

THE HARMONY OF THE SPHERES

JOSCELYN GODWIN

Greek mythology celebrates three heroes for their mastery of the powers of music. First is Orpheus, whose presence in opera began with Peri's *Euridice* of 1600. Not only could his music charm men, beasts, trees and stones, but it moved Pluto and Persephone to release his wife from Hades, and his head kept singing even after he was dead.

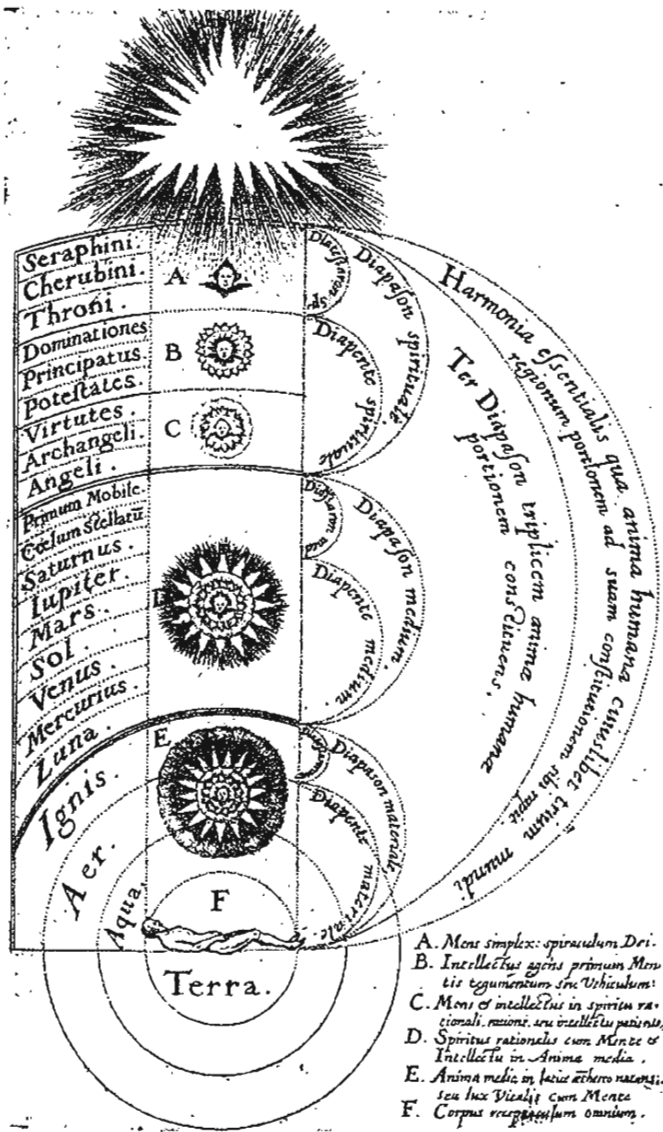
The second myth, that of Arion the virtuoso, was first staged in proto-operatic form in the Florentine *intermedi* of 1589. While Arion was on a voyage the sailors, coveting his rich belongings, decided to throw him overboard and steal them. They allowed him one last song, and in response up came a sea-monster or dolphin that bore him safely to land.

The third hero is Amphion (Anfione in Steffani's *Niobe*), who built the walls of Thebes with the power of music alone. The stones obediently levitated and slid into place as he played the lyre, or, as represented in Steffani's era, the violin.

All three myths rest on a set of assumptions about the nature of music, to which Steffani gave assent in his treatise *Quanta certezza habbia da suoi Principii la Musica* (What certainty music has of its principles, 1694). Orpheus' disciple Pythagoras (6th century BC) was the first to proclaim them in the West; Plato (5th century BC) the first to put them into writing, in the *Republic* and *Timaeus*. Ever since, they have gone under the name of the 'Harmony of the Spheres'. Pythagoras' insight that harmony is a function of number is one of the most remarkable in ancient science. He showed that the intervals we find most concordant arise from the simplest proportions. The ratio 1:2 gives an octave, 2:3 a 5th, 3:4 a 4th, 4:5 a major and 5:6 a minor 3rd, whether calculated through string length or vibration frequency.

According to *Timaeus* the Pythagorean, the Creator used these intervals, plus the whole tone (8:9), to construct the World Soul that animates everything in the universe. So the whole cosmos is based on a kind of scale.

Number also rules the arrangement and motions of the heavenly bodies, notably the seven visible planets: Moon, Mercury, Venus, Sun, Mars, Jupiter and Saturn. If we imagine the earth at the centre of the universe, these planets seem to revolve around it on transparent crystal spheres, while an eighth sphere, bearing the Fixed Stars, encloses them all. The Fixed Stars include the 12 constellations of the Zodiac, a circular zone which each planet traverses in a given period. Their motions are complex but regular and calculable, for as Solomon says, all is created according to 'number, measure and weight' (*Wisdom of Solomon*, 11.xx). Since all motion causes sound, so does that of the planetary spheres, and the blending of their tones produces a harmony that exceptional people like Pythagoras could hear.



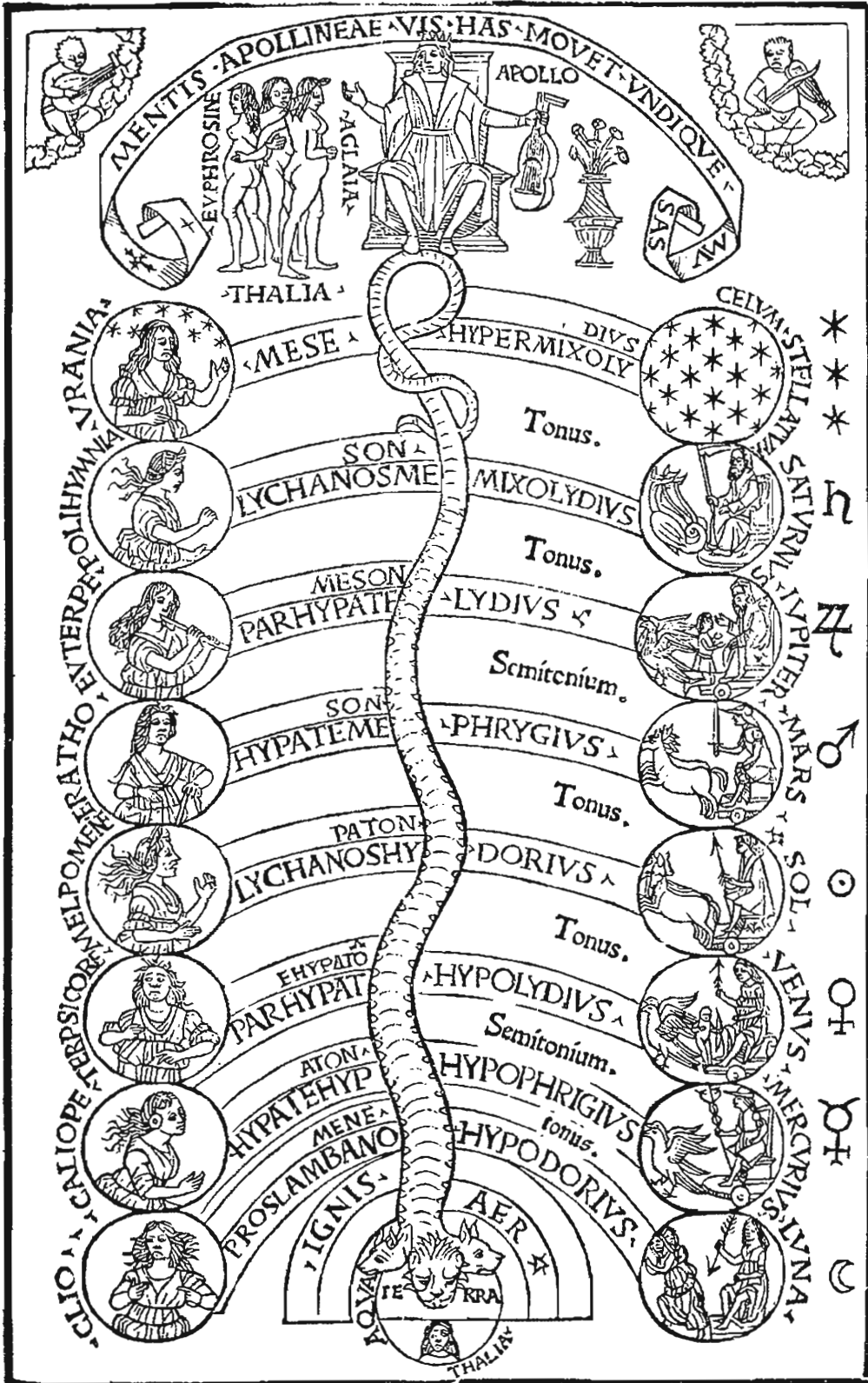
Above, 'The Elemental, Celestial, and Angelic Octaves', from *Utriusque cosmi historia* vol.2 (1619) by Robert Fludd; opposite, 'System of Tones, Modes, Planets and Muses', frontispiece from *Practica musicae* (1496) by Franchinus Gaffurius [Franchino Gafori]

Down here on earth, everything is made from the four elements of Earth, Water, Air and Fire, mixed in various proportions. This includes our bodies. In ancient medicine, they contain four substances that correspond to the elements: the Melancholic, Phlegmatic, Sanguine and Choleric humours. Their harmonious balance gives health; disproportion among them, sickness.

Given all these assumptions, several things fall into place in a wonderfully unified world-view: (1) number, (2) harmony, (3) the World Soul, (4) the seven planets, (5) the four elements, (6) the human body with its four humours and (7) the human soul.

The cosmos thus imagined obeys the principle of correspondence. 'What is above is like what is below', says *The Emerald Tablet of Hermes*. The macrocosm (the universe) resembles the microcosm (the human being), and vice versa. The whole of astrology rests on the principle that motions of the planets 'above' cause corresponding changes 'below', which we feel as physical and psychological states. Music has a similar effect because at its own level it replicates the planetary concords and discords. Someone who has mastered the system, like Orpheus and Pythagoras, can apply it to therapeutic effect.

To a certain turn of mind, since there are seven planets and seven notes in the diatonic scale, they have to correspond. Various classical writers expressed the different speeds of the planets as forming a musical scale, with the fastest planet as the highest note. This was obviously just an allegory, because there is much more than an octave's difference between the apparent speed of the Moon (circling the





'Pan as Universal Deity, harmonizing the planets with his panpipe'. From Athanasius Kircher. *Oedipus Aegyptiacus* vol.1 (1652)

Zodiac in a month) and that of Saturn (which takes 28 years).

Nonetheless, the idea was irresistible. Around 1500AD, Franchinus Gaffurius matched the pale mode on A (our natural minor) with the Moon, the boisterous C mode (our major) with Mars and the noble Dorian mode on D with the Sun. This was one of a long series of attempts to explain the psychological effects of different keys. Others extended the system of correspondences to include the Sirens, whom Plato describes as standing on the eight spheres, each singing her own note. Gaffurius assigned tones to the Nine Muses, mythical inspirers of the arts and sciences (see previous page), while his contemporary Francesco Giorgi included the Nine Orders of Angels who throng the heavens beyond the stars. Giorgi was an architect, too, who like many others used musical proportions to control ground-plans and elevations. A building thus designed mediates between the cosmos that it mirrors and the humans whom it houses.

With architecture, we touch on a fascinating tradition linking tones and stones, to which Amphion's story belongs. The idea that music can affect inert matter

is harder to credit than its known effect on ourselves, but no less logical in the light of these assumptions. A stone is part of the elemental world and therefore has 'number, measure and weight.' The corresponding harmony should cause it to resonate and set it in motion. Renaissance theorists cited the shouting and trumpeting that brought down the walls of Jericho (*Joshua* 6.xx). In their own time, they knew that a singer can shatter a glass. In ours, low-frequency sound has military potential. Of course, these are destructive applications, unlike Amphion's. Only occultists believe that the Pyramids or Stonehenge were built using some lost technology of sound. But there is hope! Recent laboratory experiments have actually raised stones through sound alone, some as large as a pea.

Early in Steffani's century, the Harmony of the Spheres made its first incursion into experimental science since Pythagoras. The astronomer Johannes Kepler, though a keen convert to Copernicus's heliocentric system, was certain that God had arranged the planetary movements in some harmonious way. After many years poring over

astronomical tables, he concluded that the planetary orbits were not perfect circles, as everyone had thought, but ellipses with the Sun at one focus, and that this explained their variations in speed. Taking speed as equivalent to musical tone, Kepler notated the different songs of the planets and the chords that they make, mathematically intelligible to humans though audible only to God.

Whereas to the Greeks, the universal machine was in perpetual motion with no beginning or end, Kepler believed that God had set it going with a tremendous consonance on the fourth day of creation, and wondered whether it would all end when that primeval chord was sounded again.

With the scientific revolution of the later 17th century, the universe had been turned inside out, yet the notion of cosmic harmony persisted. Isaac Newton was led through Kepler's laws of planetary motion to his theory of universal gravitation. He believed that he had rediscovered the secret knowledge of the ancients, concealed in the myth of the Pipes of Pan. Newton's early experiments with prisms convinced him that the colour spectrum corresponds with the seven notes of the scale. That was why he added a seventh colour (indigo) to the three primary and three secondary ones.

The philosopher Gottfried Wilhelm Leibniz, a colleague of Steffani at the Hanover court, wrote in 1689–90 that 'the Copernican hypothesis wonderfully illuminates the soul, and beautifully displays the harmony of things at the same time as it shows the wisdom of the creator' ('On Copernicanism and the Relativity of Motion', trans. R. Ariew and D. Garber, 1989). The idea of a 'pre-established harmony' was central to his philosophy. Another was that the entire created universe is mirrored in each individual, which revived the macrocosm-microcosm doctrine. Lastly, when Leibniz stated that the pleasure of music comes from a 'hidden arithmetical exercise of the soul, unaware that it is counting', he was updating the old doctrine of correspondence between number, harmony and the human soul. This would remain a minority opinion during the Age of Enlightenment, when the majority held that music, like all the arts, was based on imitation, specifically on imitating human emotions.

Is music merely a cultural construct, or is it inherent in the nature of things? Thanks to those scientists today who speak of 'string theory' and of vibration as the ultimate physical reality, the debate is not yet closed.

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