

# The Effect of Unfolding Scientific Discoveries on Visual Images of the Beginning of the Universe

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**Abstract.** Explanations of ‘The Beginning’ or ‘Creation’ have varied from primitive accounts to complex theological, philosophical and scientific arguments. Myths and ideas providing answers to the great questions of how the universe was created, and where we all came from, have circulated in the near east and the Mediterranean since ancient times, from early legends to ancient, medieval and Renaissance manuscripts, to modern scientific theory. Such ideas have also been expressed in visual images ranging from the great Creation cycles in St Mark's Venice and Michelangelo's Sistine Chapel ceiling, to the works of William Blake, Brancusi's 'egg' or technical and scientific diagrams, such as the famous NASA image ‘The Big Bang and the Expansion of the Universe’ of 2012. Visual representations of the Beginning have changed over time and may be either in line with or contrary to contemporary scientific thought.<sup>1</sup>

The concept of the Creation is fundamental to most cultures, from primitive myths to complex theological, philosophical and scientific arguments.<sup>2</sup> As Martin Rees succinctly expressed it,

Our Universe sprouted from an initial event, the ‘big bang’ or ‘fireball.’ It expanded and cooled: the intricate pattern of stars and galaxies we see around us emerged thousands of millions of years

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<sup>1</sup> This paper is a development of an earlier INSAP presentation (‘The Beginning and the End: Images of the Universe’ *Proceedings of INSAP III*, Palermo Sicily, *Journal of the Italian Astronomical Society*, Vol. 1, 2002), which had a thematic rather than chronological scientific approach. The paper is part of a much larger, ongoing project. The focus here is on images of the Beginning, and dealing largely with the Greek and Biblical traditions.

<sup>2</sup> Stephen Hawking, *Brief Answers to the Big Questions* (London: John Murray, 2020), Chapter 2.

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later; on at least one planet around at least one star, atoms have assembled into creatures complex enough to ponder how they evolved.<sup>3</sup>

Myths and ideas providing answers to the great questions of how the universe was created, and where we all came from, have circulated in the near east and the Mediterranean since ancient times. Accounts ranging from primitive legends to more sophisticated texts such as the *Enuma Elish*, dating from the second millennium BCE and, significantly, the Judaeo-Christian account in Genesis, were not only presented literally as history or 'knowledge', but also as symbolic and allegorical accounts.<sup>4</sup>

Although a vast amount has been written on religious and scientific explanations of the creation of the Universe, scant attention has been paid as to how such explanations have been expressed in visual images. In addition, consideration should be given as to whether such images are to be regarded as 'art works', devotional objects, explanations of doctrine, or as a narrative 'Bible of the illiterate', literal 'truth', or symbolic interpretations. Whilst there was no real distinction between theological and scientific accounts until early modern times, the expression of ideas by means of visual images is significant. Aimed at specialists, a wider public, or both, images are significant in demonstrating the purpose of art as a way of communicating and revealing the truth. Focusing here on the Judaeo-Christian tradition, images of the book of Genesis may be considered allegorical rather than a literal or 'scientific' account, but the relation of visual interpretations to contemporary scientific views can reveal another layer of understanding. The separation between theology, cosmology and science is a post-Renaissance phenomenon, prior to which they were regarded as part of the same body of knowledge or worldview. Visual representations of creation narratives have changed over time, and may be either in line with, or contrary to, contemporary scientific thought.<sup>5</sup>

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<sup>3</sup> Martin Rees, *Before the Beginning: Our Universe and Others* (Cambridge: MA: Perseus, 1997), p.1.

<sup>4</sup> See, for example: D. A. and M. Leeming, *A Dictionary of Creation Myths* (Oxford: Oxford University Press, 1994); Philip Freund, *Myths of Creation* (London: Peter Owen, 2003); Chris Impey, *How it Began* (New York: Norton, 2012), Chapter 11; 'Big Bang' or (more popularly) David Maclagan, *Creation Myths* (London: Thames and Hudson, 1997).

<sup>5</sup> Genesis 1:1-2:3 is based on a six-day format followed by a day of rest; Genesis 2:4-3:24 provides less detail about the cosmological aspects whilst providing more information on the creation of humankind.

The Biblical Genesis account of Creation, in particular, has frequently been depicted in artworks, including painting, sculpture, mosaics and illuminated manuscripts. Images were widely used to illuminate and inspire as well as to inform or to convey knowledge. The extent to which visual images or artistic representations of the Creation may or may not have been adapted in the light of changes in scientific knowledge or understanding of a particular age is worthy of investigation. Images from different periods and cultures can be considered in relation to the context of the age in which they were created, particularly in terms of contemporary scientific theory, including astronomy and cosmology. From ancient Greek traditions to the developments in astronomy leading up to Nicholas Copernicus' heliocentric theory, later scientific discoveries and twentieth-century work on the Steady State or Big Bang theories, such ideas have often provided inspiration for artworks., as amply demonstrated by the whole series of INSAP meetings.<sup>6</sup>

Large scale images such as mosaics and frescoes and sculptures would be available for mass observation; inspirational or devotional artefacts such as icons or manuscripts far less so. The creators of these images were not artists in the modern sense: inspired, creative free thinkers who then found a patron or market. Visual images of Genesis would have been made by clergy or monks or, later, by artisans appointed or employed by the Church, such as stonemasons, mosaicists and fresco painters. All would likely have been instructed by theological advisers, for not even an artist of the stature of Michelangelo would have been permitted to do as he wished where doctrinal and liturgical issues were involved. The relation between clergy, craftsmen, and patrons was significant as advanced knowledge of scriptures, doctrine and liturgy would have been combined with the skills of craftsmen.<sup>7</sup>

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<sup>6</sup> Texts used for the history of astronomy in this study include: Thomas S. Kuhn, *The Copernican Revolution: Planetary Astronomy in the Development of Western Thought* (Cambridge: Harvard University Press, 1986); Michael Hoskin, *The Cambridge Concise History of Astronomy* (Cambridge University Press, 1999); John North, *History of Astronomy and Cosmology* (London: Fontana, 1994).

<sup>7</sup> Space does not allow consideration of examples for wider traditions, such as the Egyptian idea of the sun rising over the mound of Creation with the Primeval Waters, or the Egyptian myth of the creation of earth from an egg by the god Ptah. There is a wealth of material from other traditions, also, such as the image of a cosmic egg in Hindu; or Jain cosmology (originating in India fifth century BCE) which perceived the universe as 'uncreated' with neither beginning nor end and with no concept of a creator; as well as innumerable creation myths emanating from American, Australasian and African mythology – see Leeming, *Dictionary*

### Early Christian and Medieval

Early visual references to the Beginning (and the 'End') of 'everything' are epitomised by the inclusion of 'Alpha and Omega' in early paintings and frescoes that summarise the theological concept of God rather than referring to the origin of the universe.<sup>8</sup> Complete cycles and individual images of the Creation gradually became more common, together with any possible connections to contemporary scientific theory. The focus may be placed, for example, on the idea of the world being created out of nothing (*ex nihilo*), or from chaos. The overall approach of an image might be inspirational, narrative, or measured, mathematical, and actually astronomical and scientific. Some images, and not only modern ones, take an abstract or symbolic approach.

The *Junius Manuscript* (MS Junius 11, Bodleian), for example, includes some of the earliest depictions of the Creation (c. 990-1000) in a series of six drawings.<sup>9</sup> The images relate to Biblical cosmology as described in Genesis and show a flat Earth covered by the 'dome of heaven' in accordance with scriptural descriptions and natural eye observation'. For example: Genesis 1:6, *And God said, "Let there be a vault between the waters to separate water from water; Isaiah 40:22, He sits enthroned above the circle of the earth... stretches out the heavens like a canopy, and spreads them out like a tent to live in; Psalm 104 He stretches out the heavens like a tent; Jeremiah 10:12 God made the earth by his power... and stretched out the heavens by his understanding.* Since classical times, the majority of the educated classes had understood that the Earth was spherical and Aristotelian and Ptolemaic astronomy recognised the

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*of Creation Myths*, especially pp.81–83 (Egyptian); pp.139–44 (Indian) and p.147 (Jain).

<sup>8</sup> Catacomb of Comodilla, Rome, fourth century; mosaic at Sant'Apollinare in Classe, Ravenna, seventh century (as in Revelation 1:8, 21:6 and 22:13, 'ἐγώ εἰμι τὸ Ἄλφα καὶ τὸ Ὠ'). For general references to Early Christian and Medieval cosmology, see, for example, Michael Hoskin, ed., *The Cambridge Concise History of Astronomy* (Cambridge: Cambridge University Press, 1999), especially chapters 1–4.

<sup>9</sup> 'The Cædmon Manuscript': parts of Genesis, Exodus and Daniel in Old English verse, illustrated with Anglo-Saxon drawings, c. A.D. 1000. A facsimile is available at: <https://digital.bodleian.ox.ac.uk/objects/d5e3a9fc-abaa-4649-ae48-be207ce8da15/surfaces/82365036-24f3-4c43-95fe-0a4a4d94d90a/> [accessed January 2023].

sphericity of the earth (and universe), as did St Augustine and Bede.<sup>10</sup> The concept of a hemispherical firmament, however, was widespread, linked to the idea of the heavens above the earth and hell beneath (with the eventual ascent to Heaven of the ‘good’ and the descent to Hell of sinners). This view, although regarded as outdated by educated people, quite possibly reflected more commonly held perceptions and is compatible with the approach of the Junius manuscript. The semi-circular images seem to relate to the doctrinal view of the universe as covered by the dome of heaven, although the main emphasis was probably theological rather than cosmological.

Significant change took place as the revival of ancient astronomy and cosmology increased in the West from the eleventh century.<sup>11</sup> Books and astrolabes became more accessible as Western Europe became more settled, the population increased, academic institutions were established, and disposable wealth accrued. Greek traditions would have continued via the Byzantine Empire, which had considerable contact with Western Europe. This contributed to what has been termed the ‘twelfth century renaissance’, dispelling the idea that nothing of intellectual or scientific note occurred in Western Europe during the so-called ‘Dark Ages’ between the fall of the Roman Empire and the Renaissance.<sup>12</sup> The Aristotelian and Ptolemaic view of a spherical, Earth-centred system held sway.

In addition, astronomical ideas filtered through from the Arab world due to the Moorish occupation of Spain. Pope Sylvester II (Gerbert of Aurillac, 946-1003) was known as the ‘Astronomer Pope’ and was hugely influenced by Islamic writings that resulted from Moorish influences.<sup>13</sup> This stimulated a scientific revival and Gerbert himself promoted the use of the astrolabe for planetary observations. He owned a globe and used astronomy for astrological and medical predictions. The influence of such developments on images of the Creation seems evident in the example of the Girona Tapestry of the eleventh century, with its clearly spherical design, embodying the educated view of the universe. The tapestry depicts

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<sup>10</sup> For succinct summaries, see Kuhn, *Copernican Revolution*, Chapters 1–3; Hoskin, *Concise History of Astronomy*, Chapter 2; North, *Astronomy and Cosmology*, Chapter 4.

<sup>11</sup> Hoskin, *Concise History of Astronomy*, Chapter 4; North, *Astronomy and Cosmology*, Chapter 10.

<sup>12</sup> Charles Haskins, *The Renaissance of the Twelfth Century* (Cambridge, MA: Harvard University Press, 1927).

<sup>13</sup> Lynn Thorndike, *History of Magic and Experimental Science*, 8 vols (New York: Columbia University Press, 1923–58), Vol. 1, pp.697–718.

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the cycles of creation presided over by Christ Pantocrator at the centre and the cosmic elements are emphasised in a stylised approach, where powerful images aim at a symbolic rather than naturalistic interpretation. The Holy Spirit, represented by a dove, is shown at the top, hovering prior to the act of Creation, that is, ‘before the beginning’. Significantly, Gerbert of Aurillac spent many years in Spain as a protégé of the Count of Girona. A similar emphasis on the circular arrangement of the universe and planets is also evident in the well-known mosaic of the *Creation* in the Cathedral of Monreale Sicily, which was built in 1174-78.<sup>14</sup>

More complex Creation designs seem to have been instigated by the twelfth century, alongside more complex astronomical thought of the time, such as the Souvigny manuscript of creation (c. 1200).<sup>15</sup> Aristotelian and Arabic astronomy were re-emphasised and shared through the rise of the universities, including the Universities of Bologna (1180), Oxford (1200), Cambridge (1209), Salamanca (1218) and Padua (1222). The thirteenth-century astronomer Johannes Sacrobosco recast astronomical thought in his *De Sphaera Mundi* of 1230, and the revised *Alfonsine Tables* of astronomical calculations (based on Ptolemy’s *Almagest*) were also produced in the thirteenth century.<sup>16</sup> At the same time, the influence of Byzantine icons, paintings, and artefacts increased as they became more widely dispersed in the West, especially after the Fourth Crusade in 1204. Classical Roman texts on art and architecture were also revived, such as Vitruvius’s *Ten Books of Architecture* of the first century BCE, which significantly advocated knowledge of astronomy as crucial for architects.<sup>17</sup> Astronomical texts and calculations also became more available although many of these focused on the mechanism of the Universe, rather than how it came into being. Such developments were reflected in art and architecture.

Influenced by Byzantine Art, St Mark’s Venice, for example, was rebuilt in the Italo-Byzantine style of domed architecture (where the dome

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<sup>14</sup> For Monreale, see:

[https://commons.wikimedia.org/wiki/File:Monreale\\_creation\\_earth.jpg](https://commons.wikimedia.org/wiki/File:Monreale_creation_earth.jpg) [accessed January 2023].

<sup>15</sup> For the Souvigny manuscript, see:

[https://commons.wikimedia.org/wiki/File:Bible\\_de\\_Souvigny\\_-\\_Biblioth%C3%A8que\\_de\\_Moulins\\_f4v.jpg](https://commons.wikimedia.org/wiki/File:Bible_de_Souvigny_-_Biblioth%C3%A8que_de_Moulins_f4v.jpg) [accessed January 2023].

<sup>16</sup> Lynn Thorndike, *The Sphere of Sacrobosco and its Commentators* (Chicago, IL: University of Chicago Press, 1949).

<sup>17</sup> Vitruvius, *The Ten Books on Architecture*, ed. and trans. Morris Hickey Morgan (New York: Dover, 1960), Book 1, Chapter 1, p.6.

represents the traditional view of the flat earth covered by the Dome of Heaven). The *Creation Dome* mosaic (1215-80, Fig. 1) was based on the Scriptural account, in a narrative approach, with scenes arranged in circles around a central symbol of the Holy Spirit hovering as a dove before the creation.<sup>18</sup> Images then follow the accounts in Genesis 1 (separation of light from dark; creation of the firmament; separation of land and sea with creation of vegetation; then sun, moon and stars; fish and birds, animals and mankind). An additional scene shows the creation of Eve from Adam's rib from Genesis 2:22. rather than simultaneous creation as in Genesis 1:27. The cosmological and astronomical scenes emphasise the magnificence of the Creation, with images of a spherical universe, full of stars in an artificial pattern rather than a naturalistic arrangement.



Fig. 1. The *Creation Dome*, St Mark's Venice, 1215-1280 (Public Domain via Wikimedia Comms).

As the thirteenth century progressed, many images showed the Creator depicted in a more mathematical way, particularly in richly decorated medieval manuscripts known as *Bibles Moralisées*. A good example of this type is the *Codex Vindobonensis 2554*, Paris, written around 1220-30. (Fig. 2).

<sup>18</sup> Otto Demus, *Byzantine Mosaic Decoration: Aspects of Monumental Art in Byzantium* (London: Routledge and Kegan Paul, 1953), p.71. For Byzantine Art generally, see David Talbot Rice, *Byzantine Art* (Harmondsworth: Penguin, 1964, or any edition).

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Fig. 2. *Codex Vindobonensis* 2554, Paris, c. 1220-30 (Public Domain via Wikimedia Comms).

Here, the more measured and mathematical approach reflects the increase in scientific enquiry and experimentation of the time.<sup>19</sup> God is depicted as

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<sup>19</sup> The image derives from Proverbs 8:27, God 'set a compass on the face of the abyss'. A similar example is the *Historia Scholastica* by Guyart des Moulins (French, 1411-12, British Library). Hoskin, *History of Astronomy*, Chapter 4.



the architect of the universe, using a scientific instrument (dividers or a pair of compasses) to measure out the Creation, making a circular universe out of chaos, and bringing order to the disorganised ‘matter’ of the universe. The Codex can be usefully compared with the designs by the German nun and mystic Hildegard of Bingen (1098–1179) in her work *Scivias*, 1151, where she describes her visions, including the six days of creation. Her images of the creation include many astronomical features and cosmic connections, represented symbolically, such as the illumination accompanying the third vision of Part I.<sup>20</sup>

By contrast, the great stained glass east window at York Minster was constructed in 1405-08 on an altogether different scale from medieval manuscripts and shows images of the Creation account alongside scenes of ‘The End’ from the Book of Revelation. The largest expanse of medieval stained glass in the world, it reflects huge scientific and technological advances. The figure of God the Father at the top of the window holds an open book inscribed with ‘Ego sum Alpha et Omega’, the beginning and end of all things. The window is well documented and it seems unlikely that the strict Benedictine monastery would have allowed freedom with the iconography and the cosmic themes. Monastic, theological advisers would have overseen the glazier’s work.<sup>21</sup>

The Black Death (at its height in 1348) had a devastating effect on Europe from the middle to the late fourteenth century, eliminating some 50% of the population, including clerics, scientists, artists, and craftsmen. It might be argued that the Black Death spurred the Renaissance by disrupting the social order and fabric and liberating new modes of expression, and there were indeed changes to social order. However, the amelioration of the conditions of serfs would be unlikely to impact on serious learning. In fact, a vast amount of talent, experience, knowledge

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<sup>20</sup> Several versions of the *Scivias* by Hildegard of Bingen exist, the earliest being the Rupertsberg manuscript now at the Wiesbaden State Library (known as the ‘The Wiesbaden “Giant” Codex’).

See: [https://commons.wikimedia.org/wiki/File:Meister\\_des\\_Hildegardis-Codex\\_001.jpg](https://commons.wikimedia.org/wiki/File:Meister_des_Hildegardis-Codex_001.jpg) [accessed 3 July 2023].

<sup>21</sup> The contract shows that it was created by John Thornton, a master glazier from Coventry who completed much of the work himself, and was paid £56 plus a £10 bonus. He would have had assistants and advisers. The window is 77feet/22m high and 32 feet/9.8m wide. See Leanne Woodhurst, ‘Country’s Largest Medieval Jigsaw Complete After a Decade’ (York Minster, January 2018), <https://yorkminster.org/latest/countrys-largest-medieval-jigsaw-complete-after-a-decade/> (accessed 10 April 2023).

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and expertise was lost. The bubonic plague seems to have brought to a halt the changes and developments of the thirteenth and early fourteenth centuries, effectively postponing the Renaissance which was not resuscitated until around 1400 in Florence.

### **Renaissance**

As the Renaissance flourished in early fifteenth-century Italy, cosmological images of the creation of the universe become somewhat superseded by more mathematical drawings of geocentric systems.<sup>22</sup> In comparison with earlier medieval mosaics, church decorations and manuscripts, images of Creation by many artists of the Italian Renaissance become more ‘anthropocentric’, focussed on Adam and Eve, their fall and expulsion from Eden. Frescoes by Masolino and Masaccio in the Brancacci Chapel, Florence (early fifteenth century), show human figures depicted very naturalistically but few cosmic elements are included. The emphasis is on human actions and sin rather than God’s creation.

By the later fifteenth century, cosmology and astronomy had developed apace, with more mathematical as well as theological approaches, not only to analyse the natural world, but also to explain it. Following after Jean Buridan (1295–1358) and Nicholas Oresme (1320–1382) in the fourteenth century, Nicholas Cusanus (1401–64) and Leonardo da Vinci (1452–1519) were two key thinkers whose innovative work was highly significant. Cosmic images combine a narrative with a more scientifically accurate methodology and are found in more complex examples such as Giovanni di Paolo’s *Creation and Expulsion from Paradise*, 1445 (Fig. 3), which shows the influence of Johannes Sacrobosco’s earlier *De Sphaera Mundi*. The figure of God floats above the universe, pointing to the Earth and setting it in motion.<sup>23</sup>

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<sup>22</sup> For example the *Diagram of the Cosmos*, Florentine, second half fifteenth century. Tinted schematic drawing, Biblioteca Riccardiana (1038, 240v): [https://www.google.co.uk/search?q=Diagram%20of%20the%20Cosmos&tbm=isch&tbs=rimg:CWosR5scFipfYf4xeSS\\_1KvS5&hl=en&sa=X&ved=0CBsQuIBahcKEwio9rfsmqnxAhUAAAAAHQAAAAAQDA&biw=1903&bih=937#imgrc=D1aKF72CO30CvM](https://www.google.co.uk/search?q=Diagram%20of%20the%20Cosmos&tbm=isch&tbs=rimg:CWosR5scFipfYf4xeSS_1KvS5&hl=en&sa=X&ved=0CBsQuIBahcKEwio9rfsmqnxAhUAAAAAHQAAAAAQDA&biw=1903&bih=937#imgrc=D1aKF72CO30CvM) [accessed January 2023].

<sup>23</sup> The design also relates to Dante’s cosmology in his *Divina commedia* (1308–21). Laurinda S. Dixon, ‘Giovanni di Paolo’s Cosmology’, *Art Bulletin* LXVII, no. 4 (December 1985): pp.604–13.

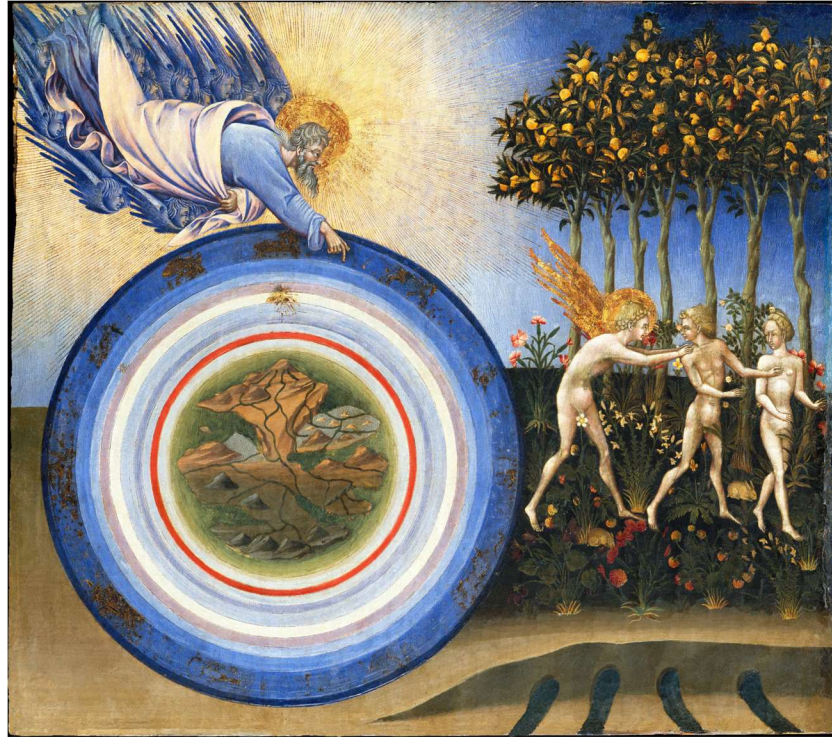


Fig. 3. Giovanni di Paolo's *Creation and Expulsion from Paradise*, 1445 (Public Domain via Wikimedia Comms).

The Spanish artist Fernando Gallego also addressed scientific concerns in his *Creation from Chaos*, dating from around 1488. This ran counter to doctrine, based on Genesis I and prevailing from the second century that God created all things out of nothing. Creation out of Chaos is very clearly and specifically indicated across the bottom of the panel, but the word 'Nille' (nothing) is also seen in the centre, indicating that creation took place 'ex nihilo', whilst chaos is all around outside – combining the two theories.

Education and scholarship were changing with the invention of the printing press which made texts more easily available. The *Nuremberg Chronicle* was printed in 1493 as an illustrated compendium of world history. Derived from the scriptures, the Creation series is remarkably abstract in designs for the first four days, while the later fifth and sixth days, and the larger image of God in majesty in the universe, are in a very different style. Nuremberg was famous at this time for its influential

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university and scholars, most notably the astronomer Regiomontanus (1436–76).<sup>24</sup>

Painted from 1508 to 1512, Michelangelo's Creation cycle on the Sistine Chapel Ceiling begins with a stunning cosmological approach to the creation of the world/universe in the dramatic *Separation of Light and Dark*. The depiction of the *Creation of sun, moon and planet/vegetation* is also very cosmic, as is the image of *God Moving over the Waters*. The scriptural order seems adjusted since Day 4 (creation of sun, moon) is placed right after the separation of light from dark. This seems more logical and in line with modern scientific thinking in which the creation of the sun must precede creation of the planet.<sup>25</sup>

### The Age of Enlightenment to Modern Times

From the late sixteenth and seventeenth centuries, increasing attempts were made at empirical scientific research in many areas but especially in astronomy. In England, great developments were taking place with Professorial Chairs of Astronomy established at Gresham College London (1597), Oxford (1620) and Cambridge (1707), followed by the work of Newton, Halley, and William and Caroline Herschel. The English philosopher and astronomer Robert Fludd (1574–1637) made wide use of visual images – and seems to depict creation *ex nihilo*, by the simple utterance of the word 'FIAT' by the 'prime mover' (Fig. 4, 1617). Other images by Fludd seem like a seventeenth-century explosion – almost comparable to the idea of a 'Big Bang'.<sup>26</sup>

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<sup>24</sup> See <https://nightingaledvs.com/from-creation-to-migration-part-3-cosmology-in-the-small/> [accessed January 2023]. Other examples from this period similarly reflect the established geocentric view of the time, e.g., the Creation of the World from Biblia Latina, Venise, printed 1476 <http://expositions.bnf.fr/lamer/images/3/001.jpg> [accessed January 2023].

<sup>25</sup> E. G. Dotson, 'An Augustinian Interpretation of Michelangelo's Sistine Ceiling,' parts 1 and 2, *Art Bulletin* 61, no. 2 (1980): pp.223–56, and *Art Bulletin* 61, no.3 (1980): pp.405–29. It has also been argued that Michelangelo's *Last Judgment* (1536–41) reflects contemporary cosmology, specifically Copernican heliocentricity: Valerie Shrimplin, *Sun-symbolism and Cosmology in Michelangelo's Last Judgment* (Kirksville, MO: Truman State University Press, 2000).

<sup>26</sup> See Robert Fludd, *De Macrocosmi Principiis*, Caput IX, 1617–19 <https://wellcomecollection.org/works/gbbychu2/images?id=e6hkyp23> [accessed January 2023].

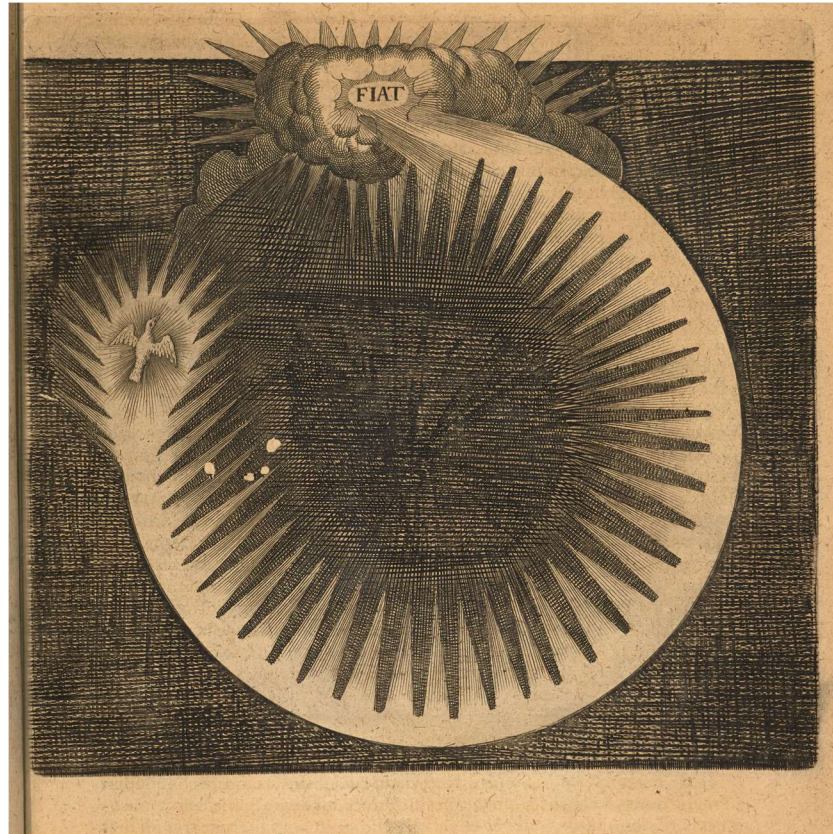


Fig. 4. Robert Fludd, *Fiat*, 1617 (Public Domain via Wikimedia Comms).

An emphasis on chaos continued in literature as Milton wrote of ‘*First there was Chaos, the vast immeasurable abyss... Outrageous as a sea, dark, wasteful, wild*’ (*Paradise Lost*, 1667), and also in popular printed images like the engraving of *The Origin of the Universe from Chaos* 1690, that similarly shows creation out of chaos.<sup>27</sup>

### **The Eighteenth and Nineteenth Centuries**

Just as references to ‘chaos’ appear from the time of the Renaissance (and long before modern Chaos theory), the theme of a more measured and

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<sup>27</sup> See, for example, the anonymous engraving of *The Origin of the Universe*, 1690, <https://commons.wikimedia.org/wiki/File:Chaos-Goeree.jpg> [accessed January 2023].

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scientific approach to Creation also recurs. The idea of measurement and a world based on proportion and number relate to the idea of the Judaeo-Christian God as master-builder or architect. The medieval image of God as architect or geometer from the *Bible Moralisée* (Fig. 1) was used to allegorise difficult passages for lay audiences. The depiction of the creator as architect continued into more modern times, a well-known example being William Blake's *The Ancient of Days*, 1794.<sup>28</sup>

In the nineteenth century, the rebellious Pre-Raphaelite Brotherhood, founded in 1848, longed to return to a purer, more naturalist approach to art by looking back to late medieval and early Renaissance art forms. They emphasised the natural world with an almost religious-like devotion to truth, basing their works on the observation of nature and the study of science.<sup>29</sup> Astronomy and cosmology were a significant source of inspiration, particularly in images of the Creation. The *Six Days of Creation* (1870-76) by Edward Burne-Jones, by contrast, closely follows the Genesis account. The angels (increasing in accordance with the number of days) hold spheres signifying the events with a somewhat mystical approach, as if returning to medieval themes, rather than reflecting the burgeoning science of the age.<sup>30</sup> By contrast, the image of Creation by Brotherhood member George Frederic Watts, *The Sower of the Systems* of 1902, is clearly influenced by contemporary scientific thinking. The 'Prime Mover' is seen as an amorphous robed faceless figure, sweeping across space in the midst of, and merged into, a dramatic swirling of stars, galaxies, nebulae and interstellar dust.<sup>31</sup>

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<sup>28</sup> William Blake, *The Ancient of Days*, in *Europe a Prophecy*, 1794, Fitzwilliam Museum. The image is identified as Urizen, rather than specifically the God of the Bible, but the term 'Ancient of Days' derives from Daniel 7:9f. [http://www.britishmuseum.org/research/collection\\_online/collection\\_object\\_details/collection\\_image\\_gallery.aspx?partid=1&assetid=114621001&objectid=1344764](http://www.britishmuseum.org/research/collection_online/collection_object_details/collection_image_gallery.aspx?partid=1&assetid=114621001&objectid=1344764) [accessed January 2023].

<sup>29</sup> John Holmes, *The Pre-Raphaelites and Science* (The Strathclyde: Association of Human Rights Institutes, 2018).

<sup>30</sup> See <https://theframeblog.com/2012/12/06/a-final-look-at-pre-raphaelite-frames/burne-jones-the-days-of-creation-in-original-frame-ill-sotheby-s-london-13june1934-lot99-harvard-art-museums-colour-pics-sm/> [accessed January 2023].

<sup>31</sup> See [https://commons.wikimedia.org/wiki/File:The\\_Sower\\_of\\_the\\_Systems\\_-\\_G.\\_F.\\_Watts.jpg](https://commons.wikimedia.org/wiki/File:The_Sower_of_the_Systems_-_G._F._Watts.jpg) [accessed January 2023]. Watts was a close friend of the astronomer James South, co-founder of the Royal Astronomical Society.

### The Twentieth Century and Modern Scientific Images

The massive twentieth-century developments in science and astronomy have had a considerable influence on art. Changes in public perceptions took place after proof was found of the expanding universe when Georges Lemaitre noted in 1927 that an expanding universe might be traced back in time to a single point, later termed the Big Bang.<sup>32</sup> Just before then, the egg symbol, as used in ancient Egypt, resurfaced in the bronze statue *Beginning of the World*, by Brancusi, 1924.<sup>33</sup>

With supporting scientific data increasingly available, an intense debate grew between those who considered that the universe started with a single cataclysmic event and those who held that the universe had existed forever in a 'steady state', as proposed by Herman Bondi, Fred Hoyle, and Thomas Gold in the 1940s. Edwin Hubble found evidence that galaxies are drifting apart at high speeds and the discovery of cosmic microwave background radiation in 1964 was crucial for the Big Bang model, a term coined by Fred Hoyle in 1949 to highlight the differences between the two ideas.<sup>34</sup> It supplanted other theories not because of any change in philosophical or spiritual thinking but because of increasingly accurate knowledge about the recession of distant galaxies and of the spatial distribution of sources of radio waves filling the universe. The discovery of cosmic background radiation supported the overriding concept that the universe was created at a single instant, billions of years ago in an immense primeval fireball. As with creation myths, there inevitably remains an almost embarrassing vagueness about the first fraction of a second, or what was there before it, or what God or some other force was doing before then, or whether the laws of physics existed before we formulated them, or even before the processes they describe occurred.

The increasing complexities of scientific insights into the composition of the universe and the manner of its creation appear to have caused a lessening in artistic attempts to depict the moment of creation. Cedric Sorel's *Big Bang*, 2008, clearly has artistic status as well as showing the influence of contemporary cosmological theory.<sup>35</sup> Yet, many images now seem to be the province of purely scientific diagrams, often made for

<sup>32</sup> Impey, *How it Began*, pp.239–64.

<sup>33</sup> See <https://www.centrepompidou.fr/fr/ressources/oeuvre/c6r4n9G>. [accessed January 2023]. The egg symbol incidentally also forms the basis of the cover design for Stephen Weinberg's book, *The First Three Minutes* (Fontana, 1987).

<sup>34</sup> Hoskin, *History of Astronomy*, p.315f.

<sup>35</sup> For an illustration, see: [https://commons.wikimedia.org/wiki/File:Big\\_bang.jpg](https://commons.wikimedia.org/wiki/File:Big_bang.jpg) [accessed January 2023].

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popular publications by Hawking, Smoot and others.<sup>36</sup> Artistic representations of the Creation of the universe seem to have become less usual in recent decades, but it is important to remember that NASA employs space artists and the International Association of Astronomical Artists (IAAA) is flourishing.

Looking at creation images in the context of contemporary science, such images are useful in explaining theory to non-experts. They can be used to elucidate theories to fellow experts but also, like many religious images, they are often used to explain matters to the general population, such as the use of images by NASA, specifically aimed at non-specialist audiences, and discussed further below. The question is at what stage ‘scientific’ images used for a particular purpose may be accorded the status of art works. In both the steady state and big bang approaches, a major issue seems to be whether the physical universe had a specific temporal origin and whether science can help explain it more effectively than theology or philosophy. Even the ‘Big Bang theory’ has more recently been challenged.<sup>37</sup> ‘Creation’ seems to require some type of external agency or force, whereas continuous inflation may not. These questions will always go beyond science alone and visual images are important for the way in which they may be used to explain such complexities. Each era considers its own theory the correct or ‘best to date’, and future ages will no doubt be amused by the way our current estimates vary between 13.6 and 13.8 billion years ago.

Images included in recent popular publications by astronomers and astrophysicists like Penrose, Rees and Hawking are largely scientific diagrams rather than art works with artistic merit and status. On the other hand, religious booklets still often revert to images directly in line with the Genesis account, but they lack in aesthetic merit, nor are they worthy of true artistic status.<sup>38</sup> Images such as *Blue Creation Painting*, 2020 by Bill

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<sup>36</sup> Stephen Hawking, *The Universe in a Nutshell* (London: Bantam, 2001), especially pp.86–87, 156 and 168–69. See also George Smoot, *Wrinkles in Time: The Imprint of Creation* (London: Little Brown, 1993), plate opposite p.183.

<sup>37</sup> See, for example, <https://webb.nasa.gov/content/features/bigBangQandA.html> and <https://www.space.com/james-webb-space-telescope-science-denial>. In spite of various arguments and some misquoted and popularised comments on the findings of the James Webb Space Telescope that went viral in August 2022, the JWST has not disproved the Big Bang, nor that it did not happen.

<sup>38</sup> For example, <https://www.amazon.com/Creation-World-International-Version-Revolving/dp/1562820966> and <https://www.shutterstock.com/image-vector/vector-illustration-creation-world-92846119> [accessed January 2023].



Bell, clearly refers to Genesis, although the background seems to show ‘the beginning’ looking more like a big bang. An example from [bibleinfo.com](http://bibleinfo.com) ‘7 Days of Creation’ is clearly influenced by science because the primeval light is shown as a light bulb! The image of the egg with planets spilling out (2015) adds a completely new approach whilst still based on the ancient idea of the egg symbol for creation.<sup>39</sup>

Best known of all, perhaps, amongst modern images is the famous NASA image ‘The Big Bang and the Expansion of the Universe’ of 2012 (Fig. 5) which is actually the modern equivalent of the Sistine Chapel Ceiling, using visuals to explain complex theory to specialists and lay people alike. A whole series of data cannot be comprehended as easily as a visual image that really drives home the concept.<sup>40</sup>

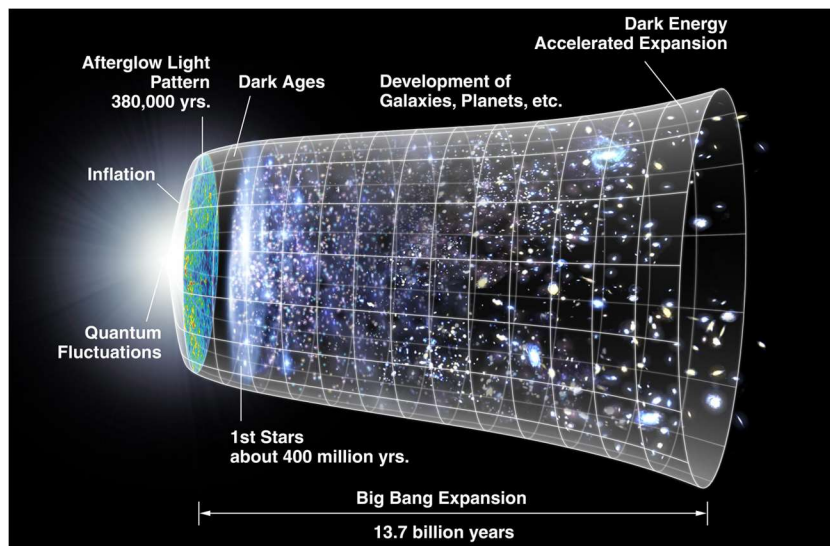


Fig. 5. The Big Bang and the Expansion of the Universe 4 Aug 2012 (NASA).

<sup>39</sup> To be found, respectively at: <https://fineartamerica.com/featured/blue-creation-bill-bell.html> [accessed January 2023]; <https://www.bibleinfo.com/en/questions/what-are-7-days-of-creation> [accessed January 2023]; and <https://www.pxfuel.com/en/desktop-wallpaper-odgxm> [accessed 6 June 2023].

<sup>40</sup> <https://www.jpl.nasa.gov/infographics/the-big-bang-and-expansion-of-the-universe> [accessed January 2023].

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To sum up, Figure 6 presents a table that is a condensed summary of the way that, as different theological and scientific theories have evolved, so too has the use of visual imagery in explaining such themes and ideas, whether to specialists and ‘those in the know’ (priests and/or scientists) or to the general public, extending nowadays even to the young/children.

Century	Date	Title/place of image/s cited	Key features	Science – prevailing ideas
10-11 <sup>th</sup>	c 1000	Junius ms. Bodleian	Dome above flat earth	Flat earth, Cosmas Indicopleustes; compare Aristotle, Ptolemy, Augustine, Bede
11-12 <sup>th</sup>	11-12 <sup>th</sup> c.	Girona Tapestry	extra scenes (e.g., Lux Tenebris), Eve from Adam's rib	Influence of Gerbert 946–1003; 12 <sup>th</sup> century renaissance; Sacrobosco 1195–c.1256
Early 13 <sup>th</sup>	1215-80	St Mark's Venice	Dome of Heaven, Byzantine style	Byzantine influence; compare Monreale, Palermo
13 <sup>th</sup>	13 <sup>th</sup> c.	Codex Vindobonensis	Dividers, or pair of compasses	More measured and mathematical; increasingly scientific; Sacrobosco,
Late 14-15 <sup>th</sup>	1405	York Minster	Details of commission known	Effect of black death; postponed the Renaissance. Oresme, Cusanus
15 <sup>th</sup>	1445	Giovanni di Paolo	Influence of Sacrobosco	Regiomontanus
Late 15 <sup>th</sup>	1488	Fernando Gallego	Chaos idea; also Nille (nothing) at the same time	Combined approach. Nothing (in centre); surrounded by Chaos
Late 15 <sup>th</sup>	1494	Nuremberg	Very abstract	Printed/multiple, accessible copies; Regiomontanus
16 <sup>th</sup>	1508-12	Michelangelo Sistine	Very different	Giles of Viterbo (cf. Copernican influence on Michelangelo's Last Judgment)
17 <sup>th</sup>	1617	Fludd and anon.	'FLAT' – compare with Milton	Tycho, Galileo, Kepler, Descartes, Newton, Halley. Chairs in Astronomy
18 <sup>th</sup>	1794	Blake	Return to mathematical geometric	Scientific (and compare Bible moralisée type). Herschels.
19 <sup>th</sup>	1870-76	Burne-Jones	Adheres to 6 days (numbers of angels)	Reverts to Genesis
20 <sup>th</sup>	1900s	Brancusi, Dali, Chagall	Very personal approach to current scientific developments	Einstein, Eddington, Hubble, Lemaitre, Hoyle
21 <sup>st</sup>	2000s	Sorel, NASA	More abstract	Penrose, Rees, Hawking
21 <sup>st</sup>	2010s	Astrophotography, Association of Astronomy Artists, Text books etc	Scientific themes but also book/children's illustrations of Genesis	Scientific diagrams; books for general public and children; religious booklets (artistic status?)

Fig. 6. Table of key dates, artworks and scientific theories and developments (V. Shrimplin).

The tradition of visual images of the universe (from ancient Egypt to NASA) both precede and go beyond Judaeo-Christian depictions of the Creation. The makers of these images, their advisers and sources used seem to have been based not only on theological exegesis but also on scientific

knowledge and theory that was part of the same approach at the time. It has always been a major purpose of art to inform as well as inspire those who look to the heavens on a dark night to ponder whence the universe and ourselves came.

Astronomical and cosmological phenomena have had a profound influence on human spiritual thought and inspiration, and cosmology and theology were, and still are, inextricably linked. Consideration of the above sample (albeit small) indicates that changing scientific knowledge and views do appear to have influenced the way that creation accounts have been depicted.