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Unstruck Sound: Music and Forgotten Truth

Unstruck Sound: Music and Forgotten Truth

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‘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.’ *Victor Zuckerkandl*

1. INTRODUCTION

The time is right for a revolution in music – not in performance but in understanding. It is well understood, following the work of Thomas Kuhn (1970), that such revolutions occur in science, when shared assumptions are threatened by some anomaly in observed data that undermines existing traditions of thought. The classic example of this process is the Copernican revolution. When newly observed phenomena threatened Ptolemy’s Earth-centered cosmology in the later Middle Ages, astronomers responded by fudging of the data; in Milton’s words, they would “contrive/To save appearances . . . gird the sphere/With centric and eccentric scribbled o’er, / Cycle and epicycle, orb in orb” (Stimson 1917, p. 14, quoting Milton, *Paradise Lost*, Book 8, 11.81-84). By placing the sun at the center of the known universe Copernicus cut through all of this confusion like Alexander’s sword through the Gordian Knot.

Another turning point occurred at the turn of the twentieth century as physicists reviewed their discipline’s accomplishments. Physics, one of them famously claimed, was close to completing its understanding of the universe; only one or two small problems remained, and these would soon be resolved by the research work of graduate students. One of these students was Max Planck. The subject: black body radiation. The solution: quantum mechanics. The

result: an ongoing revolution in physics and cosmology. Wolfgang Pauli's conclusion: ". . . we no longer have a total scientific picture of the world" (Pauli 1955, p. 209).

Uncertainty persists at the beginning of the twenty-first century. Physics has rebuilt its theoretical edifice which, according to Stephen Hawking, explains the entire evolution of the physical universe, beginning a tiny fraction (approx. 10^{-35}) of a second after the Big Bang (Hawking 1990). Again, however, there are one or two niggling problems awaiting the attention of graduate students. For one thing, there is that troublesome fraction of a second. In addition, Nobel laureate Eugene Wigner has identified a mystery at the very heart of physics: ". . . the enormous usefulness of mathematics in the natural sciences is something bordering on the mysterious," he finds, "and [it appears] that there is no rational explanation for it" (Wigner 1967, p. 223). It is in this context, in a parallel insight, that musicologist Victor Zuckerkandl felt moved to make the declaration quoted at the beginning of this paper (1973, p. 148). His view is shared by theorist David Epstein who, commenting on decades of musical analysis, finds: "It is curious that . . . tonal music . . . eludes our comprehension on many levels" (Epstein 1979).

We do not understand music; mathematics' relationship to the world remains a mystery; and we lack a complete scientific picture of the world. Could these facts be related? Could there be a common denominator, a connection between physics, mathematics, and music? My thesis is that there is, and that it is consciousness.

In recent years it has become clear to many scientists that a description of the universe is incomplete without accounting for the existence within it of consciousness. Yet we have no idea what consciousness is. Scientists from a variety of disciplines are converging on the problem. "There is nothing that we know more intimately than conscious experience," according to David

Chalmers, a leader in the field of consciousness studies, “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” (Chalmers 1995, p. 200).

At the heart of Professor Chalmers’ analysis is what he calls the “hard problem” of consciousness. The latter is in contrast to the “easy problems” of understanding the mechanisms that perform mental functions. These problems are very complex, but they appear “easy” by contrast with the fundamental task of explaining why we have qualitative phenomenal experiences at all, a problem some scientists have declared intractable. The question, put more simply, is: “Why is there a subjective component to reality?”.

No problem could be more central to issues of ultimate reality and meaning. A universe without consciousness is a universe without meaning. Utilizing mathematics, science has built a picture of a universe devoid of meaning, but now it emerges that knowledge of consciousness is of critical importance for the understanding of mathematics, as mathematical objects exist purely within this subjective realm, and yet, mysteriously, correlate very exactly with objective phenomena. It is of equal importance for the study of music. “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” (Levarie and Levy 1968, p. 1). It is this relationship between subjective and objective aspects of existence that eludes understanding in our current world view, yet it is critical to the understanding of music: “. . . 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” (Addis, 1999, p. 1). It is in

this context that a fruitful revision of music theory needs to be undertaken, a task that raises its own series of unique problems.

2. SCIENTISM AND MUSIC THEORY

Problems of consciousness are not typically found at the core, or even in the mainstream, of current thinking in music theory. “. . . there remain no data in the West on the nature of music,” writes French musicologist Alain Daniélou (1995, p.1), “except for a few technical and mostly arbitrary rules about the relations of sounds and the structure of chords.” Zuckerkandl expands on this point:

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 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. (Zuckerkandl 1973, p. 12)

And yet what Zuckerkandl finds as a negative within a theory of music, failing to come to grips with “the thing itself,” has been regarded as a positive in the development of scientific thought. Discussing the foundations of mathematics, Richard Courant and Herbert Robbins (1969, pp. 3-4) observe that “. . . mere perception does not constitute knowledge and insight; it must be coordinated and interpreted by reference to some underlying entity, a ‘thing in itself’.” The problem with such an entity, for Courant and Robbins, is that it “. . . is not an object of direct physical observation, but belongs to metaphysics. Yet,” they continue,

. . . 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.

It may have been fruitful for science, but not so for music, or the humanities in general. And yet there is no reason why the ethos of science need intrude inappropriately into the realm of the humanities. A number of prominent researchers -- Ken Wilber, Huston Smith, René Guénon, Frithjof Schuon, and Seyyed Hossein Nasr among them -- argue that science has solved many questions over the last three centuries, but in doing so, has raised another set of problems, particularly the loss of wholeness in our understanding of ourselves and nature: in short, a loss of meaning. This loss was not, Smith cautions, the direct result of science itself, which is an honorable pursuit within its own realm. The problems arise as a result of what Smith and Wilber have called *scientism*. The latter goes beyond the actual findings of science to deny that other approaches to knowledge are valid. The contention that no truths exist save those of science is not itself a scientific truth, but seems to rest on a metaphysics beyond science (Smith 1976, p. 16). Whatever its internal inconsistencies, the effect of scientism, Smith writes, has been to create a world-view that excludes subjective, esthetic and spiritual values, the abandonment of notions of ultimate reality, and the resultant jettisoning of meaning. Wilber calls the result “the disaster of modernity”:

We can . . . call this disaster “the collapse of the Kosmos,” because the three great domains – art, science and morals – were rudely collapsed into only one “real” domain, that of empirical and monological science, a world of nothing but meaningless Its [sic] 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. (Wilber 1998, p. 56)

Writing over 50 years ago, Zuckerkandl was aware of the shortcomings such an approach brings to the theory of music:

. . . 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 music. Hence modern thought can boast significant accomplishments only on the outskirts of music, above all in acoustics and musical psychology. So it has come about that the very generations that have known more glorious music, and have 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. (Zuckerkandl 1973, p. 5)

To acoustics and musical psychology a new generation of music theorists have added hermeneutics and semiotics, but these and other disciplines remain trapped on the outskirts of music. To take one example, Helmut Lachenmann, a composer and a leader in the field of hermeneutics, declares that “Music only has meaning when it points beyond its own structure to other structures and relationships – that is, to realities and possibilities around us and within us” (Nonnenmann 2005, p. 1). This direction sounds promising, but it is framed in the context of a musical esthetic that surrenders the unique structure of music to the more general structures of the physical environment, relinquishing any distinction between music and noise. By definition, it abandons any effort to understand the essential nature of music -- of tone -- as a distinct and unique phenomenon.

With a lack of understanding of music comes a lack of appreciation. However much music we consume, and however many arts councils and endowments are established to support it, music remains, in Buckminster Fuller’s description (1970, p. 175), “a pleasant sideshow for the more serious central affairs of economic life.” Intellectually, economically, the marginalization of music in our culture is complete. In the world without meaning that our culture has embraced, this condition should come as no surprise.

3. VICTOR ZUCKERKANDL AND TONAL MOTION

It fell to Victor Zuckerkandl, in the middle part of the last century, to ask the penetrating questions and reveal some essential anomalies at the heart of music. An Austrian expatriate who

taught at Wellesley College and St. John's College in Annapolis, Zuckerkandl followed in the tradition of the German music theorist Heinrich Schenker (Schenker 1979) in his philosophical turn of mind. Schenker (1868–1935) applied his analysis to the structure of masterworks, which he showed to consist of multiple, hierarchically arranged layers of musical detail, somewhat parallel to the surface and deep structures of language. Zuckerkandl, however, turned his attention to the simplest, most fundamental aspects of musical experience, those present in any piece of music, be it masterful or trivial. His goal was not to understand the structural underpinnings of Beethoven or Brahms, but simply to pluck out the very mystery of music: how is it possible at all? Here he is modeling himself on Immanuel Kant, whose master work the *Critique of Pure Reason* was generated by his asking what we can learn about the world, and about human reason, simply from the fact that natural science can exist. Zuckerkandl poses a parallel question:

How music is possible—to understand this will be our chief task throughout this study. When Kant put his fundamental question, “How is natural science possible?” he did not seek to know *if* it is possible (he saw that it existed); he sought to know what the world must be like, what I must be like, if between me and the world such a thing as natural science can occur. What must the world be like, what I must be like, if between me and the world the phenomenon of music can occur? How must I consider the world, how must I consider myself, if I am to understand the reality of music? (Zuckerkandl 1973, pp. 6-7)

Zuckerkandl’s initial investigation, into melody, is perhaps his most compelling. His first task is to determine what makes a melody more than simply a simple succession of tones. The question itself depends upon the definition of the simplest component of melody -- a musical tone -- a definition that became more and more problematical as the twentieth century wore on and the distinction between musical and non-musical sounds became progressively blurred, in the hands of both composers and theorists. As John Cage observed, the point of disagreement that had previously been a focus of attention, between dissonance and consonance, shifted to one between noise and so-called ‘musical’ sounds. From his perspective in the mid-fifties, Zuckerkandl sidesteps this difficulty by adhering to the traditional definition of musical sounds

given by German physicist and acoustician Hermann von Helmholtz (1821 – 1894): “The sensation of a musical tone is due to a rapid periodic motion of the sonorous body” (Helmholtz 1954, p. 8). Thus, a musical tone is a periodic vibration that can be defined by its frequency, as, for example, $A = 440$ cycles per second.

From this standpoint, Zuckerkandl examines the quality of tones revealed when they are arranged in a sequence, such as in a scale or a melody. It is a common experience, he notes, that the unfolding of a melody creates a sense of motion. In reality, he finds, nothing moves. Each tone is a vibration, but a fixed one, essentially static, yet each one takes on a ‘dynamic’ quality when placed in the context of a sequence of tones, or even of one other tone. Some appear at rest; others have a restless quality, pointing beyond themselves, requiring resolution. This is a common experience, a basic character of music, that we take largely for granted. Zuckerkandl examines the phenomenon more closely, declaring (1973, p. 21): “It is the dynamic quality that permits tones to become conveyors of meaning; that makes melodies out of successions of tones and music out of acoustical phenomena. The dynamic quality is the properly musical quality of tones.”

It is not necessary to focus on a melody to observe this property of music. Indeed, the formulation of melody raises secondary effects of syntax that cloud the issue. The dynamics of tones is inherent in a simple musical scale, the minimum system that defines their individual qualities within a tonal system. A central tone, usually sounded as the first tone in the scale, defines the point of repose, known as the key center, or tonic. Each subsequent tone in the scale points to the tonic in its own distinct way, giving each its own unique dynamic quality, a progressive sense of activity, or tension – a sense of striving towards, or achieving, resolution.

A simple experiment will reveal these qualities. Go to a piano and play a scale. C is the simplest of scales in that it is all white notes on the piano -- C, D, E, F, G, A, B, C. The tonic, C, is matched by its octave equivalent, the higher C; both have a sense of repose. The rest of the notes exhibit a hierarchy of dissonance: the fourth and fifth – F and G – are a little more active; the third and sixth – E and A – are more so; the second and seventh most exhibit a sense of

needing resolution, with the second – D – striving back to the tonic, the seventh – B – straining upwards toward the higher C. It is this seventh note, known as the leading tone, that most dramatically exhibits its dynamic quality. Play the C first, then the C an octave higher. Then play the B. The sense of incompleteness, of a striving toward resolution, is striking. Equally striking is the sense of completion achieved by once again sounding the C.

All this can be found described in the opening chapters of basic music theory texts, leading to discussions of scales, keys, chords, harmonic motion, form, genre and musical composition. We actually learn the essentials in kindergarten when we sing: *Do, Re, Mi, Fa, Sol, La, Ti, Do* (in India: *Sa, Re, Ga, Ma, Pa, Dha, Ni, Sa*). Yet none of these intervals, or notes, or scales, or chords are, in fact, the building blocks of music. It is the *dynamic quality* that we hear inherent in the tones that endows them with these levels of meaning. In essence, we sculpt music out of pure affect – out of pure meaning on its most abstract level. From the raw material provided by the dynamic quality of each interval – each tone in relation to the other scale tones – we can create elaborate sequences that convey more subtle shades of meaning on the most abstract levels of feeling. So much so that in India, and elsewhere, there exist theories that demonstrate precise relationships between specific musical intervals and delicate levels of feeling. Furthermore, each Indian melody form, or *raga*, can be categorized according to variations of the nine *rasas*, or essential emotions – literally flavors – described in ancient Sanskrit texts such as the *Natya Shastra* (Bharatamuni 1987). Beyond the *rasas*, the categories extend to specific states of human physiology and, in the external world, to times of day and seasons of the year.

Only peripherally aware of such non-Western theories, Zuckerkandl emphasizes the abstract nature of this musical substrate: “Tones do not relate to things, do not express anything about things, represent nothing, betoken nothing, indicate nothing” (1973, p. 16). For Zuckerkandl, meaning resides on the pure syntactical structure of melody, so that scale degree 2 leads to scale degree 1 in the same way that a transitive verb leads to a direct object, or a magnet attracts iron filings (Ibid., p. 20).

This is an interesting insight, but it does not fully explain the dynamic qualities of tones. The mystery is made more intriguing, however, by the fact that this quality can change – without there being any change in the characteristics of the physical vibration itself. Some theorists (I myself learned it from jazz bassist and theorist Gary Peacock) recognize this phenomenon through the use of three terms: a ‘pitch’ is a measure of the physical vibration: e.g., A = 440 cycles per second (c.p.s.); a ‘note’ is the letter name attributed to the pitch: A, B, C . . . G, which is also defined by its position on a line or space of the musical staff in our system of notation. The designation ‘tone,’ however, recognizes a specific dynamic quality. This quality changes with context, even though the other parameters remain the same. In the key of A, the note A, 440 c.p.s., is the tonic – DO – which conveys a sense of repose and tonal center. In the key of D, the note A (still 440 c.p.s.) is the dominant – SOL – with a sense of the mid-point of the scale, of partial, temporary repose. In the key of Bb, the note A (still 440 c.p.s.) is the seventh, or leading tone – TI – with the most intense feeling of instability, straining upwards to resolve to the tonic. The note remains A, the pitch remains 440 c.p.s., but the dynamic quality shifts within the context of each key, or, in terms of functional harmony, within each chord.

Curiouser and curiouser! How can this shift be explained? Several theories have been offered, most essentially reductionist in nature, and Zuckerkandl takes some pains to discuss the two major ones: the ‘Pulse Theory’ attributes the effect to the perception of “pulses” generated by the harmonic overtone series of each tone; “associationism” suggests that the sense of dynamics of tones is a learned response. Zuckerkandl dismisses both theories. Others have suggested a parallel in the sense of motion created by film. But in this case the illusion is created by the rapid changing of the fixed images. In music the dynamic sense, once created by the context, is *inherent within each tone*. But disposing of alternative theories is one thing; proposing an alternative is another.

Zuckerkandl’s attempt at an explanation begins promisingly, and tellingly, with a discussion of the relationship between the outer tangible world, our sense perceptions, and the inner world of our thoughts and feelings. Every sensation is usually thought to be “made up of

two components, one coming from without, physical; one coming from within, psychic” (Ibid. 1973, p. 58). A red object exists in the external world; we perceive it through our eyes, and it triggers a subjective response. With regard to music, a tone exists as the vibration of a physical medium in the external world; we perceive it through the sense of hearing, and it evokes an emotional response. But where does the dynamic quality reside? For Zuckerkandl (p. 61) it is not in either of these realms: “What makes tone musical tone is so much the work not of the physical and not of the psychic component but of the third, a purely dynamic component, that, compared with the latter, the two others appear to sink to the function of trigger and aftereffect: a physical process sets off the dynamic phenomenon; the latter reverberates in a psychic process.”

It is a slightly puzzling analysis. Subjective and objective realms interact, but tone exists in a third, dynamic realm. There is a sense of motion, of flow; this is common to our experience of music. But what is it that moves? Zuckerkandl demonstrates that this is by no means clear. He is unable to throw much light on the question, however; his ‘third realm’ lacks explanatory value; it is hard to know where to locate it, or how it relates to the other realms of objective and subjective experience. In actuality, he has bumped up against a central problem not only with music, but also with our current understanding of the world.

Zuckerkandl does make one interesting suggestion, however -- that musical phenomena are qualitatively different from other perceptions because the sense of hearing is qualitatively different from the other four senses. When we see, touch, taste or smell objects we perceive qualities within concrete phenomena; we see a red thing, feel a smooth object, etc., rather than experiencing pure redness or smoothness. The case of a musical tone, Zuckerkandl suggests (p. 70), however, “is the only sensation not that of a thing.” Our sense of hearing gives us unique access to an invisible, intangible aspect of experience or existence. “Because music exists,” he concludes (p. 71), “the tangible and visible cannot be the whole of the given world.” What is beyond the tangible? On this question Victor Zuckerkandl is silent.

4. A NEW COPERNICAN REVOLUTION?

Victor Zuckerkandl deserves great credit for his insights; his work takes a giant step in defining a fundamental problem, in spotting a chink in our current understanding. But he is unable to go further. Reminiscent of Ptolemy's 'epicycles within epicycles,' he has brought new data to light, but is unable to account for it within an old paradigm. A world-view that lacks a clear vision of an ultimate reality, and holds no place for meaning, cannot account for as profound a phenomenon as music.

In the early days of science, solving fundamental problems in cosmology required nothing less than a revolution, one brought about by Copernicus and his complete restructuring of the solar system, placing the sun at the center instead of the Earth. The problems we face in the 21st century require nothing less than a revolution of similar scope, but one that *turns on consciousness and meaning*, one that takes place in, or focuses on, the inner rather than the outer world. That such a revolution has been under way for decades in physics is clear from Werner Heisenberg's lectures on quantum theory, for example, where he would 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" (Thompson 1978, p. 110). What kind of music theory could emerge to meet such a challenge?

4.1 *Speculative Music*

Prominent among the few musicologists who have considered such questions is Joscelyn Godwin of Colgate University. In a landmark paper, celebrating its twenty-fifth anniversary this year, he defines a field he calls 'speculative music,' which, in his definition, "has to do with looking at the cosmos musically, and at music cosmically" (Godwin 1982, p. 373). "The highest task of speculative music," he writes, "is . . . the solution through music of the metaphysical enigmas surrounding man." "It seems apt," he continues, "that the present century should have seen the revival of speculative music at the same time that physicists have called into question all the assumptions of their predecessors." Describing some approaches to problems in speculative music, he is very clear that these inquiries cannot be restricted to the traditional domain of music. Often they spill over into other areas; he specifically mentions philosophy and comparative

religion. “All of these paths lead beyond the frontiers of conventional musicology,” he acknowledges, “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” (Ibid.).

The fragmentation of knowledge in our contemporary world to which Godwin refers is a corollary of its loss of meaning. He is not alone in noting this reduction. “Splintering of knowledge is a main characteristic of our time,” writes musicologist Siegmund Levarie (1980, p. 237). Music historian Edward O. Lowinsky has made similar comments:

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. (Lowinsky, 1989 p. 3)

And yet, as Zuckerkandl suggests (1973, pp. 147-8), the fragmentation of knowledge has not always been the case. The teachers of antiquity, who spoke of the music of the spheres and of the cosmos as a musical order, held an integrated view of the world, in which music provided the link between *psyche* and *cosmos*. Alain Daniélou, who spent many years studying ancient musical forms of India, confirms: “Music was . . . 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” (Daniélou 1995, p. 1). According to music historian Manfred F. Bukofzer (1942, p. 165), even in this Western world, a lack of connection between music and broader philosophical concerns is a purely recent phenomenon: “That music is bound up with speculative thinking,” he writes, “is true not only of the Middle Ages but of all periods of history *with the single exception of modern times*” (Italics mine).

The notion that the ‘ancients’ were in possession of knowledge and perceptions lost to the modern world certainly runs counter to predominant modes of contemporary thought, challenging the hegemony of modern science. It is in tune with Godwin, however, whose article is entitled “The *Revival* of Speculative Music” (Italics mine). If we have *forgotten* the meaning of the characters we must, at one time, have known it. There is, in fact, a growing body of scholarship suggesting that, correctly interpreted, ancient literature reveals profound knowledge of both *cosmos* and *psyche*. And of music. But proper interpretation is a tricky thing, particularly as our knowledge of the world, and our relationship to it, is not static, but rather changes through time. Ideas that make perfect sense in the context of one world view cannot be properly comprehended in another. They are either unimaginable or simply trivialized.

4.2 *The Strands of Western Thought*

The fundamental shifts in our view of the world have been well documented. But even the contemporary Western scientific paradigm, which appears on the surface as a coherent world view, is found, upon closer analysis, to have a number of sometimes conflicting components. Many elements of the 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 (1991, pp. 69-71) identifies two general sets of assumptions or principles within Greek thought. One set is essentially both idealist and rationalist in nature and was “especially visible in the Platonic synthesis.” 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, individualism, and secular humanism from the Sophists.”

British historian Hugh Kearney (1971) has a slightly different analysis. He has identified three opposing views, which he calls 'strands' of thought, feeding into Western science and philosophy from the Greeks. Two of these, which he names the 'magical' and the 'mechanistic,' correspond closely with Tarnas' classifications, but Kearney adds a third view, the 'organic,' derived from Aristotle, that takes biological structure as its main model -- a view that dominated during the medieval period. The mechanistic view Kearney sees as derived from Archimedes; it has been the prevailing world view since the scientific revolution of the seventeenth and eighteenth centuries. The 'magical' view derived, Kearney states, from Neo-Platonism, and has been an important thread running through all Western culture even to the present. It came to a great flowering during the Renaissance and was a significant force in the earliest scientific thought, deeply influencing such thinkers as Johannes Kepler.

Over time, however, forced to choose between the two sides of the Cartesian dualism, scientists came to value empiricism, with its emphasis on physical experiment, over rationalism, with its links to Neoplatonism and its trust in intellectual and deductive methodologies. As a result, the mechanistic viewpoint gradually came to predominate the Western mind.

4.3 Forgotten Truth

While it has been pushed to the background in the last two hundred years, the 'magical' or rationalist view will not go away, popping up in the thought of Einstein and other modern physicists, and remaining as a perplexing residue at the root of essential questions such as those dealing with the nature of mathematics, music and consciousness. There is a growing school of thought that suggests recapturing elements of this viewpoint is necessary in order to move beyond the limitations of our own prevailing world-view.

A prime example is a recent book by leading scholar of religion Huston Smith entitled *Forgotten Truth* (1976). His message is that modern culture has lost sight of one single but essential element of reality -- that there are other aspects to existence other than the purely material world

of the senses, and that contact with these levels is essential for an understanding not only of ourselves, but also of the world, not only of “*psyche*” but also of “*cosmos*.” “Modern science,” he explains (1976, pp. 5-6), “requires only one ontological level, the physical.” Music clearly requires more.

4.4 *Speculative Musicologists*

It is not only in the past that we can find non-mechanical strands of thought. They still exist in non-Western cultures, and we must encounter them in any consideration of music, as it is a serious error to confine such a study to purely European traditions. It is notable, therefore, that the writers Godwin cites as making contributions to speculative music, Marius Schneider, Dane Rudhyar, and Hazrat Inayat Khan, all have been involved with non-Western music to some degree. Schneider (1903-1982) is perhaps best known for a massive work in Spanish, *El Origen musical de los animales simbolos en la mitologia y la escultura antiguas* (Schneider 1946), which Godwin 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 (1982, p. 381) cites Schneider as a representative of “those speculative musicians to whom their science is an actuality, not merely an engaging historical study.” Schneider’s book is profoundly idiosyncratic, however, and difficult to integrate with other work in this area.

Dane Rudhyar (1895-1985) was an accomplished composer who moved to the United States from France. He published a number of piano and orchestral works in what is referred to as a “post-Skryabin style” (Sadie 1988, p. 648), and wrote sparingly but passionately on various musical subjects, among them an extraordinarily insightful book on the music of India (Rudhyar 1928). He was also known as an astrologer, and published widely on this subject, as well as on political and social issues. (See www.rudhyar.com.)

It is telling that almost all of these writings on speculative music are out of print. There is one exception, however. Hazrat Inayat Khan (1882-1927) was a musician from India who turned to the teaching of Sufism, and published a magisterial work on the subject (Khan 1960), of which Volume II, on music, has become something of a classic. In it he gives expression to the essence of musical cosmology: “Among all the different arts,” he explains (1960, p. 74), “the art of music has been specially considered divine, because it is the exact miniature of the law working through the whole universe.” This view echoes the famous statement of Beethoven that “Music is a higher revelation than all of wisdom and all of philosophy.” Indeed, musicians and philosophers from remotest antiquity to the present day have affirmed the power of music not only to charm the mind, but also to unfold deep levels of knowledge about the nature of life and of the world. Vedic scholar Maharishi Mahesh Yogi expands on this view while commenting on music as a ubiquitous cultural phenomenon:

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. It is also why music has the power to resonate with every level of the awareness of the listener - mind, intellect, emotions and pure creative intelligence. (Maharishi 1974, p. 247)

5. THE PERENNIAL PHILOSOPHY

The notion of music as a microcosm of the universe A description of music mirroring the universe is exactly in line with the viewpoint described as *Forgotten Truth* by Huston Smith. As Smith notes, this view appeared and reappeared throughout the history of ideas. It has thus been termed the *Perennial Philosophy*, originally by Leibniz and later by Aldous Huxley in a classic book of the same name. According to Huxley, the Perennial Philosophy is the metaphysic that recognizes a divine Reality inherent both in the world of things, and in the domain of mind or soul (Huxley 1970, p. vii). The resulting ethics is based on the knowledge of the immanent and transcendent

Ground of all being. Elements of the Perennial Philosophy may be found in the traditional lore of primitive peoples worldwide, and in every one of the major religions (Ibid.). Above all, the Perennial Philosophy suggests an integration of *psyche* and *cosmos*, as described by Richard Tarnas: “. . . the cosmos as a living whole appears to be informed by some kind of pervasive creative intelligence - an intelligence . . . with which human intelligence is intimately connected and with which it can consciously participate” (Tarnas 2007, p. 489).

According to this view, the cosmos is seen as emerging from an unbounded field of pure Being and unfolding through qualitatively distinct levels, finally manifesting into the outermost, material level in which the physical world has its existence. Furthermore, all of these levels are open to direct experience on the subjective level through the use of meditation techniques. This process is the reverse of the cosmological one in that it is observed as progressively more refined levels of inner perception, from outermost to innermost. (See Shear 1990, pp. 100-102.) In this model, the most superficial level of inner awareness corresponds with the activity of the senses. More refined is the level of mind, then intellect, emotions and finally pure Being, here called pure Creative Intelligence, elsewhere, pure consciousness. These levels do not co-exist on the same ontological level, however; they are contained one within the other, as Ken Wilber explains:

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. (Wilber 1998, pp. 6-7)

Hazrat Inayat Khan gives expression to this structure using Sufi terminology:

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 *Zât*. Every motion which springs forth from this silent life is a vibration and a creator of vibrations. . . . It is the grade of activity of these vibrations which accounts for the various planes of existence The activity of vibrations makes them grosser, and thus the earth is born of the heavens. (Khan 1960, Vol. I, p. 13):

Above all, from this perspective consciousness is not a byproduct of the material world, as in the contemporary view, but is the very source of the physical world, the “silent life” that is a “vibration and a creator of vibrations.”

6. THE GREAT CHAIN OF BEING AND THE MUSIC OF THE SPHERES

Ken Wilber is careful to explain that this view of the world, also known in the West as the Great Chain of Being (see Lovejoy 1942), has been almost universally accepted. “Virtually all of the world's great wisdom traditions subscribe to a belief in the Great Chain of Being,” he writes, describing it as “the core of the pre-modern religious world view” (Wilber 1998, p. 6). From the most ancient times, music has appeared as a central image within such a cosmology. The idea of an essentially musical universe flourished in China as long ago as 400 BC. It was an integral component of the Vedic tradition of India, and has many Jewish and Arab sources as well as its own extensive iconography. Often known as the ‘Music of the Spheres,’ it has touched upon almost every aspect of our own cultural history: it provided the theoretical basis for the sacred geometry underlying the great Gothic cathedrals and the architecture of the Italian Renaissance; it was a major influence on the curriculum of the medieval universities; it was a recurrent theme running through literature from Chaucer to Dryden; and as an essential component of the ‘magical’ tradition it is part of an essential “strand” of Western thought. Taken together with the Great Chain of Being, these two ideas together, according to Jamie James, constitute ‘The Great Theme’ of Western thought. As he explains (1993, p. 4), 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.” It is this “Great Theme” that has been banished to the hinterlands of our culture through the triumph of scientism, the “disaster of modernity,” the “collapse of the Kosmos.”

6.1 The Pythagorean Kosmos

Until its collapse, the *Kosmos* lasted for 26 centuries. It is perhaps no accident that the personage who was largely responsible for introducing it into our culture is also credited with discovering the musical relationships we have been considering. The sixth century B.C.E. philosopher Pythagoras of Samos is a partly historical, partly mythical figure who represents a true watershed in the history of the West. 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, who likens Pythagoras to a great maestro, bringing order to the cacophony of ideas in sixth-century B.C.E. Greece like the conductor of a recalcitrant orchestra (Koestler 1968, p. 25). Koestler goes further; he contends that this Greek philosopher’s influence on human ideas and fortunes was probably greater than that of any single person before or after him.

Koestler is not alone in attributing enormous influence to Pythagoras. Philosophers and scientists such as Whitehead and Heisenberg regarded him as one of the greatest figures in Western thought, one of those responsible for its very foundations. In spite of this historic importance, Pythagoras is rarely mentioned these days in any other context than the theorem that bears his name. Yet his significance was not in doubt to the sculptors of Chartres Cathedral; his image is prominently displayed on the west facade, where he is depicted engaged not in the practice of geometry -- this is reserved for Euclid -- but in the act of tuning a musical instrument. Later, Raphael, in his classic 1510 painting *The School of Athens*, also shows Pythagoras engaged in discussing musical relationships. Classics scholar F. M. Cornford agrees that a musical concept lies at the core of Pythagoras’ thought:

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. . . . 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. (Cornford 1966, pp. 65-66)

The concept of harmony comes from the Greek term *harmonia*, which eventually took on the meaning of a musical scale or mode, but 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. It is etymologically linked with the Sanskrit word *yoga*, through a root that gives us the English word yoke. It is in this sense that it relates to the concept of *kosmos*, another term attributed to Pythagoras. The original meaning of *kosmos* was more than simply the totality of the universe; it implied harmony, in the sense of orderliness, but also of beauty. Its root is the verb, *kosmein*, to set in order, to marshal, to arrange -- not just any sort of 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. Revealingly, the English *cosmetic* comes from the same root, suggesting an aesthetic element -- not just order as such, but with overtones of ornament or adornment. Thus *kosmos* can be rendered as “a crafted, composed, beauty-enhancing order” (Vlastos 1975, p. 3). The modern definition of cosmos has essentially lost this sense of aesthetic value, as has the Latin equivalent, *mundus*, which also suggests a sense of elegance and order; all sense of order, or beauty, or meaning is lost in the English derivative “mundane.” What is missing -- what Pythagoras sought for himself and for his followers at his ashram in Kroton -- is *harmonia*.

6.2 In The Blacksmith's Shop

The discovery to which Cornford refers, and which lead to ideas of *kosmos* and *harmonia*, is described in a famous story which was recounted endlessly, and illustrated copiously, throughout

the ancient and medieval worlds. (It is recounted in its entirety in Westbrook & Strohmeier 2000, pp. 80-84.)

Passing by a blacksmith's shop one day, Pythagoras hears the sound of hammers striking a piece of iron on an anvil and notices that the sounds they made corresponded to musical intervals, the consonances of the octave, fourth and fifth, and a dissonance corresponding to a whole step. Intrigued, Pythagoras goes into the blacksmith's, simultaneously taking a step into the modern world, because he proceeds to carry out a series of observations and experiments to determine the cause of this phenomenon. Eliminating as causes the force of the stroke, the shape of the hammers, and the changes in the beaten iron, he turns his attention to the weight of the hammers, and discovers that the harmony of the tones was produced in precise relationship to their weights.

The story can be parsed in several ways; different ages take what from it they want. Modern scholars (while pointing out the acoustical errors in the story -- pitches are not harmonically proportionate to weight) emphasize the use of experiment and the matching of numbers with physical phenomena -- the beginnings of science. Modern music theorists recognize Pythagoras' significance primarily for the development of the scale -- an early form of the sequence analyzed by Zuckerkandl. But such a limited view fails to take into account the background to Pythagoras' discovery, the significance of these numbers for what Daniélou calls "the almost forgotten science of numerical symbolism," a blending of numerology and cosmology, but also of music. "Through musical experience" he writes, "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" (Daniélou 1995, p. 1). It is for this reason that music was "considered by the ancients as the key to all sciences and arts."

6.3 One, Two, Three . . .

In the blacksmith's shop Pythagoras found that the hammers weighed 6, 8, 9, and 12 units respectively. On closer inspection, these numbers turn out to be the smallest integers that can reflect the ratios between the first four numbers: 1:2 (or 6:12) representing the octave, 2:3 (6:9 or 8:12) giving a perfect fifth, 3:4 (6:8 or 9:12) giving the interval known as a fourth. Pythagoras was well aware of the underlying symbolism:

He noted . . . that the ratios of these three pleasing intervals were all derived from the numbers one, two, three and four -- the four numbers which, taken together, form the *tetraktys*, the model of the cosmos. From these observations, Pythagoras concluded that through the use of numeric relationships, he might be able to describe exactly the harmony of the spheres in terms of the world of physical phenomena. (Westbrook & Strohmeier 2000, p. 84)

Multiple levels of meaning spring from these numbers; it is an entire cosmology in Pythagorean terms. Pythagoras himself left us no writings, but he was a very significant influence on the great philosopher Plato who left us a great deal. The most famous expression of the Pythagorean world view is contained in Plato's *Timaeus*. Here Plato describes the procedure that Pythagoras followed to 'fill in' the remaining intervals, between octave fourth and fifth, and create the seven note-scale, a variation of which we use to this day. In Plato's dialogue, however, it is described as the procedure used by a demigod to create the universe out of the fundamental substances of 'sameness' and 'difference.' The link between these two structures--the scale and the universe--propounded by Plato led to the conclusion famously summed up by Aristotle in his *Metaphysics* (A 986a): "The Pythagoreans supposed the elements of numbers to be the elements of all things, and the whole heaven to be a musical scale and number" (Aristotle 1984, Vol. 2, p. 1559). This statement was enormously influential in spawning the immensely rich tradition of the Music of the Spheres, over two thousand years of brilliant, but often muddled speculation that engaged some of the greatest minds of Greek and subsequent European thought. (See Haar 1960; James 1993; and Westbrook 1997.) It is ". . . as old as the first wakening of mankind to

consciousness,” writes Hans Kayser (1970, pp. 58-59). “First in myth, then in astral symbolism, and as the integrating constituent of nearly the whole of mankind's poetry, this concept became the presupposition for astrology and the first astronomical inquiries of all ancient peoples.” By Shakespeare’s time it was embedded in the culture. As Lorenzo tells Jessica in Act V, Scene 1 of the *Merchant of Venice*:

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.
(Shakespeare 1986, p. 505)

Fortified by another passage of Plato’s, the “Myth of Er” in *The Republic* (10.614-10.621), the tradition passed right through to the time of Robert Fludd and Johannes Kepler, until it suddenly disappeared under the pressure of the emerging empirical sciences. Recent studies of advanced meditation practices, however, have revealed that the forms referred to appear to exist in the internal, subjective realm as structures at a very deep level of conscious experience. (See Shear 1990, pp. 49-52; Westbrook 1997, pp. 30-36.) Kepler understood this correspondence when he stated the purpose of his research: “To find a proper proportion in the sensible things is to discover and to recognize and to bring to light the similarity in this proportion in the sensible things with a certain Archetype of a most true Harmony, which is present in the soul” (Cohen 1984, p. 25). In other words, Kepler sought to find real structural links between the subjective and objective realms of existence. And the model upon which he built his cosmology was derived from geometry and music.

6.4 But Where Is The Fourth?

It is in the numbers, however, that the Pythagorean legacy resides, and these are found in the very first sentence of the *Timaeus* (17a). 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?" (Plato 1965, p. 43).

Modern interpreters dismiss this passage as small talk, but nothing could be further from the truth. It was a tradition 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." Carlo Suares writes that in the first chapter of sacred text, often in the first sequence of letters, lies the seed of the text representative of the work as a whole (1992, p. 72). Suares refers to Genesis, where he finds the full meaning of the book in its first word, but his insight applies to other ancient texts. This tendency was certainly true of the Pythagorean school, where knowledge was transmitted symbolically, through the use of cryptic statements and riddles, in which a small number of words was pregnant with multiple levels of interpretation. In addition, recent analysis of the first word of the ancient Indian text the *Rg Veda* reveals a similar structure, where the first word contains the seed of the entire text. Plato's cosmological dialogue is no exception. Here the sequence 1, 2, 3, gives a complete symbolic representation of Pythagorean cosmology, the unfolding of multiplicity from an original unity. This symbolism is discussed in detail in a first century C.E. text attributed to Iamblichus, *The Theology of Arithmetic* (Iamblichus 1988).

In Iamblichus' description, the beginning point is the 'Monad,' considered as the $\boxtimes \Delta \Pi \downarrow$ (*arche*), the origin of all things, the ultimate reality of the universe. It is one, therefore it is unbounded and undifferentiated. Between one and two lies what philosophers from the time of Aristotle to the present have described as the hardest problem in philosophy: how the one becomes the many, or unity becomes diversity. Aristotle declared the problem intractable (see Halper 2005), while contemporary philosophers largely ignore metaphysics altogether.

The dyad remains without form, however; it is "the source and foundation of the diversity of numbers" (Iamblichus, p. 41). The dyad is "... contrasted to the nature of God in the sense that it is considered to be the cause of things changing and altering, while God is the cause of sameness and unchanging stability." Duality, therefore, establishes the necessary conditions for

the emergence of the relative, material world. Multiplicity actually begins with the triad: “The first conjunction of monad and dyad results in the first finite plurality, the element of things, which would be a triangle of quantities and numbers.”

From this point, the universe unfolds step by step, until it reaches completion, symbolically, in the number 10, the decad, also known as the *tetraktys*. The reason can be discerned from its form, as seen in the array of pebbles (Latin - *calculus*) the Pythagoreans used to represent numbers:

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  *   *   *
*    *    *    *

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So displayed, the number ten contains all four dimensions: line one (the number one) a point, line two (the number two) a line, line three (the number three), or all four lines, a triangle -- the simplest plane figure. These qualities are also inherent in the number four -- the *tetrad* -- as $1+2+3+4=10$. Thus 1,2,3,4, gives us unity, duality, multiplicity and completion.

“One, two, three, but where is the fourth?” Socrates says, hinting at the importance the number four holds for Pythagorean number symbolism. So it turns out that Pythagorean mathematics, as later formulated by the Roman statesman and philosopher Boethius (c.480-c.525 C.E.), contains four branches -- arithmetic, geometry, music and astronomy -- and the cosmological symbolism of 1, 2, 3, 4 can be derived from each of them. (See Westbrook 2001, pp. 149-202.) But music is central to this scheme, as the Chartres artists recognized. The unchanging, eternal essences of number, for Pythagoras, were an ultimate reality. When he came across the same numbers, and their relationships, as essential to music, however, Pythagoras discovered that these essences corresponded to phenomena in the external world. He discovered the essence of science, but in the same stroke he discovered meaning, the relationship between the subjective and objective realms.

When it comes to music, the same cosmological meaning is attached to the integers, but when we can appreciate these relationships on the level of hearing they take on another dimension entirely. The primary example is the 2:1 relationship. Seen in arithmetical terms, there is a great deal of information contained in this ratio, reflecting 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. 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” (Zuckermandl 1973, p. 102). Philosophers have puzzled over Plato’s definition of the fundamental essences from which the world is created as ‘sameness’ and ‘difference.’ The phenomenon of the octave demonstrates something that cannot be understood by the intellect, but can be appreciated by the ear.

It is not necessary to go to a blacksmith’s shop to hear these musical relationships, however. For generations of Pythagorean theorists throughout the Middle Ages and at least until the seventeenth century, they 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 diatonic scale, but the term can be misleading as it is found in other settings. More revealing is the Greek nomenclature -- the *diapason*. The meaning of this term, $\delta\iota\alpha\pi\alpha\sigma\omega\nu$, comes from $\delta\iota\alpha$, “through” plus $\pi\alpha\sigma\omega$ (the genitive plural of $\pi\alpha\varsigma$, meaning “all.” Thus, $\delta\iota\alpha\pi\alpha\sigma\omega\nu$ means ‘the total extent of a continuum’ (Heninger 1974, p. 137, n. 49).

6.5 The Vibrating String

The fact that the octave, or *diapason*, relationship is revealed by dividing the string, is itself of cosmological significance:

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. (Levarie 1980, p. 240)

The 1:2 relationship revealed in the octave, therefore, reflects the notion of the monad/dyad relationship. Continuing the division of the string into three parts, the 2:3 ratio gives the value of the dominant, the perfect fifth, the note G against the tonic of C. As with 3 in the number sequence, this is the first tone in the series that is different from the fundamental, the first element of difference after the first two partials in the series, the first sense of departure. It is difficult to describe but very striking as a direct aural experience.

“But where is the fourth?” The fourth tone in the sequence, created by dividing the string in four, brings another octave, the fundamental repeated -- the sense of return, of completion. As the harmonic series unfolds it reveals a rich matrix of possibilities that mathematicians from Pythagoras to Hans Kayser have explored for its applications to cosmology, art, architecture, and a host of other fields. (See Kayser 1950 & 2006.) Above all, it symbolically portrays the Great Chain of Being as the full range of tones emerge from the fundamental, as “the earth is born of the heavens,” as the “silent life is a vibration and a creator of vibrations.”

As all of these relationships are revealed from the divisions of a string, it is no accident that stringed instruments were associated in many ancient cultures with knowledge and spirituality, as opposed to the sensuality of the flute or other wind instruments. “Most world views, consciously held or otherwise, have certain root-metaphors which act as keys to the total

perspective” (Overzee 1992, p. 18). Thus we have the relationship between the vibrating string, the Great Chain of Being and the Harmony of the Spheres.

7. SARASWATI AND THE FLOW OF CONSCIOUSNESS

One consequence of the trans-cultural, musical-cosmological root-metaphor is the depiction of stringed instruments, often the harp or lyre, in the hands of great figures of learning or inspiration, among them Apollo, Orpheus, Pythagoras, King David, the Celtic bards, and others. The earliest example is found in India, however. It is recognized that the Perennial Philosophy was “first formulated in the Vedic era of India” (Harman 1974, p. 39), and in the words of Sri Aurobindo (Ghose 1971, p. 260): “The symbolism of the Veda betrays itself with the greatest clearness in the figure of the goddess *Saraswati* .”

In traditional representations 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, as interpreted from the meaning of its Sanskrit roots. *Saraswati* is derived from the root *Sr* = to move, or flow. It can also refer to a body of water. Thus *Saraswati* is associated with an ancient river in north India. At the same time, she is associated with the flow of thought, from its most internal aspects to its expression in speech, what Vyas (1987, p. 64) calls the “dynamic aspect of consciousness implicated in speech.”

We find a similar view from Daniélou (1964, p. 89): “*Saras*, which means fluid, refers to anything that flows and as such applies to speech and thought as well as water.” 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, however, in which he

introduces an additional element. To the first root *sr* indicating motion or flow, Maharishi adds *sva* which refers to the Self. From this perspective, therefore, *Saraswati* represents the dynamic flow of consciousness, and it is this Self-referral value that places this goddess at the heart of Vedic knowledge, and of ancient Sanskrit music theories.

In ancient Vedic cosmogony, later articulated in Vedanta philosophy, the process whereby, in Pythagorean terms, the One becomes the Many is described in terms of the Self, in its fullest sense as the Self of the universe, or Brahman. In mythological terms the creator, Brahma, is completely alone, without a second. At the moment of creation, the first boundary occurs within the unbounded value of Brahma by virtue of his becoming 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, or perceiver, the process of perception, and the object, known in Sanskrit as *rishi*, *devata* and *chhandas*, or in other schools as *adhyatmika*, *adhidaivika* and *adhibhautika*. Thus the purely abstract ground of Being becomes a lively field of consciousness. From perception comes creation, as first the impulses of the *Vedas*, and then the manifest world itself, are created from the interactions occurring within the field of consciousness, the dynamic aspect represented by *Saraswati*. In Pythagorean terms, one becomes three in the process of creation, the trinity incorporating the value of duality. In ancient China, Lao-Tse had the same insight (1961, p. 61):

Tao gave birth to One
One gave birth to Two
Two gave birth to Three
Three gave birth to all myriad things.

We find the same cosmology in ancient Egypt, articulated by John Anthony West:

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; 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.) (West 1993, p. 33)

In the Christian terminology to which West refers, the same structure is referred to as the Father, the absolute; the Son, his perfect reflection; and the Holy Spirit, the flow of consciousness between them. Unity, duality, multiplicity. But where is the fourth? Christianity is silent on this point, but *The Theology of Arithmetic* clearly identifies several levels of wholeness in the numbers 4 and 10, and for Vedanta the value of Brahman, the fullness of creation, is known as the *Samhita*, the wholeness value that incorporates *Rishi*, *Devata* and *Chhandas*. Thus the universe is a threefold structure: the undifferentiated wholeness of pure Being, the differentiated values of relative creation, and the re-integrated value of Brahman.

8. SANGITA RATNAKARA AND THE THEORY OF SOUND

Having seen the Great Chain of Being within the Vedic tradition, we can also find the source of the Music of the Spheres within ancient Indian sources, in the Sanskrit theory of sound, or *N~da*, which comes to us from a treatise on music, the *Sangita Ratnakara* of Sarngadeva, said to have been written between 1210 and 1247. At chapter two, verse 2, Sarngadeva introduces the concept of *Nada*, or sound, in its two levels of manifestation. His sutra is typically terse: “*Nada* is said to be twofold, viz., produced and unproduced.” The Sanskrit terms for produced and unproduced are *ahata* and *anahata*. The editor’s commentary reads:

Ahata of the text literally means “struck” and *anahata* literally means “unstruck.” The idea is that *nada* has 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. (Sarngadeva 1991, p. 23)

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.” (Daniélou 1968, p. 21)

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 *an~hata n~da*, or “unstruck” sound, whereas the vibration of air is known as *~hata n~da*, or “struck” sound, and corresponds with our scientific understanding of sound vibration. The relationship between these two levels of sound is an integral aspect of Indian music theory; sounds defined as “musical” are those mutual relationships corresponding to the basic laws of the universe represented by the unstruck sounds. *Samkhya* philosophy expands on this relation by analyzing the objective and subjective realms into parallel hierarchies; the objective a hierarchy of elements, the subjective the hierarchy of the senses, in line with Huston Smith’s *Forgotten Truth*, moving between gross and subtle ontological levels. The subtlest level of the physical world is *akasha*; the subtlest level of the senses is hearing.

Such concepts not only hold the promise of providing deep insights into the nature of music, they have already formed the basis for one of the world’s greatest and most sublime music traditions, one that sees music as more than mere entertainment but also, as in the view of Pythagoras and Plato, as a means to physical integration, good health, and profound spiritual development.

9. ULTIMATE REALITY, MEANING, AND MUSIC

Such a music theory is fully integrated with an underlying metaphysic that presents a picture of the world with a clearly defined, hierarchical structure, one that epitomizes such values as those described in the Perennial Philosophy and *Forgotten Truth*. It is based on an ultimate reality and shot through with meaning. Above all, it is a description that is directly opposed to the current mechanistic paradigm in one essential element, its view of consciousness. In the modern view, consciousness is, in some mysterious way, derived from matter, from the activity of the brain. In the Vedic view, the Pythagorean/neo-Platonic view, and the magical/idealist world-view that stems from it, consciousness *is the primary component of nature*. The relative world comes into being when Being becomes conscious of Itself. On this level of creation, consciousness interacts with its own nature, and these flows and stops of consciousness give rise to material forms. This level of creation, from the standpoint of music theory, is *anahata nada*, unstruck sound. Music is therefore, in this view, coeval with the cosmos itself, thus the laws of sound -- of speech and music -- are identical with the laws of nature, however they are described -- through modern physics utilizing mathematical formulae, or through Vedic literature and the verses of the *Rg Veda*. Thus Maharishi Mahesh Yogi can describe music as “parallel to the structure of life and to that of the cosmos as a whole” (Maharishi 1974), and Hazrat Inayat Khan (1960, p. 74) can state that “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.” It is within such a description of the world that a comprehensive theory of music can be articulated and the statement of the philosopher Arthur Schopenhauer from *The World as Will and Idea* quoted by Zuckerkandl (1973, pp. 147-8) makes perfect sense: “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.”

Zuckerlandl's statement brings us back to his original analysis which reveals the motion inherent in music without being able to account for it. We have seen, however, that an understanding of the world exists that sees both mind and matter -- both *psyche* and *kosmos* -- as manifestations of consciousness, not as separate realms as Zuckerlandl is forced to portray them. In such a view the world is an hierarchical ontological continuum in which cause and effect flow back and forth between mind and matter, and the motion of musical tones can be seen as the flow of consciousness itself. A music theory built on this premise would need to be worked out in much greater detail, but it would have the potential of satisfying the vision held by twentieth-century composer Paul Hindemith, whose conversations with physicists, biologists and other scientists led him to believe in a universe whose laws of construction and operation are "complemented by a spiritual reflection in musical organisms" (Hindemith 1969, p. 117). For Hindemith, musical rules would then be, as in olden times, an essential part of the code of the physical sciences and of our view of the universe.

10. THE PERENNIAL PHILOSOPHY AND THE WORLD MACROPROBLEM

Hindemith's vision notwithstanding, it seems a far-fetched proposal. Are we likely to adopt a Vedic, Pythagorean, magical/idealist viewpoint any time soon? In response, we can point to a landmark 1970 study conducted by a group of futurists at the Stanford Research Institute, headed by Willis Harman and Joseph Campbell, who were commissioned by the U.S. Department of Education to provide some insight into future trends as a guideline for educational policy. (See Harman 1970.)

After projecting a total of forty "future histories" and studying the results, the S.R.I. group concludes that the current world-view and the technologies it supports, even though it has created enormous benefits on many levels, has become obsolete, even pathogenic, and is now responsible for generating what they call the 'World Macroproblem,' the combination of environmental, social and economic problems that threaten the future of mankind. Their

solution: a system of education that will lead to the revival of a more integrated world-view. In a later study (Markley 1974), they declared that the best description of such a world-view would be the Perennial Philosophy. “This view of man,” they write (1974, p. 42), “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.”

An educational system that could accomplish this transition will need a critical component, one that was described by Plato. When he has Socrates ask, “where is the fourth?”, Plato is invoking a section of *The Republic* (509D–513E) where he describes a hierarchy of levels of knowledge through his analogy of the ‘Divided Line.’ There are four levels represented on this line. The first two involve picturing and sensing the external world. The next two are internal: one is the familiar level of thoughts and reasoning, but the fourth and highest is a higher level where one gains knowledge of ultimate structures of consciousness (Plato’s famous “Forms”) that underlie both human awareness and, according to Plato, the material universe as well. These structures can only be apprehended through the application of a higher mental faculty he called the “dialectic,” a faculty closely related to techniques of meditation held to be essential for gaining higher knowledge in the Vedanta tradition, techniques that according to SRI also hold promise for contemporary education. (See Shear 1990, pp. 11-29, 33-35, 66-69.)

11. KNOWLEDGE FOR A POSITIVE FUTURE?

Once when I was with futurist Buckminster Fuller, someone asked him why books on the future were, at that time, so negative. Without hesitating he responded, “To be negative about the future you don’t have to know anything; to be positive you have to know a great deal.” It remains to be seen whether musicians and musicologists can contribute to the knowledge that can create a positive future for mankind, or will simply benefit from it by creating a coherent music theory from an integrated world-view. I, for one, look forward to the day when I can go into a classroom and announce: “Welcome to music 140! This semester we will be studying four-part harmony

and voice leading, but first we need to consider how the universe is put together.” I know that Fuller shared this vision:

In your music education world and in your professional meetings, I think it important that you realize that within the next ten years the world of science and the world of seemingly very pragmatic affairs may be turning to the world of music for leadership in fostering the spontaneous development of the most powerfully coordinate capabilities of evolving [sic] life. Rather than being a pleasant sideshow for the more serious central affairs of economic life, you who deal with the music of the universe and the innate coordinate capability of man. . . may find yourselves being called by society to perform its most responsible task - allowing life to succeed. (Fuller 1970, p. 175)

It is becoming increasingly evident that allowing life to succeed will require us to move beyond our purely materialist orientation. This shift will require a focus on ultimate reality and meaning, a re-forging of the link between *psyche* and *cosmos*, as well as between the most ancient and most modern forms of knowledge. This effort seems likely to bring music from the periphery to the center of human thought.

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