

A Cosmological Neuroscientific Definition of God

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Abstract

The main objective of this work was to produce a scientifically reasonable definition of God. The rationale was to generate a definition for filling a small part of the spiritual vacuum of the 21st century and thus initiate a new understanding of the Intelligence that permeates the cosmos with mystery, love, order, direction and morals. This resulted in the following definition: “God may be a-humanly incomprehensible-eternal cosmic existence, intimately related to the endlessness of space, to the nature of the deepest common substance of matter and energy, to this common substance’s unceasing motion responsible for time, and to the basic laws of their allness, letting love transform this allness to an ordered Multiverse with a Soul: the—scientifically approachable—Soul of Multiverse inspired to guard these laws and equip their order with direction and morals while imbuing the cosmos with the potential of lives evolving, at the right spatial and temporal distances, to embrace the sense of the divine, thus justifying the existence of God.” The likely neural circuitry for sensing God in the human brain was identified as a network for spiritual data flow across the conscious and subconscious layers of the association cortical cognitive system exchanging data with the prefrontal cortical Self-Ken and modulated by inputs from the emotional and motivational systems of the brain. To study this mental process, the design of a God-Experience Monitor was also developed: a comfortably wearable combination of EEG and audiovisual-recorders tailored to at least partially capture the individual experiences of God anytime and at the very “*genius loci*” of such experiences.

Keywords

God, Soul, Multiverse, Holy Spirit, Cognitive System, EEG

1. Introduction

In the first of three recent cosmological neuroscience papers I proposed that “...

just as the guided complexity of matter and energy in the unique space-time of each human brain generates the host's Soul, the infinite complexity of the Multiverse, a more likely embodiment of the allness of existence than a single Universe, must also have a Soul... imagined before as Holy Spirit and other analogous religious concepts" (Ludvig, 2022a). In the second paper I argued that this multidimensional Soul may comprise the interacting domains of "Identity, Conscience, Will and Mission" at both individual human and noospheric human scales, as well as at the cosmic scale (Ludvig, 2022b). And the third paper was devoted to the idea that perhaps one of the aims of this system is to guide intelligence on Earth towards forming a just society so that the human species can become a "physically improved, morally reborn and intellectually advanced spacefaring race... worthy of its origin and destiny." (Ludvig, 2023)

Referring to a multidimensional Soul of Multiverse, associating it with the ancient idea of Holy Spirit, and discussing its role in the origin of humankind clearly had religious connotations. Indeed, I emphasized that cosmological neuroscience uses scientific facts and religious insights with equal respect, and the recognitions of Lao Tzu, Siddhartha Gautama, Jesus or Muhammad were considered as important for my arguments as the discoveries of Lomonosov, Darwin, Wallace or Einstein. Yet, out of the 22,605 words of these three papers the word "God" was used only 11-times, each in a cited sentence when it was necessary. With this, I intended to convey that my papers were scientific philosophical works not religious ones. I wished to make it clear, that they represented observations from the vantage point of cosmological neuroscience integrating both scientific facts and religious insights (Ludvig, 2022a).

But was it really right to present the essence, key details and social aspects of the Soul of Multiverse hypothesis without clarifying its relationship with the concept of God?

Sure, proper scientific work and controlled religious experience are considered very different activities, doing nothing with each other. As the molecular biologist Francis Collins, once the leading administrator of the Human Genome Project and later the director of the National Institutes of Health, wrote: "*Science's domain is to explore nature. God's domain is in the spiritual world, a realm not possible to explore with the tools and language of science... science is powerless to answer questions such as 'Why did the universe come into being? What is the meaning of human existence?'*" (Collins, 2007)

Nevertheless, my decades of studying the cellular neurophysiology and neuropharmacology of the primate cognitive system (Ludvig et al., 2004, 2015), along with analyzing my own mind during these experiments, related epilepsy research (Moshé & Ludvig, 1988; Madhavan et al., 2008; Ludvig et al., 2010), medical inventions (Ludvig & Kovacs, 2002; Ludvig et al., 2011) and philosophical-poetry/science-fiction writing (Ludvig, 1986, 2017), led me to a different conclusion.

Namely, I concluded that the primate cognitive system has the potential to perform immensely more sophisticated operations than generally thought. As a

consequence, although the human mind indeed processes scientific and religious inputs via different neural networks, these networks can, in fact, work together to form an orchestrated system and create cognitive waves where scientific reasoning and spiritual visioning harmonize. Cosmological neuroscience, energized by digitally enhanced complex thinking (Ludvig, 2022a), uses this mental system.

The main purpose of the work presented here was to use this cosmological neuroscientific approach for reconsidering the concept of God. The sub-objectives were: 1) To provide the rationale for this effort; 2) To present a new definition of God that is compatible with science; 3) To explain, phrase by phrase, the key points of this definition; 4) To identify the special brain circuitry that seemingly evolved to sense the phenomenon of God; 5) To put this article into context; 6) To place the presented definition into perspective; and 7) To provide a Conclusion that summarizes the paper's arguments for a scientifically reasonable concept of God.

The rationale was to generate a definition for filling a small part of the spiritual vacuum of the 21st century and thus initiate a new understanding of the Intelligence that permeates the cosmos with mystery, love, order, direction and morals. This understanding would synthesize religious and scientific facts on the ground that there is just one Nature with one set of laws, and although science limits its approach to what is objectively detectable and repeatedly measurable while religions aspire to approach the realm that lies beyond, both approaches open windows to the same Nature and the same laws as this cannot be otherwise. Scientific examinations of the Chauvet Cave paintings or the architecture of Göbekli Tepe proved that the concept of divine presence, God or Gods, in our surrounding world is a concept that has been accompanying human evolution for tens of thousands of years. Thus, science and religion are both fundamental to humanity, can assist to each other, helping to understand at least some attributes of the divine presence called God—just as recognized by the pioneer aviator, inventor and author Charles A. Lindbergh: “*Far from refuting the existence of divinity, science teaches us to look for it in different forms, in areas minute and huge we did not previously know existed.*” (see Gehrz, 2021)

2. A New Definition of God

God may be a—humanly incomprehensible—eternal cosmic existence, intimately related to the endlessness of space, to the nature of the deepest common substance of matter and energy, to this common substance's unceasing motion responsible for time, and to the basic laws of their allness, letting love transform this allness to an ordered Multiverse with a Soul: the—scientifically approachable—Soul of Multiverse inspired to guard these laws and equip their order with direction and morals while imbuing the cosmos with the potential of lives evolving, at the right spatial and temporal distances, to embrace the sense of the divine, thus justifying the existence of God.

3. Explanation

“God may be a—humanly incomprehensible—eternal cosmic existence...”

Accordingly, the definition departs from the God-image of most religions, which describe God as a human-like being, one who might have gone through a primeval sacrifice (Vedas), who takes side in wars (Bhagavad Gita) and gives advice for our daily routine (Zend Avesta), sometimes be feared for sending deadly flood or sulfur and fire to Earth (Torah) while helping His Son to teach with miracles (Gospels), Gracious and Merciful, who still urges us to subdue those don't worship him (Quran).

At the same time, the definition does agree with the deepest layer of these ancient imaginations, the very essence of all religions of goodness, that high above the human world there must be a cosmic intelligence, a governing force whether we call it God or Gods, the very source of *“... the manifestations of the profoundest reason and the most radiant beauty, which are only accessible to our reason in their most elementary forms...”* (Einstein, 1935) and the inspiration behind echoing this radiant beauty in the choral finale of Beethoven's Ninth Symphony: *“Brethren, beyond the starry sky, a loving father lives”*.

Thus, despite the ambiguity of its initial sentence, the definition stands against atheism that considers the idea of a God-like phenomenon in cosmos unreasonable, if not absurd.

The incomprehensible nature of God, should it exist, has both quantitative and qualitative aspects.

The quantitative aspect is due to the eternity and infinity of space of the allness of cosmos, where our own Universe, just a wave in the Multiverse, is at least 90 billion light-years in diameter, —an incomprehensible dimension for humans living on the surface of a hardly more than 12,700 km diameter planet. This is why the scientist Newton considered himself as *“a boy playing on the seashore,”* diverting himself finding pebbles and shells—while *“the great ocean of truth lay all undiscovered”* for him. And this is why the religious Muhammad registered in Sura 31 of his Quran, that *“If all the trees on Earth were pens and the sea were ink with seven more seas to replenish it, God's words would not be exhausted.”*

The not less incomprehensible qualitative side is the divine complexity, indeed mystery, of the very laws that make this divine realm work. For example, the law assuring that *“there is something rather than nothing”* perplexed even the mind of Leibniz, understanding it hardly better than the streetsweepers of his town. Indeed, the cosmologist and author Paul Davies recently reminded us that although human science and intellect *“... may serve to unlock the outermost box containing the secrets of nature, ... the inner sanctum may forever elude us.”* (Davies, 2021)

“... intimately related to the endlessness of space, to the nature of the deepest common substance of matter and energy, to this common substance's unceasing motion responsible for time, and to the basic laws of their allness ...”

Here the emphasis is on the phrase “intimately related”, conveying that the

God of this definition may not be the Creator of everything in space, time, matter and energy, as their substance as well as the Holy Spirit and/or Tao have also been there, but surely it is an “eternal cosmic existence” intimately related to each. Thus, God may operate through the endlessness of space, work with the ceaselessly moving common substance in the depths of quarks and leptons that make up matter, combine it with the ceaselessly moving gravity, electromagnetic and nuclear forces that make up energy, thus controlling the time that derives from all, at least in this Universe. And the ways of this operation, work and control are manifested in the basic laws of which fraction is already known to us as physical and chemical laws without fully understanding the reason behind the specifics of either.

“*Is there a meaning to it all?*—asks the cosmologist (Davies, 2021). From the vantage point of cosmological neuroscience, the laws of physics and chemistry do seem to stand on the foundations of some more basic cosmic laws.”

As proposed (Ludvig, 2022a, 2022b), such laws may be: the Law of Coexistence in Diversity, assuring that matter and energy are distributed and evolved in the cosmos with variations as inexhaustible as dependable on their connecting interactions; the Law of Divine—Evil Asymmetry, assuring the slight yet sufficient supremacy of the divinity of creation, harmony, evolution and life over the evil of destruction, discord, degeneration and death; the Law of Determination with Uncertainty, assuring the inviolable operation of all cosmic laws while allowing their increasingly complex interactions to work with uncertainty; the Law of Lives to Transcend, assuring the transmission of lives to nodes of space-time, like Earth, where life is destined to appear in its imperfect grandeur aspiring to be closer to its origin which is also its aim.

“... *letting love transform this allness of an ordered Multiverse with a Soul: the—scientifically approachable—Soul of Multiverse...*”

This is based on my opinion that the intellectual and technological sophistication of the 21st century created favorable conditions for starting to address the nature of Soul across human and cosmic scales with the approach of science (Ludvig, 2022a, 2022b). The addition is the inclusion of the phenomenon of “love” into the mechanisms responsible for the order of our Multiverse and the operation of its Soul.

When I checked the word “love” with Google’s search engine, it gave me 17.5 billion search results at the time of this writing. What could show more the significance of love for humanity? Though as much as arts and psychology have revealed about this emotional state, its cosmic analogue is hardly understood.

Yes, all religions of goodness, from the Abrahamic religions through the religions originated in ancient Persia, India and China to the 19th century Baha’i Faith emphasize the central role of love in human life. But all are unclear about the placement of love in the hierarchy of the world’s forces.

The Torah’s Genesis states that God first created light, and when it was done “... *God saw the light that it was good.*” The ancient authors thus conveyed their belief that God started to create not because of the love of a shared future, but

because it was good to Him. The 5th verse of the Tao Te Ching states that “*The Heaven and Earth is not sentimental; It treats things like straw dogs,*” (translation by John C. H. Wu). And Narendra Jadhav let us know that “... *Today there are 165 million Dalits... and they continue to suffer under India’s 3500-year-old caste system...*”, as “*Hindus believe that God created the caste system*”, as written down in the Rig-Veda—however ruthless and irrational the system is (Jadhav, 2005). Buddhism tried to correct it, and Christianity did place love in the center of its teachings—though the New Testament’s few misunderstandable passages (e.g., on the permissible practice of slavery) let European powers rob and colonize half of the world in the name of spreading Jesus’ words.

Science hasn’t been clearer on the role of love in cosmic scales.

While one of the greatest neuroscientists of the last century, Sir John C. Eccles, was brave to state that “*There is recognition not only of the transcendent God, the creator of the cosmos, in which Einstein believed, but also of the immanent God to whom we owe our being*”, he also asked that “*Do not we experience and delight in fellowship, joy, harmony, truth, love, and beauty, where there is otherwise the mindless universe?*” (Eccles, 1994) But how can love occur in a universe that is “mindless”?

Stephen Hawking and Leonard Mlodinov claimed in their book that “... *we now have a candidate for the ultimate theory of everything, if indeed one exists, called M-theory... the unified theory Einstein was hoping to find.*” (Hawking & Mlodinov, 2010) The more than 2000 words of the summarizing chapter on their “Grand Design” didn’t include the word “love”—their cosmos was a loveless expanse. But was love indeed missing when oceans started to appear on Earth, when the Last Universal Common Ancestors (LUCAs) conquered their waves, when the first animals found home on those exciting lands? Wasn’t the love of finding new horizons that led some *Australopithecines* out of the jungle towards the unknown, guiding them to become humans? Didn’t Michael Collins mention in his book that on the day before the Apollo 11 splashed down in the Pacific Ocean Buzz Aldrin had sent this message to the world: “*Personally, in reflecting on the events of the past several days, a verse from Psalms comes to mind to me. When I consider ...the heavens, the work of Thy fingers, the moon and the stars which Thou hast ordained, what is man that Thou art mindful of him?*” (Collins, 1974)

This article argues that an eternal cosmic existence may be the source of love used by the Soul of Multiverse to serve the laws of Divine—Evil Asymmetry and Lives to Transcend to assure the dominance of creation, harmony, evolution and life at cosmic scales while orchestrating them to move intelligent worlds towards ever higher levels, ever closer to the divine. Clearly, though I argue that God may be a cosmic existence beyond human comprehension, different from the anthropomorphic God of Abrahamic religions and the Gods of Eastern religions, this paper’s view is not the view of even such an intellect as Karl Marx, who thought that “*Religion is the sign of the oppressed creature, the heart of a heartless world, and the soul of a soulless conditions. It is the opium of people.*” (Marx, 1844)

It is also argued that the Soul of Multiverse is approachable by sciences aspiring to know how this Soul works, even if its love is often obscured, sometimes unrecognizable.

Indeed, Jesus's crucifixion, as evil as it was, obscured the cosmic love that let him show the faith, grace, honesty, understanding, goodwill, magnanimity and sacrifice that would move humankind—stuck in ruthlessness—to the next level of civilization. I believe this love, then anticipated to be transformed into the love of billions and billions for Him over thousands of years, annihilated His suffering on that Friday.

And the destructions and deaths of World War II, as evil as it was, obscured the cosmic love that would let humankind – stuck in fascism, racism, antisemitism, colonialism—come to its senses and clean its soul from these works of wickedness. I even believe, it was this very love that later gave way to the inspiration for Richard Feynman's physics of *Quantum Electrodynamics*, for Carl Sagan's astronomy in his "*Cosmos*", for Phillip Glass' music in "*Koyaanisqatsi*", for Stanley Kubrick's art in "*2001: A Space Odyssey*", for Eric Kandel's work on the "*Principles of Neural Science*" and for Imre Kertész's way of writing the book "*Fatelessness*", —a collective, monumental proof of a reborn Jewish Soul after suffering in that time of wickedness.

Yes, cosmic bodies are moved by physical forces, but physical forces may well be controlled by the more fundamental laws of space-time and matter-energy: themselves seemingly modulated by even deeper effects, like the one Dante's intuition called "*The Love that moves the Sun and the other stars.*"

"... inspired to guard these laws and equip their order with direction and morals..."

If something has been clear to the human mind about its surrounding world it is the order that maintains, moves and renews that world. Though Erwin Schrödinger wrote in his "*What is Life?*" in 1944 that "...*Life seems to be orderly and lawful behavior of matter...*", Marcus Aurelius knew the same thing 1770 years before when added to his "*Meditations*": "*Hardly a single thing is alien to the rest: ordered together in their places they together make up the one order of the Universe.*"

That the move of this order has a direction is also obvious. Just as each single life moves on the vector from its initial point of birth to its terminal point of death, and cultures move on their own historic vectors as rise and fall, the fate of cosmos is similar: it has a direction moving its matter and energy on the waves of simplicity peaking in complexity to return to simplicity before the next wave – all for an aim and end not yet known to us.

But this order and direction also have a compass, the compass of morals: a much less obvious attribute of the cold and silent Universe. Yes, morals have accompanied evolution on Earth from the moment when the first human was buried with a rite and farewells, through Hammurabi's laws, the Ten Commandments, Gospels and the other sacred texts, to the work of Mohandas Gandhi, Martin Luther King, Greta Thunberg, Malala Yousafzai and their likes.

Less obvious is that these moral laws and works must have come from somewhere, however distant their origin is, perhaps in a God-inspired Soul of Multiverse equipping the cosmic order with not just direction but also with morals to help the—slight yet significant—dominance of divine over evil.

“... while imbuing the cosmos with the potential of lives evolving, at the right spatial and temporal distances, to embrace the sense of the divine...”

This part of the definition shows my belief that human life is unlikely the only form of life in the Universe. Further, these lives may share the common feature of evolving for a purpose: the purpose of embracing, that is, loving, the divine, even if its incomprehensibility allows only to sense its presence.

Whether there are lives other than ours in the Universe and beyond is absolutely unknown to us—and this shouldn't be surprising for a hardly 10,000-year civilization evolving on a less than 13,000 km diameter planet in a cosmos where time is measured with billions of years and space with billions of light-years.

Though we may indeed be alone in this vast expanse of space-time, in the last four hundred years more and more people started to agree with Giordano Bruno, who wrote in his 1584 book, *“On the Infinite Universe and Worlds”*, that God *“... is glorified not in one, but in countless of suns, not in a single earth, a single world, but in thousand thousand, I say in an infinity of worlds...”* The genius Carl Sagan's *“Contact”*, published in 1985, includes this unforgettable passage: *“... there were so many planetary systems, so many worlds and so many billions of years available for biological evolution – that it was hard to believe the Galaxy was not teeming with life and intelligence.”* And perhaps the greatest life scientist of the last century, Francis Crick, himself wrote an article with his exceptional colleague, Leslie Orgel, about the possibility of cosmic transmission of life via *“Directed Panspermia”* (Crick & Orgel, 1973).

In the early 1980s, still in Budapest, I imagined a bit romantically the first communication to Earth by another civilization in my poem *“Meeting”*—that later appeared in my first book (Ludvig, 1986) once I was able to publish it after immigrating to the US. This is how the piece ended: *“... The telescopes turn, watch the sky, /and as freed lovers enter each other/the spirit of an alien culture pours, streams towards mankind.”* Nevertheless, a recent mathematical modeling by British scientists suggested that intelligent life is rare in the Universe (Snyder-Beattie et al., 2021).

The idea that cosmic civilizations—if more than one exists—are unlikely aimless processes, rather histories harmonizing with the Soul of Multiverse, each with its own collective Identity, Will, Mission and Conscience, to move their love closer and closer to the spirit of their origin and aim—this was the central theme of my preceding papers (Ludvig, 2022a, 2022b; Ludvig, 2023).

But why does this paper's definition state that lives outside of Earth—if they indeed exist—might have evolved “at the right spatial and temporal distances”? The reason is that these distances may be needed for the safe and free evolution of life on any planet or moon—just as we ourselves need the safety and freedom

to develop our unique existence in our mother's womb for as long as nine months. What H. G. Wells imagined in "The War of the Worlds" it cannot happen in the cosmos of Intelligence, in the Nature of the Soul of Multiverse. As the cosmic visitor to Earth in my science-fiction observed, "The contrast of lack of life outside Earth and the ecstasy of plants and animals on the planet—already sensed after Neptune—told me clearly: "This will eliminate the chance of competition between differing intelligences in the system, while let its worlds be seen and settled with no fear by the one to come." (Ludvig, 2017)

"... thus justifying the existence of God."

Cosmological neuroscience can't miss that the eternal cosmic existence we may call God must also have a reason to be. And that this reason may well be to inspire lives, filling the allness of space-time, matter-energy and their imbuing Soul with this expression of love, perhaps not without the hope that it will be reciprocated, justifying the eternity of its source.

4. Brain Circuitry for Sensing God

How did all the thinkers, scientists and engineers cited in this article form their view on God? In the Introduction I mentioned that "... although the human mind indeed typically processes scientific and religious inputs, that is, data from 'science's domain' and those from 'God's domain', via different neural networks, these neural networks can, in fact, work together to form an orchestrated system and create cognitive waves where scientific reasoning and spiritual visioning harmonize."

What did I exactly mean?

I meant that the neocortical cognitive system probably includes a neural circuitry for sensing God, that is, the cosmic existence related to the "*starry heavens*" and "*moral law*" that "... *fill the mind with ever new and increasing admiration and awe*" according to Immanuel Kant, the same admiration and awe that once inspired the extraordinary lives of Zarathustra, Lao Tzu, Siddhartha Gautama, Jesus, Muhammad, Bahá'u'lláh—and the billions and billions who followed their teachings.

This hypothetical circuitry for sensing God may well comprise emotionally and motivationally charged neural assemblies across the prefrontal cortical (Brodmann Areas [BAs] 8, 9, 10, 11, 12, 13, 14, 16, 24, 25, 32, 33, 45, 46 and 47), frontal (BA 6 and 44), parietal (BA 5, 39 and 40), temporal (BA 20, 21 and 38), occipitotemporal (BA 37) and occipital (BA 19) association cortices. The impact of the conscious layer of this circuitry, that is, the declarative thoughts, recognitions, imaginations related to God, is reflected in the not less than 9100 pages of *The Encyclopedia of Religion* (Eliade, 1987).

That this circuitry also uses data from the subconscious layer of the system is obvious from facts that religious experiences often include dreams of angels and heavens, that walking by temples, churches, synagogues or mosques often changes our mood, however briefly and unrecognizably, or that deep conversations with

people of the same religion as ours is somehow always easier than with people of other religions.

The involvement of the brain's emotional system—including neocortical components, like parts of the cingulate and prefrontal cortices, and subcortical limbic components, like parts of the amygdala and the hypothalamus – in religious experiences is as obvious in the well-documented ecstasies of St. Catherine of Siena, St. Teresa of Avila and other saints as in the practice of Sufi whirling – but also in the peaceful, uplifted moments of the millions of genuine Christians, Jews, Muslims and Buddhists when they pray to, or meditate on, the center of their faith.

And for the role of the motivational system in the brain's representation of God, it is enough to remember our childhood readings about St. Paul, who wandered from modern-day Israel to modern-day Syria, Turkey, Greece and Italy just to spread the words of a divine man from Nazareth, or to think a little bit about Simone Weil, who spent a life for trying to understand the common thread in Judaism, Christianity, Hinduism, Buddhism and Taoism, or to recall that in 1967 the world champion boxer Muhammad Ali rather stopped boxing than acting against the spirit of his faith.

Support for the role of these brain systems in religious thinking, feelings and behaviors has come from 4 groups of data.

First, fMRI studies found that during praying and religious thinking cerebral blood flow increased in the temporal, parietal and prefrontal cortical regions of religious persons, indicating increased neural activity in these brain areas (Schjoedt et al., 2009; Kapogiannis et al., 2014).

Second, EEG studies in laboratory settings found changes in the parietal association cortex during prayer and religious chanting (Dobrakowski et al., 2020; Walter & Koenig, 2022).

Third, traumatic lesions in the prefrontal cortex altered the affected patients' "personal relations with God" (Cohen-Zimmerman et al., 2020; Cristofori et al., 2022).

Fourth, temporal lobe seizures, these erroneous activators of long-term visual memories, can be accompanied with religious experience (Hansen & Brodtkorb, 2003) and hallucinations like the one described by the epileptic Dostoevsky: "*The air was filled with a big noise and I tried to move. I felt the heaven was going down upon the earth and that it engulfed me. I have really touched God...*" (see Sacks, 2012).

A schematic illustration of this brain circuitry is shown in **Figure 1**.

Studying this brain network is hard. As the illustrious authors wrote: "... *how can we distinguish the physiology or validity of religious experience in someone with epilepsy or psychosis from that of a religious sage? We can't.*" (Devinsky & Lai, 2008) The point of this article is that yes, we can. But we may have to use new approaches and methods. Because placing someone in an MRI machine or in front of computer screens in a laboratory and asking him or her to experience God may not be the best way to study that experience. And seeking the truth

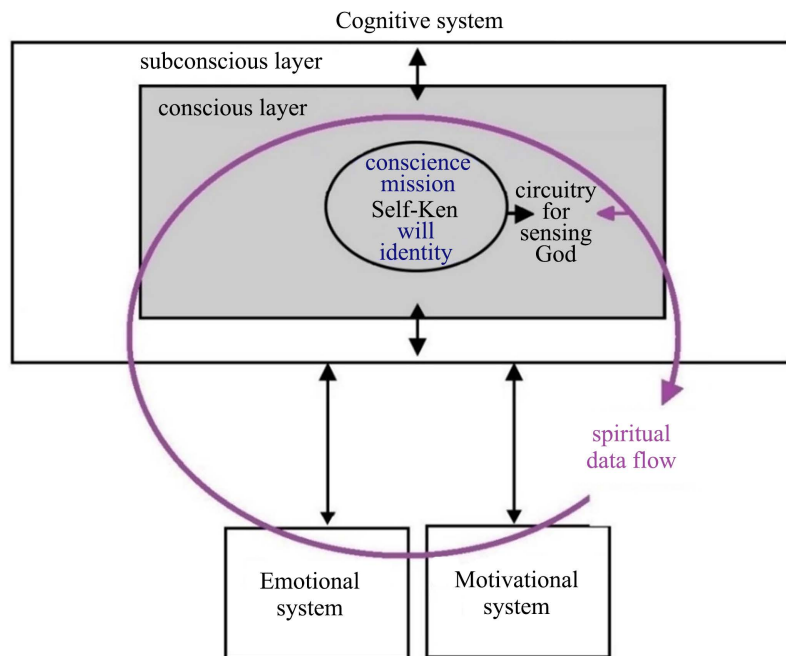


Figure 1. The possible neural circuitry for sensing God within the conscious layer of the brain's cognitive system. This circuitry is to process conscious and subconscious spiritual data flow from both hemispheres' prefrontal, frontal, parietal, temporal, occipitotemporal and occipital association cortices while interacting with the supercircuitry of Self-Ken (Ludvig, 2022a, 2022b) and the subcortical limbic structures that govern the host's most basic emotions and motivations. Involvement of the Self-Ken in this spiritual data flow is reflected in the fundamental role of religions in shaping one's Identity, adjusting his or her Conscience, strengthening his or her Will and guiding to Mission in life. The concept agrees with the insight that just like the presence of language capability in every human brain indicates a neural program for this communication, "*The presence of spiritual beliefs among all cultures strongly suggests that the human brain is programmed to experience and explain parts of existence in spiritual terms.*" (Devinsky & Lai, 2008)

about experiences of God in people with brain damage may lead to conclusions confounded with the symptoms of the disease. A sort of God-Experience Monitor usable by the mentioned religious sages or just genuinely religious healthy persons anytime at any place where the "*genius loci*" may allow the experience of God might be a better way for this research (Figure 2).

What is a "God-Experience"? It is a—short or long, but typically temporary—spiritual state of mind appearing once or more in the lives of not just such historical figures as Muhammad, Handel, Pascal, Mohandas Gandhi, Albert Schweitzer and their likes but also in the lives of many genuinely religious persons whose most creative members describe it to others.

Here are two examples. Sarah Young wrote in her book *Jesus Calling* that "*I first experienced the presence of God in a setting of exquisite beauty... in a tiny Alpine village in France... One night I found myself leaving the warmth of our cozy chalet to walk alone in the snowy mountain... After a while, I went into an open area and I stopped walking... Time seemed to stand still... Suddenly I became aware of a lovely presence with me, and my involuntary response was to*

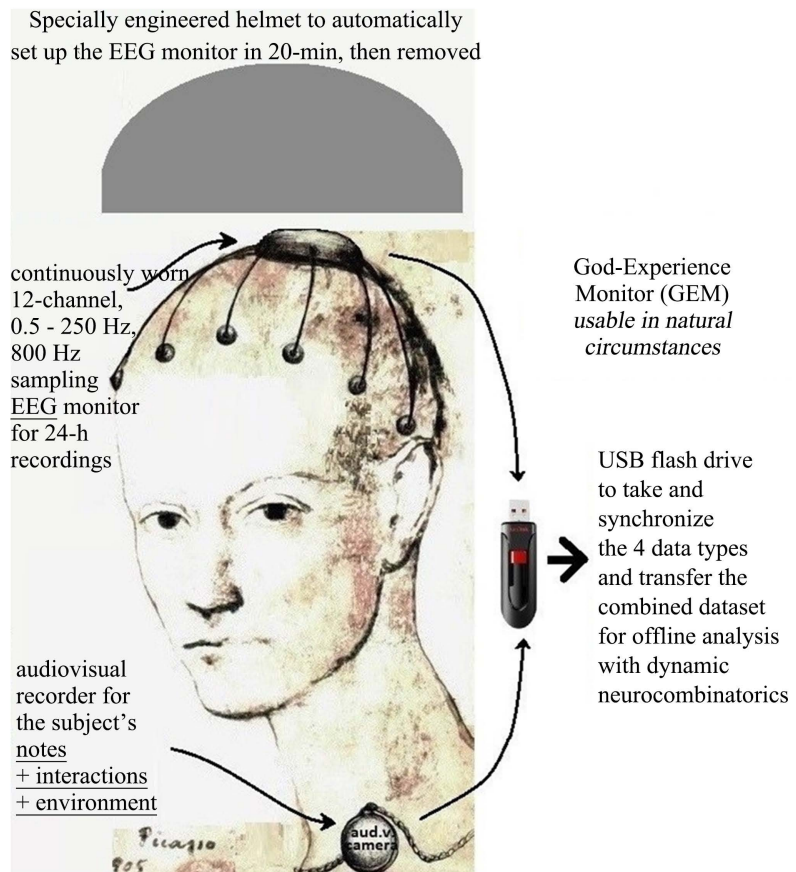


Figure 2. A version of the wearable EEG/environment monitor designs (Ludvig et al., 2011; Ludvig, 2022a) tailored for capturing the neocortical EEG and environmental events during mystic experiences including experiences with God. This God-Experience Monitor (GEM) system could determine (1) whether genuine and deep religious experiences are indeed generating unique EEG waves, (2) whether these objective electrophysiological changes indeed happen in unique times, spaces and circumstances only, and (3) whether the examined person is consciously aware of the entire segment of the GEM-recorded experience. With no connection to the internet, this is an absolutely private system.

whisper, ‘Sweet Jesus’... This was a relationship with the Creator of the universe...” (Young, 2004). And Abraham Joshua Heschel’s book, *“The Sabbath”*, shared this experience with us: *“The Sabbath, thus, is... a profound conscious harmony of man and the world, a sympathy for all things and a participation in the spirit that unites what is below and what is above. All that is divine in the world is brought into union with God...”* (Heschel, 1951).

Cosmological neuroscientists must be satisfied with nothing less than elaborating the electrophysiological—and when it will be possible, neurochemical—correlates of God-sensing, or Holy-Spirit-sensing, perhaps Soul-of-Multiverse-sensing experiences in the very environments and social circumstances where these experiences can happen to the very people who encounter such events and wish to share them. Not to miss the unexpected, they must include astronauts with experiences like the Apollo 14 Lunar Module Pilot Edgar Mitchell’s, who

confessed this: “*What I experienced during the three-day trip home was nothing short of an overwhelming sense of universal connectedness. I actually felt what has been described as an ecstasy of unity. And there was the sense that our presence as space travelers and the existence of this universe itself, was not accidental, but there was an intelligent process at work.*” (Mitchell, 2022)

5. Context

This article was written in a transition period of history when confusions and abuses accompanying the dawns of space-age and internet-age alienated most of humankind from its religious past. While this was an inevitable temporary step in human evolution, the excesses of this step also moved most people away from the morals and divine connections that the religions of goodness built into the human mind. It will take time until humankind embraces again the essence of sacred texts—invaluably described in Armstrong’s books (e.g., Armstrong, 2009) and uses reason, logic and scholar conscience synthesized with the space-born reflections of Buzz Aldrin, Edgar Mitchell and their similarly thinking comrades to revive the true message of religions of goodness and open its future.

As for the discussed definition of God, it is as separated from the inflexible dogmas of religious organizations as from the arrogance of some atheists. On the other hand, though not identical with it, the definition stands close to Spinoza’s correctly interpreted view of God: “*Spinoza’s God is thus not identical with the natural world as such but only with the creative ground that encompasses it.*” (see Winston, 1987). Especially, since Spinoza’s opinion on Jesus in Chapter 1 of his incomparable “*Theologico – Political Treatise*” is also consistent with the spirit of this article. This is how he phrased it: “... *so God revealed himself to the Apostles through Christ’s mind, as previously God had revealed himself to Moses...And in this sense we can also say that God’s wisdom, that is, the Wisdom surpassing human wisdom, assumed a human nature in Christ, and that Christ was a way to Salvation...*”. The similar, though not identical, God-concept of pantheism that “*God and cosmos are inextricably intertwined*” (Brierley, 2006), is also compatible with the definition of this article.

Michael Collins of Apollo 11 ended his account of flying to the Moon and back with these words: “*Man has always gone where he has been able to go. It’s that simple. He will continue pushing back his frontiers, no matter how far it may carry him from his homeland.*” (Collins, 1974) Perhaps the farther he will go the closer he may get to the incomprehensible, eternal cosmic existence this paper considered as God.

In that closeness, Nietzsche’s angry denial of God in his “*Thus Spoke Zarathustra*” may well be balanced by his recognition that “*Man is something to be surpassed... a bridge between the animal and the Superior Man.*”

And in that closeness, Epicurus’ riddle of how God can be both omnipotent and benevolent if there is evil everywhere may well be solved by realizing that God’s omnipotence is an omnipotence working with the laws of Divine—Evil

Asymmetry and Determination with Uncertainty, that God's benevolence is a love not measured with pleasurable human moments or ease of days but with the waves of divinity over billions of years letting lives, including the life on Earth, transcend. Where fates like the Black woman Katherine Johnson's, elevating her to the most sought mathematician of NASA in the Apollo era despite her childhood in the segregated West Virginia hostile to both Black rights and women's education, are certainly ripples in these waves of divinity.

6. Perspective

To place the definition and arguments of this paper in perspective, I here provide the reader with some relevant passages from the *General Scholium* of the 2nd edition of Newton's "*Philosophiae Naturalis Principia Mathematica*", in the translation of I. Bernard Cohen and Anne Whitman as assisted by Julia Budenz and published in 1999.

"...*He is not eternity and infinity, but eternal and infinite.*"

"...*As a blind man has no idea of colors, so we have no idea of the ways in which the most wise God senses and understands all things.*"

"...*He totally lacks any body or corporeal shape ... nor ought to be worshipped as something corporeal.*"

"...*We have ideas of his attributes, but we certainly do not know what is the substance of anything... much less do we have an idea of the substance of God.*"

"... *to treat of God from phenomena is certainly a part of 'natural philosophy.'*"

7. Conclusion

Cosmological neuroscience considers the existence of God as a more likely possibility than its absence, and views God as an eternal cosmic Intelligence operating via the Soul of Multiverse that spreads lives in our Universe and beyond, allowing them to transcend and reciprocate the love behind their origin and aim, thus justifying the existence of God. This concept, just as all past, present and future ideas on God in the human mind, is seemingly the product of a "God-sensing" neural circuitry in the brain's cognitive, emotional and motivational systems across their conscious and subconscious layers with their spiritual data flow constantly transporting information to and from the mind's prefrontal cortical Self-Ken. The EEG and behavioral/environmental correlates of this spiritual data flow can probably be captured with the sort of God-Experience Monitor shown in the article. As in the Preface of his monumental Encyclopedia of Religions Mircea Eliade reminded us: "*To know the great variety of worldviews assumed by religious man to comprehend the expanse of his spiritual universe is finally to advance our general knowledge of humankind.*" To this general knowledge, the cosmological neuroscientific definition of God presented in this article could contribute. Especially, since this definition is compatible with some of the highest scientific minds' faith in God, with the mystic experiences of some as-

tronauts who walked on the Moon, and with the very fact that the history of our Universe reveals a direction that led to the interactive potential of beauty, love, morals and aspirations on the bright side of humanity: more likely an expression of divine Intelligence than the result of physicochemical accidents.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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