further dimensions; he demonstrates that he was a scientist as well as a mystic, providing what is perhaps the first link between ancient and

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[27] Iamblichus, p. 85.

[28] See David W. Orme-Johson et al., eds., *Scientific Research on the Transcendental Meditation Program: Collected Papers*(Seelisberg, Switzerland: MERU Press, 1977).

[29] Iamblichus, p. 73.

[30] Ibid.

modern modes of thought. Although they have much to say about his superhuman powers, Pythagoras' biographers also report that Pythagoras was not entirely satisfied with direct perceptual access to universal harmony. The commentators give no explicit reason for this. We can conjecture that as the leader of a school, responsible for passing on knowledge to others, he wished to establish the principles of harmony and consonance on a systematic basis, through the use of reason, based on empirical observation, thus making them equally accessible to his disciples. On this point Iamblichus is silent. When we turn to Boethius, however, a possible rationale is given.

In the *De institutione musica,* we find one section preceded with this rubric: "Not all judgment ought to be given to the senses, but reason ought more to be trusted. Concerning the deception of the senses in this matter."[31]

Here Boethius argues that the senses alone are not sufficient to gain complete knowledge, not only of music but of any subject, unless supported by the use of reason. His argument, basically derived from his translation of Nichomachas, runs as follows:

> We propose, concerning these matters, that we should not grant all judgment to the senses--although the whole origin of this discipline is taken from the sense

[31] Boethius (1989), Book I, Section 9, p. 16.

> of hearing, for if nothing were heard, no argument whatsoever concerning pitches would exist. Yet the sense of hearing holds the origin in a particular way, and, as it were, serves as an exhortation; the ultimate perfection and the faculty of recognition consists of reason, which, holding itself to fixed rules, does not falter by any error.
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> But what need is there to speak at length concerning the error of the senses, when this same faculty of perceiving is neither equal in all persons nor equal in the same person at all times? Anyone who aspires to search for truth would to no purpose trust wavering judgment. For this reason the Pythagoreans follow a certain middle path. They do not yield the whole of judgment to the ears, yet certain things are not investigated by them except through the ears. The Pythagoreans estimate consonances themselves with the ear, but they do not entrust the distances by which consonances differ among themselves to the ears, whose judgments are indecisive. They delegate the determination of distances to rules and reason--as though the sense were something submissive and a servant, while reason is a judge and carries authority.
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> Although basic elements of almost every discipline--and of life itself--are introduced through the impression of the senses, nevertheless there is no certain judgment, no comprehension of truth, in these if the arbitration of reason is lacking.[32]

Of significance here is Boethius' characterization of Pythagorean thought as a "middle path," balancing empirical and rational approaches to the development of music theory, particularly when seen against the background of the "mystical" powers described by Iamblichus. This suggests an epistemology based on a balancing of the three strands described by Kearney. So it is that Pythagoras is seen pondering a way to integrate these approaches.

[32] Boethius (1989), Book I, Section 9, pp. 16-17.

Pythagoras and the Blacksmiths

The foregoing leads us to a famous story about Pythagoras which has been repeated and represented numerous times throughout classical, medieval and renaissance literature and iconography. It appears in Iamblichus,[33] Nicomachus,[34] Macrobius,[35] and Boethius,[36] is illustrated in the *Theorica musice* of Gafori (fig. 19), and can be seen in the *Temple of Music* of Robert Fludd.[37] The story is apocryphal; no one can attest to its historical accuracy. The same can be said of other famous stories, however; no apple ever fell on Newton's head; Martin Luther probably did not nail his theses to any church door, and so on. But the

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[33] Iamblichus, "The Life of Pythagoras," in Kenneth Sylvan Guthrie, trans. and ed., *The Pythagorean Sourcebook and Library* (Grand Rapids, Michigan: Phanes Press, 1987), pp. 86-88.

[34] *Encheiridion harmonikês*, trans. with commentary, by Flora Levin as *The Manual of Harmonics* (Grand Rapids, Michigan: Phanes Press, 1994), Chap. 6, pp. 83-86.

[35] Macrobius, *Commentarii in Somnium Scipionis,* trans. by William Harris Stahl as *Commentary on the Dream of Scipio* (Columbia University Press, 1990), Book Two, Chap. I, pp. 185-189.

[36] *De institutione musica*, trans. by Calvin M. Bower as *The Fundamentals of Music*, Claude V. Palisca, ed. (New Haven & London: Yale University Press, 1989), Book I, sections 9-11, pp. 16-19.

[37] See fig. 4, p. 16.

principles displayed are still critical components of our culture, even if their sources are mythical rather than historical.

In most versions, the story begins as Pythagoras is considering how to integrate the knowledge of music. "Once as he was intently considering music," Iamblichus reports, he was

> ". . .reasoning with himself whether it would be possible to devise some instrumental assistance to the sense of hearing so as to systematize it, as sight is made precise by the compass, rule and telescope,[38] or touch is made reckonable by balance and measures.[39]

As he was considering these things, Pythagoras happened to pass by a blacksmith's shop where he heard the sound of hammers beating out a piece of iron on an anvil. He was struck by the fact that some of the sounds made by the hammers seemed to be in harmony with each other; he recognized intervals of the octave, the fifth, and the fourth. He also noted that "the sound between the fourth and

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[38] While telescopes, as such, did not exist in the sixth-century B.C.E., Guthrie has chosen to use a modern term for what Thomas Taylor renders as "dioptric instrument." See Thomas Taylor, *Iamblichus' Life of Pythagoras* (London: The Author, 1818), p. 84.

[39] Iamblichus, p. 86.

Fig 19 - Pythagoras and the Hammers
Gafori, 1492

the fifth, taken by itself, was a dissonance, and yet completed the greater sound among them."[40]

"Delighted, therefore, to find that the thing he was anxious to discover had by divine assistance succeeded,"[41] Pythagoras went into the blacksmith's shop in order to seek out the basis of this phenomenon, a task that required him to perform some distinctly scientific experiments, perhaps the first of their kind. He carefully observed the activity of the smiths and the sounds that came from the blows of each hammer. He had the smiths change hammers, their way of striking the anvils, the position of the iron being worked, and so forth. Noting that none of these things changed the sounds being produced, he removed the heads from the hammers and weighed them. And here was the revelation! The harmony of the tones corresponded to the proportion of the weights!

At this point, the story becomes rather muddled, getting involved in some aspects of acoustics that the classical writers are unable to present accurately.[42] What emerges, however, is a picture of Pythagoras returning to his workshop and carrying out further experiments to

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[40] Ibid.

[41] Ibid.

[42] For example, the writer describes weights being used to change the pitch of a string where a change of pitch can only be proportional to the *square* of the weight.

substantiate his initial insight. We hear of him working with stretched strings, lengths of pipe, bells, monochords, triangles, and the like. (See fig. 20.) The results of this activity are precisely what scientific experimentation is supposed to test, namely, whether a theory, or initial finding, is found to be universally applicable. In this case, the empirical evidence supported Pythagoras initial finding; the relationships between the ratios, the musical intervals and the physical media held true in every instance. The octave is always found in the 2:1 relationship--whether in the length of strings or columns of air or whatnot. It is a universal relationship, as are the other musical intervals. This conclusion, expressed in its simplest form, is a sequence of numbers: 6, 8, 9, 12. These are the weights of the original hammers in the story and represent the smallest whole numbers that express the basic relationships Pythagoras had discovered, 1:2, 2:3 and 3:4, or, in musical terms, the octave, fifth and fourth.

The Watershed

It is hard to imagine the impact such a discovery must have conveyed:

> To discover that these fundamental proportions, on which every scale is built, could be expressed so simply in ratios between the first four numbers was

> enough to flood any mathematician's soul with joy. To Pythagoras it came as a revelation, lighting up the framework of the moral, no less than of the natural, world.[43]

It is also a major watershed in the history of thought. The use of empirical experiment to establish universal physical truths looks forward to scientific theory and the emerging foundations of the Western intellectual tradition. The terms in which these findings are expressed look back to the ancient mystery schools and their underlying number symbolism, a symbolism intimately linked with music as we will explore in the following chapter. From this perspective, it is revealed that the relationships Pythagoras discovered that day in the blacksmith's shop were not only mathematically elegant and pragmatically useful, but also of cosmological significance, a view of great interest in the ancient world. Many of Pythagoras' followers would give expression to the idea that the harmony of the spheres and the harmony of numbers are related. It is an additional dimension that these relationships could find a parallel in the world of physical phenomena. For many modern commentators, this is the only aspect of Pythagoras' thought worthy of study, since it points to the foundations of the

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[43] F. M. Cornford, "The Harmony of the Spheres," in *The Unwritten Philosophy and Other Essays* (Cambridge: Cambridge University Press, 1950), p. 19.

modern world view. But if Pythagoras sought a balance, then we need to take the same stance to understand his thought, particularly his theory of number and music. Seyyed Hossein Nasr explains the balance inherent in Pythagorean mathematics:

> Pythagoras not only believed firmly in the existence of order in nature as did other Greek philosophers but he also sought to explain this order not by asking what is the nature of the constitutive substance of the cosmos, but what is its pattern. His response to this question was mathematical structures that constitute the forms of things and by virtue of which things are what they are and are distinguished from each other. It is the mathematical structure of things that makes them what they are and not their matter. The cosmos is mathematically intelligible, but on the condition that mathematics be understood in its qualitative as well as quantitative sense and be seen symbolically.[44]

Nasr suggests that it was exactly this balance that was lost during the seventeenth-century watershed.

> It is precisely this aspect of mathematics that was denied by those in the sixteenth and seventeenth centuries who evoked the name of Pythagoras in seeking to mathematicize physics and reduce the science of nature to the study of pure quantity, with results that from the spiritual point of view can only be called catastrophic, for what is not symbolic (from the Greek verb *symballein*, meaning to unite) cannot but be diabolic (from another Greek verb *diaballein*, meaning to divide). Pythagorean mathematics was a means of uniting rather than dividing, and Pythagorean numbers and geometric patterns are so many reflections of

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[44] Seyyed Hossein Nasr, *Religion and the Order of Nature* (New York, Oxford: Oxford University Press, 1996), p. 83.

Unity, of the number one or the geometric point, which echo Unity but somehow never break away from It.[45]

Number, *Kosmos*, Music

It is from this perspective that we should examine the mathematical significance of our story. In most versions, the writers take pains to present the actual weights of the hammers, six, eight, nine and twelve pounds respectively. This is the smallest sequence of whole numbers that expresses 1:2, 2:3, and 3:4. As we shall see, these numbers are of great cosmological significance for the Pythagoreans.

There is a further dimension to the mathematical elegance of this simple sequence. A significant interest in Pythagorean mathematics is the study of the various kinds of means, or ways of dividing a numerical ratio. There are three of these-the arithmetic, geometric and harmonic, and two of these appear in the 6,8,9,12 sequence. The arithmetic mean divides two numbers, a and c, such that, where the mean is b, $b-a = c-b$.[46] Thus, in the sequence in question, 9 is the arithmetic mean as $9-6 = 12-9 = 3$. The harmonic mean, given in here by 8, is a little more complex. It occurs when

[45] Ibid.

[46] We could also write $B = (A + C)/2$.

a:c = (b-a):(c-b).[47] In this case, 6:12 = (8-6):(12-8) = 2:4 = 1:2.[48] These relationships will be of importance in our study of Plato's *Timaeus* in Chapter 5.

The Musical Application. This sequence of numerical relationships also reveals an underlying musical value. In modern terms, 6:8:9:12 represents the sequence: tonic, subdominant, dominant, tonic, or C, F, G, C, and thus the skeletal form of the diatonic scale. Macrobius explains the next step.

> After discovering this great secret, Pythagoras chose the numbers from which consonant chords might be produced so that when stringed instruments had been adjusted with regard to these numbers, certain ones might be pitched to the tonics and others to other consonant notes, numerically harmonious.[49]

Iamblichus gives more detail on Pythagoras' method for building a complete scale, or what came to be known as the "Eight Stringed Lyre of Pythagoras."

> Then he filled up the middle spaces with analogous sounds in diatonic order, and formed an octochord from symmetric numbers: from the double, the three to two, the four to three, and from the difference of these,

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[47] Also expressed as B = 2AC/A + C.

[48] The geometric mean does not appear here but occurs when the terms in a sequence of numbers differs from its immediate predecessor by a constant ratio, such as in 1,2,4,8,16... In concise form it is expressed as B = $\sqrt{}$A x C.

[49] Macrobius, p. 187.

> the 8 to 9. Thus he discovered the harmonic progression, which tends by a certain physical necessity from the lowest to the most acute sound, diatonically.[50]

This was one application of Pythagoras' discovery of the relationship between string length, number and musical tone, an application of importance for practical music making, first in a system used by ancient Greek musicians for tuning the lyre, and then in the development of the scale which was to be used, at least in theory, throughout medieval times in Europe. Herein lies its significance for music. Its significance for science grows out of the following:

> Pythagoras was the first to discover the mathematical basis of music so that what had formerly been only a system based on probability and guess-work. Hellenic musicians before the discovery of the musical consonances had tuned their stringed instruments by ear, torturing the tuning pegs in the process, as Plato put it; and even after Pythagoras' great discovery some musicians still insisted on tuning their instruments by ear alone. Plato went to the other extreme by demanding that theoretical music should dispense with hearing altogether and concentrate on the mathematical ratios forming the harmonies. Pythagoras combined the two methods so that his music was at once empirical and theoretical.[51]

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[50] Iamblichus, p. 87.

[51] Peter Gorman, *Pythagoras: A Life* (London: Routledge & Kegan Paul, 1979), pp. 160-161.

By balancing the empirical and the theoretical, Pythagoras is integrating the traditions of Archimedes and Aristotle. Gorman reminds us that he also balanced these perspectives with the magical tradition, often referred to in terms of mysticism.

> The experimental method which Pythagoras employed on this historic occasion proves that he was not just a religious mystic in the oriental mold, but a follower of the scientific revolution which the Ionians had initiated in his lifetime. His mysticism was always based on reason and the empirical method which of course he transcended by his powerful intellect.[52]

James expands on this assessment:

> Pythagoras's discovery of the arithmetical basis of the musical intervals was not just the beginning of music theory; it was the beginning of science. For the first time, man discovered that universal truths could be explained through systematic investigation and the use of symbols such as mathematics. Once that window was opened, the light spread across the whole breadth of human curiosity--not least in the field of cosmology. The genius of Pythagoras lay in the comprehensive way he joined the inner man and the cosmos.
>
> Before Pythagoras, the picture of the cosmos was much closer to poetry than to science.[53]

In making his discoveries at the blacksmith's shop, and translating them into both abstract and concrete applications, Pythagoras makes a major contribution to the future development of science while linking this modern view

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[52] Gorman, p. 163.

[53] James, p. 37

with the ancient cosmological traditions. His contribution to scientific thinking has two aspects, forming the two legs upon which modern science stands. The first, and most obvious, is the use of empirical observation and experiment. The second is the relationship between the abstract realm of numbers and the concrete realm of the physical world. It is here, as Wigner's phrase the "unreasonable effectiveness of mathematics," so eloquently indicates, that mysticism creeps into science by way of the magical tradition, and where science finds itself linked, usually against its will, with ancient number symbolism. It is this link, provided by Pythagoras, and derived from his discoveries in music, that forms the central tenet of his thought.

> In the teaching of Pythagoras the philosophic quest for the ἀρχή ["archay"], the first cause and principle of all things, was carried to a consideration of the problem of the Orphic lyre itself ["The Magic of the String"], by which the hearts of men are quelled, purified, and restored to their part in God. His conclusion was that ἀρχή is number, which is audible in music, and by a principle of resonance touches - and adjusts thereby - the tuning of the soul. This idea is fundamental to the arts of both India and the Far East and may go back to the age of the pyramids . . . a principle by which art, psychology, philosophy, ritual, mathematics, and even athletics were to be recognized as aspects of a single science of harmony.[54]

[54] Joseph Campbell, *The Masks of God: Occidental Mythology* (New York, 1994), p. 185.

If this is indeed a single science, it must extend to all forms and phenomena. That is, the principles of music and mathematics must extend to the structure of the universe:

> Having made his wonderful discovery of the mathematical basis for the musical intervals, he came to the conclusion that these mathematical truths must underlie the very principles of the universe. Pythagoras, who had inherited the notion of the spheres, made the logical assumption that they must make sounds in their revolutions; and that being the case, these sounds would of necessity be musical and harmonious. The Pythagoreans conceived of the cosmos as a vast lyre, with crystal spheres in the place of strings.
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> The classical account of Pythagoras's vision of the cosmos comes, again, from Aristotle.[55]

The account to which James refers is the famous statement from Aristotle's *Metaphysics,* quoted above, that the Pythagoreans, ". . . supposed the elements of numbers to be the elements of all things,"[56] contrasting this view with that of earlier teachers, seeing essential values in numbers ". . . more than in fire and earth and water."[57]

It is ironic that Aristotle's account should be one of the most famous expressions of our theme from the classical period, because, as we shall see in Chapter V, he actually rejected the idea. Nevertheless, Aristotle gives a clear

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[55] James, p. 38.

[56] *Metaphysics,* 1-5, 986a. See note 14, p. 120, above.

[57] Ibid.

representation of the idea, suggesting that it had two distinct aspects. First, there is what we might call the first principle of musical cosmology, the connection between number, music and *kosmos,* the view, elegantly summed up by Nasr, that "what provided order in the realm of nature was not just any mathematical pattern but patterns based on harmony, or, more precisely, on musical harmony."[58] This is the general notion of cosmic harmony expressed in the term *harmonia* and referred to by Gary Tomlinson.[59] It is a principle that extends not only to all of creation, but is infused throughout all the disciplines of knowledge according to Pythagorean thought. But Aristotle presents a second, more specific, application of this notion, namely the relationship between the structure of the scale and that of the planets. It is this idea that is referred to by Monteverdi, Chaucer, Dryden, Shakespeare and Milton, the image most readily generated by the term "music of the spheres tradition." It will be important to recall this distinction as we review the Platonic sources of musical cosmology.

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[58] Nasr (1996), p. 83.

[59] Chap. I, note 3.

<u>A Caveat</u>

Before concluding our consideration of Pythagoras it is worth reiterating an earlier caveat. In dealing with Pythagoras, there is uncertainty about any factual material as he did note write anything that has survived. In explaining this situation, however, Haar also provides some firm ground for the consideration of Pythagorean teaching.

> As for Pythagoras himself, the result of generations of Neo-Platonic enthusiasm in crediting him with countless inventions, achievements, and miraculous doings is that one now hesitates to attribute anything to the man himself. "Pythagorean" is a legitimate label for certain elements in Greek thinking, however, and prominent among these is the blending of astronomy with musico-mathematical theories into the concept of a harmoniously ordered universe. It is surely not going too far to identify the basic elements of the Pythagorean cosmos with Pythagoras himself.[60]

With this observation in mind, it is also worth remembering Koestler's view of Pythagoras as a man "whose influence on the ideas, and thereby on the destiny, of the human race was probably greater than that of any single man before or after him."[61] It is remarkable that Pythagoras could have had such an enormous impact while leaving no written record of his teaching, particularly when we remember how dependent upon written documents the Western

[60] Haar (1960), p. 71.

[61] See p. 113, note 2, above.

tradition was to become. Perhaps only one other figure has been able to have a similar intellectual influence without leaving us any writings, and that is Socrates. To a large extent, we draw on one writer to represent both Socrates and Pythagoras. That is the great philosopher Plato, who, among his other achievements, produced two major sources of the music of the spheres tradition. Before examining these sources, however, we will go more deeply into Pythagorean number symbolism and compare it to similar ideas of great antiquity.

CHAPTER IV

NUMBER, TONE AND *KOSMOS*

If the figure of Pythagoras represents a watershed in the history of the West, the story of his discoveries in the blacksmith's shop exemplifies the characteristics of both the ancient world of which he was a product and the modern world whose foundations he established. It is through his linking of mathematics to the physical world and his use of experiment that Pythagoras contributed to the roots of science and thus to the modern world. It is through the numbers involved in the story that we learn about the symbolic roots of cosmology in the ancient world.

The weights of the blacksmith's hammers were, again, 6, 8, 9, and 12 units, respectively. The 6, 8, 9, 12 sequence is important because it is the smallest set of whole numbers that will demonstrate all the relationships between the first four integers, 1, 2, 3, 4, as 1:2 = 6:12, 2:3 = 6:9 and 8:12, 3:4 = 6:8 and 9:12. Once we have extracted these four numbers from the sequence we will find that they contain a wealth of imagery.

The Quadrivium

The most convenient framework within which to examine Pythagorean number theory itself invokes the numbers one through four. This is evident when we consider the categorization of the various branches of mathematics that was implicit in Pythagorean doctrine from the earliest times.

> In the field of theoretical and applied science, Pythagoras through his preoccupation with numbers established arithmetic and geometry as systematic studies. Diogenes Laertius reported that Pythagoras "also discovered the musical intervals on the monochord" (VIII.ii), and consequently he was credited with instituting musicology. Because of his explanation of several celestial phenomena and because of his formulation of the first cosmology—he instituted, in fact, the word *κόσμος*--Pythagoras was the progenitor of astronomy as a science.[1]

It is no accident that Pythagoras is credited with discovering four branches of learning, nor that all of these depended upon number. Every aspect of Pythagorean doctrine has a symbolic component, and the symbolism was typically based on numerical values, in which the number four had a particular significance.

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[1] S.K. Heninger, Jr., *Touches of Sweet Harmony: Pythagorean Cosmology and Renaissance Poetics* (San Marino, CA: Huntington Library, 1974), p. 29.

> . . . These "four paths" to knowledge were four distinct disciplines—arithmetic, geometry, music and astronomy. But they all depended upon the Pythagorean assumption that number is the basic principle in the universe and that relationships between items are determined by numerical ratios, thereby producing a structure of harmonious proportions.[2]

The term *Quadrivium* for these four disciplines was coined by Boethius and transmitted to the Middle Ages in his codification of Pythagorean mathematics.

> The idea of cosmos was articulated with the greatest clarity . . . in terms of the quadrivial disciplines. It is not surprising, of course, that mathematics lent itself to the explication of universal order since both the quadrivium and the idea of cosmos derived from a common source, the Pythagorean theory of numbers. Cosmos in its essentials is a mathematical concept, a concern for parts and the integrated whole, a relation of the diverse finite to the unified infinite. Cosmos is therefore best expressed in terms of the four mathematical disciplines, and it is formulated with increasing degrees of sophistication as we proceed from arithmetic to music and geometry and finally to astronomy.[3]

Thus, the quadrivial sequence, inherent in Pythagorean theory and established by Boethius, is in itself an interesting example of the 1,2,3,4 symbolism. It also forms a convenient framework for our examination of the first four numbers. Each discipline represents a different symbolic form, but each presents the sequence 1,2,3,4 to describe the

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[2] Heninger, p. 53.

[3] Heninger, p. 149.

cosmogony that lies at the center of both Pythagorean and Platonic doctrine.

Arithmetic

Within Pythagorean mathematics, arithmetic consists of much more than rules for manipulating numbers. It reflects the view of numbers as fundamental entities underlying all forms and processes in nature, as archetypes or, in Platonic terms, as "Forms," a view that is explicated in *The Theology of Arithmetic,* an ancient text attributed to Pythagoras' biographer Iamblichus.[4] The nature of this text can be seen from the foreword by Keith Critchlow, who quotes the first- or second-century writer Aetius's comments about Pythagoras' theory of number. Pythagoras, he says,

> . . . assumed as first principles the numbers and the symmetries existing among them, which he calls harmonies, and the elements compounded of both, that are called geometrical.[5]

Here Aetius goes beyond the strict confines of arithmetic, citing the symmetries, or harmonies, among numbers that are

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[4] See Iamblichus (attributed to). *The Theology of Arithmetic: on the Mystical, Mathematical and Cosmological Symbolism of the First Ten Numbers*, trans. by Robin Waterfield; with foreword by Keith Critchlow (Grand Rapids, Michigan: Phanes Press, 1988) .

[5] Iamblichus (attributed to), p. 9.

Fig 20 - The *Typus arithmetica,* Gregor Reisch, *Margarita philosophica* (Freiburg, 1503)

the subject matter of the Pythagorean discipline of music or harmonics. The reference to the third discipline, geometry, is equally clear.

Iamblichis is careful to expound on the nature of number in the very first statement of the *Theology of Arithmetic* as he explains the nature of the monad. "The monad," he states, "is the non-spatial source of number."[6] As such, it is not itself a number. Another ancient text, an anonymous biography of Pythagoras preserved in the writings of the Byzantine philosopher Photius (c. 820-891 C.E.), clarifies this distinction. "The Pythagoreans preach a difference between the Monad, and the One; the Monad dwells in the conceptual realm, while the One dwells among numbers."[7] This distinction is critical, echoing through the centuries even to the dispute about mathematics between Fludd and Kepler. One is a number, which is an abstraction in itself; it would appear to belong to the conceptual realm. Yet the idea of a number that can participate in the processes of calculation and measurement is not subtle

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[6] Iamblichus (attributed to), p. 35.

[7] Anonymous, preserved by Photius, *The Life of Pythagoras,* in Kenneth Sylvan Guthrie, trans. and ed., *The Pythagorean Sourcebook and Library* (Grand Rapids, Michigan: Phanes Press, 1987), p. 137.

enough to convey the meaning of the monad and the other entities dealt with in such texts as *The Theology of Arithmetic*. It is important to keep this distinction in mind as we examine the relationship between the first four numbers as understood in Pythagorean arithmetic.

Monad, Dyad, Triad ... Tetraktys. The relationship between one, two, three and four is best understood by the nature of the number ten. The qualities of the monad, the dyad, the triad and the tetrad are all contained in the value of the decad. Also known as the tetraktys, the number ten was the most important in the Pythagorean system, representing the complete and full value of the universe. The reason can be discerned from its form, as seen in the array of pebbles the Pythagoreans used to represent numbers.[8]

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      *
    *   *
  *   *   *
*   *   *   *
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[8] It is from this that we get the term calculation, from the latin word *calculus,* meaning pebble.

The significance of this pattern lies in its representation of completeness. It contains all four dimensions. Line one constitutes a point. The two points in line two form a line, thus two dimensions. The three points in lines one and two together, or the six points in the first three lines, form what are known as triangular numbers:

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          *                *     *
       *     *          *     *     *
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The triangle represents the simplest figure in space, with three dimensions. Adding the four points of the bottom line, while creating another triangular number, demonstrate the spatial dimension when arrayed as a tetrahedron, and also imply the element of motion and thus of time. The four parts of the diagram also represent the subject areas of the four aspects of the quadrivium, arithmetic with single entities, music with relationships between entities, geometry with relationships in space, astronomy with relationships in time, or motion.

Given these properties, the number ten was seen to symbolize the universe, or nature, itself. All possible numbers were seen to exist within it, or from combinations of the numbers that added up to it. Thus, by dealing with just the first ten numbers, *The Theology of Arithmetic* runs the gamut of symbolic numerology. In describing the decad itself, Iamblichus emphasizes this element of completeness:

> . . . a natural equilibrium and commensurability and wholeness existed above all in the decad. It has encompassed seminally within itself all things. . . Hence it was reasonable for God to use it as a measure for things and as a gnomon and straight edge when he added things to one another and fitted them together harmoniously. And this is why, both in general and in particular, things from heaven to Earth are found to have been organized by it.
>
> Hence the Pythagoreans in their theology called it sometimes "universe," sometimes "heaven," sometimes "Fate" and "eternity," "power" and "trust" and "Necessity," "Atlas" and "unwearying," and simply "God" and "Phanes"[9] and "sun."
>
> They called it "universe," because all things are arranged by it both in general and in particular;[10] and because it is the most perfect boundary of number, in the sense that "decad" is, as it were, "receptacle,"[11] just as heaven is the receptacle of all things, they called it "heaven" and, among the Muses, "Ourania."[12] [13]

It is not only within its own structure that the perfection of the decad is seen, however. It is also perceived in the numbers that lead up to it, some of which

[9] The name of the Creator in Orphic cosmogony.

[10] *Kosmos* (universe) means literally "order" or "arrangement."

[11] *Dechas*, a word coined by Pythagoreans for this purpose.

[12] Her name is cognate with the word for "heaven."

[13] Iamblichus (attributed to), pp. 109-110. (Notes 9-12 are translator's.)

reiterate the symbolism of wholeness or perfection, while others symbolize the processes whereby wholeness is differentiated and regained through higher levels of integration in the processes of creation. Thus, as we will see, the monad, manifest as the number one, represents the fullness of the creator, the abstract principle of wholeness and potentiality underlying the creation itself. The tetrad, on the other hand, representing the number four, is said to be equivalent to the decad or tetraktys, because the first four numbers add up to ten; 1+2+3+4=10. Thus the qualities of wholeness can be also expressed in these four numbers. If we look at these numbers in turn, we can see the fundamental qualities of the creative process in the Pythagorean cosmogony.

The Monad. If the decad and the tetrad are perfect, what of the monad? We have already noted the distinction between the monad and the number one. As Theon of Smyrna puts it, "The monad is then the principle of numbers; and the *one* the principle of numbered things."[14] In its more abstract form, oneness was seen as a unified basis of existence.

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[14] Theon of Smyrna. *Expositio rerum mathematicarum ad legendum Platonem utilium* (2nd century C.E.), trans. by Robert & Deborah Lawlor from the 1892 Greek/French edition of J. Dupuis as *Mathematics Useful for Understanding Plato* (San Diego: Wizards Bookshelf, 1979), p. 13.

> The Pythagoreans considered the Monad as the origin (*arche*) of all things, just as a point is the beginning of a line, a line of a surface, and a surface of a solid, which constitutes a body. A point implies a preceding Monad, so that it is really the principle of bodies, and all of them arise from the Monad.[15]

As Macrobius explains:

> 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.[16]

Macrobius's statement reveals the potential of Pythagorean thought to translate number theory into religious as well as cosmological terms; the concept of Oneness lends itself as easily to the idea of the monad as the origin of all number as it does to the idea of God as the source and origin of the universe. Theon reflects this view in his description of the monad:

> Unity is the principle of all things and the most dominant of all that is: all things emanate from it and it emanates from nothing. It is indivisible and it is everything in power. It is immutable and and never departs from its own nature through multiplication

[15] Anonymous (preserved by Photius), #7, in Guthrie, p. 138.

[16] Macrobius. *Commentary on the Dream of Scipio* [I.vi.7-8], trans. William H. Stahl (New York: Columbia University Press, 1952), pp. 100-101. Cf. Ralph Cudworth, *The True Intellectual System of the Universe* (London, 1678), pp. 371-373, cited in Heninger, p. 136, note 30.

> (1x1=1). Everything that is intelligible and not yet created exists in it; the nature of ideas, God himself, the soul, the beautiful and the good, and every intelligible essence, such as beauty itself, justice itself, equality itself, for we conceive each of these things as being one and as existing in itself.[17]

Centuries later, during the Italian Renaissance, Ficino articulated the same understanding:

> ONE . . . is the principle of all numbers and dimensions and therefore most resembles the principle of the universe itself, the One, since it too remains entirely eminent and simple even as it procreates offspring. All the even numbers proceed from the 1 and the odd numbers turn back towards it. All dimensions issue from it as from a point. It is the substance of all numbers in that any number is 1 repeated. Hence 1 is the "measure" of all numbers whether odd or even... The 1 is like the maker of the world who imposes form on the 2 as on indeterminate matter. . . The 1 is indivisible, for when it appears to be divided it is in fact being miraculously doubled. Thus as the principle of "identity, equality, and likeness" it again resembles God.[18]

Whatever terms are used, be they religious, scientific or mathematical, it is this unified field that is the starting point for any comprehensive cosmology. Following from this most elemental concept, the next step is to describe the process of creation itself; how does God create the universe? Or, how does the One give rise to the Many?

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[17] Theon of Smyrna, p. 66.

[18] Michael J. B. Allen, *Nuptial Arithmetic: Marsilio Ficino's Commentary on the Fatal Number in Book VIII of Plato's Republic* (Berkeley: University of California Press, 1994), pp. 64-65.

This deepest of all mysteries is dealt with in every cultural setting, in terms that are shrouded in various kinds of mythical, often highly cryptic, symbolism. In Pythagorean terms, where numbers are seen as the essential elements of creation, this story is told through the cosmological significance of numbers and the sequence through which they unfold.

The Dyad. From the monad, we progress to the dyad. If the monad represents the unity that underlies all existence, the dyad is the first principle whereby that One becomes many. As a result, its qualities are sharply contrasted with that of the monad. "Number Two, or Dyad," Porphyry tells us, "signified the dual reason of diversity and inequality, of everything that is divisible, or mutable, existing at one time in one way, and at another time in another way."[19] The *Theology of Arithmetic* contrasts the dyad with both the qualities of unity and of those expressed in threefold structures:

> So the dyad alone remains without form and without the limitations of being contained by three terms and proportionality, and is opposed and contrary to the monad beyond all other numerical terms (as matter is contrary to God, or body to incorporeality), and is as it were the source and foundation of the diversity of numbers, and hence resembles matter; and the dyad is all but contrasted to the nature of God in the sense that it is considered to be the cause of things

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[19] Porphyry, in Guthrie, p. 133.

> changing and altering, while God is the cause of sameness and unchanging stability.[20]

Here the dyad is associated with the essential bifurcation of nature that is the prerequisite for the manifestation of the physical universe. It is without form; form depends upon the value of three. And yet it is absolutely opposed to, or contrasted with, the nature of God, or of the value of unity. In the simplest terms, as we will see in Chapter V, monad and dyad represent sameness and difference, limit and the unlimited, good and evil. And yet, as Iamblichus tells us, both values are present in everything. "So each thing and the universe as a whole is one as regards the natural and constitutive monad in it, but again each is divisible, in so far as it necessarily partakes of the material dyad as well."[21] And yet, "The dyad is also an element in the composition of all things, an element which is opposed to the monad, and for this reason the dyad is perpetually subordinate to the monad, as matter is to form."[22]

<u>The Triad</u>. The nature of the triad is made manifest in the relationship between the monad and the dyad. "The first conjunction of monad and dyad results in the first finite

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[20] Iamblichus (attributed to), p. 41.

[21] Ibid.

[22] Iamblichus (attributed to), p. 42.

plurality, the element of things, which would be a triangle of quantities and numbers."[23] Thus, "The triad has a special beauty and fairness beyond all numbers, primarily because it is the very first to make actual the potentialities of the monad—oddness, perfection, proportionality, unification, limit."[24] Pseudo-Iamblichus goes on to articulate the relationship between the first three numbers.

> The monad is like a seed in containing in itself the unformed and also unarticulated principle of every number; the dyad is a small advance towards number , but is not number outright because it is like a source; but the triad causes the potential of the monad to advance into actuality and expression. 'This' belongs to the monad, 'either' to the dyad, and 'each' and 'every' to the triad. Hence we use the triad also for the manifestation of plurality, and say 'thrice ten thousand' when we mean 'many times many,' and 'thrice blessed.'[25]

Springing from this quality of realized potentiality, the number three is the first number that represents quantity in the real world. Heninger expresses this clearly. First he reviews the values of monad and dyad. "The monad," he writes, "represents the unity of the conceptual world, while the dyad represents the idea of extension and

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[23] Iamblichus (attributed to), p. 41.

[24] Iamblichus (attributed to), p. 49.

[25] Iamblichus (attributed to), p. 50.

therefore the divisibility of the physical world."[26] Both of these are abstractions. The number three, however, is ". . . the first arithmetical number per se--that is, a 'quantity composed of units' . . . whose physical extension is proved by the fact that it has a *terminus a quo* and a *terminus ad quem*, with something in between."[27] He quotes St. Augustine, from *De musica*, I.xii: "There is a certain perfection in three because it is a whole: it has a beginning, middle, and end."[28] This same idea is expressed by Porphyry:

> Things that had a beginning, middle and end they denoted by the number Three, saying that anything that has a middle is triform, which was applied to every perfect thing. They said that if anything was perfect it would make use of this principle, and be adorned according to it; and as they has no other name for it, they invented the form, Triad, and whenever they tried to bring us to the knowledge of what is perfect they led us to that by the form of this Triad.[29]

There are many practical applications of this idea. One is found in the work of the twentieth-century mathematician and architect R. Buckminster Fuller, father of the geodesic dome and countless other inventions, whose whole architectural system begins from the observation that the

[26] Heninger, p. 87.

[27] Ibid.

[28] Ibid.

[29] Porphyry, in Guthrie, p. 133.

triangle is the only intrinsically stable geometric figure. Fuller developed an alternative system of mathematics by suggesting that the Cartesian system, based on 90-degree co-ordinates, is profoundly counter-intuitive, and replacing the 90-degree system with 60-degree constructions. Moving on from there, he found the tetrahedron to be a fundamental building block in physics, chemistry, crystallography and a host of other areas.

On a more abstract level, in the field of cultural history, Ken Wilber and Erich Neumann find a tripartite structure in the evolution of consciousness, breaking down into the realms of the pre-personal, the personal and the trans-personal. It is Neumann's thesis that ". . .a series of archetypes is a main constituent of mythology, that they stand in an organic relation to one another, and that their stadial succession determines the growth of consciousness."[30] Examining the whole field of mythology, Neumann finds one underlying motif which he defines as "the history of this self-emancipation of the ego, struggling to free itself from the power of the unconscious and to hold its own against overwhelming odds."[31] The achievement of

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[30] Erich Neumann, *The Origins and History of Consciousness*, R. F .C. Hull, trans., forward by C.G. Jung (Princeton, New Jersey: Princeton University Press, 1971), p. xvi.

[31] Neumann, p. 127.

this emancipation gives rise to the hero myth which exists at the central point in this three-stage process. The figure of the hero, in which we see modern man, is preceded by pre-egoic consciousness on the one hand, while potentially leading to the possibility of the trans-personal on the other. Ken Wilber sums up this process succinctly. "There are only two stations at which men and women are perfectly content. One is slumbering in the subconscious, the other is awakened in the superconscious. Everything in between is various degrees of pandemonium."[32]

From Fuller's perspective, threefold structures underlie the very fabric of matter. According to Wilber's and Neumann's views, the value of three is expressed in the structure of history. Iamblichus adds another dimension in applying the value of the triad to the fields of knowledge and action.

> The triad is called 'prudence' and 'wisdom'--that is, when people act correctly as regards the present, look ahead to the future, and gain experience from what has already happened in the past: so wisdom surveys the three parts of time, and consequently knowledge falls under the triad.[33]

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[32] Ken Wilber, *Up From Eden: A Transpersonal View of Human Evolution* (Garden City, New York: Anchor Press/Doubleday, 1981), p. 111.

[33] Iamblichus (attributed to), p. 51.

So it is that one, two, three outlines the process of the one becoming the many. But what about the fourth? How does it complete this process?

<u>The Tetrad</u>. It is Iamblichus who answers this question, again most succinctly. "Everything in the universe turns out to be completed in the natural progression up to the tetrad."[34] Thus the tetrad symbolizes completion both in its form, representing, as it does, the structure of the tetraktys, but also in its position in the sequence 1,2,3,4, which itself, through the numerical symbolism of this tradition, represents the sequential unfolding of creation from unity through extension to the full range of manifestation. Everything participates in this process, Iamblichus tells us, everything "in general and in particular, as does everything numerical--in short, everything whatever its nature."[35] He continues:

> The fact that the decad, which is gnomon and joiner, is consummated by the tetrad along with the numbers which precede it, is special and particularly important for the harmony which completion brings; so is the fact that it provides the limit of corporeality and three-dimensionality. For the pyramid, which is the minimal solid and the one which first appears, is obviously contained by a tetrad, either of angles or of faces, just as what is perceptible as a result of matter and

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[34] Iamblichus (attributed to), p. 55.

[35] Ibid.

> form, which is a complete result in three dimensions, exists in four terms.[36]

Here Iamblichus provides double significance to the first three numbers and their completion through the fourth. Within the realm of arithmetic, the symbolism of these numbers suggests the process of creation and evolution by virtue of the original unity, the monad, dividing within itself to produce the dyad, thus providing the impetus to move forward in the creation of the first real number, the triad, which represents all processes in nature that have a beginning, a middle and an end. The process finds its fulfillment in the tetrad, which represents the full value of the created world, the principle of soul and justice. The combination of the first four numbers, 1+2+3+4, add up to the most perfect number of all, the decad, the number of Nature itself. And in its manifestation as the tetractys, this symbol of fullness or completion was regarded as so holy that members of the Pythagorean brotherhood would swear the most solemn of oaths on the "holy Tetractys."

> I swear by the discoverer of the Tetraktys,
> Which is the spring of all our wisdom,
> The perennial root of Nature's fount.[37]

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[36] Ibid.

[37] Iamblichus, in Guthrie, p. 98.

The second element mentioned by Iamblichus, in his description of the qualities of the Tetrad, deals with the structure of the Quadrivium; he mentions several four-fold groupings, the four seasons, the four elements, etc., and also includes the four branches of mathematics and their significance.

> Moreover, it is better and less liable to error to apprehend the truth in things and to gain secure, scientific knowledge by means of the quadrivium of mathematical sciences. For since all things in general are subject to quantity when they are juxtaposed and heaped together as discrete things, and are subject to size when they are combined and continuous, and since in terms of quantity, things are conceived as either absolute or relative, and, in terms of size, either at rest or in motion, accordingly the four mathematical systems or sciences will make their respective apprehensions in a manner appropriate to each thing: arithmetic apprehends quantity in general, but especially absolute quantity; music apprehends quantity when it is relative; and geometry apprehends size in general, but especially static size; astronomy apprehends size when it is in motion and undergoing orderly change.[38]

Following through with Iamblichus' recommendation, we should consider the next discipline within the quadrivium--music, or harmonics.

[38] Iamblichus (attributed to), pp. 55-56.

Music

Music is of fundamental important to Pythagorean thought, not only for its practical applications but even more for its symbolic significance, such as, for example, the process of unlocking the meaning of one, two, three, four. These express the basic relationships used in music, the perfect consonances.

1:2 = octave

2:3 = fifth

3:4 = fourth

From these basic intervals we can gain a sense of how the number four supplies completion in the realm of musical symbolism. Just as in the realm of arithmetic, the number four is related to the number ten:

> The concordant intervals of the scale, determined by mathematical reasoning alone, are assumed to be the proportions between the component numbers of the perfect number 10, the decad. The number 10 defines the limit of the physical universe and therefore only proportions between its component parts can be considered as natural. Since 1 + 2 + 3 + 4 = 10, the possible proportions are 2:1, 3:1, 4:1, 3:2, and 4:3.[39]

[39] Heninger, p. 95.

Fig 20 - The Typus musicae. Gregor Reisch, *Margarita philosophica* (Freiburg, 1503)

Thus Pythagoras' findings in his earliest musical experiments dovetail perfectly with the whole realm of symbolism inherent in Arithmetic.

There is another level to the symbolism, however. We have seen that Iamblichus defines music as the branch of the quadrivium that deals with quantity when it is relative, as opposed to arithmetic, which deals with quantity in and of itself. Thus, the *Theology of Arithmetic* defines the symbolic significance of each number. To determine the relationships among these numbers, Pythagorean theory turns to music because there are certain numerical relationships that are fully grasped only when the corresponding musical relationships are taken into consideration. There are many texts, from Nicomachus[40] to Boethius,[41] on the theory of harmonics, detailing the nature of intervals, consonance and dissonance and so forth. Yet there is no book that gives total insight into the nature of musical symbolism. It is not available purely through the intellect; it has to be apprehended by the ear.

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[40] Nicomachus, *Encheiridion harmonikês*, trans. with commentary by Flora Levin as *The Manual of Harmonics* (Grand Rapids, Michigan: Phanes Press, 1994).

[41] Boethius, *De institutione musica*, trans. by Calvin M. Bower as *The Fundamentals of Music*, Claude V. Palisca, ed. (New Haven & London: Yale University Press, 1989).

The Octave. The primary example is the 2:1 relationship. Seen in arithmetical terms, there is a great deal of information contained in this ratio, as we have seen in our examination of the monad and the dyad. The monad has the quality of wholeness, the primal unity at the basis of creation. The dyad represents diversity, inequality, divisibility. The relationship between them symbolizes the mystery of the One becoming the Many. From a musical perspective there is something more, however. 2:1 is the ratio of the musical octave, the most fundamental relationship in music. If we hear two tones, one after the other, where one is twice the frequency of the first, something extraordinary occurs. We perceive them *both* as the same and as different.

Pitch, Note and Tone. To help understand this phenomenon, music theorist Gary Peacock[42] suggests using three different terms to describe each musical sound: pitch, note and tone. The pitch is a simple physical phenomenon, the number of vibrations per second. Secondly, the note is the name we give to it, using letter names. Thus the vibration rate of 440 cycles per second is given the note name A. The concept of tone is more abstract, however. It corresponds to what Victor Zuckerkandl has called the

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[42] Music theory class with author, Cornish Institute, Seattle, Washington, 1980-81.

"dynamic quality of tone,"[43] a term that denotes the degree of tension or resolution exhibited by each note within a tonal system, rather than the more common musical usage of degrees of volume from *piano* to *forte*. Simply put, in the key of A, the note A, whose pitch is 440 cycles per second, has the quality of I, or the tonic. In the key of C, the same note, A, at the same pitch, 440 cycles per second, is a different tone; it has a different dynamic quality. Its function is of VI, of the sixth. In the key of E, it is IV, and so on. The exact same vibration, which is given the same note name, A, is experienced as having a different dynamic quality depending upon the context in which it is heard, according to its place in a "dynamic field" of tones.

Zuckerkandl demonstrates the dynamic quality of tones by examining the experience of a scale, utilizing the Western major scale, known in India as *Bilaval that*. If we play a simple diatonic scale, let us say beginning on C, the experience we have as we move from C to D to E is of moving away from a point of rest to points of greater degrees of activity. This process achieves a certain culmination upon reaching the fifth tone of the scale, which has the sense of a turning point. "Up to 5, all motion is a departure from .

[43] Victor Zuckerkandl, *Sound and Symbol: Music and the External World.* (Princeton: Princeton University Press, 1956), pp. 11-24.

. . ;" Zuckerkandl writes; "after 5 it is an advance toward . . . ; 5 is the turning point."[44] All tones point back toward the 1 until the 5th tone is reached. After that, however, something remarkable happens. The final tones in the sequence, those subsequent to 5, no longer point back toward 1. They no longer give the sensation of wanting to return to the origin. They now point toward 8. They have the dynamic sense of wanting to resolve toward the eighth tone. When the eighth tone is reached, however, another remarkable sensation is found. The eighth tone has the same quality as the first. The pitch is different, but it is the same note. The scale starts on C and ends on C. It is also, in Peacock's terminology, the same tone--it has the same dynamic quality.

All of this seems obvious, even trivial, to a musician or music theorist. Yet, as Zuckerkandl painstakingly brings out, there is a great mystery in this experience.

> This is the phenomenon that has fittingly been called "the miracle of the octave"; Ernst Kurth characterizes it as "one of the greatest riddles . . . the beginning of irrationality in music, a thing unparalleled in all the rest of the phenomenal world."[45]

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[44] Zuckerkandl, p. 97.

[45] Zuckerkandl, p. 102.

Of course, all tonal and modal music is built out of the tensions and releases inherent in the dynamic qualities of tones and the particular sequence of the scale. But when we return to the field of cosmology, we find that the miracle of the octave gives further meaning to Plato's symbolism. This is inherent in the sequence of one, two, three and four.

For generations of Pythagorean theorists throughout the Middle Ages and at least until the seventeenth century, the musical relationships among these numbers were discerned through the use of the monochord, a process of dividing a string. Since the time of Joseph Sauveur (1653-1716), the discovery of the harmonic overtone series has revealed all of the same relationships occurring simultaneously within a vibrating string or air column. In each case the sequence of sounds reveals the same properties. The 2:1 ratio of the octave is revealed through the first division of the string. This relationship outlines the scale and gives it the sense of leaving and returning. It gains the name of octave from the eight notes in the scale, but this is a misleading term. More revealing is the Greek nomenclature, the *diapason*. The meaning of this term, διαπασῶν, comes from δία, "through" plus πασῶν (the genitive plural of πᾶς), meaning "all."

Thus, διαπασῶν means "the total extent of a continuum."[46] When we hear the 2:1 relationship, apart from the remarkable sensation of sameness coupled with difference, we also gain the sense of the outline of a tonal space, a space that has been created by its boundaries, its beginning, 1, and its end, 2, a sense that is confirmed and reinforced when this relationship is heard in the context of, or as the boundary conditions of, a musical scale.

In evaluating the significance of this interval, Siegmund Levarie and Ernst Levy focus on the number 2. "What is the relationship of the number '2' to the whole?" they ask. "Does the number 2 have special privileges denied to other numbers?"[47] Their response reminds us of Iamblichus's characterization of the dyad, only with Biblical implications:

> Just as the division of the string in 2 was necessary to create the basic tonal space, so the division of the universe into duality was necessary to create the world. The biblical story of the Creation is one of repeated division: heaven and earth, light and darkness, land and water, male and female. Duality or polarity pervades our life. It makes life possible and it defines life. It determines the framework within

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[46] See Heninger, p. 137, n. 49.

[47] Siegmund Levarie and Ernst Levy, *Tone: A Study of Musical Acoustics* (Kent, Ohio: Kent State University Press, 1968), p. 15.

> which all problems arise and within which they demand a resolution.[48]

James Haar agrees with this analysis: "Pythagoras must have identified the structure of the universe with his most perfect consonance, the octave. . . ."[49] It follows that Plato can discuss the structure of the world and its soul in terms of the arrangement of relationships within the boundaries of the octave, as a musical scale. The same relationship is hinted at in the discipline of arithmetic, in the nature of the monad and the dyad. But to fully understand the *relationship* between these two entities requires the discipline of music, the ability to *hear* the quality of the two numbers. From this standpoint, the 1:2 relationship imposes itself on the whole sequence of numbers.

When seen from the standpoint of music, or harmonics, the sequence of tones, what Hans Kayser refers to as the "Tonezahl," has a different structure. The sequence seen purely as the counting numbers is an open-ended one, thus:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 ... etc.

[48] Levarie and Levy, p. 15.

[49] Haar, p. 76.

Its only logical conclusion is at infinity, in the sense of the uncountably large, signified in set theory as the Hebrew letter aleph, א.

If we consider the same sequence in terms of the harmonic overtone series, it has a profoundly different structure. The 2:1 relationship and its characteristic of closure is repeated at every power of two. Rather than an open-ended structure extending to infinity, we have a series of cycles whose nature is defined in the first manifestation of 1:2, and which then repeats itself indefinitely, with more and more information being unfolded with each repetition, thus:

1				2
2		3		4
4	5	6	7	8

8 9 10 11 12 13 14 15 16 . . . $\propto$

The first cycle, which is nothing but the first two numbers, 1 and 2, presents no qualities of creation itself--only the boundary conditions within which creation can occur, the process of unity reproducing itself with a value essentially identical to itself. Thus, the qualities of unity, diversity, and the relationship between them are all contained within this relationship. We could argue that all these qualities are also contained within the number 1 itself because it must exemplify the quality of unity. Yet, in traditional cosmologies, unity contains within itself all the values of multiplicity:

> Traditional arithmetic conceives of numbers as so many elements of multiplicity which somehow never leave Unity. It sees arithmetic as applied metaphysics and at the same time as the quantitative aspect of a reality whose qualitative aspect is revealed in music.[50]

When we move to the second cycle of the series, the next iteration of the 2:1 relationship, we find it in the ratio of 2:4. This time, however, there is additional information contained in the cycle, the number three. As soon as we hear the third partial it is clear that this a qualitatively different experience from either the first or second. This can also be seen arithmetically; while the first two numbers exemplify the unique number one and the first power of two, three is also a prime number and therefore completely unique. The quality it presents to our aural experience as the third partial is what the Greeks called the diapente, translated as the fifth. It is the note in the scale, as Zuckerkandl describes it, that represents the dynamic mid-point, the farthest removed from the quality

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[50] Seyyed Hosein Nasr, *The Need for a Sacred Science* (Albany, State University of New York Press, 1993), p. 102.

of the tonic, before the ear starts to seek resolution in moving on to the eighth note in the series rather than in moving back to the first. We call it the dominant. The 3:2 relationship is the simplest ratio other than the octave, the first real consonance.

Whatever qualities we attribute to the 3:2 relationship, the one of significance here is that it is the first manifestation of any interval outside of the generating tone or its octave. Thus, as in arithmetic, "the triad causes the potential contained within the monad to advance into the true expression of number," so the third partial gives the first expression of the potential contained in the fundamental. More and more of this potential will be brought out in each successive cycle, bounded by each power of 2.

According to the Pythagoreans, the Monad is the origin of all things; similarly, the fundamental is the source of all possible musical relationships. Within the first cycle of manifestation we are introduced to the dyad in its reflection of the monad. "With the dyad arises the duality of subject and object, the knower and the known."[51]
In the second cycle we are presented with the Triad:

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[51] Guthrie, p. 22.

> With the advent of the Triad, however, the gulf of dualism is bridged, for it is through the third term that a Relation or Harmonia ("joining together") is obtained between the two extremes. While Two represents the first *possibility* of logos, the relation of one thing to another, the Triad achieves that relation in *actuality*.[52]

This statement could be used to illustrate the arithmetical qualities of these numbers, but it applies equally well to the relationship available to the ear in music. In any event, it demonstrates that the numbers one, two, three reveal the symbolism for the process of manifestation, of one becoming many via duality--the creation of the *kosmos*.

But what of the number four? In arithmetic it is the tetrad that forms the image of the Decad. In harmonics it represents closure even more emphatically, for it is another iteration of the power of 2: the octave. Thus in the second cycle of the partial series, 2,3,4, we have not only the manifestation of *kosmos* in 3, but its culmination or fulfillment in 4. The demand for completion is satisfied through the Tone Number sequence. The progression of numbers tends to represent a process of unfolding, or unpacking, of qualities contained within the primary numbers. These qualities are immediately available to the sense of hearing but are also signified through the prime numbers. The

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[52] Ibid.

exception is the number 1, which, like the monad and the fundamental, is qualitatively different from any other number. After that, all octave, or diapason, repetitions are found in the powers of two. The first number in the sequence that has a distinctly different quality from either 1 or 2, the fundamental or its first octave repetition, is 3, the next prime. The significance of this number is seen in the 2:3 ratio--the perfect fifth--and beyond that in the general principle of the progressive emergence of changing values out of the fundamental source, the number 1. The same quality is found in all the reiterations of the power of three, 4:6, 8:12 and so on.

Taken together, therefore, the numbers 1, 2, 3 embody the basic ontological principles of creation and evolution, from unity to diversity, that Plato's discourse is devoted to describing. And the number 4 provides completion to this first fully manifest reiteration of the cycle. This is true in the area of number, but when manifest in the field of harmonics, a theoretical value is made available directly to the senses. Furthermore, the harmonic series is structured in such a way that all subsequent cycles are summed up in the qualities heard in 1,2,3, and completed in 4.

Fig. 22: The *Typus geometriae*. Gregor Reisch, *Margarita philosophica*, 1503

Geometry

Inquiring into the nature of one, two and three inevitably leads to the consideration of geometry. For just as three, either as a number or a musical interval, symbolizes relativity emerging out of the unmanifest values of unity via duality, so geometry, as the third branch of the *quadrivium*, brings us to the consideration of the physical world. Pythagoras' biographers agree that he gained his knowledge of geometry during his sojourn in Egypt. There, however, it seems to have had many practical applications:

> It is said that while he was in Egypt he very much applied himself to geometry. For Egyptian life bristles with geometrical problems since, from remote periods, when the Gods were fabulously said to have reigned in Egypt, on account of the rising and falling of the Nile, the skillful have been compelled to measure all the Egyptian land which they cultivated, wherefrom indeed the science's name, geometry (i.e., "earth measure"), was derived. Besides, the Egyptians studied the theories of the celestial orbs, in which Pythagoras also was skilled. All theorems about lines also seem to have been derived from that country.[53]

At the same time, Pythagoras was clearly instructed in more esoteric applications. "He thus passed twenty-two years in the sanctuaries of temples," writes Iamblichus, "studying astronomy and geometry, and being initiated in no casual or

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[53] Iamblichus, in Guthrie, p. 96.

superficial manner in all the mysteries of the Gods."[54] Indeed, evidence is emerging that geometry had cosmological, as well as practical application in ancient Egypt.[55] Pythagoras is said to have used this knowledge to create the foundations of what has come to be called sacred geometry. Having mastered the practical applications of geometry, Pythagoras transformed it into a form of philosophical inquiry, examining its principles from the beginning and applying its theorems to immaterial and conceptual realms. "Whatever Pythagoras received, however, he developed further, he arranged them for learners, and personally demonstrated them with perspicuity and elegance."[56]

Whatever its original sources, a tradition of sacred geometry has existed for centuries, one in which cosmology blends with more practical concerns. "The principles that underlie disciplines such as geomancy,[57] sacred geometry, magic or electronics," according to Nigel Pennick, "are

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[54] Iamblichus, in Guthrie, p. 61.

[55] See, among other sources, R. A. Schwaller de Lubicz, *The Temple in Man: Sacred Architecture and the Perfect Man*, Robert and Deborah Lawlor, trans. (Rochester, Vermont: Inner Traditions International, 1977).

[56] Iamblichus, in Guthrie, p. 97.

[57] The art of appropriate placement of both secular and spiritual structures, known in China as *Feng Shu'e* or in India as *Stapathya Veda*.

fundamentally linked with the nature of the universe."[58] Thus, as Robert Lawlor explains, the foundations of the discipline are bound up with the task of the physical representation of cosmological principles:

> Those who use geometric figures to describe the beginning of Creation must attempt to show how an absolute Unity can become multiplicity and diversity. Geometry attempts to recapture the orderly movement from an infinite formlessness to an endless interconnected array of forms, and in recreating this mysterious passage from One to Two, it renders it symbolically visible.[59]

Lawlor's statement places geometry in line with arithmetic and music, presenting the same cosmology in a different, though related, symbolic form. The world is seen as emanating from an underlying unity and progressing into multiple forms of creation. The mechanics of this process reflect the same understanding about the nature of the monad derived from arithmetic.

> From both the metaphysical and natural points of view it is false to say that in order to arrive at two, you take two ones and put them together. One only need look at the way in which a living cell becomes two. For One by definition is singular, it is Unity, therefore all inclusive. There cannot be two Ones. Unity, as the perfect symbol for God, divides itself from within

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[58] Nigel Pennick. *Sacred Geometry: Symbolism and Purpose in Religious Structures* (Wellingborough, Northamptonshire, U.K.: Turnstone Press, 1980), p. 9.

[59] Robert Lawlor, *Sacred Geometry: Philosophy and Practice* (London: Thames and Hudson, 1982 & 1997), p. 23.

> itself, thus creating Two: the "self" and the "me" of God, so to speak; the creator unity and the created multiplicity.[60]

In the field of geometry, however, there is more than one way of representing this process. "Unity creates by dividing itself, and this can be symbolized geometrically in several different ways, depending upon how the original Unity is graphically represented."[61] Lawlor includes an example of Japanese Zen calligraphy that shows the process of creation as a progression from the Unity of the circle, through the triangle, to the manifest form of the square. (See fig. 23.) There are other versions of this process, but the figures of circle and square appear repeatedly. "Unity can be appropriately represented as a circle," Lawlor writes, "but the very incommensurability of the circle indicates that this figure belongs to a level of symbols beyond reasoning and measure."[62] This is evocative of the nature of the monad, an original form that stands before other forms, in this case manifesting as the irrational number π that emerges from any attempt to measure the circle. He continues: "Unity can be restated as the square, which with its perfect symmetry, also represents wholeness,

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[60] Ibid.

[61] Ibid.

[62] Ibid.

Fig. 23: Sengai, *Square, Triangle, and Circle*. Japan, *c*. 1830. Tokyo, Mitsu Gallery

and yields to comprehensible measure"[63] (although the square mirrors the incommensurable in the value of its diagonal, the irrational √2). Once again, it is significant that, however it is represented, the intermediary stage between original Unity and the fullness of the manifest world is an important step and cannot be omitted. In arithmetic it is the dyad, in music the second partial. "In geometrical philosophy the circle is the symbol of unmanifest Unity, while the square represents Unity poised, as it were, for manifestation."[64] John Michell has a similar analysis of these two figures:

> The first figure of sacred geometry is the circle, whose circumference has neither beginning nor end and is therefore the geometer's image of entirety and eternity. As the simplest and most self-sufficient of space-enclosing shapes, and the matrix of all others, it is the natural symbol of that unique living creature, the cosmos.[65]

His view of the square is slightly different, seeing it as an opposite rather than an alternative form:

> The symbolic opposite of the circle is the square. Whereas the circle represents the unknowable, spirit and the heavens, the square is material and of the

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[63] Ibid.

[64] Ibid.

[65] John Michell, *The Dimensions of Paradise: The Proportions and Symbolic Numbers of Ancient Cosmology* (San Francisco: Harper & Row, 1988), p. 66.

> earth. The ratio between its width and its perimeter, instead of being the irrational π as in the case of the circle, is simply and rationally 4. The circle and the square, made commensurable with equal perimeters, form a diagram of the fusion of matter and spirit and together illustrate human nature and the nature of the universe.[66]

The same reconciliation of opposites, or completion of the world, seen in the tetrad and the octave reiterations of the tone sequence can also be depicted through geometric forms. "The object of sacred geometry being to depict that fusion of opposites, the squared circle is therefore its first symbol. Temples and cosmological cities throughout antiquity were founded on its proportions."[67] Heninger expands upon this idea:

> In essence, the problem of squaring the circle is a geometrical formulation of the incongruity between the world of concept and the world of matter. As a geometrical figure, a circle has certain properties which set it apart from all other forms: it has no beginning or end, every point on its circumference is equidistant from the center, and its circumference considered as linear distance encloses a maximum area. It, like the point and the monad, represents unified perfection, and therefore infinity and eternity and deity. The circle emblematizes the conceptual world. God himself had long been described as a circle (with center everywhere and circumference nowhere). In contrast to the circle, the square has a finite number of sides. Moreover, in Pythagorean terms the square is the number 4, which in turn represents the physical universe because a minimum of four points is required

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[66] Ibid.

[67] Michell, pp. 66-67.

> for three-dimensional extension. The square emblematizes the material world.[68]

Heninger makes a telling comparison between the symbolism of geometry and that of arithmetic. The circle has the same qualities of unity as the monad; the triangle's symbolism mirrors that of the triad. Similar parallels exist with the fundamental and the third partial in music. Before we can equate the square with the tetrad, however, we have to go one step further by reconciling two opposing values, because the square represents the physical world.

> Any attempt to change a circle to a square therefore involves reducing the infinite to the finite, involves transmuting the divine to the physical. . . Conversely, any attempt to circularize a square--for example, by increasing its sides an infinite number of times--becomes an effort to make continuous what is discontinuous, an effort to raise the physical to the level of perfection. The problem of squaring the circle, then, crosses the boundary between the abstract conceptual world and the measurable space-time continuum.[69]

It may be inferred from this that the solution of how to square the circle, however avidly it was pursued from antiquity until as late as the sixteenth century, had little practical application for construction or engineering. Rather, it was a kind of holy grail of geometry, whose

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[68] Heninger, p. 111.

[69] Ibid.

Fig. 24: Squaring the Circle

purpose was purely for the edification of the individual. And not merely intellectual edification--its solution was always linked with some esoteric or alchemical practice the purpose of which was the spiritual advancement of the individual. This is very much in line with the Platonic and Pythagorean view of geometry. Speaking of geometry in the *Republic*, Plato comments:

> What we want to find out is whether the subject is on the whole one which, when taken further, has the effect of making it easier to see the form of the good. And that, we say, is the tendency of everything which compels the mind to turn to the region of ultimate blessedness which it must spurn no effort to see.[70]

This view is reiterated by Proclus:

> The geometry deserving study is that which, at each theorem, sets up a platform for further ascent and lifts the soul on high, instead of allowing it to descend among sensible objects and so fulfill the common needs of mortal men.[71]

In light of this, what of the demand for completion as far as geometry is concerned? The symbolism of the circle and the square reiterate the same process we have seen in arithmetic and music; unity manifests and gives rise to the

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[70] *Republic*, 526d-e, Desmond Lee, trans. (London: Penguin Books, 1974), p. 334.

[71] *Commentary on Euclid, Book I*, in Thomas, *Greek Mathematics*, pp. 175-177. Cf. Plato, *Republic*, 526D-527C (above).

diversity of creation. With the introduction of the idea of squaring the circle a new dimension is added--the reconciliation of the opposite values that inevitably follow. And both Plato and Proclus indicate that the result will be the upliftment of the soul--an experience beyond what should normally be expected from studying mathematics. This idea is also of significance in considering the field of astronomy.

Astronomy

As part of the quadrivium, astronomy has been defined as the study of spatial relationships in motion, a concept quite different from the modern understanding of this field. We will see the influence of this idea when we examine Plato's cosmology in the *Timaeus*. But the very concept of cosmos and its relationship with astronomy is also an important consideration. As we saw in Chapter III,[72] the meaning of *kosmos* for the Greeks was as different from modern usage as was that of astronomy, and this usage is apparent in the Pythagorean view of the heavens, as reported by his biographers:

[72] See Chap. III, pp. 124-125.

Fig. 25: *The Typus astronimae.* Gregor Reisch, *Margarita philosophica,* 1503

> It was Pythagoras who first called heaven *kosmos*, because it is perfect, and "adorned" with infinite beauty and living beings. Pythagoras adds that the survey of the whole heaven, and of the stars that revolve therein, is indeed beautiful, when we consider their order, which is derived from participation in the first and intelligible essence. But that first essence is the nature of Number and "reasons"[73] which pervades everything, and according to which all those [celestial] bodies are arranged elegantly, and adorned fittingly.[74]

The primary concern of astronomy thus becomes the perception of an underlying order in the universe. For Pythagoras such a perception is the essence of wisdom:

> Now veritable wisdom is a science conversant with the first beautiful objects which subsist in invariable sameness, being undecaying and divine, by the participation in which other things also may well be called beautiful. The desire for something like this is philosophy. Similarly beautiful is devotion to erudition, and this notion Pythagoras extended, in order to effect the improvement of the human race.[75]

The emphasis on objects that "subsist in invariable sameness" is in line with Pythagoras' emphasis on the primacy of universals, and leads to a demand for an astronomy perceptible to reason rather than to the eye. Such an approach provides the impetus behind the Pythagorean organization of the physical universe. Pythagoras'

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[73] "Reasons" = *logoi*, productive principles, ratios, patterns, etc. (Guthrie's footnote)

[74] Iamblichus, in Guthrie, p. 70.

[75] Iamblichus, in Guthrie, p. 70.

biographers do not have much to say on this subject. The best source we do have is Aristotle. Even though he is highly skeptical about the Pythagorean viewpoint, we can learn a good deal about it from him. It is interesting, for example, that he describes the fundamental principle underlying Pythagorean cosmology not in the *De Caelo*, but in the *Metaphysics*. It occurs directly after the section quoted above[76] in which he informs us that the Pythagoreans ". . . supposed the elements of numbers to be the elements of all things, and the whole heaven to be a musical scale and a number." He continues:

> And all the properties of numbers and scales which they could show to agree with the attributes and parts and the whole arrangement of the heavens, they collected and fitted into their scheme; and if there was a gap anywhere, they readily made additions so as to make their whole theory coherent. E.g. as the number 10 is thought to be perfect and to comprise the whole nature of numbers, they say that the bodies which move through the heavens are ten, but as the visible bodies are only nine, to meet this they invent a tenth--the 'counter-earth'. . .
> Evidently, then, these thinkers also consider that number is the principle both as matter for things and as forming their modifications and states. . . and the whole heaven, as has been said, is numbers.[77]

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[76] Chapter III, note 14.

[77] Aristotle, "Metaphysics," 1-5, 985b-986a, in *Collected Works of Aristotle*, Jonathan Barnes, ed., Bollingen Series LXXI-2 (Princeton: Princeton University Press, 1984), p. 1559.

According to Aristotle, the aesthetic component of *kosmos* appears to have been the dominant factor for Pythagoras in working out cosmological details, and this component is derived from the properties of numbers. It appears that these properties can be elaborated following the sequence inherent in the quadrivium, with the principles of arithmetic providing the foundation for the subsequent mathematical disciplines. This relationship is clarified by the second-century writer Nicomachus of Geresa, a key figure in the history of mathematics and the Pythagorean tradition.

> In his own day and for generations thereafter, Nicomachus seems to have been to arithmetic what Euclid was to geometry. Indeed, it was even said of Nicomachus: *Aritmeticam Samius Pythagoras invenit, Nicomachus scripsit* (Pythagoras of Samos invented arithmetic, Nicomachus composed it).[78]

In his *Arithmetike eisagoge* (Introduction to Arithmetic), said to be the first work to treat arithmetic as a separate topic from geometry, Nicomachus describes the various components of the quadrivium; he asks:

> Which then of these four methods must we first learn? Evidently, the one which naturally exists before them all, is superior and takes the place of origin and root and, as it were, of mother to the others. And this is arithmetic. . . because we said that it existed before all the others in the mind of the creating God like some universal and exemplary plan, relying upon which

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[78] Nicomachus (1994), translator's introduction, p. 14.

> as a design and archetypal example the creator of the universe sets in order his material creations and makes them attain to their proper ends. . .[79]

Given such a hierarchy within the quadrivium, it is the *Theology of Arithmetic* that determines the principles within music, geometry and astronomy. Thus, the nature of the musical scale is determined by the properties of the tetrad. The intervals from which the eight-stringed lyre of Pythagoras is constructed are derived only from the first four numbers, one, two, three and four. Thus the hammers Pythagoras hears in the blacksmith's shop turn out to have the ratios of 6:8:9:12 with all the numerological and cosmological significance of these numbers. Similarly, in the description of Pythagorean cosmology, we learn first that the concept of *kosmos* implies an aesthetic order inherent in the world, then that the exact nature of the heavens is derived from the nature of the decad. The counter earth is brought into the scheme in order to bring the number of heavenly bodies to ten, the perfect number.

Concerning the relationship between the tetrad and the decad, this cosmological scheme demonstrates the tendency

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[79] Nicomachus of Gerasa (c. 60-c. 120 C.E.), *Arithmetike eisagoge* trans. Martin Luther D'Ooge as *Introduction to Arithmetic* (London and New York: The Macmillan Company, 1926), p. 187.

toward closure indicated by the cosmology of one, two, three, four; the inherent perfection of both the tetrad and the decad allow for the former to be the source of perfection in the musical scale, while the decad has to be invoked to account for the perfection of the more complex structure of the physical universe. The relationship between the two numbers allows for a relationship to be developed between these two structures, the scale and the planets.

Herein lies the origin of the music of the spheres tradition. By the time of Nicomachus, at least, this cosmology is expanded through the establishment of relationships between planets and musical notes. In his *Manual of Harmonics*, he writes that "the names of the notes were derived from the seven stars which traverse the heavens and travel around the earth."[80] The explanation he gives stems from a mixture of second-century astronomy and physics:

> For they say that all swiftly whirling bodies necessarily produce sounds when something gives way to them and is very easily vibrated; and that these sounds differ from one another in magnitude and in region of the voice either because of the position in which the motion of each is accomplished, these positions being more subject to fluctuation or, conversely, more resistant. These three differences are clearly observed in the case of the planets, which differ from one another in size and speed and position as they whir

[80] Nicomachus (1994), p. 45.

> continuously and without pause through the ethereal expanse.[81]

This explanation is supplemented by etymological considerations relating planet names to those of the notes, but the end result, in the words of Flora Levin's commentary, ". . . is to demonstrate that the musical notes were named after, and, hence reflect, the positions or *epochai* of the seven planets relative to earth."[82]

However it is calculated, the end result is a fixed association between notes and planets that is an essential component of the music of the spheres tradition. Indeed, "Nicomachus provides what may be the most ancient version of this distinctly Pythagorean-Platonic concept."[83] It demonstrates that the overall concept of *kosmos,* with its related notion of *harmonia*, imposes an aesthetic order, not only in the field of mathematics itself, but also to each of the disciplines within it. In astronomy, the universe is given order by association with the decad of arithmetic and the consonances of music, themselves related to the tetrad. And all of this symbolism derives from the first four numbers, 1, 2, 3, 4.

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[81] Ibid.

[82] Flora Levin, commentary to Nicomachus (1994), p. 47.

[83] Flora Levin, commentary to Nicomachus (1994), p. 52.

The Historical Context

Having seen the essence of Pythagorean doctrine in general, and Pythagorean cosmogony in particular, demonstrated through the symbolism of number, we can apply this to our understanding of Plato, in whose dialogues two major sources of the music of the spheres tradition are to be found. Before going on to this, however, there is an important point to be made.

The cosmology we have outlined is not restricted to the doctrines of Pythagoreanism; we can find the same essential cosmogony in many different cultural settings, expressed in varying types of symbolism, sometimes numerical, sometimes linguistic, sometimes mythical. Whatever the form, this understanding of the world is intimately linked to music. As Daniélou explains:

> All music is based on the relations of sounds, and a careful study of the numbers by which these relations are ruled, brings us immediately into the almost forgotten science of numerical symbolism. Through musical experience it is easy to see that numbers correspond to abstract principles and that their application to physical reality follows absolute and inescapable laws. It is in music only that this connection between physical reality and metaphysical principles is evident. Music was, therefore, justly considered by the ancients as the key to all sciences and arts, the link between metaphysics and physics,

through which the universal laws and their multiple applications could be understood.[84]

To examine this symbolism in broader detail will require a digression.

Greek Thought and its Sources

Almost without exception, texts on the history of Western culture, dealing with music, philosophy or whatever, begin with the Greeks. The first chapter in Bertrand Russell's *A History of Western Philosophy* is entitled "The Rise of Greek Civilization,"[85] Grout and Palisca begin *A History of Western Music* with "The Greek Heritage,"[86] while Paul Henry Lang starts his exposition of Western music history with "Ancient Greece."[87] In one sense this is perfectly reasonable, as it is widely agreed that the odyssey of Western thought does indeed begin in Greece around two and a half millennia ago. Indeed, we have already argued in Chapter II that Pythagoras made a major contribution to this process. And yet there is a problem

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[84] Alain Daniélou, *Music and the Power of Sound: The Influence of Tuning and Interval on Consciousness* (Rochester, Vermont: Inner Traditions, 1995), p. 1.

[85] New York: Simon and Schuster, 1964, pp. 3-24.

[86] New York: W.W. Norton & Company, 1988, pp. 2-9.

[87] New York: W.W. Norton & Company, 1941, pp. 1-20.

with this viewpoint if we are trying to build a more complete perspective on history. A number of scholars support this view. Charles Bakewell writes:

> It is customary to speak of Greek philosophy as ancient philosophy. This is quite misleading. It is evident of our inveterate temporal provincialism. For there is a provincialism that comes from isolation in time which can prove a more formidable obstacle to understanding than that which comes from isolation in space. . .
> The fact is that viewed in the true perspective of time Socrates lived but yesterday. . . It would be far more accurate to regard the Greeks as having written the first chapters in modern philosophy. Greek philosophy is our own philosophy, and science, in its beginning.[88]

Greek philosophy did not appear out of nowhere; it must have its own sources. Greek thought is better understood when these sources, as well as parallel developments elsewhere, are given due consideration. Philosopher Antonio T. de Nicolás agrees that omitting such considerations provides a "formidable obstacle to understanding":

> . . by returning to Greece as the origin of Western man, what Western man does is to draw an imaginary line between himself and the rest of humanity. By acting thus, all he does is reinforce the controls of his present cultural isolation and sickness. "The whole of Western philosophy," Whitehead said, "is just a footnote to Plato." But what hardly anyone has bothered to find out is how Plato himself is a footnote to previous cultures; for neither Plato nor Greece are

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[88] Charles M. Bakewell, "The Philosophical Roots of Western Culture," in F. S. C. Northrop, ed., *Ideological Differences and World Order* (New Haven & London: Yale University Press, 1963), p. 69.

> absolute beginnings for Western man and Western culture. Underlying them there is still man, the maker of cultures and ideas of man.[89]

There can be no doubt that the Greek contribution was a unique one, but one that planted a seed in an already fertile field. "Much of what makes civilization had already existed for thousands of years in Egypt and Mesopotamia," writes Bertrand Russell, "and had spread thence to neighbouring countries. But certain elements had been lacking until the Greeks supplied them."[90] It is when we ask what it is that the Greeks supplied that a certain prejudice becomes evident. It emerges more clearly when Russell speaks of Pythagoras; while he agrees that Pythagoras ". . . was intellectually one of the most important men who ever lived,"[91] he cannot resist adding, "both when he was wise and when he was unwise."[92] Russell presumably justifies this statement with his next, "Mathematics, in the sense of demonstrative deductive argument, begins with him, and in

[89] Antonio T. de Nicolás, *Four Dimensional Man: Meditations Through the Rig Veda* (Stony Brook, New York: Nicolas Hays Ltd., 1976), p. 50.

[90] Russell, p. 3.

[91] Russell, p. 29.

[92] Ibid.

him is intimately connected with a *peculiar form of mysticism.*" (Russell's italics.)[93]

There are, it would seem, two approaches currently prevalent in the study of ancient cosmology. One is the product of an arrogant and ardent reductionism, arising out of Western scientific thinking, that seeks to redefine everything in its own terms or, if this does not prove possible, to relegate it, as Russell does here, to the sphere of the "mystical" or the quaint. This approach, particularly characteristic of the nineteenth century, though still with us to this day, is based on the premise that it is only the scientific revolution of the last three hundred years that have brought us anything approaching rational or reliable knowledge about the world, and that anything else is, at best, a crude attempt at such thinking or, at worst, mere superstitious nonsense. To approach any ancient wisdom tradition from this angle is to do it a grave injustice.

The second approach, prevalent in certain spheres of literature, is to assume that it is only the ancients who knew anything, and modern science is a crude and narrow distortion of what knowledge should be. This too smacks of extremism. Fortunately, resolving the dichotomy is not

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[93] Ibid.

essential to this study. Nevertheless, our concern is to strive for some balance between these views, and thus to avoid falling into the errors to which both extremes are prone. Cornford expresses a similar view in his essay on the music of the spheres. Speaking of Pythagoras and his view of number, he warns against a partial vision of ancient thought:

> . . . 'All things are number.' That is the barest extract; the words, just in themselves mean little, and that little might be understood, while the feeling is neglected. The man of science, tracing from its source in that formula the main stream of mathematical physics, will be inclined to take the formula as preserving the only element of truth and value in Pythagoras' system, and to discard the harmony of the soul and of the spheres as so much dross. For the man of religion, on the other hand, the scientific statement will have no interest; he will find his profit in the recognition that the soul is immortal and may achieve perfection by becoming attuned to some divine principle in the universe. Pythagoras would say to both: What is your warrant for valuing one part of my experience and rejecting the rest? One of you will listen only to the head, and the other only to the heart. If I had done so, you would never have heard my name. It may be that nothing I taught is true in the letter: but if any part is true in the spirit, then the whole is true. Seek truth and beauty together; you will never find them apart. With the Angel of Truth your mind may wrestle, like Jacob:'I will not let thee go except thou bless me'; but Beauty is the Angel of Annunciation, before whom the soul must be still as a handmaid:'Be it unto me according to thy word.'[94]

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[94] F. M. Cornford, "The Harmony of the Spheres," in *The Unwritten Philosophy and Other Essays* (Cambridge: Cambridge University Press, 1950) pp. 26-27.

In spite of the admonitions of such a respected scholar as Cornford, it is ironic that a philosophical mind such as Russell sees fit to judge the work of Pythagoras and Plato on the basis of an assumption that Plato himself takes great pains to deny: that discursive thought, along with empirical testing, are the only proper criteria of knowledge--merely because they are the basis of the scientific method. Thus Greek philosophers are to be judged favorably to the extent that they are scientific in their thinking.

By contrast, Russell's colleague Alfred North Whitehead, even as he delves deeply into the history of science, is capable of a more balanced view. Speaking of the Ionian school of philosophy, whose ideas have been conveyed to us through Plato and Aristotle, he writes that " . . . with the exception of Aristotle . . . this school of thought had not attained to the complete scientific mentality. *In some ways, it was better.*" (Author's italics.)[95]

If it was indeed better, it was, again, owing to a balanced outlook in which the categories employed earlier of magical, organic, and mechanistic, were all given equal weight, and the bias betrayed by Russell when he speaks of a "peculiar mysticism," and the "inveterate temporal provincialism" of which Bakewell speaks, can be overcome. It

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[95] Alfred North Whitehead, *Science and the Modern World* (New York: Macmillan/The Free Press, 1967), p. 7.

is clear, however, with regard to the music of the spheres tradition, that an element of mysticism is at the root of this phenomenon, and that to understand it fully we cannot flinch from dealing with mystical or otherwise esoteric material. We have already quoted Joscelyn Godwin's statement that "the subject of esotericism is so new to humanistic scholarship that no conventions yet exist for its treatment."[96] From what we have already learned, however, it seems that it will be necessary to move beyond this limitation in order to understand our topic more completely.

Historical Links

It is in this context that we must examine the sources from which both Pythagoras and Plato derived, or inherited, their ideas. We have mentioned the legends surrounding Pythagoras' travels and studies in Egypt and elsewhere, citing Manly Hall that "he visited many countries and studied at the feet of many masters."[97] And Plato mentions Solon's travels in Egypt, where the Greeks were regarded as a very immature race.

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[96] See Chap. I, note 52, p. 44.

[97] Manly P. Hall, *An Encyclopedic Outline of Masonic, Hermetic, Qabbalistic and Rosicrucian Symbolic Philosophy* (San Francisco: H. S. Crocker & Co., 1928), p. 65. See Chapter III, note 4, p. 115.

It would take an extensive study to explore all the points of contact between the Greeks and more ancient civilizations. Two things come to our aid, however. First, it is the view of James that "there is good reason to suppose that in earliest antiquity there existed an intellectual continuum stretching throughout Asia, even into China, and that the wall between East and West was erected at a later date."[98] Such a notion receives some support from musicological studies. Albert von Thimus' *Die harmonikale Symbolik des Alterthums*[99] purports to show a common basis in many ancient cosmologies based on essentially musical symbolism. In the broader area of sacred mathematics, it is well known that similar patterns have been observed in Greek temples, Vitruvian theaters, Gothic cathedrals and Alberti's churches; but archeologist Alexander Thom has found these same patterns in megalithic monuments in Britain that date back to 3000 B.C.E, leading Gordon Strachan to write that "Alexander Thom's originality was to make the daring and original assumption that our prehistoric ancestors were as intelligent as we are."[100]

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[98] James, p. 26.

[99] Hildesheim/Zurich/New York: George Olms Verlag, 1988.

[100] Gordon Strachan, *Jesus the Master Builder: Druid Mysteries and the Dawn of Christianity* (Edinburgh: Floris Books, 1998), p. 219.

This still does not explain the reason for these parallels and whether there was contact among these various traditions. The second idea that helps us here is that of universal archetypes, existing within consciousness, an idea that has been raised by C. G. Jung, Joseph Campbell, Mircea Eliade, and others. We will explore this theory more fully in Chapter VI. Here, suffice it to say that it is not necessary to establish actual historical links between Pythagoras, Plato, and other ancient teachings, in order to understand the principles of innate structures of consciousness. The existence of such archetypes suggest that it is reasonable to assume that thinkers in every culture and at every time will make contact with them and give expression to their findings in a way that is compatible with their own cultural environment. To support this view, we will take a brief look at essential cosmological ideas from several ancient cultures and examine their relationship with one another and with doctrines brought out by Pythagoras and Plato.

China

It is difficult to find direct connections between the Chinese tradition and that of ancient Greece. There is some research suggesting that Pythagorean mathematical knowledge was known in China prior to its discovery in Greece,[101] but it is hard to establish clear historical links between the two civilizations. Yet there are distinct and sometimes striking similarities in their cosmologies. For example, having seen the multiple levels of meaning associated with the first four numbers in Pythagorean lore, consider the following from the Tao Teh Ching:

> Tao gave birth to One
> One gave birth to Two
> Two gave birth to Three
> Three gave birth to all myriad things.[102]

Levy and Levarie expand on this:

> Lao-Tse, around 600 B.C., wrote in China: "One has produced Two, Two has produced Three." One of the commentators adds: "These words mean that One has been divided into Yin, the female principle, and Yang, the male principle. These two have joined and out of their conjunction came (as a Third) Harmony. The spirit of Harmony, condensing, has produced all beings."[103]

The parallels with the Pythagorean cosmology outlined above are striking but they do not end there. In both cases the cosmos is seen as a holistic and orderly continuum in

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[101] See Frank J. Swetz and T. I. Kao, *Was Pythagoras Chinese?: An Examination of Right Triangle Theory in Ancient China* (University Park, Pennsylvania: Pennsylvania State University Press, 1977).

[102] Lao Tse, *Tao Teh Ching*, Asian Institute Translation (New York: St. John's University Press, 1961), p. 61.

[103] Levarie and Levy (1968), p. 23.

which music is an important component. In the case of the Chinese, this view developed during the Han Dynasty of 206 B.C.E-220 C.E. Its approach mirrors the universal patterns common to traditional cosmologies, although with a distinctively Chinese character. To quote Derk Bodde:

> The Universe, according to this view, is a harmoniously functioning organism consisting of multitudinous objects, qualities and forces which, despite their seeming heterogeneity, are integrated into coherent patterns by being subsumed under one or another of many numerical categories. (The best known such category, of course, is that in sets of fives, such as the five elements, five directions, five colors, etc.) Among items belonging to a common category, a particular affinity exists between those having the same relative position within their respective sequences . . .[104]

The range of these correspondences can be seen at fig. 26. Among these categories we will find the five planets, Jupiter, Mars, Saturn, Venus, Mercury, and the five notes known as Chueh, Chih, Kung, Shang, and Yu. These relationships represent a Chinese version of musical cosmology. It is unclear, however, whether this is intended to relate to the physical universe or is simply part of an abstract cosmology. According to Bodde, the idea was applied in ways that are both abstract and practical:

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[104] Derk Bodde, "The Chinese Cosmic Magic Known as Watching for the Ethers," in Søren Gerod & Else Glahn, eds., *Studia Serica Bernhard Karlgren Dedicata* (Copenhagen: Ejnar Munksgaard, 1959), pp. 14-15.

Category	Wood	Fire	Earth	Metal	Water
Calendar Signs	Chia 1 I 2	Ping 3 Ting 4	Wu 5 Chi 6	Keng 7 Hsin 8	Jen 9 Kuei 10
Seasons	Spring	Summer	Between	Autumn	Winter
Directions	East	South	Center	West	North
Emperors	Fu-hsi	Shen-nung	Huang Ti	Shao-hao	Chuan-hsu
Political Structure	People	Affairs of Country	King	Ministers	Natural World
Musical Tones	Chueh	Chih	Kung	Shang	Yu
Planets	Jupiter	Mars	Saturn	Venus	Mercury
Tastes	Sour	Bitter	Sweet	Salt	Acrid
Internal Organs	Liver	Heart	Spleen	Lung	Kidney
(Alternate Order)	Spleen	Lung	Heart	Liver	Kidney
Colors	Virid	Red	Yellow	White	Black
Human Faculties	Demeanor	Speech	Vision	Hearing	Thought
Virtues	Charity	Courtesy	Wisdom	Justice	Fidelity
Creatures	Feathered Creatures	Hairy Creatures	Fleshed Creatures (Humans)	Shelled Creatures	Scaly Creatures
Domestic Animals	Fowl	Pig	Cow	Sheep	Horse

Fig. 26 - Chinese Cosmological Correspondences

> It is evident that such correlations not only cut across the usual categories of time and space, the abstract and the concrete, but also bridge the apparent gap between the human and the natural worlds. These two worlds, in fact, actually merge to form a single continuum, the halves of which are so closely interwoven that the slightest pull or strain on the one spontaneously induces corresponding pull or strain on the other. A primary function of the ruler is to prevent or relieve such pulls and strains by the correct performance of periodic rituals designed to reinforce the normal affinities between the two halves.[105]

If we examine this statement carefully, we will see two main themes appearing. The first of these is the importance of numerical symbolism. The second is the relationship between the human and the natural worlds. Both ideas arise out of the perception of the universe as a single, harmoniously functioning organism, and both are essential features of Chinese thought since the earliest times. To a large degree, the history of Chinese thought has been a perpetual dialectical process within which these two main themes both rival and complement each other. As Fritjof Capra puts it:

> The Chinese sage . . . does not dwell exclusively on this high spiritual plane, but is equally concerned with worldly affairs. He unifies in himself the two complementary sides of human nature--intuitive wisdom and practical knowledge, contemplation and social action--which the Chinese have associated with the images of the sage and the king. Fully realized human

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[105] Ibid.

beings, in the words of Chuang-Tzu, "by their stillness become sages, by their movement kings."[106]

The Role of Music Theory

Music theory is central to both schools of Chinese thought. Metaphysical speculations are centered on the nature of the Tao and its various forms of manifestation as expressed above by Lao-Tse. Such fundamental, metaphysical relationships form the basis of the whole range of ancient Chinese sciences which sought to understand the world on the basis of various combinations of Yin and Yang. Music was certainly one of these sciences; a system relating musical sounds to the order of the universe was worked out as early as the third century B.C.E., as part of the general systematization of knowledge undertaken in China at that time. The origins of Chinese music theory are lost in prehistory and attributed to various supernatural emperors and other beings who copied the sounds of bird song. Some of these are identified by name, such as the Emperor Fu Hsi, said to have lived in the thirtieth century B.C.E. He is credited with the invention of writing as well as various musical instruments such as the *Ch'in*, a table harp or

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[106] Fritjof Capra, *The Tao of Physics: An Exploration of the Parallels Between Modern Physics and Eastern Mysticism* (Boulder, Colorado: Shambhala, 1983), p. 91.

zither later popularized by Confucius, and the *Se,* a lyre or harp. And perhaps the most interesting figure is described by Clack:

> According to the Book of Rites the formalizing of the intervals and their organization into a scale came under Huang Ti, the great "Yellow Emperor", who traditionally came to the throne in 2700 B.C., and with whom we are supposed to leave the era of pure myth and enter upon legendary history.[107]

Ling Lun and the Bamboos. Although he lived more than two thousand years earlier, Huang Ti plays a role in China similar to that of Pythagoras in Greece. The story associated with Huang Ti is as charming, if as apocryphal, as that of Pythagoras and the blacksmith's shop. Its earliest sources are from the third century B.C.E., in the writings of Leu Buhwei (239 B.C.E.)[108] and the *Lü-shih ch'un-ch'iu,*[109] but it appears in numerous versions. The following is from Clack:

> The Emperor desired to base all the other sciences on music, but owing to its chaotic state that was

[107] Robert Wood Clack, *Celestial Symphonies: A Study of Chinese Music* (New York: Gordon Press, 1976), p. 5.

[108] See Laurence A. Picken, "The Music of Far Eastern Asia: China," in *New Oxford History of Music,* Egon Wellesz, ed. (New York: Oxford University Press, 1957), p. 93.

[109] See Bell N. Yung, "China," in *The New Grove Dictionary of Music and Musicians,* Stanley Sadie, ed. (London: Macmillan, 1980), p. 261.

> impossible until it had been thoroughly systematized. Accordingly he ordered Ling Lun, one of his ablest Ministers, who was also an enthusiastic musician, to retire to the mountains and remain there in seclusion until he had found a solution to the problem.[110]

The mythical nature of this narrative is revealed in the name Ling Lun itself, as *ling* means music or musician and *luen* indicates a rule or ruler. Ling Lun (or Ling Luen) is thus a "music ruler."[111] Ling Lun did not hear any hammers; instead he was influenced by elements characteristic of China's flora.

> Ling Lun went off to the west of the K'un Lun Mountains into a valley where the tallest and straightest bamboos grow. There he cut off the largest section of bamboo he could find, and . . . blew into his pipe, which he found gave off a low clear note, just exactly in tune with the lowest note he could produce with his own voice.[112]

Ling Lun was astonished to find that this same tone was generated by the murmur of the Yellow River and the rustling of the wind in the trees. "Truly," he said "I have found THE Fundamental Musical Tone of All Nature."[113] As if this were not enough, Ling Lun was visited by a pair of divine phoenix birds. The male bird's song began with the same tone and had

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[110] Clack, p. 6.

[111] Picken, p. 94.

[112] Ibid.

[113] Ibid.

five other notes. The female phoenix's song added six more notes at a higher pitch. The minister quickly cut more bamboo pipes corresponding to these twelve notes. "And when Ling Lun started to compare his pipes he found that if he arranged them according to pitch the length of each pipe was exactly two-thirds that of the one giving the next lower tone."[114] Ling Lun's pipes were all arranged at intervals of a perfect fifth. The 2:3 ratio had a cosmological significance as well as a musical one for the Chinese, however. It follows from Lao Tze's Pythagorean statement and is described in the Book of Rites: "Since three is the number of Heaven, and two that of the Earth, sounds in the ratio of two to three will harmonize as perfectly as do Heaven and Earth."[115]

The result was that the pitch pipes, when perfected, not only formed the basis of the correct musical scale but also of standards of measurement in other fields such as length, weight, and capacity. Through the relationship of music with the months of the year, the pitch pipes were linked with calendrical calculations and were even used as instruments to measure and observe the cosmic movements of *Yin* and *Yang* in their manifestation as *Ch'i*, or ether.

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[114] Clack, p. 7.

[115] Ibid.

The development of the scale in China that followed from this discovery has been well documented.[116] It is not necessary to reiterate its details here as our concern is with its cosmological underpinnings. Suffice it to say that cosmology continued to play a role in the process. The adherence to the numbers 1, 2, 3 & 4, because of their cosmological significance, caused the Chinese theorists to continue the process of generating ascending fifths and descending fourths past twelve iterations until a complete series of sixty-six had been reached. A distinct problem revealed itself at the twelfth step, however, as the Chinese discovered what was to become known as the Pythagorean comma, the discrepancy between twelve fifths and seven octaves for which they sought practical solutions for centuries.[117] But cosmological and other purely theoretical considerations ran parallel with the practical concerns of music making for a similarly extended period.

> The *liuhleu* (66) (the complete note series) was not a "chromatic scale," but an array of all the notes in the Chinese musical firmament of the third century B.C. The process of generation described in the writings of Leu Buhwei presumably provided an approximate theory,

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[116] See Picken, Yung, & Thrasher. For one of the fullest accounts of the cosmological basis for Chinese music theory see Alain Daniélou, *Introduction to the Study of Musical Scales* (London: The India Society, 1943). Revised as Daniélou (1995), pp. 29-57.

[117] See Yung, p. 261.

> satisfying the desire for order of those engaged at that time in systematizing the sum total of human knowledge.[118]

The cosmological associations upon which the ancient Chinese theorists drew in the development of their music theory extended into every area of concern, including the fundamental qualities of *yin* and *yang*, derived from Taoist doctrine, and their various combinations as expressed in the *I ching*.[119] Applied to the maintenance of harmony in the external world, the resulting schema became a part of Confucian thought.

<u>Music, Ritual and Cosmology</u>. From Bodde's remarks quoted above, we learn that periodic rituals were regarded as an essential means whereby the ruler of the Chinese state maintained harmony between Man and the environment. Music was again central to this purpose and, very largely, was developed specifically to fulfill it as a powerful moral force at the basis of a properly ordered state, rather than as entertainment or an expression of aesthetic values. The following is from Hsun-Tzu, a second- century B.C.E. Confucian philosopher:

> The early kings hated . . . disorder, and so they established the music of the Ya and Sung (two of the

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[118] Picken, p. 95.

[119] See Daniélou (1995), pp. 30-33.

> divisions of the book of odes) to guide it. They caused its music to be joyful, not degenerate, and its beauty to be distinct and not limited. They caused it in its indirect and direct appeals, its complexity and its simplicity, its frugality and richness, its rests and notes, to stir up the goodness in men's minds and to prevent evil feelings from gaining a foothold. This is the manner in which the early kings established music.[120]

Thus we can see that, in ancient China, music was afforded a place of great significance both in its theoretical aspect, as the basis for much proto-scientific thought, and, in performance, as the basis for the moral order of the state and even of the universe. All this stems from the underlying cosmology, one that parallels Pythagoras' in a number of ways, even though it is expressed in a very different form. We can now go on to see the same essential cosmology given yet another form of expression by the ancient Vedic tradition of India.

India

India more readily exhibits cultural links with Greece than does China. Indeed, in Chapter V we will discuss parallels between Platonic thought and the Vedic tradition of India. Several other writers have commented on this

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[120] B. Jenkins, *Notions of the Ancient Chinese Respecting Music* (Shanghai: Report of the North China Branch of the Royal Asiatic Society, 1868), p. 45.

relationship. For example, in *Plato and the Upanishads,* Vitsaxis G. Vassilis draws many correspondences between these two systems of thought. In his introduction to the Vassilis book, T. M. P. Hahadevan suggests some actual historical connections between the two cultures:

> It has been established that there was contact between India and Greece even long before Alexander's campaign. This contact was first through the Achaemenid Empire, then through that of the Seleucids, and finally under the Romans, through the traders of the Indian Ocean. It is obvious that exponents and exemplars of literature, science, philosophy and religion travelled not infrequently between the two countries. The cultural climate was quite favorable for the sharing of ideas between India and Hellas. We also have accounts of the visits of Indian sages to Athens and their meetings with Greek philosophers. Eusebius (A.D. 315) speaks of a tradition which he attributes to Aristoxenes, the well-known writer on harmonics and a pupil of Aristotle, that certain learned Indians actually visited Athens and conversed with Socrates. Reference to the visit of Indians to Athens is also found in the fragment of Aristotle preserved in Diogenes Laertius.[121]

Similarly, Daniélou cites Greek sources which indicate that much of Greek music itself may have filtered through from India:

> According to Strabo ("Geography" X, II. 17) the Greeks considered that music "from the triple point of view of melody, rhythm and instruments" came to them originally from Thrace and Asia, including India. Further, "the poets, who make the whole of Asia, including India, the land or sacred territory of

[121] T. M. P. Hahadevan, introduction to Vitsaxis G. Vassilis, *Plato and the Upanishads* (New Delhi: Arnold-Heinemann, 1977), p. 9.

Dionysos, claim that the origin of music is almost entirely Asiatic. Thus, one of them, speaking of the lyre, will say: the strings of the cithara of Asia resound."

Megasthenes (quoted by Arrian in his *Indika*, VII, 8, written in 150 B.C.) tell us that Dionysos "taught the Indians to worship the other Gods and himself by playing cymbals and drums; he also taught them the satyr dance which the Greeks call kordax."

This is because they are, of all peoples, the greatest lovers of music and have practiced dancing with great love since the days when Bacchus and his companions led their bacchanalia in the land of India." (Arrian: *Anabasis of Alexander* VI, 3, 10.)[122]

Sound and the Vedas

Regardless of whether this connection can be established, the Indian tradition provides a fertile field of research for two main reasons. First, the Sanskrit literature of India offers what William D. Whitney calls "[an] ample . . . literary representation of an equally distant epoch and a text [that] exists in a state of purity almost absolute, offering hardly a corruption."[123] The result is that India still retains elements of its most ancient cultural roots. These roots are enshrined in the ancient body of literature to which Whitney refers, the Vedas, comprising four sections known as *Rg, (or Rig), Sama, Yajur,*

[122] Alain Danliélou, *Northern Indian Music* (New York: Praeger, 1969), p. 2.

[123] William D. Whitney, "On the History of the Vedic Texts," *Journal of the American Oriental Society*, Vol. IV (1854), pp. 257-258.

and *Atharva*. The ten-thousand Sanskrit verses of the Rg Veda constitute the central Vedic text; the other Vedas contain much of the same material re-arranged for different purposes, and many other Sanskrit texts act as commentaries on the core content. "The oldest Indo-European literary and philosophical monument is the Rig Veda," writes Radhakrishnan. "A study of the hymns of the Rig Veda is indispensable for an adequate account of Indian thought."[124]

The view of Vedic thought that has emerged over the last two-hundred years is of a wide-ranging, fragmented, body of literature. Certain aspects were seen as different, sometimes contradictory, philosophical "systems." Other scholars, such as René Guénon, have disputed this view:

> The diverse metaphysical and cosmological conceptions of India are not, strictly speaking, different doctrines, but only developments of a single doctrine according to different points of view and in various, but by no means incompatible, directions. Besides, the sanskrit word *darshana*, which is attached to each of these conceptions, properly signifies "view" or "point of view," for the verbal root *drish*, whence it is derived, has as its primary meaning that of "seeing": it cannot in any way denote "system," and if orientalists translate it thus, that is merely the result of Western habits of thought which lead them into false assimilations at every step.[125]

[124] Sarvepalli Radhakrishnan and Charles A. Moore, eds. *A Sourcebook in Indian Philosophy* (Princeton: Princeton University Press, 1973), p. 3.

[125] René Guénon, *Homme et son devenir selon le Vedanta*, trans. by Richard C. Nicholson as *Man and His Becoming according to Vedanta* (New York: Noonday Press, 1958), p. 14.

On the surface, the Vedic literature seems to have little connection with Greek thought. Yet it contains an expression of the same cosmological view contained in the 1, 2, 3, 4 of Pythagorean symbolism; only the medium is different. Instead of number it is expressed in sound--the root sounds of the Sanskrit language.

> It is the greatest understatement to say that the Rg Vedic methodology draws its main clue to interiorizing all perception, the whole sensorium, from sound. Rg Vedic man was enveloped by sound; surrounded and excited by sound; made aware of presences by sound; looked for centers of experience in the experience of sound; found the model of complete, absolute instantaneity and communication in sound.[126]

The specific aspects of sound most relevant to the Vedas, and the subsequent Hindu tradition, are language and music; Hindu cosmology, for example, is truly a musical one. "According to Hindu mythology," writes Seyyed Hosein Nasr, "the first art to have been revealed to mankind by Śiva was music. The harmony of music is also the key to the understanding of the universe, which is structured upon musical harmony."[127] David Reck writes:

> In India, it is said, the universe hangs on sound. Not ordinary sound, but a cosmic vibration so massive and subtle and all-encompassing that everything seen and

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[126] de Nicolás, p. 50.

[127] Nasr (1993), p. 102.

> unseen (including man) is filled with it. The ancient *rishis*, the seers, practiced yoga and austerities to tune themselves to this cosmic sound, to make it vibrate in their spinal columns, hearts, and brains. From this sound the great god *Shiva* created music and dance and taught it to his wife, the goddess *Sri*. The art of music passed on to other heavenly beings, to the celestial entertainers, the *gandharas* and *kinnaras*, to the goddess of learning and language, *Saraswati*.[128]

Saraswati and the Mechanics of Creation

The reference to Saraswati is of central interest in this context. If we subscribe to the view that "Most world views, consciously held or otherwise, have certain root-metaphors which act as keys to the total perspective,"[129] then we can see this goddess as a compressed metaphor for the understanding of the Vedic world view through the medium of sound, and "comprehending such a root-metaphor can lead to an understanding of the world view as a whole."[130] In this case, in the words of Sri Aurobindo, "The symbolism of the Veda betrays itself with the greatest clearness in the figure of the goddess Saraswati."[131]

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[128] David Reck, *Music of the Whole Earth* (New York: Charles Scribner's Sons, 1977), p. 7.

[129] Anne Hunt Overzee, *The Body Divine: The Symbol of the Body in the Works of Teilhard de Chardin and Rāmānuja* (Cambridge: Cambridge University Press, 1992), p. 18.

[130] Ibid.

[131] Sri Aurobindo, *The Secret of the Veda* (Pondicherry: Sri Aurobindo Ashram, 1971), p. 260.

Fig. 27: Saraswati

In traditional representations of Saraswati (fig. 27) the goddess is usually depicted with four arms. One holds a book, another a rosary, while two are occupied in playing the *vina*, an ancient stringed instrument. It is these symbols that link her to learning, language, sound and music, and through these aspects of sound, to the underlying cosmology. This deeper meaning of Saraswati, as in all Vedic literature, can be derived from the actual sound of her name, from the meaning of the Sanskrit roots that make up the word Saraswati (or Sarasvati).

> The word *Sarasvati* is derived from the root Sr = to move. Like a flowing river, speech too is characterized by incessant motion from pure consciousness, intentional consciousness, thought and finally speech. *Sarasvati*, therefore, stands for the dynamic aspect of consciousness implicated in speech.[132]

We find a similar view from Daniélou:

> The name *Sarasvatī* is of rather obscure origin. It is sometimes thought to refer to the pool of knowledge. The name is that of a sacred river, called the Sarsuti; although now dried up, it is mentioned in the Rg Veda as "She who goes pure from the mountains as far as the sea." . . . *Saras*, which means fluid, refers to anything that flows and as such applies to speech and thought as well as water.[133]

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[132] R. T. Vyas, "Sarasvati: A Study in Symbolism, with Special Reference to the Motif of Vina," *Journal of the Indian Musicological Society*, Vol. 18, No. 2 (December 1987), p. 64.

[133] Alain Daniélou, *Hindu Polytheism* Bollingen Series LXXIII (New York: Pantheon Books, 1964), p. 89.

Both of these scholars agree that the symbolism contained in the word hinges on the interpretation of the ideas of movement, or flow, and the idea of a river, pool or other body of water. Vedic scholar Maharishi Mahesh Yogi has carried out a further parsing of this word in which he introduces an additional element. To the first root *sr* indicating motion or flow, Maharishi adds *sva which* refers to the Self.[134] From this perspective, therefore, Saraswatī represents the dynamic flow of the Self, and it is this Self-referral value that places Saraswati at the heart of Vedic knowledge. To appreciate why requires an examination of Vedic cosmogony, the process whereby, in Pythagorean terms, the One becomes the Many. In Vedanta philosophy, this process is described in terms of the Self, in its fullest sense as the Self of the universe, or Brahman.

> From a cosmic standpoint, Vedanta explains the relationship of the unmanifested absolute Reality (*Brahman*) with the manifested relative aspect of life by introducing the principle of *maya*. The word *maya* means literally that which is not, that which does not exist. This brings to light the character of *maya*: it is not anything substantial. Its presence is inferred

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[134] There are various ways to divide this word into its component roots. Dividing it as *saras + vati* gives us the root *sr*, meaning fluid, going, moving, etc., while *vati* means to be full, or possessed of. Thus *Saraswati* means "full of motion." Alternatively, dividing the word *sara + svati* still gives *sr* but also *sva* meaning own, one's own, or Self. Thus *Saraswati* would mean "flow of the Self."

> from the effects that it produces. The influence of *maya* may be understood by the example of the sap appearing as a tree. Every fibre of the tree is nothing but the sap. Sap, while remaining sap, appears as the tree. Likewise, through the influence of *maya, Brahman*, remaining *Brahman*, appears as the manifested world.
>
> On the individual level, Vedanta explains the relationship of the absolute Self (*atman*) and the relative aspect of individual life by the principle of *avidya*. *Avidya*, or ignorance, is nothing but *maya* in a coarser form. If *maya* can be likened to clear water, then muddy water is *avidya*.
>
> Under the influence of *maya*, Brahman appears as *Ishvara*, the personal God, who exists on the celestial level of life in the subtlest field of creation. In a similar way, under the influence of *avidya, Atman* appears as *jiva*, or individual soul.[135]

The relationship between *Ātman* and *jiva* is given by Sarngadeva in his thirteenth-century text on music theory, the *Sangīta Ratnākara*:

> These individual beings are not different from the Ātman, neither is the world different from it; for, creating by its own power, it is non different (from its creation), just as gold is non-different from (its products such as) ear-ring etc.; according to others, however, it creates through nescience as the rope gives rise to the snake.[136]

The mystery, then, is that the One does not become the Many; the Many are part of the One. The *jiva* is part of the

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[135] Maharishi Mahesh Yogi, *On the Bhagavad-Gita: A New Translation and Commentary, Chapters 1-6* (London and New York: Penguin Books, 1983), pp. 491-492.

[136] Śārngadeva, *Sangīta Ratnākara,* R. K. Shringy and Prem Lata Sharma, trans.(New Delhi: Munshiram Manoharlal, 1991), Vol. 1, ii-v, pp. 30-31.

Ātman; it is only an illusion that they are separate. The nature of Saraswati is revealed in the mechanics of the process whereby *Ātman* becomes *jiva,* or Brahman becomes the world, or the sap becomes the tree. This process is recounted repeatedly, in different symbolic forms and from different perspectives, throughout Vedic literature. Indeed, it could be said to be the central subject matter of this most ancient system of thought.

Agni, the Rg Veda, and Linguistic Symbolism

Referring to the book of Genesis, Carlo Suarès tells us "It is the purpose of all ciphers to invest a few signs with much meaning. In the severity of its beginning, in its first chapter, in its first sequence of letter-numbers, is the seed, and in the seed is the whole."[137]

The same appears to hold true for the *Rg Veda,* the text that lies at the center of Vedic literature. According to the analysis by Maharishi Mahesh Yogi, the first word of the first verse of this text is indeed the seed containing the whole, telling the whole story, not only of the *Rg Veda* itself but also of the entire body of Vedic literature. The word is Agni. It is usually translated as "god of fire," but

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[137] Carlo Suarès, *The Cipher of Genesis* (York Beach, Maine: Samuel Weiser, 1992), p. 72.

this is superficial and tells us little. When we look more deeply into it, and apply the same kind of analysis used to unlock the meaning of Saraswati, a very different picture emerges. What is described are the same mechanics of creation symbolized as 1, 2, 3, 4, or monad, dyad, triad, tetraktys.

When the first letter, A, is pronounced, it requires the mouth and throat to be fully open, AAA . . . This represents the fullness of the unmanifest, Brahman. The unmanifest begins to manifest through the introduction of the first boundary, represented by the letter G. When articulated, the closure of G imposes itself on the full openness of the sound A. A full stop is created as non-existence imposes itself on the full value of Being. From the imposition of this boundary, the full stream of manifestation, or becoming, emerges and continues as represented by the syllable Ni, another sound without closure. The details of the process and the content of manifestation and evolution are unfolded through the rest of the verses of Rg Veda and commented upon by the rest of Vedic literature.

There are musical parallels here, as well as numerical ones, and Pythagoras would recognize them both. When a string is set vibrating it produces the fundamental tone, but when it is stopped, when one becomes two, three, etc., the potential note values inherent in the fundamental are made manifest. A, G, Ni; monad, dyad, triad; C, C, G. And it is interesting that the syllable Ni, which, as part of Agni, represents the duality of A and G, "leading on" to the full value of the manifest world, is also used to describe the leading tone in Indian music, Sa, Re, Ga, Ma, Pa, Dha, Ni.

Mythological Symbolism. The Vedic tradition reiterates the same information on multiple levels. An anthropomorphic, or mythical, description of the same processes expressed in A-G-NI is presented in terms of the Brahma, the creator. In the beginning, Brahma is completely alone, without a second. But then, the first boundary occurs within the unbounded value of Brahma by virtue of the fact that he becomes aware of one thing--himself. This act of awareness, even though it was not of any object other than his own nature, turns the unity of the Self into the trinity that is required for the act of perception: the subject, the process of perception, and the object, known in sanskrit as *Rishi, Devata* and *Chhandas.*[138] The value of Brahma himself is known as the *Samhita,* the wholeness value that incorporates *Rishi, Devata* and *Chhandas*. It is the same idea that we find in

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[138] A slightly different terminology is used in other sources. To clarify, Maharishi here equates *rishi* with *adhyatmika, devata* with *adhidaivika* and *chhandas* with *adhibhautika.*

traditional arithmetic, where "elements of multiplicity . . . somehow never leave Unity."[139]

The same structure, with further similarities to Pythagorean symbolism, is described by the Sanskrit theory of sound--*Nāda*. It comes to us from the treatise on music to which we have already referred.

Sangīta Ratnākara and the Theory of Sound. The *Sangīta Ratnākara* of Śārngadeva, said to have been written between 1210 and 1247, plays a role among Sanskrit music treatises similar to that of Boethius' *De institutione musica* in the West, with many subsequent treatises being deeply influenced by both its form and its content. In its own terms, it describes cosmic and human music as well as the performance practices of *Sangīta,* which covers vocal and instrumental music and dance.

At chapter two, verse 2, Śārngadeva introduces the concept of *Nāda*, or sound, in its two levels of manifestation. His sutra is typically terse: "*Nāda* is said to be twofold, viz., produced and unproduced." The Sanskrit terms for produced and unproduced are *āhata* and *anāhata*. The editor's commentary reads:

> *Āhata* of the text literally means "struck" and *anāhata* literally means "unstruck." The idea is that *nāda* has

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[139] See note 50, p. 179, above.

> two forms, viz., the created and the uncreated, the former being an object of sense perception and the latter a matter of mystic experience of Yoga in which sound and light are fused together and there is direct perception.[140]

Daniélou expands on this description:

> In Indian musical theory, it is said that there are two kinds of sound, one a vibration of ether the other a vibration of air. The vibration of ether, which cannot be perceived in the physical sense, is considered the principle of all manifestation, the basis of all substance. It corresponds to what the Neo-Pythagoreans called the "Music of the Spheres." It forms permanent numerical patterns which are the basis of the world's existence. This kind of vibration is not caused by a physical shock as are audible sounds. It is therefore called "anahata" or "unstruck." The other kind of sound is an impermanent vibration of air, an image of the ether vibration. It is therefore called "ahata" or "struck."[141]

What Daniélou refers to here as "ether" is a translation of the Sanskrit *akasha*. This word is sometimes rendered as "space," but it really indicates an unmanifest or metaphysical level of existence. Thus the vibration of this level is known as *anāhata nāda,* or "unstruck" sound, whereas the vibration of air is known as *āhata nāda,* or "struck" sound, and corresponds with our scientific understanding of sound vibration. According to Daniélou, the

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[140] Śārngadeva, Vol. I, p. 23.

[141] Danliélou (1969), p. 21

relationship between these two levels of sound is an integral aspect of Indian music theory:

> The sounds used in music are those whose mutual relationships form an image of the basic laws of the Universe as represented by the unstruck sounds. Thus musical sounds have it in their power to reproduce the first creation of the Primordial Intellect.[142]

Gandharva and Marga. This definition results in a highly elevated view of music and also one that provides further parallels with the Pythagorean tradition. Both of these aspects are found in a statement from the music faculty at Maharishi International University:

> Everyone finds a tremendous appeal in music because music arises from so fundamental a source that it is parallel to the structure of life and to that of the cosmos as a whole. This is why Pythagoras wrote that music and the universe of heavenly bodies are governed by the same mathematical laws.[143]

The parallels are not restricted to the Vedic and Pythagorean traditions; the same connection between macrocosm and microcosm is found in Chinese thought, as we have seen. It is, in fact, characteristic of most ancient cosmological systems and lies at the heart of the "magical" tradition. To illustrate it further, we can look at the

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[142] Danliélou(1969), p. 22.

[143] "Music and the Science of Creative Intelligence," *Maharishi International University Catalog 1974/75* (Los Angeles/Heidelberg: MIU Press, 1974), p. 247.

mythologies surrounding Indian music and its origins. Reck picks up the story after Shiva has created music and passed it on to Saraswati:

> In time the Himalayas, the abode of the gods, were filled with joyful music making, drama, and dance. But on earth civilization was in utter and hopeless decline. People, bogged down in earthly desires, sickness and death, bored with the four vedas, the holy scriptures of Hinduism, begged the gods for something to relieve them of their sorrows and hardships, something to ornament their lives and turn their hearts toward the sweet nectar of the gods. The god Brahma meditated for a hundred thousand years and then decided to give them music as a fifth Veda, equal to the scriptures, a divine gift that contained the seeds of both happiness on earth and the path to moksha, ultimate release, supreme salvation. Bharata, a great sage, wrote it all down in a gigantic manual, the classic Natya sastra, and music has filled the Indian subcontinent ever since. [144]

It is said that Brahma took speech from the *Rg Veda*, music from the *Sama Veda*, action from the *Yajur Veda*, and *Rasa*, or affect, from the *Atharva Veda* to create *Natya Veda*, or *Natya Shastra* as it is more widely known. It is also known as *Gāndharva Veda*, and recognized as a major component of Vedic literature. It describes a music of the highest purpose. A key concept that has emerged from early Sanskrit texts, many of which have only recently appeared in translation, is the distinction made between *Gāndharva* and other forms of music. For example, in the *Sangīta Ratnakara*,

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[144] Reck, p. 7.

at Chapter I, verses 21c-24b, we find a critical definition of *Sangīta*:

> *Gītam* (vocal melody), *vādyam* (playing on instruments) and *nrttam* (dancing), all the three together are known as *sangīta* which is twofold, viz. *mārga* and *deśī*. That which was discovered by Brahma and (first) practiced by Bharata and others in the audience of Lord Śiva is known as *mārga (sangīta)*, which definitely bestows prosperity; while the *sangīta* comprising *gītam, vādyam* and *nrttam*, that entertains people according to their taste in different regions, is known as *deśī*..[145]

This distinction, between sacred or universal forms, and more secular, or regional forms of music, is of great importance in all the main music traditions, but particularly in India. Daniélou describes the significance of this in some detail:

> The theory of sounds can be approached in two ways: either as the systematic application of the universal laws of creation common to sound and other aspects of manifestation, or as the empirical use of physical peculiarities in the development of sounds. The first approach is called by the Indians *mārga* (directional) and, being based on absolute laws, is universal and unchangeable, while the other, which is called *deśī* (regional), varies endlessly according to place and time.
>
> The power of a music constructed according to *mārga* rules is extraordinary, its influence over animate and inanimate things unlimited. In the words of the grammarian Bhartrihari, "This science of sounds is the chemistry of the universe." There is no sort of transformation in the structure or appearance of things that cannot be achieved through the influence of organized sounds.

[145] Śārngadeva (1991), p. 10.

> Ritual music must necessarily follow the rules imposed by *mārga* theory. This is why most of the *mārga* definitions are kept in the ritual that regulates the singing of the *Sāmaveda*. On the other hand, the object of *deśī* music is usually only pleasure or the expression of human feelings and passions, so *deśī* systems vary greatly from country to country and from time to time. Their influence may be good or bad. All modern musical systems are of this empirical and unstable kind, and their relative value can be measured only by comparing them with the permanent definitions of the *mārga* theory, which alone is based on absolute laws.[146]

Daniélou concludes with a statement from the sixteenth-century writer Rāmāmātya.

> The music that is called *gāndharva* (*mārga*) is that which has been, from time immemorial, practiced by the *gāndharvas* and which leads surely to *moksa* (liberation), while the *gana* (*deśī*) music is that which has been invented by composers (*vaggeyakaras*), in conformity with recognized rules, and which pleases people. *Gāndharva* music always follows the rules of theory.[147]

It is for this reason, as William P. Malm points out, that the Vedic hymns have been preserved for so many centuries:

> In India the physical vibrations of musical sound (*Nada*) have always been inextricably connected with the spiritual and metaphysical world. As a result, the intoned word has great power in its combination of religious text and musical sound. Thus the correct singing of a Vedic hymn is essential not only to the

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[146] Rāmāmātya, *Svaramela-kalānidhi*. Sanskrit text and trans. M.S. Ramaswami Aiyar (South India: Annamalai University, 1932), cited in Daniélou (1995), p. 59.

[147] Ibid.

> validity of the ritual but also to the stability of the universe.[148]

It is important to remember that these terms, *mārga* and *deśī,* apply not only to music, but to the visual and plastic arts as well, providing a link with the Western concept of "sacred" art as seen in Chapter I.[149] The great art historian Ananda K. Coomaraswamy makes this clear. As Campbell writes:

> In India, as noticed by Ananda K. Coomaraswamy,[150] works of art representing indifferent objects, local personages and scenes, such as fill the walls and rooms of most of our museums, have been characterized as *deśī,* ("local, popular, provincial") or as *nāgara* ("fashionable, wordly") and are regarded as esthetically insignificant; whereas those representing deities or revered ancestors, such as might appear in temples or on domestic shrines, are perceived as tokens of an inward, spiritual "way," or "path," termed *mārga,* which is a word derived from the vocabulary of the hunt, denoting the tracks or trail of an animal, by following which the hunter comes to his quarry. Similarly, the images of deities, which are but local forms of "elementary ideas," are but footprints left, as it were, by local passages of the "Universal Self" (*ātman*), through contemplating which the worshiper attains "Self-rapture" (*ātmānanda*).[151]

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[148] William P. Malm, *Music Cultures of the Pacific the Near East and Asia* (Englewood Cliffs, New Jersey: Prentice Hall, 1967), p. 68.

[149] See Chap. I, notes 11 and 12, pp. 8-9.

[150] Ananda K. Coomaraswamy, "The Part of Art in Indian Life," in Roger Lipsey, ed., *Coomaraswamy,* 3 vols., Bollingen Series LXXXIX (Princeton: Princeton University Press, 1977), Vol. 2, pp. 71 ff. (Campbell's note)

[151] Joseph Campbell, *The Inner Reaches of Outer Space* (New York: Harper & Row, 1986), pp. 31-32.

As we have seen, the word *mārga* comes from a root meaning way, or path. *Mārga sangīta* therefore indicates a form of music designed to support the path toward enlightenment. Thus Sarngadeva claims that it bestows prosperity, while Rāmāmātya clearly states that *moksa* (liberation) is its goal. This would suggest that *gāndharva* is an aspect of Vedic practice. One researcher who clearly supports this idea is Mukhund Lath of Rajasthan University, who has written extensively on this subject:

> Gāndharva was not only immutable like Vedic mantras, its performance was not unlike the performance of a Vedic sacrifice. It was a special kind of sacrifice in honour of the gods. It was a yāgya that was free of the immense expenses involved in Vedic sacrifices, and it was especially pleasing to Lord Śiva. Like Vedic sacrifices, gāndharva was governed by strict commands regarding dos and donts. Every movement in it had to strictly follow the injunctions or vidhis laid down for it. These injunctions were preserved in the manuals on gāndharva (such as the *Dattilam*). Movements forbidden or not prescribed were to be avoided: For this very reason Abhinava has called *gāndharva* "*pravrttinivrttipradhāna,*" governed by observances regarding what is applicable and what is non-applicable.[152]

[152] Mukund Lath, *A Study of Dattilam: A Treatise on the Sacred Music of Ancient India* (New Delhi: Impex India, 1978), p. 84. See also Emmie Te Nijenhuis, *Dattilam: A Compilation of Ancient Indian Music* (Leiden/Köln: E. J. Brill, 1970).

<u>The Source of the Vedas</u>. The antiquity of the Vedic tradition raises the issue of its origins. The Vedas themselves suggest an answer. At *Rg Veda* I164.39, we find:

> *richo akshare parame vyoman*
> *yasmin deva adhi vishve nisheda*

Maharishi Mahesh Yogi translates this as:

> The Richa (hymns of the Veda) reside in the imperishable transcendental field--pure awareness, pure intelligence, pure consciousness, in which reside all the impulses of creative intelligence.[153]

The implication here is that the hymns of the Vedas are not composed as other literature or music are. Rather, they are said to exist *within consciousness itself*, the flow of which is the essence of Saraswati, or sound at the level of *anahata nada*. They are not created, therefore, but recognized by those who are sufficiently sensitive to perceive them. As the Rg Veda itself puts it, at V.44.14:

> yojagaratam richah kamayante
>
> The hymns seek out him who is awake.[154]

It is for this reason that the Vedic texts themselves are known as *srutis*, which indicates something that is heard.

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[153] "Vedic Study," Maharishi International University Catalog, p. 195.

[154] Ibid., p. 196.

The same term, is used for the microtonal divisions of the scale in Indian music. By contrast, commentaries on the Vedas, and other aspects of Vedic literature that are authored rather than cognized, are known as *smritis,* which literally means "remembered."

If we equate *anahata nada* with the music of the spheres, as Daniélou does,[155] then we would have to count Pythagoras as one who was "awake." This means more than merely being conscious. We will remember that Porphyry describes Pythagoras' "certain indescribable divinity, difficult of apprehension."[156] This suggests that Pythagoras' ability to "hear" the music of the spheres was similar to the special abilities ascribed to the Vedic *rishis,* or seers, which enabled them to create the hymns of the *Vedas* through direct perception of the laws of nature within their own awareness. The link to Western tradition is not only via Pythagoras; an Indian writer finds a parallel with Plotinus. "Plotinus also referred to the 'music of the spheres' which was heard by the mystics. In Indian thought, we have a parallel in the idea of *Anahata Nada.*"[157]

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[155] See note 141, p. 236, above.

[156] See Chap. III, note 23, p. 127.

[157] Lalita Ramakrishna, *The Aesthetics of Karnatik Music: Perception and Change*, M.A. Thesis, Delhi University, 1987, p. 57.

<u>The Inner Value of Music</u>. This emphasis on inner perception is another area of agreement between Pythagoras and the Vedic rishis; both valued inner knowledge over external perception. One effect of this in India is that music, in its manifestation as *Gāndharva Veda,* has always been seen as relating to *rishi,* the inner value of the Self. By contrast, *Sthapatya Veda,* which deals with architecture and the structuring of the external environment, is classified under *chhandas,* i.e., relating to the objects of perception. While there have been times, for example in Renaissance Europe, when architecture, or the most external application of artistic expression, was regarded as the "Queen of the Arts," in India the highest value has always been given to the most internal art form, vocal music. The origin of this idea can be found in a famous story recounted in the second chapter of the *Vishnudharmottara Purana.* It takes the form of a dialogue between the sage Markendeya and King Vajra.

> Once upon a time, a king, desirous of learning sculpture, went to a learned sage and asked to be taught the art. But the teacher said, "How can you know the laws of sculpture, if you do not know painting?" "Teach me the art of painting, Master," said the disciple. "But how will you understand painting, without the knowledge of dance?" "Instruct me in the techniques of dance, O Wise One," requested the royal student. The teacher continued, "But you cannot dance without knowing instrumental music." "Let me learn the laws of instruments," prayed the king. The guru

> replied, "Instrumental music can be learnt only if you study deeply the art of singing." "If singing is the fountainhead of all arts, I beg you, O Master, to reveal to me the secrets of vocal music." This prime place given to the voice in ancient times still abides, and many of the qualities of Indian music derive their characteristics from this fact.[158]

The Vibrating String. So it is that, in the form of the intoned word, this most ancient of cosmologies has been conveyed intact into the modern world. And how remarkable that, when we probe into the subtleties of its expression and go beyond its culturally determined peculiarities, we find essentially the same picture of the world described by Pythagoras, and later Plato, with the nature of sound, and music, playing a central role.

The essential components of the Pythagorean cosmology find a correspondence in the Vedic tradition. The process of creation and manifestation, of the monad becoming the dyad and then the triad, is expressed in the wholeness value inherent in A, being stopped by the value of G, or the wholeness value of Brahman becoming duality and then trinity in the values of *Rishi, Devata* and *Chhandas*. Only the form of the symbolism is different. Guy Beck describes the parallels and the contrasts in the two systems.

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[158] B. Chaitanya Deva, *An Introduction to Indian Music* (New Delhi: Publications Division, Ministry of Information, Government of India, 1992), p. 1.

> The relationship between sacred sound and music is, of course, familiar to students of Pythagoras and his "Harmony of the Spheres." The Pythagorean school, however, based the sacrality of music on the sacredness of numbers instead of words, as explained by a modern scholar conversant in both traditions: "Words are the Vedic Yoga: they unite mind and matter. Pure, ecstatic contemplation of phonetic sound reverberating on the ether in the sacred chant may be compared to the contemplation of geometrical forms and mathematical laws by the Pythagoreans. The Word is God, Number is God--both concepts result in a kind of intoxication. Only the Pythagorean Master can hear the music of the spheres: only the perfected Hindu sage can hear the primordial sound--Nāda."[159] [160]

The reasons for both the cosmological parallels and the methodological differences remain obscure. Sri Aurobindo does propose a hypothesis, however:

> The hypothesis I propose is that the Rig Veda is itself the one considerable document that remains to us from the early period of ancient thought of which the historic Eleusian and Orphic mysteries were the failing remnants, when the spiritual and psychological knowledge of the race was concealed, for reasons now difficult to determine, in a veil of concrete and material figures and symbols which protected the sense from the profane and revealed it to the initiated.[161]

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[159] Richard Lannoy, *The Speaking Tree: A Study of Indian Culture and Society* (London: Oxford University Press, 1971), p. 276. (Beck's footnote)

[160] Guy L. Beck, *Sonic Theology: Hinduism and Sacred Sound* (Columbia, South Carolina: University of South Carolina Press, 1993), p. 111.

[161] Sri Aurobindo, *The Secret of the Veda* (Pondicherry: Sri Aurobindo Ashram, 1971), p. 91.

This remains a hypothesis, however interesting. What is notable is the underlying thread of musical symbolism tying together these diverse traditions. Whether it is the divine *vina* of Saraswati, the lyre of Orpheus, or the monochords of Pythagoras and Fludd, the image of the vibrating string pervades these musical cosmologies. And let us not forget the bamboo pipes of Ling Lun in China. All of these give the same basic information: 1, 2, 3, 4.

The Intellectual Continuum

"In earliest antiquity there existed an intellectual continuum stretching throughout Asia, even into China."[162] If this was indeed the case, as James suggests, then similar cosmological ideas should be discernible within each culture. In Greece, China, and India, we have examined those traditions that have left us extensive information about their music and music theory. Outside of these, however, it is still possible to find evidence of the same fundamental ideas that we have seen in Pythagoras, the Vedas, Lao Tze and Confucius.

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[162] James, p. 26. See Chap. III, note 7, p. 116.

Egypt.

Consider the following:

> I am One that transforms into Two
> I am Two that transforms into Four
> I am Four that transforms into Eight
> After this I am One.[163]

This inscription, from the Coffin of Petamon, is cited by Lucie Lamy as an example of the same cosmology: unity becoming duality; duality becoming multiplicity; multiplicity concluding in unity. Lamy, along with her uncle, R. A. Schwaller de Lubicz, developed a new view of Egyptian antiquities and the symbolism they contain. After fifteen years studying the Temple of Luxor and other sites, de Lubitz wrote:

> If a Cause-Origin of the Universe is admitted, it is of necessity unique. However, if reason imposes on us the idea of an indivisible, i.e. quantity-less, unity, the idea of this unity eludes our point of view as creatures forming part of this Universe, a consequence of the unique Cause.
>
> Such unity exists for us only if comparison is possible; but comparison means consciousness and duality. The whole process of creation thus occurs between the numbers One and Two; and duality is the fundamental character of the created Universe. This duality is the principle of sexuality. Duality implies comparison and this succession of phenomena produces cerebral consciousness. Unity creates by "looking at

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[163] Inscription on Coffin of Petamon, Cairo Museum no. 1160. Cited in Lucie Lamy, *Egyptian Mysteries: New Light on Ancient Knowledge* (New York: Thames & Hudson Inc., 1981), p. 9.

> itself"; this is the unfaithful angel of the Judeo-Christian tradition, another image of Adam's sin in Genesis. We call this Unity God, or nonpolarized energy, in its aspect of indivisible Unity, and God the Creator, or polarized energy, in its aspect as *Unity-conscious-of-itself.*
>
> Therefore, the *Universe is only consciousness* and presents only an *evolution of consciousness,* from beginning to end, which is the return to its Cause. The aim of every "initiatory" religion is to teach the way that leads to this the ultimate merging.[164]

Unity creates by looking at itself; creation occurs entirely between One and Two; all tones in the harmonic series occur between the first and second partials. It is precisely the same idea. In the notions of polarized and unpolarized energy, de Lubicz gives it a new perspective. But by far the most important idea that he brings out here is that the universe is *consciousness,* because this is the view, shared by all the ancient wisdom traditions, that contrasts most sharply with that of the contemporary world. Following the separation of mind and matter in the philosophy of Descartes, and the subsequent emphasis on empirically verifiable data, the scientific view has focused on matter as the basis of the world. Consciousness is seen as a function of the brain's activity. For the ancient philosophers and theologists the opposite was the case. The

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[164] R.A. Schwaller de Lubicz, *The Temple of Man: Apet of the South at Luxor,* Robert & Deborah Lawlor, trans. (Rochester, Vermont: Inner Traditions International, 1998), Vol. 1, p. 31.

universe arises as a result of the self-reflection of a deity or an octave projection of a fundamental principle of unity as the basis of a series of musical-mathematical relationships. In India, it was Brahma who became aware of his own existence as the *samhita* value becomes *rishi, devata* and *chhandas*. In Egypt it is Tum, or transcendent cause, who, in regarding himself, creates Atum. de Lubicz calls this initial step of cosmogony the Primordial Scission. The process is described by de Lubicz's student, John Anthony West:

> One, the Absolute or unity, created multiplicity out of itself. One became two.
>
> This Scwaller de Lubicz calls the 'Primordial Scission' (Division, Separation). It is forever unfathomable and incomprehensible to human faculties (although language allows us to express what we cannot comprehend).
>
> The creation of the universe is a mystery. But in Egypt this was regarded as the only ineluctable mystery--beyond the Primordial Scission, all is in principle comprehensible. And if it is objected that a philosophy founded upon a mystery is unsatisfactory, it must be remembered that modern science is rife not only with mysteries, but with abstractions corresponding to no possible experience in reality: the zero, which is negation; infinity which is abstraction; and the square root of minus one, which is both a negation and an abstraction. Egypt carefully avoided the abstract.
>
> Tum (transcendent cause), in regarding himself, created Atum out of Nun, the primeval waters...
>
> In our terms unity, the Absolute or unpolarised energy, in becoming conscious of itself, creates polarised energy. One becomes simultaneously Two and Three.
>
> Two, regarded by itself, is divisive by nature. Two represents the principle of multiplicity; Two, unchecked, is the call to chaos. Two is the fall.

> But Two is reconciled to unity, included within unity, by the simultaneous creation of Three. Three represents the principle of reconciliation, or relationship. (This three-in-one is of course the Christian trinity, the same trinity that is described in innumerable mythologies throughout the world.)[165]

Lamy describes this same process which we have already characterized as the greatest of all mysteries--how the One becomes the many. She confirms that one explanation was common to all the centers of learning in Egypt.

> Before there was any opposition, any yes and no, positive and negative; before there was any complementarity, high and low, light and shadow; before there was presence and absence, life or death, heaven or earth: there was but one incomprehensible Power, alone, unique, inherent in the *Nun*, the indefinable cosmic sea, the infinite source of the Universe, outside of any notion of Space and Time. This vision of the original unity was common to every period and initiatory centre -- Heliopolis, Memphis, Hermopolis and Thebes.
>
> The great mystery is the passage from invisible into visible, to be realized by the Power which from the incomprehensible One will call forth the Many.
>
> The first impulse is a projection of the inner desire of the Creator-to-be to know himself, to realize his own consciousness. This originating power is symbolized by the heart.[166]

Reading this, it becomes evident that, on one level at least, any debate about where Pythagoras traveled is largely

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[165] John Anthony West, *Serpent in the Sky: The High Wisdom of Ancient Egypt* (Wheaton, Illinois: Quest Books/Theosphical Publishing House, 1993), p. 33.

[166] Lamy, p. 8.

irrelevant. Whether he went to Egypt or India, he would have learned essentially the same cosmology.

The Orphic Creed

In discussing sources of Pythagoreanism we need to revisit the Orphic tradition briefly. Pythagoras was said to have adopted many aspects of Orphic doctrine. From where did Orphism derive its cosmology? The question is moot because it is the same schema that we have been discussing, once again with a different terminology. Within the Orphic religion the first principle is the figure of Chronos.

> Chronos, this Ineffable First, polarizes, that is, adds to itself, presents itself to itself, doubles itself, giving rise to two principles: *Aether*, that is Heaven or Fire, a male principle, and *Chaos*, that is, What is Poured, or Water, a female principle. Demythologizing these two principles, the Platonic Pythagoreans will call them *Peras*, a principle of Limitation or Distinction, and *Apeiron*, a Principle of Unlimitedness or Lack of Distinction or Indefinitude. That is to say, as an Islamic source has it: "When from the Cause emanates One, there emanates from it Not-One," that is: Two. Thus it is between One and Two that creation occurs, and Plato will call the Principle of Intelligible Matter, the *Apeiron*, the Indefinite Dyad.[167]

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[167] Christopher Bamford, "Homage to Pythagoras," in Christopher Bamford, ed., *Rediscovering Sacred Science* (Edinburgh: Floris Books, 1994), p. 21.

Bamford does not only invoke Islamic and Platonic sources. He goes on to cite Coleridge, who rejected the idea that matter precedes mind.

> Coleridge, in fact, is very good on these things. As what he calls a "transcendental philosopher" he says not "Give me matter and motion and I will construct you the universe," as Descartes does, but rather: "Grant me a nature having two contrary forces, one which tends to expand infinitely, while the other strives to apprehend or find itself in this infinity, and I will call up the world of intelligences with the whole system of their representations to arise before you." In other words: "Every power in nature and spirit must evolve an opposite as the sole means and conditions of its manifestation: and all opposition is a tendency to reunion." This is true universally. Even God, the Unknowable Cause without Cause, must evolve an opposite by the necessity of Himself, and that opposite can only be Himself, so that the principle of polarity becomes the principle of identity.[168]

<u>Kabbalah</u>

"In the beginning God created the heaven and the earth." Everyone in the Judao-Christian tradition is familiar with this statement; it is Genesis, I.1. And yet this appears to be as misleading a translation as "Come, God of fire, to the sacrifice" is of Rg Veda, I.1. Just as the early translators of Vedic literature were unaware of its many levels of symbolism, so King James' panel of scholars was not conversant with Kabbalah.

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[168] Ibid.

The Kabbalah tradition, outlined in Chapter I, concerns itself extensively with the deeper levels of meaning contained in the Hebrew language and the Jewish canon. It is this discipline to which Suarès refers when he speaks of the first sequence of letter numbers containing the seed of the whole.[169] And the sequence in question is Genesis, I.1.

The term letter-numbers used by Suarès refers to an ancient system of codes, applicable to several ancient languages including Sanskrit, Greek, and Hebrew, among others.

> Hebrew writing has no numerals to indicate numbers. These are expressed by the letters of the Hebrew alphabet, each letter corresponding to a number. The origin of these numbers, so we believe, goes back to an epoch long before history, and ancient tradition purports to show their significance, which is that each number has a meaning in relation to cosmic forces. A similar tradition is found at the origin of the civilization of ancient Egypt. None can say whence it arose.[170]

Strachan writes that

> . . . generations of biblical scholars have either dismissed this dimension as worthless or not even believed it existed. The fact that it is indeed there and has by no means been considered worthless, particularly in the Judaic tradition, is attested by the lengthy entry in the *Encyclopedia Judaica* under

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[169] See note 137, p. 232, above.

[170] Suarès, p. 57.

> *Gematria*, for such is the name of this branch of number symbolism.[171]

Strachan continues, "The origins of the numerical alphabet are evidently shrouded in the mists of antiquity."[172] He cites various researchers who have concluded that "it first developed in Syro-Phoenicia during the fifth century BC although an earlier Eastern source could not be ruled out."[173] Regarding the latter, he reports that

> . . . the use of letters to signify numbers was known to the Babylonians and the Greeks. The first recorded use of it was on an inscription of Sargon II (727-707 BC) which says that the king built a famous wall 16,283 cubits long to correspond with the numerical value of his name.[174]

At fig. 28 Strachan supplies a table of the two gematria systems, the older, or "lesser" and the more recent, or "greater" system, applied to both Hebrew and Greek alphabets.

John Michell has devoted many years to the study of *gematria* and is perhaps the leading expert in this field. He writes:

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[171] Strachan, p. 112. Strachan cites *Encyclopedia Judaica* (Jerusalem, 1971), Vol. 7, pp. 370-372, to which the reader is referred for more complete information.

[172] Strachan, p. 113.

[173] Ibid.

[174] Ibid.

<u>Gematria</u>

The Gematria of the Hebrew and Greek Alphabets.

Hebrew		Lesser	Greater	Greek		
Aleph	א	*1*	1	Α	α	*Alpha*
Beth	ב	*2*	2	Β	β	*Beta*
Gimel	ג	*3*	3	*Γ*	*γ*	*Gamma*
Daleth	ד	*4*	4	*Δ*	*δ*	*Delta*
He	ה	*5*	5	*Ε*	*ϵ*	*Epsilon*
Waw	ו	*6*	6	*Ϝ*	*ϝ*	*Digamma*
Zayin	ז	*7*	7	*Ζ*	*ζ*	*Zeta*
Heth	ח	*8*	8	*Η*	*η*	*Eta*
Teth	ט	*9*	9	*Θ*	*θ*	*Theta*
Yodh	י	*10*	10	*Ι*	*ι*	*Iota*
Kaph	כ	*11*	20	*Κ*	*κ*	*Kappa*
Lamedh	ל	*12*	30	*Λ*	*λ*	*Lambda*
Mem	מ	*13*	40	*Μ*	*μ*	*Mu*
Nun	נ	*14*	50	*Ν*	*ν*	*Nu*
Samekh	ס	*15*	60	*Ξ*	*ξ*	*Xi*
'Ayin	ע	*16*	70	*Ο*	*ο*	*Omicron*
Pe	פ	*17*	80	*Π*	*π*	*Pi*
Tzadhe	צ	*18*	90	*Ϙ*	*ϙ*	*Quppa*
Qoph	ק	*19*	100	*Ρ*	*ρ*	*Rho*
Resh	ר	*20*	200	*Σ*	*σ*	*Sigma*
Sin, Shin	ש	*21*	300	*Τ*	*τ*	*Tau*
Taw	ת	*22*	400	*Υ*	*υ*	*Upsilon*
			500	Φ	φ	*Phi*
			600	Χ	χ	*Chi*
			700	Ψ	ψ	*Psi*
			800	Ω	ω	*Omega*

Fig. 28 (Strachan, p. 116)

> It is well known that the letters of the Greek and Hebrew alphabets have their numerical values, and it is a well-established tradition, the truth of which enquiry will confirm, that in certain books of the Bible whole passages as well as words and phrases are constructed according to a system of geometry and mathematics which enables those instructed in the art to obtain an insight into their more profound meanings.[175]

The degree of complexity and sophistication that this system lends to the study of ancient literature can only be imagined. We will limit our study to the beginning of Genesis. When Suarès applies this art there, what he finds in the very first word is another version of the cosmology found in several other ancient traditions.

In Hebrew Genesis I.1. is *Bereshyt Barah Elohim et Ha Shamaim Vay et Ha Eretz*. We will be concerned with the very first word, *Bereshyt*, or בראשית. As seen in the chart above, using the greater system, these letters correspond to the numbers 2, 200, 1, 300, 10, 400. What light does this throw on their meaning? We see immediately that the sequence does not follow the familiar 1, 2, 3, 4 progression exactly, despite the relationship of one to the letter א, which, in pronunciation, has an open sound similar to the AAAA that we

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[175] John Michell, *The View Over Atlantis* (London: Abacus, 1973), p. 80. See pp. 79-83 of Michell for a complete explanation of *gematria*.

associate with Agni. The reason for this can be found within the Kabbalistic doctrine of *tsimtsum* or "withdrawal." It was formulated by Rabbi Isaac Luria (1534-1572). It is said that he asked himself the following questions:

* How can there be a world if God is everywhere?
* If God is "all in everything," how can anything exist that is not God?
* How can God have created the world ex nihilo, if there is no nothingness?[176]

These are the kind of questions beloved by theologians and metaphysicians.

> Rabbi Isaac Luria replied by formulating the theory of *tsimtsum* ("reduction"). According to his theory, the first act of the Creator was not to reveal himself to something on the outside. Far from being a movement toward the outside or a sort of hidden identity, the first stage was a folding in, a withdrawal; God withdrew "from himself into himself" and in doing so left a void within his bosom, thus creating a space for the world to come.
>
> . . . In relation to the infinite this space was nothing more than an infinitesimal point, but in relation to creation, it was all the space of the cosmos.[177]

The process described is parallel to that whereby the A of Agni collapses onto G, or the *samhita* value of Brahman (wholeness) becomes Bindu (point) or, in terms of Tantra

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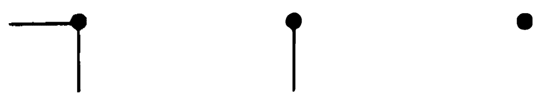
[176] Mark-Alain Ouaknin, *Mysteries of the Kabbalah*, Josephine Bacon, trans. (New York, London, Paris: Abbeville Press Publishers, 2000), p. 194.

[177] Ouaknin, p. 195.

philosophy, whereby Śiva becomes Śakti.[178] In Kabbalah, this leads to the process whereby, in a progression reminiscent of Pythagoreanism and the quadrivium, a point becomes a line, and a line becomes a plane. Ouaknin represents these thus (reading, as in Hebrew, from right to left):



"For Kabbalists these three basic geometric shapes are the basis of the Hebrew alphabet. All the letters are constructed on the basis of a combination of the point, the line, and the plane, of which the archetypes are the three letters of the alphabet: *yod, vav, dalet,*"[179] or י ו ד. From these letters, *aleph*, א, the first composite letter, can be constructed, thus  = א.

This same process is represented through the *gematria* of Bereshyt, or בראשית, through the number values of 2, 200, 1, 300, 10, 400 as follows.

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[178] See Sir John Woodroffe, *Introduction to Tantra Śāstra* (Madras: Ganesh & Co., 1969), pp. 4-17.

[179] Quaknin, p. 284.

The number 2 has essentially the same meaning as the Pythagorean dyad, the duality of existence. It appears first in the sequence because, according to Kabbalah, it represents a dwelling, a form into which the formless can enter. When multiplied by 10 to become 200, it forms the Kabbalistic symbol for the entirety of the universe, the Pythagorean Tetraktys. It is only now, when this immense dwelling is established, that we come to the value of א, the unity, or monad. Why this sequence? Because the next number, 300, represents motion, or flow, "Prodigious cosmic motion. Motion of everything that exists," as Suarès puts it.[180] Thus we see it is essentially the same process, but seen from the standpoint of the relative world; the receptacle is described first, one so vast that it encompasses the entire universe, and then the value of unity is breathed into it, in the same way that God breathes life into other aspects of his creation at later stages of the process.

We are left with two numbers. *Yod,* the number 10, also bears a resemblance to the tetraktys. Suarès defines it as "a projection of *Aleph* . . .the finite that never rejoins the infinite . . . the manifested existence in time of

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[180] Suarès, p.66.

Aleph, the timeless, the immeasurable."[181] Finally, 400 represents the glue that holds the whole creation together. It is the "resistance to the life-breath which animates it . . . that which enables life to produce its prodigiously varied manifest forms."[182]

Again, the terminology changes as the cosmogony is seen from a slightly different perspective. Yet it recalls the same essential understanding that we have seen repeatedly. And it is repeated within the Kabbalah tradition, not just in the structure of בראשית, but in the nature of א, the structure of the multiple names of God, and so forth. But just as Beck found comparisons and contrasts between the Vedic and Pythagorean traditions, Barbara Holdrege finds similarities and differences between Veda and Torah:

> . . when dealing with the traditions' conceptions of language our understanding of what constitutes "hearing" or "seeing" has to be adjusted to account for the fact that in certain strands of these traditions language is considered to have both a gross and a subtle dimension. Hence "that which was heard" by the Vedic *rishis* is represented not as gross speech but as subtle impulses of sound reverberating forth from the Transcendent. These sounds were preserved on the gross level through the speech of the *rishis*, but, according to the *jñāna-kāndins*, the true reality of *śruti* can be apprehended only by establishing one's awareness on that transcendental level which is the source and abode of the *mantras*. Similarly, certain kabbalists maintain that the material letters inscribed on the Torah scroll

[181] Ibid.

[182] Ibid.

are simply the gross manifestations of the subtle letters that exist in the upper worlds as configurations of divine light. In this perspective the full reality of Torah can be apprehended only through a visionary experience of the subtle realms of the Godhead where the light of the supernal Torah eternally shines.

According to such traditional formulations, then, the explanation for the differences in the conceptions and practices associated with Veda and Torah lies in the essential character of the mystical experiences through which their subtle reality can be apprehended. Even though these experiences may be described as involving both hearing and seeing, in brahmanical representations of Veda the auditory channel is emphasized, while in certain kabbalistic representations of Torah, such as those found in the Zohar, visionary experience is given priority. The implication of these conceptions is that it is this fundamental difference in the perceptual structure of mystical experience that accounts for the different modes of transmission of the earthly texts - whether oral or written - not vice versa.[183]

Sufism

Sufism, the esoteric branch of Islam, is represented here by one statement, but it is a profound one, summing up, in the most simple and eloquent terms, the understanding of creation and the structure of the world that underlies all of the cosmologies we have been examining. The statement is from Hazrat Inayat Khan, musician turned Sufi teacher, from whom we have heard in previous chapters. He writes:

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[183] Barbara Holdrege, *Veda and Torah: Transcending the Textuality of Scripture* (Albany: State University of New York Press, 1996), p. 415.

> THE Life Absolute from which has sprung all that is felt, seen, and perceived, and into which all again merges in time, is a silent, motionless and eternal life which among the Sufis is called *Zàt*. Every motion which springs forth from this silent life is a vibration and a creator of vibrations. Within one vibration are created many vibrations; as motion causes motion so the silent life becomes active in a certain part, and creates every moment more and more activity, losing thereby the peace of the original silent life. It is the grade of activity of these vibrations which accounts for the various planes of existence. These planes are imagined to be different from one another, but in reality they cannot be entirely detached and made separate from one another. The activity of vibrations makes them grosser, and thus the earth is born of the heavens.[184]

Polarity and Division

Such metaphysical and theological principles might seem to have little to do with music. Siegmund Levarie, who was an associate of Hans Kayser, believes that the opposite is true. In a 1980 article he proposes that the fundamental structures upon which music is based correspond with general principles of growth and form to the extent that music could be used as a general structural model. The principle that he enunciates is exactly that described by Bamford--the principle of polarity.

> Now any structure--in nature, in art, in society--is the product of two polar forces: one generating and the other limiting. The interplay of both forces is

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[184] Hazrat Inayat Khan, *The Sufi Message* (London: Barrie & Rockliff, 1960), Vol. II, p. 13.

> essential. Growth without limitation leads to a kind of universal cancer, an annihilation of form and of meaningful organization, whereas limitation without a generative counterforce remains an empty concept, a denial of matter and of vitality. Neither process alone is capable of yielding a structure, but their polarization is a central concern of all morphology, musical and otherwise.[185]

G. Spencer-Brown has conducted a similar study in the area Lavarie mentions--morphology. The principle he finds to be fundamental is related to polarity; it is that of division, bringing to mind de Lubicz's idea of the "Primordial Scission." Spencer-Brown finds this notion underlying both cosmology and abstract mathematics.

> The theme of this book is that a universe comes into being when a space is severed or taken apart. The skin of a living organism cuts off an outside from an inside. So does the circumference of a circle in a plane. By tracing the way we represent such a severance, we can begin to reconstruct, with an accuracy and coverage that appear almost uncanny, the basic forms underlying linguistic, mathematical, physical, and biological science, and can begin to see how the familiar laws of our own experience follow inexorably from the original act of severance.
>
> . . . Although all forms, and thus all universes, are possible, and any particular form is mutable, it becomes evident that the laws relating such forms are the same in any universe. It is this sameness, the idea that we can find a reality which is independent of how the universe actually appears, that lends such fascination to the study of mathematics.[186]

[185] Siegmund Levarie, "Music as a Structural Model," *The Journal of Social Biological Structure,* Vol. 3 (1980), p. 239.

[186] G. Spencer-Brown, *Laws of Form* (New York: E. P. Dutton, 1979), pp. xxix-xxx.

We know that mathematics and music are closely related. So it is no surprise that, along with the principle of polarity, Levarie finds the idea of division as basic to his musical morphology. It is, in fact, the principle Pythagoras discovered through the use of the monochord.

> The whole idea of genesis by division is a transcendental heritage of mankind. It dominates the first chapter of the Bible. . . The same idea determines Plato's explanations of creation. . . . For this explanation of the principle of any genesis, Plato was indebted to Pythagoras whose experiments on the monochord taught a general truth about the universe. Just as division of a string creates individual tones and leads to the discovery and establishment of basic musical laws, such as consonance and dissonance or major and minor, so the whole world can be understood as a multiplicity of phenomena initiated by one process and governed by polarity.[187]

Sarawati, Rhea, Isis

We have returned to the division of a string--to Saraswati, Orpheus, and Pythagoras. The field of Pythagorean number symbolism is so fertile that it is possible to link Greece, India and Egypt by delving a little further into an analysis of the dyad. We recall that the Indian goddess of learning and music, Saraswati, represents the flow of consciousness that results when Brahma becomes aware of his own nature, when the monad becomes the dyad, when the

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[187] Levarie (1980), p. 240.

universe manifests itself through the octave reflection of its own nature. We can find the same symbolism in the Greek goddess Rhea and the Egyptian Isis:

> The dyad was called 'Rhea', mother of the gods, because the name of this goddess is similar to the Greek verb *rhein* meaning to 'flow'. Since matter was always in a state of flux, Rhea and the dyad became synonymous with it. In later Pythagoreanism the dyad was also called 'Isis' for the name of this goddess is like the Greek word for 'equal' or 'isos';this etymology referring to the equality of the single units in the two . . . . The Pythagoreans were very interested in the origin of words and their meanings for they were searching for the language of the gods which held the key to ultimate reality.[188]

Gorman indicates that the Greek language had inner meanings similar to those we have found in Sanskrit. When we add the element of *gematria*, the code whereby, in Greek, Sanskrit, Hebrew and other ancient languages, all the letters are associated with numbers so that every passage of scripture or literature is also a series of numerical sequences, we can get some idea of how complex this field is. The implications of just the first four numbers would seem to be endless. We will conclude simply by reiterating the basic thesis of this chapter: the universality of these relationships and their corresponding cosmology. Francis Macdonald Cornford sums it up:

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[188] Peter Gorman, *Pythagoras: A Life* (London: Routledge & Kegan Paul, 1979), p. 142.

> The Monad, so conceived, is not the first in the series of numbers; indeed, it is not a number at all, but it is the original undifferentiated unity, from which emerge the two opposite principles Limit and Unlimited, the elements of number and of all things.
>
> . . . This view has also the advantage that it brings the Pythagorean scheme of thought into line with the other early systems, both mythical and scientific. The abstract formula which is common to the early cosmogonies is as follows: (1) There is an undifferentiated unity. (2) From this unity two opposite powers are separated out to form the world order. (3) The two opposites unite again to generate life.[189]

We will find this view, and the understanding of the symbolism through which it is conveyed, to be of great importance when we go on to study Plato and the two main sources of the music of the spheres tradition contained in his writings.

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[189] Francis Macdonald Cornford, "Mysticism and Science in the Pythagorean Tradition," part two, *Classical Quarterly* 17 (1923), pp. 3-4.

CHAPTER V

THE GREEK SOURCES: THE TIMAEUS

It is in the writings of Plato that we come to the most significant, direct sources of the music of the spheres tradition. This appears in both of the aspects defined by Aristotle, the general idea of order in the universe, and the specific correspondences between astronomical and musical forms. Before considering these, it is important to understand the relationship between Plato and his precursor, Pythagoras.

Pythagoras and Plato

As described in the previous chapter, and as Sri Aurobindo confirms, both Plato and Pythagoras were part of an ancient mystery tradition:

> . . . in ancient Europe the schools of intellectual philosophy were preceded by the secret doctrines of the mystics; Orphic and Eleusinian mysteries prepared the rich soil of mentality out of which sprang Pythagoras and Plato.[1]

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[1] Sri Aurobindo, *The Secret of the Veda* (Pondicherry: Sri Aurobindo Ashram, 1971), p. 4.

As part of this tradition Plato was himself deeply influenced by Pythagorean doctrine. This is nowhere more evident than in the area of musical cosmology. As James Haar puts it, "Plato did not invent the music of the spheres. For the fact that the theory was Pythagorean in origin there is abundant testimony."[2] Furthermore, at least one of the source texts for this tradition, the *Timaeus*, is perhaps the most Pythagorean of the Platonic dialogues. For this reason, it is important to understand the similarities between Pythagorean and Platonic doctrine as well as some of the subtle differences in their thinking, particularly in the area of epistemology, a central issue in both systems.

The Theory of Knowledge

Pythagoras' theory of knowledge is explained in a lengthy passage from Iamblichus that begins as follows:

> He [Pythagoras] was the first to give a name to philosophy, describing it as a desire for and love of wisdom, which later he defined as the science of objectified truth. Beings he defined as immaterial and eternal natures, alone possessing a power that is efficacious, as are incorporeal essences. The rest of things are beings only figuratively, and considered such only through the participation of real beings; such are corporeal and material forms, which arise and decay without ever truly existing. Now wisdom is the

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[2] James Haar, *Musica Mundana: Variations on a Pythagorean Theme*. Ph.D Dissertation, Harvard University, 1960, p. 1.

> science of things which are truly existing beings, but not of the mere figurative entities. Corporeal natures are neither the objects of science, nor admit of a stable knowledge, since they are indefinite, and by science incomprehensible; and when compared with universals resemble non-beings, and are in a genuine sense indeterminate. Indeed it is impossible to conceive that there should be a science of things not naturally the objects of science; nor could a science of non-existent things prove attractive to any one.[3]

Reading this, one might forget the aspect of balance in Pythagoras' thought posited in the previous chapter, a balance between the ideal and the empirical, between the magical, organic, and mechanical traditions. It re-confirms that, if Pythagoras flirted with empirical observation and experimentation, his primary focus was on eternal and universal entities. This view dominated his approach to teaching, since his main emphasis was on the cultivation of the mind and the soul, rather than the accumulation of information or acquisition of skills. This is what Boorstin refers to as "pure knowledge" aimed at "the purification (*catharsis*) of the soul."[4] Thus, as Porphyry reports, for Pythagoras,

> The purified mind should be applied to the discovery of beneficial things, which can be effected by certain

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[3] Iamblichus, "The Life of Pythagoras," in Kenneth Sylvan Guthrie, trans. and ed., *The Pythagorean Sourcebook and Library* (Grand Rapids, Michigan: Phanes Press, 1987), p. 97.

[4] See Chap. III, note 12, p. 119.

> arts, which by degrees induce it to the contemplation of eternal and incorporeal things which never vary.[5]

One example of this approach is seen in Pythagoras' approach to mathematics. Although he is perhaps best known for his contribution to geometry, the theorem regarding right-angled triangles, for Pythagoras the practical applications of the objects of mathematics were secondary to their role as objects of contemplation, used to purify and refine the very processes of thinking. Porphyry again:

> That is the reason he made so much use of the mathematical disciplines and speculations, which are intermediate between the physical and the incorporeal realm. . . [These disciplines he used] as degrees of preparation to the contemplation of the really existent things, by an artistic principle diverting the eyes of the mind from corporeal things, whose manner and state never remain in the same condition, to a desire for true [spiritual] food. By means of these mathematical sciences, therefore, Pythagoras rendered men truly happy. . . ."(Guthrie's insertions.)[6]

We will find the same approach to mathematics in Plato's *Republic*. Indeed, Pythagoras' reference to the universal aspects of existence is clearly reflected in Plato's doctrine of the Forms, and the resultant approach to epistemology is shared, to some extent, by both philosophers. Thus, for example, when describing his

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[5] Porphyry, "The Life of Pythagoras," in Guthrie, p. 132.

[6] Ibid.

approach to the study of astronomy, Plato emphasizes the importance of the universal realm of the Forms rather than the empirical world as a fitting subject of study. "The stars that decorate the sky," says Socrates,

> though we rightly regard them as the finest and most perfect of visible things, are far inferior, just because they are visible, to the true realities; that is to the true relative velocities, in pure numbers and perfect figures, of the orbits and what they carry in them, which are perceptible to reason and thought but not visible to the eye.[7]

After his discussion of astronomy, Plato goes on to discuss the study of harmonics, and it is here that he takes issue with the Pythagorean view--in particular, the interest in empirical experiment that emerges from Pythagoras' experience in the blacksmith's shop.

> "As we said when dealing with astronomy just now, our pupils must not leave their studies incomplete or stop short of the final objective. They can do this just as much in harmonics as they could in astronomy, by wasting their time on measuring audible concords and notes against each other."
>
> "Lord, yes, and pretty silly they look," he [Glaucon] said. "They talk about 'intervals' of sound, and listen as carefully as if they were trying to hear a conversation next door. . . They all prefer to use their ears instead of their minds."
>
> "You mean those people who torment the strings and try to wring the truth out of them by twisting them on pegs. [I am thinking of] the Pythagoreans, who we said would tell us about harmonics. For they do just what the astronomers do; they look for numerical

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[7] Plato, *Republic,* 529, c-d, Desmond Lee, trans. (London: Penguin Books, 1974), p. 338.

> relationships in audible concords, and never get as far as formulating problems and examining which numerical relations are concordant, which not, and why."[8]

This is a curious passage, in view of Iamblichus' and others' descriptions of Pythagorean epistemology. It suggests that, in the two centuries between Pythagoras and Plato, the former's followers had fallen into Aristoxenes' camp in preferring the evidence of the ear over that of the intellect in developing music theory. Such an approach runs counter to Pythagoras' emphasis on universals as the focus of epistemology. Perhaps the "tormenting of strings" described by Plato reflects only the empirical side of the Pythagorean approach, the verification of subjective experience sought for in Pythagoras' acoustical experiments. His criticism that Pythagorean theorists were not involved in theoretical considerations seems unjustified. When examining the passages from Plato that reflect Pythagorean doctrine, it will be important to examine both sides of this picture.

Symbolic Teachings: Riddles and Puzzles

There is a further consideration that is important in considering Pythagorean sources. Both Iamblichus and

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[8] *Republic*, 531, a-c, pp. 340-341.

Porphyry report that the Pythagorean brotherhood was divided into a hierarchy, with the deepest teachings reserved for those who passed a series of tests, including spending five years in silence, before gaining admittance to an inner circle. Such practices were characteristic of the ancient wisdom traditions in general and the Greek mystery religions in particular. They appear to have been based on the desire to preserve the integrity of an oral tradition over many generations while maintaining at its essence the intimate relationship between teacher and student. Pythagoras experienced this himself during his studies in Egypt and Babylon, when he received instruction from the priests only after proving himself through his patient demeanor, a process that repeats itself even into the present day for those wishing to gain acceptance into a monastic tradition.[9]

In keeping with such an approach, Pythagoras kept his teaching under tight control. He hesitated to put it into writing and adapted it according to the level of preparation of his audience. "His utterances were of two kinds, plain or symbolical," reports Porphyry.

> His teaching was twofold: of his disciples some were called Students (*mathematikoi*), and others Hearers

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[9] A similar attitude pervades the various schools of the magical tradition described in Chapter I, such as the Rosicrucians and Freemasons, to the extent that they are often referred to as "secret societies."

> (*akousmatikoi*). The Students learned the fuller and more exactly elaborate reasons of science, while the Hearers heard only the summarized instructions of learning, without more detailed explanation.[10]

This distinction must always be kept in mind when dealing with references to the "Pythagoreans." We cannot always know with certainty to which group reference is being made. It may well have been merely the *akousmatikoi* who were busy "tormenting" the strings by twisting them on pegs. This group might well have been unaware of the deeper aspects of Pythagorean lore, as these were imparted in an encrypted form typical of sacred teachings:

> To his intimates he was wont to utter symbolically oracular sentences, wherein the smallest number of words were pregnant with the most multifarious significance, not unlike certain oracles of the Pythian Apollo, or like Nature herself in tiny seeds, the former exhibiting conceptions, and the latter effects innumerable in multitude, and difficult to understand.[11]

Those of Pythagoras' followers who were able to interpret, and thus to comprehend, these encrypted statements were admonished to refrain from repeating them to others.

> Nor did they think fit either to speak or to write in such a way that their conceptions might be obvious

[10] Porphyry, p. 130.

[11] Iamblichus, in Guthrie, p. 97.

> to the first comer; for the very first thing Pythagoras is said to have taught is that, being purified from all intemperance, his disciples should preserve the doctrines they heard in silence.[12]

It is well known that the members of the Pythagorean brotherhood were appalled when one of their number revealed a secret of Pythagorean mathematics, the existence of incommensurable quantities, or irrational numbers. According to Iamblichus, the guilty party was vilified and expelled from their community, a tomb being erected to symbolize his leaving. It is assumed that the reason for this action was that this knowledge threatened the foundations of Pythagorean mathematics, which was based purely on commensurable quantities. But revealing any aspect of the inner knowledge of the brotherhood was enough to elicit horror and revulsion from its members.

Such an attitude toward publicly revealing the inner nature of secret teachings is one aspect of Pythagoreanism that was inherited by Plato. In the seventh of his preserved letters, Plato makes it clear that there is an inner core of teachings that he would never commit to writing:

> One statement at any rate I can make in regard to all who have written or who may write with a claim to knowledge of the subjects to which I devote myself--no matter how they pretend to have acquired it, whether from my instruction or from others or by their own

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[12] Iamblichus, in Guthrie, p. 116.

> discovery. Such writers can in my opinion have no real acquaintance with the subject. I certainly have composed no work in regard to it, nor shall I ever do so in future, for there is no way of putting it in words like other studies. Acquaintance with it must come rather after a long period of attendance on instruction in the subject itself and of close companionship, when, suddenly, like a blaze kindled by a leaping spark, it is generated in the soul and at once becomes self-sustaining.
>
> Besides, this at any rate I know, that if there were to be a treatise or a lecture on this subject, I could do it best... If I thought it possible to deal adequately with the subject in a treatise or a lecture for the general public, what finer achievement would there have been in my life than to write a work of great benefit to mankind and to bring the nature of things to light for all men? I do not, however, think the attempt to tell mankind of these matters a good thing, except in the case of some few who are capable of discovering the truth for themselves with a little guidance. In the case of the rest to do so would excite in some an unjustified contempt in a thoroughly offensive fashion, in others certain lofty and vain hopes, as if they had acquired some awesome lore.[13]

Plato justifies this by writing of four distinct levels of knowledge, of which the inner ones can be comprehended only through direct experience guided by a teacher, and are virtually impossible to convey via the written word. He certainly considers that this applies to his deepest ideas.

> For this reason no serious man will ever think of writing about serious realities for the general public so as to make them a prey to envy and perplexity. In a word, it is an inevitable conclusion from this that when anyone sees anywhere the written work of anyone

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[13] Plato, Letter VII, 341c-342, L. A. Post, trans., in Edith Hamilton and Huntington Cairns, eds., *The Collected Dialogues of Plato* (New York: Pantheon Books, 1961), pp. 1588-1589.

> . . . the subject treated cannot have been his most serious concern--that is, if he is himself a serious man. His most serious interests have their abode somewhere in the noblest region of the field of his activity. If, however, he really was concerned with these matters and put them in writing, "then surely" not the gods, but mortals "have utterly blasted his wits."[14] [15]

A similar point can be found in the *Phaedrus*. Socrates recounts the legend of the Egyptian god Theuth, who is credited with the invention of the arts of number and calculation, geometry and astronomy, and above all, writing. When these inventions were presented to Thamus the King of Thebes, however, he condemned writing as harmful to the Egyptian people, weakening the power of memory and making them less self-reliant, dependent upon external objects rather than internal powers. Socrates agrees. "Anyone who leaves behind him a written manual," he tells Phaedrus, "and likewise anyone who takes it over from him, on the supposition that such writing will provide something reliable and permanent, must be exceedingly simple-minded."[16] Socrates continues to condemn written words:

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[14] *Iliad* 7.360, 12.234. (Editor's footnote. See note 15.)

[15] Plato, Letter VII, 344c-d, Hamilton and Cairns, eds., p. 1591.

[16] *Phaedrus* 275d-e, R. Hackforth, trans., Edith Hamilton and Huntington Cairns, eds., *The Collected Dialogues of Plato* (Princeton: Princeton University Press, 1961), p. 521.

> . . . they seem to talk to you as though they were intelligent, but if you ask them anything about what they say, from a desire to be instructed, they go on telling you just the same thing forever. And once a thing is put in writing, the composition, whatever it may be, drifts all over the place, getting into the hands not only of those who understand it, but equally of those who have no business with it; it doesn't know how to address the right people, and not address the wrong. And when it is ill-treated and unfairly abused it always needs its parent to come to its help, being unable to defend or help itself.[17]

Socrates asks if there is another sort of discourse "brother to the written speech, but of unquestioned legitimacy" that is better and more effective. Phaedrus asks what sort of discourse he has in mind and Socrates replies, "The sort that goes together with knowledge, and is written in the soul of the learner, that can defend itself and knows to whom it should speak and to whom it should say nothing."[18]

It is clear, therefore, that great care has to be taken in interpreting Pythagorean literature, as well as those of Plato's dialogues most influenced by Pythagoreanism. However it might look on the surface, there are hidden meanings and multiple levels of interpretation.

> All Pythagoric discipline was symbolic, resembling riddles and puzzles, and consisting of maxims, in the style of the ancients. Likewise the truly divine Pythian oracles seem to be somewhat difficult of

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[17] Ibid.

[18] Ibid.

> understanding and explanation to those who carelessly receive the answers given. These are the indications about Pythagoras and the Pythagoreans collected from tradition.[19]

This approach to teaching is of great importance in considering the tradition of musical cosmology that stems from Orpheus, Pythagoras and Plato. And there is good reason to assume that subsequent writers had no more than a partial understanding of these sources.

The Pythagorean Plato

There is a great deal in the philosophy of Plato that reflects Pythagorean thought, but two passages, one a complete dialogue, the other a section of *The Republic,* are particularly significant sources for the music of the spheres tradition. And it is a ". . .common notion that it was from Pythagorean tradition that Plato drew the elements for the two myths."[20] We will examine these dialogues in the light of the themes that have emerged in our discussion of Pythagoras: the significance of number, especially as represented by musical relationships, for understanding the world; the importance of ideal forms of knowledge, distinguishing between the appearance of things and their

[19] Iamblichus, in Guthrie, p. 116.

[20] Haar, p. 1.

true natures; and the use of symbolic forms of expression in articulating knowledge. Given the last of these considerations, it should be no surprise that we find passages in Plato filled with "riddles and puzzles." We will also find that Haar's characterizations of these dialogues as myths may provide a better basis for understanding them once we understand the level of knowledge that myth contains.

The *Timaeus*

History

The *Timaeus* is an appropriate place to begin; the partial Latin translation by Calcidius in the fourth century C.E. was the only Platonic dialogue available in Europe from the end of the classical era until Ficino's translations appeared during the Renaissance.

> The *Timaeus*, as it turned out, was the only Platonic dialogue that never sank into oblivion in the West. During the Dark and Middle ages its first and most essential part was known in the Latin version of Calcidius. This freak of survival was probably the single most important fact in the transmission of the doctrines of cosmic and psychic harmony.[21]

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[21] Joscelyn Godwin, *The Harmony of the Spheres: A Sourcebook of the Pythagorean Tradition in Music* (Rochester, Vermont: Inner Traditions International, 1993), p. 4.

Certainly, it was widely known. "There was hardly a medieval library of any standing which had not a copy of Chalcidius' version and also a copy of the fragment translated by Cicero."[22] Furthermore, the *Timaeus* deals directly with the musical structure of the universe, and it is the main source for the concept of cosmic harmony expressed in the term *harmonia*. It is also one of the most clearly Pythagorean of Plato's dialogues. As Haar tells us: "Plato makes Timaeus speak in Pythagorean vein, in fact as a Pythagorean of the fifth century if the setting of the *Timaeus* was meant as historical fact."[23] Furthermore, Dominic O'Meara cites Iamblichus in his *Commentary on the Timaeus,* as ascribing both Pythagorean and Orphic origins to Timaeus' discourse:

> One should put it this way, then, that Timaeus, being a Pythagorean, follows Pythagorean principles (ἀρχαῖς). And these in turn are Orphic principles... this Pythagoras himself states.[24]

If S.K. Heninger is correct, it is difficult to over-emphasize the importance of Pythagorean thought in Plato's

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[22] Raymond Klibansky, *The Continuity of the Platonic Tradition During the Middle Ages* (London: The Warburg Institute, 1939), p. 28.

[23] Haar, p. 71.

[24] Iamblichus, *In Timaeus,* fr. 74 (transl. J.M. Dillon), cited in Dominic J. O'Meara, *Pythagoras Revived: Mathematics and Philosophy in Late Antiquity* (Oxford: Clarendon Press, 1989), p. 99.

Academy, and the importance of Plato for passing on his predecessor's teachings:

> Through Plato's writings, especially the *Timaeus*, Pythagorean doctrine had entered the mainstream of Greek thought. It oversimplifies but slightly, in fact, to say that Socrates provided the method and the Pythagoreans the curriculum for Plato's Academy. This is not to denigrate the achievement of Plato or to diminish his honor, but to place the Pythagorean school in better perspective. There is no doubt that much of Plato's teaching was a graft on the stock of Pythagorean doctrine.[25]

Heninger's view is not new; a similar statement can be found from the Byzantine scholar Photius (c. 820-891 C.E.):

> Plato is said to have learned his speculative and physical doctrines from the Italian Pythagoreans, his ethics from Socrates, and his logic from Zeno, Parmenedes and the Eliatics. But all of these teachings descended from Pythagoras.[26]

The *Timaeus* not only reflects Pythagorean thought, it directly contributed to its revival in Europe; Guthrie cites the "brief and beautiful Renaissance of Pythagorean thought at the cathedral school of Chartres during the 12th century, due in part to a Latin translation of Plato's *Timaeus*."[27]

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[25] S.K. Heninger Jr., *Touches of Sweet Harmony: Pythagorean Cosmology and Renaissance Poetics* (San Marino, CA: Huntington Library, 1974), p. 21.

[26] Photius, in Guthrie (1987), p. 138.

[27] Guthrie, p. 43. It is this renaissance that resulted in the flourishing of sacred geometry and architecture

But this dialogue is also one of the most difficult of Plato's works to understand, and its most significant section, the description of the creation of the World Soul, "is the most perplexing and difficult of the whole dialogue."[28]

Given the difficulty of understanding the *Timaeus*, especially the passages concerning the music of the spheres, there has been no shortage of commentaries on it; over forty appeared during ancient and medieval times alone. In the modern era, Albert von Thimus[29] wrote extensively on the *Timaeus* in the nineteenth century; Thomas Taylor,[30] A. E. Taylor[31], Francis Cornford,[32] Ernest G. McClain,[33] and

mentioned in Chapter II, and of which Chartres cathedral is one of the finest examples.

[28] A.E. Taylor, *A Commentary on Plato's Timaeus* (Oxford: Oxford University Press, 1928), p. 106.

[29] Albert Freiherr von Thimus, *Die harmonikale Symbolik des Alterthums,* Vols. I & II (Hildesheim/Zurich/New York: George Olms Verlag, 1988).

[30] Thomas Taylor, *The Theoretic Arithmetic of the Pythagoreans*, Manly Hall, intro. (Los Angeles: Phoenix Press, 1934; reprint, New York: Samuel Weiser, 1975).

[31] A.E. Taylor, op. cit.

[32] Francis Macdonald Cornford, *Plato's Cosmology* (London/New York: Harcourt Brace, 1948).

[33] Ernest G. McClain, *The Pythagorean Plato: Prelude to the Song Itself* (London: Nicolas Hays, 1978).

Michell,[34] among others, have contributed to this literature in the twentieth.

The complexity of the task of interpreting this dialogue becomes clear in the enormous divergence of viewpoints among these various commentaries. A.E. Taylor and Cornford provide solid classical views, carefully fitting Plato's description of the World Soul into the general context of the cosmological statements found throughout his writings. They are, however, unable to account for the dimension emphasized in the fullest ancient commentary, that of Proclus, who finds the source of Plato's description in Orphic and Chaldean theology.

In recent years, McClain and Michell have placed the *Timaeus* in the context of the ancient systems of mathematical symbolism with which Plato would have been familiar. Michell finds that the number symbolism within the *Timaeus* embodies the ancient canon that he also identifies as contained in megalithic monuments, Gothic cathedrals, and even the Greek language. McClain, following von Thimus, finds the work to be a musical cypher based on the ancient obsession with tuning systems. Hans Kayser, Ernst Levy and Keith Critchlow sum up centuries of speculative mathematics,

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[34] John Michell, *The Dimensions of Paradise: The Proportions and Symbolic Numbers of Ancient Cosmology* (San Francisco: Harper & Row, 1988).

finding elaborate symbolism based on number emerging from Plato's formulations. Other writers have suggested that Plato cannot be fully understood if we assume the dialogues to be the kind of discursive representations characteristic of modern philosophical treatises. Gerald Press suggests that Plato's writing frequently points to certain kinds of inner, mental images, while Jonathan Shear and Renée Weber find that Plato's insights result from the application of certain meditation-related techniques. And, as mentioned above, Haar refers to it as a myth. There is no reason these interpretations should be seen as contradictory.

> Perhaps the *Timaeus* should be classed with those "revealed" scriptures, which seem to act as universal reflectors: each commentator projects onto such a work his own preoccupations and beliefs, and each receives from it perfect confirmation. One interpretation does not contradict another: each is valid in proportion to its interpreter's intellect and motives. . .[35]

My contribution in this study will be to suggest that one key to interpreting the *Timaeus* can be found in the question posed by Socrates in the very first sentence of the dialogue.

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[35] Godwin, p. 4.

<u>Content</u>

The main purpose of the *Timaeus* is both theological and teleological; it sets out to give an account of the origin of the world and of the phenomena of nature, centered on the structure of the human soul. In doing this, the dialogue spans a wide range of subjects of which the most important are the composition of the World-Soul and the human soul and the manner of their creation; the nature of the elements and their relationship with mathematical forms; the characteristics of space and time; the physical basis of sensation; pleasure and pain, and human physiology. Through all of these considerations runs the theme of the relationship between Being and Becoming and, from this, the understanding of right knowledge, knowledge of Being, as opposed to mere opinion, which springs from the restriction of perception to the transitory and unreliable realm of Becoming. While there is one passage most directly related to the music of the spheres tradition, it is best understood in the context of the epistemology set forth in the beginning of the dialogue.

<u>Context</u>

To begin the dialogue, Socrates is asked to give a brief summary of the previous day's discussion, which turns out to have been the content of *The Republic*. However, Socrates feels that his description of an ideal state lacks reality, or life. Therefore he seeks to develop the ideas with a description of actual activity, or motion, occurring within the state in order to bring it to life. To do this, he calls upon two of his companions, Timaeus and Critias, since he feels that they are imbued with philosophy and statesmanship, as well as with specific knowledge of astronomy and history. Their response to Socrates forms the basis for two dialogues, the *Timaeus* itself and the *Critias*, the first dealing with cosmology and the second with the story of ancient Athens and Atlantis. The second of these themes, the Atlantis myth, is briefly introduced at the beginning of the *Timaeus*, setting the scene by establishing the great antiquity of the ideas to be set forth. Critias relates that Solon, a close friend of his great-grandfather and the seminal "law-giver" of the state of Athens, traveled to Egypt, where he learned from the priests that the Greeks were a very young people, so much so that they barely had any real recollection of their older ancestors. (We are reminded here of Pythagoras' reported travels to Egypt, which gives a further indication of the ideas to be presented.) The story of Atlantis is picked up again in the *Critias*. Before going further with it, however, Timaeus is to set the scene with his description of the origin of the World itself, and it is this description that comprises the main body of the dialogue.

The Ideal World

Before he proceeds to speak of the structure of the world, Timaeus makes an observation of fundamental philosophical importance, one that directly reflects the Pythagorean and Platonic viewpoint of the primacy of ideal forms of knowledge, the distinction between the appearance of things and their true natures:

> We must in my opinion begin by distinguishing between that which always is and never becomes from that which is always becoming but never is. The one is apprehensible by intelligence with the aid of reasoning, being eternally the same. The other is the object of opinion and irrational sensation, coming to be and ceasing to be, but never fully real.[36]

The distinction that Timaeus makes here is a critical one. Most significantly, it places the dialogue directly in line with Pythagorean epistemology. Timaeus indicates that the

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[36] Plato, *Timaeus*, 28a. Desmond Lee, trans. (London: Penguin Books, 1965), p. 40.

description of the creation which is to follow is an ideal one. Rather than a description of the universe in its purely physical manifestation, the *Timaeus* sets forth the abstract principles fundamental to the processes of creation and manifestation, and it is these principles, essentially mathematical and musical in their nature, that form the basis for the numerical symbolism found in the dialogue. It is from this perspective that we arrive at the notions of universal harmony and the music of the spheres. Thus the context within which we should consider these writings is that described by Daniélou,[37] the ancient view of music as a key to the understanding of a cosmology based on abstract mathematical symbolism.

This passage is particularly significant in view of any tendency to interpret or to refute the cosmology presented in the *Timaeus* solely in terms of its application to the physical solar system. Timaeus seems to anticipate, and to attempt to avoid, this confusion at the outset of his presentation, reminding us of Pythagoras' admonitions about the nature of reliable knowledge as derived from unchanging universals rather than from phenomena in the ever-changing physical world.

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[37] See Chap. IV, note 84, p. 203.

<u>The World of Number</u>

As well as the emphasis on the realm of Being rather than becoming, and its employment of a symbolic mode of expression, the *Timaeus* reflects Pythagoreanism through a symbolism based on numbers. This is apparent from the very beginning of the dialogue.

Having established that what he is about to describe is essentially an eternal archetype upon which external forms of creation are based, Timaeus continues by explaining the motivation in the mind of the Creator when framing the creation. Being perfectly good and therefore completely lacking in envy, God wished that all things should be as good as He. He therefore determined to create order throughout the whole range of creation, as order is the measure of perfection. To create this order He set up the universe as a body containing a soul which itself contains intelligence. It is this intelligence that is expressed through the elaborate number symbolism upon which the dialogue rests.

Positing number to be the primary element of creation is consistent with the view expressed by Plato in the statement at the beginning of the *Timaeus*, where he demands that we distinguish "between that which always is and never becomes from that which is always becoming but never is."[38] Here Plato is making a distinction between one level of creation, where the essential archetypal Forms exist, and a lower realm, where the physical phenomena of the world, which mirror the ideal forms, have their existence. From this view, it necessarily follows that there are different modes of apprehending these different levels of creation. "The one is apprehensible by intelligence with the aid of reasoning," Plato tells us, "being eternally the same. The other is the object of opinion and irrational sensation, coming to be and ceasing to be, but never fully real."[39]

Plato's view mirrors that of Pythagoras's distinction between the appearance of things and their true natures.[40] It accounts for the direction of his philosophy, distrusting the senses and putting his faith in the eternal realm of being. In the first century C.E., the same view was expressed by Plutarch:

> The very world and every part thereof is compounded of a substance intelligible or spirituall, and of a substance sensible or corporall: whereof the one hath

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[38] *Timaeus*, 28a. See note 36, p. 290, above.

[39] Ibid.

[40] See note 3, p. 271, above.

> furnished the thing that is made and engendred with forme and shape, the other with subject matter.[41]

This bifurcated view of nature is of great importance in understanding the context of the Pythagorean approach to mathematics.

One of the theorists who have been involved with Plato's puzzles and riddles in the form of hidden mathematical symbolism is Ernest McClain. He suggests that this symbolism was not fully understood even by Plato's immediate followers:

> Plato's later dialogues abound in mathematical allegories. *Timaeus* begins with a very long one, *Statesman* contains a short one, the *Republic* has three, and both *Critias* and *Laws* are permeated with them from beginning to end. When Plato died in 347 B.C. his pupils and friends immediately began to argue about these mathematical constructions and about Plato's purpose in using them for models of souls, cities, and the planetary system. By the beginning of the Christian era much of Plato's mathematics had become a riddle.[42]

McClain belongs to a small group of music theorists who suggest that a knowledge of music is necessary to decipher Plato's allegories. He also finds musical keys to other ancient literature such as vedic and Islamic sources. In

[41] "A Commentarie of the Creation of the Soule, which Plato describeth in his booke *Timaeus,*" in *The Morals*, Philemon Holland, trans. (London, 1603), p. 1031. Cited in Heninger, p. 74.

[42] McClain, p. 1.

this instance, the nature of the allegory is revealed in one key sentence.

One, two, three . . .

Plato makes it clear at the very beginning that number is the key component of the dialogue. He does so subtly, but its significance is not lost on McClain: "'One, two, three,' Socrates counts, opening the *Timaeus* dialogue with the numbers which generate the World-Soul."[43]

Socrates' question trails off into a seemingly innocuous remark about the number of guests for that day's symposium, "but where, my dear Timaeus, is the fourth of my guests of yesterday who were to entertain me today?"[44] We might be tempted to dismiss this opening sentence as small talk. This would be a mistake; experience with ancient literature, particularly of a cosmological nature, suggests that nothing should be overlooked and little should be taken at face value. Having seen the numbers 1, 2, and 3, or their equivalents in other symbolic forms, at the heart of several ancient cosmologies, very often at the very beginning of key works of literature or scripture, these numbers provide a clue regarding the purpose and underlying symbolism of the

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[43] McClain, p. 57.

[44] *Timaeus*, 17a.

dialogue. Plato is setting out to describe the structure of the cosmos and having seen the cosmological context in the ancient world, with which Plato would have been familiar, will be helpful in interpreting the complex and obscure myth that Plato is about to unfold.

The Three Steps of Creation

The importance of the first three numbers is evident in the central image of the dialogue, the creation of the World Soul, a process that requires three steps. Beginning from the unity of the primordial chaos, Plato's creator isolates the fundamental duality of Sameness and Difference. These are combined into a third, compound substance that is subdivided into harmonious, integer proportions, "reassembling it according to both the musical pattern of the Dorian tetrachord and the mathematical pattern of the three 'means' (arithmetic, harmonic and geometric) until it is all 'used up'".[45] As a third step, the substance is divided lengthwise into two strips which are bent round into two circles which then rotate around each other to form the circles of the Same and the Different.

Commentators are divided on the meaning of this image. Some feel he is referring to the division of the monochord.

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[45] McClain, p. 58.

Others, such as Desmond Lee, believe he is referring to the model of the solar system known as an armillary sphere.[46] These are reasonable interpretations, but central to Plato's symbolism is the qualities of the numbers themselves, as understood from the Pythagorean perspective.

Existence, Sameness and Difference

The essential tripartite value at the heart of Plato's *Timaeus* cosmogony is expressed as follows: "From the indivisible, eternally unchanging Existence and the divisible, changing Existence of the physical world he mixed a third kind of Existence intermediate between them."[47] In the Platonic view of the universe, existence has two poles, the absolute, eternal, unchanging realm of the Good wherein reside the ideal forms, and the relative, ever-changing realm of physical manifestation filled with objects that are, at best, impermanent, at worst, illusory. In short, these are the very realms of Being and Becoming that Timaeus brought to our attention at the beginning of the discourse, reflecting the Pythagorean emphasis on the "incorporeal essences" of true Beings, rather than the "corporeal and material forms, which arise and decay without ever truly

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[46] See Lee, p. 46.

[47] *Timaeus*, 35.

existing."[48] The three elements in Plato's scheme are these two poles with a third value intermediate between them. This reflects the principle that Plato has already enunciated, "...it is not possible to combine two things properly without a third to act as a bond to hold them together. And the best bond is one that effects the closest unity between itself and the terms it is combining."[49]

Plato's demiurge follows this process, establishing an intermediary aspect between two extremes. This could have been accomplished in one stage but the Creator is not satisfied with this. Following the tripartite pattern suggested in the opening sentence, the demiurge continues the process through three steps. The second and third steps of composition of the World Soul continue thus:

> . . . again with the Same and Different he made, in the same way, compounds intermediate between their indivisible element and their physical and divisible element: and taking these three components he mixed them into [a] single unity, forcing the Different which was by nature allergic to mixture, into union with the Same, and mixing both with Existence.[50]

With the concepts of Sameness and Difference, Plato is again dealing with ideal forms of knowledge with a variety

[48] See note 3, p. 271, above.

[49] *Timaeus*, 31.

[50] *Timaeus*, 35b.

of meanings. On one hand, the terms are related to basic principles of logic, as Plato held that reasoning consisted essentially of judgments of sameness (affirmation) and difference (negation).[51] They also represent the values of number in the fundamental dualism of the Pythagorean number symbolism that we examined in detail in Chapter IV. Nicomachus, as Cornford reports, makes a connection between the Pythagorean concepts of monad and dyad and Plato's notion of sameness and difference:

> Nicomachus . . . tells us that the ancients, Pythagoras and his successors, found 'the other or otherness' in 'two','the same or sameness' in 'one'. They regarded 'one' and 'two' as the principle of all things.[52]

In keeping with this concept, the Pythagoreans associated the value of two, or the dyad, with a list of ten fundamental pairs of opposites, as preserved by Aristotle:[53]

limit	unlimited
odd	even
one	plurality
right	left
male	female
at rest	in motion

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[51] Lee, p. 46.

[52] Francis M. Cornford, *Plato and Parmenides* (New York: Liberal Arts Press, 1957), p. 9.

[53] See "Metaphysics," 1-5, 986a, in *Collected Works of Aristotle*, Jonathan Barnes, ed., Bollingen Series LXXI-2 (Princeton: Princeton University Press, 1984), p. 1559.

straight	crooked
light	darkness
good	evil
square	oblong[54]

It is beyond the scope of the present inquiry to show how each of these pairs is related to the extremes of Being and Becoming. Suffice it to say that there is a correspondence between the first pair, Limit and Unlimited, and the other dichotomy, that of Sameness and Difference. The word Limit can be misleading in this context. The Greek word is *peras*, and it indicates not so much a limitation as a highly ordered state. Conversely, *apeiron* suggests an indefinite, poorly defined value, lacking in order. Whatever dualities we consider, however, the narrative makes it clear that such a duality is necessary, but not sufficient for the creation of any phenomena. A third step is required. In Plato's scheme, as presented here, and in accordance with the recurring symbolism seen in Chapter IV, creation is the result of the emergence of the triad from the dyad. For Plato, this occurs through the reconciliation of opposites by a third term, or mean, a compound "intermediate between their indivisible element and their physical and divisible element."[55] In keeping with this scheme, a third step is

[54] Guthrie, p. 23.

[55] See note 50, p. 298, above.

necessary to arrive at the final composition of the soul. According to Cornford,[56] this gives the following three-part structure to the composition of the World Soul:

First Mixture	Second Mixture	Final Mixture
Indivisible Existence Divisible Existence	Intermediate Existence	
Indivisible Sameness Divisible Sameness	Intermediate Sameness	Soul.
Indivisible Difference Divisible Difference	Intermediate Difference	

The end result is three steps, alternating differentiation and re-integration at each point, to arrive at a unified element: mind stuff.

Division, Number and the Musical Scale

This brings us to the heart of Plato's musical-mathematical cosmology. Having used three steps to turn the triadic mind-stuff into a single substance, the demiurge now divides it further.

> He first marked off a section of the whole, and then another twice the size of the first; next a third, half as much again as the second and three times the first, a fourth twice the size of the second, a fifth three

[56] F. M. Cornford, *Plato's Cosmology: The Timaeus of Plato* (London: Routledge & Kegan Paul, 1956), p. 61.

> times the third, a sixth eight times the first, a seventh twenty-seven times the first.[57]

Again, Plato is exploiting the numbers one, two, and three. There is no more complete way of doing this as the sequence of numbers given, 1, 2, 3, 4, 9, 8, 27, is nothing other than the first three powers of the first three numbers, that is, 1, 2, 3, 2 squared, 3 squared, 2 cubed, and 3 cubed.[58] Timaeus is thus giving the full *dimensions* of the universe, using a numerical, Pythagorean, form of symbolism wherein square and cube numbers signify two-dimensional planes and three-dimensional solids. This is not the only significance of this sequence. Beginning with the earliest commentaries, those of Crantor, these values were displayed in a manner patterned after the Greek letter *lambda*

```
          1
         /\
        /  \
      /2  3\
      /      \
    /4      9\
    /          \
  /8         27\
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Now comes the musical part.

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[57] *Timaeus*, 35.

[58] 1 squared and 1 cubed are both equal to 1 and are therefore omitted from the sequence.

> Next he filled in the double and treble intervals by cutting off further sections and inserting them in the gaps, so that there were two mean terms in each interval, one exceeding one extreme and being exceeded by the other by the same fraction of the extremes, the other exceeding and being extended by the same numerical amount. These links produced intervals of 3/4 and 4/3 and 9/8 within the previous intervals, and he went on to fill all intervals of 4/3 with the interval 9/8; this left, as a remainder in each, an interval whose terms bore the numerical ratio of 256 to 243. And at that stage the mixture from which these sections were being cut was all used up.[59]

We recognize the resulting structure as the Dorian scale in Pythagorean tuning. This description has led to an enormous amount of commentary. Plato's description is sufficiently general to allow for many different realizations of the basic formula which he sets forth, realizations that bring out both the arithmetical and the musical qualities of the basic relationships. Of greatest importance is the use of the means.

Three kinds of means, or mathematic divisions, were commonly used in Pythagorean arithmetic, the arithmetic, the harmonic and the geometric. Of these Plato uses the first two, the arithmetic (exceeding and being exceeded by the same numerical amount) and the harmonic (exceeding one extreme and being exceeded by the other by the same fraction

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[59] *Timaeus*, 36a-b.

of the extremes). To demonstrate these using all whole numbers, we can take the sequence:

6 8 9 12

The number 9 is the arithmetic mean in the sequence 6 : 9 : 12, as the difference between 6 and 9 and between 9 and 12 is the same. 6 : 8 : 12, on the other hand, demonstrates the harmonic mean where the ratio between the differences is the same as the ratio between the extremes, (12 - 8 : 8 - 6, or 4 : 2 = 12 : 6 or 2 : 1) or, as Plato might have expressed it, because 8 exceeds 6 by one-third of six and is exceeded by 12 in the amount of one third of 12.

These two means are significant because of the elegance, and symbolic significance, of the resultant 6 8 9 12 sequence. Here the two series dovetail perfectly into a pattern of inverse symmetry, thus:

	3:4			2:3		
6		8		9		12
		2:3			3:4	

We recognize here the essential framework of the diatonic scale:

6	8	9	12
C	F	G	C
Tonic	Sub-dominant	Dominant	Tonic

We also recognize the weights of the hammers discovered by Pythagoras in the blacksmith's shop.

Having inserted the two kinds of means between extreme values to create the 6 8 9 12 sequence, Plato recognizes the resultant intervals of 3 : 2, 4 : 3 and 9 : 8, and from these he selects the 9 : 8 ratio as his basic unit in forming the scale, doing this by filling up all intervals of 4 : 3 with the intervals of 9 : 8. This is the formula for the construction of the Dorian tetrachord, and carrying it out through a whole octave generates the relationships which we recognize as the Pythagorean scale:

Series:	1	9:8	81:64	4:3	3:2	27:16	243:128	2
Intervals:	9:8	9:8	256:243	9:8	9:8	9:8	256:243	

This involves only the first few numbers of the original series (although we should note that Plato has introduced the number 4 into the process, if only because, within the octave, 3:4 is the reciprocal of 2:3). There are, however, a number of ways of generating number series from the processes Plato describes, and many of these have been explored by commentators in recent years.

Modern Analyses

Ernest McClain

Among modern writers, it is Ernest McClain who analyzes these number sequences in terms of musical phenomena, believing them to be at the root of most, if not all, of the symbolism found in Plato's writings. McClain's interpretation of these passages consists largely of extensions of realizations by ancient writers, including Crantor, Nichomachus and Proclus.[60]

There are two main ways of generating numerical realizations of Plato's description, both of which contain much information, both musical and arithmetical. The first of these is somewhat more complex, consisting of an arithmetic sequence "exponed in one row". [61]The resultant series begins at the number 768, which is the smallest number that will allow all the relevant operations to be performed on the whole series from 1 to 27 with all whole numbers resulting. In McClain's words:

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[60] See McClain, Appendix I, pp. 135-163.

[61] See fig. 29, p. 307, and McClain, p. 61.

Item	Completed Progression	Falling Pitch	Rising Pitch	Original "Portions"	"Means" Inserted
1.	768	D	D	1	6
2.	864	C	E		
3.	972	Bb	F#		
4.	1024	A	G		8
5.	1152	G	A		9
6.	1296	F	B		
7.	1458	Eb	C#		
8.	1536	D	D	2	12
9.	1728	C	E		
10.	1944	Bb	F#		
11.	2048	A	G		16
12.	2187	Ab	G#		
13.	2304	G	A	3	18
14.	2592	F	B		
15.	2916	Eb	C#		
16.	3072	D	D	4	24
17.	3456	C	E		27
18.	3888	Bb	F#		
19.	4096	A	G		32
20.	4374	Ab	G#		
21.	4608	G	A		36
22.	5184	F	B		
23.	5832	Eb	C#		
24.	6144	D	D	8	48
25.	6561	Db	D#		
26.	6912	C	E	9	54
27.	7776	Bb	F#		
28.	8192	A	G		
29.	8748	Ab	G#		
30.	9216	G	A		
31.	10368	F	B		81
32.	11664	Eb	C#		
33.	12288	D	D		
34.	13122	Db	D#		
35.	13824	C	E		108
36.	15552	Bb	F#		
37.	16384	A	G		
38.	17496	Ab	G#		
39.	18432	G	A		
40.	19683	Gb	A#		
41.	20736	F	B	27	162

Fig 29: Portions of the World Soul "Exponed in One Row"

> Notice that the first octave shows the model diatonic scale; in later octaves, chromatic tones appear as members of overlapping tetrachords. The last octave 1 : 2 = 10,368 : 20,736 summarizes the entire tonal material, showing that the sequence consists merely of octave replications of ten different tone-values.[62]

We can derive more information from the second method of setting forth these values that McClain gives us. This is developed from a table of proportions after Nichomachus and consists of a triangular matrix with the powers of 2 along one side, the powers of 3 along the hypotenuse and the resultant ratios of 3:2 in the vertical columns:

											Frequency	Wave Length
1	2	4	8	16	32	64	128	256	512	=	A	G
	3	6	12	24	48	96	192	384	768	=	D	D
		9	18	36	72	144	288	576	1152	=	G	A
			27	54	108	216	432	864	1728	=	C	E
				81	162	324	648	1296	2592	=	F	B
					243	486	972	1944	3888	=	Bb	F#
						729	1458	2916	5832	=	Eb	C#
							2187	4374	8748	=	Ab	G#
								6561	13122	=	Db	D#
									19683	=	Gb	A#

Fig. 30 - The Lambda Pattern of Nicomachus[63]

[62] McClain, p. 62.

[63] McClain, p. 63.

McClain's note to this diagram reads as follows:

> Plato's table has been "rotated" between his own century and that of Nicomachus (c. 100 A.D.), this arrangement proving more convenient for writing. The table can be continued to infinity to contain all integer products of 2 and 3 in "continued geometric progressions" of 1:2, and 2:3, and 1:3. (Compare with Crantor's lambda in fig. 31.)[64]

There is a great deal of information in this table.

According to McClain:

> The table generates, in derivative patterns, the integers required for a model tetrachord, for a model octave, and, if continued far enough, for the entire Timaeus scale. Plato, with a genius for economy, failed to be very explicit about what we were to do with the creator's "portions" and thus opened a door to endless historical controversy; we have discovered that the alternatives his formula allows are all relevant in one way or another.[65]

The tetrachord emerges in a pattern which repeats throughout the table. Locating any octave pair, we can find the arithmetic mean just below the smaller number and the harmonic mean just above the larger. For example, see the pattern of 6 : 8 : 9 : 12. Similarly, within any triple, the arithmetic mean lies to the right of the smaller number and the harmonic to the left of the larger, as in

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[64] Ibid.

[65] McClain, p. 62.

6 : 9 :: 12 : 18. As McClain points out, this corresponds to the multiple musical functions as tonic, dominant and subdominant in a series of fifths. Extending the table far enough will result in the generation of any musical relationship within the limits of Pythagorean intonation. Here it is extended far enough to bring it to the number 19,683, which is close to the limit of the single row realization at 20,736. McClain finds "very strong Platonic confirmation of our construction" in the statement of Socrates that the standing army of Ancient Athens was "roughly some twenty thousand".[66] McClain takes this fact, along with many others, to support

> . . . a thesis which none of us could have anticipated: not only are all of Plato's mathematical allegories capable of a musical analysis--one which makes sense out of every step in his arithmetic--but all of his allegories taken together prove to be a unified treatise on the musical scale.[67]

The Lambda, Plato's Cross and the Means

It is not only the musical scale that receives a treatment as mathematical allegory in the *Timaeus*, according to McClain. He finds a similar numerical matrix underlying the next section, in which Plato described the construction

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[66] McClain, p. 63.

[67] McClain, p. 3.

of the Circle of the Same and the Circle of the Different, the section at the heart of the music of the spheres tradition:

> He then took the whole fabric and cut it down the middle into two strips, which he placed crosswise at their middle points to form a shape like the letter X; he then bent the ends round in a circle and fastened them to each other opposite the point at which the strips crossed, to make two circles, one inner and one outer. And he endowed them with uniform motion in the same place, and named the movement of the outer circle after the nature of the Same, of the inner after the nature of the Different. The circle of the Same he caused to revolve from left to right, and the circle of the Different from right to left on an axis inclined to it; and made the master revolution that of the Same. For he left the circle of the Same whole and undivided, but slit the inner circle six times to make seven unequal circles, whose intervals were double or triple, three of each; and he made these circles revolve in contrary senses relative to each other, three of them at a similar speed, and four at speeds different from each other and from that of the first three but related proportionately.[66]

McClain refers back to the Lambda pattern in this context. Pointing out that Pythagorean theory associates the number one with existence, even numbers with difference and odd with sameness, a version of the Lambda can be constructed as follows:

---

[66] *Timaeus*, 36c-d.

```
          Existence
              1
             /\
            /  \
           /2  3\
          /      \
         /4      9\
        /          \
       /8          27\

   Difference     Sameness
```

Fig. 31 - Crantor's Lambda[69]

From this, Plato sets up the pattern of the Greek letter Chi, which is in the form of the letter X. He does this by extending reciprocals in a mirror pattern:

```
1/27                1/8    B                  D
    1/9          1/4          E           D
        1/3    1/2              A      D
             1                     D
        2      3                D      G
    4             9          D            C
8                   27     D                  F
```

Fig. 32 - Plato's Cross (Chi = X)[70]

From here he fills in the means:

[69] McClain, p. 65.

[70] Ibid.

1/27 1/18 1/12 1/8	B E A D
1/9 1/6 1/4	E A D
1/3 1/2	A D
1	D
2 3	D G
4 6 9	D G C
8 12 18 27	D G C F

Fig. 33 - Plato's Cross With The Means Inserted

Every row of "pebbles" in any direction, is a logarithmic sequence showing the world's "best bonds, . . . continued geometrical proportion." (Numbers are interpreted here as multiples of string length or wave-length. If they are interpreted as multiples of frequency then upper and lower halves of the tonal interpretation are interchanged.)[71]

This gives us a matrix from which much information can be read. McClain interprets the splitting up of the inner circle as referring to generating the seven tones of the scale through selection of a series of fifths from across the matrix. Again we find arithmetic relationships revealing musical possibilities, here in the context of a supposedly astronomical schema. McClain sees this as an abstraction, by no means a literal description of the heavens typical of the

[71] McClain, p. 67.

more traditional interpretation of this passage that led to the idea of the Harmony of the Spheres and centuries of speculation in astronomy.

McClain's analysis reveals that a sophisticated numerical symbolism lies at the heart of the *Timaeus* and that musical relationships are the key, or at least one key, to unlocking these puzzles and riddles. The exact purpose of these musical allegories, even if we accept them, is less clear, however. Further work in this area may help to clarify the purpose of this obscure symbolism.

John Michell and the Ancient Canon

Another writer commenting on Plato's *Timaeus* is John Michell, who has written extensively on the canon of number that appears to have existed throughout ancient cultures from as long ago as megalithic times. He confirms from the outset that, in his view, the numerous commentaries have failed to clarify Plato's symbolism. He writes: "A riddle which has defeated some of the sharpest minds from classical times onward is not likely to be solved by any of the methods previously tried."[72] He attempts to move our

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[72] John Michell, *The Dimensions of Paradise: The Proportions and Symbolic Numbers of Ancient Cosmology* (San Francisco: Harper & Row, 1988), p. 163.

understanding forward by placing Plato's work into the context of this ancient canon. After extensive analysis of a wide range of phenomena, from megalithic monuments to the traditions of sacred geometry and the hidden meanings of the scriptures of various cultures, Michell suggests the existence of a common symbolism based on number.

> The special regard paid to mathematical studies in the ancient world arose from the understanding that number is the mean term in the progression from divine reason to its imperfect reflection in humanity. At some very early period . . . certain groups of numbers were brought together and codified. Thus was created that numerical standard, or canon of proportion, which was at the root of all ancient cultures and was everywhere attributed to some form of miraculous revelation. It was taken to be the nucleus and activating principle of number generally, a summary of all the types of progressions and relationships which occur within the field of number and thus a faithful image of the numerically created universe.[73]

Michell's analysis overlaps McClain's to a large extent, describing the use of musical intervals in determining the proportions of the World-soul. From this point, however, Michell goes one step further:

> It is not doubted that Plato intended the World-soul to form a musical scale extending over four octaves and a major sixth. Yet that was not his only intention. In accordance with the Pythagorean doctrine of the primacy of number, he depicted the essence of the universe, its Soul, as a numerical sequence containing every canonical form of harmony and proportion discovered in music, geometry and the philosophical study of nature.

[73] Michell, p. 7.

> The World-soul is more than a scale of music, which is but one of its aspects. Throughout his account of how it was constructed Plato clearly implies that it was first and foremost a code of number. From it he derived the natural formulas which, he believed, should be followed by artists and musicians and which he made the basis of his own philosophy.[74]

In attempting to show the connection between Plato's dialogue and this ancient code of number, Michell analyzes the various sequences of numbers associated with the World-soul, assembles them into an aggregate value, and compares this with similar numbers from other sources of sacred numerology such as the *Timaeus Lochrius* (first century C.E.), the work of Theon of Smyrna (second century C.E.), and the *Timaeus* commentary of Proclus (c. 410-c. 485), as well as the contemporary analysis of A. E. Taylor. The results are not completely conclusive and, in fact, reveal what Michell feels to be ambiguities in Plato's description. Indeed, when it comes to the description of the motions of these spheres, Michell emphasizes the difficulties of interpretation: "His description of their motions and their relationships to the planetary orbits is so obscure and complicated that no one from Aristotle onwards has claimed to be much the wiser for studying it."[75]

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[74] Michell, pp. 162-163.

[75] Michell, p. 169.

While Michell's work appears similar to McClain's in many respects, it goes one step further both by placing Plato's work into the context of an ancient canon of knowledge and by suggesting a purpose to the number patterns that Plato presents in the dialogue.

> Plato's evident intention was to identify number as the archetype of creation and to draw attention to those particular numbers which constitute its core and which, in various combinations, generate the entire field of number. His purpose was to provide for the use of rulers and reformers an objective standard, thus allowing statecraft to become a science, firmly based on those numbers and proportions which constitute the essence of the universe.[76]

Whatever Plato's intentions, many mysteries and enigmas continue to surround the numbers and proportions he describes, and interpretations of their significance continue to proliferate. Several of these emphasize the significance of the lambda formation.

The Lambda and the Lambdoma

The central and "most perplexing and difficult" section of the *Timaeus* revolves around the symbolism of the numbers 1,2,3,4,8,9,27. We have seen that these represent the first three powers of the numbers one, two and three first mentioned by Socrates at the beginning of the dialogue and

[76] Michell, p. 169.

associated with the fundamental principles, Existence, Sameness and Difference. We have also seen the significance of organizing these numbers according to the relationship of the three means: arithmetic, harmonic and geometric.

A further extension of this symbolism, as we have seen, revolves around the symbol of the Greek letter lambda that serves as a form for the arrangement of these numbers thus:

```
            Existence
                1
               /\
              /  \
            /2  3\
           /      \
          /4       9\
         /           \
        /8          27\

    Difference     Sameness
```

There have been many variations and extensions of this diagram. We will look at two of these.

Keith Critchlow and Harmonic Symmetry

Keith Critchlow is the head of research for the Prince of Wales Institute of Architecture and a leading authority on sacred mathematics. In his foreword to *The Theology of Arithmetic,* an ancient text attributed to Pythagoras' biographer Iamblichus,[77] he investigates the internal symmetries of Plato's 1,2,3,4,9,8,27 sequence, taking as his starting point their *Lambda* arrangement.

```
       1
      /\
     /  \
    /2  3\
   /      \
  /4      9\
 /          \
/8          27\
```

Critchlow suggests that the Lambda can be seen as a form of *Tetraktys*. "Even if Plato himself did not suggest the lambda form in the *Timaeus*," he writes,

> . . . yet because the convention of triangular numbering and the image of the Tetraktys in four lines of dots were completely familiar to the Pythagoreans of the day, it would be inevitable that they would make the comparison. The idea of doing so is not new: the pattern we are about to look into was published by the Pythagorean Nicomachus of Geresa in the second century A.D.[78]

Following the progression of the right leg of the *Lambda* as 1x3=3,x3=9,x3=27, he shifts this to the position of 2 and obtains 2x3=6,x3=18. The diagonal from 4 gives 4x3=12.

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[77] Keith Critchlow, foreword to (attributed to) Iamblichus, *The Theology of Arithmetic: On the Mystical, Mathematical and Cosmological Symbolism of the First Ten Numbers,* Robin Waterfield, trans. (Grand Rapids, Michigan: Phanes Press, 1988).

[78] Critchlow, p. 13.

```
          1
         /\
        /  \
       /2   3\
      /   \   \
     /4    6   9\
    /  \    \   \
   /8   12   18 27\
```

Following the same process using the powers of two from the left leg produces the same results as 3x2=6,x2=12 and 9x2=18.

```
          1
         /\
        /  \
       /2  3\
      /   /  \
     /4  6    9\
    /   /   /  \
   /8  12  18 27\
```

Critchlow then uses the filled-in Tetraktys to demonstrate the insertion of the means as described by Plato.

> The means set up proportional unions between extremes and are therefore in themselves the epitome, in mathematical terms, of the mediating principle—in common with the definition of *psyche* ('soul') as mediating between the metaphysical (intelligible) domain and the physical (sensible) domain. The means are set in a hierarchical tendency, as one might call it. The geometrical is the most heavenward (metaphysical), the harmonic the most central (psychic and anthropological), and the arithmetic the most earthward (physical).[79]

[79] Critchlow, p. 17.

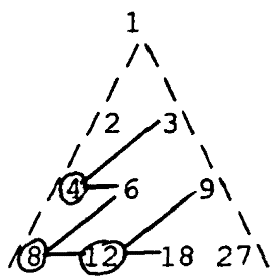
All three of these means are demonstrated within the *Lambda/Tetraktys* figure. We have dealt with two of these in considering the 6,8,9,12 sequence discovered by Pythagoras. The third proportion, the geometric mean, occurs when the terms in a sequence of numbers differs from its immediate predecessor by a constant ratio. Such a sequence appears on each leg as the powers of 2 and 3.

```
        1
       /\
      /  \
    /2   3\
    /      \
  /4   6   9\
  /          \
/8  12  18 27\
```

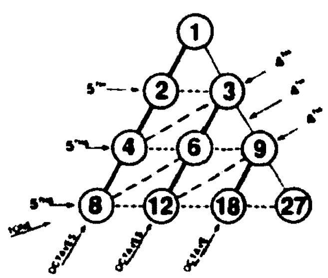
The following shows the symmetry of the arithmetical proportions, 2,3,4, and 4,6,8, and 6,9,12 with 3, 6 and 9 acting as the mean or mid-terms.

```
        1
       /\
      /  \
    /2   3\
    /      \
  /4   6   9\
  /          \
/8  12  18 27\
```

Similarly, the harmonic means, in which ". . .the mean exceeds one extreme and is exceeded by the other by the same fraction of the extremes (see *Timaeus* 36),"[60] can be seen with the progressions 3,4,6; 6,8,12; and 9,12,18 within the figure as follows:



All of these relationships are filled in below, along with the musical ratios of octaves (2:1), fifths (3:2), fourths (4:3), and the whole tone (9:8).



Critchlow goes on to focus on the number six that lies at the center of the diagram:

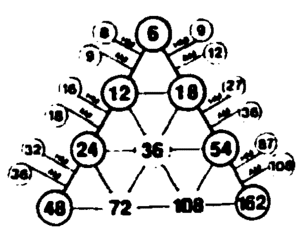
[60] Critchlow, p. 18.

```
            1
           /\
          /  \
        /2   3\
       /       \
     /4   6    9\
    /            \
  /8  12   18  27\
```

Following Francesco Giorgi[81] (who was inspired by Ficino's commentary on the *Timaeus)*, the whole number sequence can be shifted to represent a new pattern based on the number 6.

```
             6
            /\
           /  \
       12/     \18
         /       \
     24/   36    \54
       /           \
  48/  72    108   \162
```

This allows the insertion of the arithmetic and harmonic means as follows:



[81] *De Harmonia Mundi Totius* (Venice, 1525).

giving the sequence: 6,8,9,12,16,18,24,27,32,36,48,54,81, 108,162. The original numbers are underlined. The others are arithmetic and harmonic means and "display musical ratios."[82] Critchlow says Giorgi describes these relationships in terms of three ontological domains, the geometric referring to the heavenly or theological realm, the arithmetic to the earthly or cosmological and the harmonic as "the harmony of the other two," which Critchlow interprets as ". . . the human, psychological or anthropological domain. This links the three domains through the metaphor of musical proportion, and with the pattern of the Sacred Decad or Tetraktys."[83] His conclusion reinforces the significance of symbolism in Pythagorean lore in general and the *Timaeus* in particular. "Our intention," he writes, "is mainly to indicate that the 'literature' of the Pythagorean tradition tends to be *a stimulus or an aid for the mind in its recall of the unwritten doctrines*" (emphasis mine).[84] This is another perspective that argues against interpreting these dialogues too literally.

[82] Critchlow, p. 19.

[83] Ibid.

[84] Ibid.

Critchlow gives a further demonstration of the potential applications of this numerical symbolism. He sums up what he sees as its significance:

> Taken arbitrarily, such facts can seem curiosities and usually do to those ignorant of arithmosophy, yet in the light of a wisdom teaching they demonstrate particular depths of symbolic value and meaning lying within the arrangement of numbers. These examples of interpretation are an indication that Plato put forward the Lambda pattern in the first instance as one of profound signification and yet left the inquiring mind to unfold the layers of meaning and the 'Pythagorean' source for themselves.
>
> It has been said that written teachings are only ever partial (the Platonic *Seventh Letter* says as much), so we should expect the patterns given in the study of arithmosophy to appear simple and yet reveal more through sincere and genuine seeking.[85]

From both a mathematical and a musical perspective, it appears that Plato has set forth a theme that has lent itself to multiple variations. Plato himself refers to such as the "prelude to the main theme."[86] Before returning to our consideration of the main theme we will indulge in one more elaborate variation.

Hans Kayser and the Pythagorean Table. While the lambda arrangement of the *Timaeus* number sequence is found in several ancient commentaries, for its modern development as the Lambdoma, or Pythagorean Table, we have to turn to

[85] Critchlow, p. 21.

[86] *Republic,* 531c.

Albert von Thimus. Von Thimus' major source was Iamblichus, in his commentary on Nicomachus's treatise on arithmetic, where the formation of the Lambdoma is described as follows:

> Let us first take a unit, and describe from one corner of the same a figure in the shape of the Lambda Λ (the Greek L), and let us fill out one side of the line with the numbers adjoining the unit, going just as far forward as we wish--for example 2 3 4 5 6 etc. Then we fill the other side, beginning with the next largest part, which is one half its size [1/2], with 1/3, 1/4, 1/5, 1/6 etc. Thus we may observe the interplay of the corresponding reciprocals, and we shall see that balance of interconnected and well-ordered relationships which we have just described.[67]

In its lambda form the diagram is drawn thus:

```
        1/1
      2/1  1/2
    3/1      1/3
  4/1          1/4
5/1              1/5
                     etc.
```

---

[67] Nehmen wir vorab die Einheit, und beschreiben wie von einem Winkel derselben aus, eine Figur in Gestalt des Lambda und füllen die eine der Seiten der Reihe nach mit den an die Einheit sich anschliessenden Zahlen, so weit fortschreitend als wir eben wollen z. B. 2 3 4 5 6 7 u. s. w., die andere Seite aber, beginnend von dem grössten der Theile, welcher das seiner Grösse nach dem Ganzen zunächstliegende Halbe ist, der Reihe nach mit den hieren sich anschliessenden Theilen 1/3 1/4 1/5 1/6 1/7 u. s. w., so wird sich unseren Blicken das erwähnte Wechselspiel des Einander ausgleichenden zeigen, und wir werden jenes Gleichgewicht des Mitverknüpften, und das wohlgegliederte Verhältniss sehen, welches wir eben bezeichneten. Von Thimus, vol. I, p. 133-134. Author's translation.

He followed logically the indications for filling out the diagram, and also, on practical grounds, turned the whole figure 45° to produce the following schema:

1/1	1/2	1/3	1/4	1/5	. . . etc.
2/1	2/2	2/3	2/4	2/5	
3/1	3/2	3/3	3/4	3/5	
4/1	4/2	4/3	4/4	4/5	
5/1	5/2	5/3	5/4	5/5	
.					
.					
etc.					

Kayser adopted this format and used it as a basis for his many-layered interpretations. In the process he discovered that this numerical table possesses an astonishing number of applications, in arithmetic, geometry, acoustics, crystallography, and cybernetics, and also allows many philosophical and theological interpretations.[88] This enabled him to corroborate the old traditions which spoke of the universal validity of a legendary "Pythagorean Table."

Siegmund Levarie and Hans Levy have written extensively about Kayser's work; in fact, Levy worked with Kayser for

[88] Rudolph Haase, "Harmonics and Sacred Tradition," Marton Radkai, trans., in Joscelyn Godwin, ed., *Cosmic Music: Three Musical Keys to the Interpretation of Reality* (Rochester, Vermont: Inner Traditions International, 1989), pp. 93-94.

some time in Europe. In an overview of Kayser's work, they summarize his contributions to "mathematics and music, philosophy and theology, architecture, physical science, and organic science."[89] Kayser himself speculated widely on many aspects of these fields, taking as his starting point the basic theorems of harmonics derived from the table.[90] He also wrote volumes specifically devoted to philosophy,[91] Greek architecture,[92] and botany[93] as well as articles on a wealth of other subjects. The complete Pythagorean Table is given at fig. 34.

Timaeus as Symbol

It can be seen that the applications of the musico-mathematical symbolism at the heart of Plato's cosmology, as found in the *Timaeus* and developed by subsequent

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[89] Siegmund Levarie and Hans Levy, "The Pythagorean Table," *Main Currents in Modern Thought*, Vol. 30, No. 4 (March-April, 1974), p. 120.

[90] Hans Kayser, *Lehrbuch der Harmonik* (Zurich: Occident Verlag, 1950).

[91] Hans Kayser, *Akróasis, Die Lehre von der Harmonik der Welt* (Basel/Stuttgart: Schwabe & Co. Verlag, 1964).

[92] Hans Kayser, *Paestum* (Heidelberg, Lambert Schneider Verlag, 1958).

[93] Hans Kayser, *Harmonia Plantarum* (Basel: Benno Schwabe & Co. Verlag, 1945.

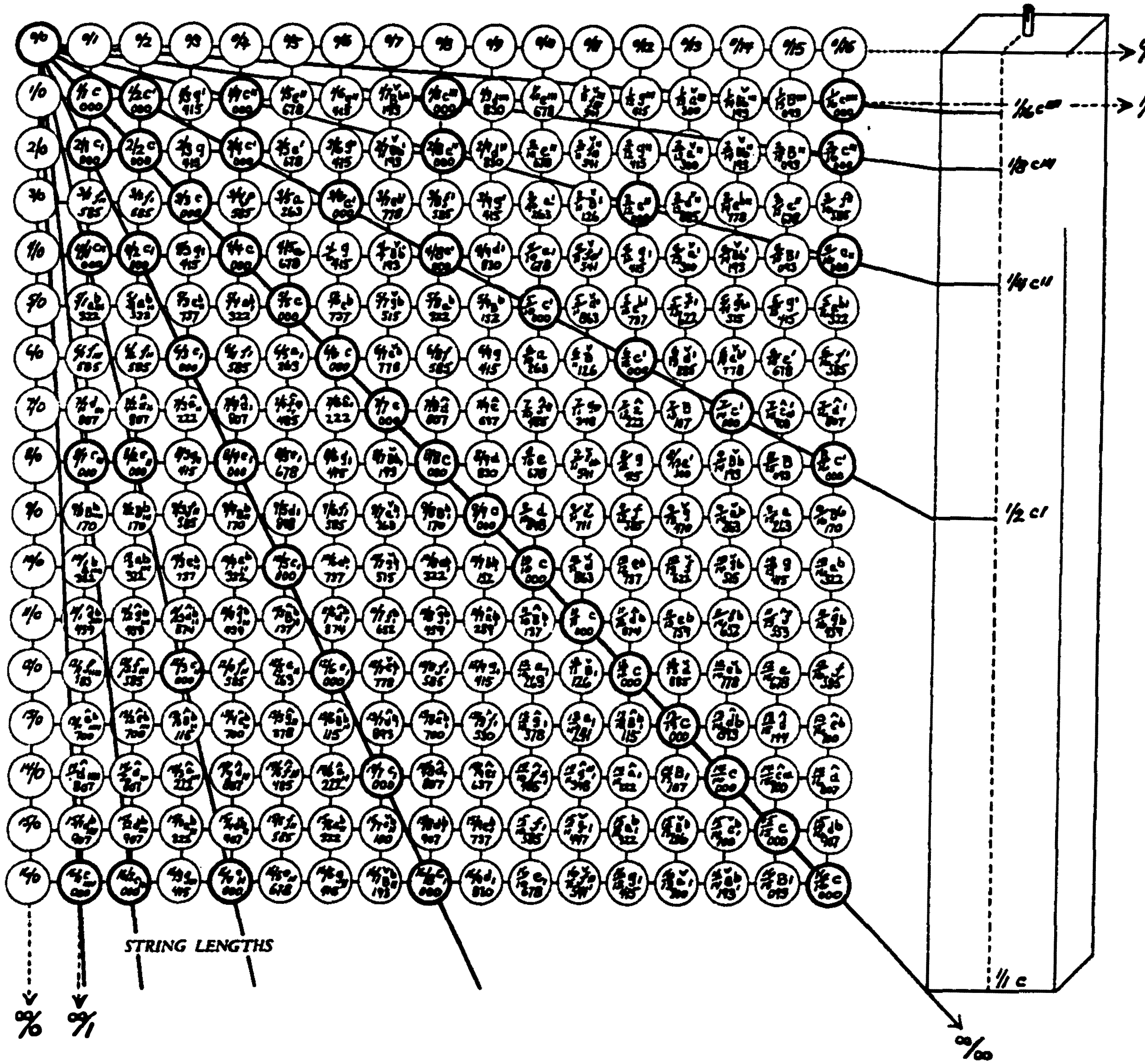

Fig 34 - The *Lambdoma*, or Pythagorean Table

contributors to the Pythagorean tradition, have a wide range of influence, illuminating many phenomena both in nature and in human thought. To pursue all of these is well beyond the scope of this study. The preceding sets forth some of the work in this area that makes it abundantly clear how dependent this dialogue is on a mathematical symbolism pregnant with potential interpretations. This will be important when we come to consider which of these interpretations were carried forward into the modern world. Before doing this, however, we can go one step further in our analysis of the symbolism involved. We will restrict our commentary to one brief statement within the dialogue.

One, Two, Three. . . But Where Is The Fourth?

We have already quoted Ernest McClain's observation that Plato opens the *Timaeus* dialogue with the numbers that generate the World-Soul, setting forth the essential meaning of the dialogue in seed form in a single statement: "One, two, three. . ." We have seen a series of mathematical riddles and puzzles that deal with the formation of the World Soul, all of which revolve around the numbers one, two, and three, and their various combinations and permutations. And we have had a hint of the extent of the speculative literature that these "riddles and puzzles" have spawned.

But there is more to the *Timaeus'* opening statement; it is actually a question: "SOCRATES: One, two, three--but where, my dear Timaeus, is the fourth of my guests of yesterday who were to entertain me today?"[94]

We have already suggested that this is not small talk. Our review of ancient literature in the previous chapter demonstrated the tradition, existing throughout the ancient world, to structure sacred literature in such a way that a great deal of information is contained in very few words, particularly the very first words of the text, like ciphers that "invest a few signs with much meaning."[95] As we saw in everything from the Rg Veda to Genesis, and to reiterate Suarès, "In the severity of its beginning, in its first chapter, in its first sequence of letter numbers, is the seed, and in the seed is the whole."[96]

This approach is in keeping with Pythagoras' call for teaching to be couched in symbolic language, his admonitions against overt or obvious expressions of knowledge, his

[94] *Timaeus*, 17a.

[95] Carlo Suarès, *The Cipher of Genesis* (York Beach, Maine: Samuel Weiser, Inc., 1992), p. 72. See Chap. IV, note 137, p. 232.

[96] Ibid.

tradition of teaching through "symbolically oracular sentences, wherein the smallest number of words were pregnant with the most multifarious significance."[97] What differentiates the Pythagorean expression in the *Timaeus* is its numerical form; indeed, we have seen that the processes described in the first part of the dialogue are based on the numbers 1, 2, and 3. In asking, "One, two, three, but where, my dear Timaeus, is the fourth?" Socrates invokes the whole range of Pythagorean-Platonic cosmology and the underlying order upon which it based. Thus the rest of the dialogue, perhaps the whole body of Pythagorean literature, can be said to be a commentary on this one expression.

Throughout Pythagorean number theory, as we have seen,[98] the number four represents completion. There are four aspects to the quadrivium: arithmetic deals with universal entities, music with relationships, geometry with space, astronomy with space and time. Considering the quadrivium in this sequence invokes the cosmogony that is symbolically invoked within each discipline; from universals come relationships that form the basis for space, time and the whole of creation. Whether it is the monad and the dyad, Brahman and Bindu, Tun and Atum, or other variations on this

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[97] See note 11, p. 276, above.

[98] See Chap. IV, pp. 162-163.

theme, the Primordial Scission allows the One to become the Many. In Pythagorean lore, the number 4, in the form of the tetrad, and associated with the Tetraktys, indicates closure, as the octave reiteration creates the sense of closure at the fourth partial. Thus, when Socrates asks, "where is the fourth?" he is asking for completion. As the *Timaeus* is involved with the creation of the world, Socrates is asking for it to be a complete picture, for the wholeness that is greater than the sum of the parts, for the *samhita* value of *rishi, devata* and *chhandas*, for *kosmos*.

At the beginning of the dialogue, Socrates makes it clear that he is seeking an ideal state including the element of life and movement that was lacking in the *Republic*. He had universals (arithmetic), relationships (music), and space (geometry). He is asking for the addition of the fourth dimension provided by astronomy, for the value of motion to be added to the values of point, line and plane. He is thus invoking the full range of his cosmogony from the full value of unity to the full value of diversity, while suggesting that the dialogue must be interpreted in terms of all of these levels. Above all, in presenting this entire cosmological structure, with multiple levels of interpretation in a variety of symbolic forms, *Plato is not* *limiting himself simply to a description of the physical solar system.*

There is, however, yet another level of interpretation to Socrates' statement, one that involves a critical understanding of the full range of creation from a somewhat different perspective. The impulse behind the *Timaeus* is essentially cosmological; it deals with the process of creation, moving outward from the realm of consciousness to the physical world. But one of the most famous and powerful of Plato's analogies deals with the opposite process, the inner process of education, of gaining knowledge. And, here again, Socrates' question, "One, two, three, . . . but where is the fourth?" is of great significance.

The Divided Line

It is not only in the *Timaeus* that Plato emphasizes the importance of the realm of Being over that of becoming. In the heart of the *Republic*, in a passage known as the analogy of the Divided Line,[99] and immediately preceding the better-known allegoryy of the Cave,[100] Plato sets forth perhaps the most explicit formulation of his theories of ontology and

[99] *Republic*, 509d-511e.

[100] *Republic*, 514a-521b.

epistemology. In light of the opening of the *Timaeus*, it is significant that he again draws upon a four-level hierarchy, of which the fourth, and for him the most important, is frequently overlooked. Judging from his description, it appears that disregarding this level of knowledge, which stems from direct experience of the Forms, and ultimately of the Form of the Good, is a significant error, as an entire dimension to his doctrine hinges upon this experience.

The Sun: Light and Intelligence. It is also significant for our consideration of Plato's cosmology that the Divided Line analogy follows, and to some extent draws and expands upon, an analogy that is derived from imagery of the sun. Known as the simile of the Sun, it is part of the section dealing with the Good as the ultimate object of knowledge.[101] Here Plato compares the light of the sun, which provides the light by which objects may be seen, with the inner light of intelligence, arising from its source, the Good, which enables the inner faculty of vision, or the mind's eye, to perceive the inner values of thoughts and Forms. He calls the two realms the visible and the intelligible. The Divided Line analogy takes this idea one stage further, dividing each of these realms into two sections. The resulting fourfold schemata also deals with the kind of mental

[101] *Republic*, 502d-509c.

activity through which each of the four realms may be apprehended. Three of these realms are well known through ordinary experience. A fourth is posited, however, that is reached through more unusual or esoteric means and throws light on the inner meaning of all of Platonic doctrine. "One, two, three, . . . but where is the fourth?"

The Four Realms. Dealing first with the external world, which he refers to as the "visible" realm, Plato divides this into two sub-sections, one containing merely "images," reflections or shadows of various objects, and the other realm containing the objects themselves, "the animals around us, and every kind of plant and manufactured object."[102] "Would you be prepared to admit," asks Socrates, "that these sections differ in that one is genuine, one not, and that the relation of image to original is the same as that of the realm of opinion to that of knowledge?"[103]

Moving to what he calls the "intelligible" realm, that of internal, mental objects, Plato again creates a higher and a lower division:

> In one sub-section the mind uses the originals of the visible order in their turn as images, and has to base its inquiries on assumptions and proceed from them not to a first principle but to a conclusion: in the other it moves from assumption to a first principle

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[102] *Republic*, 510a.

[103] Ibid.

> which involves no assumption, without the images used in the other sub-section, but pursuing its inquiry solely by and through forms themselves.[104]

This appears difficult to understand and, indeed, Socrates' questioner asks him to clarify the distinction. In order to do this, Plato points out that the mental processes utilized in mathematical reasoning not only uses visible images but require basic assumptions based on a knowledge of numbers, geometric figures and so forth. Starting from these we can proceed through consistent steps to a conclusion. He contrasts this with another mental process that is based not on the concept of any triangle, or square, or other figure, but starts from the actual *form* of that figure itself:

> . . . it treats assumptions not as principles, but as assumptions in the true sense, that is, as starting points and steps in the ascent to something which involves no assumptions and is the first principle of everything. . . the whole procedure involves nothing in the sensible world, but moves solely through forms to forms, and finishes with forms.[105]

Plato concludes by associating each of the four levels he has described with a specific state of mind:

> So please take it that there are, corresponding to the four sections of the line, these four states of mind: to the top section intelligence, to the second reason,

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[104] *Republic,* 510b.

[105] *Republic,* 511b

> to the third belief, and to the last illusion. And you may arrange them in a scale, and assume that they have degrees of truth possessed by their subject-matter.[106]

Plato scholar Jonathan Shear has arranged these levels in a scale that acts as a useful summary of the whole passage:

> The four levels of the Divided Line, and their respective objects, faculties, and types of knowledge or cognition can be summarized as follows:

Level	Object	Faculty	Type of Knowledge
IV	Forms	dialectic	transcendental cognition
III	mathematics etc.	thinking, reasoning	scientific understanding
II	physical objects	sense perception	common-sense belief
I	shadows	illusory perception	illusion[107]

Within the realm of the visible world it seems straightforward to rank the realm of physical objects higher than that of shadows and the realm of perception higher than that of illusion; it is less obvious when dealing with purely mental processes. Plato makes it clear throughout his writings that he regards mental activity as superior to perception of the physical world. In this analogy, however, Plato distinguishes two levels within mind. There is the

[106] *Republic*, 511e.

[107] Jonathan Shear, *The Inner Dimension: Philosophy and the Experience of Consciousness* (New York: Peter Lang, 1990), p. 12, note 2.

more obvious thinking level within which we deal with the objects of mathematics and arrive at scientific understandings. But, Plato tells us, there is also a higher level--that of the Forms themselves. Each of these levels makes use of a particular faculty or mode of thought. One of these is the well-known concept of Plato's dialectic. While normally thought to apply to level III in Shear's diagram, Plato places it at level IV. From closer examination, it appears that the dialectic has different forms that can be applied to both of these levels.

The Dialectic. It may appear confusing in the Divided Line scheme to find reference to the dialectic as a mental function higher than that of discursive thought and mathematical reasoning, since the dialectic is most frequently associated with these activities, especially the discursive argument through question and answer that has come to be known as the Socratic method. The following is a standard description of the dialectic:

> Now Plato's dialectical method, as everyone knows, begins in its basic form with the deductive reasoning of the classical Hellenic syllogism, where one formulates an adequate major premise, confronts it with a contrary and qualifying minor premise, and from this artificially induced confrontation derives a synthesis or conclusion. This play of 1) thesis, 2) antithesis,

> and 3) synthesis is at the root of all twenty of Plato's dialogues.[108]

As Desmond Lee points out, however, this definition results in "a term whose modern associations are quite misleading in interpreting the *Republic*."[109] Plato himself insists that the process of gaining knowledge "is not in reality what some people proclaim it to be in their professions."[110] It appears that we must count modern professors of philosophy among the professions in question. An exception is Jonathan Shear, who agrees with Lee. His definition is more precise, pointing out that Plato describes two distinct meanings, or levels, of the dialectic.

> Later in the dialogue [The *Republic*]. . . Plato distinguishes two phases of what he calls "dialectic." The first phase is there closely associated with disputation and discovery of contradictions, and thus appears discursive in nature. The second phase (begun later, after an intervening fifteen-year period of civil service), however, was to enable the most successful students to

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[108] David L. Hoggan, "Plato's Dialectic v. Hegel and Marx: An Evaluation of Five Revolutions," *The Journal of Historical Review*, vol. 6, no. 1, pp. 67-90.

[109] Lee, commentary on The *Republic* (1974), p. 311.

[110] *Republic*, 540a, trans. Paul Shorey, reprinted in *Collected Dialogues of Plato*, Edith Hamilton and Huntington Cairns, eds., Bollingen Series LXXI (Princeton: Princeton University Press, 1973), 518b, p. 750.

> turn upward the vision of their souls and fix their gaze on that which sheds light on all [and behold] the good itself.[111]

> It is thus clearly this second, final phase that Plato was referring to in the discussions of "dialectic" in the context of the Divided Line that we have been examining.[112]

Elsewhere, Shear clarifies the unique nature of this "second, final phase" of the dialectic:

> The dialectic, according to Plato, is so different from the discursive reasoning characteristic of mathematics and physics that he describes it as
>
> (a) turning the mind in the *opposite direction*,
> (b) employing a *different faculty*,
> (c) having *different objects* (as different as solid objects are from shadows and reflections), and
> (d) producing a different kind of knowledge, knowledge so different that it is likened to the difference between waking and dreaming, that is, the difference between *different states of consciousness*. [Shear's italics][113]

From this description, the final phase of the dialectic appears to be similar to an ancient Indian form of mental discipline known as jñana yoga. Shear here draws two conclusions. First he suggests that the use of the dialectic

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[111] *Republic* (trans. Shorey), p. 771.

[112] Shear (1990), p. 19.

[113] Jonathan Shear, "Maharishi, Plato and the TM-Sidhi Program on Innate Structures of Consciousness," *Metaphilosophy,* Vol. 12, No. 1 (January, 1981), p. 79.

results in something quite different from the discursive mode of discourse that philosophy is typically assumed to be. "The vision of the Good," writes Shear, "according to Plato, is of something quite extraordinary."[114] Second, Shear concludes that "there can really be no question ... that Plato intends us to recognize that *he is talking about some kind of experience.*"(Emphasis mine.)[115] He quotes Plato directly:

> the last thing to be seen and hardly seen [in the realm of the Forms] is the idea [Form] of the good, and ... when seen it must needs point us to the right conclusion that this is indeed the cause for all things of all that is right and beautiful ... being the authentic source of truth and reason ... and anyone who is to act wisely in private or public must have caught sight of this.[116]

Plato does indeed seem to be describing a process of direct experience rather than merely a thought process. Research by three other scholars supports this view.

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[114] Shear (1990), p. 18.

[115] Shear (1990), p. 18.

[116] *Republic* (trans. Shorey), 517b-d, pp. 749-50.

Ken Wilber and The Three Eyes of Knowledge

The idea that knowledge exists on different levels is not peculiar to Plato; such a theory of knowledge is common to many ancient cultures, including the medieval tradition of Christian mysticism. According to the psychologist Ken Wilber:

> St. Bonaventure, the great Doctor Seraphicus of the church and a favorite philosopher of Western mystics, taught that men and women have at least three modes of attaining knowledge -- "three eyes," as he put it (following Hugh of St. Victor, another famous mystic): the eye of flesh, by which we perceive the external world of space, time and objects; the eye of reason, by which we attain a knowledge of philosophy, logic and the mind itself; and the eye of contemplation, by which we rise to a knowledge of transcendental realities. . . . that particular wording . . . is Christian; but similar ideas can be found in every major school of traditional psychology, philosophy and religion.[117]

The eye of flesh covers both levels of external perception mentioned by Plato in the Divided Line allegory, but when we come to the inner, mental realm, there is a definite correspondence between Bonaventure's categories and the Platonic analysis. In each case the distinction is a critical one.

Having introduced the notion that these different ontological levels exist, Wilber suggest that different

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[117] Ken Wilber, *Eye to Eye: The Quest for the New Paradigm* (New York: Anchor/Doubleday, 1983), pp. 2-3.

categories of phenomena can be properly understood only if we clarify the different modes of gaining knowledge that result and the way in which they interact with one another. He sees a major difficulty arising when this consideration is overlooked, resulting in what he calls "category errors," where one kind of knowledge is mistaken for another. He goes on to point out numerous instances in the history of science, philosophy and religion in which such category errors have led to distortions and misunderstandings. Could this not also apply to the reading of the Platonic dialogues themselves?

The Good, The True, The Beautiful

Renée Weber thinks that it does. The key to this view takes us back once more to the admonition at the beginning of the dialogue. We can only understand Plato, writes Professor Weber, when we look beyond the physical world to the world of universals. In short, we certainly fail to realize the whole picture at levels one and two of the divided line.

> The truth about the sensible world thus lies in the intelligible world; mere percepts and facts cannot yield knowledge, since they lack the informing principle that alone can *explain* (not merely *describe*) them. To explain is to illuminate the seemingly isolated particular in the light of the universal. This

> process involves cosmic principles, for Plato's universe is organic and organismic, a living entity endowed with intelligence and a soul, as he says in the *Timaeus*. In consequence, nothing exists in isolation; the particular truth and being of everything is indissolubly wedded to the truth and being of the whole. Such an insight is wrung from experience only by arduous effort and philosophical training. It demands de-emphasizing the world of perception which, by virtue of its unrelated randomness, is inimical to the synoptic vision of truth.[118]

In an elegant analysis, Weber goes on to relate this epistemology to the cosmology in which all phenomena are related to the ultimate value, that of the Monad. At the same time, she explains why even the third level of the divided line is insufficient to provide comprehensive knowledge according to Plato.

> The ineffability of ultimates applies above all to the sacrosanct Platonic concept, the One, regarding which Plato demonstrates that all predication leads to contradictions (*Parmenides)*. He therefore ends the dialogue with an ontological generalization: "Then we may sum up the argument in a word and say truly: if One is not, then nothing is." (166) Thus, the limitless One can neither be defined nor described. For these reasons, Plato in the *Republic* rejects even the most exact and exalted of languages, mathematics, as insufficient to the region of Being, to which *dialectic* alone can lead us.
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> The stricture upon mathematics is striking, since in such works as *Meno, Phaedo, Republic,* and *Timaeus* Plato elevates it to the privileged human language. Yet even mathematics can be faulted on two counts: First,

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[118] Renée Weber,"The Good, The True, The Beautiful: Are They Attributes of the Universe?" in *Nature, Man, and Society: Main Currents in Modern Thought* (New York: Nicolas Hays, Ltd., 1976), p. 136.

it utilizes diagrams and equations, both of which are rooted in the sensible world (lines, chalk, dimensions, etc.) and hence subject to distortion. Second and more significant, even mathematics employs unexamined definitions, axioms and hypotheses, which are assumed but not known, to be true. By contrast, dialectic, "that other sort of knowledge," yields unmediated intuitive insight.

> [Dialectic] treats its assumptions not as first principles but as *hypotheses* in the literal sense, things "laid down" like a flight of steps [cf. *Symposium*] up which it may mount all the way to something that is not hypothetical, the first principle of all; and having grasped this, may turn back and . . . descend at last to a conclusion, never making use of any sensible object, but only of Forms, . . . (*Republic* 511)

If mathematics fails to explicate true being, all language will fail. Nevertheless, if being *could* be designated, Plato would do so in terms of goodness, truth and beauty.[119]

Goodness, truth and beauty are ultimate principles for Plato, yet exist in a paradoxical relationship as each one is descriptive of the highest form. This relationship can be explained, Prof. Weber suggests, by virtue of its parallels with a similar concept from Vedanta philosophy.

> To students of Indian philosophy, the Platonic concepts of good, true, and beautiful find correlates in *sat* (being), *cit* (consciousness), and *ananda* (bliss). Let us note that like Plato, the Indian philosophers denied the possibility of predicating any properties whatever of the ultimate, exemplified in their phrase *neti, neti*: "not this, not that." Nevertheless, they provide some approximate attributes for Brahman, the immutable principle of reality: it is

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[119] Weber, pp. 136-137.

> one rather than many, abstract and universal rather than concrete and particular; ideal and nonmaterial; eternal because uncompounded, i.e. "unborn"; infinite, not localized; hence field rather than finite thing; beyond words, thoughts, or concepts--"the one-without-a-second," as the Upanishads and later Shankara, propounding Advaita Vedanta, term it.
>
> Brahman, not a god but a principle, corresponds to Plato's intelligible world, the source of being and the principle of life. As in Plato, knowledge thereof leads away from sense experience; after consciousness becomes commensurable with the object it seeks, it can know true being. "The subtle Self . . . is realized in that pure consciousness wherein is no duality [the meditative state] . . . [120] [121]

From this parallel, Weber goes on to add her voice to the view that Plato's description of the dialectic parallels techniques derived from Eastern schools of philosophy.

> Meditation, we are told, transmutes the conditioned and partial into the unconditioned absolute. In Mahayana Buddhism, for example, the aim of meditation is to achieve the state of *sunyata*, emptiness, which is to say devoid of "self-nature" or delineable properties. It seems reasonable to conjecture that *meditation functions in Oriental philosophy as dialectic does in Plato*; both are direct, unmediated experiences of being that involve man's spiritual or higher consciousness. Just as dialectic is Plato's "coping stone of the sciences," surpassing even mathematics in its capacity to train us for "the contemplation of the highest of all realities" (*Republic* 533), so meditation is regarded as the unrivaled road to reality in Indian and Tibetan philosophy.[122]

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[120] *The Upanishads*, tr. Prabhavananda and Manchester (N.Y.: New American Library, 1957), p. 47. (Weber's note.)

[121] Weber, p. 138.

[122] Ibid..

This "contemplation of the highest of all realities" corresponds with the Pythagorean concept of "pure knowledge" as referred to by Daniel Boorstin in Chapter II,[123] that results in the purification, or *catharsis*, of the soul. Weber finds this concept of knowledge shard by Plato and the Indian tradition. "Genuine knowledge in both Platonic and Indian philosophy is wisdom, i.e., a non-dualistic *state of being* in which the knower, the known, and the process of knowing become one."[124] She goes on to cite the *Amritabindu* and *Svetasvatara Upanishads*:

> Like the butter hidden in cream, pure consciousness resides in every being. It is to be constantly churned, with the mind serving as the churning rod. . . . Knowledge of the Self is gained through meditation.[125]

A similar description is offered by Elemire Zolla, who also emphasizes the sophistication exhibited by the Indian tradition in dealing with issues of consciousness:

> When the experiencing psyche and the things it perceives, subject and object, melt and are absorbed into one another, what takes place may be called "metaphysical experience." . . . In Sanskrit it would be *asamprajñasamadhi*. Sanskrit is the best tool for dealing with the topic. It has been pointed out that it

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[123] See Chap. III, note 12, p. 119.

[124] Weber, p. 140.

[125] Ibid.

> lavishes twenty accurate, nicely defined different terms on what Western languages brutishly lump together as "consciousness."[126]

The experience reported by Weber, Zolla and others supports a kind of knowledge that is quite different from the mere acquisition of information. The Greeks appear to have understood this, as Greek has almost as many different words for knowledge as Sanskrit does for consciousness. It is illuminating to compare their meanings.

Epistēmē or Theōria?

A view similar to that of Shear and Weber is suggested by another scholar. Writing in the *Journal of Neoplatonic Studies,* Gerald Press suggests that it could be an error to read Plato in the same way that we read more modern philosophical treatises. We are used to seeing writings in philosophy as almost invariably reflecting discursive thought processes, reasoned arguments to support sets of propositions. We assume that Plato's work falls into the same category. This could be a mistake, Press suggests, citing the multiple Greek words for knowledge:

> Ancient Greek, unlike modern English, had a variety of different words for knowledge, besides *epistasthai*--

[126] Elemire Zolla, *Archetypes: The Persistence of Unifying Patterns* (New York: Harcourt Brace Jovanovich, 1981), p. 1.

> *episteme*. *Sophia, gnōmē, gnōsis, synesis, mathēma, mathēsis, historia,* and *nous* are familiar and, like *epistēmē* and *technē*, have been studied. I suggest that *theasthai-theōria* belongs in this constellation of Greek words of knowing in its particular use to refer to mental seeing, a mental image or vision.[127]

Press suggests that much of Plato's dialogues contained an element that falls into a different category. He proposes

> . . . that we consider *theōria* rather than *epistēmē* as the kind of knowledge that is to be found in the dialogues, the kind of knowledge that Plato can have intended to communicate, can have intended to teach, can have expected his readers or hearers to acquire from the dialogues, can have believed defined philosophy and philosophers. The solution to the puzzle, I am suggesting, is that there is knowledge of a sort to be found in the dialogues, but that it is *not* the dogmatic sort of knowledge that has been sought by many interpreters of Plato.[128]

Press goes on to suggest the kind of knowledge that Plato presents in much of his writing.

> By *theōria* or vision I mean something that is in one way the opposite of the kind of knowledge that has been the focus of much of Western Philosophy since Aristotle. For one thing, it refers to a mental image or seeing rather than to a proposition or set of propositions. *Theōria* in this sense refers to something inner, immediate, comprehensive, and experiential. It is not mediated, at least in the beginning, by discursive thought or language, nor is it inferential.

[127] Gerald A. Press. "Knowledge as Vision in Plato's Dialogues," *Journal of Neoplatonic Studies*, Vol. III, No. II (Spring 1995), pp. 74-75.

[128] Press, pp. 71-72.

> Thus it will not take the form of an argument in the usual technical sense.[129]

Cornford reinforces Press's view, relating the concept of *theoria* to the practices of the Pythagorean brotherhood. He suggests a different purpose to this approach to knowledge, a purification of the mind rather than feeding it information or simply exercising it with argument:

> To the Pythagorean 'purification' partly consisted in the observance of ascetic rules of abstinence from certain kinds of food and dress, and partly was reinterpreted intellectually to mean the purification of the soul by *theoria*, the contemplation of the divine order of the world.[130]

Four Levels of Interpretation

Cornford, Weber and Press appear to agree with Shear that what Plato is describing in many of his dialogues is, on one level at least, some kind of direct experience. If this is the case, then much of Plato's writing would have to be approached somewhat differently than the standard teaching of Plato allows. The idea of a fourth level of experience, superior to and quite different from the three

[129] Ibid.

[130] Francis Macdonald Cornford, "Mysticism and Science in the Pythagorean Tradition," part I, *Classical Quarterly* 16 (1922), p. 139.

ordinary levels of awareness, reached through a higher-level application of the practice of dialectic, provides another approach to the "riddles and puzzles" contained in the *Timaeus*. This is suggested by the opening of the *Timaeus*, because the analogy of the divided line, with its various levels of perception and knowledge, itself calls for multiple levels of expression and understanding, of which discursive thought is only one and, according to Plato, not even the highest. That is not to say there is no discursive argument in Plato, only that *the dialogues should not be read only as that*.

There are four levels of being and perception described by Plato. The dialogues, like most ancient literature, need to be understood on all of these levels. One level of interpretation is a rich mathematical symbolism; commentators have been exploring its meaning for centuries, and we have seen several contemporary examples. This relates to the third level of Plato's analogy, the level of mathematical and discursive thinking. As for the highest level of interpretation, this has often been missing, in spite of Plato's repeated emphasis on its importance. And this is what Socrates seems to be calling for in the first statement of the dialogue. Again, "One, two, three, . . . but where is the fourth?"

Such a conclusion should not come as a surprise. Plato begins the dialogue with an admonition to distinguish between Being and Becoming. And the Pythagorean dimension of the dialogue requires that we remember the ontology and epistemology described by Iamblichus and Porphyry at the beginning of the present chapter. "Wisdom is the science of things which are truly existing beings, but not of the mere figurative entities,"[131] Iamblichus tells us, while Porphyry recommends "the contemplation of eternal and incorporeal things which never vary."[132] Further, given Plato's approach to knowledge, brought out in his descriptions of astronomy and harmonics, could we accept any other interpretation?

* * *

The implications of this line of reasoning for our understanding of the music of the spheres seem far-reaching. Within this tradition, the distinctions between the different levels of experience described by Plato have been consistently muddled and confused. Phenomena that exist on multiple levels, including mental processes, have been taken as purely physical. Texts structured according to ancient

[131] See note 3, p. 271, above.

[132] See note 5, p. 272, above.

practices of symbolic representation have been assumed to be discursive philosophy in the modern manner. The various passages that describe Plato's musical cosmology, on the one hand the *Timaeus*, on the other the Myth of Er, have been viewed as similar categories of expression. But Plato's intentions appear to have been quite different. This will become immediately relevant when looking at the other major source of musical cosmologies to be found in Plato.

CHAPTER VI

THE GREEK SOURCES: THE MYTH OF ER

The Context

For the second of our two Platonic sources of the music of the spheres tradition, we turn from the *Timaeus* to the *Republic*. Of Plato's dialogues, the *Timaeus* is a continuation of the *Republic* and is itself continued in the *Critias*. At the end of the *Republic* we find another passage, known as the Myth of Er, that has been extremely influential in the tradition of musical cosmology. This passage forms the basis for a work in Latin, Cicero's *Dream of Scipio*, which, along with a fifth century C.E. commentary by Macrobius, was enormously influential on subsequent ideas about the music of the spheres. Like the *Timaeus*, Plato's Myth can be understood on many levels, but he has provided at least one set of guidelines for its interpretation, those contained in the section from the *Republic* that we have already examined--the Divided Line.

The Myth.

The subject of Plato's narrative is an account of the journey, or vision, of Er, a brave man whom Plato describes as being a native of *Pamphylia,* literally "all races," making Er a kind of "Everyman" figure. Er is killed in battle, but after ten days he revives and gives an account of his time in the afterlife, which was spent in the company of many other souls. After seeing the different routes taken by the just and the unjust to heaven and hell, a description echoed centuries later by Dante, he journeys across the "Plain of Truth" to a place where he sees the whole structure of the universe set out before him.

> After seven days spent in the meadow the souls had to set out again on the eighth and came in four days to a place from which they could see a shaft of light stretching from above straight through earth and heaven, like a pillar, closely resembling a rainbow, only brighter and clearer; this they reached after a further day's journey and saw there in the middle of the light stretching from the heaven the ends of the bonds of it; for this light is the bond of heaven and holds its whole circumference together, like the swifter of a trireme.[1]

The "swifter of a trireme" indicates the rib-like undergirding of a ship. "And from these ends hangs the spindle of Necessity, which causes all the orbits to

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[1] Plato, *The Republic,* Desmond Lee, trans. (London: Penguin Books, 1974), 616a-b, p. 450.

revolve; its shaft and its hook are of adamant [a hard, brilliant mineral], and its whorl a mixture of adamant and other substances."[2] There are actually a series of whorls, eight in total, all nested one within the other like a series of bowls, each having a certain color, each rotating at a particular rate, and each generating a particular tone through an associated Siren.

> The whole spindle revolved with a single motion, but within the movement of the whole the seven inner circles revolved slowly in the opposite direction to that of the whole, and of them the eighth moved fastest, and next fastest the seventh, sixth and fifth, which moved at the same speed; third in speed was the fourth, moving as it appeared to them with a counter revolution; fourth was the third and fifth the second. And the whole spindle turns in the lap of Necessity. And on the top of each circle stands a siren, which is carried around with it and utters a note of constant pitch, and the eight noted together make up a single scale. And round about at equal distances sit three other figures, each on a throne, the three Fates, daughters of Necessity, Lachesis, Clotho, and Atropos; their robes are white and their heads garlanded, and they sing to the sirens' music, Lachesis of things past, Clotho of things present, Atropos of things to come. And Clotho from time to time takes hold of the outermost rim of the spindle and helps to turn it, and in the same way Atropos turns the inner rims with her left hand, while Lachesis takes inner and outer rims with left and right hand alternately.[3]

It is an enormously influential image; its influence can be seen in many areas. Here is the scene depicted by the

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[2] *Republic*, 616c, p. 450.

[3] *Republic*, 617a-d, p. 451.

1589 *intermedio* in Florence.[4] It provides many of the themes for the woodcut from Gafori's work shown at fig. 5 above. It is reflected in the passages from Shakespeare and Milton quoted in Chapter I.[5] The central idea of the heavens as revolving, crystalline or adamantine spheres is the common thread, and Plato gives special emphasis to the shaft of light upon which the spheres are suspended.

While there has been extensive commentary on this section of the *Republic*, its meaning, and indeed its ultimate sources, have remained obscure. Even the translator of the edition of Plato cited above, referring to the Myth of Er, states that "In the more detailed interpretation of this passage there is much uncertainty."[6] However, some recent research suggests a new interpretation of Plato's description. Along with this, other questions, both musical and cosmological, may be seen in a new light.

The Musico-Mathematical Interpretation

Like the *Timaeus,* the account of the Myth of Er

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[4] See the illustration at Chap I, fig. 1, p. 2.

[5] See pp. 10-11.

[6] Lee (1974), Appendix II, p. 461.

contains a wealth of allusions to Pythagorean mathematical and musical concepts. Ernest McClain writes:

> The *Republic* concludes with the tale of a "strong man, Er, son of Armenius," full of allusions to numerical, temporal, tonal, and spatial relations. I submit that the "plain of truth" from which we start our journey to heaven is the musical proportion 6:8::9:12, present in every Platonic construction; that the static model for the planetary system (which Plato will "set in motion" arithmetically in the *Timaeus* allegory that follows) is the Dorian tetrachord and its reciprocal . . . and that Plato's tempering of the solar system correlates with the fundamental issue of musical temperament . . . .[7]

It is McClain's view that the mathematics of music in general, and tuning systems in particular, form a framework for interpreting most, if not all, of Plato's work. He writes, for example, that "From a musician's perspective, Plato's *Republic* embodies a treatise on equal temperament."[8] He goes on to provide a full explanation of the Myth of Er from this perspective.[9] It is a fascinating insight but it is only one level of interpretation. In terms of the Divided Line analogy, it arises from level three. We need to remember Socrates' demand for all four levels, especially level four, to play a part in our interpretation.

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[7] Ernest G. McClain, *The Pythagorean Plato: Prelude to the Song Itself* (London: Nicolas Hays, 1978), p. 461.

[8] McClain, p. 5.

[9] McClain, pp. 41-55.

The *Axis Mundi*

We have noted James Haar's characterization of these dialogues as myths, so understanding them as such requires consideration of the insight into the nature of myth that emerges from the work of C. G. Jung, Erich Neumann, Mircea Eliade, Joseph Campbell and others over the last few decades.

The first point to be made in this regard is that the central motif in the structure described by Plato, subsequently named the "Spindle of Necessity," falls into a well-defined category of archetypal images known as the *axis mundi,* which appears in a variety of forms such the World Tree, or Tree of Life:

> The image of the Cosmic Tree or Tree of life belongs to a coherent body of myths, rites, images and symbols which together make up what the historian of religion Mircea Eliade has called the "symbolism of the Centre."[10]

Joseph Campbell has also commented on this:

> In many cases the center is conceived as an axis (*axis mundi*) extending vertically to the pole star and downward to some pivotal point in the abyss. Iconographically, it may be represented as a mountain,

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[10] Roger Cook, *The Tree of Life: Image for the Cosmos* (London: Thames & Hudson; New York: Avon Books, 1974), p. 9.

> a stairway or ladder, a pole or, very commonly, a tree.[11]

Roger Cook finds three main categories for this symbol, of which the first applies directly to Plato's myth:

> This idea of the cosmic axis and the "centre of the world", which is extremely ancient (fourth or third millennium B.C.) and widely diffused, is embodied primarily in three images, which are to be found in a great variety of forms throughout the world. These are the Pillar or Pole, the Tree and the Mountain.[12]

Cook's definition places the vision that Er receives into a much broader context--the overarching need of men and women to locate a center in the universe, or to place themselves at "that Center which is beyond time and which is nothing other than the Eternal."[13] This notion links the music of the spheres tradition with large areas of mythological symbolism, including, for example, notions of sacred space.

> . . . should a Hindu affirm that his house is in the "Center of the World," one accepts his belief as a living truth and, consequently, a spiritual reality. . . in the face of such beliefs, western scholars

[11] Joseph Campbell, *The Mythic Image* (Princeton: Princeton University Press, 1974), p. 190.

[12] Cook, p. 9.

[13] Seyyed Hosein Nasr, *The Need for a Sacred Science* (Albany, New York: State University of New York Press, 1993), p. 35.

> inferred the only possible conclusion: namely, that the sacred space in which the "Center of the World" is inscribed has nothing to do with the profane space of geometry; it has another structure and responds to another experience.[14]

The desire for a sacred center appears in every cultural setting:

> Every holy place in every tradition is looked upon as a center of the world, a place where the sacred enters the profane, where the immeasurable is reflected back to that which can be measured and the energy of eternity pours itself into time--Mount Olympus, for instance, from which the Greek gods descended to the earth; Mount Meru of the Hindus, Mount Zion and Mount Tabor in Palestine; the Rock of Jerusalem, which was thought to be the navel from which the whole earth unfolded; the field of Golgotha, which is homologized to the Garden of Eden in order that the new Adam could be crucified at the place where the old Adam was created; the Kaaba in Mecca, the sacred spot of the world community of Islam; Borobudu, the great Buddhist navel in Java; the sacred lodge of the Algonquin Indians; the underground kiva of the Hopis. One could go on with this list forever for, as Mircea Eliade has truly said, "The multiplicity of even infinity of centers of the world raises no difficulty for religious thought, concerned as it is not with geometrical or geographical space but with existential and sacred space." Therefore it can be said that for religious man his temple, his cathedral, his church, his dwelling-house, even, indeed, his own body is symbolically situated at the center of the world. For where is the spring, where are the hearth and home of myth, tradition and symbol? Where else could these be but in man himself? How could they be outside of him?[15]

[14] Mircea Eliade, "Sacred Architecture and Symbolism," in *Symbolism, the Sacred, and the Arts,* Diane Apostolos-Cappadona, ed. (New York: Crossroads, 1985), p. 105.

[15] Travers, P. L. "In Search of the World Tree," *Parabola*, Vol. 24, no. 3 (August 1999), p. 19.

It is at the center of the world that the World Tree is found, an image with the broadest cultural diffusion. It has Christian (fig. 35), Hindu (fig. 36), Buddhist (fig. 37), and Scandinavian (fig. 38), sources among others. World tree symbolism is central to the Garden of Eden story (fig. 39) as well as to "pagan" creation myths (fig. 40). In the form of the ten *sefiroth*, the first struture created "when the primordial light of infinity descends upon the world,[16] it is central to the *kabbalah* (fig. 41). One of the most famous descriptions of the archetypal tree is from a Native American source in the vision of Black Elk, the medicine man of the Oglala Sioux:

> Then I was standing on the highest mountain of them all, and round about beneath me was the whole hoop of the world. And while I stood there I saw more than I can tell and I understood more than I saw; for I was seeing in a sacred manner the shape of all things in the spirit, and the shape of all shapes as they must live together like one being. And I saw that the sacred hoop of my people was one of many hoops that made one circle, wide as daylight and as starlight, and in the center grew one mighty flowering tree to shelter all the children of one mother and one father. And I saw that it was holy.[17]

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[16] Mark-Alain Ouaknin, *Mysteries of the Kabbalah,* Josephine Bacon, trans. (New York, London, Paris: Abbeville Press Publishers, 2000), p. 219.

[17] John G. Neihardt, *Black Elk Speaks* (Lincoln and London: University of Nebraska Press, 1979), p. 43.

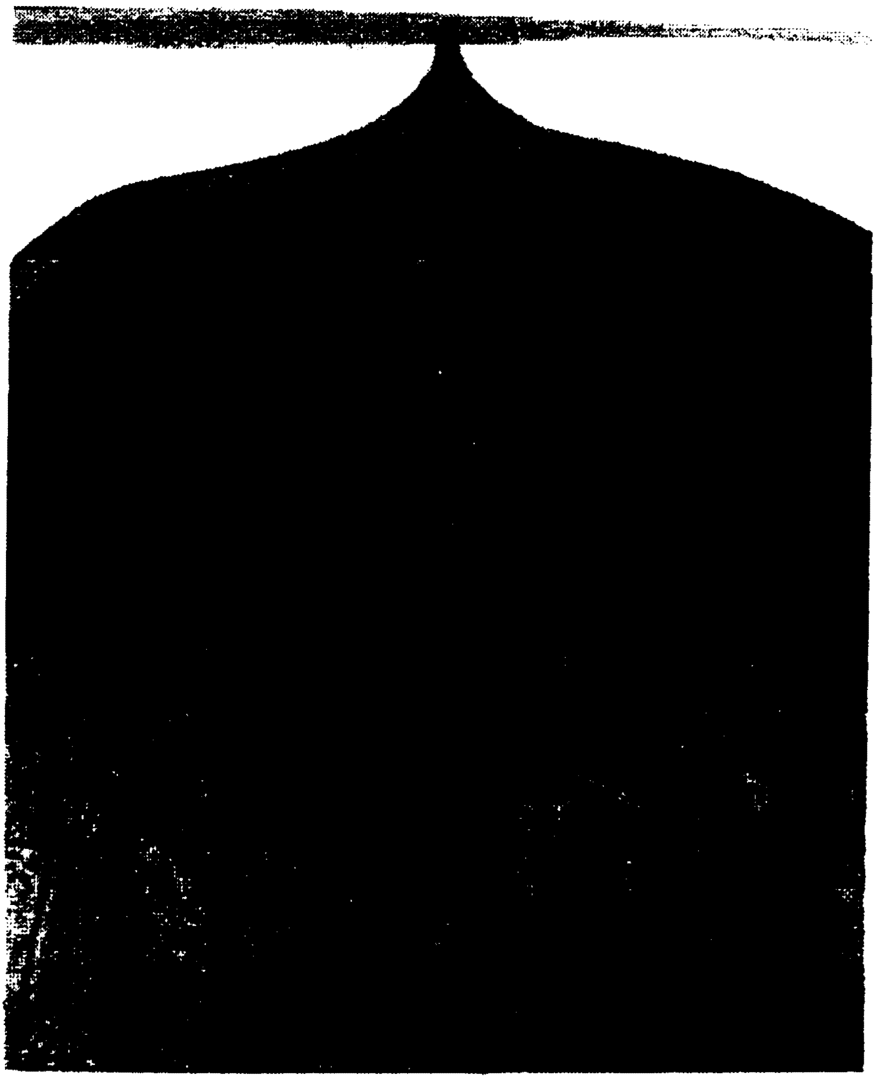

Fig 35: *The Mystery of the Fall and Redemption of Man*, Giovanni da Modena, Bologna, 15th century.

Fig 36: *Tree of Life & Knowledge*, Bronze, India, Vigayanagar period, 1336-1546

Fig 37: Assembly Tree of the Gods, Tanka, Tibet, early 19th Century?

Fig. 38: Scandinavian World Tree, *Yggdrasil*
Relief on the Stavkirke, Ulnes, Norway

Fig. 39: Tree of Death and Life,
Miniature by Bethold Furtmeyer from
Archbishop of Salzburg's Missal, 1481

Fig. 40: Birth of Adonis from Myrrh Tree, bowl, Urbino 16th century

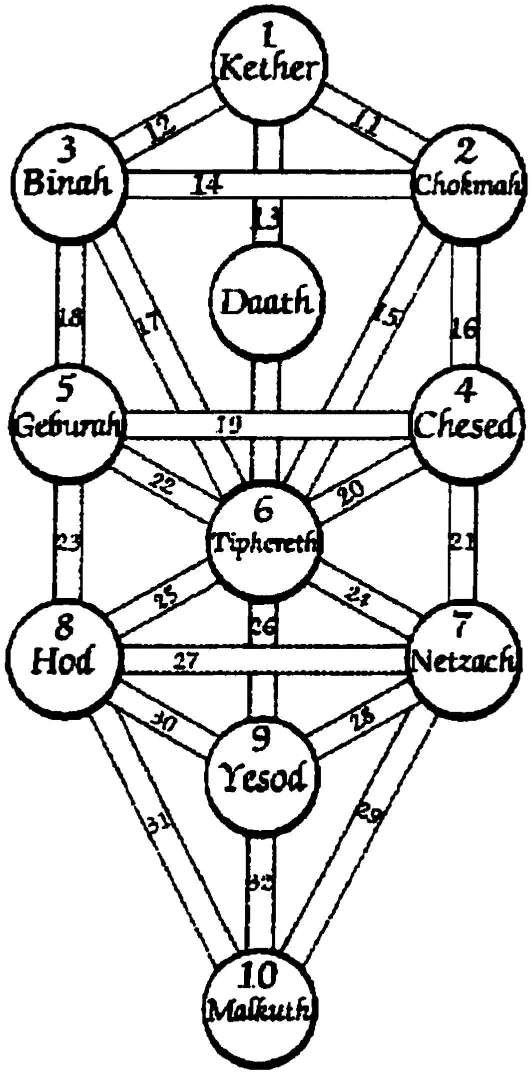

Fig. 41 - The Ten Sefiroth of
the Kabbalistic Tree of Life

(See figs. 42-44.) In the manner of myth, there are several images here that are culturally determined in the context of Native American cosmology, while, at the same time, the underlying image appears to be parallel to the vision presented to Er in the afterlife.

As a further variation, in many sources a connection is made between the *axis mundi* as the center of the universe and the spine as the center of the human nervous system, and thus of consciousness within the individual.

> In this ancient system of symbology, which comes down apparently from Old Bronze Age times, 2000 B.C. or so, the human spine is represented as equivalent, in the individual body, or microcosm, to the axial tree or mountain of the universe, the macrocosm--the same mythical *axis mundi* symbolized both in the tree of Eden and in the towering ziggurats in the centers of ancient Mesopotamain cities. It may be recognized, also, in the Dantean Mount Purgatory, where the seven ascending stages represent steps in the purification of the soul on its way to the Beatific Vision.
>
> The stages of the ascending *Kundalinī* also are seven, there being between the root base and crown five intermediate lotuses; and as each is touched and stirred by the rising serpent energy, the psychology of the yogi is transformed.[18]

Within this group of symbols we also find that of the inverted tree. "The idea of the cosmic tree as imperishably fixed in the empyrean is also expressed in the image of the inverted tree, with its roots above and its branches below.

[18] Joseph Campbell, *The Mythic Dimension: Selected Essays 1959-1987* (San Francisco: Harper, 1997), pp. 170-171.

Fig. 42: Black Elk at the Center of The World, water color by Standing Bear, Dakota, 20th century

Fig. 43:Black Elk at Center of The Earth, Mount Harney Peak

Fig. 44: Black Elk and the World Tree

This image appears in widely different traditions."[19] One of the oldest versions of this image is from the Vedic tradition:

> Rk Veda speaks of the eternal
> Ashvattha, the World Tree, whose roots
> are on top and branches with leaves below.
> They are the Vedic hymns.
> He who knows it knows the Veda.[20]

The inverted tree image also appears in the Judaic mystical tradition. A good example of this is to be found in an engraving from the *Philosophia sacra* of 1626 by Robert Fludd (Fig. 45).

As a further dimension to this imagery, John Michell unearths multiple examples of *axis mundi*, or polar, symbolism worked into ritualized landscapes in various parts of the world.

> The idea of a fixed centre and a continually moving periphery has many illustrations. It is like a wheel turning on its axle, a rope swung round a vertical pole, a compass making a circle. A grander cosmological image is of a spherical universe, with the spherical earth at its centre, both revolving upon the same unmoving pivot, the world-pole.
>
> In all traditional systems of religion this image has provided the dominant symbol. The doctrine associated with it describes the universe as a divinely

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[19] Cook, p. 18.

[20] *Bhagavad-Gītā* 15.1, in Tony Nader, *Human Physiology: Expression of the Veda and the Vedic Literature* (Vlodrop, The Netherlands: Maharishi Vedic University, 1995), p. 43.

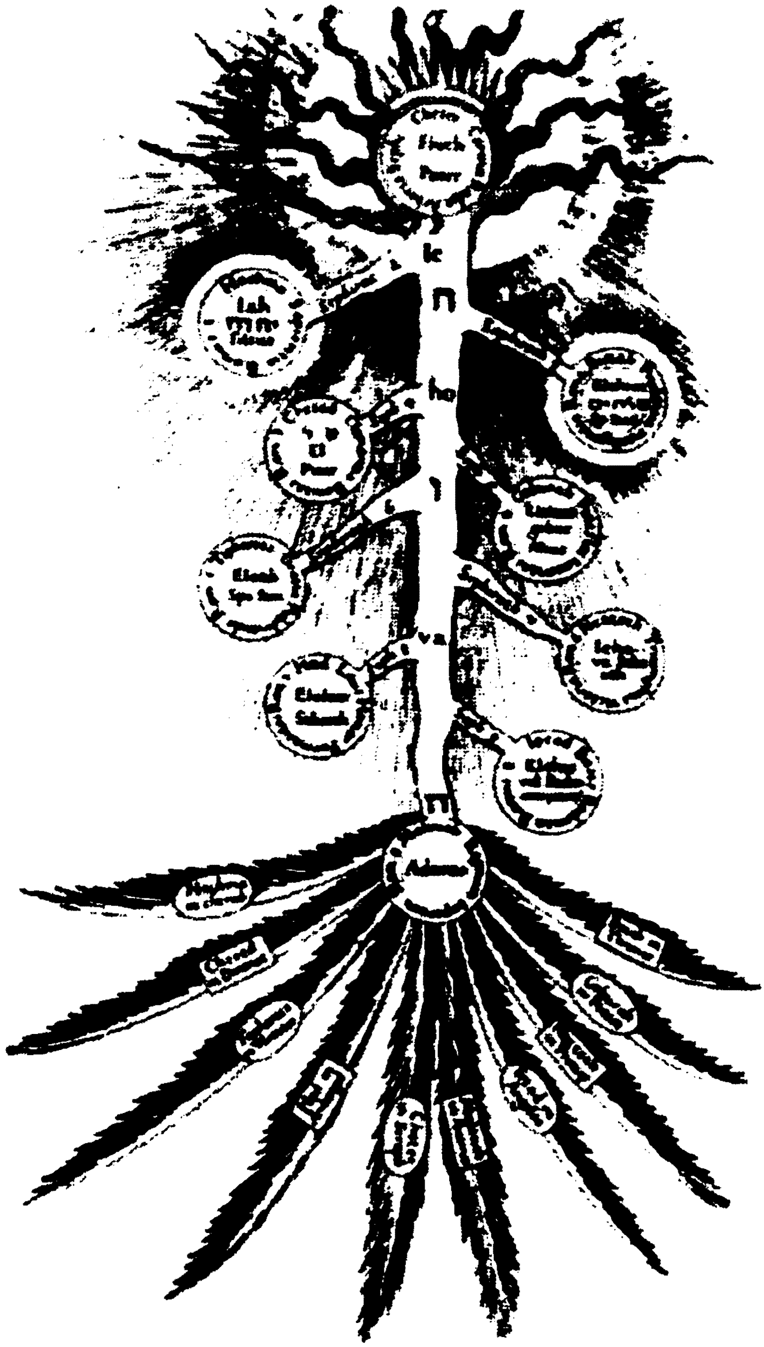

Fig. 45: The Sephirotic Tree, Robert Fludd, engraving from *Philosophia sacra*, 1626

> born creature, never the same, never at rest, but with a still, unvarying centre which, like the core of a magnetic field, governs everything around it.[21]

Such a world-view is reflected in highly traditional social orders:

> A natural product of this world-view is a social order which is designed to reflect the order of the universe. It is centred in every sense upon a symbol of the world-pole, which is itself a symbol of eternal law. In imitation of the universal pattern, every unit in society replicates the entire social structure, so an image of the world-pole is found at the centre of every community and every household.[22]

The center of the world is located on a subtler, non-physical level and equated with a unity that existed before the manifestation of the world.

> Eliade has shown how all aspects of mankind's "mythical behaviour" reflect an underlying desire to grasp the essential reality of the world. This is particularly evident in man's obsession with the origin of things, with which all myths are ultimately concerned. The centre is, first and foremost, the point of "absolute beginning" where the latent energies of the sacred first broke through; where the supernatural beings of myth, or the Gods or God of religion, first created man and the world. Ultimately all creation takes place at this point, which represents the ultimate source of reality. In the symbolic language of myth and religion is often referred to as the "navel of the world", "Divine Egg", "Hidden Seed" or "Root of Roots"; and it is also imagined as a vertical axis, the "cosmic axis"

[21] John Michell, *At the Centre of the World: Polar Symbolism Dicovered in Celtic, Norse and Other Ritualized Landscapes* (London: Thames and Hudson, 1994), p. 8.

[22] Ibid.

> or "axis of the world" (Axis Mundi) which stands at the centre of the Universe and passes through the middle of the three cosmic zones, sky, earth and the underworld. It is fixed at the heavenly end to either the Pole Star or the sun, the fixed points around which the heavenly bodies rotate. From here it descends through the disk of the earth into the world below.[23]

Such a cosmology is central for practitioners of traditional religious techniques induced through ecstatic trance states for the purpose of gaining visionary insight:

> The main feature of the shaman's universe is the cosmic centre, a bond or axis connecting earth, heaven and hell. It is often pictured as a tree or a pole holding up the sky. In a trance state, a shaman can travel disembodied from one region to another, climbing the tree into the heavens or following its downward extension. By doing so he can meet and consult the gods.[24]

The world of archetypal imagery is closely related to such traditional cosmologies. Images such as the Spindle of Necessity in Plato's myth give a view of the heavens radiating outward from a mythical world axis. At a deeper level, however, this cosmic center merges with more abstract conceptions such as the Pythagorean Monad.

> In this eternal beginning there is only the Supreme Identity of "That One" (*tad ekam*)[i.e. Mind], without differentiation of being from non-being, light from

[23] Cook, p. 9.

[24] Geoffrey Ashe, *The Ancient Wisdom* (London: Abacus Books, 1979), p. 144.

> darkness, or separation of sky from earth. The All is for the present impounded in the first principle, which may be spoken of as the Person, Progenitor, Mountain, Tree, Dragon, or endless Serpent.[25]

The same imagery can also be an aspect of an anthropomorphic figure, as with the Vedic figure of Siva:

> The word Siva means "auspicious" and Lord Siva is venerated as the source of all that is good and auspicious, and as the primordial source of all creation. Siva who is unmanifest, *arupa*, or without form, chose to manifest Himself on this night [Mahasivaratri] as an effulgent pillar of light, without beginning or end. This light represents the primal, cosmic energy or vibration that is the source of all creation. From this light emanated Brahma, the Creator, Vishnu, the Protector and Rudra, the Destroyer that causes the final dissolution of all things back into the unmanifest.
>
> While this is the abstract concept of the unmanifest, which is difficult to comprehend, Siva also takes shape as the Linga or cosmic egg and this is the abstract and concrete symbol that is usually worshiped in Siva temples.[26]

In another of his forms, Siva, according to Daniélou, manifests himself centuries later as Dionysius. Thus, on the level of myth, another link is forged between the Greek line that leads to Orpheus, Pythagoras and Plato as well as far more ancient, legendary figures. It is in alchemy, however, that all the symbols are brought together, cosmic tree,

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[25] Ananda K. Coomaraswamy, *Hinduism and Buddhism* (New York: Philosophical Library, 1943), p.6.

[26] Program announcement, Sri Siva Vishnu Temple, Lanham, Maryland (March 1997), p. 1.

cosmic mountain, and the numerical symbolism of Pythagoras that harks back to the opening of the *Timaeus*:

> The seedling atop the Cosmic Mountain symbolizes the fusion of earth and sky. In the alchemical tradition Maria [Prophetessa] is said to shriek out in ecstasy: "One becomes two, two becomes three, and out of the third comes the One as the fourth." As a formula of the alchemical process, her saying also describes the germination of the seedling into the Cosmic Tree.[27]

This telling conjunction of images demonstrates the multi-dimensional nature of symbolism embedded in ancient literature in general, and the music of the spheres tradition in particular. Again, Plato's Divided Line analogy provides the framework for the consideration of these various levels of interpretation. Plato has also provided sources for each of the main aspects of musical cosmology. The *Timaeus* presents the basis for the underlying mathematical symbolism while the Myth of Er conveys the *axis mundi* image from its earliest sources into the mainstream of Western thought. Between these two aspects, the numerical on the one hand, and the archetypal on the other, there is no question of one rather than the other being a correct interpretation; they are both valid, each representing one

[27] David Fideler, *Jesus Christ, Sun of God: Ancient Cosmology and Early Christian Symbolism* (Wheaton Illinois & Madras, India: Quest Books/ Theosophical Publishing House, 1993), p. 289.

aspect of Plato's intelligible world--levels three and four respectively of the Divided Line scheme.[28] It is also valid to consider these patterns as they manifest in the visible world. The mistake that Socrates tries to avert by asking "where is the fourth?" consists of considering everything *only* on one level. Like Kepler, we have to try to understand both the archetype "which is present in the soul," and its reflection in the physical world.[29]

We have examined the number symbolism in some detail. Now the significance of these seemingly universal images brings us to the concepts of archetype and archetypal symbolism. These need to be defined and examined in greater depth.

Archetypes and Forms

There are two significant theories regarding inner structures of consciousness. One is Plato's theory of Forms, the other is Jung's theory of Archetypes.

The Forms. By Forms, Plato indicates the innate structures to be found at the highest level of the Divided Line analogy, knowledge of which is as different from

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[28] See Chap. V, notes 106 & 107, p. 338.

[29] See Chap. I, note 86, p. 62.

ordinary knowledge as waking is from dreaming.[30] As Lee writes, "Unfortunately, Plato never gives in his dialogues a full or direct exposition of the theory [of Forms] . . . [or] developed a set technical terminology."[31] Lee refers us to Cornford, who defines Platonic Forms as "ideals or patterns, which have a real existence independent of our minds and of which the many individual things called by their names in the world of appearances are like images or reflections."[32] Images and reflections require light in order to be seen, and Plato provides this in the form of the sun in the analogy of the same name[33] that immediately precedes the section on the Divided Line. Immediately subsequent to the latter section, which acts as an introduction to it, is the analogy of the Cave, and here the light is provided by a fire. But Plato indicates that he is using the sun as an analogy for the highest object of knowledge, the Form of the Good itself, calling it the "child of the Good."[34] Plato goes on, "The good has begotten

[30] See Chap. V, note 113, p. 341.

[31] Lee, p. 264.

[32] Francis MacDonald Cornford, trans. and intro., *The Republic of Plato* (London: Oxford University Press, 1980), p. 180.

[33] *Republic,* 507-509, pp. 305-309.

[34] *Republic,* 508c, p. 308.

it in its own likeness, and it bears the same relation to sight and visible objects in the visible realm that the good bears to intelligence and intelligible objects in the intelligible realm."[35]

As Lee points out, the actual nature of the Forms has to be inferred from passages such as this. But etymology provides another clue. One of the main terms Plato uses for the Forms is *eidos*. It is from this word, etymologically something "seen," that we obtain the English "idea," which gives the sense of mental structures arising from the unconscious mind. It is through empirical testing of such structures against those in the external world that science tries to formulate laws of nature. But we can draw further implications from *eidos;* it is related to the Sanskrit *Veda*, a word that is typically translated as "knowledge" but that carries the added dimension of structures inherent in nature that can be accessed within consciousness and, in the form of the *Rg Veda*, "seek out him who is awake."[36] Plato's Forms are accessed by the highest application of the Dialectic; the Vedas are directly cognized by *rishis* on the level of *anahata nada*. Pythagoras heard the music of the spheres, and recognizing it as ἀρχή ["archay"], the first cause and

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[35] Ibid.

[36] *Rg Veda* V.44.14. See Chap. IV, note 154, p. 243.

principle of all lesser things, concluded that its nature is number.[37] Campbell puts all of this into the context of mythology:

> There is a beautiful saying of Novalis:"The seat of the soul is there, where the outer and the inner worlds meet." That is the wonder-land of myth. From the outer world the senses carry images to the mind, which do not become myth, however, until there transformed by fusion with accordant insights, awakened as imagination from the inner world of the body. The Buddhists speak of Buddha Realms. These are planes and orders of consciousness that can be brought to mind through meditations on appropriately mythologized forms. Plato tells of universal ideas, the memory of which is lost at birth but through philosophy may be recalled.[38] These correspond to Bastian's "Elementary Ideas" and Jung's "Archetypes of the Collective Unconscious."[39]

The Archetypes. The theory of archetypes was developed by Jung after extensive clinical studies of the dreams, artwork, etc., of patients suffering from, and frequently recovering from, disorders such as schizophrenia. Jung noticed patterns in these phenomena, with similar forms arising in different patients at similar stages of their disease and recovery. Noticing further correspondences between these images and those from anthropology, mythology, alchemy, and various other fields, Jung theorized that the

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[37] See Chap. III, note 54, p. 143.

[38] Plato, *Timaeus*, 90d. Desmond Lee, trans. (London: Penguin Books, 1965), p. 119.

[39] Joseph Campbell, *The Inner Reaches of Outer Space* (New York: Harper & Row, 1986), p. 31.

unconscious mind contains inherited patterns, modes of functioning similar to the instinctive patterns that influence animal and, to some extent human, behavior. He half borrowed, half coined the term archetype from the Greek *arché* (origin), and *tupos* (imprint), and defined it as "universal and inherited patterns which, taken together, constitute the structure of the unconscious."[40] Later writers such as Neumann, Eliade and Campbell took this concept further, from clinical to cultural applications, and began to identify similar motifs and patterns of motifs in different historical and cultural settings, leading to work such as Neumann's *Origins and History of Consciousness*[41] and Campbell's *Hero with a Thousand Faces*. In his writings, however, Jung took care to differentiate between actual archetypes and specific mythological motifs:

> The term "archetype" is often misunderstood as meaning a certain definite mythological image or motif. But this would be no more than a conscious representation, and it would be absurd to assume that such variable representations could be inherited. The archetype is, on the contrary, an inherited *tendency* of the human mind to form representations of mythological motifs--

[40] C. G. Jung, "Symbols of Transformation," R. F. C. Hull, trans., in William McGuire, ed., *The Collected Works of C. G. Jung*, Bollingen Series XX (Princeton: Princeton University Press, 1976), Vol. 5, p. 228.

[41] Princeton: Princeton University Press, 1971. See Chap. IV, note 30, p. 164.

> representations that vary a great deal without losing their basic pattern.[42]

There is a close connection between Jung's theory of archetypes and Plato's doctrine of the Forms; Jung states that he based his concept on Plato's. There is a distinct difference, however. The concept of archetypes is almost Aristotelian, as universals are determined from the examination of particulars; myths, stories, and dreams are essentially the phenomenology that suggest the existence of underlying patterns. *There is no question of directly perceiving the archetypes themselves*. Jung himself writes that "The collective unconscious shows no tendency to become conscious under normal conditions, nor can it be brought back to recollection by any analytical technique since it was never repressed or forgotten."[43] Elsewhere he goes further, comparing archetypes with the images they generate, but also drawing a critical distinction--we see the images but we do not see the underlying archetypes.

[42] C. G. Jung, "The Symbolic Life," R. F. C. Hull, trans., in William McGuire, ed., *The Collected Works of C. G. Jung*, Bollingen Series XX (Princeton: Princeton University Press, 1976), Vol. 18, p. 228.

[43] C.G. Jung, "On the Relation of Analytical Psychology to Poetry," in *The Spirit of Man, Art & Literature*. *Collected Works*, Vol. 15 (Princeton: Bollingen Press, 1922).

> An archetype--so far as we can establish it empirically--is an *image*. An image, as the very term denotes, is a picture of something. An archetypal image is like the portrait of an unknown man in a gallery. His name, his biography, his existence in general are unknown, but we assume nevertheless that the picture portrays a once living subject, a man who was real. We find numberless images of God, but we cannot produce the original. There is no doubt in my mind that there is an original behind our images, but it is inaccessible. We could even be aware of the original since its translation into psychic terms is necessary in order to make it perceptible at all.[44]

To use an analogy of our own, if we hold a magnet under a sheet of paper on which we scatter iron filings, the filings form a definite pattern that reflects the influence of the magnetic field. We see the pattern; we do not see the field. Similarly, we see clinical and mythological phenomena. We see patterns in them. We speak of archetypes, but we do not see them. We infer their existence from observation of the phenomena. However compelling the clinical evidence reported by Jung, and the cultural evidence collected by Neumann, Eliade, Campbell, et al., lacking empirical evidence, the theory of archetypes remains that--a theory. Thus, for example, the *axis mundi* notion has been little known outside of a rather limited group of researchers and makes little impact on contemporary studies in the humanities. But the theory harks back to Plato, and,

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[44] Jung (1976), Vol. 18, p. 706.

in his Divided Line analogy, Plato makes it clear that direct perception of the forms themselves is not *only possible but absolutely necessary for a complete education.* It is therefore of particular interest to us to learn of another study that looks at the Myth of Er passage with reference to Shear's and Press's suggestions regarding this special mode of knowledge that Plato describes. The study's conclusion is that direct perception of the underlying Forms themselves, rather than just their manifestation in art and myth, may indeed be a possibility. If so, it throws light on many topics in cultural history, not the least of which is the music of the spheres.

Plato and the *Yoga Sūtras*

In a paper presented at the annual convention of the American Psychological Association,[45] Jonathan Shear reports on a remarkable study that casts light upon the "riddles and puzzles" of Platonic thought and also suggests either a historical link between Greek and Indian thought, or a deeper connection between Platonic images and certain

[45] Jonathan Shear, "Plato, Piaget and Maharishi on Cognitive Development," unpublished paper presented at American Psychological Association conference, Toronto, 1978. The essential material of this paper appears as Shear (1981), pp. 72-84.

archetypal forms of experience. The study involved the use of mental techniques described by Patanjali in the third chapter of the *Yoga Sūtras*, a Sanskrit text of considerable antiquity.[46]

The *Yoga Sūtras* is the central text of one branch of what have traditionally been known as the six systems of Indian philosophy, each of which looks at phenomena from a slightly different angle. The system of *Yoga*, expounded by Patanjali in four sets of aphorisms, deals with the nature of the mind and techniques to still its activity to allow for direct perception of the Self. Certainly no one reading these verses would imagine that they have anything to do with a Pythagorean or Neo-Platonic cosmology. In recent years, however, this ancient text has been the object of experiments aimed at gaining a deeper understanding of the nature of consciousness, and some of these have created surprising links with experiences described by Plato.

The experiments are described by Nobel Laureate in Physics Brian Josephson:

> . . . recent developments . . . in effect allow controlled experiments to be carried out on pure consciousness. These are the TM-Sidhi techniques, based on the *Yoga Sūtras* of Patanjali dating back some two thousand years. These involve using meditation to

[46] See M. N. Dvivedi, trans. and ed., *The Yoga-Sūtras of Patanjali* (Delhi: Sri Satguru Publications, 1983).

> create the state of pure consciousness, and then perturbing it in various ways, using specific sūtras or phrases which contain ideas which determine the nature of the subsequent effects.[47]

Two different sections of the *Yoga Sūtras* are important in these experiments. In Chapter I Patanjali describes the state of *samadhi*, literally, *sama* "balanced," *dhi* "intellect," or the state where consciousness stands free of any fluctuations. The technique to achieve this state is known in Sanskrit as *dhyana*. This term is frequently translated into English as "meditation." In Chinese *dhyana* translates as *Ch'an,* and in Japanese *Zen*.

Samyama. In Chapter III of the *Yoga Sūtras,* Patanjali describes a more advanced technique called *samyama*. This consists of *dhyana, samadhi* and a third component, *dharana*, or directed attention. When all three practices converge into one, it becomes the technique described by Josephson as "perturbing consciousness in specific ways to produce specific effects." In the rest of Chapter III, Patanjali describes about forty applications of this technique. It is these which were used as the basis of the "controlled

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[47] Brian D. Josephson, "Conscious Experience and Its Place in Physics," in Michel Cazenave, ed., *Science and Consciousness: Two Views Of The Universe* (Oxford/New York: Pergamon Press, 1984), pp. 14-15.

experiments to be carried out on pure consciousness" to which Josephson refers. Studies such as this reflect the growing interest in consciousness studies which has led to the kind of conference at which Josephson made the above-quoted statement,[48] as well as to the creation of some new academic journals. Shear, whose analysis of Plato's Divided Line allegory we cited above, is the one of the founding editors of the major journal in this field,[49] and has been involved in some of the experiments in question.

As part of a program in the psychophysiology of consciousness,[50] Shear conducted research with subjects who were working with Patanjali's text, not as an item of philosophical attention, but as an experimental tool in the manner described by Josephson. Such an approach, to some degree, parallels Press' view of the intended application of all or part of Plato's dialogues. One *sūtra* in particular produced highly unexpected results.

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[48] The colloquium on "Science and Consciousness" was held in Cordoba, Spain in 1979 under the auspices of *France-Culture* and *Radio-France*.

[49] *Journal of Consciousness Studies*, published in the United Kingdom and United States by Imprint Academic, Thorverton, UK.

[50] Maharishi European Research University, Seelisberg, Switzerland.

<u>The Pole Star</u>. At chapter III, verse 29 of the *Yoga Sūtras* we find: *Dhruve tad-gati-jñānam,* literally "on the pole-star, knowledge of their [the star's] motions." The commentary reads "By *samyama* on the pole-star is produced knowledge of the relative motions of the stars and planets."[51] This appears to refer to some aspect of astronomy, but no one has ever made any connection between this and the music of the spheres tradition. Indeed, India has not been regarded as a particularly rich source of this tradition, or of Pythagoreanism in general.[52] But the M.E.R.U. program approached the Vedic texts differently. Rather than trying to make sense of them as discursive philosophy, as *epistemé,* the participants used the *sutras* as mental objects in the process of *samyama,* an approach closer to Cornford's and Press's definition of *theoria.*[53]

In focusing on this particular *sūtra,* the subjects in Shear's experiment produced some striking results. Their significance was obvious to Shear only because he is a scholar conversant with Plato. It was these results which he

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[51] Dvivedi, p. 82.

[52] "There are few attempts at defining musical notes in terms of numbers," Alain Daniélou wrote to me in 1992. "The one given by Ahobala in his *Sangita Purijata* is late and unconvincing."

[53] See Chap. V, notes 128-130, pp. 350-351.

reported in the 1978 American Psychological Society meeting as follows:

> According to Patanjali, proper use (*samyama*) of this sūtra should enliven the already established background state of pure consciousness and produce the indicated result. One would naturally expect to gain (internal) awareness of the motion of the stars as we normally perceive and conceive of them. Such perceptions do represent frequent early phases of the experience. But in many cases, where *samadhi* or pure consciousness is particularly well established, the experience quickly develops into something quite different. The pole star is seen as a point on a long rotating shaft of light. Rays of light come out from the shaft like the ribs of an umbrella. The umbrella-like structure on which the stars are embedded is seen rotating. Along the axis of light are other umbrella-like structures, one nested in the other, each rotating at its own rate, each with its own color, and each making a pure lovely sound. Remarkably, we find the same experience recorded in detail in Plato's *Republic*.[54]

Shear is here referring to the Myth of Er. The structure that Plato depicts therein is remarkably similar to the ones described by the experimental subjects. (Fig. 46, sections A through E, presents an artist's impression of how these might look that was used in the publication of the study.) While the participants had extensive training in the Yoga practices involved, none of them were Plato scholars or had any familiarity with the Myth of Er or Plato in general.[55] During the study, they were asked to submit

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[54] Shear (1981), p. 11.

[55] In personal communication with the author, Dr. Shear states that, even as a professional in the field of

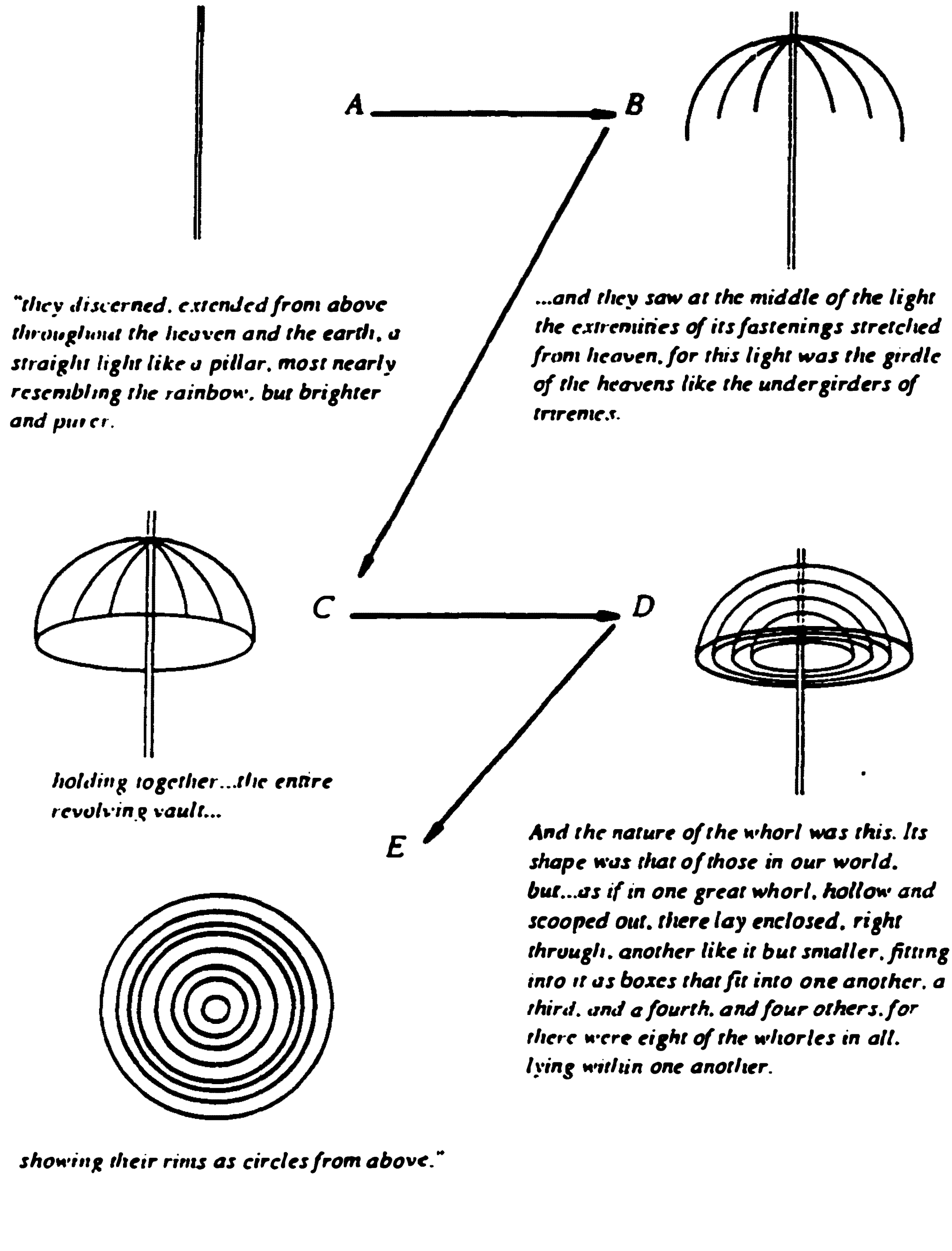

Fig. 46: Structure of the Universe from Plato's Myth of Er

sketches and/or drawings of any experiences resulting from the use of this particular *sūtra* during their practice, particularly any experiences they would regard as unexpected. From this group of subjects, drawn from Europe, Canada and the United States, a significant number[56] submitted drawings or descriptions which are readily recognizable as being of the structure in question. A number of these drawings and descriptions are reproduced at figures 47 through 49. Having been fascinated by this subject for many years, I find it hard to describe how profoundly I was struck upon seeing this material. Shear's conclusion is as follows:

> The fact that modern Americans and Europeans practicing a technique derived from ancient India innocently and quite unexpectedly get this experience recorded in detail by Plato in ancient Greece shows that innate potentials of consciousness exist, and can independently of all such superficial, external considerations as nationality, culture, time and place,

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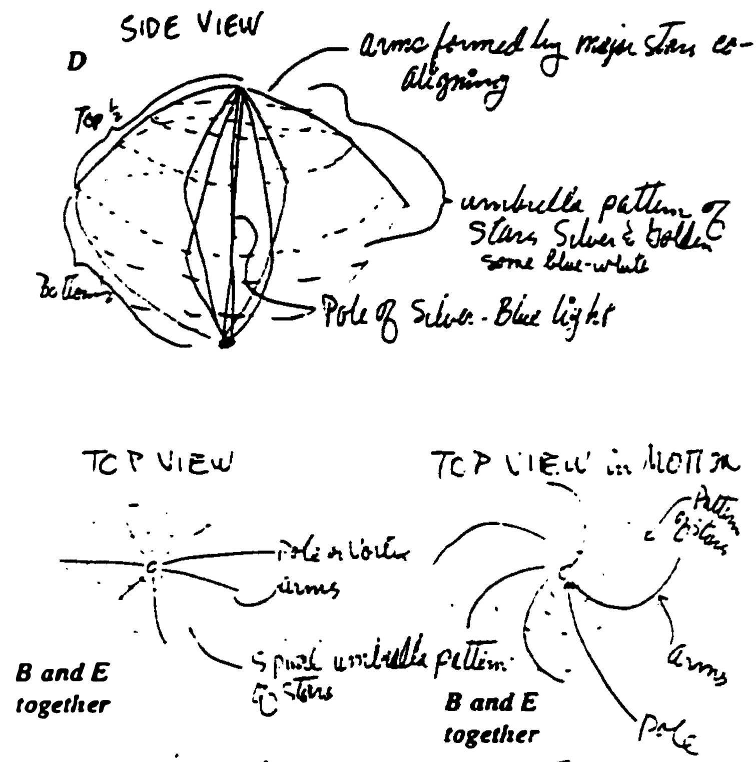
philosophy, with an extensive knowledge of Plato, he himself had only a very minimal familiarity with this passage, presumably because it is far from being the part of Plato upon which it was fashionable to focus in philosophy departments in the 1960s and 1970s. He also states that he had little or no interest in Jung's theory of archetypes prior to this research providing experimental evidence for the existence of such structures.

[56] Thirty-six out of a total of fifty-three subjects submitted drawings that were of interest. Of twenty-five subjects in one particular group, eleven made drawings.

subject J. D.



The motion of Stars seen in the "Pole Star" sutra was very much like an immense umbrella or round canopy. Arms, formed by major Stars aligning went outward from a central pole of Blue Silver light. Smooth golden and silver Stars formed a Spiral around the pole and its arms. I can't begin to draw it as its multi dimensional.

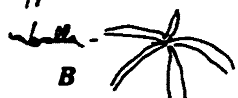
The motion of stars seen in the "Pole Star" sutra was very much like an immense umbrella or round canopy. Arms.formed by major stars aligning.went outward from a central pole of silver light. Smooth golden and silver stars formed a spiral around the pole and it's arms. I can't begin to draw it as it's multi dimensional

Fig. 47: Samples of Subjects Drawings

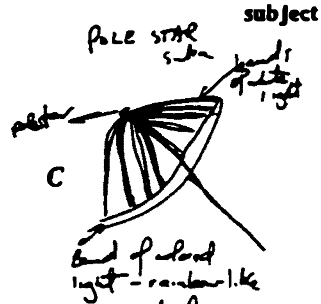
Samples of Subject's Drawings (letters B - E added)

subject R. A.

The form which appeared is like an umbrella.



Ribs are like bands of cloudy white light, and the whole form is in a background of stars + space



Band of colored light - rainbow like
counter clockwise rotation of the "umbrella"

The form which appeared is like an umbrella. The ribs are like bands of cloudy white light and the whole form is in a background of stars and space.

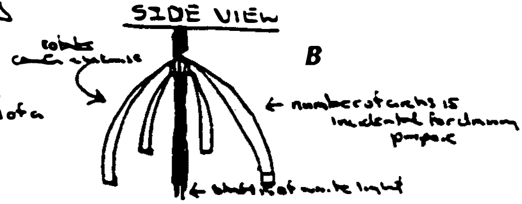
Band of colored light - rainbow like. Counter clockwise rotation of the "umbrella"

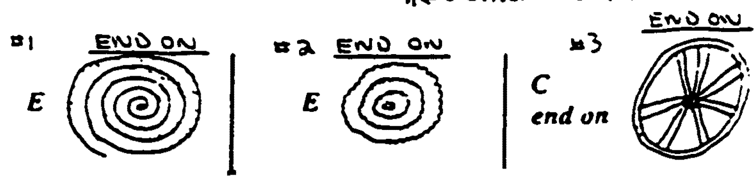
subject R.S.

Pole Star: often see a single bright star as if its a shining gem to which other clumps of stars which look like archs of light or rainbows are attached. This whole arrangement rotates counter-clockwise at times slowly. Pole star has a wide shaft of blinding white light, brighter than any other arch going thru its center like a Super highway

SIDE VIEW

description came to me in words: umbrella and hull of a Sailing ship





Pole Star: often see a single bright star as if it's a shining gem to which other clumps of stars which look like arches of light or rainbows are attatched. This whole arrangement rotates counter-clockwise at times slowly. Pole Star has a wide shaft of blinding white light, brighter than any other arch going thru it's center like a super highway. Description came to me in words: "umbrella and hull of a sailing ship". Number of arches is incidental for drawing purpose.

Fig. 48: Samples of Subjects Drawings

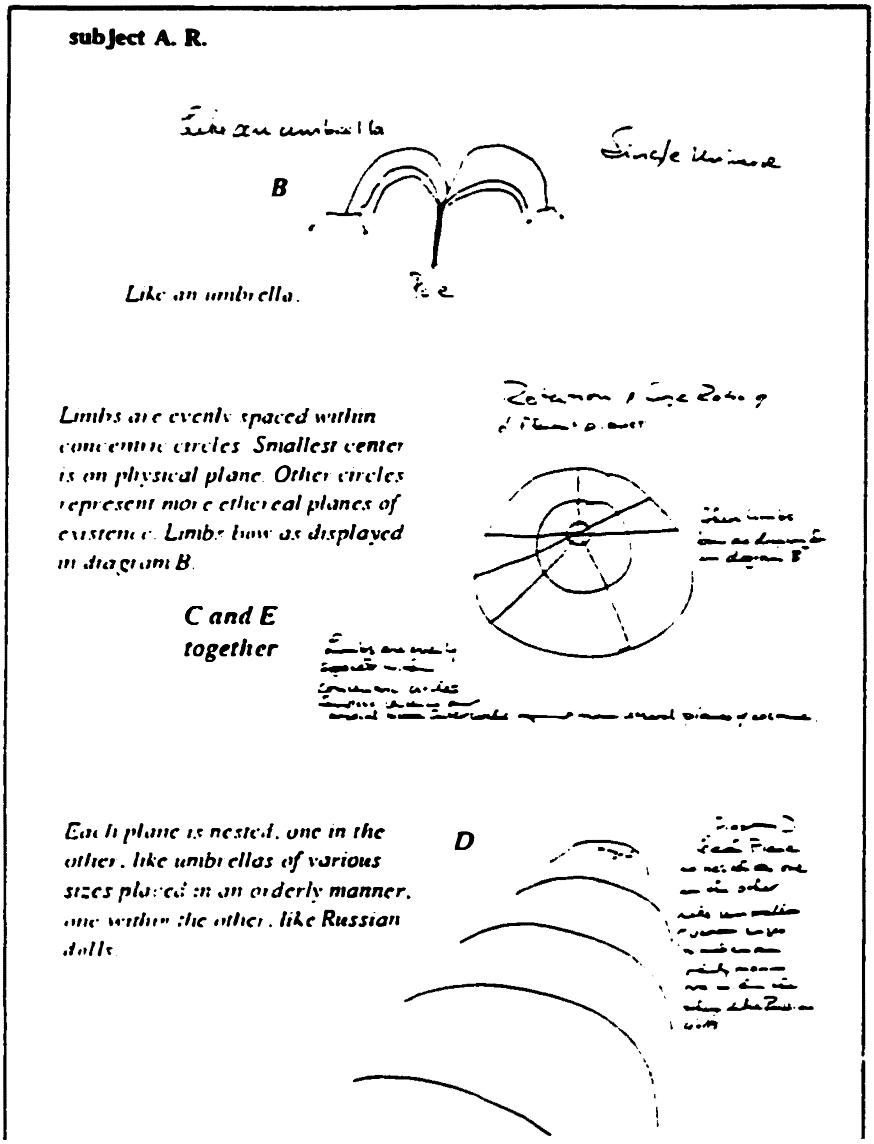


Fig. 49: Samples of Subjects Drawings

> be isolated and activated to produce experiences of archetypes of consciousness.[57]

Shear refers to one of the groups in the study:

> Of the twenty-five people on that course, eleven submitted descriptions. The drawings of nine of the subjects matched Plato's description quite clearly; some saw various parts of the structure and from various perspectives some saw the whole, some saw details not found in the *Republic* but described in other dialogues (e.g. *Phaedo*). The drawings of the other two subjects, although not obvious representations of the structure, are roughly compatible with some of its major features.[58]

Plato's Forms as Archetypes. What can we conclude from this? Shear believes that these results provide substantial evidence in support of the notion, held by Plato and supported by more recent thinkers such as Jung, that the mind contains certain inherent structures or archetypes. Pointing to passages in the *Republic* and elsewhere that emphasize the importance of innate forms of knowledge, he summarizes Plato's theories as follows:

> He [Plato] held that the mind has inborn knowledge of fundamental archetypes, the Forms. According to Plato's theory, we are born with this knowledge in a latent potential form; experience can activate these potentials; and it is the activation of these

[57] Shear (1981), p. 74.

[58] Shear (1981), pp. 11-12.

> potentials which underlies all of our subsequent knowledge.[59]

Elsewhere Shear expands on this description.

> Plato . . . held that we are capable of recognizing things only because of the existence and enlivenment of transcendental, inborn Forms or structures of pure intelligence. According to his theory, our experiences cause particular corresponding Forms to be enlivened, and we then classify the objects experienced in terms of these Forms.[60]

He goes on to describe the influence of this idea on Western philosophy and psychology, and to mention some modern proponents of similar concepts, such as Jung, but also Chomsky and Piaget. However, Shear acknowledges that:

> In the absence of any technique for isolating, activating and experiencing innate archetypes . . . modern scientific thinkers have generally rejected them as illusory, and the generally accepted position about Plato is that his reasoning to the Forms (whether correct or incorrect) led him to invent them.[61]

Shear is referring to the unavailability of such techniques to scientific researchers, at least until recently. Plato himself, however, makes direct mention of such techniques. He argues that there is

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[59] Shear (1981), p. 3.

[60] Shear (1990), p. 203.

[61] Shear (1981), p. 2.

> . . . a capacity which is innate in each man's mind, and that the organ by which he learns is like an eye which cannot be turned from darkness to light unless the whole body is turned; in the same way the mind as a whole must be turned away from the world of change until its eye can bear to look straight at reality, and at the brightest of all realities which is what we call the good.[62]

Plato is not referring here to gaining empirical knowledge; for that the attention is turned outwards, through the senses, towards the visible realm. It is for the higher knowledge of the Forms for which the attention must be turned inward. He continues:

> Then this turning around of the mind itself might be made a subject of professional skill,[63] which would effect the conversion as easily and effectively as possible. It would not be concerned to implant sight, but to ensure that someone who had it already was not either turned in the wrong direction or looking the wrong way.[64]

<u>The Prelude to the Song Itself</u>. Shortly after this passage, Plato embarks on a discussion of the later stages of the training required for his students--future philosopher kings if he is successful. The curriculum set forth includes the mathematical arts, but presented in a sequence that is slightly different from that of the

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[62] *Republic,* 518c-d, p. 322.

[63] *Technē*. (Translator's note).

[64] *Republic,* 518d-e, p. 322.

Pythagorean quadrivium. That schema, as we have seen, has a cosmological component, describing the unfolding of creation through one, two, three and four dimensions. Plato's purpose in this passage is educational, presenting the sequence in which these disciplines should be tackled. He begins with arithmetic, skips to plane geometry and then to astronomy. At this point, however, Plato changes his mind and adds solid geometry, considering it a mistake to proceed "straight from plane geometry to solid bodies in motion without considering solid bodies first on their own. The right thing is to proceed from second dimension to third."[65] He then proceeds to astronomy, and finally to harmonics. His emphasis, as we have noted, is on the perception of the Forms--the eternal, unchanging phenomena that represent aspects of Being rather than becoming. But these subjects are "only a prelude to the main theme we have to learn."[66] At the culmination of the entire process (after thirty or more years), Plato's students turn to the study of the Form of the Good itself, and for this, the technique to be used is the higher form of the dialectic, referred to by Plato as "the coping-stone that tops our educational system; it

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[65] *Republic*, 528b, p. 336.

[66] *Republic*, 531e, p. 341.

completes the course of studies and there is no other study that can be placed above it."[67]

Dialectic and *Yoga*. In light of the foregoing discussion, both in this chapter and the previous one, it appears that this coping-stone is a technique, or series of techniques, aimed at bringing direct knowledge of the fourth, and highest, level of knowledge--knowledge of the Forms and the Form of the Good itself. These structures have also been referred to as archetypes, which Shear defines as "deep universal potentials of intelligence."[68] Moreover:

> [Plato] held that they can be experienced, that they are responsible for giving form to all of our knowledge and experience, and that knowledge of them is therefore necessary for one to understand what knowledge really is and how to live a fully knowledgeable and effective life. And they are properly known not by inference, but only by experience of the highest level of reality.[69]

This understanding is not unique to Plato, however.

> Similar accounts are found in Vedanta, Taoism and other Eastern philosophical traditions. In Vedanta, for example, the 'Veda' or (fundamental) truth is held to be the collection of resonances of the unmanifest, subsets of which are selectively activated by our particular experiences. When we see something the 'impression' of that object is said to 'fall' upon this transcendental field within and enliven corresponding resonances which, when thus amplified, then produce the

[67] *Republic*, 534e, p. 347.

[68] Shear (1981), p. 3.

[69] Ibid.

> subjective phenomena that we refer to as knowledge and perception.[70]

As an extension of this understanding, the prescriptions of the *Yoga-Sūtras* can be seen as practical techniques designed to achieve direct perception of this transcendental field. "*Yogas citta-vrtti-norodhah,*" or "Yoga is the suppression of the transformations of the thinking principle,"[71] declares Patanjali. The result is "*Tadā drastuh svarupe 'vasthānam,*" or "Then the seer abides in himself,"[72] a description of the state of *samadhi* in which the normal perturbations of awareness are stilled, allowing for the experience referred to by Josephson as "the state of pure consciousness."[73] Achieving this state, in turn, allows for specific perturbations to be introduced in the ways prescribed by Patanjali. The process appears to parallel that described by Plato as the final stage of the dialectic and the "turning around of the mind itself," the technique that, he says, "might be made a subject of professional skill,"[74] enabling it to directly contemplate the Form of

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[70] Shear (1990), p. 203.

[71] *Yoga-Sūtras,* I,ii. Dvivedi, p. 1.

[72] *Yoga-Sūtras,* I,iii. Dvivedi, p. 3.

[73] See note 47, p. 390, above.

[74] See note 64, p. 401, above.

the Good. This is the application of the "Eye of Spirit" of St. Bonaventure, the "*lumen superius*, the light of transcendental Being which illumines the eye of contemplation and reveals salutary truth,"[75] or the *Contemplatio* of Hugh of St. Victor, "the knowledge whereby the psyche or soul is united instantly with Godhead in transcendental insight."[76] It was to this same realm of knowledge that Pythagoras directed the attention of his followers, in his case through the study of mathematics:

> Pythagoras . . . used difficult mathematical theorems and problems to test and prepare his students for ascent to the divine. It is this use of mathematics in the spiritual development of its students that distinguishes the Pythagorean tradition from other great traditions.... Unlike the practical forms of mathematics we are familiar with today, Pythagoras developed ideal systems of mathematics that functioned as intellectual mandalas that guided the soul to a vision of the structure of heaven.[77]

Plato also advocated the use of mathematics to refine and strengthen the mind--a rigorous ten-year program of study--but only as a preparation for the practice of dialectic. As

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[75] Ken Wilber, *Eye to Eye: The Quest for the New Paradigm* (New York: Anchor/Doubleday, 1983), p. 3.

[76] Ibid.

[77] Robert Apatow, "The Tetraktys: The Cosmic Paradigm of the Ancient Pythagoreans," *Parabola*, Vol. 24, No. 3 (August 1999), p. 39.

Peter Gorman writes, "This analysis of number by Pythagoras is a forerunner of the Platonic dialectic which became a mystical vehicle by which man attained to the divine."[78]

However this level of experience is attained, it has been described with various degrees of sophistication. Hindu *sástras,* as well as Buddhist texts, subdivide this realm methodically into numerous subdivisions. But as Wilber explains:

> the *surface structures* of this realm are naturally different from culture to culture and tradition to tradition. The *deep structure* . . . however, is simply that of *archetypal form;* it is marked by transmental *illumination, intuition,* and beginning *gnosis,* which brings a profound insight into the fundamental or Archetypal forms of being and existence itself.[79] (Wilber's italics.)

This insight provides the basis for a broader definition of archetype, correlating this concept, to a large degree, with the ancient cosmologies we reviewed in Chapter IV and the magical tradition in general. Wilber's definition is as follows:

> Archetypes, as used by Plato, St. Augustine, and the Buddhist-Hindu systems, refer to the *first* forms of manifestation that emerge from Void Spirit in the course of the creation of the universe. That is, in the

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[78] Peter Gorman, *Pythagoras: A Life* (London: Routledge & Kegan Paul, 1979), p. 137.

[79] Wilber (1983), p. 92.

> course of *involution*, or the emergence of the lower from the higher, the archetypes are the *first created forms, upon which all subsequent creation is patterned* (from the Greek *archetypon*, meaning "that which was created as a pattern, mold, or model"). (Wilber's italics)[80]

The Magical Tradition and the Realm of Death

Undoubtedly, we are dealing here with what Kearney termed the "magical tradition,"[81] one that appears to be represented in diverse cultural settings. Terminology differs from one tradition to the next; we do not find Plato speaking of *samadhi*, but the goal of the dialectic appears to be similar to that state. In the Myth of Er, we will recall that the visions that constitute the myth were presented to a man from *Pamphylia*, all races. Unlike descriptions of *Yoga* practice, however, the visions occur to him after he dies, and later he comes back to life to tell his story. In several other dialogues, particularly the *Phaedo, Meno, Theaetetus* and *Phaedrus*, Plato explicitly identifies knowledge of the Forms, true knowledge, as that which is experienced "after death." And in the *Phaedo* he describes the essential occupation and epistemological method of the philosopher as "practicing death," that is, accustoming the soul "to withdraw from all contact with the

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[80] Wilber (1983), p. 242.

[81] See Chap. I, note 35, p. 27.

body and concentrate itself by itself . . . alone by itself."[82] This is remarkably similar to Patanjali's description of the goal of *yoga* where "the seer abides in himself."[83]

The Orbits of the Soul. The similarities do not end there. If we turn back to the *Timaeus*, Plato describes how the soul, once it is constituted, is placed in the body, with results that are damaging to the soul's integrity:

> And into this body, subject to the flow of growth and decay, they fastened the orbits of the immortal soul. Plunged into this strong stream, the orbits were unable to control it, . . . and because of the consequent violent conflict the motions of the whole creature were irregular, fortuitous, and irrational.[84]

In particular, it is contact with the influence of the senses and their violent activity that upsets the delicate orbits of the soul. It is precisely for this reason that the *Yoga-Sūtras* prescribe "the suppression of the transformations of the thinking principle,"[85] by achieving the state of *samadhi* described above, in which the activity

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[82] Plato, *Phaedo*, 67c-d, in Edith Hamilton and Huntington Cairns, eds., *Collected Dialogues of Plato* (New York: Pantheon Books, 1961), p. 50.

[83] See note 72, p. 404, above.

[84] *Timaeus*, 43, p. 59.

[85] See note 71, p. 404, above.

of the body and of the senses settles down to the point that allows for the experience of consciousness in its state of least excitation-- "a flame which does not flicker in a windless place," as Lord Krishna describes it in the *Baghavad-Gita*.[86] In light of this, it is very interesting to find the following passage later on in the *Timaeus*:

> For when the impact of external sensation subdues the orbits and their container, then the orbits only seem to be in control but are in fact overpowered. And because of all this the soul when first bound to its mortal body is as much without reason today as it was in the beginning. But when the stream of growth and nourishment flows less strongly, the soul's orbits take advantage of the calm and as time passes steady down in their proper courses and the movement of the circles at last regains its correct natural form, and they can name the Different and the Same correctly and render their possessor rational.[87]

This passage, which seems to have escaped the notice of many commentators, is extremely illuminating when seen in the context of Shear's study and the pole-star *sūtras*. Laboratory research has demonstrated that the practices followed by the experimental subjects to achieve what they term "the state of least excitation of consciousness," produce a unique physiological condition characterized by a

[86] Chap. VI, verse 19, in Maharishi Mahesh Yogi, trans., *Baghavad-Gita: A new Translation and Commentary* (London: International SRM Publications, 1967), p. 311.

[87] *Timaeus*, 44, p. 60.

dramatic reduction in the metabolic rate.[88] It seems reasonable to interpret Plato's reference to the "stream of growth and nourishment" as the metabolism and its slowing down to the physiological correlates of the state of *samadhi*. When it does slow down, the orbits "steady down in their proper courses"--a condition similar to the steady state of the intellect in *samadhi*.

It is also revealing to find a similar description in a work on Yoga called the *Hathapradipika* that is frequently attached to the *Yoga Sutras:*

> Disturbance of mind follows disturbance of breath, and the mind remains calm when the breath is calm; hence in order to attain fixity of mind, the breath should be controlled. So long as the *Nādīs* [channels of energy flow], the vehicles of *Prāna* [breath, energy], are obstructed by abnormal humours, there is no possibility of the *Prāna* running in the middle course (Susumnā), and of accomplishing the *Unmanī-mudrā* [state of concentration]. Hence *Prānāyāma* [Yoga breathing exercises] should be practiced, in the first instance, for the clearance of these humours. . . When the humours of the *Nādis* are cleared, the body becomes lean and beautiful, and digestion becomes keen, health ensues, the retention of the breath is done without effort, and the *Nāda* [sound] within becomes audible.[89]

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[88] Robert Keith Wallace, "The Physiological Effects of Transcendental Meditation: A Proposed Fourth Major State of Consciousness," in David W. Orme-Johnson and John T. Farrow, eds., *Scientific Research on the Transcendental Meditation Program, Collected Papers* (Seelisberg, Switzerland: Maharishi European Research University Press, 1977), Vol. 1, pp. 43-78.

[89] Dvivedi, pp. 126-127.

In each case, a technique is applied to calm the disturbance of mind, which according to Plato, is caused by the activity of the senses and according to the *Hathapradipika* results from disturbance of breath.[90] As a contrast in the two approaches, however, the Greek view sees the end result as becoming "rational," associated with the intellect, whereas the Indian view sees it as being able to hear the "*nāda* within," associated with subtle hearing, a reiteration of the contrast described by Guy Beck in Chapter IV above.[91]

We can find further points of similarity here. Above, Plato associates rationality with the ability to distinguish between Sameness and Difference. By comparison, in the fourth chapter of the *Yoga-Sūtras*, Patanjali describes a similar ability as a criterion for the depth of perception. In this case, it is the ability to distinguish between *Purusha*, the undifferentiated, absolute aspect of existence,

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[90] The hypo-metabolic state referred to by Wallace is indeed highly correlated with a complete suspension of respiration for brief periods, yet with oxygen and carbon-dioxide levels in the blood remaining constant. See Badawi, K. Wallace, R. Orme-Johnson, D. et al. "Electrophysiologic characteristics of respiratory suspension periods occurring during the practice of the transcendental meditation program," *Psychosomatic Medicine,* 46 (1984), pp. 267-276, and Farrow, J. T. and Herbert, R. "Breath suspension during the transcendental meditation technique," *Psychosomatic Medicine*, 44(2), 1982, pp. 133-153.

[91] See Chap. IV, note 160, p. 247.

which we could term Sameness, and intellect--for Patanjali the subtlest aspect of individual mind. As the role of intellect is defined as the perceiving of distinctions between the various aspects of experience,[92] it is not unreasonable to associate this with Difference.[93]

Interpreting the Platonic Myths

All of the foregoing further serves to demonstrate the complexity that lies beneath the surface of ancient texts and the multiple levels upon which we have to interpret them. The idea that we cannot only approach Plato as discursive philosophy is greatly reinforced, and deep structures of meaning are unexpectedly revealed, when we use mathematics, music, or mythology to unlock the "riddles and puzzles" contained within them, or when we approach them as *theōria* rather than *epistēmē*.

These results, and the other studies cited, suggest that the tradition of musical cosmology, as portrayed in its Platonic sources, is presented on multiple levels of

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[92] *Yoga-Sūtras*, III, xxxvi, Dvivedi, p. 85.

[93] For further parallels between Plato and Patanjali, see Shear, "The Philosopher, the Yogi, and Enlightenment: Plato's Symposium and Patanjali's Yoga Sutras," *Darshana International* (Moradabad, India) vol. XXX, no. 1 (January 1990), pp 72-86.

symbolism according to a schema that Plato himself sets forth, both in detail in the *Republic* and in highly compact form at the opening of the *Timaeus*. On one level, the musical universe exists in elaborate mathematical symbolism that hinges on musical forms and relationships. This is related to the third level of Plato's Divided Line analogy, the level where the objects of mathematics are entertained by the mind; it finds an elegant expression in the formulations of the world-soul in the *Timaeus*. On another level, the music of the spheres image is embedded in archetypal patterns of symbolism that link it with ideas that are both universal in their application and fundamental to human experience. This would appear to be Plato's fourth level, the level of the Forms themselves. Also known by the term archetypes, these innate structures give rise to patterns of thought which then express themselves on multiple levels--aesthetic, mythological, religious, sociological, and historical. We have seen one example in the *axis mundi* series of images. According to Plato, however, the highest form of knowledge is the direct experience of the Forms, or archetypes, rather than merely their inference from phenomenology. And recent research suggests that such experiences may indeed be possible.

Given that Plato, along with Pythagoras, admonishes us repeatedly that such fundamental levels of knowledge are the only ones worth pursuing, it should be no surprise to find these themes echoed in his work and thus at the very source of the music of the spheres tradition. Whether Plato has usually been understood in this way is quite another thing. To determine this we have to examine the writers who conveyed Plato's ideas from ancient Athens into medieval Europe and beyond.

CHAPTER VII

THE LATER SOURCES

The Transmission of Plato's Dialogues

We have seen that the writings of Plato provide the two main sources of the music of the spheres tradition in Europe. It is also apparent that there are many possible levels of interpretation for these texts. To understand the influence of Plato's thought, it is important to consider its transmission through time, and, more important, how it was understood by the primary contributors to the literature on universal harmony. We will find that, in many important respects, it was incompletely understood; certain levels of interpretation, *including those considered most important by Plato himself*, were lost on subsequent writers. This would be of little consequence when studying the music of the spheres tradition as a historical oddity, as many commentators have. It is of great significance, however, when viewing its sources as possessing a core meaning rich in archetypal symbolism, as some of the interpretation and research presented in Chapters V and VI suggests.

From the time of Plato's death until the presentation of the Florence *intermedi,* 1,937 years passed. By the middle of the seventeenth century the gap had stretched to two full millennia. Can the intentions behind Plato's writing have remained intact over this period of time? To answer this it is necessary to trace the paths through which the images and concepts of the *Timaeus* and the *Republic,* particularly the Myth of Er, took from Plato's academy to the Florentine academy and beyond.

Calcidius

It was a very uncertain path. The *Republic* had appeared in Latin only relatively recently, in the form of Marsilio Ficino's mid fifteenth-century translation, when the plans were being made for the Medici wedding. The *Timaeus* had a much longer presence in European libraries, albeit in a garbled form. Until the twelfth century it was the only work of Plato's known in the West; it was certainly the most influential of Plato's writings during late Antiquity and the Middle Ages. But again, translation is a critical issue. Greek manuscripts were extremely rare in Europe until the fall of Constantinople in 1453. The *Republic,* for example, was not available in Greek until after Ficino's translation appeared. Thus medieval and Renaissance readers were dependent upon Latin translations. In the case of the *Timaeus*, the only available Latin version was that of Calcidius, produced in the fifth century C.E. One fragment existed in a translation by Cicero but, as Paul Dutton writes,

> Calcidius and not Cicero was the gateway to the Latin *Timaeus* of the Middle Ages. His shaping of the tradition and reception of the work was so fundamental (some would say corrupting) that it is difficult now to know where Calcidius stops and Plato starts. As its translator and commentator Calcidius made critical decisions about how to present the dialogue that made his work a part of the medieval reading of the *Timaeus*; Calcidius and the *Timaeus* became enmeshed. But medieval commentators were puzzled about who he was and how to approach his work. In glosses and commentaries they lingered over his preface to the translation and they wrote commentaries on his commentary. Even the attempts of twelfth-century commentators to distance themselves from Calcidius were doomed to failure. Indeed, throughout the Middle Ages the names and thoughts of Calcidius and Plato were often interchangeable.[1]

If medieval scholars were reading a second-hand version of the *Timaeus*, it was also an incomplete one; Calcidius' translation comprised only what Godwin refers to as "its first and most essential part."[2] This section certainly

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[1] Paul Dutton, *Approaches to Calcidius in the Middle Ages*, paper delivered at conference entitled "Plato's *Timaeus* as Cultural Icon," University of Notre Dame, March 30, 2000, abstract. See http://www.nd.edu/~timaeus/dutton.html.

[2] Joscelyn Godwin, *The Harmony of the Spheres: A Sourcebook of the Pythagorean Tradition in Music* (Rochester, Vermont: Inner Traditions International, 1993), p. 4. See Chap. V, note 21, p. 282.

encompasses the structure of the world-soul, including the essential numbers of the underlying riddle, and Plato's admonitions regarding the primacy of universals. But we have seen that one of the keys to the interpretation outlined in the present study does not come from the *Timaeus* at all but from the Divided Line analogy in the *Republic*.[3] It seems unlikely, therefore, that the idea of the direct knowledge of the Forms played a part in medieval interpretations of Plato.

Aristotle

A further barrier to such an interpretation existed in the person of Aristotle. If Plato had a limited influence during the Middle Ages, it was Aristotle who filled the vacuum, since many of the latter's works were available both in the original Greek and in translation from the twelfth century onwards. Aristotle's influence on medieval thought was profound; his writings were one of the mainstays of university life in Europe. And his influence went well beyond the medieval era, as James Hankins points out. "No one," he writes, "would any longer maintain the facile generality, once the staple fare of textbooks, that the

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[3] See Chap. V, pp. 334-339.

Middle Ages were an Age of Aristotle and the Renaissance an Age of Plato."[4] But, although Aristotle was Plato's student, he was not a supporter of all of Plato's doctrines; in fact, he was a detractor of many of them. Specifically, Haar refers to Aristotle as the "*advocatus diaboli*, the man who rejects and scoffs at the notion of celestial harmony,"[5] stating that "it is clear that the theory that the movement of the stars produces a harmony, i.e. that the sounds they make are concordant, in spite of the grace and originality with which it has been stated, is nevertheless untrue."[6] S. K. Heninger goes so far as to suggest that Aristotle specifically distorted a key source of the tradition:

> The music of the spheres is also one of our most ancient traditions. By Plato's time it had been fully formulated by the Pythagoreans, who treated it as a fundamental postulate in their science. In the last book of the *Republic* (616C-617B), recounting the famous vision of Er, Plato describes eight heavenly spheres whirling concentrically around the Spindle of Necessity. On each sphere a siren sits, singing a note of the diapason, and the eight together form a single harmony.[7] Aristotle, *intentionally mistaking this*

[4] James Hankins, *Plato in the Italian Renaissance* (Leiden: E. J. Brill, 1990), Vol. 1, p. 3.

[5] Haar, p. 85.

[6] *De Caelo*, II, 9, 290b12, J. L. Stocks, trans., in *Collected Works of Aristotle*, Jonathan Barnes, ed., Bollingen Series LXXI-2 (Princeton: Princeton University Press, 1984), Vol. I, p. 479.

[7] Cf. Milton *Arcades*, 61-73. (Heninger's note)

> *doctrine as a statement of physical fact,* denies the music of the spheres with obvious delight (*De caelo,* 290b12-291a27).[8] (Author's italics.)

Heninger understands Plato's doctrine to be essentially symbolic and mathematical rather than a "statement of physical fact." Referring to the concept of *cosmos* as formulated by the Pythagoreans, and again by Renaissance thinkers, he writes:

> The most comprehensive representation of cosmos . . . was the concept of universal harmony--in its simplest form, the music of the spheres--and this concept embraced not only arithmetic, music and geometry, but also astronomy. It was, in fact, the statement of cosmos to which each of the quadrivial sciences contributed coordinately.[9]

Therefore universal harmony ". . . represents the concept of order as order prevails in the heavens, a divine plan that informs and controls our universe."[10] To take this concept and reduce it to a mere statement of physical fact, or even to emphasize the primacy of physical fact, is to contradict Plato's specific instructions regarding the correct way to approach astronomy, harmonics, and so forth,

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[8] S. K. Heninger, Jr., *Touches of Sweet Harmony: Pythagorean Cosmology and Renaissance Poetics* (San Marino, CA: Huntington Library, 1974), p. 179.

[9] Heninger, pp. 178-179.

[10] Heninger, p. 179.

and does not appear to reflect Plato's intentions.[11] Plato, like Pythagoras, was interested above all else in direct knowledge of unchanging essences, in Plato's case in perceiving the Forms at the highest level of the Divided Line schema. But Aristotle does not accept Plato's theory of the Forms.

> Aristotle's critical study of Plato's theory of universals had convinced him that universals could not exist by themselves, but only in particular things. Since substances must be capable of independent existence, it appears that they cannot be universals but must be particulars. However, this generated a dilemma since Aristotle also believed that only universals were definable and the objects of scientific knowledge (in the *Analytics* model). Thus if substances are knowable, they cannot be particulars. But now it looks as if substances cannot exist at all since they cannot be either universals or particulars. Aristotle's dilemma arises because he was tempted to regard particular substances as ontologically primary, while (at the same time) insisting that understanding and definition are of universals. The latter thought he shared with Plato; but the former is very much his own, and one which led to a fundamentally different account of numbers and universals than the one Plato offered.[12]

This view with regard to ontology extended to Aristotle's understanding of the processes of thought, and thus to his epistemology.

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[11] Plato, *The Republic*, Desmond Lee, trans. (London: Penguin Books, 1974), 529c-d, p. 338, and 531a-c, 341-341. See Chap. V, notes 7 & 8, pp. 273-274.

[12] Ted Honderich, ed., *The Oxford Companion to Philosophy* (Oxford: Oxford University Press, 1995; Electronic reproduction, Boulder, Colorado: NetLibrary, 2000), p. 56.

> Aristotle proceeds to show how reason is related to imagination. A thought is not an image, but we cannot think without images. More definitely, "the faculty of thought thinks the forms *in* the images." An image is a particular mental occurrence just as much as is a sensation; *thought* first occurs when the mind discerns a point of identity between two or more images. But even when a universal has thus been grasped, it is Aristotle's doctrine that imagery is still needed by the mind. "The soul *never* thinks without an image." Just as in geometrical proof, though we make no use of the particular size of the triangle, we draw one of a particular size, so in thought generally, if we are thinking of something non-quantitative, we yet imagine something quantitative, and if our object be something indefinite, we imagine it as of a definite quantity. Nothing can be thought of except in connexion with a continuum, and nothing, however timeless, can be thought of except in connection with time. Aristotle seems here to be setting himself against Plato's view, expressed in the Divided Line, that while scientific thought needs the aid of imagery, philosophical thought deals with pure forms without any such assistance. The use of imagery is the price, Aristotle maintains, which reason has to pay for its association with the lower mental faculties.[13]

In this context, philosophical thought refers to the fourth level of Plato's Divided Line analogy, accessed via the higher level of the dialectic, as discussed in Chapter V. According to Plato, it is the level of mental functioning that is carried out without the use of images. When Aristotle denies this possibility, Plato's exposition of universal harmony as a system of underlying Forms giving order and structure to the external world becomes untenable.

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[13] W. D. Ross, *Aristotle* (London, Methuen & Co. Ltd., 1945), p. 148.

We are left to seek the source of order purely within the world of physical phenomena.

Conflicting views of Platonic and Aristotelean thought have been topics of debate for 2,400 years, of course. Marjorie Grene attempts to sum up the current view.

> Those who are steeped in the dialectic of the Platonic dialogues, for whom western thought is 'a series of footnotes to Plato', see in Aristotle a pupil who misconstrued his master. Aristotelian form is Platonic form surreptitiously tucked away in the visible world. For Plato, the Ideas can be known only by a painful and profound conversion; the philosopher must climb laboriously out of the cave to the sun above. Aristotle denied this necessity, and was left with the dilemma [of] the contradiction between the denial of real universals and the assertion of the universality of real knowledge.
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> . . . Those more interested in the development of logic, on the other hand, are inclined to see in Plato's work a first adumbration of a correct logic, brought to full flower by his most brilliant pupil, and so for them Plato is but a halting Aristotle.[14]

Grene finds both of these viewpoints one-sided and proposes a more balanced position:

> Each of these views boasts doughty supporters, especially in contemporary English-speaking philosophy, the second. But the latter position is as unfair to Plato as the former is to Aristotle, and there are also, scattered through the literature, proponents of a third view, which respects equally both master and pupil, but sees in the relation between them neither essential decline nor essential progress, but two

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[14] Marjorie Grene, *A Portrait of Aristotle* (Bristol, U.K.: Thoemmes Press, 1998), p. 39.

> deeply divergent attitudes to experience, to man and the world.[15]

Such a view also attacks the notion that Aristotle moved beyond Plato in developing a more "modern" world-view.

> The picture of a development from Platonic 'metaphysics' to observation and 'science' is based on a shallow view of both. All science rests on some metaphysics, some vision of reality. Moreover, the vision of modern science in its most authoritative branches, that is, first and foremost, in mathematical physics, is in several important ways more Platonic than Aristotelian: in its reliance on mathematical forms as the instrument of all science, for example, or in its scepticism about the power of language (even formal language) to enunciate once and for all the definitive answer to its problems.[16]

A balanced view of the Plato/Aristotle dichotomy is important for understanding the three strands of Greek thought. It should be remembered that Kearney attributes the magical view not to Plato but to the Neo-Platonists, whose focus was on the transcendental to the exclusion of the physical world. For Plato, however, there are four levels of the Divided Line, and while he emphasizes the importance of the highest level it is not necessarily at the exclusion of the others. Let us remember that at the beginning of the *Timaeus* he suggests that the vision presented in the *Republic* lacks reality, life and movement.

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[15] Grene, pp. 40-41.

[16] Grene, p. 37.

> My feelings are rather like those of a man who has seen some splendid animals, either in a picture or really alive but motionless, and wants to see them moving and engaging in some of the activities for which they appear to be formed.[17]

Socrates' question, "One, two, three--but where is the fourth?" in the context of the Divided Line, can be read in both directions; it points to the level of the Forms, arrived at via the dialectic in its advanced mode, but it also suggests movement in the opposite direction, from the abstract to the concrete, from the Forms to their actualization in the "real" world, the world of life and motion.

Again, the issue is one of balance. Grene seeks this by considering Plato and Aristotle together, an idea that is reflected in Raphael's great painting, *The School of Athens* (fig. 50). Plato is seen with his hand raised to the heavens while Aristotle points doggedly down to earth. Equally significant (and everything in Renaissance painting is deeply symbolic), Plato holds a copy of the *Timaeus,* a highly abstract work of cosmology, while Aristotle clutches a copy of his Ethics, which deals with far more practical concerns.

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[17] *Timaeus,* 19, Desmond Lee, trans. (London: Penguin Books, 1965), p. 31.

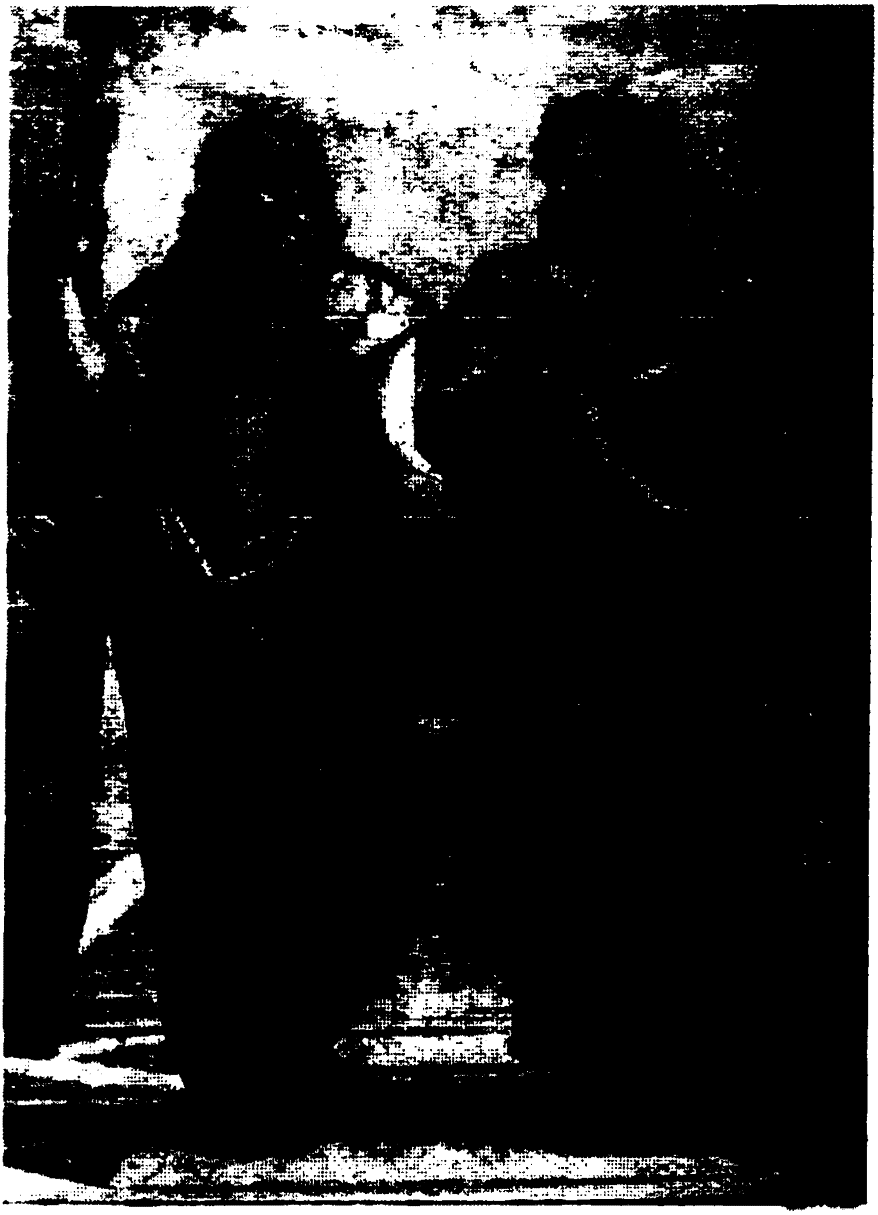

Fig. 50: Plato and Aristotle. Raphael, *School of Athens*. Stanza della Segnatura, Vatican. (Detail)

There is an alternative view, however, namely that both Plato and Aristotle strove for balance, each in his own way. Aristotle, in rejecting Plato's view of universals, tried to develop one of his own, characterized by Bertrand Russell as "Plato diluted by common sense."[18] This is difficult, Russell adds, "because Plato and common sense do not mix easily."[19] When it comes to the music of the spheres, however, the main effect of the denial of Plato's theory of Forms is to lead away from the Pythagorean concept of *cosmos,* with all its implications of beauty and order, via the Latin equivalent *mundus*, towards the English "mundane," as the tradition tends toward consideration of physical fact rather than underlying archetype. A huge speculative edifice is constructed on this basis in subsequent centuries, and balance becomes more and more difficult to achieve. Thus, Aristotle's view represents the beginning of the death knell of the musical cosmology that Plato unfolds in the *Timaeus* and the Myth of Er.

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[18] Bertrand Russell, *A History of Western Philosophy* (New York: Simon and Schuster, 1964), p. 162.

[19] Ibid.

The Tradition Unfolds

Of course, the music of the spheres persisted for several centuries before it faded away. According to Heninger, this was in spite of Aristotle's position. After explaining the younger philosopher's rejection of Plato's ideas about the universal harmony, Heninger continues:

> But the idea nonetheless persisted because no other statement of cosmos conveyed its order and beauty with such imaginative completeness. *The idea was soon articulated so finely that particular notes were assigned to the various spheres.*[20] (Author's italics.)

Such elaborations of the idea take it well beyond what we find in Plato. In the Myth of Er, Plato does maintain that each of the cosmic hemispheres gives out a single note. He does not, however, get involved in a discussion of which hemisphere, or planet, is aligned with which note. But where Plato refrained from treading, multiple other writers did not hesitate to rush in.

Nicomachus

We have already cited a prime example of this: the statement by the second-century philosopher Nicomachus of Gerasa, in the *Manual of Harmonics*, that the names of the

[20] Heninger, p. 179.

notes were derived from the seven stars.[21] He is not entirely confident about this, however. He actually begins this sentence with "It is probable that," and when he goes on to describe these "swiftly whirling bodies"[22] and their relationships, he feels compelled to preface his remarks with "For they say that . . ."[23] The title of the section in question, Chapter 3 of the *Harmonics,* is equally lacking in conviction: "Among objects of perception, the music of the planets is considered to be the prototype of our music according as we imitate it."[24] As in so many of these sources, the information is presented in terms of third parties, sometimes specific, usually vague.

Theon

We find a similarly imprecise assessment of the universal harmony in another second-century commentator, Theon of Smyrna, in his only surviving work, *Expositio rerum mathematicarum ad legendum Platonem utilium (Mathematics Useful for Understanding Plato*). As Godwin is careful to

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[21] Nicomachus, *The Manual of Harmonics,* Flora Levin, trans. and commentary (Grand Rapids, Michigan: Phanes Press, 1994), p. 45. See Chap. IV, note 80, p. 200.

[22] Ibid.

[23] Ibid.

[24] Ibid.

point out,[25] Theon begins his dissertation with something of a disclaimer: ". . . we will not hesitate to relate what our predecessors have discovered, nor to make more widely known the Pythagorean traditions which we have inherited without ourselves claiming to have discovered the least part of it."[26] Undeterred, he proceeds to expound on "The order of the Planets and the Celestial Concert"[27] but begins with this statement: "Here are the opinions of certain Pythagoreans relative to the position and the order of the spheres or circles on which the planets are moving."[28] The planets he lists are the Earth, the Moon, Hermes (Mercury), Venus, the sun, Mars, Jupiter and Saturn. For this arrangement he cites Alexander of Aetolia: "In these verses Alexander has indicated the order for the spheres that he has determined."[29] Theon then proceeds to criticize Alexander's arrangement. "It is evident that he arbitrarily imagined the intervals which separate them, and nearly all

[25] Godwin (1993), p. 16.

[26] Theon of Smyrna, *Expositio rerum mathematicarum ad legendum Platonem utilium,* trans. by Robert & Deborah Lawlor from the 1892 Greek/French edition of J. Dupuis as *Mathematics Useful for Understanding Plato* (San Diego: Wizards Bookshelf, 1979), p. 32.

[27] In Book II, Chap. XV.

[28] Theon, p. 91.

[29] Theon, p. 93.

the rest."[30] Theon suggests that the seven-stringed lyre in Alexander's description, the image of the divine world created by Hermes (Mercury), falls short. There are supposed to be nine sounds, but only six tones are mentioned, and Alexander's account does not fit into either the diatonic or the chromatic system. By comparison, Theon then presents the system of Eratosthenes, who assigns a different order to the planets, one that Theon prefers. But then he states that "the mathematicians establish neither this order nor a like order among the planets."[31]

A Dubious Beginning

It is from this beginning that the music of the spheres tradition emerges from antiquity. There follows one and a half millennia of speculation about the various planet-tone relationships, a luxuriant and exotic literary edifice, built upon a most insecure foundation. Exactly how the notes and the planets are assigned is a prime example, for the most part, of blind speculation, opinion, even whimsy--everything, in short, that both Plato and Pythagoras would have condemned. By the eighteenth century this structure had become so unsound that there was little left for the

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[30] Ibid.

[31] Ibid.

enlightenment encyclopedists but to condemn and dismantle it.

It is beyond the scope of this study to examine all this literature in detail. That has been done admirably by Haar and Godwin and, to some degree, by Heninger and James. For our purposes, it will be best to concentrate on the most significant works through which the music of the spheres tradition was transmitted. Claude Palisca has identified four writers who appear to have conveyed the essential elements of this theme into medieval Europe.

> The main links to ancient music theory known during the Middle Ages were the *De institutione musica* of Boethius, the *Commentarius in Somnium Scipionis* (Commentary on the Dream of Scipio) of Macrobius, the *De Nuptiis Philologiae et Mercurii* (Marriage of Philology and Mercury) by Martianus Capella, and the *Institutiones divinarum et humanarum litterarum* (Institutions of Divine and Human Letters) of Cassiodorus.[32]

By examining each of these in turn, we can gain some sense of the way this tradition unfolds. In particular, we can attempt to determine to what extent the full meaning of the original Greek sources, specifically the passages by Plato, is maintained in the process.

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[32] Claude V. Palisca, *Humanism in Italian Renaissance Musical Thought* (New Haven & London: Yale University Press, 1985), pp. 35-36.

The Latin Sources

Boethius

The first of these texts, the *De institutione musica* of Boethius, ". . . has probably affected musical thought as much as any other single theoretical work in the history of Western music . . . and was used as one of the chief sources of musical theory for over a millennium."[33] Both a philosopher and a statesman, Anicius Manlius Severinus Boethius (480-524 C.E.), like Pythagoras and Kepler, stood at the transition point between different epochs and modes of thinking. For Boethius, the transition was between the Greek and Roman worlds on the one hand, and the emerging culture of medieval Europe on the other.

As a statesman, a Consul of the waning Roman empire, Boethius represented Roman values at the court of the new power in Italy, King Theodoric of the Ostrogoths, to whom he acted as advisor. As a philosopher and writer, Boethius pursued the goal of making the writings of Plato and Aristotle available in Latin, and to interpret and reconcile their philosophical views. At the same time, as either a

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[33] Boethius, *The Principles of Music,* Calvin M. Bower, trans. and commentary (Ph.D. dissertation, George Peabody College for Teachers, 1967), introduction, p. ii. Boethius' text was still in use as a basic music text, at Oxford, as late as the eighteenth century.

Christian himself or, at least, as someone sympathetic to Christian theology, he anticipated St. Thomas Aquinas in attempting to reconcile Greek thought with Christian doctrine. Through these efforts he made a major contribution to the foundation of medieval culture.

> Seen by Gibbon as "the last of the Romans whom Cato and Tully would have acknowledged as their countryman" and by R.W. Chambers, with Cassiodorus and St. Benedict, as "one of three founders of the Middle Ages", he is eminent among those who served to transmit the wisdom and graces of the Ancient World "to restore the balance" of the new."[34]

Boethius' most famous treatise was a largely Neoplatonic work, *The Consolation of Philosophy*, which was enormously popular in the Middle Ages; close to four hundred manuscript copies of the original Latin work have come down to us. It was translated into Anglo-Saxon by Alfred the Great and into English by Chaucer; there was a Byzantine version in the 13th century by Planudes, a 16th-century English one by Elizabeth I, and many others. Written while its author was in jail awaiting execution, after falling decidedly out of favor with the king, the *Consolation* was the crowning achievement of Boethius' literary career, demonstrating the degree of synthesis he had been able to

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[34] Basil Blackwell, foreword to Margaret Gibson, ed., *Boethius: His Life, Thought and Influence* (Oxford: Basil Blackwell, 1981), p. vii.

accomplish in his philosophy. "One aspect of Boethius' intellectual achievement," writes his biographer, "which . . . impresses itself on the reader of the *Consolation* as one of particular complexity, is its absorption of both Classical and Christian traditions."[35]

Apart from the *Consolation*, Boethius also translated Porphyry, wrote commentaries on Cicero, and composed original treatises of various lengths on logic, mathematics, and music. We still have manuscripts of the earlier works, on arithmetic and music, both of which are based on Greek handbooks by Nicomachus and Ptolemy. There is little that survives of Boethius' geometry, however, and nothing on astronomy.

While Boethius did not leave any translations of Plato that we know of, he was familiar with Greek literature and he is closely linked with Platonic thought; it was even claimed that he had studied in Athens. Regardless of whether this is true, his contemporary Cassiodorus praised him for the work he did in translating and transmitting classical learning into European culture:

> In your translations Pythagoras the musician, Ptolemy the astronomer, Nichomachus the arithmetician, and Euclid the geometer are read by Italians; Plato the theologian and Aristotle the logician debate in the

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[35] John Matthews, "Anicius Manlius Severinus Boethius," in Gibson, op. cit., p. 20.

> Roman tongue; and you have given Archimedes the mechanician back to the Sicilians in Latin.[36]

Cassiodorus seems to suggest that Boethius was responsible for transmitting all three strands of Greek learning into European culture, through Plato, Aristotle and Archimedes. Henry Chadwick puts this into a slightly different perspective:

> His world is the old world of antiquity with an intellectual framework dominated by Ptolemaic ideas about the world, by Aristotle's doctrines of substance and accidents, by a Platonic metaphysic setting asunder mind and matter, by Pythagorean ideas of mathematics and of musical proportion as the key to the structure of the cosmos.[37]

It is helpful in reading Boethius to see his work within this framework. It is also important, however, to realize two seemingly contradictory things about Boethius that Chadwick brings out, because, even though he was "by temperament a man who liked to strike out on his own,"[38] it is also significant that "neither in his intellectual studies nor in his works on mathematics did Boethius claim

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[36] Cassiodorus, *Variae* i. 45 (Migne: *Pat. Lat.* xvix. 529 C.), Cited in Boethius (1967), p. 5.

[37] Henry Chadwick, introduction to Gibson, op. cit., p. 2.

[38] Ibid.

to be original."[39] We will find this to be the case with the authors of all four of the Latin texts under consideration.

De institutione musica. Boethius' treatise on music is, indeed, both idiosyncratic and derivative, representing a compendium of ideas from earlier writers while adding only a handful of original concepts. We have already encountered one example of his original contributions--the categories of music referred to in Chapter 1, *musica mundana, musica humana and musica instrumentalis*, terms that can be found in treatises on music throughout the Middle Ages, and even as late as 1617, when they appear in Fludd's work. Also, the term *quadrivium* appears probably for the first time in Boethius, not in his music theories, but, following the logical sequence of the quadrivium, in his *De Institutione Arithmetica*. This sets the scene for his general approach to the subject of music, however, as Boethius adheres closely to the Platonic definition of music as a mathematical discipline, and it is presented as such in the *De Institutione Musica*. Boethius also follows Plato in emphasizing music's ethical power. Indeed, the first chapter of his treatise is entitled "That music is related to us by nature, and that it can ennoble or debase our

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[39] Chadwick, in Gibson, p. 3.

character."[40] Boethius makes a distinction between music and the other three aspects of the quadrivium:

> Thus it follows that, since there are four mathematical disciplines, the others are concerned with the investigation of truth, whereas music is related not only to speculation but to morality as well. For nothing is more consistent with human nature than to be soothed by sweet modes and disturbed by their opposites.[41]

All of this leads to what is perhaps the most important consideration in seeking to understand Boethius's work on music: *De Institutione* is essentially an abstract work of philosophy rather than any kind of practical manual. Having defined *musica mundana, musica humana and musica instrumentalis,* Boethius chooses to focus his work primarily on the first category, somewhat on the second, little on the third. He approaches music theory in a strictly deductive form, based on the Platonic notion that the true foundations of music are the a priori laws of proportion inherent in musical relationships. The main thrust of Boethius' treatise on music, therefore, as of the rest of the mathematical disciplines he describes, is the achievement of a higher state of intellectual and spiritual development:

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[40] Boethius (1967), p. 31.

[41] Boethius (1967), p. 32.

> The influence of the Platonic tradition on *The Principles of Music* is further seen in the expressed pedagogical purpose of these mathematical works. These disciplines are not treated as ends in themselves but rather are considered as a preparation for the study of philosophy. They are described as the "quadrivium," the four-way path "by which one should come to those places where the more excellent mind, having been delivered from our senses, is led to the certainty of intelligence."[42] These places of which Boethius is speaking are in the land of Platonic philosophy where pure forms, essences, exist in and of themselves and cease to "suffer radical change through participation in the corporeal."[43] Music and the other mathematical disciplines are thus not a part of philosophy proper as they would be in the Aristotelian tradition, but they are rather pedagogical preparations for the ascent to pure philosophy in the Platonic sense of the word.[44] [45]
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> *The Principles of Music* was thus written more for the student who aspired to philosophy than for the practicing musician, even though it was the practicing musician's most authoritative theory text for almost a thousand years.[46]

Boethius makes this approach explicit in discussing the relative merits of reason and the senses in the study of music. This is found in Book I, section 9 of *De institutione musica*, in connection with Boethius' recounting of Pythagoras' discoveries in the blacksmith's shop.[47] "Not all

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[42] See *The Principles of Arithmetic*, I. i., in Boethius (1967), p. 27. (Bower's footnote)

[43] Boethius, p. 24. (Bower's reference)

[44] See Plato, *Republic*, vii, 523-534.

[45] Boethius (1967), Bower's intro., pp. 15-16.

[46] Boethius, p. 17.

[47] See Chap. III, note 31, p. 130.

judgment ought to be given to the senses," he states, "but reason ought more to be trusted."[48]

Boethius' views on this issue appear to put him squarely in the Platonic camp, and, like Plato, he treats music as a mathematical discipline. However, where Plato contrasts such an approach with the practices of "the Pythagoreans" who "torment the strings and try to wring the truth out of them by twisting them on pegs,"[49] Boethius attributes this approach to Pythagoras himself. This appears in the very next section, Book I, section 10, "In what manner Pythagoras investigated the ratios of consonances."

> This, then, was primarily the reason why Pythagoras, having abandoned the judgment of hearing, had turned to the weights of rules. He put no credence in human ears, which are subject to change, in part through nature, in part by external circumstance, and undergo changes caused by age. Nor did he devote himself to instruments, in conjunction with which much inconstancy and uncertainty often arise. . .
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> Assessing all these instruments as unreliable and granting them a minimum of trust, yet remaining curious for some time, Pythagoras was seeking a way to acquire through reason, unfalteringly and consistently, a full knowledge of the criteria for consonances.[50]

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[48] See Chap. III, note 31, p. 130.

[49] *Republic,* 531. See Chap. V, note 8, p. 274.

[50] Boethius, *The Fundamentals of Music,* Calvin M. Bower, trans., Claude V. Palisca ed. (New Haven & London: Yale University Press, 1989), pp. 17-18.

Boethius then proceeds to tell the story of Pythagoras and the blacksmith's shop, including the essential series of ratios 6:8:9:12. He then goes on to consider the sense of hearing and the nature of consonances. Following this, at Book I, section 34, he returns to the topic of reason versus the senses by giving us another telling classification, this time of musicians. He gives us three categories: "The first class consists of those who perform on instruments, the second of those who compose songs, and the third of those who judge instrumental performance and song."[51]

The first of these groups is quickly dismissed; they "are excluded from comprehension of musical knowledge, since . . . they act as slaves. None of them makes use of reason; rather, they are totally lacking in thought."[52] The second group does not fare much better. Boethius refers to them as poets, "a class led to song not so much by thought and reason as by a certain natural instinct. For this reason this class, too, is separated from music."[53] It is only the third group, "that which acquires an ability for judging, so that it can carefully weigh rhythms and melodies and the composition as a whole," that warrant serious consideration

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[51] Boethius (1989), p. 51.

[52] Ibid.

[53] Ibid.

in Boethius' estimation. This class, he writes, "since it is totally grounded in reason and thought, will rightly be esteemed as musical."[54]

Mathematics, pragmatic and mystical. With these passages, Boethius establishes music as a mathematical discipline. But the exact nature of this discipline, as Boethius understands it, is of significant in determining the extent to which his description reflects Plato's intentions.

It is evident from our earlier discussion that an emphasis on mathematics characterizes two seemingly opposed strands of knowledge emerging from the Greeks, the magical and mechanistic traditions, symbolized by Plato on the one hand, Archimedes on the other. To which of these schools should Boethius be assigned? In his essay on Boethius' work in arithmetic and music, John Caldwell brings out information that is critical to this question. He points out that Boethius stands at the very end of a tradition of mathematical philosophy that had extended for nearly a thousand years. Characteristic of this tradition was the tendency to classify mathematical subjects into the four areas that Boethius was to call the quadrivium, which, along with the trivium--grammar, rhetoric and dialectic--formed

[54] Ibid.

the seven liberal arts of the medieval university curriculum.

> The emergence of this particular series of subjects was not without its vicissitudes. Pythagoras and his followers were much occupied with the mystical properties of numbers and their relation to each other; and numerical relationships are the unifying factor of these particular arts. Plato in the *Republic* specified arithmetic, plane geometry, solid geometry, astronomy and 'harmony' for special study as conducive to the good of the soul through the contemplation of the eternal verities as expressed by the properties of numbers. These had their practical application, but they came to be sharply distinguished from, and exalted above, such pragmatic disciplines as medicine, geography, pneumatics and architecture. Nevertheless, Plato's treatment implied a rather different emphasis from that of the early Pythagoreans, and it encouraged a more disciplined, though still speculative, treatment of arts which were after all of practical origin and of at least potentially practical application. Thus it was possible for Nicomachus of Gerasa, writing in the second century A.D., to write two completely different, but still speculative, works of arithmetic. One, the *Theologumena*, was purely mystical in content; the other, the *Introduction*, was more down to earth in analysing the real properties of number; but neither could be equated with the practical business of computation, which the Greeks called logistics.
>
> On the whole, it was the more disciplined, analytical approach to mathematical philosophy which prevailed in later antiquity. Occasionally a mystical element might obtrude into a fundamentally more disciplined work (as in Nicomachus' brief extant work on music), but *it was the latter type which carried the day.* (Author's italics)[55]

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[55] John Caldwell, "The *De Institutione Arithmetica* and the *De Institutione Musica*," in Gibson, op. cit, pp. 135-136.

Which of these approaches was Boethius folowing? There is something of a dichotomy here. His underlying purpose might suggest an emphasis on the mystical:

> Boethius applied the Pythagorean philosophy to Christian thought with the intention of showing how music related to God, the most beautiful of all things. He felt that an aspect of the supreme beauty of God was expressed by the perfection of audible numerical ratios in music. Thus, music was seen as a means of gaining some understanding of the divine.[56]

It is difficult, however, to extract any sense of esoteric knowledge from the text itself. Boethius' emphasis throughout is on the use of reason, thus the third level of Plato's Divided Line. While distrusting St. Bonaventure's "eye of flesh," Boethius turns to the "eye of reason," with no sense of the "eye of spirit" entering into his discourse. He takes pains, both in the treatise on music and that on arithmetic, to distinguish between the unchanging immutable and changing material values. Pythagoras, he says, "held that philosophy was the knowledge and study of whatever may properly and truly be said 'to be.'"[57] He defines these as "forms, magnitudes, qualities, relations, and other things which, considered in themselves, are immutable, but, which,

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[56] Timothy Rayborn, "Sacred Sound, Sacred Song: Chant in Five Religious Traditions," In *Gregorian Chant: Songs of the Spirit,* Huston Smith, ed. (San Francisco: KQED Books, 1996), p. 71.

[57] Boethius (1989), II, 2, p. 52.

joined to material substances, suffer radical change and are altered in many ways because of their relationship with a changeable thing."[58] He goes on in the next section to define various kinds of quantities, magnitude, multitude, different kinds of relationships. All of these are seen in terms of number.

None of this is original; a passage from Nicomachus is almost identical. And it certainly seems to reflect the standard interpretation of Pythagorean and Platonic doctrine in trusting reason over the senses. But Boethius seems to have missed an essential distinction in Pythagorean doctrine. Pythagoras made a distinction between, for example, the monad and the number one. We will remember Photius' statement, "The Pythagoreans preach a difference between the Monad, and the One; the Monad dwells in the conceptual realm, while the One dwells among numbers."[59] Similarly, Plato distinguishes between the objects of mathematics and the forms themselves. Boethius recognizes no such distinction. He should not have been unaware of the concepts; he had access to such texts as the *Theology of Arithmetic,* or a similar work by Nicomachus. But, as Chadwick writes: "It is noteworthy that Boethius, who owed

[58] Boethius (1989), p. 53.

[59] Anonymous, preserved by Photius, *The Life of Pythagoras,* In Guthrie (1987), p. 137. See Chap. IV, note 7, p. 153.

Nicomachus a large debt, never makes use of these more mystical speculations."[60]

Quite apart from the speculative side of Pythagorean and Platonic mathematics, it is debatable whether Boethius, or other Latin writers, even had a clear understanding of the analytical side of the discipline. Leonard Mlodinow has written a history of geometry. He comments on the aptitude for mathematics of the Romans compared to that of the Greeks.

> As Rome conquered Greece, the Romans became custodians to the Greek legacy. The inheritors of the Greek tradition conquered much of the world and with it, faced many technical and engineering problems, yet their emperors did not support mathematics as did Alexander or the Ptolemys of Egypt, and their civilization did not produce mathematical minds such as Pythagoras, Euclid and Archimedes. In the 1,000 years of their recorded existence, dating from 750 B.C., history does not mention one Roman theorem proved, nor even one Roman mathematician.
>
> In abstract mathematics, the Romans were ignorant, and proud of it. As Cicero said, "The Greeks held the geometer in the highest honor; accordingly, nothing made more brilliant progress among them than mathematics. But we have established as the limit of this art its usefulness in measuring and counting."[61]

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[60] Henry Chadwick, *Boethius: The Consolations of Music Logic, Theology, and Philosophy* (Oxford: Clarendon Press, 1981), p. 72.

[61] Leonard Mlodinow, *Euclid's Window: The Story of Geometry from Straight Lines to Hyperspace* (New York: The Free Press, 2001), p. 45.

It appears that Boethius himself tried his hand at passing Greek mathematics on to Latin readers.

> It is not that the Romans weren't literate. They were. They even wrote their own Latin technical books, but these were bastardized works adapted from their knowledge of the Greeks. For example, the principal translator of Euclid into Latin was a Roman Senator from an old established family, Anicius Manlius Severinus Boethius. . . Boethius abridged Euclid's works, creating the kind of treatment suitable for a multi-choice test.[62]

This may be unfair to Boethius, although Mlodinow does report significant shortcomings in the Roman philosopher's understanding of Euclid: "Boethius gave only definitions and theorems, and apparently also felt free to substitute approximations for exact results. And that was on a good day. In other cases, he just plain got it wrong."[63]

Boethius on the Heavens. When approaching the subject of celestial harmony, Boethius offers a version that is certainly speculation, but not of the mystical kind. It appears *before* the classification of musicians, as part of the discussion of consonances. Like the rest of this discussion it is derived principally from Nichomachus, although in Boethius' version, it is dryly technical and

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[62] Mlodinow, pp. 45-46.

[63] Mlodinow, p. 46.

reflects the contradictions to be found in the various other sources he mentions:

> At this point it would seem proper to add concerning the above tetrachords that the disposition from the hypate meson to the nete synemmenon is, as it were, a kind of exemplar of the celestial order and specification. The hypate meson is assigned to Saturn, whereas the parhypate is like the orbit of Jupiter. The lichanos meson is entrusted to Mars. The sun governs the mese. Venus holds the trite synemmenon. Mercury rules the paramete synemmenon. The nete is analogous to the orbit of the moon.
>
> Marcus Tullius draws up a different order, for in the sixth book of *De re publica* he asserts: "Nature is so disposed that low sound emanates from its one extreme part, whereas high sound emanates from its other. Therefore that high celestial orbit, that of the stars, the revolution of which is faster, moves with a high and shrill sound, whereas the weak orbit of the moon moves with a very low sound. The earth, in ninth place, remaining immobile, is alone always fixed in place." Tullius thus regards the earth as silent--that is, immobile. Next after the earth he assigns the lowest sound to the moon, which is closest to silence, so that the moon is the proslambanomenos, Mercury the hypate hypaton, Venus parhypate hypton, the sun the lichanos hypaton, Mars the hypate meson, Jupiter the parhypate meson, Saturn the lichanos meson, and the highest heaven the mese.[64]

This is but the first of many examples of the conflicting viewpoints among the various writers on cosmic harmony.

Boethius, in his treatise, is passing on a view of mathematics and a version of the music of the spheres that reflects the views of Aristotle and Nicomachus. But by failing to include any reference to the higher levels of

[64] Boethius (1989), I, 27, pp. 46-47.

perception mentioned by both Plato and Pythagoras, Boethius' work lacks an essential dimension that, according to our analysis in Chapter III, they considered to be essential. Thus the tradition is passed on in an impoverished form. To make matter worse, even Boethius' writings were themselves poorly understood.

> Partly as a result of the treatise's encyclopedic scope and erudition, partly as a result of the exalted status of its supposed author, the De Institutione Musica served as the ultimate authority on music theory until the sixteenth century. The treatise is a dense and difficult discussion of late Hellenistic music theory, deeply grounded in Pythagoreanism and *largely incomprehensible to most of the medieval scholars who made use of it as their prime source of musical knowledge*. Nevertheless, all subsequent medieval writing on music, however garbled, utilized the De Institutione Musica as a theoretical base.[65] (Author's Italics)

There are many ironies in the history of universal harmony; this appears to be one of them. According to Chadwick, much of Boethius' work was motivated by a desire to preserve ancient teachings.

> It is his [Boethius'] great fear that amid the general collapse of higher studies in his time, the knowledge acquired by the philosophers and scientists of

[65] Elizabeth A. Newby,, *Portrait of the Artist: Legends of Orpheus and Their Use in Medieval and Renaissance Aesthetics*, PhD. Thesis, Harvard University, 1981 (New York: Garland Publishing Inc., 1987), p. 40.

> classical Greece may simply be obliterated by a failure of transmission.[66]

Boethius certainly transmitted a substantial body of knowledge to subsequent generations. It is another question whether he conveyed it with all its dimensions of meaning intact.

Cassiodorus

Flavius Magnus Aurelius Cassiodorus (c. 490-583) was also a Roman politician and scholar. Born in southern Italy, he succeeded Boethius as consul to Theodoric after the latter's execution in 524 and went on to serve three other Ostrogothic rulers. Like Boethius, he was dedicated to preserving Roman culture at a time when the Empire was disintegrating. He spent several years in Constantinople, where he must have been exposed to the ancient texts that were preserved there. Returning to Italy, he established a monastic foundation dedicated to the preservation and translation of such texts, along with other intellectual activities, an approach to monastic life which was later to influence the Benedictine order.

Cassiodorus was himself active in organizing the translation into Latin of Greek works, but his best known

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[66] Chadwick (1981), p. 69.

literary work was an original one, The *Institutiones divinarum et humanarum litterarum,* which was to become one of the most influential books of the Middle Ages and which, like Boethius' writings, attempted to reconcile Christian culture with more ancient "pagan" sources.

The Institutiones is divided into two books, the "Divine Letters" and the "Secular Letters." The work is something of an accomplishment in view of the literary situation in Italy at the end of the fifth century:

> The first half of this century had seen revisions of the works of numerous secular authors--Virgil, Horace, Caesar (*De bello Gallico*). . . Macrobius (commentary on the *Somnium Scipionis*), Martianus Capella (*De nuptiis Mercurii et Philologiae*). . . The second half of the century, however, was characterized by the dislocation of the senatorial class and a consequent decline in the cultivation of secular letters; there was interest in little except the revision of theological works.[67]

The first part of the work reflects this tendency, being essentially a reworking of a number of sources to create an overview of knowledge needed for a Christian scholar. "It is bibliographical in content, attempting to show the beginning student where to go to begin his course of studies in Christian learning,"[68] ". . . a theoretically

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[67] *Cassiodorus, An Introduction to Divine and Human Readings,* Leslie Webber Jones, trans. with intro and notes (New York: Octagon Books, Inc., 1966), introduction, p. 27.

[68] James A. O'Donnell, *Cassiodorus* (Berkeley: University of California Press, 1979), p. 205.

complete work, covering everything about divine and secular learning that the student needs to know."[69] In the course of this survey, the author feels compelled to provide an overview of secular learning which, in his day, comprised the seven liberal arts. Thus the second part of this work contains descriptions of the trivium and the quadrivium, and it is here that the material on cosmic harmony appears. It is not an exposition of either originality or imagination, however. Cassiodorus' only goal is to

> . . . provide a text of the seven *artes* and *disciplinae* of a sort that will reduce these studies to the appropriate state of subservience to scriptural ones, a state they have long avoided in the hands of their secular practitioners. It is true that Cassiodorus introduces the study of what we would call "humanities" to his monastery; but he does so only in order to take command of those subjects once and for all, to make them a branch of "divinity," to subordinate them to higher things.[70]

The result is that in Book Two, "Cassiodorus is merely repeating what he has been told by the authors he excerpts."[71]

Before dealing with harmony, Cassiodorus reveals his philosophical orientation in his description of the Dialectic.

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[69] O'Donnell, p. 212.

[70] O'Donnell, pp. 212-213.

[71] O'Donnell, p. 213.

> To be sure, the first philosophers had dialectic in their teachings, but they did not possess the skill to reduce it to an art. After their time, however, Aristotle, diligent expounder of all knowledge that he was, imposed rules upon the argumentation employed in this subject, which had previously had no definite principles.[72]

The chapter that follows is essentially an explication of Aristotelian logic, including his categories, syllogisms, and other areas of discursive argument. Conspicuous by its absence is any hint of Plato's approach to dialectic with its higher and lower aspects leading to distinct knowledge of mathematical objects and the Forms.

When it comes to the section on harmony, we are once again presented with a fairly routine exposition of three categories: harmonics, rhythmics and metrics. At the outset of the section, we are introduced very briefly to the story of Pythagoras and the hammers. "A certain Gaudentius, writing on music, says[73] that Pythagoras discovered its beginnings in the sounds of hammers and the striking upon taut strings."[74] [75] Later, we find equally brief reference to

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[72] Cassiodorus, p. 158.

[73] In his *Isagoge*, Chap. xi. Gaudentius wrote in Greek, at some time during the first three centuries after Christ.

[74] This sentence = Isadore, *Etymologiae*, III. xvi. I.

[75] Cassiodorus, p. 189. (Notes 73 & 74 are Jones' footnotes.)

Orpheus and King David and the salutary powers of music. But as far as the music of the spheres is concerned, it receives only cursory mention:

> The sky and earth and everything which is accomplished in them by the supernal stewardship are not without the science of music; for Pythagoras is witness to the fact that this world was founded through the instrumentality of music and can be governed by it.[76]

Later we find:

> The sky itself, as we have stated above, is said to revolve with delightful harmony; and to state the whole matter succinctly, whatever heavenly or earthly occurrence takes place in a manner consistent with the ordering of its Author is said to not to be exempt from this science.[77]

This is the full extent of the treatment universal harmony receives; there is certainly no mention of the *Timaeus* or the *Republic*. Cassiodorus ends his survey:

> In the course of this brief treatment of secular studies, then, it becomes clear that these studies possess no little utility in bringing about an understanding of the divine law--a fact which has been pointed out by certain holy Fathers as well.[78]

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[76] Cassiodorus, p. 190.

[77] Cassiodorus, p. 196.

[78] Cassiodorus, p. 203.

Martianus Capella

The liberal arts also provide the theme for Martianus Capella's major work, but this work contains little more useful information about the universal harmony.

Little is known about Martianus; it is thought that he was a native of north Africa. It has also been suggested that he was a high-ranking politician or official, but this is also conjectural. What is known is that his prose and poetry introduction to the subject of the liberal arts was of immense cultural influence down to the late Middle Ages and was widely used as a school textbook throughout the Middle Ages. But, writes William Harris Stahl, ". . . the reader is immediately at a loss to explain how a book so dull and difficult could have been one of the most popular books of Western Europe for nearly a thousand years."[79]

Written probably between 410 and 439 C.E., the work's overall title is not known, but manuscripts give the title *De Nuptiis Philologiae et Mercurii* to the first two books and entitle the remaining seven *De arte grammatica, De arte dialectica, De arte rhetorica, De geometrica, De arithmetica, De astrologia, and De harmonia*. In the allegory

[79] William Harris Stahl, *Martianus Capella and the Seven Liberal Arts, with a Study of the Allegory and the Verbal Disciplines by Richard Johnson with E. L. Burge* (New York: Columbia University Press, 1971), Part I, "Introduction," p. 21.

De Nuptiis, the god Mercury marries and, at the marriage ceremony, gives his bride seven maidens, each of whom declaims on the one of the seven liberal arts that she represents. Naturally, the material about music comes from the maiden representing this discipline. Prior to this, however, Mercury's bride, the divine Philology, has to journey through the heavens in order to reach the location of the nuptials.

> One of the main themes of many satires [of the period] is the heavenly voyage, and this concept provides the central metaphor of the De Nuptiis, the journey of a mortal, complete with a description of the celestial realms and afterlife.[80]

It is through this journey that the celestial harmony is described. The various planets and their orbits, or spheres, are encountered and the distances between them are carefully noted, either in terms of tones and half-tones, or in specific distances--126,000 stadia being mentioned for the first whole-tone span, for example. Whatever his sources are for this, he does not appear to represent them accurately:

> Martianus's scheme of celestial harmony is more than a little confused, whether through ignorance on the part of the author or through scribal error incorporated in the vulgate. There is little doubt that in all schemes of celestial harmony the largest interval, between the

[80] Danuta Shanzer, *A Philosophical and Litereray Commentary on Martianus Capella's De Nuptiis Philologiae Book 1* (Berkeley: University of California Press, 1986), p. 33.

> lowest sphere (whether the earth or the moon) and the highest was the octave or interval of six full tones.[81] Martianus's text as it stands certainly suggests that he was following this pattern (54.15) *sicque sex tonorum conscensionibus et stadiorum defecta lassitudine fatigati cum diapason symphoniam quidquid emensi erant*. The problem here is that if one adds up the stages of Philologia's journey as they are enumerated, there is one half-tone too many.[82]

Some of this problem may be due to a lack of interest in the earlier sources, especially if these came from Plato and other philosophical texts. Martianus was either unaware of them or lacked respect for them. "Martianus' range of learning did not include a serious interest in the philosophers, for whom he expressed mild contempt."[83]

> He calls them "starveling and unkempt." Remigius[84] identifies the philosophers described by Martianus as Sophists, Stoics, and Cynics. Elsewhere Martianus says that they are "abstruse and ostentatious."[85]

In spite of this lack of regard for philosophers, Martianus does undertake to discuss dialectic, since this subject is part of the trivium, or arts of language. He appears to follow Aristotle for the most part. "The subject of

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[81] W. Burkert, "Hellenistische Pseudopythagorica," *Philologus* 105 (1961), p. 40. (Shanzer's footnote)

[82] Shanzer, pp. 90-91.

[83] Stahl et al., p. 9.

[84] Remigius of Auxerre, *Commentum in Martianum,* C. E. Lutz, ed. (Leiden, 1962-1965), Vol. II, p. 129. (Stahl's footnote)

[85] Stahl et al., p. 9, note 2.

Martianus' fourth book is in most respects the same as the traditional formal logic derived from Aristotle which has been taught until recently in most university courses in 'Logic.'"[86] This is of interest to our discussion, for, as we have seen, Plato's description of the dialectic, in reference to the Divided Line analogy, includes reference to a higher level of application, important for the direct apprehension of the Forms, as well as the more usual understanding of discursive argument.

> By the *Republic* dialectic promised to achieve a higher form of knowledge than even mathematics.[87] Unlike mathematics, which works down from the uncertified assumptions, it would be able to mount up to an "unhypothetized beginning" from which all knowledge could be deduced. As the highest point in the education of the guardians of Plato's ideal city, dialectic becomes "the coping-stone of all the sciences"[88] and synonymous with philosophy. . .
>
> Dialectic's future, more humble position as a servant of rhetoric also had its origins in Plato. In the *Phaedrus* dialectic is indispensable to the true rhetorician.[89] [90] . . . The same passage introduces the equation of dialectic with the method of collection and division characteristic of the late dialogues, and

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[86] Richard Johnson, "The Allegory and the Trivium," in Stahl et al., p. 104.

[87] *Republic*, 510-11.

[88] *Republic*, 534e.

[89] *Phaedrus*, 269-74.

[90] Johnson, in Stahl et al., pp. 105-106. (Notes 84-86 are Johnson's footnotes)

> influential in the formation of Aristotle's theories of classification, definition, and the syllogism.[91]

We have already noted that Aristotle's views on the dialectic differ from those of Plato. Not surprisingly, as Stahl explains, this disagreement results in a dichotomy in the way dialectic is understood.

> Aristotle shared none of Plato's optimism for achieving metaphysical or scientific truth by dialectical methods. He therefore distinguishes between philosophy and science on the one hand, and the principles of valid reasoning used in all disciplines employing argument and inference on the other.[92]

This quite separate distinction becomes amplified in the work of later writers, then further distinctions arise and are themselves confused. By the third or fourth century, Stahl writes, ". . . the two separate strands of dialectic as the pure science of logic and the practical art of disputation become inextricably tangled."[93]

Martianus' discussion of dialectic reflects this confusion:

> As heir to this development, Martianus' compendium of dialectic appears excessively weighted with irrelevant logical material, if viewed as a debating manual, or sadly contaminated by its subservience to

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[91] Johnson, in Stahl et al., p. 106.

[92] Ibid.

[93] Johnson in Stahl et al., pp. 106-107.

> rhetoric, if viewed as the introduction to logic which it more nearly resembles.[94]

Whatever understanding Martianus has of dialectic, he makes no indication that he understands the higher meaning that Plato attributes to it. Similarly, his exposition of arithmetic, while influential, appears to have only weak links with the Pythagorean tradition.

> Martianus' extended section on arithmetic. . . is one of the most important Latin expositions of Greek arithmetic from the early Middle Ages. Although his ultimate sources were Nicomachus and Euclid, it is evident from a comparison of the three works that Martianus' immediate sources was some compilation (or compilations) of the Nicomachean and Euclidean traditions.[95]

Arithmetic's speech does contain some shades of the Theology of Arithmetic. Stahl suggests that this was probably a rather rote recitation of, perhaps, poorly understood sources.

> That Martianus occasionally introduces Neoplatonic terminology and seems to be expressing Neoplatonist and Neopythagorean doctrines must not be taken to indicate that he was a follower of the Neoplatonic school of philosophy. Neoplatonism was the only pagan philosophy to flourish in the last century of the Western empire, and its adherents took a leading part in the bitter conflict with Christianity. The remnants of secular philosophy and scientific learning that survived were largely in the Platonic tradition, stemming ultimately from Plato's *Timaeus*. From the time of its completion

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[94] Johnson in Stahl et al., p. 107.

[95] Stahl et al., p. 156.

> until the late Middle Ages, that book inspired generations of commentators on, and popularizers of, works on theoretical cosmography and arithmology, and it is not to be expected that a Latin compiler of traditional and conflated doctrines on the quadrivium would wholly avoid the use of Neoplatonic vocabulary.[96]

Both aspects of the discipline are included in Arithmetic's speech, the mystical and the practical, arithmology and practical number theory. Stahl has little patience with the former, stating that "it is to the credit of Martianus that he gives much greater attention to arithmetic than to arithmology."[97] This certainly reflects the contemporary view. It would not have pleased Plato.

When we come to the speech of the bridesmaid representing harmony, we find fairly typical passages, both classical and biblical, about the universal power of music. We also find the most overtly Neoplatonic passage in the whole of Martianus' text.

> But when the Monad and first hypostasis of intellectual light was conveying souls that emanated from their original source to earthly habitations, I was ordered to descend with them to be their governess. It was I who assigned the numerical ratios of perceptible motions and the impulses of perfect will, introducing restraint and harmony into all things.[98]

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[96] Stahl et al., p. 10.

[97] Stahl et al., pp. 151-152.

[98] Martianus Capella, *De Nuptiis,* 922, Stahl's translation. In Stahl, et al., p. 204.

Again, Stahl emphasizes that this does not indicate that Martianus truly represents Neoplatonism. He is simply reiterating concepts that were "commonplaces in the writings of compilers who knew little else about Neoplatonism."[99] What follows is, again, a standard exposition of fifth-century music theory, with sections on consonance, tetrachords, the Greater Perfect System, rhythm, meter, etc., with no mention of the cosmic harmony. It is of interest to historians of music theory, of course, but there is no clear passing on of the inner meaning of universal harmony.

Cicero and Macrobius

The last of the four texts that we will consider is that by Macrobius, but it is by no means the least important. We have noted the wide influence of the texts by Boethius, Cassiodorus and Martianus during the Middle Ages, but, according to John Hollander, Macrobius' commentary on the Dream of Scipio "might be considered the Locus Classicus of the heavenly music motif."[100]

In considering this work, we have to consider both the original text by Cicero and Macrobius' commentary; the two are inextricably linked. Indeed, it was only owing to the

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[99] Stahl et al., p. 205.

[100] John Hollander, *The Untuning of the Sky* (New York: Princeton University Press, 1961), p. 29.

commentary that Cicero's text survived through the Middle Ages. *Somnium Scipionis* is part of a longer work, *De re publica,* of which only brief fragments survived until a large section was discovered in 1820. But the text of the *Somnium Scipionis* was appended to various copies of Macrobius' *Commentary* and hence survived.[101]

The reason why Cicero's story is of such interest is that it is clearly based on Plato's Myth of Er. As James Haar points out,[102] this was never a secret. Cicero is careful to place Scipio's description at the end of his work *De Re Publica* in the exact same way that Plato places the *Myth of Er* at the very end of *The Republic*. Similarly, "The two known ancient commentaries devoted to the *Dream of Scipio,* that of Favonius Eulogius and that of Macrobius, both announce at the outset that Cicero borrowed his idea for the dream from Plato."[103] The passage describes a dream of the great Roman general Scipio in which he is presented with a vision of the structure of the universe, a vision

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[101] It is reported by Stahl that a number of classicists feel that preserving the original text is the only useful purpose that Macrobius' *Commentary* has served.

[102] Haar, p. 90.

[103] Haar, p. 90, n. 58. Cf. Favonius, *Disputatio de Somnio Scipionis,* R. E. van Weddington, ed. (Brussels: Latomus, 1957), I, i, p.13; Ambrosius Aurelius Theodorus Macrobius, *Commentary on the Dream of Scipio,* William Harris Stahl, trans. (New York: Columbia University Press, 1952), I, 1, ii, p. 81.

that parallels that of Er of *Pamphylia* but also differs in several critical respects.

The story's narrator, Publius Cornelius Scipio Africanus, arrives in Africa to visit King Masinissa, Rome's ally and a close friend of his family. After his initial meeting with the king, Scipio retires for the night, falls into a deep slumber and has a lengthy dream. His grandfather, Scipio Africanus the elder, appears to him and speaks to him about his destiny as Consul of Rome. In order to prepare him for this task, the elder Scipio gives his grandson a guided tour of the universe, in both its earthly and celestial regions. One section of this narrative contains all the elements of the heavenly music motif as part of an exposition of cosmology. Scipio the elder explains that:

> The whole universe is comprised of nine circles, or rather spheres. The outermost of these is the celestial sphere, embracing all the other spheres. In it are fixed the eternally revolving movements of the stars. Beneath it are the seven underlying spheres, which revolve in an opposite direction to that of the celestial sphere. One of these spheres belongs to that planet which on earth is called Saturn. Below it is that brilliant orb,... called Jupiter. Next comes the ruddy one, which you call Mars, dreaded on earth. Next, and occupying almost the middle region, comes the sun, leader, chief, and regulator of the other lights, mind and moderator of the universe, of such magnitude that it fills all with its radiance. The sun's companions, so to speak, each in its own sphere, follow - the one Venus, the other Mercury - and in the lowest sphere the moon, kindled by the rays of the sun, revolves. Below the moon all is mortal and transitory, with the

> exception of the souls bestowed upon the human race by the benevolence of the gods. Above the moon all things are eternal. Now in the center, the ninth of the spheres, is the earth, never moving and at the bottom.[104]

This description differs in several respects from Plato's original description in the Myth of Er. The Spindle of Necessity, the daughters of Necessity, Lachesis, Clotho, and Atropos, the sirens seated upon each circle singing the notes of the scale--none of these is found in Cicero's version. Moreover, the order of the Planets is different, a fact that creates some problems for Macrobius, as will be seen presently.

Whatever their order, Scipio appears to hear the notes made by the planets as he inquires about them. "What is this great and pleasing sound that fills my ears?" he asks. The Elder Scipio replies:

> That . . . is a concord of tones separated by unequal but nevertheless carefully proportioned intervals, caused by the rapid motions of the spheres themselves. The high and low tones blended together produce different harmonies... The ... eight spheres, two of which move at the same speed, produce seven different tones, this number being, one might almost say, the key to the universe. Gifted men, imitating this harmony on stringed instruments and in singing, have gained for themselves a return to this region, as have those who have devoted their exceptional abilities to a search for divine truths. The ears of mortals are filled with this sound yet they are unable to hear it. Indeed, hearing is the dullest of the senses; consider the people who dwell in the region about the Great

[104] Macrobius, p. 73.

> Cataract, where the Nile comes rushing down from the lofty mountains; they have lost their sense of hearing because of the load roar. But the sound coming from the heavenly spheres revolving at very swift speeds is of course so great that human ears cannot catch it; you might as well try to stare directly at the sun, whose rays are much too strong for your eyes.[105]

Again, there are discrepancies between Cicero's version and that of Plato. Most striking is the idea of the sounds of the planets being inaudible to human ears. This appears to be a contribution from the Aristotelian tradition going back to a passage from *De Caelo*:

> Some thinkers suppose that the motion of bodies of that size must produce a noise, since on our earth the motion of bodies far inferior in size and in speed of movement has that effect. Also, when the sun and the moon, they say, and all the stars, so great in number and size, are moving with so rapid a motion, how should they not produce a sound immensely great? Starting from this argument and from the observation that their speed, as measured by their distances, are in the same ratios as musical concordances, they assert that the sound given forth by the circular movement of the stars is a harmony. Since, however, it appears unaccountable that we should not hear this music, they explain this by saying that the sound is in our ears from the very moment of birth and is thus indistinguishable from its contrary silence, since sound and silence are discriminated by mutual contrast. What happens to men, then, is just what happens to coppersmiths, who are so accustomed to the noise of the smithy that it makes no difference to them.[106]

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[105] Macrobius, pp. 73-74.

[106] Aristotle, *De Caelo*, II, 9, 290b. J. L. Stocks, trans., in *Collected Works of Aristotle*, Jonathan Barnes, ed., Bollingen Series LXXI-2 (Princeton: Princeton University Press, 1984), Vol. I, p. 479.

These details are significant, but what is more important is the context. As we have seen, the interpretation of Plato's text depends upon many passages outside of the Myth of Er itself: the Divided Line analogy and description of the nature of the dialectic in the *Republic;* the admonitions to emphasize knowledge of the Forms over manifest phenomena at the beginning of the *Timaeus* and in the descriptions of Harmonics and Astronomy, again in the *Republic;* the idea of "practicing death" in the *Phaedo;* and so on. There is no reason to suppose that these nuances of Platonic thought were correctly transmitted. We have already discussed the loss of quality in the study of mathematics that occurred in the transition from the Greek world to that of Rome. As Stahl relates, similar processes took place in philosophy and literature. Rome produced any number of great literary figures but, at the same time, he writes, "Men devoid of talent who aspired to literary careers, pillaged the writings of their predecessors and passed themselves off as men of great learning."[107] The result has been that "respectable scientific subjects, together with the occult arts, were consigned by neglect to *viri doctissimi,* [and] the doom of science in the West was

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[107] Stahl et al., pp. 232-233.

sealed for a thousand years."[108] Cicero was definitely aware of this deterioration, mentioning it in Book I of his *De oratore*.

> He points out that the Greeks placed the philosopher and the specialist on the pedestals of their intellectual world, while the Romans more sensibly reserved the place of honor for the orator. . . Cicero's ideal orator was not a master of Greek abstract and rigorously systematic disciplines; he prepared his briefs from derivative handbooks. His intellectual enthusiasms were for style and beauty in literature and rhetoric, not for science and philosophy, and the motivation for his professional researches lay in their applications to the arts of persuasion.[109]

But even if Cicero understood this problem, he was unable to transcend it. "Cicero did not have the background or the temperament to transmit the specialized treatises of Hellenistic Greek writers."[110] He continues:

> A society whose intellectual elite does not go beyond the level of books like Will Durant's *The Story of Philosophy* and Lancelot Hogben's *Science for the Citizen*, a society that breaks contact with original minds, as the Romans did, is doomed to intellectual decay. The way of the popular handbook, as it is digested and made more palatable for each succeeding generation, is inevitably downward.[111]

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[108] Ibid.

[109] Stahl et al., pp. 232-233.

[110] Stahl et al., p. 233.

[111] Stahl et al., p. 234.

Stahl is actually referring to Martianus Capella's work, the *Marriage of Philology and Mercury,* which we have just examined, and which he calls "a milestone in that downward course,"[112] but it could equally well apply to The Dream of Scipio and *conceivably to all the Latin works through which the music of the spheres tradition was transmitted,* including Cicero's commentator.

The Commentary. Little is known about the author, Ambrosius Aurelius Theodosius Macrobius, thought to be a Roman grammarian who flourished around the beginning of the fifth century C.E. In fact he is known only through his writings. Only three of his works have survived, of which the *Commentarius in Somnium Scipionis* is the best known. Like the other three of our Latin texts, it was widely circulated during the Middle Ages, and like the others, it was probably a poor representation of the original Greek sources. Macrobius was one of the "polymaths and encyclopedists who, in the fourth, fifth, and sixth centuries, attempted to epitomize and present in readily accessible form the classical liberal arts and the more attractive teachings of classical philosophy."[113] Their compilations were, Stahl writes, "quite inadequate to convey

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[112] Ibid.

[113] Stahl, introduction to Macrobius, p. 9.

the more precise and advanced achievements of the classical mind to the medieval world."[114]

> Apart from the disinclination or inability of both writers and readers to comprehend the more recondite matters of Greek philosophy and the more specialized developments of Greek science, the main reason that these works are poor representatives of classical thought is that the authors follow the traditional practice of a long line of compilers and commentators who had long since lost contact with the classical originals. In many cases the late encyclopedists were removed from classical Latin authors by five or six, and from Greek authors such as Plato and Aristotle, by ten intermediate sources, and in many cases the separation was probably greater. Yet they give the impression that they are handling the original works.[115]

Macrobius' commentary is a lengthy work, sixteen or seventeen times longer than *Scipio's Dream*, even though he selects only about three quarters of the original to comment upon. In many places, his commentary bears only passing reference to the original text before embarking on highly personal expositions of Neoplatonic doctrine, including fairly lengthy passages on Pythagorean number theory and the music of the spheres. Stahl's comments regarding Martianus' Neoplatonism[116] as material from older sources, slavishly copied without full comprehension, could apply equally well to Macrobius. The chief source of the *Commentarius in*

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[114] Ibid.

[115] Ibid, pp. 9-10.

[116] See note 96, p. 461, above.

Somnium Scipionis is thought to be Porphyry's commentary on the *Timaeus*, a Neoplatonic work that is now lost. But knowing so little about Macrobius' background, it is difficult to determine the depth of his understanding of either Plato or the Neoplatonists.

Much of Macrobius' work does appear to support Neoplatonic and Neopythagorean doctrine. He argues for the Neoplatonic position regarding the immortality of the soul,[117] refuting the Aristotelian position in the process, as well as for the classification of the virtues,[118] among other topics. He presents elaborate arguments for the Pythagorean view of number.[119] He also has a very interesting section about the nature of dreams that he presents in order to justify Cicero's account of Scipio's vision in dream form.[120] He classifies dreams into five main types, the enigmatic dream, the prophetic vision, the oracular dream, the nightmare and the apparition.[121] After extensive explanation and definition he concludes that "The dream which Scipio reports that he saw embraces the three reliable

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[117] 2, XIII-XV.

[118] 1, VIII, pp. 120-124.

[119] 1, V, 2, VI, 83.

[120] 1, iii.

[121] In Greek, *oneiros, horama, chrematismos, enypnion* and *phantasma*. In Latin, *somnium, visio, oraculum, insomnium,* and *visum*. Macrobius, p. 88.

types mentioned above,"[122] namely the first three categories, as the last two types "are of no assistance in foretelling the future; but by means of the other three we are gifted with the powers of divination."[123]

The contrast with the Myth of Er is important here. Er does not have a dream; he dies and returns to life seven days later, a reference to the idea of "practicing death," a convention that, as we argued in Chapter VI,[124] suggests a parallel with certain *yoga* practices. There is no indication of a parallel understanding from Macrobius. Yet the idea of achieving higher states of consciousness can definitely be found among Neoplatonists. Consider the following from Proclus regarding the inner meaning of the *Timaeus*:

> The mode, however, of unfolding it [i.e., the division of the soul, as described in *Timaeus* 35b] should accord with the essence of the soul, being liberated from visible, but elevating itself to essential and immaterial harmony, and transferring from images to paradigms. For the symphony which flows into the ears, and which consists in sounds and pulsations, is very different from that which is vital and intellectual. No one, therefore, should stop at the mathematical theory, but should excite himself to a mode of survey adapted to the essence of the soul; nor should he think that we ought to direct our attention to interval, or the differences of motions. For these are assumed remotely [i.e., metaphorically or symbolically], and are no means adapted to the proposed subjects of investigation. But he should survey the assertions by

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[122] Macrobius, p. 90.

[123] Ibid.

[124] See Chap. VI, pp. 407-408.

> themselves, and consider how they afford an indication of the psychical middle, and look to the demiurgic providence as their end.[125]

Proclus' statement is a caveat, similar to Plato's own, and ultimately to Pythagoras', not to seek knowledge merely on the superficial, sensory level. Being in accord with the essence of the Soul liberates it from purely sensory (visible) perception. Instead, "elevating itself to essential and immaterial harmony," that is, to the level of Being, not becoming, "and transferring from images to paradigms," would involve moving from the third to the fourth level of perception in terms of the Divided Line analogy. Even "the mathematical theory" is not the final level of interpretation, Proclus suggests, but rather the reader "should excite himself to a mode of survey adapted to the essence of the soul." That is, he should achieve a level of insight that comes from the highest functioning of consciousness--for Plato, the direct perception of the Forms.

Is it possible that Macrobius understood Proclus' (and hence Plato's) admonitions in this respect, or is he merely parroting a more ancient source such as Porphyry? This is

[125] Thomas Taylor, trans., *Proclus On the Timaeus of Plato* (London: the Author, 1820), Vol. II, pp. 75-86. Quoted in Godwin (1993), p. 75.

hard to determine, although there are several passages in his text that reflect a Neoplatonic cosmology.

One passage deals with the discrepancy between Plato and Cicero regarding the sequence of the planets in the sky. Macrobius "finds himself in the awkward position of having to choose between Plato's order and Cicero's order, for both authors are infallible in his estimation."[126] The problem is that Cicero "speaks of the sun as the fourth of seven, occupying the middle position, whereas Plato says that it is just above the moon, that is, holding the sixth place from the top among the seven spheres."[127] Macrobius resolves the problem by suggesting that "Cicero is in agreement with Archimedes and the Chaldean system; Plato follows the Egyptians, the authors of all branches of philosophy."[128] He justifies this by stating that

> The sphere in which the sun journeys is encircled by the sphere of Mercury, which is above it, and by the higher sphere of Venus as well. . . When these two planets course through the upper reaches of their spheres, they are perceived to be above the sun, but when they pass into the lower tracts of their spheres they are thought to be beneath the sun.[129]

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[126] Stahl, introduction to Macrobius, p. 17.

[127] Macrobius, p. 162.

[128] Ibid.

[129] Macrobius, p. 163.

As a result, he tells us, the sun is seen in two different positions, depending upon when it is observed, giving rise to the discrepancy. Macrobius carries off a bit of sleight of hand here, as he admits that the Egyptian observations are correct without wishing to represent the Chaldean view, and hence Cicero's, as incorrect. This is not the only inconsistency; Macrobius gives two conflicting versions of Plato's sequence of planets, one at I, xix, 7-10, the other at I, xxi, 27, a prime example of the ongoing muddle about the planetary realm that plagues the history of the music of the spheres tradition and, according to Stahl, "another bit of evidence in support of those who hold that he [Macrobius] did not read the *Timaeus*."[130]

In a later passage,[131] however, also dealing with distances between the planets, Macrobius presents a more abstract argument for the Platonic version against that of Archimedes, namely that the former was based on musical intervals rather than physical measurements, favoring "these intervals, which in the incorporeal Soul are apprehended only in the mind and not by the senses."[132] In the only direct reference to his main source, Macrobius determines to follow Porphyry, who reports the Platonist view that

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[130] Macrobius, p. 163, note 1.

[131] II,iii,12-16.

[132] Macrobius, p. 196.

> the planets poised in the corporeal universe. . . followed the pattern of the Soul's fabric, and that harmony was thus forthcoming, the proportional intervals of which were interwoven into the fabric of the Soul and were also injected into the corporeal universe which is quickened by the Soul.[133]

Macrobius expands on this Neoplatonic cosmology in another passage, one that was very influential during the Middle Ages and that also illustrates the gap between Cicero's original text and Macrobius' commentary. In Book I, Chapter xiv, Cicero states that

> Men were created with the understanding that they were to look after that sphere called Earth, which you will see in the middle of the temple. Minds have been given to them out of the eternal fires you call fixed stars and planets, those spherical solids which, quickened with divine minds, journey through their orbits and circuits with amazing speed.[134]

According to authorities cited by Stahl, namely Paul Henry and Pierre Courcelle,[135] Macrobius draws on core Neoplatonic texts, Plotinus' *Enneads* and Porphyry's *De regressu animae*, in his commentary on this passage, presenting the emanation doctrine about divine and human souls and their relationship to the world.

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[133] Macrobius, pp. 196-197.

[134] Macrobius, p. 142.

[135] See Macrobius, p. 34.

It is God's temple, manifest in the form of the universe to display "the omnipotence of the Supreme God,"[136] to which Macrobius refers. Such a universe is animated throughout by Divine mind, emanating from God and touching everything from the stars to individual souls.

> Now let us explain, in accordance with the teachings of cosmogonists, how *animus*, meaning "mind," is common to us and the stars.[137] God, who both is and is called the First Cause, is alone the beginning and source of all things. He, in a bounteous outpouring of his greatness, created from himself Mind. This Mind, called *nous*, as long as it fixes its gaze upon the Father, retains a complete likeness of its Creator, but when it looks away at things below it creates for itself Soul. Soul, in turn, as long as it contemplates the Father, assumes his part, but by diverting its attention more and more, though itself incorporeal, degenerates into the fabric of bodies.[138]

Macrobius goes on to explain the mechanics of this process. As Soul descends into more dense realms of matter, "into the lower regions and to the earth," it becomes progressively more "incapable of sustaining the pure divinity of Mind.

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[136] Ibid.

[137] Cf. Plato, *Timaeus* 41D-42E, and see Thomas Whittaker, *The Neo-Platonists* (Cambridge, England, 1918), pp. 23-24. H. F. Stewart (*The Cambridge Medieval History*, H. M. Gwatkin, J. P. Whitney, and others, eds., Vol. I, p. 573) calls the passage that follows "as good a summary of the Plotinian trinity as was possible in Latin." The views that stars are animated beings was held by Tycho Brahe and Kepler. See Lynn Thorndike, *A History of Magic and Experimental Science* (New York, 1923-1941), Vol I, p. 457. (Stahl's footnote.)

[138] Macrobius, p. 143.

Human bodies, on the other hand, were found to be capable of sustaining, with difficulty, a small part of it."[139] As "divine minds were infused into all bodies which had smooth spherical shapes,"[140] then the stars "are quickened with divine minds"[141] and "man alone was endowed with reason, the power of mind, the seat of which is in the head."[142]

Macrobius then provides a classical summary of this doctrine.

> Accordingly, since Mind emanates from the supreme God and Soul from Mind, and Mind, indeed, forms and suffuses all below with life, and since this is the one splendor lighting up everything and visible in all, like a countenance reflected in many mirrors arranged in a row, and since all follow on in continuous succession, degenerating step by step in their downward course, the close observer will find that from the Supreme God even to the bottommost dregs of the universe[143] there is one tie, binding at every link and never broken. This is the golden chain of Homer which, he tells us, God ordered to hang down from the sky to the earth.[144]

What Plotinus and Porphyry, via Macrobius, have outlined here is the doctrine that later came to be known as the Great Chain of Being. Indeed, in a footnote, Stahl

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[139] Macrobius, p. 144.

[140] Ibid. Cf. Plato, *Timaeus* 33b, 34b. (Stahl's footnote.)

[141] Ibid.

[142] Ibid.

[143] That is, the earth. (Stahl's footnote.)

[144] Macrobius, p. 145. See *Iliad* viii.19. (Stahl's footnote.)

states that the idea of a single countenance reflected in many mirrors comes directly from Plotinus' *Enneads*, I.i.8.[145] He goes on: "W. H. V. Reade[146] says that it was through Macrobius that this doctrine and figure were transmitted to the Middle Ages."[147] This is of great significance for the music of the spheres tradition when we remember that *the Great Theme of Western culture described by James*[148] *consists of these two great ideas taken together*. Macrobius also finds that, as applied to the nature of Soul, it is a ubiquitous concept throughout the ancient world. "It is interesting to note that this discussion of Soul embraces the opinions of all who are known to have made pronouncements about the soul."[149] He cites Plato, Xenocrates, Aristotle, Pythagoras, Philolaus, Posidonius, Asclepiades, Hippocrates, Heraclides Ponticus, Heraclitus the philosopher, Zeno, Democritus, Critolaus the Peripatetic, Hipparchus, Anaximenes, Empedocles, Critias,

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[145] Regarding possible links between Neoplatonism and the Upanishads, it is interesting to note that the Sanskrit term for the nervous system is *Chitabhhas*, or consciousness reflector.

[146] Cambridge Medieval History, Vol. V, p. 790. (Stahl's footnote)

[147] Macrobius, p. 145.

[148] See Chap. I, p. 5, note 6.

[149] Macrobius, p. 146.

Parmenides, Xenophanes, Boethius and Epicurus! He concludes, "The acceptance of the soul's incorporeality has been as general as the acceptance of its immortality."[150]

This Neoplatonic cosmogony is significant when it comes to Macrobius' treatment of music theory. His exposition is well in line with tradition. Pythagoras appears promptly[151] and discovers the consonances at the blacksmith's shop. He then uses this discovery to develop the knowledge of intervals and tuning. Next, Plato, "guided by Pythagoras' revelation and drawing upon the godlike power of his own genius,"[152] applies this knowledge to the construction of the World-Soul. Macrobius gives us a brief guided tour of the number symbolism utilized by Plato's demiurge in the *Timaeus*. As usual there is some conceptual fudging. In one instance, Macrobius attempts to re-establish Plato's sirens where Cicero had failed to mention them. "In *a* discussion in the *Republic* about the whirling motion of the heavenly spheres, Plato says that a Siren sits upon each of the spheres, thus indicating that by the motions of the spheres divinities were provided with song."[153] He then makes an adjustment to accommodate nine muses on eight spheres.

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[150] Macrobius, p. 147.

[151] II,i, 8-12.

[152] Macrobius, p. 189.

[153] Macrobius, pp. 193-194.

"Moreover, cosmogonists have chosen to consider the nine Muses as the tuneful song of the eight spheres and the one predominant harmony that comes from all of them."[154] Outside of this, however, we do find one interesting idea that emerges directly out of the Neoplatonic concept of the Golden Chain of Homer. Having established the relationship between musical relationships and the structure of the World-Soul, Macrobius ventures an answer to a very fundamental question: why do all people seem to like music?

> Every soul in this world is allured by musical sounds so that not only those who are more refined in their habits, but all the barbarous people as well, have adopted songs by which they are inflamed with courage or wooed to pleasure; for the soul carries with it into the body a memory of the music which it knew in the sky, and so is captivated by its charm that here is no breast so cruel or savage as not to be gripped by the spell of such an appeal. This, I believe, was the origin of the stories of Orpheus and Amphion, one of whom was said to have enticed the dumb beasts by his song, the other the rocks. . . Thus every disposition of the soul is controlled by song.[155]

We will return to the issue of the great chain of being and the disposition of the soul controlled by song. But the story of the transmission of sources is not complete.

[154] Macrobius, p. 194.

[155] Macrobius, p. 195.

And the Sources Begat Sources

Over a thousand years separate Macrobius from the final flowering of the music of the spheres tradition with Fludd and Kepler. Much was written on the subject during that time. But, as Macrobius himself wrote, "The fact that Cicero made mention of music . . . is no excuse for going through all the treatises on the subject, a mass of literature that, it seems to me, is without end."[156] Space limitations force us to follow Macrobius' suggestion here, but even a cursory overview of this literature reveals a tradition filled with what Haar has, in some instances, called a "thoughtless jumbling of sources,"[157] in others, the ". . .parroting of tradition in its most desiccated form."[158]

Aurelian of Réômé. As a case in point, we can cite a treatise from the tenth century by Aurelian of Réômé. Newby cites this work as an example of the tendency by ninth- and tenth-century theorists to produce expansions of Boethius, Cassiodorus and other earlier theorists. These works, "which are largely glosses, reflect the desire to conflate the material of their sources into a monolithic and consistent

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[156] Macrobius, p. 199.

[157] Haar, p. 292.

[158] Haar, p. 320.

tradition of musical philosophy and aesthetics."[159] The tradition that emerged was hardly monolithic and certainly not consistent. Aurelian's treatise, *Musica Disciplina,*

> . . .reveals not only the current trends in musical philosophy, but also provides a good demonstration of the manner in which originally well thought out concepts, such as that of the music of the macrocosm and the microcosm, could be blurred and misconstrued. The *Musica Disciplina* exemplifies how the heirs to a collection of disparate and incompletely documented traditions attempted valiantly, but naively, to reconcile the diverse positions of their various authorities (in Aurelian's case, Pseudo-Boethius and Isadore).[160]

Particularly notable is the way in which concepts shift in meaning over time. In *Musica Disciplina*, for example, the notion of *musica humana* no longer means the reflection of cosmic order within the human mind and body. Rather it signifies the corpus of liturgical chant as revealed to Pope Gregory by the Holy Spirit. The term's earlier meaning has been revived somewhat by the time it appears in Fludd's work, but these conceptual shifts exemplify the elasticity of meaning associated with this tradition, particularly among the medieval schoolmen.

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[159] Newby, p. 52.

[160] Newby, pp. 52-53.

A Change of Direction

By the time we get to the thirteenth century, a subtle shift of emphasis occurs on two fronts, one musical, the other scientific. The Neoplatonic emphasis derived from Boethius, Macrobius, and others is modified somewhat by the increasing availability of Aristotle's works. In the scientific arena, a major figure emerges in the person of Roger Bacon, who will challenge the supremacy of Plato and Pythagoras.

> Thirteenth-century scientific thought, taking its lead from Aristotle, was not likely to tolerate literal reading of Platonic myths. Roger Bacon spends a good part of the chapter on music in his *Opus Tertium* refuting, not only the standard Pythagorean theory (referring of course to *De Caelo*) but also a modification of it in terms of its physical cause. . . Bacon does not give the names of the "Many and learned" who propose a celestial music from the light of the stars rather than from their movement, but this altered form of *musica mundana* may well represent academic speculation on Boethius, meant to take Aristotle's refutation into account, at Paris or Oxford in the mid thirteenth-century. . . Bacon concludes decisively that "ideo nulla est musica mundana."[161] Yet, he admits, the theory has persisted "among the vulgar"; among the learned it is merely recounted, not approved, and thus Boethius mentions the theory merely to retell an opinion of the unlettered. The revered Boethius, whose merits as a scholar Bacon admired, thus gets off more easily than Pythagoras, who is simply said to have been wrong.[162]

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[161] Opus tertium, ch. LIX, in Opera inedita, ed Brewer, p. 230. (Haar's footnote)

[162] Haar, pp. 307-309.

Newby reports on a further development from this period:

> After the discovery of Aristotle's works and the establishment of the cathedral schools and later the first universities, the Neoplatonic musical tradition continues to be maintained; but by this time there begins to appear a growing concern: how to reconcile that tradition with purely aesthetic observations about current practices of music and poetry. The ever-expanding corpus of paraliturgical music, the development of polyphony, even the elegant and highly sophisticated secular tradition of music-poetry of the troubadours suggests greater awareness of man's autonomous role in the act of artistic creativity. By the thirteenth century, one finds a significant falling-off in the number of treatises dealing with matters of general musical philosophy and cosmology, and an accompanying increase in the number of works that treat the problems of performance, notation and composition of music.[163]

Jacques de Liège

We can see an example of this latter trend in the *Speculum Musicae* of Jacques de Liège, written around the turn of the fourteenth century. A large section of this is a reworking of Boethius' text, but it also contains a great deal of material on the theory and practice of compositional techniques. Ironically, Jacques' work also seems to contain more on *musica mundana* and *musica humana* than Boethius' original, but this is probably because these sections of the older work are lost or were never composed. When he does

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[163] Newby, p. 53.

deal with the "Celestial or Divine Music," however, it receives a lukewarm treatment. He speculates that

> Perhaps Boethius and the Pythagoreans understand by the music proceeding from the motions of the celestial bodies the connection, order, proportion, concord, or any other suitable relationship which the orbs have with one another in motion, position, luminosity, virtues, inequality or equality of movement.[164]

Later, referring to Boethius' description of the harmony existing among the elements, he expresses the opinion that ". . .it is plain that this is a metaphorical expression, and so it may be when he says that sounds and modulations arise from the celestial motions."[165] He goes on to admit that ". . . whether the truth of the matter is that there really are sounds and sounding music there, God knows, to whom nothing is hidden and who can do these things and greater ones still, though they are unknown to us."[166]

<u>Gafori</u>

Such a view was not uncommon in this period. Indeed, in view of the complexity and richness of the treatises on the celestial harmonies that extends from this period to the

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[164] *Jacobi Leodiensis, Speculum musicae,* Roger Bragard, trans. & ed. (Rome: American Institute of Musicology, 1955). In Godwin (1993), Vol. I, p. 138.

[165] Ibid.

[166] *Jacobi Leodiensis,* in Godwin (1993), p. 139.

time of Fludd and Kepler, it is remarkable to realize how tenuous a connection the treatises had to their sources. Take, for example, the following from Franchino Gafori. "There are those who believe the muses follow the order of constellations and modes,"[167] and, "we do not think it incongruous to agree with the conception of Pythagoras and Plato, who said that celestial sounds are produced according to a certain order of instrumental sounds."[168] These statements seem surprisingly lacking in conviction considering that it was Gafori who commissioned the famous woodcut from Guillaume de Signerre that we saw in Chapter I. The illustration is from his earlier work, which deals with *Practica Musica*. When Gafori decides to offer some thoughts on *Musica speculativa,* it is in the form of another layer of rehashed sources. Yet, as Godwin points out, "this is the ground on which so many Renaissance theorists met."[169]

Zarlino

A generation later, the theorist Gioseffo Zarlino is also, for the most part, focused on practical concerns in

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[167] F. Gaffurius, *De Harmonia Musicorum Instrumentorum Opus* (1518), Clement A Miller, trans. (American Institute of Musicology, 1977). In Godwin (1993), p. 178.

[168] *Franchino Gafori,* in Godwin (1993), p. 183.

[169] *Franchino Gafori,* in Godwin (1993), p. 178.

his *Institutione Harmoniche*. He still finds space for an exposition of what he calls *musica animastica*, a category which covers *musica mundana* and *musica humana*, as opposed to the music of instruments and voices which he calls *musica organica*. But it is a relatively brief exposition.

> Zarlino's account of musica mundana is the most succinct and balanced of his time, taking in the major classical authorities and the few relevant biblical verses, and extracting from them what is of philosophical value, rather than analyzing controversial and perhaps meaningless details of correspondences. In his very lack of fascination with the latter, he would set the tone for future music theorists, enabling them to dispense with the subject altogether, leaving it to cultivation by amateurs like Fludd, Kepler, and Kircher, or to eccentrics like Werckmeister and Tartini.[170]

Zarlino's writing shows evidence that a wider range of texts was available in the sixteenth century. He makes the requisite nod to Pythagoras (with the *de rigueur* disclaimer, "for it is the opinion of many ancient philosophers . . ."), regarding the sounds emanating from the heavens, and notes Aristotle's opposition to the idea, and Cicero's acceptance of it, with a lengthy quotation from the *Somnium Scipionis*.

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[170] Godwin (1993), pp. 205-206. Godwin comments (p. 239) that Andreas Werckmeister's statements on the music of the spheres was "in the last resort only poetic," while of Giuseppe Tartini he writes (p. 314) that his "musico-mathematical theories are so complex, and in some respects so confused, that it is impossible to give any details of them."

Plato's view is represented via its citation in Tullius, and then Zarlino goes on to consider Ptolemy.

> Whoever will examine the heavens in detail, as Ptolemy did with such diligence, will find by comparison of the twelve portions of the Zodiac, in which are the twelve heavenly signs, various musical consonances: the fourth, fifth, octave, and others in their turn.[171]

Zarlino is here citing Ptolemy's Harmonics,[172] but he also introduces a new element, adding astrological considerations to the already confusing mix.

> Not only in the things mentioned may one find such harmony, but also in the various aspects of the seven planets, in their nature, and in their positions or sites. First from the aspects which they make with inferior things, such as Trine, Square, Sextile, Conjunction, and Opposition, and according to their good or bad influences, comes such diverse harmony of things that it is impossible to describe it. Then, as to their nature, there are some (as the astrologers say) of an unhappy and malignant nature, which come to the good and benign ones to be tempered. From this results harmony, and great convenience and advantage to mortals.[173]

As Godwin notes, Zarlino refrains from going into too much detail. This is in contrast with Ptolemy's original.

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[171] Godwin (1993), p. 208.

[172] Book three, 101.27-104.2. See Ptolemy, *Harmonics*, trans. and commentary by Jon Solomon (Leiden: Brill, 2000), pp. 154-157.

[173] Godwin (1993), pp. 208-209.

> "Harmonia" in Greek never loses its root meaning of the fitting together of disparate, potentially conflicting elements. In the third book of Ptolemy's *Harmonica*, however, cosmic harmony is seen above all in the zodiac. . . This harmonic structure of the celestial world is worked out in astonishing detail.[174]

It is interesting to find that some of the authorities in this field, even in classical times, found some of this speculative writing to be too much. "Macrobius felt embarrassed," Chadwick informs us, "when cosmic harmony was taken so far as to be traced into the smaller details."[175] It is also interesting to note that Ptolemy was disparaged by subsequent writers.

> Commentators from Kepler to the present have been embarrassed by it [Ptolemy's *Harmonics*], calling it ingenious nonsense. But Kepler himself suffered the same posthumous verdict on what he considered the crown of his work, his explanation of the elliptical planetary orbits through musical harmony. Does each age simply have its own distinctive nonsense?[176]

Into The Mainstream(s)

The Renaissance could be said to be a golden age in the history of our topic. It would seem a travesty to skim over such a rich period in the history of cosmic harmony, but we are saved by the fact that these riches have attracted many

[174] Chadwick (1981), p. 82.

[175] Ibid.

[176] Godwin (1993), p. 21.

researchers, and these years have already been carefully documented, particularly by Heninger, whose book provides an exhaustive examination of Pythagorean lore as a background to the study of poetics.[177] We will focus on a single issue--the understanding of Greek sources, particularly Plato.

By the time of the Renaissance, another shift of emphasis occurred: as the trickle of Greek manuscripts coming into Europe turned into a flood, the pendulum swung back towards the magical tradition after the medieval dominance of Aristotelianism. This influence was felt in every field of endeavor.

> Plato was, without doubt, the darling of the renaissance. In the early quattrocento several of the dialogues were rendered into Latin by various translators even before the Florentine Academy resurrected him in toto and enshrined him as their tutelary spirit. For centuries Plato's *Timaeus* had been the basic text for cosmology, passing over into science and theology; his *Symposium*, adorned with Ficino's expansive commentary, provided a doctrine to guide moralist and love poet alike; his *Republic* was the touchstone for discussion of all public matters from government to education to art.[178]

In this atmosphere, Platonic and Pythagorean notions came to the forefront in every area from cosmology to poetry--certainly in music. But we have already noted Tarnas' observation that Renaissance thought is not

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[177] See the section on Pythagorean Doctrine, particularly Chaps. 1, *Numbers*, and 2, *Cosmos*, pp. 71-200.

[178] Heninger, p. 21.

monolithic but rather a "simultaneous balance and synthesis of many opposites."[179] Thus, for example, Platonic doctrine was also used to support a materialist philosophy:

> Because of Plato's emphasis on mathematics in the Academy, best publicized by the educational system prescribed for the *Republic* (522E ff), he was seized upon by the empiricists who wished to justify measurement and was made the classical precedent for the new science.[180]

Glarean

So the great flowering of Pythagoreanism contained the seeds of its own destruction. But this is typical of the age. We have seen the confusion of opinion in Gafori and Zarlino; it is re-emphasized in another sixteenth-century text, the *Dodecachordon* of Heinrich Glarean, in which the maze of contradictions is discussed openly.

> Macrobius writes in book 1 of Saturnalia that Apollo's lyre had seven strings, through which it may be preferable to understand the movements of as many heavenly spheres. I believe he may have taken spheres for planets, although this speculation is vain.[181]

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[179] See Chap. I, note 82, p. 60.

[180] Heninger, p. 21.

[181] Heinrich Glarean, *Dodecachordon,* Clement A. Miller, trans. (American Institute of Musicology, 1965), in Godwin (1993), p. 197.

Glarean compares multiple opinions on such topics until conceding that "writers have fallen into diverse ways of arranging the sounds according to their highness and lowness,"[182] before going on to add his own opinion to the mix. He is not averse to contradicting the most authoritative of classical sources. In discussing the sounds made by the various planets, he writes, "to say what I think, this place in Cicero undoubtedly has been corrupted, and Macrobius did not understand it accurately although he wrote four very long chapters on it."[183]

Glarean raises the essential question. Plato has been turned on his head; Cicero has been corrupted; Macrobius did not understand the planetary harmony. By the time we arrive at the sixteenth century, can anyone claim to understand this tradition?

Full Circle

We have come almost full circle; it is another seventy years from the time of Glarean and Zarlino to the critical turning point from 1617 to 1619 that we discussed in Chapter I and the work of Fludd, Kepler and Descartes. If Kepler is the watershed between the classical and modern worlds, multiple streams flow into that watershed from the

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182 Glarean, in Godwin (1993), p. 199.

183 Godwin (1993), p. 201.

Renaissance, many of them crossing one another, some gathering strength, others eventually drying up. On the other side of the watershed, however, once the natural scientists of the eighteenth century have done their work, only one stream emerges, and the music of the spheres is not part of it. Why is this?

There are several possible reasons. The sheer muddling of the tradition was probably enough to ensure that it could not stand up to any serious scrutiny. Several writers, most notably Johannes Tinctoris, Francisco de Salinas and Giovanni Battista Benedetti, published invective against it.[184] At the same time, however, in another ironic development, the idea entered the mainstream of thought, particularly in the field of poetry. And yet, as Hollander describes, it seems that familiarity breeds contempt. By the eighteenth century the whole notion had become trivialized as "decorative metaphor and mere turns of wit."[185]

Before this process had run its course, however, the music of the spheres tradition enjoyed a final flowering that perfectly demonstrates the very difficulties and inconsistences that we have been discussing.

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[184] See Claude V. Palisca, *Humanism in Italian Renaissance Musical Thought* (New Haven: Yale University Press,1985), pp. 181-187.

[185] Hollander, p. 19. Cited by Palisca, p. 190.

The (Greek) Temple of Music

In 1589, in Florence, at the Medici wedding, and in 1607, in Mantua, at the presentation of Monteverdi's *Orfeo*, an entirely new system of composition was on display, along with the mythical content of Giovanni Bardi and Ottavio Rinuccini's verses, or the declamations of Monteverdi's and Striggio's *La Musica*. The settings of these verses were composed in a style that supposedly reflected the practices of ancient Greek music, painstakingly reconstructed by Bardi, Galilei, Jacopo Peri and other members of the Florentine Camerata. They had been aided in this effort by the scholar Girolamo Mei, who cited Ptolemy as one of his major sources. The tradition they created, of course, was opera; that story is well known. It is also well known to modern scholarship that the style created by Bardi et al. bears little resemblance to the way Greek music actually sounded. Paralleling this development, another Baroque edifice was under construction, best exemplified, perhaps, by the wonderfully colorful writings of Athanasius Kircher,[186] aspects of Fludd's and Kepler's writings, and countless others, all citing Pythagoras, Plato and the other

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[186] See Joscelyn Godwin, *Athanasius Kircher: A Renaissance Man and the Quest for Lost Knowledge* (London: Thames and Hudson, 1979). On music see Athanasius Kircher, *Musurgia universalis* (2 vols., Rome 1650; facsimile, Hildesheim 1970).

ancients. Is there any reason to suppose that their understanding of these sources was any less distorted than Bardi's, Mei's and Peri's was of theirs? It is our thesis that there is no reason to think so. Opera, of course, even if in different and evolving forms, had a future. The music of the spheres did not. Following the dispute between Fludd and Kepler, the insights of Descartes and Hume, and the other developments of the Enlightenment, its fate was sealed. Gradually, the study of music began to separate itself from the general concerns of science. At the same time, empirical evidence was gathering that undermined the basic assumptions of musical cosmology.

> It is important to keep in mind in analyzing music's relationship to science that music, unique among the arts, is at the opening of the scientific age inseparable from science. It is not surprising under these circumstances that the area of musical thought most affected by the scientific revolution were those bordering on the fields of science that underwent the greatest transformation. These, it will be recalled... were astronomy and dynamics. Astronomy, music's sister-science in the quadrivium, had until the middle of the sixteenth century bolstered the idea that earthly music contained in microcosm the divine harmony of the universe; but now there was growing evidence that the universe was not a harmony after all. In the fields of dynamics the studies of the nature of vibration and of sound likewise upset many of the widely held notions of number-symbolism and of the way music affects the senses and the mind.[187]

[187] Claude V. Palisca,"Scientific Empiricism in Musical Thought," in H. H. Rhys, ed., *Seventeenth Century Science and the Arts*, the William J. Cooper Foundation Lectures, Swarthmore College, 1960 (Princeton NJ: Princeton University Press, 1961), p. 93.

As scientists and explorers were discovering more about the physical environment a general change of perspective, known as a "paradigm shift," occurred, creating a world-view in which the music of the spheres became more and more marginalized as a serious scientific idea.

> During this period . . . there took place a twofold expansion of the European imagination. The first aspect was geographical, associated with the names of great navigators from Vasco da Gama to Drake. . .
>
> The second expansion was cosmological, the work of Copernicus, Kepler, and Galileo. Their new cosmologies swept aside the tidy system of nesting spheres, turned by the hand of God, that had served so well since the time of Aristotle. Breaking the bounds of the Ptolemaic cosmos required a new imagining of space, while the infinite vistas revealed demanded a new scale of time. Isaac Newton himself, largely responsible for the consecration of the former, was incapable of the latter. But all efforts at universal explanation had to be revised in the face of the new knowledge, and this was one of the foremost tasks that the philosophers of the eighteenth-century Enlightenment set themselves.[188]

The revision that they arrived at held no place for universal harmony; even if writers such as Mersenne continued to pay lip service to the general idea of harmony in the universe, and even if scientific thought had essentially grown out of this tradition, it could not survive much longer.

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[188] Godwin. *Arktos: The Polar Myth in Science, Symbolism, and Nazi Survival* (Grand Rapids, Michigan: Phanes Press, 1993), p. 142.

> In the 1620s, perhaps, the Pythagorean revival and the Scientific Revolution could go hand in hand. Two centuries later, and in the face of the Industrial Revolution, it was time for the ancient wisdom to part company with its wayward stepchild.[189]

The tradition was over. As John Hollander put it, the sky was untuned.[190] The bath water was thrown out. It is our thesis that a baby went out with it. It remains to detail what form it took, and how it might be rescued.

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[189] Antoine Fabre d'Olivet, *Music Explained as Science and Art*, Joscelyn Godwin, trans. (Rochester, Vermont: Inner Traditions International, 1987), p. 26.

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

CHAPTER VIII

THE SKY RE-TUNED?

The final consideration for our study concerns the relevance of musical cosmologies at the beginning of the twenty-first century; is this tradition entirely defunct, or does it contain anything of value, either now or for the bfuture?

We may recall the original definition of the music of the spheres from James Haar: "the blending of astronomy with musico-mathematical theories into the concept of a harmoniously ordered universe."[1] For all practical purposes, such a concept has disappeared from the mainstream of Western thought; it plays no significant role in the physical sciences, for example. The essential Pythagorean concept of *harmonia* may, perhaps, continue to play a role in mathematics and physics, mainly in the abstract sense of the aesthetic value of scientific discovery.[2] And historians, both of music and of science, continue to find items of

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[1] See Chap. I, note 4, p. 4.

[2] See Ernst Peter Fischer, *Beauty and The Beast: The Aesthetic Moment in Science*, Elizabeth Oehlkers, trans. (New York & London: Plenum Trade, 1999).

interest within the tradition.[3] But the more explicit idea of a *musica mundana* cannot be found in any science curriculum. Most astronomers, for example, regard it merely as a historical oddity that accidentally threw up something of value in the work of Kepler and Newton. And cosmology is regarded as a purely physical science with no theological, psychological, or cultural elements--a distinct contrast with more traditional cosmologies. In the last five centuries, Copernicus has removed the Earth from the center of the universe, Darwin has removed Man from the center of creation, and Einstein has even removed the absolute values of space and time; it is a vision of the universe vastly different from any that has preceded it. We will examine its effect on theories of music, as well as broader areas of knowledge upon which such theories depend.

Theories of Music

One of the results of the disappearance of musical cosmology is its effect on the theory of music itself. This can be seen, for one thing, from the very change in the definition of music theory over the ages. There can be no

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[3] See Penelope Gouk, *Music, Science and Natural Magic in Seventeenth Century England* (New Haven: Yale University Press, 1999) op. cit.

doubt that music theory has gone through enormous changes in the course of its history, even within Western culture. Claude Palisca illustrates this by comparing four major theory treatises, *De institutione musica* (c. 500) by Boethius,[4] *L'arte del contraponto ridotta in tavole* (1586-9) by Giovanni Maria Artusi,[5] *L'armonico pratico al cimbalo* (1708) by Francesco Gasparini[6] and *Der Freie satz* (1935) by Heinrich Schenker.[7] While these four books have little in common, they are all subsumed under the heading of music theory. He concludes:

> Even allowing for the span of time encompassing them--from about 500 to 1935--and the changing practice of music, the absence of any significant overlap in these four books, whether of content, purpose or intended audience, demonstrates at once the diffuseness and the richness of the concept of theory.[8]

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[4] See Chap. I, note 8, p. 7 and Chap. VII, note 33, p. 433.

[5] Venice, 1586.

[6] *L'Armonico Pratico al Cimbalo,* Venice, 1708, trans. by Frank S. Stillings, as *The Practical Harmonist at the Harpsichord,* David L. Burrows, ed., Music Theory Translation Series, no. 1 (New Haven: Yale School of Music, 1963).

[7] *Der Freie Satz,* 2 vols., Oswald Jonas, ed. (Vienna: Universal Edition, 1956).

[8] Claude V. Palisca, "Theory, Theorists," *The New Grove Dictionary of Music and Musicians,* Stanley Sadie, ed. (London: Macmillan, 2001), Vol. 25, p. 359.

Palisca's insight clearly illustrates the vastly different ideas about the nature of music and its role in human life that have been held through the course of the two millennia of Western thought. And compounding the diversity, as we have seen, has been the limited understanding of the original and fundamental contributions to this field.

One thing that stands out when we look at the examples chosen by Palisca is the gradual disappearance of cosmological content as we come forward in time. We have examined the work of Boethius in the previous chapter; having coined the term, he certainly represents *musica mundana*. Artusi was a student of Zarlino and was actively involved in disputes with Vincenzo Galilei and, later, with Monteverdi. His concerns are strictly those of *musica instrumentalis*, however, most famously with the definition and use of dissonance. Similarly, Gasparini, one of Domenico Scarlatti's teachers, was concerned in his writing with contrapuntal and harmonic theories, particularly figured bass. Coming to the early twentieth century, Schenker, a student of Anton Bruckner, was also deeply concerned with theoretical, structural issues, mainly within the sphere of fully functional tonality. There is a further dimension to Schenker, reflecting a concern with the psychological aspects of art that tend towards mysticism. It is not an entirely positive vision, however, since Schenker held that "perceiving the coherence in the masterworks exceeds the spiritual power of contemporary men especially, who, without coherence in themselves, can no longer endure the tension of any kind of coherence."[9]

Schenker's view implies a prediction. He is suggesting that his insights into the relationships between *musica humana* and *musica instrumentalis* would not find their way into the mainstream of musical thought. And he has been correct; Schenker's work may be revered but his world-view has scant influence. By the time we reach the present day, gone, for the most part, is any consideration of *musica mundana* or *musica humana*. Along with this, according to Zuckerkandl, music theorists have been content to focus on the details of *musica instrumentalis*.

> It is true that the century which preceded ours was the first to develop a separate science of music; however, like all nineteenth century science, it was oriented after the pattern of natural science. But the principles and methods of thought, and the intellectual tools, that natural science has developed can be successfully employed only in the marginal provinces of

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[9] "Das Erfassen der Zusammenhänge in den Meisterwerken überschreitet die geistige Kraft zumal der heutigen Menschen, die ohne Zusammenhang in sich selbst die Spannung eines Zusammenhanges überhaupt nicht mehr vertragen." *Der freie Satz,* 2nd ed. (Vienna: Universal Edition, 1956), p. 32, trans. by William A. Pastille, in *Ursatz: The Musical Philosophy of Heinrich Schenker* (Ph.D. diss., Cornell University, 1985), p. 35.

> music. Hence modern thought can boast significant accomplishments only on the outskirts of music, above all in acoustics and music psychology . . . So it has come about that the very generations that have known more glorious music, and learned to observe it more closely, than any that preceded them have, on the whole, stopped thinking about music. There have been important exceptions . . . yet so far they have remained exceptions.[10]

In the quarter-century since this was written there have been significant developments in musicology and music theory: a great deal of early and non-Western music has been discovered or reconstructed; new disciplines such as ethnomusicology and systematic musicology have been developed. But while, for example, we have learned much about the social and political contexts within which music has developed at different times and in different parts of the world, it is not clear that such new knowledge has gone any further in illuminating the essence of what music is. Some leading musicologists share this view. John Blacking, for example, commenting on the ubiquitous nature of certain musical phenomena, writes:

> I am convinced that the explanation for this is to be found in the fact that at the levels of deep structures of music there are elements that are common to the

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[10] Victor Zuckerkandl, *Sound and Symbol: Music and the External World* (Princeton: Bollingen Press, 1973), p. 5.

> human psyche although they may not appear in the surface structures.[11]

We are a long way from discovering what such elements might be. At the same time, according to David Epstein, we still do not even understand some essential musical phenomena within Western music:

> It is curious that with the developed techniques of analysis and with the heightened perception and awareness of musical content that have arisen from the study of contemporary music, tonal music of the eighteenth and nineteenth centuries, particularly of the so-called classical-romantic era, eludes our comprehension on many levels. We still do not fully understand what makes this music "work" - what factors impel its temporal forward motion, what controls the unfolding of its contents, what precisely constitutes its rhythmic structure. Nor is it clear what analytical perspective will best penetrate and reveal these properties.[12]

Similarly, advances in more general areas of music theory also leave some basic questions unanswered.

> The musical theorist looks at his subject above all from the viewpoint of the technique of musical composition . . . With a few notable exceptions it (music theory) has been concerned not with understanding music but with making it. It has become chiefly instruction in the practice of composition . . . the few scholars who have been concerned with a real theory of music have remained outsiders. To put it in a rather crass comparison: the problems of the musical

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[11] John Blacking, *How Musical is Man?* (Seattle: University of Washington Press, 1973), pp. 108-109.

[12] David Epstein, *Beyond Orpheus* (Cambridge: M. I. T. Press, 1979), p. 3.

> theorists are the problems of an electrician, not the problems of electricity. . . . This is in no sense intended as blame or reproach. Doubt begins to enter when musical theory behaves as if its questions and answers sufficed to attain to understanding the thing itself, its nature, its essence.[13]

This should be no surprise in view of the nature of contemporary modes of thought; the scientific approach to knowledge--scientific progress, in short--has been made possible by essentially rejecting such non-empirical goals.

> Whatever our philosophical standpoint may be, for all purposes of scientific observation an object exhausts itself in the totality of possible relations to the perceiving subject or instrument. Of course, mere perception does not constitute knowledge and insight; it must be coordinated and interpreted by reference to some underlying entity, a "thing in itself," which is not an object of direct physical observation, but belongs to metaphysics. Yet, for scientific procedure it is important to discard elements of metaphysical character and to consider observable facts always as the ultimate source of notions and constructions. To renounce the goal of comprehending the "thing in itself," of knowing the "ultimate truth," of unraveling the innermost essence of the world, may be a psychological hardship for naive enthusiasts, but in fact it was one of the most fruitful turns in modern thinking.[14]

Perhaps Zuckerkandl, Blacking, Epstein and others, including this writer, are simply naive enthusiasts who should stop complaining about the effects of science and its

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[13] Zuckerkandl, p. 12.

[14] Richard Courant and Herbert Robbins, *What is Mathematics?* (Chicago: Oxford University Press, 1969), pp. 3-4.

abandonment of metaphysics. But it appears that the limitations of "observable facts" are also recognized from within scientific circles. For example, there is a growing tendency to criticize scientific thinking for ignoring larger questions and relying more and more on a purely reductionist approach.

> Faced with a system, the scientist responded automatically by taking it to pieces. Animals were atomized down to organs, organs microscoped down to cells, cells studied as collections of molecules, smashed to component atoms. This method of analysis tends to become dogma; and, in fact, the reductionists tended to assert that all science was to be advanced in this way alone. Get to know the properties of each part, and you have only to put the parts together again and you will know the whole.[15]

It is true that such methodologies have been enormously successful and have produced wonders, both theoretical and technological. There is, however, a wide range of phenomena with which they have not been able to deal, with a resulting set of human, social problems.

> Those of us who are part and product of Western technological culture. . .. are unwittingly taking part in the anomaly of attempting to conduct society without the metaphysical or spiritual dimension. It is that very dimension which addresses itself to origins and humanity's overall relationship with our universe or the "whole." Because of the distractions of technological "magic" and its obvious material advantages, we have failed to achieve a wholeness in

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[15] W.R. Ashby, editorial, *Behavioral Science*, vol. 18 (1973), p. 1.

> industrial or post-industrial society. The paradoxes of increased material wealth and energy greed, natural resource destruction and the increase of mental illness all point to the fact that never before in human history has a culture been attempted without a spiritual dimension; in fact one could go further and suggest that a society is not correctly definable as "human" without such a dimension.[16]

Whatever its social effects, purely reductionist, or mechanistic, approaches have not been able to deal effectively with music. We have been able to analyze music down to its component parts, whether they be scales, motifs, themes, harmonies, forms, or pitch-class-sets; what we cannot seem to do is understand the larger questions of the kind Zuckerkandl and Epstein outline. A case in point is brought out by a contemporary music theorist John Rahn. He agrees that the current world-view is profoundly mechanistic:

> The prevailing image of the present intellectual epoch, perhaps soon to be supplanted, is that of the machine, interpreted in its widest sense to subsume formalizations of any kind. The work of Frege, Russell, Godel, Hilbert, Carnap, and so many others laid the foundations of the current civitas mentis machinosae.[17]

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[16] Keith Critchlow, *Time Stands Still* (London: Gordon Fraser, 1969), p. 7.

[17] John Rahn, "On Some Computational Models of Music Theory," *Computer Music Journal*, vol. 4, no. 2 (Summer 1980), p. 66.

Reflecting his intellectual epoch, Rahn's approach to theory has been an attempt to impose formal mathematical models on musical form. "To explicate something is, ultimately, to formalize it, that is to make it into a machine at whose metaphorically whirring and clicking parts we are happy to stare, and be enlightened. As a child of my epoch, this is my belief."[18] Rahn finds, however, that some theorists evade such formalization, particularly Heinrich Schenker.

> Schenker, who died in 1935, was something of an anachronism. His metaphors are overwhelmingly organic (almost disgustingly so) and the philosophy within which his theories swam was (insofar as it can be determined) an idealistic one. Although Schenker's philosophy has been compared to Hegel's and Goethe's, it was "essentialist" in the mediaeval sense, and similar in flavor to that of Plotinus or the Pseudo-Dionysius, and Schenker's epistemology was the ecstatic one of the mystic. We tend to assume that, in principle, a mechanical model of a theory can preserve all essential aspects of it, that whatever cannot be formalized is nugatory nonsense. Schenker would have fits at our presumption.[19]

Schenker is only an anachronism if one is completely committed to the mechanistic view, a view that Schenker himself did not share. But where Schenker feared to tread, his interpreters plunge ahead. Rahn is well aware of Schenker's view. Nevertheless, he admits that he can find no

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[18] Ibid.

[19] Ibid.

alternative but *to impose a mathematical model anyway.* "Since I cannot understand or cannot apply any aspects of Schenker's theory that are not (in principle) formalizable," he writes, "I must consider formalizations of Schenker's explications or even improvements of Schenker."[20]

While this kind of work goes ahead, there are other theorists who harbor grave doubts that it can ultimately be successful. At the same time, there is broad concern about the future of other musical disciplines. Historian Fred Fisher writes, "The kinds of questions still awaiting answers suggest the need for a different methodology, and it is unlikely that today's curriculum as presently constituted will ever come to grips with them."[21] Similar reservations come from ethnomusicologist Alan Merriam:

> Music can and must be studied from many standpoints, for its aspects include the historical, social, psychological, aesthetic, symbolic and others. If an understanding of music is to be reached, it is clear that no single kind of study can successfully be substituted for the whole.[22]

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[20] Ibid.

[21] Fred Fisher, "Mathematical Techniques in Music History," *Proceedings of the College Music Society*, Vol. 18 (1978), pp. 24-33, n. 2.

[22] Alan P. Merriam, *The Anthropology of Music* (Evanston, Illinois: Northwestern University Press, 1964), p. 64.

But perhaps the most striking statement in this regard is by historian Edward Lowinsky, the beginning of which was quoted in Chapter I.[23]

> The present era is characterized by a complete lack of any philosophy which would bind together the multitude of phenomena and of human activities into one meaningful whole. That music has a significance deeper than the sensual and emotional sensations it may arouse in the listener is no longer a common belief. Nor does music today maintain that same intimate contact with the social and the cultural life of the public that was so typical of the state of music in bygone ages. Music finds itself today in an unprecedented state of isolation. Neither performers nor composers, neither teachers nor musicologists are able by their separate or even by their joint efforts to overcome this situation completely. More is necessary: man must recapture a new unity of vision. This will be an extremely long and arduous process, to which workers in all fields will have to contribute.[24]

Musica Speculativa

What Lowinsky calls for is a tall order; he indicates that difficulties within the field of music are a symptom of more deep-rooted problems. He is joined in this view by Joscelyn Godwin, who, in a 1982 article, called for a revival of speculative music, which he defines as "looking

[23] See Chap. I, note 107, p. 79.

[24] Edward E. Lowinsky, "Music History and Its Relation to the History of Ideas," in *Music in the Culture of the Renaissance and Other Essays*, Bonnie J. Blackburn, ed. (Chicago: University of Chicago Press, 1989), p. 3.

at the cosmos musically, and at music cosmically."[25] "The highest task of speculative music," he writes, is "the solution through music of the metaphysical enigmas surrounding man."[26] Presumably, such an effort would involve the reintroduction, in some form, of *musica mundana* and *musica humana* into the curriculum--or at least an appreciation of what these terms signify. When he goes on to cite writers whom he feels have contributed to such an effort, he has to agree with Lowinsky that the task at hand goes beyond the specific concerns of musicology.

> Among modern writers who have attempted this, Marius Schneider . . . Dane Rudhyar, and Hazrat Inayat Khan seem to me to have had the most penetrating insights, but much is left to be done especially in the context of comparative religion and occultism.
>
> All of these paths lead beyond the frontiers of conventional musicology into the sometimes hostile territory of other disciplines. Yet this is the challenge faced by all who attempt to forge a holistic vision from the shattered fragments of twentieth-century learning.[27]

Godwin also cites the work of Albert von Thimus, Hans Kayser and Ernest McClain, whose work we have discussed. Each of these writers has a unique perspective within two

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[25] "The Revival of Speculative Music" in *Musical Quarterly*, Vol. LXVIII, No. 3 (July 1982), p. 373.

[26] Godwin (1982), p. 388.

[27] Ibid.

distinct paths that he sees speculative music taking--the "historical" and the "actual." "One treats it [speculative music] from outside as a historical phenomenon; the other seeks to make it a way of thought, even a way of life, for today."[28] McClain, for example, follows a distinctly historical line, finding "a musical mathematics that lie at the very center of archaic thought,"[29] not only, as we have seen, in Plato's work but also in Hebrew, Babylonian and Vedic texts.[30] Others, such as Kayser, look for applications of musical thinking in the development of contemporary thought.

Godwin mentions three other contributors' work in speculative music, Marius Schneider, Dane Rudhyar and Hazrat Inayat Khan. Schneider is perhaps best known for a massive work in Spanish, *El Origen musical de los animales simbolos en la mitologia y la escultura antiguas,*[31] which Godwin

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[28] Godwin (1982), p. 374.

[29] Godwin (1982), p. 378.

[30] See *The Myth of Invariance: The Origin of the Gods, Mathematics and Music from the Rg Veda to Plato* (New York: Nicolas Hays, 1976).

[31] The full title is: *El Origen musical de los animales simbolos en la mitologia y la escultura antiguas: ensayo historico-etnografico sobre la subestructura totemistica y megalithica de las altas culturas y su supervivencia en el folklore español* (Barcelona: Instituto Español de Musicologia, 1946).

describes as one of the most original works of nonfiction he has ever seen. Schneider traces the origins of musical cosmologies to the mythology of the early Neolithic age, which included systems of correspondences between notes, elements, planets, signs of the zodiac, seasonal and geographical correspondences, and associations with psychological states, creating a proto-musical cosmology. Godwin cites Schneider as a representative of "those speculative musicians to whom their science is an actuality, not merely an engaging historical study."[32] His book is a profoundly idiosyncratic work, however, and difficult to integrate with other work in this area.

Dane Rudhyar is an accomplished composer who moved to the United States from France. He has published a number of piano and orchestral works in a "post-Skryabin style,"[33] and has written sparingly but passionately on various musical subjects.[34] He is better known as an astrologer, however, and has published widely on this subject as well as on political and social issues.

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[32] Godwin (1982), p. 381.

[33] Stanley Sadie, ed., *The Norton/Grove Concise Encyclopedia of Music* (New York: W. W. Norton, 1988), p. 648.

[34] *The Rebirth of Hindu Music* (Madras): Theosophical Publishing House, 1928); *The Magic of Tone and the Art of Music* (Boulder, Colorado: Shambala, 1982); *The Music of the Spheres* (Tiburon, California: Big Sur Tapes, 1996).

Hazrat Inayat Khan was a musician from India who turned to the teaching of Sufism.[35] His work on music has become something of a classic. In it he gives expression to the essence of music cosmology: ". . . among all the different arts, the art of music has been specially considered divine, because it is the exact miniature of the law working through the whole universe,"[36] essentially the same idea that Dane Rudhyar explains on his recorded lecture. Inayat Khan goes a step further by bringing the music of the spheres to the level of personal experience, in the context of an interesting, but unfashionable, view on esthetics:

> There are five different aspects of the art of music: the popular, that which induces motion of the body; technical, that which satisfies the intellect; artistic, that which has beauty and grace; appealing, that which pierces the heart; uplifting, that in which the soul hears the music of the spheres.[37]

Inner or Outer Reality?

We have arrived back at the music of the spheres and have briefly reviewed the work of those who still subscribe to the idea on one level or another. But we are still left

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[35] See Chap. IV, note 183, p. 264 & fig. 51, p. 516.

[36] Hazrat Inayat Khan, *The Sufi Message,* vol. II (London: Barrie & Rockliff, 1960), p. 74.

[37] Khan, p. 53.

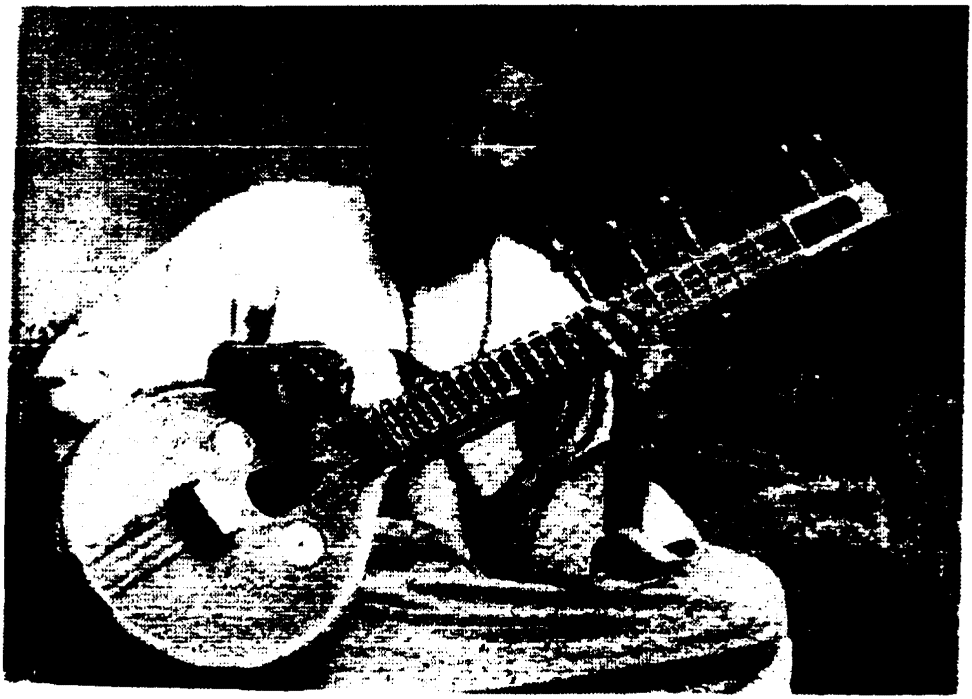

Fig. 51: Sufi Hazrat Inayat Khan

with the central question. On what level could the music of the spheres be considered a reality? Can it act as a model for the physical world, or is it an internal, archetypal form that shapes experience? The writers we have been examining place it on a variety of different levels; many of them understand it as a potent symbol of the harmony in the universe, others bring out deep levels of mathematical symbolism. While we have not emphasized it, there are others who suggest that the model of musical harmony does actually apply to the physical structure of the external world. Some research has been directed towards proving, for example, that Kepler's formulations were closer to the truth than is currently accepted. Godwin reports that:

> The recent researches of Rudolph Haase show that the predominance of harmonious intervals in the solar system, as discovered by Kepler, not only far exceeds random expectation, but is reinforced by measurement of the outer planets that were not yet discovered in Kepler's day. So Kepler was right, and it remains for us to draw conclusions appropriate to our own time and convictions.[38]

Bode's Law. Godwin is referring to a pair of articles by Rudolf Haase, "Kepler's World Harmony and its Significance for Today,"[39] and "The Sequel To Kepler's World

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[38] Godwin (1993), p. 222.

[39] In Joscelyn Godwin, ed., *Cosmic Music: Musical Keys to the Interpretation of Reality* (Rochester, Vermont: Inner Traditions International, 1989), pp. 111-130.

Harmony."[40] Kayser also touches on this subject.[41] Both authors refer to the principle revealed by astronomer Johann Daniel Titus in 1776, formulated mathematically by Johan Bode six years later, and known as the Titus-Bode law. If we take the series 0, 3, 6, 12, 24, . . . and add 4 to each term: 4, 7, 10, 16, 28, . . . then divide each term by 10, this generates the series 0.4, 0.7, 1.0, 1.6, 2.8, . . . which gives a rough approximation of the relations between distances of the traditionally known planets from the sun. Haase, Kayser, and others have argued that this mathematical law, and the principles of resonance it reflects, provides some justification for the formulations made by Kepler in his *Mysterium cosmographicum* and *Harmonice Mundi*. It is beyond the scope of this essay to evaluate these views. But attempts to justify Kepler's formulations in terms of the physical solar system get to the central issue of the present thesis.

<u>The Ontological Question</u>. For the purposes of our study the central question is whether, out of these multiple sources, layered one over the other for two and a half millennia, and reflected today in a rich, ongoing,

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[40] Godwin (1989), pp. 131-144.

[41] See Hans Kayser, *Akróasis: The Theory of World Dynamics*, Robert Lilienfeld, trans. (Boston: Plowshare Press, 1970), pp. 59-60.

speculative literature, Plato's full meaning is conveyed into the modern world.

Why is Plato so important? There is no doubt that he was a major source of the tradition. But it is not simply a question of whether Platonic sources have been followed slavishly by subsequent writers. *The question is whether the central issue raised by Plato in those sources has been applied to the understanding of musical cosmology.* And the central issue has nothing to do with notes, planets, scales . . . indeed with any specific aspect of music or astronomy. Whether Kepler's formulations are of value in understanding the physical solar system is fascinating, but it is important that such speculations should not overlook one vital point. We have already quoted Kepler regarding the fundamental purpose of his work, but it bears repeating here:

> To find a proper proportion in the sensile things is to discover and to recognize and to bring to light the similarity in this proportion in the sensile things with a certain Archetype of a most true Harmony, which is present in the soul.[42]

Writers such as Haase, Kayser, McClain and others are profoundly interested in discovering the "proper proportion in the sensile things," which includes an understanding of

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[42] See Chap. I, note 86, p. 62.

the musical relationships inherent in the planets, as well as a wealth of other phenomena. But they make little or no mention of the critical relationship between the patterns underlying structures in the physical world and the archetypal forms inherent in our own consciousness. This relationship was of great importance to Kepler; it was critical for Plato. It is at the core of Indian aesthetics; as Daniélou expresses it: "We can perceive the patterns of what we call beauty because they correspond to patterns which are an essential part of our own being."[43]

The central issue, therefore, is primarily ontological. Heninger sums it up nicely:

> Generally speaking . . . in our intellectual history we have usually recognized that we seem to have experience of two distinguishable sorts, one occurring in a realm of physical objects which we perceive with our senses and the other transpiring in a realm of abstract concepts which we contemplate with our minds. Plato was the first in recorded Western thought to formalize this dichotomy, which he did by postulating an unchanging world of absolute being and a transient world of continually becoming; and he interrelated the two halves of this reality by assuming that the physical objects in the world of becoming are replicas (albeit imperfect replicas) of the ideal essences in the world of being.[44]

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[43] Alain Daniélou, "Aesthetics and Indian Music," *The World of Music*, No. 18, Vol. 2 (1976), p. 19.

[44] Heninger, p. 10.

Heninger's statement brings us to the crux of the matter. Plato was unequivocal about the significance of this distinction, but when we examine the literature of the music of the spheres tradition it is rarely clear which of these levels is being discussed, or, more importantly, which level, if any, is causally primary. As Heninger puts it:

> Given such a dichotomization . . . we have difficulty in designating which kind of experience is real and which is only a projection of the other.[45]

This is a general statement, but it is directly applicable to the tradition we have been studying. A host of problems flows from the dichotomy Heninger describes. We could cite the confusion from the time of Plato onwards regarding the ontological status of the notes, the planets and the spheres; are these physical phenomena, metaphors, allegories, or archetypal symbols? We could point to the difficulties discussed above in understanding the phenomenon of music itself, in the context of contemporary thought; is it a mental phenomenon, or can it be reduced to its physical components? What is more important, however, is the fact that this ontological problem is fundamental and has an effect on all aspects of epistemology.

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[45] Ibid.

Forgotten Truth. At this point we need to remind ourselves again, as we were by James in Chapter I, and by Plotinus, Porphyry, and Macrobius in Chapter V,[46] that the music of the spheres has always been linked with the more general concept of the Great Chain of Being. It is these two ideas together that for James constitute "The Great Theme" of Western thought.[47] Arthur Lovejoy, in his book on this subject, points to the philosophy that provides the foundation to this view and that he calls "otherworldliness." He defines this as the belief that

> . . . both the genuinely "real" and the truly good are radically antithetic in their essential characteristics to anything to be found in man's natural life, in the ordinary course of human experience . . . the objects of sense and even of empirical scientific knowledge are unstable, contingent, forever breaking down logically into mere relations to other things which when scrutinized prove equally relative and elusive.[48]

Thus, for example, Plato, following Pythagoras, repeatedly directs his students not to look for reliable knowledge in the ever-changing field of becoming. Rather, he directs our attention to the pure Forms in the realm of Being. As Lovejoy puts it, philosophers of this school hold that

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[46] See Chap. VII, note 144, p. 478.

[47] See Chap. I, note 7.

[48] Arthur O. Lovejoy, *The Great Chain of Being: A Study of the History of an Idea* (Cambridge: Harvard University Press, 1942), p. 25.

> The human will . . . not only seeks but is capable of finding some final, fixed, immutable, intrinsic, perfectly satisfying good . . . only in a "higher" realm of being differing in its essential nature, and not merely in degree and detail, from the lower.[49]

This view, Lovejoy writes, "has, in one form or another, been the dominant official philosophy of the larger part of civilized mankind through most of its history," taught "in their several fashions and with differing degrees of rigor and thoroughness [by] the greater number of speculative minds and of the great religious teachers."[50] A picture emerges of the universe consisting of gradations between different distinct levels of existence, the view that came to be known as the Great Chain of Being, understood and described slightly differently in various historical and cultural settings.

> According to this nearly universal view, reality is a rich tapestry of interwoven levels, *reaching from matter to body to mind to soul to spirit*. Each senior level "envelops" or "enfolds" its junior dimensions--a series of nests within nests within nests of Being--so that every thing and event in the world is interwoven with every other, and all are ultimately enveloped by Spirit, by God, by Goddess, by Tao, by Brahman, by the Absolute itself.[51]

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[49] Lovejoy, p. 26.

[50] Ibid.

[51] Ken Wilber, *The Marriage of Sense and Soul: Integrating Science and Religion* (New York: Random House, 1998), pp. 6-7.

Ken Wilber, citing Huston Smith, agrees with Lovejoy as to the universal diffusion of the idea:

> Huston Smith--whom many consider the world's leading authority on comparative religion--has pointed out, in his wonderful book *Forgotten Truth*, that virtually all of the world's great wisdom traditions subscribe to a belief in the Great Chain of Being. Smith is not alone in this conclusion. From Ananda Coomaraswamy to René Guénon, from Fritjof Schuon to Nicholas Berdyaev, from Michael Murphy to Roger Walsh, from Seyyed Nasr to Lex Hixon, the conclusion is consistent: the core of the premodern religious world view is the Great Chain of Being.[52]

Plato is essentially outlining this concept in the Divided Line analogy; he describes a graded series of four ontological levels, two of which exist within ourselves with the other two referring to the external world. But, as with many ideas expressed by Plato, it was given a slightly different interpretation by Aristotle, with some loss of clarity regarding the location of these various levels. In developing systems of classification of natural phenomena, "it was he [Aristotle] who chiefly suggested to naturalists and philosophers of later times the idea of arranging (at least) all animals in a single graded *scala naturae* according to their degree of 'perfection.'"[53]

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[52] Wilber (1998), p. 6.

[53] Lovejoy, p. 59.

> The result was the conception of the plan and structure of the world which, through the Middle Ages and down to the late eighteenth century . . . most educated men were to accept without question--the conception of the universe as a "Great Chain of Being," composed of an immense, or ... infinite, number of links ranging in hierarchical order from the meagerest kind of existents . . . through "every possible" grade up to the *ens perfectissimum*.[54]

Compared to Plato's divided line schema, Aristotle is not as definite about the ontological status of each of the levels in his system. Thus, in its passage through European thought, the idea took on a slightly different shape, as did the idea of universal harmony. By the eighteenth century, as Lovejoy mentions above, both concepts began to disappear. Huston Smith asks why this occurred:

> "Down to the eighteenth century," Lovejoy tells us. Why did the hierarchical outlook then collapse? As it had blanketed human history up to that point, constituting man's primordial tradition and what might also be called the human unanimity, the force that leveled it must have been powerful, and modern science is the obvious candidate. The timing is right: Bacon, Hobbes, and Newton saw the writing on the wall in the seventeenth century, but it took another century for the scientific outlook to sweep the field. And the logic is inexorable: the structure of the two views is such that it was inevitable that they collide. Modern science requires only one ontological level, the physical.[55]

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[54] Ibid.

[55] Huston Smith, *Forgotten Truth: The Primordial Tradition* (New York: Harper & Row, 1976), pp. 5-6.

This theme keeps returning--the development of science and its resulting effect on the world-view we have been considering. We have mentioned the separation of mind and body resulting from the work of Descartes. We have pointed to the reductionism that follows from a purely mechanistic methodology. Now we see a further, ontological, ramification. According to Smith, and Wilber, the effect of scientific thinking on the Great Chain of Being was to collapse it. The method of empirical verification of knowledge is enormously powerful; it removes doubt, superstition, guesswork, factually false theories, and a dependence upon scriptural authority. But, by definition, empirical methodology takes place on the physical level.

> Objects can be larger or smaller, forces can be stronger or weaker, durations can be longer or shorter, these all being numerically reckonable. But to speak of anything in science as having a different ontological status--as being better, say, or more real--is to speak nonsense.
>
> Itself occupying no more than a single ontological plane, science challenged by implication the notion that other planes exist. As its challenge was not effectively met, it swept the field and gave the modern world its soul.[56]

Both Wilber and Smith, along with the other researchers he cites, such as Guénon,[57] Schuon,[58] Nasr,[59] argue that

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[56] Smith, p. 6.

[57] René Guénon, *Homme et son devenir selon le Vedanta*, trans. by Richard C. Nicholson as *Man and His Becoming*

science has solved many questions over the last three centuries but has also caused many others, particularly the loss of wholeness in our understanding of ourselves and nature. *This was not,* Smith cautions, *the direct result of science itself, but of what he calls scientism.*

> With science itself there can be no quarrel. Scientism is another matter. Whereas science is positive, contenting itself with reporting what it discovers, scientism is negative. It goes beyond the actual findings of science to deny that other approaches to knowledge are valid and other truths true. In doing so it deserts science in favor of metaphysics--bad metaphysics as it happens, for as the contention that there are no truths save those of science is not itself a scientific truth, in affirming it scientism contradicts itself.[60]

Whatever its internal inconsistencies, the effect of scientism, Smith writes, has been to create a world-view that excludes subjective, esthetic and spiritual values. Wilber absolutely agrees. He points out that Plato speaks of three basic values--truth, goodness and beauty, but that the

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according to Vedanta (New York: The Noonday Press, 1958).

[58] Frithjof Schuon, *The Transcendent Unity of Religions,* intro. by Huston Smith (Wheaton, Illinois; London; Madras: Theosophical Publishing House, 1984/93).

[59] Seyyed Hossein Nasr, *The Need for a Sacred Science* (Albany: State University of New York Press, 1993); *Religion and the Order of Nature* (New York, Oxford: Oxford University Press, 1996); *The Spiritual and Religious Dimensions of the Environmental Crisis* (London: Temenos Academy, 1999).

[60] Smith, p. 16.

latter two have been discarded in the single pursuit of truth--a noble intention with unintended consequences. He calls the result the "disaster of modernity."

> We can also call this disaster "the collapse of the Kosmos," because the three great domains--art, science and morals--after their heroic differentiation, were rudely collapsed into only one "real" domain, that of empirical and monological science, a world of nothing but meaningless Its roaming a one-dimensional flatland. The scientific worldview was of a universe composed entirely of objective processes, all described not in I-language or we-language, but merely in it-language, with no consciousness, no interiors, no values, no meaning, no depth and no Divinity.[61]

It is not just that we need more holistic thinking, Wilber explains. The thinkers and philosophers who forged the scientific revolution had a holistic view of the world. "This 'great interlocking order,' as numerous theorists from Charles Taylor to Arthur Lovejoy have carefully demonstrated, was one of the defining conceptions of the Enlightenment and of the modern scientific worldview."[62] The problem is that it was a *flatland* holism.

> It was not a holism that actually included all of the interior realms of the I and the WE (including the eye of contemplation). . . Nowhere in systems theory (or in flatland holism) could you find anything resembling beauty, poetry, value, desire, love, honor, compassion, charity, God or the Godess, Eros or Agape, moral wisdom or artistic expression. . . It was the reduction of all

[61] Wilber (1998), p. 56.

[62] Wilber (1998), p. 57.

> the value spheres to monological Its perceived by the eye of flesh that, more than anything else, constituted the disaster of modernism.[63]

Wilber refers here to the three eyes of knowledge of St. Bonaventure,[64] a concept that corresponds closely with Plato's divided line analogy. Both he and Huston Smith are suggesting that scientific methodology is built around the eye of flesh and the eye of reason, and, crudely understood, is taken to exclude the eye of spirit, thus dealing only with levels two and three of the divided line. But there are signs that this limited view of the range of science has already become obsolete in view of recent findings in some areas of research. As long ago as 1955, physicist Wolfgang Pauli could report the following:

> Since the discovery of the quantum of action, physics has gradually been forced to relinquish its proud claim to be able to understand, in principle, the whole world. This very circumstance, however, as a correction of earlier one-sidedness, could contain the germ of progress toward a unified conception of the entire cosmos of which the natural sciences are only a part.[65]

[63] Ibid.

[64] See Chap. V, note 117, p. 343.

[65] Wolfgang Pauli, "The Influence of Archetypal Ideas on Kepler's Theories," in C. G. Jung, *The Interpretation of Nature and the Psyche* (Chicago: Bollingen/Pantheon, 1955), p. 209.

There are other scientists whose insight runs along similar lines. Eugene Wigner, whose comment on the "unreasonable effectiveness of mathematics in the physical sciences" we have already noted,[66] relates this to the role of consciousness--a factor ignored in Wilber's flatland.

> Until not many years ago, the "existence" of a mind or soul would have been passionately denied by most physical scientists. . . and it was nearly universally accepted among physical scientists that there is nothing besides matter. There are several reasons for the return, on the part of most physical scientists, to the spirit of Descartes's "Cogito ergo sum," which recognizes the thought, that is the mind, as primary. . . . It may be premature to believe that the present philosophy of quantum mechanics will remain a permanent feature of future physical theories; it will remain remarkable, in whatever way our future concepts develop, that the very study of the external world led to the conclusion that the content of the consciousness is an ultimate reality.[67]

Wigner sees consciousness as one polarity in the Cartesian dualism and the pendulum of modern thought swinging toward that side of the dichotomy. Sir James Jeans conceived of the resolution of the dichotomy itself, and this was in 1948!

> Today there is a wide measure of agreement, which on the physical side of science approaches almost to unanimity, that the stream of knowledge is heading towards a non-mechanical reality; the universe begins

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[66] See Chap. III, note 16, p. 121.

[67] Eugene Wigner, *Symmetries and Reflections* (Bloomington & London: Indiana University Press, 1967), pp. 171-172.

> to look more like a great thought than a great machine. Mind no longer appears as an accidental intruder into the realm of matter; We are beginning to suspect that we ought rather to hail it as the creator and governor of the realm of matter--not of course our individual minds, but the mind in which the atoms out of which our individual minds have grown exist as thoughts.
>
> The old dualism of mind and matter . . . seems likely to disappear, not through matter becoming in any way more shadowy or insubstantial than heretofore, or through mind becoming resolved into a function of the working of matter, but through substantial matter resolving itself into a creation and manifestation of mind.[68]

This is a challenge to the mechanistic world-view from the standpoint of physics. Freeman Dyson also challenges that view within the field of biology.

> The mind, I believe, exists in some very real sense, in the Universe. But is it primary or the accidental consequence of something else? The prevailing view among biologists seems to be that the mind arose accidentally out of molecules of DNA or something. I find that very unlikely. It seems more reasonable to think that mind was a primary part of nature from the beginning and we are simply manifestations of it at the present stage of history. It's not so much that mind has a life of its own, but that mind is inherent in the way the Universe is built and life is nature's way to give mind opportunities it wouldn't otherwise have.[69]

Many great scientists have observed that there is more to the universe than mere matter; the very experience of

[68] Sir James Jeans, *The Mysterious Universe* (Cambridge: Cambridge University Press, 1948), p. 137.

[69] Freeman Dyson, interview in *U.S. News and World Report*, April 18, 1988, p. 72.

deep intuitive understanding itself demands more than a purely mechanical explanation. Einstein related it to music.

> Somewhere I have heard the phrase "The matchless beauty of Einstein's mathematics." I am sure this beauty of conception was the outcome of pure musical skill. Einstein was only sixteen when he had the idea that was to bring about such a revolution in physics, and he himself says, "It [the optics of motion] occurred to me by intuition. And music is the driving force behind this intuition. My parents had me play the violin from the time I was six. My new discovery is the result of musical perception."[70]

Such minds are at the cutting edge of science; the mainstream is a different matter. There has been an upsurge in interest in the understanding of consciousness, but, as we know from Thomas Kuhn, scientific paradigms shift very slowly.[71] However, the need for such a shift to occur with some urgency has been noted on the most practical level.

The World Problematique

In a famous statement in 1968,[72] the Club of Rome set forth what they termed the "world problematique"--the

[70] Shinichi Suzuki, *Nurtured by Love* (Athens, Ohio: A. Senzay Publications, 1983), p. 79.

[71] Thomas S. Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1970).

[72] Donella H. Meadows et al., *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*, 2nd edition (New York : New American Library, 1975).

complex of social, economic, and environmental problems that threaten human life on our planet. Following from this, in a landmark 1970 study, a group of futurists at the Stanford Research Institute, headed by Willis Harman and Joseph Campbell, were commissioned by the U.S. Department of Education to provide some insight into future trends as a guideline for educational policy.

After projecting a total of forty "future histories" and studying the results, they concluded that the current world-view and the technologies it supports, even though it has created enormous benefits on one level, has become obsolete, even pathogenic, and is now responsible for generating the world macroproblem. They write:

> On the whole, it looks as though of some 40 feasible future histories, there are very few that manage to avoid some period of serious trouble between now and 2050. The few that do, appear to require a dramatic shift of values and perceptions with regard to what we came to term the world "macroproblem."[73]

The authors do propose a solution, but their recommendation has nothing to do with economics, technology or politics. Rather, it hinges upon a complete change in our way of understanding ourselves and our world.

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[73] Willis Harman, et al., *Alternative Futures and Educational Policy* (Menlo Park, CA: S.R.I International, 1970), p. 6.

> If we are correct in this tentative belief that the various aspects of the world macroproblem, although they may be ameliorated or postponed by certain technological achievements, are intrinsic in the basic operative premises of present industrialized culture--if this is correct, then it follows that education toward changing those premises, directly or indirectly, is the paramount educational task for the nation and the world. This means that education should be directed toward responsible stewardship of life on earth with the associated changes in values and premises. It probably includes adaptation to a new and evolving metaphysic that will support these changes (since values are always rooted in an implicit picture of man-in-relation-to-his-world).[74]

The action they propose is on several levels: they wish to change fundamental premises through education, while simultaneously indicating that such an approach rests ultimately upon a *conceptual* shift--the adoption of a new metaphysic. In fact, what they are suggesting is no less than the regaining of a world-view that lies at the root of every major religious tradition as well as many philosophical systems. This emerged from a second study conducted at Stanford Research in 1974:

> Although most of the views of man we have surveyed have come into being during a particular era, often borrowing and adapting views of other cultures, there is one view that has remained surprisingly unchanged since it was first formulated in the Vedic era of India, about 1500 B.C. Although this view has always remained somewhat underground in most cultures, it has remained visible, in almost unchanged form, as an identifiable image of humankind in so many times and

[74] Harman et al. (1970), p. 10.

places that Huxley has termed it the "Perennial Philosophy."[75]

The Perennial Philosophy

This term was initially coined by Leibnitz, but it was Aldous Huxley who popularized it in a book of the same name.[76] In defining the Perennial Philosophy, Huxley writes as follows:

> *Philosophis Perennis*--the phrase was coined by Leibnitz; but the thing--the metaphysic that recognizes a divine Reality behind the world of things and lives and minds; the psychology that finds in man something identical with divine Reality and the ethic that places man's final end in the knowledge of the Immanent and Transcendent Ground of all being--the thing is immemorial and universal. Rudiments of the Perennial Philosophy may be found among the traditional lore of primitive peoples in every region of the world, and in its fully developed forms it has a place in every one of the higher religions. A version of this Highest Common Factor in all preceding and subsequent theologies was first committed to writing more than twenty-five centuries ago, and since that time the inexhaustible theme has been treated again and again, from the standpoint of every religious tradition and in all the principal languages of Asia and Europe.[77]

However pervasive the Perennial Philosophy has been, such a view does not enjoy wide acceptance in the modern

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[75] Harman et al., *Changing Images of Man* (Menlo Park, CA: S.R.I. International, 1974), pp. 39-40.

[76] Aldous Huxley, *The Perennial Philosophy* (New York: Harper & Row, 1970). See also Schuon, op. cit.

[77] Huxley, p. vi.

world; its metaphysical claim of a "divine reality" in particular goes beyond what the modern scientific mind may be willing to entertain. But the Stanford Research Institute team, in the second of their two studies, are firm in their belief that

> . . . this view of man, if it can be experienced by more than the small minority of persons who have apparently realized it through the centuries, would seem to provide the needed sense of direction and the holistic perspective and understanding described.[78]

The Spectrum of Consciousness

The foregoing suggests that the problems with music theory are embedded in a much larger problem; it is most interesting to see the convergence of some of the suggested solutions. The Perennial Philosophy, for example, is closely related to Lovejoy's concept of "otherworldliness" underlying the Great Chain of Being. This itself appears to parallel the ontological framework that Plato and Pythagoras were espousing in their descriptions of world harmony. Similarly, Kepler also appeared to be attempting to correlate the inner world of mind and the outer world of matter in the cosmology he took such pains to construct. And, as we have seen, this process requires the integration

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[78] Harman et al. (1974), p. 42.

of the magical, organic and mechanistic strands of thought, the use of all three eyes of knowledge, and the traversing of all levels of the divided line analogy as Plato demanded and as Pythagoras suggested when he sought empirical justification of his own mental, or spiritual, insights.

Some excellent minds continue to be absorbed in these ideas. As a student of religion, Huston Smith contributes the insight that the Great Chain is understood in strikingly similar ways in different religious traditions. The different ontological levels are represented primarily in four categories, as seen in fig. 52. He offers this model as a starting point for the development of a new paradigm.

Ken Wilber has done perhaps the most sophisticated work in this area, drawing on Eastern philosophical traditions as well as the most recent work in psychology to develop what he calls the Spectrum of Consciousness model.[79] Noting that reality, and our description of it, fall into a series of unrelated categories, each with its own academic disciplines and self-serving terminology, he proposes a model that provides a holistic context within which any phenomenon can be understood. The model has essentially four components. Reflecting the primary distinction between inner and outer

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[79] See *The Spectrum of Consciousness* (Wheaton, Illinois: Quest Books, 1993), and *A Brief History of Everything* (Boston & London: Shambala, 1996).

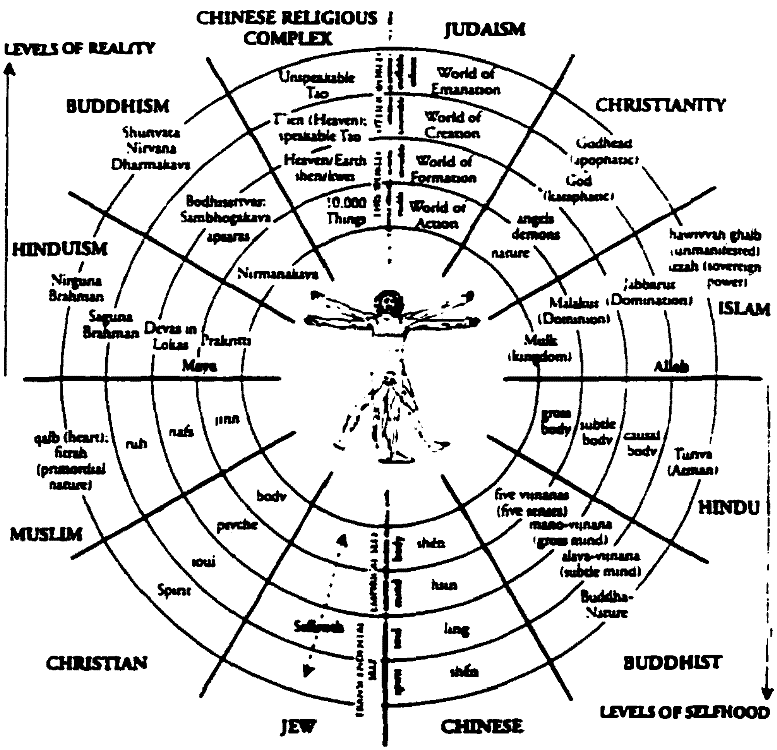

Fig. 52: The Great Chain of Being's Hierarchical Ontology, Huston Smith, 2000

worlds, he goes one stage further and adds the categories of individual and communal or collective to arrive at four quadrants, encompassing what he calls the "intentional," "behavioral," "social," and "cultural" spheres (fig. 53). Within each sphere he introduces a series of sub-categories to allow for different organizational and ontological hierarchies. From there, he proceeds to integrate concepts from the different disciplines, particularly the physical and social sciences, to provide a single framework within which all phenomena can be understood.

Wilber's goal is to develop the holistic vision that Godwin calls for, and particularly to move toward a reintegration of science and religion. Reintegrating scientific and esthetic values must be a corollary of this. But there is no doubt that this is indeed "a complex and extremely long and arduous process, to which workers in all fields will have to contribute."[80] At this point, one of the fields of research that is most important in such an effort is consciousness studies.

What is consciousness?

One conclusion that has emerged from our review of the music of the spheres is that it cannot be regarded merely as

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[80] See note 24, p. 511.

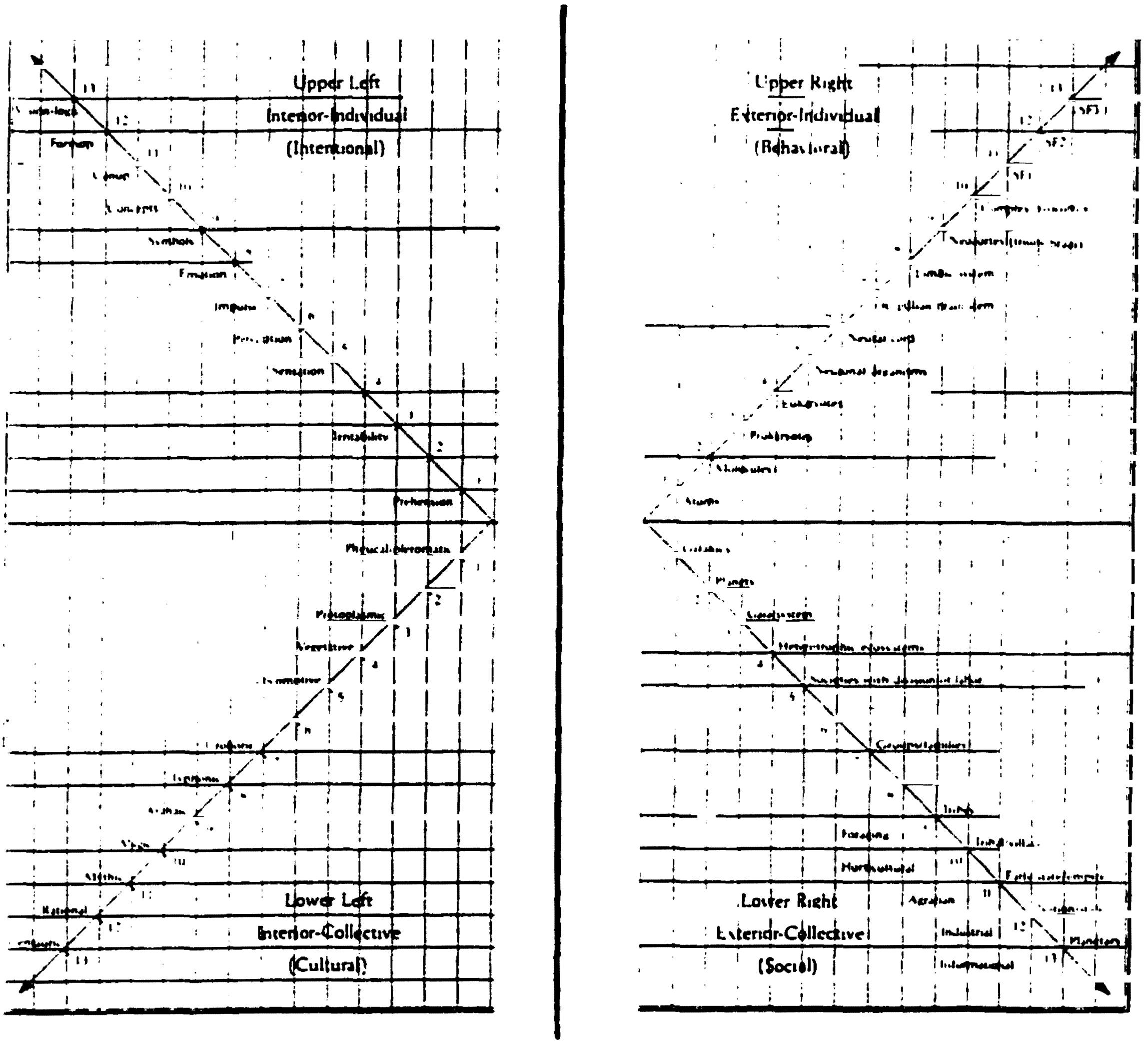

Fig. 53: Ken Wilber's Spectrum of Consciousness Model

a phenomenon in the external, physical, world; the research we have examined suggests that there is an important internal, mental component. Thus, the separate development of the concept within the magical and mechanistic strands of thought, and its eventual rejection by the latter tradition, reflects an incomplete understanding of its nature and significance. To re-evaluate the tradition in terms of a new, more integrated world-view, requires a deeper understanding of the mental component. This has been difficult up to now because, following Descartes' separation of mind and matter, science found it both easier and more productive to focus on the physical side of the picture, and an understanding of mind has largely lagged behind. That is not to say that the various fields of psychology have not observed and classified the activity and content of mind in great detail, and that neuroscience has not gone a long way in charting relationships between mental events and activity in the brain. But none of this has answered the fundamental question of what the mind, or consciousness, itself is. In recent years, however, this has become a subject of much greater interest among scientists. Pauli expressed such a need almost fifty years ago, in the essay already cited[81] about the dispute between Fludd and Kepler, which was

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[81] See note 65, p. 529.

essentially a conflict between the magical and mechanistic world-views.

> To us, unlike Kepler and Fludd, the only acceptable point of view appears to be the one that recognizes both sides of reality, the quantitative and the qualitative, the physical and the psychical, as compatible with each other, and can embrace them simultaneously.[82]

The current interest among scientists in the problem of consciousness indicates at least the beginnings of a shift in this direction. This is reflected in the appearance of new journals and a flurry of work being done on defining the problem and its potential solutions. A leader in this effort has been David Chalmers of the University of Arizona. He writes:

> Consciousness poses the most baffling problems in the science of the mind. There is nothing that we know more intimately than conscious experience, but there is nothing that is harder to explain. All sorts of mental phenomena have yielded to scientific investigation in recent years, but consciousness has stubbornly resisted. Many have tried to explain it, but the explanations always seem to fall short of the target. Some have been led to suppose that the problem is intractable, and that no good explanation can be given.[83]

[82] Pauli, p. 208.

[83] David J. Chalmers, "Facing Up to the Problem of Consciousness," *Journal of Consciousness Studies,* Vol 2, No. 3 (1995), pp. 200-219. The arguments in this paper are presented in greater depth in Chalmers's *The Conscious Mind* (Oxford: Oxford University Press, 1996). Extensive discussion of this topic by leading scientists and

Chalmers does not agree that the problem is intractable, but he does divide it into two parts, the "easy" problem and the "hard" problem. He lists some examples of so-called "easy" problems:

> the ability to discriminate, categorize, and react to environmental stimuli; the integration of information by a cognitive system; the reportability of mental states; the ability of a system to access its own internal states; the focus of attention; the deliberate control of behavior; the difference between wakefulness and sleep.[84]

These phenomena lend themselves fairly readily to explanation in terms of neurophysiology and similar disciplines. "All of them are straightforwardly vulnerable to explanation in terms of computational or neural mechanisms," Chalmers reports. "This is why I call these problems the easy problems." Of course, he adds, "easy" is a relative term; solving these problems will require an enormous amount of work over a considerable period of time. But at least the path to their solution is understood. "There is every reason to believe that the methods of cognitive science and neuroscience will succeed."[85] The

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philosophers, including Chalmers, can be found in Jonathan Shear, ed., *Explaining Consciousness: The Hard Problem* (Cambridge: MIT Press, 1997)

[84] Ibid.

[85] Ibid.

problem of mind itself is quite another matter; it goes beyond these phenomena and becomes a problem of much greater magnitude.

> The really hard problem of consciousness is the problem of *experience*. When we think and perceive, there is a whir of information-processing, but there is also a subjective aspect. . . This subjective aspect is experience. To make further progress, we will need further investigation, more refined theories, and more careful analysis. The hard problem is a hard problem, but there is no reason to believe that it will remain permanently unsolved.[86]

If this problem does indeed yield to scientific explanation, Chalmers feels, the effects will be felt well beyond the narrow realms of cognitive science and neuroscience. It is worth reproducing Chalmers's analysis of this potential in its entirety:

> Once a fundamental link between information and experience is on the table, the door is opened to some grander metaphysical speculation concerning the nature of the world. For example, it is often noted that physics characterizes its basic entities only *extrinsically*, in terms of their relations to other entities, which are themselves characterized extrinsically, and so on. The intrinsic nature of physical entities is left aside. Some argue that no such intrinsic properties exist, but then one is left with a world that is pure causal flux (a pure flow of information) with no properties for the causation to relate. If one allows that intrinsic properties exist, a natural speculation given the above is that the intrinsic properties of the physical - the properties that causation ultimately relates - are themselves phenomenal properties. We might say that phenomenal

[86] Ibid.

> properties are the internal aspect of information. This could answer a concern about the causal relevance of experience--a natural worry, given a picture on which the physical domain is causally closed, and on which experience is supplementary to the physical. The informational view allows us to understand how experience might have a subtle kind of causal relevance in virtue of its status as the intrinsic nature of the physical. This metaphysical speculation is probably best ignored for the purposes of developing a scientific theory, *but in addressing some philosophical issues it is quite suggestive.*[87]

It is suggestive because it reintroduces the notion of the "thing in itself" that scientific methodology had felt the need to abandon, and relates this "thing in itself" to the function of experience. Whether such a framework would go some way towards satisfying Zuckerkandl's plea for deeper insight is certainly speculative. But are these not the kind of questions with which speculative music should deal?

The Role of Musicology

All of the foregoing raises a basic question. Can the study of music itself contribute to the effort Lowinsky outlines, or answer questions raised by Epstein when he calls for "a new and broader frame of reference for theoretical inquiry in music"?[88] A new approach is called for, Epstein writes, because current methods "cannot deal

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[87] Ibid.

[88] Epstein, pp. 204-205.

with the kinds of questions concerning affect and expression," because their operative assumptions are "limited to the handling of primarily objective musical data."[89] They certainly do not extend to an understanding of the subjective realms that are an essential part of music. Epstein agrees that "we may be ready for another of those shifts of perspective whose need arises on an almost cyclical basis in theoretical inquiry."[90] But can such an approach grow out of the disciplines of music theory and musicology themselves, or can it only be the beneficiary of a more integrated world view developed within other disciplines, such as consciousness studies? Currently, while aspects of the physical and social sciences, including anthropology, are well represented, disciplines of a philosophical or metaphysical nature play a very limited role in the musicology and music theory curricula. If speculative musicology is to make a greater contribution, it will have to take a form that differs considerably from the one Godwin sketches. The context in which Godwin places speculative music is the "occult," something that can be a subject of academic study but not an academic category in

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[89] Ibid.

[90] Epstein, pp. 204.

its own right; lacking a proper foundation there is no context into which such work can be placed and evaluated.

Mind and Music

One answer comes from a recent book by Prof. Laird Addis of the University of Iowa, in which he presents the results of a study of music and the philosophy of mind. He believes this to be groundbreaking and critical work:

> If I may be so bold, no earlier account of the nature and appeal of music has invoked to a significant degree any explicit philosophy of mind. But then such ontologies of mind--which is what I mean by genuine philosophy of mind--are themselves exceedingly rare. Yet, if I am not mistaken, no philosophical account of what music is for human beings can be ultimate or adequate unless it contains or presupposes a plausible theory of the nature of the mind.[91]

From this starting point, Addis poses a simple and fundamental question, but one that musicologists have, in general, shied away from: why do people like music? He finds this to be closely related to a slightly different question, regarding the relationship between music and emotion, a subject that has generated a somewhat larger body of writing by musicians and philosophers and one that evokes one of the two "musical conceptions handed down from the ancient

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[91] Laird Addis, *Of Mind and Music* (Ithaca, New York: Cornell University Press, 1999), p. x.

Mediterranean world," that "have captivated European minds" cited by Gary Tomlinson in Chapter I, namely "music's ethical power to affect man's soul," the other being "the presence of harmony in the cosmos."[92]

Drawing on the work of Susanne Langer, Leonard Meyer and Peter Kivy, Addis formulates a theory that he is able to sum up as follows: "Passages of music are isomorphic with certain possible states of consciousness."[93] Prior to Addis' work, attempts to demonstrate this idea have been interesting but not entirely convincing. Addis' approach is far more sophisticated and will benefit greatly as more information emerges from theoretical and empirical research into consciousness.

Conclusion

In this study I have suggested that if we are to find any value in the music of the spheres tradition, it is not in re-establishing an archaic view of astronomy, or music theory, but in gaining a deeper understanding of the links between the inherent structure of human consciousness and the nature of the physical world, with special regard to phenomena such as music. Such an intention can be found at

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[92] See Chap. I, note 3, p. 4.

[93] Addis, p. 72.

the core of the Platonic literature that forms the source of the tradition in the Western world, but this intention was largely lost in the transmission of the tradition over two and a half millennia. It has been suggested, however, that we may be ready to reconsider such a viewpoint.

> Only now, in the last quarter of our century, the knowledge won through the Scientific Revolution is ready to be incorporated into a new system that again takes account of metaphysical realities. The spiral of human development is leading many people back to a world view not so very different from Fludd's, yet, (as is the way with spirals) a little more advanced.[94]

For the world view to be more advanced it will have to draw on the kind of work being done by Chalmers, Shear, et al. In the field of music, Addis' work makes a significant contribution by suggesting a link between *musica mundana* and *musica instrumentalis*. To extend these links to include *musica mundana* is another step, however. We will recall Zuckerkandl's statement about the deeper teaching of music--that it concerns the nature not of "psyche" but of "cosmos." It appears that, in the mind of some scholars at least, making that connection is a critical task of current scholarship. If such a goal could be accomplished, this would be the baby that can be reclaimed from the bath water.

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[94] Joscelyn Godwin, *Robert Fludd: Hermetic Philosopher and Surveyor of Two Worlds* (London: Thames & Hudson, 1979), p. 5.

Fifty years ago, composer Paul Hindemith, a friend of Hans Kayser and student of the music of the spheres tradition, envisioned a future role for music, one that would result from the kind of reintegration of knowledge called for by Godwin and Lowinsky. His words provide a fitting conclusion to this study.

> Talking with physicists, biologists, and other scientists who are unaware of a crisis in musical thought, one is always profoundly surprised to how great an extent they operate with concepts analogous to those in musical creation. . . This could lead us to the belief that there is some sound foundation to the ancient idea of a universe regulated by musical laws--or, to be more modest, a universe whose laws of construction and operation are complemented by a spiritual reflection in musical organisms.
>
> The time may perhaps return, when musical rules will be, as they were in olden times, an essential part of the code of the physical sciences.[95]

[95] Paul Hindemith, *A Composer's World: Horizons and Limitations, The Charles Eliot Norton Lectures 1949-1950* (Gloucester, Massachusetts: Peter Smith, 1969), p. 117.

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____ . *The Marriage of Sense and Soul: Integrating Science and Religion* (New York: Random House, 1998)

Wilson, Edward O. *Consilience: The Unity of Knowledge* (New York: Alfred A. Knopf, 1998)

Woodroffe, Sir John. *Introduction to Tantra Śāstra* (Madras: Ganesh & Co. Pvt. Ltd., 1969)

______. *The Garland of Letters: Studies in the Mantra-Śāstra* (Madras: Ganesh & Co, 1969)

______. *Shakti and Shakta* (New York: Dover Publications, 1978)

Wortmann, Eberhard. *Das Gesetz des Kosmos* (Remagen: Otto Reichl Verlag, 1965)

Yates, Frances A. *Giordano Bruno and the Hermetic Tradition* (London: Routledge and Kegan Paul, 1964)

______. *Theatre of the World* (Chicago: University of Chicago Press, 1969)

______. *The French Academies of the Sixteenth Century* (London: Warburg Institute, University of London, 1947)

______. *The Occult Philosophy in the Elizabethan Age* (London: Routledge and Kegan Paul, 1979)

______. *The Rosicrucian Enlightenment* (London: Routledge and Kegan Paul, 1972)

Young, Irwin, ed. and trans., *The Practica Musicae of Franchinus Gafurius* (Madison Wisconsin: 1969)

Yung, Bell N. "China," in *The New Grove Dictionary of Music and Musicians,* Stanley Sadie, ed. (London: Macmillan, 1980), Vol. 4, pp. 260-262

______. Evelyn S. Rawski and Rubie Watson, eds. *Harmony and Counterpoint: Ritual Music in Chinese Context* (Stanford: Stanford University Press, 1996)

Zarlino, Gioseffo. *Istitutione harmoniche,* facsimile reprint of Venice, 1573 edition (Ridgewood, New Jersey, 1966)

______. *The Art of Counterpoint,* part three of *Le istitutioni harmoniche* (1558), G. Marco & C. Palisca, trans. (New Haven: Yale University Press, 1968)

Zimmer, H. *Myths and Symbols in Indian Art and Civilization* (New York: Harper and Row, 1962)

Zolla, Elemire. *Archetypes: The Persistence of Unifying Patterns* (New York: Harcourt Brace Jovanovich, 1981)

Zuckerkandl, Victor. *Sound and Symbol: Music and the External World* (Princeton: Princeton University Press, 1956)

CURRICULUM VITAE

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DEGREE PROGRAMS

Ph.D in Musicology, University of Maryland, College Park, 2001

Graduate program in Ethnomusicology, University of Washington, Seattle, Washington, 1980-82

M.A. in Interdisciplinary Studies, Maharishi International University, Fairfield, Iowa, 1977

B.A. (Hons.) in English, California State University at Sacramento, 1974

University of London, Liberal Arts program (English, French, History), 1965-68

OTHER EDUCATION AND RESEARCH

Flute Masterclass, Dr. William Montgomery, University of Maryland, auditor, July 1994, July 1995, July 1998

Research project in Europe and India entitled *Ayur Veda, Samkhya and the Time Theory of Performance in Hindustani Classical Music*, American Institute of Indian Studies, 1993-94

Research visit to Alain Daniélou collection, Fondazione Giorgio Cini, Venice, March 1992

Private instruction in Bansuri (bamboo flute) with Prof. Debu Chaudhuri, Pandit Vijay Raghav Rao, & Pandit Hariprasad Chaurasia, U.S.A., Holland and India, 1988-95

Courses in Hindustani music, theory and performance, Gandharva School of Music, Washington, D.C., 1988-90

Jazz improvisation and music theory studies, Gary Peacock, Cornish Institute, Seattle, Washington, 1982-84

Instruction in Hindustani music, sarod and vocal, with Ustad Zia Muhammad Dagar and Ustad Sabri Khan, University of Washington, 1980-82

Postgraduate study in Vedic Studies and the Psychophysiology of Consciousness, Arosa, Switzerland, 1976

Travel and independent research, Europe, Turkey, Iran, Afghanistan and India,1968-70

ACADEMIC POSITIONS AND OTHER TEACHING

Adjunct Professor of the Humanities, Maharishi University of Management, Fairfield, Iowa, 1999-present

Visiting lecturer and curriculum consultant to World Music Program, Birmingham Conservatory, University of Central England, Birmingham, U.K., 1998-present

Founder and president, *Harmonia Institute*, developing multi-media educational programs, 2001

Independent lecturer in musicology, cultural history and future studies, offering lectures and seminars in colleges and institutions in the U.S., Europe, and India, 1996-present

Consultant to Smithsonian Institution, performance programs in Indian and other non-Western music, 1994-1995

Visiting lecturer in music, Bombay University, Spring 1994

Visiting lecturer in music, Delhi University, Fall 1993

Substitute teacher in music and humanities, Seattle, Washington, 1980-83, Montgomery County, Maryland, 1988-present

Private instructor in saxophone, clarinet, flute and music theory, in England and the U.S.A., 1968-present

Director, Gandharva School of Music, Washington, D.C., 1987-90

Lecturer in Future Studies, Bellevue College, Bellevue, Washington, 1981-83

Director of Curriculum Development and Lecturer in Music, Maharishi International University, Fairfield, Iowa, 1975-78

PERFORMANCE

Freelance performer in multiple genres, flute, saxophone clarinet. Washington D.C. area, 1998-present

"ANJALI - Dances From the Soul," "Bhanu Singher Padabali" based on the compositions of Rabindranath Tagore, Indian dance performance, arrangements and flute performance, June 2001

Incidental music for movie *Gobsmacked* by independent film maker Peter Tong, Edinburgh festival, 1997

Leader, *The Linden Trio* 1994-98
  Unique combination of classical and jazz forms. Performance venues include Kennedy Center and British Embassy. Playing flute and saxophone

Member, *Sunset Royal Café Orchestra*, 1995
  Washington D.C. orchestra specializing in early Ellington and other thirties and forties jazz. Played clarinet and saxophone

Freelance Studio Musician, Delhi and Bombay, India, 1993-94
  Music for Indian movies and Air India on flute and saxophone

Leader, *Peter Westbrook Quartet*, Seattle, Washington and Washington, D.C., 1980-96
  Pure acoustic jazz ensemble

Member, *Parallax*, Washington, D.C., 1987-90
  Electric jazz quintet

Freelance studio musician, London, U.K. 1970-72,1977-78
  Flute and saxophone work on a variety of jazz, folk, popular and world-beat recordings

Member, *Sattva*, U.K., 1971-72
  Popular jazz/rock ensemble which toured Europe extensively

Member, *Spontaneous Music Ensemble*, London, U.K. 1970-72
Groundbreaking ensemble in the area of collective improvisation. Tours of U.K., Germany, Holland. Recordings for B.B.C.

Music Director, International Drama Festival, Birmingam Arts Centre, U.K., July 1968

Incidental music for *Three Plays of Samuel Beckett*, University of Birmingham, U.K., January 1968

Intercollegiate Jazz Contest, Croydon, U.K., 1967

PUBLICATIONS

The Divine Vīnā and the World Monochord: Musical Cosmology from the Rg Veda to Robert Fludd. Ph.D. Dissertation, University of Maryland, College Park, 2001

1, 2, 3, 4. Pythagoras and the Cosmology of Number. Vedic Mathematics Newsletter, February, 2001

Divine Harmony: The Life and Teachings of Pythagoras, With John Strohmeier (Berkeley, CA: Berkeley Hills Books, 2000)

Music columnist for *Hinduism Today,* February 2000-present

Bansuri Dreams (John Wubbenhorst, et. al). CD Notes. Drimala Records, October 1999

"Āyur Veda, Samkhya and the Time Theory of Performance in Hindustani Classical Music." *Journal of Indian Philosophy and Religion*, Vol. 3, October 1998 (See also online at: www.sacredscience.com/archive)

Southern Brothers (Kadri Gopalnath and James Newton). CD notes. Water Lily Acoustics, October 1998

From the Ashes (Dr.L. Subramaniam and Larry Coryell). CD notes. Water Lily Acoustics, October 1998

India Archive Records. CD notes. Recordings by Pandit Raghunath Seth and Pandit Ronu Majumdar

"Universal Elements in Musical Cosmology." *Cosmos*, Vol. 13, No. 2, June 1997, pp. 21-47.

"Kadri Gopalnath", *Saxophone Journal*, May/June 1996

Consultant on chapter entitled "Non-Western Musical Influences", in Elliot Schwartz and Daniel Godfrey, *Music Since 1945: Issues, Materials and Literature* (New York: Schirmer Books, 1993)

"Angelic Intelligences: The Music of Alan Hovhaness", *DownBeat*, March 1982

"The Guitar with Interchangeable Fingerboards", *Xenharmonikon*, March 1978

An Idea Whose Time Has Come: A New Tonal Universe for the Guitar (Fairfield, IA; Intonation Systems,1977)

Music and the Science of Creative Intelligence: The Dynamics of Wholeness. Book and videotaped lecture course for first-year core program(Fairfield, IA; Maharishi International University, 1975)

COLLOQUIA

Music, Metaphysics and Meaning, American Musicological Society, Capital Chapter, Fall meeting, October 2001

Musical Symbolism and the Ancient Wisdom Traditions, Siva-Visnu Temple, Greenbelt, Maryland, June 2001

Music, Metaphysics and Meaning, Lecture Series, Birmingham Conservatory, University of Central England, Birmingham, UK, March, 2001

Gandharva Veda: Rhythms and Cycles in Music and Nature, Notes and Numbers, Lecture Series, Maharishi International University, Skelmersdale, UK, March 2001

Perennial Philosophy: Operating Manual for Spaceship Earth, Manchester University, Manchester, UK, March 2001

Utopia or Oblivion, Wigan College, Wigan, UK, March 2001

Divine Harmony: The Life and Teachings of Pythagoras, Greenwood Learning Centre, Hampton, UK, March 2001

The Divine Vina and the World Monochord: Mārga Sangīta and the Symmetries of Nature. Conference on Mysticism, Reason, Art and Literature: East West Perspectives, Ferrum College, Virginia, September, 2000

Member, Program Committee, International Interdisciplinary Conference in Calcutta, India, 1-4 August, 2000 on *Language, Thought and Reality: Science, Religion and Philosophy*. Society for Indian Philosophy & Religion. Paper presented on *Orpheus, Hermes, Pythagoras and the Western Guruparamparâ Tradition*

Language, Number and Music: Root Metaphors in Genesis, the Rig Veda and Plato's Timaeus. Society for Indian Philosophy and Religion, Elon College, North Carolina, April, 2000

The Perennial Philosophy: Operating Manual for Spaceship Earth. Dept. of Religion, Virginia Commonwealth University, Richmond, Virginia, April, 2000

Divine Harmony: The Life and Teachings of Pythagoras. Transitions Learning Center, Chicago, Illinois, February, 2000

Knowledge for a Positive Future: Veda, Svara and the Shape of Time. Maharishi University of Management, Fairfield, Iowa, January, 2000, Maharishi International University, Skelmersdale, UK, May 2000

Music, Cosmos and Consciousness: The Role of Music in the Understanding of Cultural History. California Institute for Integral Studies, San Francisco, May, 1999

The Harmonious Blacksmith: Pythagoras and the Origins of Western Music Theory. Dept. of Music, California State University at Sacramento, May 1999

Tuning, Temperament and Symmetry, College of Marin, Kentfield, California, May 1999

Mass Communications and the Mythic Image. School of the Art Institute of Chicago; Dept. of Fine Art, Maharishi University of Management, Fairfield, Iowa, May 1999

Nāda Brahman and the Music of the Spheres: Dept. of Music, Maharishi University of Management, May 1999

Āyur Veda, Samkhya and the Time Theory of Performance in Hindustani Classical Music. Society for Ethnomusicology, Mid-Atlantic Chapter, Smithsonian Institution, Washington, D.C., April 1999

Divine Harmony: Music in Hindu and Western Philosophy. Siva-Visnu Temple, Greenbelt, MD, March 1999

Harmonia: Musical Symbolism at the Heart of Western Thought. American Musicological Society Capital Chapter, Winter Meeting, January 1999

Yoga and Harmonia: Musical Cosmology, Pythagoras and the Veda. Lecture series, Temenos Academy, Prince of Wales Institute of Architecture, London, December 1998

Yoga and Harmonia: Musical Cosmology, Pythagoras and the Veda. American Philosophical Society Conference, December 1998

Conference on Pythagoras, Traditional Cosmology Society, University of Edinburgh, Edinburgh, Scotland, November 1998. Organizer, discussion leader, and contributor of paper *Yoga and Harmonia: Musical Cosmology, Pythagoras and the Veda.*

Āyur Veda, Samkhya and the Time Theory of Performance in Hindustani Classical Music. Conference of Society for Indian Philosophy and Religion, Elon College, North Carolina, March 1998

Musical Archetypes and Cultural Identity, Peabody Conservatory, Johns Hopkins University, Baltimore, Maryland, November, 1997

Music, Cosmos and the Self. One-day seminar, presented in Fairfield, Iowa; Richmond, Virginia; Skelmersdale, UK; Washington, D.C.; Berkeley, California, 1997-1999

Introduction to Musica Speculativa. Lecture series, Temenos Academy, Prince of Wales Institute of Architecture, London, September 1997. Part 1, *The Divine Monochord,* Part 2, *The Divine Vina,* Part 3, *Musica Speculativa.*

Music, Mathematics and Nature, School of the Art Institute of Chicago, June 1997; Maharishi University of Management, September 1997

Universal Elements in Musical Cosmology, Traditional Cosmology Society Conference, University of St. Andrews, Scotland, June 1996; Temenos Academy, Prince of Wales Institute of Architecture, London, May 1996; American Musicological Society Conference, Fredericksburg, Virginia, October 1995

Indian and Western Sources for the Music of the Spheres, Center for Advanced Studies, Skelmersdale, U.K., June 1996

Participant in conference, *Śārngadeva Samāroh*, Benares Hindu University, Benares, India. Organized by Sangeet Natak Akademi, New Delhi, India, February 1994

Research assistant and course contributor, Music 130, University of Maryland, College Park, 1992/93

Paradigm Change and Human Consciousness. Conference of World Future Society, Cambridge, Massachussetts, May 1987

Paradigm Change and the Theory of Music. Conference on Music: A Multidisciplinary Phenomenon, Immaculata College, Immaculata, Pennsylvania, 1983

The Concept of Rasa in Hindustani Classical Music. Conference on Consciousness and the Arts, University of Sussex, Brighton, U.K., 1977

The Liberal Arts and the Future, Dublin, Cork and Limerick. Lecture tour of Ireland for International Meditation Society, March 1976

Sama Veda and the Tradition of Song in North India, University of Birmingham, U.K., 1972

Music and the Science of Creative Intelligence, California State University, Humboldt, California, 1972

Lecture tour of Universities in the U.K. and Ireland, Student's International Meditation Society, 1970-71

OTHER EMPLOYMENT

Regional vice-president, Primerica Financial Services, Seattle, Washington & Bethesda, Maryland. Full time 1982-89, part time, 1989-present

Independent software consultant for education and business applications, Seattle, Washington, 1981-84

Computer programmer and systems analyst. Nordata, Seattle, Washington 1979-81

Director of Educational Programs, Intonation Systems, Fairfield, Iowa, 1977-79

Elementary school teacher, Birmingham, U.K., 1963-65

REFERENCES

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