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The Paradox of the Divine Architecture in Dante's La Divina Commedia

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Abstract: La Divina Commedia was written nearly 700 years ago and for much of that time it has been closely examined and scrutinised across many different levels: the sources; the meaning; the linguistic structure of the poem; the hidden subtexts; the influences; the analogies and the numerology of the poem have all been analysed in detail. However, a totally neglected area of the great work is the architecture of the universe that Dante created, particularly the architecture of Paradise and the Celestial Rose. Dante attempted to create a universe that was truly Euclidian and one that was fitting for the Divine Architect with His compass and straightedge, a popular image of his time. However, Dante inadvertently created a four dimensional universe that was beyond the geometric understanding of his time. The universe that Dante created in La Divina Commedia cannot be drawn with a compass and straightedge. This paper examines Dante's architectural metaphors, the structure of his universe, and the paradox that it creates.

Keywords: Spatial Symbolism, Architecture, Dante

Introduction

DANTE WAS A scientist, philosopher, theologian, mystic and poet whose works include; *De Monarchia*, *La Vita Nuova*, *De Vulgari Eloquentia*, *Convivio*, *Canzoniere*, a collection of short poems and sonnets, and his most enduring work, the *La Divina Commedia*. The depth of these works demonstrates the breath of his knowledge of the time; he indeed belonged to the "small company of those who 'well understand.'"[1]

Dante scholars have long recognized that number symbolism is an important element in the composition of the *Divina Commedia*. Three and multiples of three, representing the Trinity, permeated the poem. *La Divina Commedia,* consists of three books; *Inferno*, *Purgatorio* and *Paradiso*. Each book has thirty-three cantos with one extra canto in the *Inferno* as a prologue and the cantos consist of three-lined stanzas.[2] However, the numbers go beyond the structure of the poem, references to numerical symbolism are used expressively throughout the poem. None of these references are arbitrary; each reference was intended to add enlightenment to his Scriptural exegesis.[3] It is in Dante's plan of the universe where he turned number symbolism into a perfect and divine geometry.

[1] V. F. Hopper, *Medieval Number Symbolism,* (New York: Cooper Square Publishers Inc, 1969) 137.
[2] B. Vanderwielen, The Significance of Numbers in the Structuring of Dante's *Commedia*, in Surles, R. L. (ed), *Medieval Numerology* (New York & London: Garland Publishing Inc, 1993) 77-91 at p.77.
[3] Hopper, Medieval Number Symbolism; R. A. Peck, 'Number as Cosmic Language', in D. L. Jeffrey (ed), By Things Seen: Reference and Recognition in Medieval Thought (Ottawa: The University of Ottawa Press, 1979) 47-80.

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Dante's universe is well structured and the geometry fits together like a magnificent divine puzzle. The idea of a Divine Architect working with a compass and straightedge to create the perfect design, was originally promulgated by Plato in the *Timaeus*,[4] and was subsequently adopted by Christianity. The tradition of this was also exemplified by the Book of Wisdom. "You have ordered all things in measure, number and weight."[5]

Saint Augustine considered the circle to expound perfection over all other geometrical figures. The circle was perfect and contained many divine qualities and virtues.[6] Because of these virtues Roger Bacon concluded that the universe was spherical and there can only be one universe with one centre.[7] This was the commonly held view which was strongly defended by the Roman Church well into the scientific revolution of the seventeenth century. For the Church mere observations of scientists, such as Copernicus, Kepler and Galileo could not be allowed to upset the perfect plan of God.[8]

In the time of Dante this divine plan had the earth in the centre, surrounded by the perfect spheres of the seven material planets, the sphere of the fixed stars, and the Primum Mobile. The first eight spheres were clearly visible and the ninth sphere, the Primum Mobile, was first introduced by Ptolemy in the second century[9] to explain the movement of the spheres through the fixed stars. The Primum Mobile was later adapted by Christianity as being the most spiritual of the material spheres – the closest of the material spheres to God. Past the Primum Mobile was the immaterial Empyrean, the abode of God. This plan of ten spheres (Figure One) was perfect, concentric, geometric and simple. However, although the structure of the first nine spheres was generally accepted, the structure of the immaterial Empyrean was an extremely complex matter.

[4] Plato, *Plato's Republic,* (Indianapolis: Hackett Publishing Company, 1994).
[5] Wisdom 11:21
[6] Augustine *De Quantitate Animae,* (Gunther Zainer, Augsburg, c1470) 11, 17 & 12, 19.
[7] R Bacon, *Opus Majus,* (London: Herbert Jenkins, 1925) 176 & 185-86).
[8] A. Koestler, *The sleepwalkers,* (London: Hutchinson, 1959).
[9] Ptolemy, *The Almagest,* (Chicago: Encylopaedia Britannica, 1955).

Figure One: The Generally Perceived Plan of the Material Spheres Surrounded by the Immaterial Sphere the Empyrean

Scholars of the thirteenth century were attempting to construct a cosmos based on their new found knowledge of Aristotelian physics and logic.[10] Peter Lombard gave scholastic structure to the traditional Christian view of Heaven, the immaterial Empyrean was the sphere that was beyond all the celestial spheres, it was infinite, it had no boundaries and it simply opened out to infinity.[11] Within this infinite tenth sphere was not only God's abode but also the nine levels of angels, as described by pseudo-Dionysus and Saint Gregory. The Empyrean was a 'place' that was "both everywhere and nowhere, both timeless and eternal."[12] In adding Aristotelian logic, to exemplify the structure of theology, scholars such as Lombard and Aquinas wanted to exclude all inconsistencies. However, the Empyrean remained beyond human perception; this Empyrean could not be drawn with a compass and the straightedge. This universe consisted of nine finite, material and visible spheres and was surrounded by a tenth immaterial and invisible sphere that consisted of nine concentric divisions or spheres.

In *La Divina Commedia,* Dante posited a God that was the designer of a perfect geometric universe. Dante used two architectural metaphors to emphasise the construction of this universe and its geometrical structure. The first metaphor was the Divine Architect who created this perfect symmetrical universe where all things in this universe depended upon Him – this metaphor was deeply rooted in the philosophy of Plato. For Dante the design of the universe He created seemed to be constructible with a compass and straightedge; however, he introduced a fourth dimension which was beyond the geometric understanding of the

[10] R. E. Rubenstein, *Aristotle's Children,* (Orlando: Harvest Book, 2003).
[11] J. B. Russell, *A History of Heaven: The Singing Silence,* Princeton: Princeton University Press, 1999.
[12] Russell, *A History of Heaven: The Singing Silence,* 123.

time. To demonstrate this, this paper first examines the structure of the universe that Dante created and then briefly gives an overview of the fourth dimension that was included as part of this creation. The second metaphor Dante used was the master-builder metaphor that came from the *New Testament*. This paper examines how Dante used this metaphor to construct a cathedral of faithful souls, the universal Church, which had echoes of a Gothic Cathedral. This cathedral is the pinnacle of *La Divina Commedia* and from this cathedral Dante used a geometric problem as a key to understanding the universe. Finally the paper turns to the paradox that is created by the structure of the universe of the *La Divina Commedia* and its precedence.

The Universe of *La Divina Commedia*

The depiction, or indeed understanding, of the beatific vision was a concept that many artists, poets, philosophers and theologians have struggled with. In *La Divina Commedia,* Dante attempted to make sense of the Empyrean by constructing an Empyrean that was not an incomprehensive endless tenth sphere. Instead he attempted to create a perfect structure that was concentric and a fitting plan for the Divine Architect. Dante moved away form the structure of the Empyrean commonly accepted in his time. He moved away from the structure promulgated by Lombard and Aquinas, both of whom Dante had placed in the sphere of Sun of *Paradiso* as two of the twelve souls that were the most learned and wisest of man.[13] The question is – why move away of a widely established and accepted view of the universe?

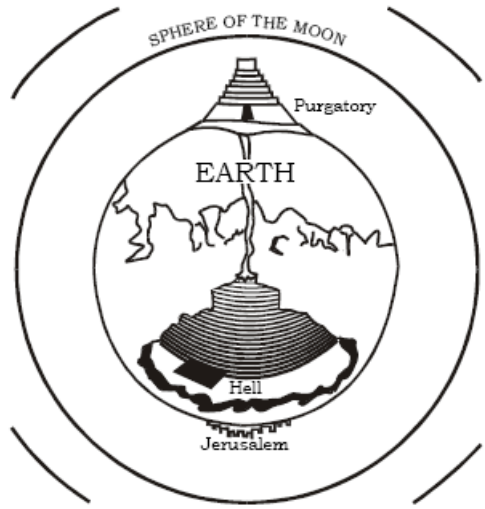

Figure 1: Earth, Hell and Purgatory

The universe of *La Divina Commedia* consisted of the divisions Hell, Purgatory, Paradise and the Empyrean. Dante journeyed through all of these divisions with the assistances of guides: Virgil guided him through Hell and to the top of Purgatory; Beatrice from the top of Purgatory to the centre of the Empyrean and Saint Bernard into the centre of the Empyrean.

[13] Dante, *La Divina Commedia - Paradiso,* (Firenze: La Nuova Italia, Firenze, 1966).

Each guide attempted to enlighten Dante as to what he would be seeing. Each of these divisions had nine levels, which open into each other. When Satan fell from Heaven to Earth, he fell through Jerusalem to the centre of the Earth and created an enormous nine-level pit, which became the inferno, Hell. The mountain of Purgatory arose in the middle of the Southern Hemisphere opposite to Jerusalem. The material that Hell displaced was pushed upwards and created the nine-level mountain of Purgatory. The height of the mountain was equal to the depth of Hell (Figure 1). Then there were the nine levels of the material universe, the spheres of the seven planets, the fixed stars and the Premiun Mobile. The Moon had the smallest, dimmest light and the slowest obit of all the spheres.[14] The larger the obit of the planet the brighter and faster the revolution of the orbit became. From the Premiun Mobile, Dante and Beatrice proceed through the nine Angelic spheres of the Empyrean to the centre. In the centre of the Empyrean was a point of light infinitely bright – this point of light was God. The speed and brightness of the Empyrean's spheres was the reverse of the material spheres, the larger the obit of the Angelic spheres (the further away form God) the dimmer the light and slower its revolution. This curious universe appears to have a closed and complete structure. This is indeed a universe that is radically different to the accepted wisdom of Dante's period. He constructed a universe that, at first glance, could be constructed by a compass and straightedge; yet, infinity remains within the centre of the Empyrean – the point of light that represents God. The image of the Divine Architect with His compass (see Figure 2) fits well with the plan that Dante created.

Figure 2: The Divine Architect, 13th Century

However, this universe becomes curious on closer examination. Both the material universe and the Angelic universe make perfect sense in their geometrical structure if examined individually (Figure 3). It is at the union of these worlds that goes far beyond Dante's geometric understanding, or indeed any scientific understanding for the next 600 years.

[14] Dante, *La Divina Commedia - Paradiso,* III, 51.

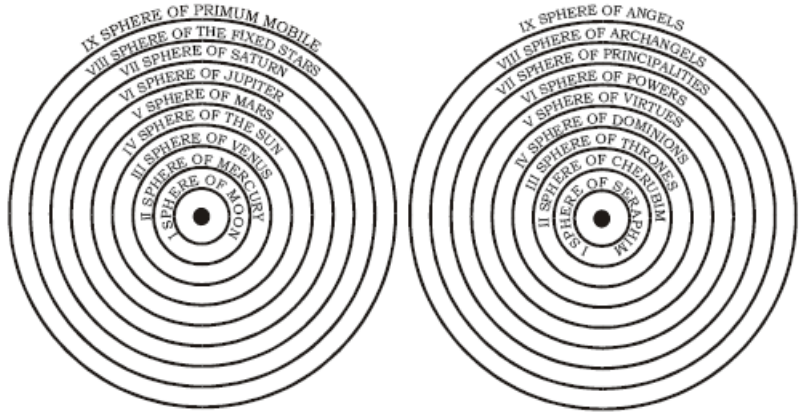

Figure 3: The Material and the Angelic Spheres

In Canto 27 of the *Paradiso,* Dante and Beatrice had travelled thought the material spheres and are about to leave the eighth sphere that of the fixed stars, when Beatrice instructed Dante to look down and through all the distance that he has travelled. She said to him;

> *Adima il viso e guarda come tu se' vòlto* [15]
> (Cast your sight down and see how far you have revolved)

Dante looked down and saw back though the spheres that he had travelled through and he saw the earth in the centre of the spheres. He described the earth as being a 'puny threshing-ground.' They move on to the Primum Mobile the last, largest, brightest and fastest of the material spheres. In Canto 28, Dante saw that Beatrice's eyes were bright with the radiant light;

> E com' io mi rivolsi e furon tocchi
> Li miei da ciò che pare in quel volume,
> Quandunque nel suo giro ben s'adocchi,
> Un punto vidi che raggiava lume
> Acuto sì, che 'l viso ch'elli affoca
> Chiuder conviensi per lo forte acume[16]
> (And when I turned around, my own (eyes) met by what appears in that revolving sphere to be one that looks intently on its circling, I saw a point which radiated a light so keen that the eye on which it blazes must close because of its piercing power.)

Dante turned around to look up to see a radiant point in the centre of the Empyrean. Beatrice sensing Dante's bewilderment and eagerness to understand said:

[15] Dante, *La Divina Commedia - Paradiso,* XXVII, 85. All translations are done by the author.
[16] Dante, *La Divina Commedia - Paradiso,* XXVIII, 13-18.

Da quel punto depende il cielo e tutta la natura. [17]
(On that point the heavens and all nature are dependent.)

Contemplating both the material and the Angelic universes Dante realised that in the material spheres, the spheres are more divine the farther from the centre they are. While in the angelic spheres they are the reverse, the closer the sphere was to the centre of the Empyrean the more divine it is. Dante notes,

E l'essemplare non vanno d'un modo, [18]
(the model and the copy do not follow the one fashion)

The model being the Angelic spheres and the copy being the material spheres (Figure 3).

The Fourth Dimension in the La Divina Commedia

The material spheres are ordered in importance from the slowest, dimmest and smallest sphere of the Moon to the largest, brightest, fastest and most important sphere of the Primum Mobile. The Angelic spheres are ordered in importance from the slowest, dimmest and largest sphere of the Angels to the smallest, brightest, fastest and the most important sphere of the Seraphim, the closest to God. Both the material and the Angelic spheres have height, breath, depth and are ranked in their 'supremacy' by their proximity to God by their speed and brightness. Speed and brightness are intrinsically linked, the faster the spheres become the brighter they become. This introduced a fourth dimension to the universe of the *Divine Comedy* that of speed and brightness. In short it is possible to plot Dante's universe with four co-ordinates, Length, breath, width and, speed and light i.e (x_1, x_2, x_3, x_4,).

From a twenty-first century perception the fourth dimension can be considered in two different ways. One is the time-space continuum of physics where the fourth dimension is time.[19] The second is geometric space[20] and this paper only considers geometrical space. This space is difficult to understand once it has more than three-dimensions, and most people, including mathematicians, cannot image any shape beyond three-dimensions. But in the nineteenth century a book was written for non-mathematical persons to explain this concept. It was entitled *Flatland: A Romance of Many Dimensions,* reportedly a biography of A. Square, but it was in fact written by an English schoolmaster Edwin A. Abbott.[21]

Square lives in a two dimensional house in a two dimensional world, Flatland. Square is visited by a sphere from the three dimensional world, Spaceland. The sphere can come from above or below, concepts that do not exist in Flatland. To a Flatlandian the sphere can appear out of nowhere as it can appear, coming from above or below, as a dot magically expanding into a line, as it moves through Flatland, and then it contracts into a dot and then disappears as it moves out of Flatland. Amazed by this magic, Square eventually visits the one dimensional world of Lineland and realises that he can have this magical power in a lower dimen-

[17] Dante, *La Divina Commedia - Paradiso,* XXVIII,41-42.
[18] Dante, *La Divina Commedia - Paradiso,* XXVIII, 56.
[19] Modern physicists consider there to be ten dimensions which act like space and an eleventh which is time.
[20] In geometric space each dimension a 90º extension is inserted form each existing plane and the dimensions can be infinite.
[21] E. A. Abbott, *Flatland: A Romance of Many Dimensions,*(Princeton: Princeton University Press, 1991).

sion. If a hypersphere from the fourth dimension visited the third dimension it would be able to appear and disappear, walk though solid walls and view things from different angles that do not exist in the third dimension. With an extra geometrical dimension impossible things in a lower dimension can happen!

Dante stood at a point where two spherical universes could be viewed. From the fastest and brightest material sphere he turned around to look up through the slowest and dimmest to the fastest and brightest of the Angelical spheres. In a third dimensional universe to turn around to look behind is the normal angle of viewing. Dante did not turn around *and* look up, since if this was the case why would he have needed to turn around at all. Furthermore, Beatrice's eyes reflecting the brightness of the *point in the centre* of the Empyrean required that Dante was facing Beatrice to see this reflection. Dante turned around to see up into the centre of the Empyrean. This concept of 'up' could only exist in a four dimensional universe, which Dante had inadvertently created. A four dimensional universe is a geometrical structure that makes possible things that are impossible in the third dimension.

Dante's Radical Departure from the Accepted Divine Architecture

Dante made the Empyrean a separate set of spheres, so that Paradise consists of two sets of concentric spheres; the material and the immaterial, and infinite is represented by one radiant point, God, in the centre of the immaterial Empyrean with earth being in the centre of the material spheres.

This is a radical move away from the Empyrean promulgated by the philosophies and the theologies at the time. The nine levels of angels were well established as part of the Empyrean in the time of Dante. The nine levels of angles were generally depicted as encircling the material spheres as the tenth sphere, the Empyrean.

Divine light emanated thought the nine levels of angels, the celestial hierarchy, from God. The *Celestial Hierarchy* and the *Ecclesiastical Hierarchy,* which had postulated this divine emanation, were the two most influential books in the Middle and Medieval Ages. In religious history, the author of these works was known as, Saint Dionysius the Areopagite, an Athenian convert of Saint Paul mentioned in Acts 17: 34. In fact, the author of these Greek Neo-Platonist works was anonymous, and the works were written in the fifth or sixth century.[22] The author later became know as pseudo-Dionysius. In *La Divina Commedia*, Dante described the nine spheres of angels according to Saint Dionysius' schema and claimed that the secret of the angels proclaimed by Dionysius had been received from Saint Paul. The illuminating light that emanated from God was very important throughout the works of pseudo-Dionysius. In the opening paragraph, he claimed

> …the Light (emanating from God) spreads itself generously toward us, and in its power to unify, it stirs us by lifting us up. It returns us back to the oneness and deifying simplicity of the Father who gathers us in. For, as the sacred Word says, 'from him and to him are all things.'[23]

[22] J. Pelikan, *What Has Athens to Do with Jerusalem?,* (city: University of Michigan Press, 2000).
[23] Pseudo-Dionysius, *Pseudo-Dionysius: The Complete Works* (Mahwah: Paulist Press, 1987) 120b.

The light was passed through the hierarchy from one sphere to the next and each sphere received their light from the previous one.

The spatial concept of this universe was ambiguous. Either the light of God was infinite space that encircled the nine Angelic spheres and the nine material spheres. This was the image accepted by the church. Alternatively this image of light came from God emanating from the centre through the spheres of the celestial hierarchy where each sphere received their light from the previous one, inferring the two spheres system, similar to the one that Dante created. Although pseudo-Dionysius described the celestial hierarchy, throughout his work he never attempted to give any physical description of Heaven. For pseudo-Dionysius the divine is beyond the tangible and human perception, it can only be understood in terms of human symbolism, the divine is "beyond intelligence" not even words "come up to the inexpressible Good, the One, this Source of all unity."[24] Though his works are enigmatic, their influence was tangible as well as spiritual. Abbot Suger of Saint Denis, a major force in the introduction of Gothic, borrowed some ideas from pseudo-Dionysius to explain the symbolism of light in the basilica he built**.** Light emanated thought the cathedral for the upper chapel of the western bays; Suger claimed that it was "most beautiful and worthy to be the dwelling of angels."[25] Light was an important element in *La Divina Commedia;* light emanated from a single point in the centre of the Empyrean it filtered outward through the celestial spheres, then through the material spheres to the centre, earth.

The Celestial Rose and Master-Builders Metaphor

Dante and Beatrice move on into the Empyrean towards the point of light in the centre. Beatrice led Dante into the Celestial Rose, she said,

> *Mira quanto è'l convento delle bianche stole!*
> *Vedi nostra città quant; ella gira.* [26]
> (Behold how great is the assembly of the white robes! See our city, how great is its circuit!).

The city or the Celestial Rose was the assembly of the blessed seated in rows that opened outward. Dante does not describe the structure of the Rose in any great detail, all that is known is that it is massive; it is circular; it has tiered and petalled seats; it is rose-like and it opens outwards. The seating divided the rose between the saints of the *New Testament* and the *Old Testament*. The light of God that was directly above the rose emanated throughout. From this description the Celestial Rose appears to be a cathedral that has the features of a rose window.

The dominant focus of the Celestial Rose is the Virgin Mary, The Queen of Heaven,[27] and this is supported by the fact that the rose was the symbol of Mary. In the twelfth and thirteenth century, Mary was the most popular Saint; the cult of Mary took a central place

[24] Pseudo-Dionysius, *Pseudo-Dionysius: The Complete Works,* 588b.
[25] S. M.Crosby, The Royal Abbey of Saint-Denis: From Its Beginnings to the Death of Suger, 475-1151 (New Haven and London: Yale University Press,1987) 222.
[26] Dante, *La Divina Commedia - Paradiso,*XXX, 130-131.
[27] Dante, *La Divina Commedia - Paradiso,* XXXI, 100.

in Catholic worship in this period.[28] This veneration is reflected in the number of cathedrals and churches dedicated to her in this period.

In the thirteenth and fourteenth century the cathedral was the height of human achievement; it embodied the whole of Christian knowledge and attempted to mimic the divine. The cathedral was not only a demonstration of popular spiritual enthusiasm it was also a central focus of the community life. The population as a whole contributed to the enormous cost of the building of the cathedral either through money or labour.[29] The cathedral dominated the town it and rose above all other buildings and was a manifestation of the community's religious faith. Art historian Kenneth Clark described the religious fervour that surrounded the building of Chartres Cathedral.

> Men and women came from far away carrying heavy burdens of provisions for the workmen – wine, oil and corn. Among them were the lords and ladies pulling the carts with the rest. There was perfect discipline and a most profound silence. All hearts were united and each man forgave his enemies.[30]

The cathedral was the heart of the city and life of the citizens evolved around it. It also brought wealth to the city. If the cathedral acquired a valued relic, pilgrims would flock to the cathedral and bring prosperity to the city. Geoffrey Chaucer's *The Canterbury Tales* [31] written sixty years after the death of Dante demonstrates the popularity and power of the pilgrimage which brought together people of different social status. The cathedral of the fourteenth century structured the city and the memory of its people. Similar to the central position of the cathedral in the city, Dante place the Celestial Rose in the heart of the Empyrean.

The Celestial Rose was described as having tier on tier[32] and ranks of petals that unfolded,[33] and although the assembly were all saints the tiered seats or petals had a rigid seating structure – a clear hierarchy. In Mary's dominion symmetry and order prevail in the structure of the Rose. By the mid-thirteenth century Rose windows had become popular right through the cathedrals of France.[34] Although Italy did not adopt Gothic architecture in its 'purity' it did adopt elements such as flying buttresses, pointed arches and rose windows giving them a distinctly Italian style. Dante would have been able to admire a beautiful rose window in Italy at the church of Saint Francesco in Assisi, completed in c1239 and consecrated in 1253.[35] Furthermore, there are ten years unaccounted for in Dante's life and some scholars believe that he spend these years in France, which would have made him very familiar with rose windows.

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[28] J. B. Russell, J. B. and D. W Lumsden, D. W. *A History of Medieval Christianit,* (New York: Peter Lang, 2005). 129

[29] Russell & et al, *A History of Medieval Christianity,* 130.

[30] K. Clark, *Civilisation,* (London: BBC, 1969) 56.

[31] G. Chaucer, *The Canterbury Tales,* (New York: Penguin, 1977).

[32] Dante, *La Divina Commedia - Paradiso,* XXX, 112.

[33] Dante, *La Divina Commedia - Paradiso,* XXX, 124.

[34] P. Cowen, *Rose Window,* (London: Thames and Hudson, 1979) 8; G. D. Di Scipio, *The Symbolic Rose in Dante's Paradiso,* (Ravenna: Longo Editore,1984) 151.

[35] Di Scipio, *The Symbolic Rose in Dante's Paradiso,* 152.

In the centre of most rose windows is the image of Mary or Christ, Mary is depicted holding the Christ child or a rose.[36] Albertus Magnus, whose soul Dante place in the sphere of the sun as one of the twelve wisest of all man and praised him as among the great theologians,[37] notes that,

> *Chistus est rosa, Maria est rosa, ecclesia est rosa, fideliter anima est rosa.* [38]
> (Christ is a rose, Mary is a rose, the Church is a rose, the faithful soul is a rose.)

To Albertus Magnus the rose embodies the perfect and the pure.

Saint Paul, in a key Christian text, outlined an enduring master-builder metaphor, which permeated medieval thinking.

> According to the Grace of God which is given unto me, as a wise master-builder, I have laid the foundation, and another buildeth thereon. […] Know ye not that ye are the temple of God, and that the Spirit of God dwelleth in you? If any man defile the temple of God, him God destroy; for the temple of God is holy, which temple ye are (I Corinthian, 3: 10-17).

Although this metaphor built on the *Old Testament* with the importance of Tabernacle and the erection of Temple of Solomon, both of which remained an important element in the *New Testament,* these were earthly manifestations of God. Paul turned the metaphor away from a physical temple to the congregation and to the spiritual temple within.

The master-builder metaphor permeated Christian theology, scholars such as Ambrose, Augustine, Gregory the Great, Bede, and many others used this metaphor extensively. In the twelfth century theologian Hugh of Saint Victor claimed that the sacred Scripture was like a building, once the masons have laid the foundations he built up the walls row by row each course carefully considered and placed.[39] Dante was aware of these works and placed many of these authors' souls in the sphere of the sun – the sphere of the wise.

Dante's Celestial Rose built a city of the blessed souls tier on tier and ranks of petals that unfold, the hierarchy of each row carefully considered just as in the writing of Hugh of St Victor – the universal church was built of faithful souls. The light emanated through the Rose from above, the light was so intense that it momentarily blinded Dante. The light emanated through the Rose as it did through the Gothic cathedral, although perhaps less blinding. Suger wrote in praise of his church,

> The church shines with its middle party brightened.
> For bright is that which is brightly coupled with the bright,
> And bright is the noble edifice which is pervaded by new light.[40]

The Celestial Rose is the divine cathedral, which was central to Dante's life and work. This cathedral had the petals and symmetry of a rose window but its purpose and tiers or courses

[36] Di Scipio, *The Symbolic Rose in Dante's Paradiso,*
[37] Dante, *La Divina Commedia - Paradiso,* X, 98.
[38] Magnus, A. (1477) *De Lauibus beatae Virginis Mariae* (Strasburg: Johann Mentelin, 1477) XII, iv, 33.
[39] Huge of St. Victor, *Didascalicon* (New York: Columbia University Press, 1991) vi, 4.
[40] U. Eco, *Art and Beauty in the Middle Ages* (New Havem: Yale Press, 2002) 46.

are those of a cathedral. This cathedral was built for the divine souls of the saints which represented the universal church

Beatrice left Dante to take her seat in assembly in the Rose; Dante was then guided by Saint Bernard. Bernard then entreated Mary to remove the obstacles from Dante's eye so that he would be able to behold the Glory of God. Dante struggled to understand the truth of all that he perceived, he looked into the Divine point of light and,

> *Qual è'l geomètra che tutto s'affige*
> *Per misurar lo cerchio, e non ritrova,*
> *Pensando, quel principio ond'elli indige.* [41]
> (As the geometer who wholly applies himself to measure (square) the circle, and for all his thinking does not discover the principle he needs)

From the perfect symmetry of the Rose, Dante contemplated the Divine point of light in the middle of the Empyrean. According to Beatrice; "On that point the heavens and all nature are dependent."

As Dante struggled to understand what he saw in the centre of the Empyrean, he used the geometric analogy of the squaring of the circle to emphasise this struggle. It was not until the nineteenth century that π was discovered to be irrational and no accurate construction of a square being equal to a given circle was possible using a compass and straightedge. The problem was impossible to solve. However, to Dante, the possibility or impossibility of the problem was not considered. Dante only considered that the geometer had not been able to discover the solution, and that the solution was somehow elusive to the mathematicians.

Dante used the geometric analogy of the squaring of the circle to emphasise this struggle in his attempt to understand the divine realm

> *Veder voleva come si convene*
> *l'imago al cerchio e come vi s'indova;*
> *ma non eran da ciò le proper penne:*
> *se non che la mia mente fu percossa*
> *da un fulgore in che sua voglia venne.* [42]
> (I wished to see how the image conformed to the circle and how it has its place therein; but my own wings were not sufficient for that, save that my mind was smitten by a flash wherein came its wish.)

Through his contemplation what he perceived to be a geometrical problem Dante was suddenly struck with a flash of understanding God.

Conclusion

In *La Divina Commedia* Dante attempted to make sense of the universe. He postulated a God as the Divine Architect on which the heavens and all nature are dependent. By the beginning of the fourteenth century the writings of Saint Dionysius (later pseudo-Dionysius) were at their most influential, this is reflected in theological writings and in the structure of

[41] Dante, *La Divina Commedia - Paradiso,* XXXIII, 133-135.
[42] Dante, *La Divina Commedia - Paradiso,* XXXIII, 136-141.

the cathedrals at the time. The divine light is central to *Paradiso*, it permeated every sphere, both material and immaterial. In keeping with the writings of Saint Dionysius the closer the spheres are to God, the divine point of light, the brighter and more divine the spheres are. However, by defining God as a point of light surrounded by the hierarchy of angels, Dante created a separate sets spheres for the Empyrean. By creating two separate sets of spheres, with God as the centre of one and the earth in the centre of the other, Dante created what he thought to be a truly Euclidean universe. Dante must have considered that he had created a universe that was symmetrical and perfect, a suitable plan for the Divine Architect with His compass and straightedge.

Although Dante does inadvertently create a four dimensional universe, it could have still have been understood as two separate sets of spheres except for the fact that he turned around to look up. Jeffrey Burton Russell explained this vision of Dante's as a vision that,

> … reconfirms the view of the cosmos where up and out are better that down and in, because more open to the divine light.[43]

It is possible that this is want Dante intended. However, this does not consider the geometrical possibilities of these angles. In fact Dante scholars have failed to see to mathematical implications of Dante's description and often refer to the Empyrean as the tenth sphere of paradise that encompasses the other nine spheres.[44] Although this was the accepted view of the universe at the time, it was not what Dante described. However, Dante himself claimed that words failed him in the massive task of describing Paradise.

> *E così, figurando il paradise,*
> *Convien salter lo sacrato poema,*
> *Come chi trova suo cammin riciso.*
> *Ma chi pensasse il ponderosa tema*
> *E l'omero mortal che se ne carca,*
> *Nol biasmerebbe se sott' esso trema.* [45]
> (So picturing Paradise, the sacred poem must make a leap like one that finds his path blocked. But if he that considers the weighty theme and the moral shoulder that is burdened with it he will not blame me if I tremble beneath the load.)

The creation of a fourth dimension and the dimensional transformation from the third to the fourth dimension at the border of the material and immaterial universe in *La Divina Commedia* would clearly have been beyond Dante's mathematical understanding. However it does create an interesting paradox. In attempting to create a truly Euclidean universe to fit the image of the Divine Architect with his compass he inadvertently created a universe that goes beyond the constructs of a simple compass and straightedge. The only way, from a third dimensional perception, to view a fourth dimensional structure is through slices, three dimensional cross sections, it is not possible to view it or even represent it in totality. Like Mr Square it is only possible to see the fourth dimension in terms of the third dimension.

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[43] Russell, *A History of Heaven: The Singing Silence,* 175.
[44] This is encouraged by books such as Edmund G Gardner, *Dante's Ten Heavens: A Study of the Paradiso* (New York: Books for Libraries Press,1972)
[45] Dante, *La Divina Commedia - Paradiso,* XXIII, 61-67.

This paradox is not new it is in fact quite ancient. In the *Timaeus*, Plato claimed that 'god' gave humans sight so that it was possible to behold the revolution of Reason in the Heavens. By contemplation of the unvarying revolution of 'god', it was possible to be able to stabilise the variable revolution in ourselves.[46] Through an act of contemplation of the unchanging macrocosm one could secure the changing microcosm. These revolutions of the Heavens in the *Timaeus* can be geometrically constructed, with a compass and straightedges. In the *Republic,* Plato claimed that astronomy can only truly be understood through geometry which was a result of the unvarying revolution of god.[47]

In the story of Err, in the *Republic,* Err like Dante ascended to the heaven and from the extremities of heaven he could see the orbits of the planets whorl around the spindle of Necessity, which hangs,

> … by means of which all the orbit revolve; its staff and hook are made adamant, whereas in the whorl adamant is mixed with other material, […] the whole spindle turned at the same speed, but as the whole turned the inner circles were carried round at a slower pace in a motion contrary to that of the whole.[48]

The orbits whorled around the spindle, but unlike Dante, the speed of the orbits are not evenly paced. Thus, he does not create a fourth dimensional co-ordinate. Each of the orbits has a siren, which sings a single note. The daughters of Necessity and the fates of Past, Present and Future, sitting outside of the orbits and sang to the music of the sirens. The spindle turns on the knees of Necessity and each of the fates assisted in its turning. This universe of Plato, though seemingly simple is complex. In attempting to describe a complete universe Plato *hangs* the universe from a hook, the only place this hook could hang from is from another dimension. Although the dimensional structure is not as clearly delineated as Dante's it nevertheless exists. Plato's Divine Architect metaphor working with his compass is fundamentally floored. Its construction realises on another dimension that needs more that a compass to express its totality.

If perceived in purely Euclidean terms Dante the structure of the universe of *La Divina Commedia* was two separate sets of spheres. The Divine Architect designed a perfect and symmetrical universe. His divine light filtered through the two sets of spheres and in the centre of the Empyrean was a cathedral built from the master-builder metaphor from the *New Testament* that represented the universal church. From the Celestial Rose, the universal church, Dante contemplated a geometrical problem. By contemplating this geometrical problem Dante understood God and all that he had seen, he used Euclidian geometry as the key to the universe. Throughout the *La Divina Commedia* Dante sort the truth he met philosophers and theologians from throughout history; however it was through the contemplation of geometry, and not philosophy or theology, that the truth was revealed to him.

La Divina Commedia is one of the great milestones of literature. The number symbolism has long been recognised as an important element in the composition of the *La Divina Commedia*. Equally important is the structure of the universe. Dante used geometry and architectural metaphors to create the ambience to his great work; they are an integral part of poetry of *La Divina Commedia*.

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[46] Plato, *Plat''s Republic,* 47c.
[47] Plato, *Plato's Republic,* VII, 530.
[48] Plato, *Plat's Republic,* X, 616c.

Dante had an excellent understanding of the geometry of his time and although not conscious of multi dimensional spaces he would have understood the impossibility of turning around to look up. Perhaps Dante used this impossible concept as a poetic device to make the Empyrean just a little more mysterious after simplifying its structure. Or more likely, after creating this symmetrical universe he attempted to reconcile the two separate set of spheres so that there was a smooth transient for one to the other. Whatever the reason, the end result is that he created a paradox – the Divine Architect could no longer rely on His compass and straightedge.

About the Author

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