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MARGARET WERTHEIM

LOST IN SPACE:
THE SPIRITUAL CRISIS OF
NEWTONIAN COSMOLOGY



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THE MAD SCIENTIST PLOTTING WORLD DOMINATION IS A FICTION. BUT IT IS NO FICTION THAT THE MODERN SCIENCE WHICH WE IDENTIFY WITH THE ROYAL SOCIETY WAS A PROFOUND CHALLENGE TO EXISTING WORLDVIEWS AND SYSTEMS OF MEANING. JUST HOW PROFOUND IS EXPLORED BY MARGARET WERTHEIM, WHO WONDERS WHETHER WE HAVE YET COME TO TERMS WITH THE CHANGE.

STARSHIP DREAMING

The Starship *Enterprise* heads into the void, its warp drive set to maximum, its crew primed 'to boldly go where no man has gone before'. The drive engages, a burst of light flares out from the rear engines and with an indefinable Woosh ingrained in the minds of *Star Trek* fans everywhere, the world's most famous spaceship disappears from our screens and zaps across the universe to a far distant galaxy. As one of those besotted millions, I am not here to quibble about the scientific 'errors' in Gene Roddenberry's masterpiece; as far as I'm concerned 'Beam me up, Scotty' remains the most thrilling line on television. What I wish to discuss here is an underlying

premise of the series that has tugged at the back of my consciousness since childhood. The crew of the *Enterprise* take it for granted – as do real-life physicists, astronomers and SETI enthusiasts – that our cosmos is a homogeneous space ruled everywhere by the same physical laws. Such continuity is logically necessary if humans are ever to travel to the stars or communicate extraterrestrially. So essential is the idea of spatial homogeneity to modern science it has been named 'the cosmological principle' and it serves as the foundation of our faith that if indeed we are *not* alone then we will share something meaningful with our alien confrères – the Laws of Nature.

In the realms of both science fiction and science practice the importance of this principle is hard to overstate, for it underpins physicists' confidence that the patterns of behaviour discovered here on Earth will govern distant worlds. Apples, planets, stars, galaxies, black holes and the explosive aftermath of the big bang are all compelled by gravity's unifying force. The *Enterprise* can set its navigation system to any spatial coordinates precisely because the cosmological principle assures its crew that when they arrive the physics they know and trust will still be working. In contrast to biology, whose plasticity *Star Trek* writers gleefully celebrate in a myriad polymorphous modes, the laws of physics remain the same everywhere – they are the Platonic ideal at the core of an otherwise capricious cosmos. It is physics that makes ours a *uni-* rather than a *multi-*verse.

To citizens of the twenty-first century the cosmological principle may seem close to tautological. For us *space* is now an arena to be measured and mapped, 'the final frontier' on which we have imposed a metric of parsecs and light years. Yet the idea of spatial continuity was one of the more contentious propositions of the scientific revolution and its consequences have been far reaching. I want to argue here that adopting this view set the stage for an unbearable tension between science and Christianity and has problematised the very concept of a human 'self'. In essence, concepts of space and concepts of self are inextricably entwined so that when a culture

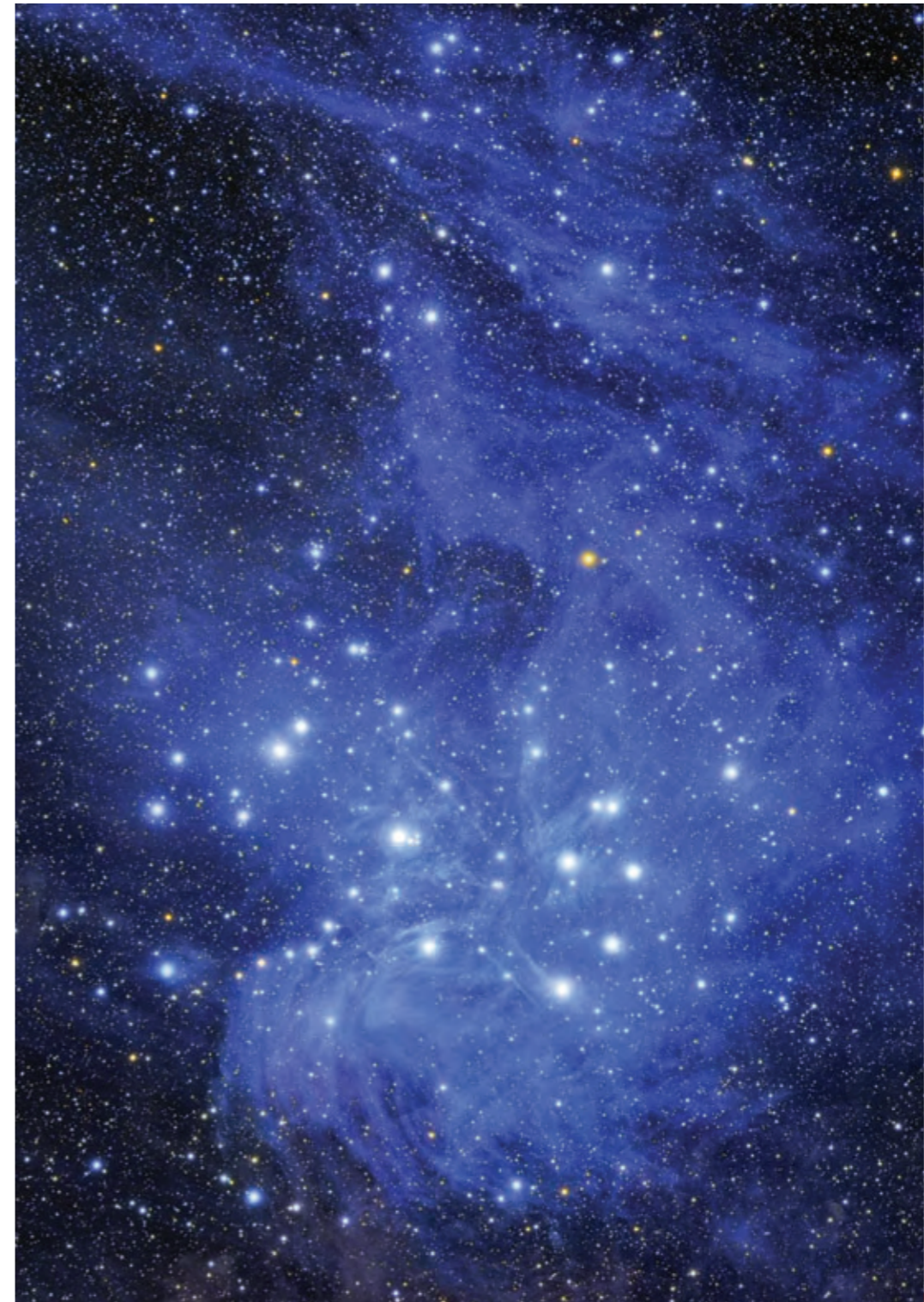
adopts a new conception of space, as Western culture did in the seventeenth century, it impacts our sense of not merely *where* we are but of *what* we are. While Newton's synthesis famously united the heavens and Earth, it tore a hole in our social fabric that we are still struggling to comprehend and whose consequences continue to reverberate in the US 'war' between science and religion.

A SHORT HISTORY OF SPACE

The magnitude of the transformation taking place in the sixteenth and seventeenth centuries was not lost on any of its participants. Copernicus, Kepler, Descartes, Galileo and Newton all understood that what was at stake in the revolution under way was the fate of the Christian soul. Each of these men stood on the side of God and argued that the emerging cosmology supported a case for the divine. What all of them feared was a universe stripped of spirit. They believed in a Holy Spirit whose Love *in-formed* the world and in the immanent spirits of their fellow human beings; in 'the new astronomy' they saw the reflected glory of their Creator, whose presence in the material universe supported their faith in Christianity's promise of the soul's eternal salvation. As Johannes Kepler summed up the case: 'For a long time I wanted to become a theologian ... Now, however, behold how through my effort God is being celebrated in astronomy.'

The literally soul-destroying potential of the new cosmology hung like a cloud over the consciousness of seventeenth-century science and the source of this angst originated in concerns quite apart from its mechanistic tendencies. By the middle of the sixteenth century thoughtful minds had begun to discern that the idea of continuity between the terrestrial and celestial realms threatened the foundation of Christian faith as it had been construed for 1,500 years. By supplanting the geocentric finitude of medieval cosmology, the new science threatened to undo the metaphysical balance between body and soul on which Christian theology relied.

Opposite:
Pleiades star
cluster. Around
440 light years
from Earth.



Contrary to accounts given in many popular science books, medieval cosmology was underpinned by a rigorous logic that attempted to encompass the totality of humans as physical, psychological and spiritual beings. Medieval scholars read the world in an iconic rather than a literalist sense; nature was a rebus in which everything visible to the eye represented multiple layers of meaning within a grand cosmic order. The physical world was the starting point for investigations that ultimately sought to comprehend a spiritual reality beyond the material plane and what is so beautiful here is that the metaphysical duality of body and soul was mirrored in the architecture of the cosmos.

As is well known, the medieval cosmos was finite, with the Earth at the centre surrounded by concentric spheres that carried the Sun, the Moon, the planets and stars revolving around us. Beyond the sphere of the stars was the final sphere of the universe proper, what the medievals, following the Greeks, called the *primum mobile*. Technically this constituted the limit of the universe – here, as Aristotle argued, space and time ended. Critically, because physical space was finite, medieval minds could imagine that ‘beyond’ the material world there was plenty of ‘room’ left for some other kind of space. On medieval cosmological diagrams we see it labelled the ‘Heavenly Empyrean’. What lay ‘beyond’ physical space was the spiritual space of God and the soul.

In the final stanzas of *The Divine Comedy* Dante enacts this transition. Having traversed the span of his universe from the depths of Hell in the centre of the Earth, up the purifying mountain of Purgatory and through the celestial layers, Dante pierces the shell of the *primum mobile* and bursts through the skin of the world to come face to face with God, ‘the Love that moves the Sun and the other stars’. For medieval thinkers *this* spiritual domain was the primary realm of the Real with the physical realm serving as a secondary and rather pale reflection. Just what it meant to have a ‘place’ outside physical space was a question that much exercised medieval minds – no scholar of the Middle Ages believed that Heaven lay literally

beyond the stars. Yet whatever the philosophical difficulties, scholars of the time insisted that physical space was not the totality of reality but one half of a larger metaphysical whole.

This dualism of body and soul – matter and spirit – was mirrored in a dualism that was believed to exist between the terrestrial and celestial realms. Again, following the Greeks, medieval natural philosophy held that the two regions were qualitatively distinct regions: in the terrestrial realm things were made up from the four mundane elements, earth, air, fire and water; those in the celestial realm (stars, planets, comets and so on) were composed of a fifth element, or quintessence, also known as the æther. Everything in the terrestrial realm was subject to decay and death, those in the heavens were believed to be eternal, prone neither to decay nor change. Subtleties compounded, for the celestial realm was not itself homogeneous.

Fourteenth-century Italian Renaissance poet Dante Alighieri holding his book *The Divine Comedy* against the backdrop of Hell, Purgatory and Paradise. Painting by Domenico Michelino, 1465.



Ascending from the surface of the Earth medieval cosmology posited that in each successive sphere things became more ethereal. In effect, celestial space exhibited a vector of grace: the closer one got to God, the more 'pure' the region was said to be. Within the scheme of medieval cosmology, celestial space thus served as a mediating zone between the purely material realm of the Earth and the purely spiritual realm of the Empyrean. To put it another way, the celestial heaven of the planets and stars stood as a metaphor for and pointer to the religious Heaven of God and the soul, and the whole of medieval thinking rejoiced in this analogy.

But what if terrestrial space and celestial space were not qualitatively distinct? What if the cosmos was a homogeneous domain? Just such an idea began to bubble into European consciousness during the fifteenth century forming the seeds of what would become, in the seventeenth, a full-blown reconfiguration of Western cosmological thinking.

The first person to express this vision in anything like its modern form was a cardinal of the Roman Catholic Church, Nicolas of Cusa, who completed in 1440 a masterpiece of scientific proleptics entitled *On Learned Ignorance*. The universe Cusa proposed had no crystal spheres and no hierarchy of planets; in one daring swoop he abolished the distinction between the 'base' Earth and the 'ethereal' heavens, positing that the stars and planets were also mundane material bodies. Cusa's cosmos was infinite – 'unbounded' is the word he used – a space in which all regions were materially and spiritually on par. He even suggested that other stars were peopled by other physical beings, an idea that would not be broached again for 150 years. Cusa's ideas were too radical for most of his contemporaries, but in the sixteenth century the tectonic plates of the Western psyche began to shift, resulting in the work of Copernicus and all that came after him.

Why was such a shift occurring? After all, the medieval world picture had held stable as a philosophical construct for more than a thousand years. The telescope had not yet been invented, astronomical observations were not qualitatively better, the Ptolemaic model continued to yield reasonable

results. Cosmological technologies were not perceived to be failing. So what *was* going on? Astronomy wasn't undergoing a crisis, nonetheless underlying conceptions of how reality might be were beginning to change. We know this primarily not from what scientifically minded thinkers were saying but from what painters were doing. Long before the rise of science a new Western attitude to space was apparent in the realm of art, and to understand the cosmological transformation wrought by Galileo and Newton in the seventeenth century it is instructive to turn first to the frescoes of Giotto. Here we can see explicitly the spiritual stakes that were coming into play as Europeans began to feel their way out of a medieval world.

Along with medieval philosophy, medieval art focused on the numinous realm of the soul. Art also was iconic, aiming to represent the spiritual order beyond the material world. One way of conveying that order was through scale; thus Christ would be the largest figure in a painting, with angels next in size, followed by saints and martyrs, then ordinary human beings. Backgrounds too were iconic; gold and azure represented Heaven, whose value was viscerally present in exorbitantly expensive gold leaf and lapis lazuli pigments. Depth was almost absent from these images. But in the late twelfth century representation began to undergo a subtle transformation with a gradual interest in three-dimensionality starting to emerge. This new style reached a crescendo with Giotto's work in the Arena Chapel in Padua in which he depicted a sequence of near-life-sized images recounting the life of Christ. What is immediately startling about these Christ Cycle frescoes is their sense of physical presence. Figures look solid and are anchored to the ground as if compelled by gravity. We are clearly no longer in Heaven but on Earth. Everyone appears at the same scale: Christ and humans and angels. Flat blue and gold backgrounds are replaced by attempts at genuine landscapes; there are mountains, trees and carefully observed studies of animals. Buildings seem to be leaping out of the surface. True, they are not entirely convincing, but one feels here that the artist is striving to convey three-dimensional space.



View of the south wall of the Arena Chapel depicting scenes from the Life of Joachim and Anna and the Life of Christ, by Giotto di Bondone, circa 1305.



Opposite: Giotto's *The Last Judgement* in the Arena Chapel in Padua, a great example of classical medieval spatial representation.

All this was in keeping with a revived interest in the natural world. After the hiatus of the early Middle Ages, scholars had begun to recover the science and mathematics of ancient Greece, and during the thirteenth century the study of nature underwent a renaissance. With his careful attention to empirical detail, Giotto reflected this novel scientific bent. For artists and their patrons (many of whom were leaders of the Catholic Church) the observations of the outer eye were becoming more interesting than the revelations of the inner eye. In short, visual attention was shifting towards the material realm.

Paradoxically, this refocusing from spirit to matter was given credence by a novel theological development and it is here that science and religion intersect in a uniquely Western way. As Europeans recovered the heritage of the Greeks one thinker they increasingly encountered was Pythagoras, a mathematician and mystic who had dreamed the dream that would become modern physics. In the fifth century BCE Pythagoras posited that the structure of the world was determined by mathematics: 'All is number', he famously declared. A small band of medieval thinkers took Pythagorean

precepts and transformed them into a Christian context, giving rise to the then-novel idea that God had created the material world according to mathematical rules.

Among God's primary tools was Euclidean geometry and in 1267 the Franciscan friar Roger Bacon argued in a treatise to Pope Clement IV that artists ought to follow their Creator and construct images accordingly with



The Greek philosopher, mathematician and scientist Pythagoras.

geometric relationships. Bacon called the new style 'geometric figuring' and he proposed that the Church encourage painters to adopt it as a matter of principle. Artists who did so would not just be rendering Creation truthfully, Bacon said, they could also serve a powerful propaganda purpose, for according to him the techniques of three-dimensional verisimilitude were so psychologically powerful that viewers beholding such images would believe they were actually witnessing the scenes depicted. They would believe they were really *seeing*, for example, Christ raising Lazarus in front of them. To put this into current parlance, Bacon was suggesting that 'geometric figuring' acted as a kind of virtual reality and, as he saw it, this medieval VR would have the power to convert unbelievers to the Christian faith.

From the fourteenth through sixteenth centuries artists elaborated Bacon's vision with ever-greater finesse, a movement that culminated in the formalisms of 'linear perspective'. The consequences of this representational revolution reached far beyond the painted surfaces of the churches from which it began. Art historian Samuel Edgerton has argued that 'geometric figuring' retrained European minds to see space in a Euclidean sense and that in this respect Renaissance artists from Giotto through Raphael paved the way for the physicists who came after them. Edgerton's thesis helps make sense of a historical conundrum, for following Aristotle most Western thinkers pointedly rejected a Euclidean view of space. As physicist and science historian Max Jammer has stressed, such a view of space was not 'thought reasonable until the seventeenth century'. No other culture we know of has conceived of its cosmic scheme in this mathematical manner, and even in the West most learned people rebelled against the idea for several hundred years. Perspectival painting served to introduce the concept as a visceral *experience*, subverting intellectual objections by giving viewers a powerful psychological illusion that the painted scenes they were looking at were actually there.

By the mid-sixteenth century, educated Europeans were coming to believe that the space around them here on Earth *was* a Euclidean realm.

But that raised an uneasy question: How far out does this space extend? Does it extend to the Moon? To Mars? To the Sun and stars? Though not articulated in quite this form during the Renaissance, the question assumed immense importance because it challenged the medieval distinction between the terrestrial and celestial realms. If Euclidean space proceeds beyond the Earth then that suggests that similar laws and similar things should be found in both regions.

The unification of the two domains was of course cemented by Isaac Newton and in some ways it remains his most profound legacy. Newton showed that the same force of gravity that makes an apple fall to the ground also operates to keep the Moon revolving around the Earth and the planets orbiting the Sun. Newton's law (a Pythagorean triumph if ever there was one) demonstrated an essential continuity, for if gravity operates between celestial bodies then they *too* must be mundane matter like the pebble that rolls down a hill. Moreover, once astronomers abandoned the medieval distinction between earthly and celestial space, there was no longer any reason to imagine a limit to the physical world. Why should physical space not go on for ever? By the end of the eighteenth century, that view had become scientific orthodoxy.

WHERE IS HEAVEN?

This new cosmology had profound theological consequences, for with physical space extended to infinity there was literally no room left for Heaven. One could say, as liberal theologians *do*, that the realm of the soul is simply beyond the material plane and leave it enigmatically at that, yet with physical space infinitised the whole question of what a 'beyond' might constitute became increasingly problematic. For better or worse, one of the consequences of the scientific revolution was to write out of Western cosmology any sense of spiritual space as a legitimate aspect of the Real.

Newton himself was concerned about the matter and tried hard to

rescue the situation by associating space with God. Picking up on a tradition that originates in Judaism, he posited space as the medium through which the deity's presence permeates the world. Space, he said, was God's *sensorium*, the substrate through which He sees all, feels all, knows all. Space was indeed synonymous with divine Knowing. As President of the Royal Society Newton understood that the new science had to do much more than make empirical predictions – it had to be acceptable to reasonable society. Galileo and Descartes had both run afoul of such expectations about what a cosmology should deliver and Newton was determined not to make the same deistic mistake. As Britain's leading representative for science, he comprehended that neither the people nor the patrons would support the endeavour if it was seen to be in conflict with wider spiritual needs. The Royal Society stood on the side of reason, but it also allied itself with the state, the King and God. All this wasn't just a propaganda exercise, for psychologically speaking, Newton needed reasons to accept the new space himself – God made the void 'reasonable' to *him*.

Newton had good cause to worry, for soon after his death less religious minds stripped the theological embellishments from his system leaving humans alone in the void. Increasingly in the age of science we have confronted the dilemma that if we want to claim something is real, we have to posit its position in physical space. If one can't point to coordinates on a map, then more and more one invites the accusation that whatever it is, is not real at all. Hence the liberal theological dilemma about Heaven. Where is it? Both Hell and Purgatory could easily be abandoned, but Heaven – the domain of human salvation – is critical to Christian integrity. The soul also became collateral damage as 'Man' was transformed into 'an atomic machine'. Without its own *place* in the cosmic scheme, the spirit was disenfranchised. Humans became mere bodies, flecks of dust residing on a chunk of rock orbiting a small and insignificant star in the outer suburbs of a very mundane galaxy. We moderns are not only not at the centre of the universe, as spiritual beings we actually don't exist in this world.

POST-NEWTONIAN SPACE

During the twentieth century physicists developed a post-Newtonian vision of space beginning with Einstein's relativity theories and proceeding to so-called 'hyperspace' theories. How have these ideas impacted on the discussion above? Relativity compounds the problem in a truly fascinating way. General relativity, which is the cosmological version of Einstein's ideas, replaced the three-dimensional Euclidean void of Newton's cosmology with a four-dimensional Minkowskian void that now includes *time* as part of the spatial matrix. Physicists call it *spacetime*, and treat time as effectively another dimension of space. From a theological perspective the consequences here are non-trivial because in a purely relativistic cosmos nothing really 'happens'. Time unwinds itself in a manner predetermined by the tensor equations; nothing evolves or comes into being that wasn't already inherent at the start. In a purely relativistic cosmos (where there are no quantum effects) time is thereby neutered: there is no *happening* whatever. From a four-dimensional perspective the universe *just is*, complete and whole as a pre-set form. If this cosmos is a thought in the mind of God, it is one that is effectively static. Now that might be OK for God – who has always been said to see time whole – but it is not OK for human souls whose destiny cannot be pre-ordained. Christian theology demands that time be open so that individuals truly have a choice about what decisions they make. As moral beings our 'worldlines' cannot be set by analytic equations; for Heaven to mean anything, we must be able to act on our own *volition*. In short, the Christian concept of salvation requires a concept of spacetime that is more dynamic and incomplete than relativity allows.

Hyperspace theories add further complications. These theories extend Einstein's concept of space from four dimensions to ten or eleven. Where Einstein folded time into the spatial matrix, hyperspace theories aim to fold in everything. Here matter itself becomes a by-product of the shape of space. In hyperspace theories there is actually nothing

but space curled up into patterns – everything that exists from protons and petunias to planets and people is at core complex enfoldings of space. The English physicist Paul Davies has called this 'structured nothingness'. We may think of it as a kind of cosmic origami. At the start of our universe, space had *no* structure – it was simple and unformed like a blank sheet of paper, then as time proceeded the 'paper' crinkled up into ever more elaborate structures, eventually giving rise to the complexities we see today.

Where does this take us theologically? Unlike relativity's God, the God of hyperspace theory is an active and dynamic Creator. As a fan of origami it thrills me to think of Him whiling away the tedium of eternity folding space into increasingly subtle forms. He is an architectonic genius, a veritable master of structure. A standing ovation for origami God, I say. But where do *we* stand in this picture? Is there a place in the hyperspace cosmos for humans as spiritual beings? It seems to me there is not – at least not in a way that I believe was a central aspect of the medieval world picture. In the hyperspace vision of cosmology, space becomes not just the *arena* of reality, as it was for Newton and Einstein, but reality itself. Here, there is actually nothing but structured space. This is an extraordinary philosophical move. Newton's cosmos contained three fundamental things: matter, space and force (epitomised by gravity). With hyperspace theories there is now just one fundamental thing – space – everything else being a by-product of this fundamental 'stuff'. What we have here is literally a post-material account of the world, for matter has now been relegated to secondary status. At first glance that might seem like a good thing for the spiritualists, and some people have tried to read it that way. Western culture has a long tradition of opposing matter and spirit, so something that is *not* matter can easily be read within this tradition as *ipso facto* spiritual. I believe such optimism will prove to be as historically futile as Newton's hope that space would be read as God's *sensorium*.

The problem is that in hyperspace theories everything is reduced to a seamless monism. Everything is collapsed into a single category. This is precisely the mistake that Descartes sought to avoid with his infamous dualism. As a man of science Descartes wanted to articulate what the new science could do, but as a devout Catholic he also wanted to preserve the gift of Christian salvation. His answer was to postulate two distinct 'realms' of experience: the *res extensa* or extended realm of matter in motion, and the *res cogitans*, the 'realm' of thoughts, feelings, morality and spiritual consequence. The new science would tell us about the former, but for Descartes science would have nothing to say about the latter. In effect, Descartes tried to preserve the dualism inherent in medieval thinking while also opening up the possibilities he so boldly saw in the emerging science. As a Catholic, he understood that the Christian soul could not be bound by mathematical laws, and since he believed that mathematics *was* the language of the material world there had to be some 'realm' apart from those laws.

Descartes failed in the same sense that Newton failed; his theological trappings were stripped away by later generations who took what he had done and used it to promulgate a purely secular cosmology. Since the Enlightenment we have come to use the word 'cosmos' to mean the purely physical world and 'cosmology' to mean our concept of the material domain alone. We have forgotten the wider picture in which 'the cosmos' encompassed multiple levels of being; we tell ourselves that older cosmologies are childish tales and that we moderns supposedly have outgrown these stories and faced reality 'squarely' to work out where we 'truly' are.

SPACE AND SELF

In discussions about science and religion it is often noted how corrosive a mechanistic philosophy was to the Christian idea of a soul; what is not widely understood is how important a role our conception of space has

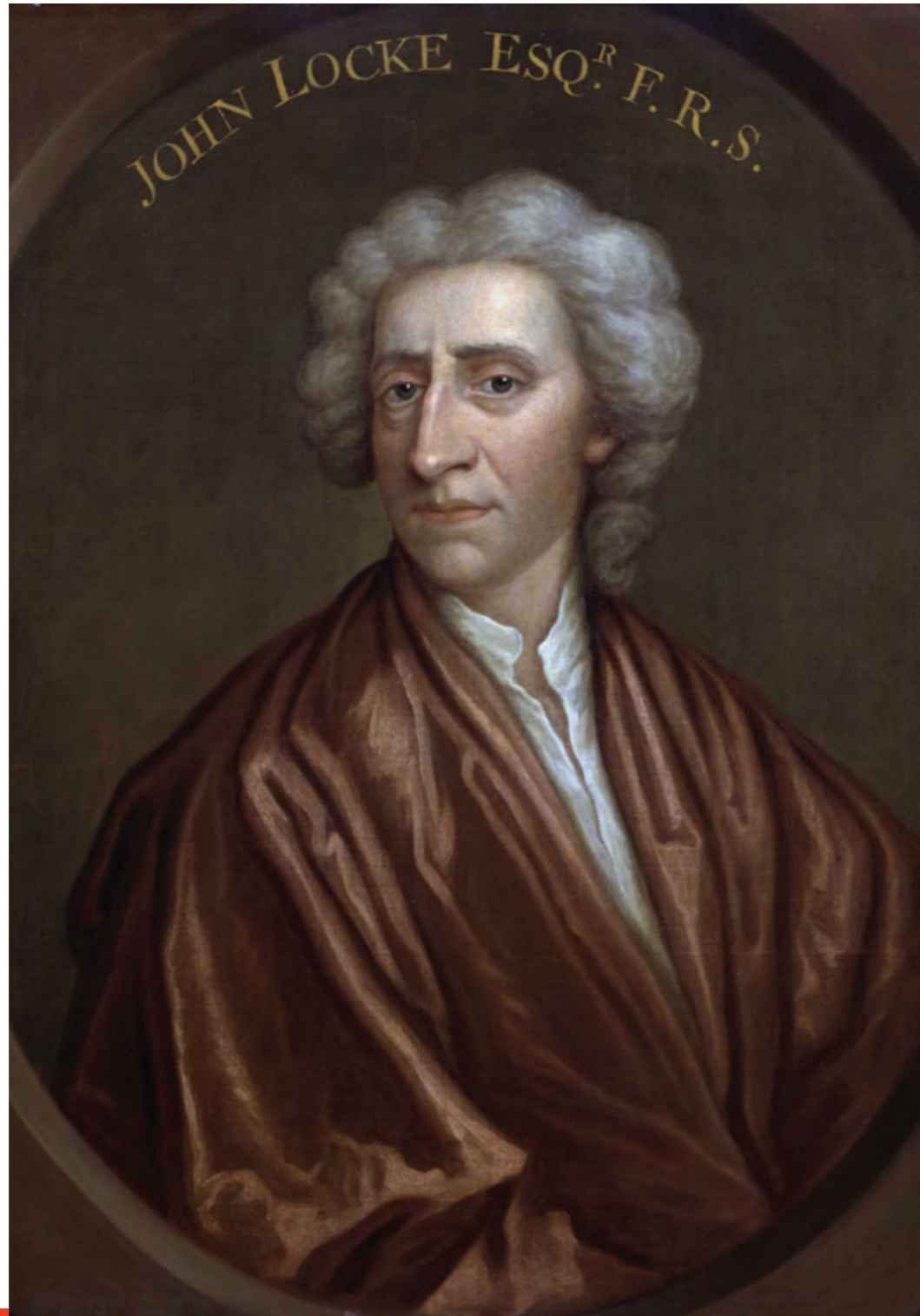
played in this story. Eighteenth-century natural philosophy was premised on a neutral, homogeneous, infinite and passive space. The very qualities of Euclid's ideal that made it such a fruitful foundation for the development of physical science are just the qualities that have become so problematic for those who wish to assert the reality of a 'spiritual' plane of being. For medieval Christians, a dualistic conception of the human person went hand in hand with a dualistic spatial scheme; with the advent of a purely physicalist world picture it has become increasingly difficult to argue for the reality of *any* kind of non-physical dimension to human existence.

Christians are not the only ones who might be troubled by this development. Secularists can be concerned too, for the equation of physical space with the totality of 'reality' also problematises the idea of a human *self*. What does it mean to say that the self exists if we cannot locate it on a map? In talks I give about this subject I am sometimes asked during question time to 'prove that the self exists'. It is always a young man who makes this demand and he is usually a student of physics or philosophy. He is well read and he means his question in earnest. He does not believe that the self exists and he wants me to prove it does. At first I was puzzled by this demand, then I realised how I should answer: If the self does not exist, I say, then *his* self doesn't, so I shall move right along to a question from someone who does. I assume there are some selves in the room who do exist.

But are there? In the mathematically defined space of modern cosmology do any of us exist?

A SCIENCE OF MIND

In the early eighteenth century, the philosopher John Locke claimed that it wasn't stable for a society to have only a science of body. According to Locke, we would eventually need to develop a complementary science of mind, which is what Freud attempted in the late nineteenth century. The psychoanalytic tradition of the past century may be read, in part, as one



Opposite:
Portrait of John
Locke, after Sir
Godfrey Kneller.

reaction to the cosmological shift that took place two hundred years earlier. Freudian psychoanalytics and its many descendants are attempts to make sense of the self in a non-spatial framework and in a very real way to get beyond the metaphysical dualism of our Christian and Greek heritage. Personally I find myself greatly in sympathy with the whole exercise and although I think its therapeutic effects are easily overstated, I do believe the psychoanalytic stream of theory and practice is a powerful response to what remains within our society a cosmologically inspired trauma.

I do not mean to propose here that every individual is personally feeling this rent; but it is clear that a great many of us are. For all of the immense practical and epistemic triumphs of modern scientific metaphysics, which is premised on a homogeneous continuous conception of space, it is manifestly not being accepted by huge slabs of our population. Reactions against it have been vast and varied from William Blake's scathing poetic critiques (that science would 'conquer by rule and line' and 'unweave the rainbow'), to Alfred Whitehead's enigmatically difficult 'process philosophy', which attempts to articulate a reality in which neither matter nor mind take precedence, rather both are artefacts of a fundamentally procedural world. Intellectual alternatives to pure physicalism are myriad: Teilhard de Chardin, Loren Eiseley, Mircea Eliade and Rupert Sheldrake may all be read as responses, to say nothing of the exponentially expanding volume of New Age literature. To the continuing horror of many champions of science, belief in astral planes, psychic channelling, reincarnation and past lives seems to be growing stronger.

In part I believe what this represents is a widespread social refusal of spatial monism. Whole sectors of our society are just not buying it! More than twenty million people bought *The Celestine Prophecy* (it is one of the most successful books of all time), which posits that when we become the beings we ought to be our souls 'cross over' (via some processes of quantum mechanics) to a higher spatial plane. In the age of science, one of the most pervasive fantasies is indeed the existence of other spaces of being: from the

X-Files and *Buffy the Vampire Slayer* to *Lost* and *Battlestar Galactica*, our television screens offer a steady diet of realities in which multiple spaces and planes of being co-exist. (Cyberfiction offers yet another response – the fantasy of downloading one’s mind into a computer to live for ever in a virtual world is nothing more, though a good deal less, than a technological version of Heaven.) One of the great philosophical projects of the post-Enlightenment era has been to articulate non-spatialised conceptions of the self in relation to the cosmos; yet judging by the evidence of the most pervasive medium on our planet the enterprise has met with little success in a sociological sense. Even science fiction writers – Carl Sagan, no less – keep on inventing wormholes through the physio-spatial matrix to *other*, suspiciously spiritualised, places of being.

Those of us who love science may choose to interpret all this as a kind of play, and in some sense it is, but the refusal to accept spatial monism is also in part fuelling the rise of Creationism and other fundamentalist brands of Christianity. At the same time that spatial monism erased the division between earthly and heavenly space, it also provided a platform for erasing any fundamental distinction between living and non-living things. In the new era of science, *continuity* itself became the epistemic model – the continuity of the laws of nature, the continuity of space, the continuity of matter, the continuity of life. No body is special, because no thing is special, because no place is special. Humans are related to apes because, in the end, we are all just inert matter floating in a homogeneous void. The fundamentalist rebellion against Darwinism is not just a rejection of the continuity proposed by biology but in a wider, and less obvious way a rejection of the very premise of totalised cosmic continuity. Christians who insist on a space for the soul wish to reclaim that part of the medieval world picture that literally gave a *place* to moral human agents. Though I do not endorse their specific responses, I believe that in this respect the religious right point us to a deep and abiding sociological problem that will not be easily resolved and which ought not be so readily dismissed.

CONCLUSION

At all times in *The Divine Comedy* Dante knew where he was. He was embedded in a cosmos that gave him a position physically, spiritually and psychologically. One of the many strengths of the *Comedy* is that it gives a concrete landscape to both soul *and* psyche. While the book must be read as the journey of a Christian soul through Hell and Purgation towards Paradise, it can also be read as a journey of psychological self-examination and healing. The descent into Hell is a literal depiction of human psychic suffering; the trip up Mount Purgatory is the therapeutic path. We can gauge Dante’s progress by the state of his surroundings – we feel the anguish as we slog with him through the ditches of the Malebolge, we rejoice with relief as he trots up the marble ramps of the mountain. Dante may be a sinner, but he is never lost – his cosmos tells him in the very texture of his surroundings where he stands as a material body, as a Christian soul and as a human self.

Several years ago I gave a lecture at a small university in the American South. After the lecture I was taken aside by a professor at the school, an anthropologist who had done field work in Namibia with the Himba tribe. One day, he told me, he was approached by a Himba man who asked him a question: ‘Do you Westerners really see the space between you as empty?’ ‘Yes,’ my American interlocutor replied, ‘that is the way our science tells us to see the world.’ The Himba man went on to explain that, in his culture, people saw the world in a different way. According to their worldview, each person is surrounded by a kind of self-space which extends out around the individual. Going about their daily business, he and his fellow villagers found their self-spaces continually intersecting. They rarely found themselves ‘alone’ – their ‘selves’ being continually in *touch* with others. Having explained this way of seeing, the Namibian man asked the American professor a second question: ‘If you people really see yourselves as isolated points alone in empty space, how do you bear it?’

It seems to me that as a society we are not bearing it. Unlike Dante, we are lost in space.