Neurophilosophy and the distal hyperuranic world: Fred Previc’s space of the gods (and of men)

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Summary

Unlike the concept handed down by philosophy (and by the philosophy of science), which proposes a univocal, intellectualistic vision of space, Previc’s studies have shown that the relationship between consciousness and space is instead managed by a number of modules, making it possible to categorise spatial interaction on four levels which correspond to the different ways in which we project our existence in different practical and cultural scenarios. What emerges as particularly important is the fourth level of the management of spatiality, the one that sees human consciousness dealing with the great distances – the heavens, the house of the gods. This module makes use of a neural pathway involving ventral sensory structures that also manage the relationship with religion and transcendence. But these are also the structures that are activated when populations are forced to set out in search of new lands – the quest for the eternal “Promised Land”. In this study of infinite spaces, the path of the gods and of men coincide and they are seen to advance along it together.

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Traits and faces

Felicited for centuries, the most famous and familiar prayer in the Christian world (and also the one with the most well established origins) begins with the words: “Our Father, who art in heaven!” “In heaven” is a translation of the Latin “in coelis”, which means “up in the sky”. In view of formal Christian teaching that God must be considered omnipresent – in heaven, earth and everywhere – it is interesting to think that man has never really wondered why the prayer was not formulated, ab ovo, in more precise terms.

In truth, it is probably quite unrealistic to think that man might have been capable, from the beginning, of specifying more precisely God’s location in space! Not only because he would have been subject to the influences of universal ideological traditions, according to which “positive” gods are always located on some high ground (for example on the top of Mount Olympus or Mount Sinai), but also because he would have been constrained by structural factors that determine the various ways in which the human brain manages spatial schemes (also in order to set up scenarios in which to project its representations and images). These remarks lead us on to the central topic of this discussion – a brilliant and fascinating essay entitled The role of the extrapersonal brain systems in religious activity (1), in which the author, neurologist Fred Previc, elaborates an entirely new model for studying and exploring, in depth, the concept of space.

From a conceptual point of view, we can say that the notion of “space” is bound up with a time-honoured representation of space as an undifferentiated, flat and abstract extension. Indeed, all spaces, Euclidean and otherwise, allude to a single, abstract and uniform “substratum”, which may be moulded to our ideas, but which always, in some way, continues to be the same original, pure and homogeneous substance.

If we were to encounter a mathematician talking about the Euclidean triangle or the Poincaré sphere, it would be pointless to disturb him by asking him where exactly he imagines this triangle or sphere to be located – on the moon, for example, or near his chair, or closer to him still? The mathematician would probably should react to this dull question of ours with an expression of astonishment or with an air of commiseration; and his irritation certainly would not be lessened even if we were to point out that, in the beginning, Plato himself, the most famous “mathematicising” philosopher of all, conceived of triangles and circles as existing in a hyperuranic world, in the very home of God, given that God himself, as Plato tells us in Timaeus, must have employed these geometrical tools to plan and build the universe. On the subject of divinities, it has to be noted that not only in Platonic philosophy, but also in all iconographic and literary religious traditions, the supreme gods are always thought of and depicted as living above us, at supreme altitudes or in celestial spaces. But also – and this is the really important thing! – it has to be noted that these divine figures are frequently represented through recourse to geometrical shapes, such as circles (celestial spheres), or the triangle that has come to be used as a divine symbol (Trimurti, the Holy Trinity).

This relationship between the image of the divine (i.e. the representation of God’s visage) and geometric lines is relevant to a primary functional activity of the brain (one of its most profound), which is crucial to the formation and growth of social and group relationships. We can
think of this brain activity as connected to what we can call “trait recognition”, that is a process of consciousness that allows people to identify and recognise faces. This capacity to recognise shapes and facial traits plays a crucial role from an evolutionary perspective, because it not only allows us to discriminate between familiar, friendly presences and unfamiliar, potentially dangerous presences, but also to perceive, from people’s facial expressions, their moods, intentions and spiritual inclinations. Of course, this crucially important primary hermeneutical function is codified by the limbic system (involved in the processing of emotions), in particular the inferior temporal lobes (2). These are areas responsible for interpreting other people’s facial expressions and features, but they are also intuitively sensitive to geometrical shapes, particularly the simplest and purest ones – the ones able to support human face recognition, namely: the line, circle, triangle, and cross. Because of this association, these shapes quickly acquired symbolic meaning. Indeed, the circle is the stereotype of the oval shape of the face; the cross symbolises the intersection between the axis of the eyebrows/eyes and that of the nose; the triangle is the nose itself, in profile or, otherwise, reminiscent of the face’s characteristically angular lines.

The humanisation of transcendence

It is possible to note a very strong symbolic spread of these signs, but their interpretation has sometimes been rather approximate and distorted by clichés. For example, the link that has emerged in history between the symbol of the cross and racist and xenophobic movements seems inexplicable (and incongruous). It is perhaps easier to understand this strange connection if we consider that the cross, in its earliest meaning, was a sign symbolising the face of the other, and thus the basis for the construction/deconstruction of a social relationship. The cross is a bivalent, ambiguous symbol, whose positive and negative connotations (acceptance of the face of the other versus rejection of, or contempt for, the face of the other) get confused. A circle and cross – or rather a cross inside a circle – can together depict, in a stylised manner, the human face. But they are also symbols used by racist movements (e.g. the KKK, the Nazis). In this context, to exalt the cross is to denote a casting into doubt of the process of self-recognition: I may, or may not, recognise you as my fellow! The cross, as the symbolic-emotional archetype of the process of social recognition/non-recognition, has been used, since ancient times, as an instrument with which to torture those who rejected the prevailing social order, for example the so-called latrones (a term used in Roman times to mean “political rebels”, not “robbers” as flexible interpreters have tended, erroneously, to think) (3).

It is because of this abstruse, atavistic, pre-Christian (and ultimately anti-Christian) meaning that the archetypal cross symbol is today adopted by xenophobic groups as a menacing, warning sign to be directed at all those who are “different”, that is, at immigrants, foreigners and all those who do not share their features, skin colour, language or culture.

If the limbic-temporal lobe system is responsible for managing both symbolic geometries and facial recognition processes, it becomes possible to understand the ancient symbolic link that has become established, on a cultural level, between divinity, the face and the cross. The cross is the image of the face of the other and God represents the concept of the other in its pure, authentic state. Therefore, God, the face and the cross tend to merge symbolically into one. A symbolic connection of this kind emerges in the evangelical episode of the meeting between Jesus and Veronica on the way to Calvary. Christ handed the woman a cloth bearing an image of himself: the Holy Face of God. The same connection between divinity, the cross and the image (the mirror) can be found in the figure of Dionysus (4). These references confirm the existence, in man, of a natural overlap between the idea of otherness (and thus God Himself) as the absolute and ideal other) and the symbolic geometrical features our brain uses to codify faces.

In this context, we need only remark upon the shapes children use to depict the human form (squares, triangles, circles, crosses) in order to appreciate the closeness of the relationship between the acquisition of human presence (the face of the other as the interface of a social relationship) and geometry. Squares, triangles, circles, and crosses feature in the most ancient graffiti drawn by our ancestors in the Upper Palaeolithic period, Cro-Magnon man, or Homo sapiens sapiens, who lived approximately 40,000 to 10,000 years ago. These graphic signs thus appeared in a time known to have seen a consolidation of an early social structure accompanied by the development of rites, gestures and ceremony – in short, of a basis for the gradual development of a religious culture.

The physical proximity and close relationship between the cortico-temporal system (the first area engaged in the management of geometrical-figurative symbolic forms) and the limbic system (amygdala and hippocampus, involved in the processing of memory and emotions) suggests that excessive emotional stress could lead to abnormal stimulation of the temporal lobes and result in the generation, spontaneous and uncoordinated, of hallucinations, visual images of faces and figures. The temporal lobes are usually involved in hallucinatory processes, i.e., the production not only of visual, but also of auditory hallucinations (these areas play a role in sound recognition and language production).

This production of images is driven not only by pathological events. It may also be regarded as an effect of a natural modality used by the brain to process the external world, i.e., to “humanise” signals and shadows. This is the hypothesis advanced by theologians J. Ashbrook and C.R. Albright (5), who argue that we should understand the human brain as a machine created precisely for translating transcendence into a human language or essence, so as to render it more familiar to us. From this perspective, the brain fulfils a “humanising” function and the activity of face recognition, in particular, takes on a specific meaning, because it is through recognition of the “face of the other”, or rather, symbolically, through recognition of the face of God Himself, that we can gain access to transcendence. In this formulation, the latent influence of Levinas’s philosophy, and specifically of Levinas’s concept of “infinite face” (6), can clearly be felt.

In the construction of a metaphorical world, physiognomic metaphors recur particularly frequently. Children, in fact, often “see” human faces in the fronts of objects.
Shadows at night and branches moving in the wind are also often perceived as "human." Similarly, when we observe a dappled floor, our brain will often have us make out people in the shapes we see. From a historical perspective, however, the geometry of the starry sky provides the most important example of the phenomenon of the "humanising" of transcendence. By linking together the brilliant dots they saw in the sky above them, men traced out images and fables, transcribing the whole of human experience onto the night sky. In this way, mankind first wrote his own history in the sky, looking to the movement of the heavenly bodies or the variability of those figures up high to provide him with the answers to his first questions on the meaning of terrestrial events. But there is also another explanation for this emotional transport towards the sky and we will look at it by introducing, albeit briefly, Previc's research.

Beyond the confines

Whereas philosophers (and also common sense) are inclined to consider space as a homogeneous, continuous, non-qualitative, abstract entity (res extensa), from the viewpoint of the neurosciences this general concept can instead be broken down into different spatial systems, according to the different ways in which the brain processes and organises spatial experiences.

Previc identifies four different ways in which we configure spatial relationships, each corresponding to specific neuroanatomical pathways and neurochemical processes. He developed his categorisation after a period spent studying and working at an aeronautical centre for the prevention of spatial disorientation in pilots, a frequent cause of flying accidents.

Spatial disorientation is not a phenomenon linked only to mysteries like that of the "Bermuda Triangle"; "losing oneself in space", an experience due to the seductive nature of space, is also an important cultural archetype linked to well-known myths and legends — one that we can see in Odysseus's wanderings as he searches for Ithaca, and in the biblical wanderings across the wasteland, in pursuit of a far-off "Promised Land", of a tribe of shepherds — God's people. But why is it God's people who are wandering people? Why is Moses able to meet God only at the top of a high mountain? Why is the "Promised Land" itself visible only from the top of a faraway hill? Does the book of Exodus tell us about a real journey, or about a fictional journey, like that of Odysseus or Aeneas?

These and other similar questions can find some answers in Previc's theory of the brain's mechanisms for mapping distal spaces, which are correlated with proximal brain structures implicated in the generation of religious and ideological phenomena. It is conceivable that Previc was led from studies of disorientation in pilots to a theory about religion as a result of the simple observation that voyages across distal celestial spaces can evoke religious states in some astronauts. Indeed, astronauts at extreme altitudes have reported experiencing feelings very similar to mystical raptures, or the kind of psychological alterations usually associated with the use of drugs that can induce a hyperdopaminergic state or with a reduction of the oxygen supply (hypoxia). But the idea that "strange things" can happen "above" is not just a cliché or a sensation we might get from reading Richard Bach's extraordinary story Jonathan Livingston Seagull (7), for example. It is a fact that migrants and wayfarers across distal spaces are prone to experience visions, hallucinations, encounters with UFOs or mirages. Really "strange things" can happen above! To cite a religious source, we can also mention a passage from the Gospel of Matthew (chapter 17, verses 1-9), according to which "[...] Jesus took with Him Peter, James and John the brother of James, and led them up a high mountain by themselves. There He was transfigured before them. His face shone like the sun, and His clothes became as white as the light. Just then there appeared before them Moses and Elijah, talking with Jesus." The significant point is that this happening, for some a divine event, for others a mere hallucinatory phenomenon, occurred, in any case, "up a high mountain". By collecting further evidence and examples of this kind, both literary and neurotheological, we could certainly add weight to this hypothesis concerning the existence of a deep and extensive network linking the brain's management of space with major cultural events. It would enable us not only to justify the early historical existence of a close bond between symbolic geometry (triangles, pyramids, crosses, circles) and the divine sphere, but also to claim that religious feeling in general grows within a framework of management and mapping, by the brain, of distal space.

Human consciousness of space is characterised by a kind of "exploratory compulsion" that prompts human experience to move towards a kind of hyperspace (another world) and produces a "hypervision" generated by an expansion of the brain faculties involved in the management of space. The following excerpt taken from The role of the extrapersonal brain systems in religious activity (page 512) summarises Previc's ideas (1):

The soul is an extension of corporeal space, God and Heaven extend the concept of space beyond the most distant sensorial realm, and the after-life extends time beyond the finite period of our own lives. The concepts of God and Heaven are also inextricably linked to upper space — e.g., the Hebrew word "El Elyon" for God refers to "Most High," "exalt" has as its Latin root "alt" for high, "transcendence" connotes an upward movement; "supernatural" denotes a higher plane of existence. Jesus reputedly talked to the spirits of Abraham and Moses on a mountaintop, Mohammed purportedly was lifted by Gabriel's chariot into the sky, the Nordic Gods lived in the heights of Valhalla, and Nirvana represents the highest stage of enlightenment (seventh heaven), in which bodily pleasures and pains no longer matter. The relationship between the sacred and the celestial dates at least as far back as the Aboriginal "sky-world", but it is more clearly evidenced by later religions. The Egyptians bestowed great status on astronomer-priests and created the pyramids, one of many famous structures on different continents with both astronomical and religious significance. Large mosques, temples, and cathedrals of all major religions protrude into the sky, and monasteries are much more likely to be built on top of hills rather than in deep valleys. Many famous mountains throughout the world, such as Fuji, Kilimanjaro,
Olympus, Sinai, and Shasta, have been imbued with sacred properties, while angelic and other positive supernatural figures typically associated with upper space invoke flight.

This “looking skywards” is not to be understood merely as a cultural, iconographic stereotype; it in fact refers to a clear physiological reflex (an upward rolling of the eyeballs) that is observed in a number of phenomena of consciousness, such as religious-contemplative phenomena, hallucinations, and dream states (REM sleep). Underlying this ocular reflex is a complex neuroanatomical and neurochemical system, which Previc analyses. He demonstrates the existence, in the brain, of neural pathways common to phenomena that, despite being of different types (dreams, visions, hallucinations, mystical raptures, out-of-body experiences, distant scenes etc.), all involve the production and distortion of visual scenarios characterised by upper visual field dominance.

**Previc’s four categories of space**

As regards the neurochemical processes involved in these experiences, we can only remark that upward eyeball rolling reactions are linked to hyperdopaminergic activity, as displayed in the stargazer rat experiment. As shown in figure 1, an increased level of dopamine affects the rat’s posture, forcing it to turn its eyeballs skywards.

Accordingly, it is well known that upper visual field negligence is often related to substantia nigra damage, i.e., to dopaminergic system failure. Individuals with depression, in which the serotonergic system predominates over the dopaminergic one, show a clear propensity to assume a slumped posture, with head and gaze turned downwards.

Not only is upward eyeball rotation a natural attitude during prayer, it is also a spontaneous behaviour when seeking to concentrate on theoretical and mathematical questions. From this point of view, the apparently pertinent question we might have been tempted to ask our mathematician – i.e., where he would locate the triangle on which he was about to meditate – is not as stupid as it might at first have seemed. Because, in fact, his triangle is located, just as Plato thought, beyond the confines of space, high up in the hyperuranic sky.

Thus we come to Previc’s spatial realms. Previc identifies four categories or realms of 3D space, related to as many human spatial interactions. He describes them using a diagram (Fig. 2).

**Figure 2** - Previc’s four realms of space.

Previc first draws a distinction between peripersonal space, a narrow spatial field related to individual prehensile activities (reaching/manipulating), and the other three extrapersonal spatial realms, one of which, ambient-extrapersonal space (earth-referenced, postural), being related to the management of body postures and body movements in the world around us, could be considered a proximal extension of the aforementioned peripersonal space. The other two extrapersonal spatial realms, termed focal-extrapersonal space and action-extrapersonal space, are more expressly “intended for” the management of distal spaces. Consequently, peripersonal and ambient-extrapersonal space, corresponding to the space in which our limbs (responsible for manipulation and locomotor activities) are located, have a prevalently downward bias. Focal-extrapersonal space is the only retinotopically-organised spatial system, and its visual inputs are concentrated in a central area corresponding to 30 degrees of the visual field. This focal visual space is upwardly aligned. In this spatial realm, the narrowness of the visual field is compensated for by an increased exploratory capacity and an increased faculty to locate objects through targeted eye movements.

Focal-extrapersonal space is closely related to the last and most extensive realm, which Previc calls the action-extrapersonal space, a spatial system that “uses mainly visual and auditory information to enable us to orient, navigate, and interact in topographical space” (page 503). This system allows management of all surrounding distal spatiality, but is also closely bound up with processes of memorisation of places and events, as well as with emotions associated with them. At the same time, it allows extensive and wide-ranging head movements that anticipate movements of the body in space, and integrates visual, auditory, vestibular and proprioceptive inputs. This system, like the focal one, is upwardly aligned.

The above-described classification is partly supported by neuroanatomical (and neurochemical) differences, as these spatial mapping systems use different neural pathways. Indeed, our brain processes and manages...
each of these spatial systems through the use of specific and appropriate resources and pathways. The crucial neural difference between the proximal (peripersonal and ambient-extrapersonal space) and the distal (focal- and action-extrapersonal space) systems is that the former use, from a neuroanatomical point of view, the dorsal network “extending from the dorsal visual pathways through to the lateral and medial portions of the parietal lobe and finally into the superior-lateral portions of the frontal lobe”, while the focal- and action-extrapersonal systems “mainly course ventrally through the occipital-temporal pathways and finally on into the lateral and medial-basal portions of the frontal lobe” (page 503).

According to Previc’s model, the action-extrapersonal system, which is upwardly aligned, is certainly the most meaningful for understanding consciousness phenomena related to hallucinations, visionary experiences and dreams, and mystical and religious experiences. The peculiar meaningfulness of this neural spatial mapping system is due not only to its complex interactions with limbic and cortical areas (also involved in the emotional component of religious experiences), but also to the specific neurotransmitter that, predominantly, this system uses, namely dopamine. Of the various peculiar features of Previc’s spatial management systems, at least three can usefully be highlighted: a) the ventral pathways characterising the focal- and action-extrapersonal systems; b) the predominance of the dopaminergic neurotransmission in these systems (compared with the predominance of the serotonergic and noradrenergic neurotransmission in the peripersonal system), and finally, with regard to the lateralisation of brain functions, c) the predominance of the left hemisphere in the extrapersonal management of distal space, and of the right hemisphere in the management of peripersonal space (as shown by studies of apraxia and of body negligence). In fact, there exists evidence suggesting that damage to the right hemisphere, with consequential prevalence of the left one, produces distorted and extraverted perceptions of space, characterised by a sense of being at the mercy of external agents.

**Extrapersonal space, dreams, hallucinations, out-of-body experiences**

Dreams and hallucinations etc. “represent the triumph of the extrapersonal systems over the body-oriented or peripersonal systems” (1, page 507). This claim can be supported by some considerations on one of the most common personal experiences, namely dreaming. If we dream that we are driving a car, for example, we do not usually visualise our hands, or experience tactile sensations, only auditory and visual ones. In our dream, we may even have a clear sensation of travelling through a wide-ranging action-external space, our body itself seeming to be totally “sucked” into this external spatial field, as though we have been projected outwards beyond our own body. A dreamer’s visual planes are usually upwardly oriented, too, meaning that he or she can rarely focus on objects on the ground. Indeed, when an object located at ground level is visualised, it is often presented from an eccentric perspective. We see it as though we were looking at it from a cloud in the sky, i.e. from the perspective of a hypothetical celestial God. Thus, the experience of dreaming allows us to gain some sense of the dominance of purely extrapersonal space, a totally extraverted dimension which seems to absorb our very subjectivity.

The predominance of the extrapersonal over the peripersonal system of space during dreaming may be also confirmed by observing the behaviour of the related neural substrate. The more vivid and clearly defined dreams are, the more marked is the activity in the ventromedial (limbic) areas of the brain, and in the occipital, temporal, parietal and frontomedial areas too. All these areas are closely involved in extrapersonal spatial mapping systems. It is also possible to notice, during dreaming, a decrease in the activity of the dorsal pathway, usually involved in the management of peripersonal space.

Dreaming is thus the simplest and most common experience through which man can approach a potentially very broad sphere of consciousness. The production of nocturnal dreams is supported by neural mechanisms that are also involved in other, more or less complex, dramatic, pathological generations of visions. These mechanisms we can see activated both in schizophrenic diseases and in religious and mystical states. Previc summarises as follows the role of the neural substrate in the management of these phenomena (1, page 518):

A review of the neuroanatomy and neurochemistry of dreaming, hallucinations, and religious beliefs, practices and experiences in normal humans indicates that there may be a common neural substrate of all behavioral phenomena that reflect a predominance of extrapersonal brain system activity and a reduction of bodily (self-oriented) activity (see also D’Aquil & Newberg, 1993). In terms of their neuroanatomy, dreams, hallucinations, and religious experiences may all be mediated by ventromedial (cortico-limbic) pathways extending from the medial temporal lobe to the anterior cingulate and prefrontal cortex. Conversely, there appears to be little activation or even de-activation of the parietal-occipital areas during these phenomena.

Various experiences that can be found reported in religious literature (out-of-body experiences, flights and transportations to other, transcendent worlds, the appearance of deceased people, etc.) are common features of everyone’s dream experiences. So much so that philosopher Schopenhauer even talked of an “organ of dreaming”, by which he meant a single, basic brain function able to unify a wide range of “oniric” phenomena, extending from simple dreaming to “para-normal” phenomena (8), and Previc has explored this Schopenhauerian unitary conception of all visionary activity of consciousness in some depth. But what Previc’s theoretical formulation brings out is the close dependence of all these phenomena (dreams, hallucinations, visions etc.) on a process of inhibition of proprioceptive peripersonal spatiality, with a contemporaneous exaltation of action-extrapersonal spatial systems. This predominance also implies an upward orientation of the visual field.
The role of dopamine

Similarly, with regard to the neurochemical aspects and the role of neurotransmitters in these processes, Previc underlines a consistent predominance of the dopaminergic over the serotonergic system.

The most consistent neurochemical change associated with all of these behaviors is the elevation of DA, particularly in the ventromedial cortical areas. By contrast, ACh is elevated during dreaming, decreased during most hallucinations, and inconsistently affected during meditation, while NE transmission is reducing during dreaming, largely unaffected during hallucinations, and possibly decreased during religious behaviors. Serotonin is also decreased during dreaming, hallucinations and mystical behavior, but direct empirical evidence for its role in religious activity is not as impressive as for DA. (1, page 518).

Not only may hyperdopaminergic states cause a forced upward rotation of the head and eyeballs (oculogyric crisis), as previously mentioned in the case of the stargazer rat, they also constitute an active neurochemical substrate for the production of more or less pathological (or maniacal) imaginary and visionary phenomena. The prevalence of this neurotransmitter is also linked to enhanced feelings of pleasure and gratification. This effect is confirmed, for example, by the pleasure that people usually gain from dreaming (as Freud himself theorized). Religion, like dreaming, is a source of pleasure and consolation. It is the best natural “medicine” mankind has to counteract pain, fear, depression, loss of motivation and of the sense of life having no meaning.

From this point of view, the nineteenth-century definition of religion as the “opium of the people” is not at all inappropriate. But to include religious phenomena in the broader and purely neuroanatomical-neurochemical category of phenomena that encompasses dreaming, delirium, hallucinations and epileptic or schizophrenic disorders, may be acceptable only for certain, extreme situations – those in which it really is possible, for example, to observe a natural transformation of a schizophrenic or pathological state into a state of religious delirium and vice versa, or if we are considering religious sentiment in its most ancient and primordial expressions, in which pathological states seem barely discernable from mystical raptures and celestial visions. Some authors, for example, interpret the celestial visions of Moses, Paul of Tarsus and Muhammad as effects of temporal lobe epilepsy.

The dopaminergic system plays a crucial role in pleasure control. But this system has been found to be particularly active in the generation of ideological and fictive phenomena, too. It is worth considering carefully the hypothesis concerning the presence, within humans, of an inherent pleasure reinforcement circuit, that is, of a biostrategy for management of the libido that results in a binding together of the religious and sexual spheres. This is the conclusion reached by Newberg, for example, at the end of his studies in the field of neurotheology and the psychology of religion (9). Dawkins (10) goes further, defining the dopamine DRD4 receptor as the “God gene”. Previc also refers to the evolution of the dopaminergic system as a crucial factor enabling us to understand, in part, the mystery of the development of human intelligence and culture. He points out that the expansion of the dopaminergic system, characterised by a homogeneous distribution of dopamine in the brain, particularly in its upper strata, began with the evolution of primates. An effect of the progressive expansion of the dopaminergic system “is the large increase (near-doubling, relative to body weight) of the DA-rich neostriatum in humans relative to chimpanzees, who spend the majority of their day in peripersonal activities” (1, page 525).

Differences in neurochemical values must also be evaluated in relation to dietary habits. The relationship between religious practices and dietary practices is well known, as is the importance attached to fasting in different religions (e.g. Ramadan in Islam). Also found in pseudo-religious body-centred philosophies, fasting is, in fact, a stereotype of the ascetic approach to life. The hermit abstains from eating to refine his spirit, and to gain access to a higher spiritual dimension. Vice versa, in opulent societies, religion is on the decline. From another point of view, a decrease in DA receptors has been observed in obese rodents (11), a finding confirmed in various animal studies. It has also been demonstrated that chickens fed on restricted rations increase significantly their own dopamine concentration in the basal telencephalon (12).

To draw some inferences from this evidence, we might hypothesise, from an anthropological point of view, the existence of a basic relationship between lack of resources and contemporaneous hyperactivation of the dopaminergic system, leading, according to Previc’s theory, to an opening up of action-extrapersonal space.

From heaven to earth

This opening up of distal scenarios results not only in a copious release of fictive celestial projections, related to an over-production of religious, mythical, utopian representations, but also in an opening up of distal terrestrial horizons. As the mind struggles to travel along celestial highways, the feet, prompted by shortage and need, tread endless routes in search of new worlds or wealth. It should not be forgotten that the stars in the sky were, for early wayfarers and sailors, the only points of reference; man had to scan the sky if he wanted to go far on earth. Peoples whose gods are located up in the sky are “more spread out” than those who have only terrestrial or sylvan gods. Thus, the conquest of heaven (God’s kingdom) and the conquest of terrestrial realms went hand in hand; great empires often generated great religions (consider, for example, the Arab Empire/Islam, the Roman Empire/Christianity) and vice versa. Ideological expansion and military expansion are almost always connected and both represent integral stages in a single process. This process, at its primary (or neural) level, is a spatial re-mapping process accompanied by an opening up and activation of the action-extrapersonal system of spatial management, which prevails.

Fasting, hunger, underfeeding, etc., activate physiological processes that stimulate neural areas closely involved both in the generation of visions and hallucinations and in ideological projections. The brain modules
most involved in these processes (showing a dominance of the left hemisphere) are the ones otherwise known to provide the neural basis for consciousness events with mythological and ideological overtones, that is the temporal lobe area primarily, but also the parietal lobe and cingulate gyrus.

Philosophers, for their part, long had a vague appreciation of this latent relationship between dietary habits and the production of ideologies. Nietzsche, for example, in his last book *Ecce Homo* (13), dwells on his dietary habits, to which he attributes an important role in the production of his brilliant philosophical intuitions. In reference to Newberg’s ideas on the relationship between religion and sexuality, we can also mention Ludwig Feuerbach’s systematic and philosophical endeavour to reduce, in general, all theology to anthropology. Feuerbach claims that every imaginary man-to-God relationship is really a metaphorical transcription of a man-to-man relationship (14). Hence, all theology is, in truth, anthropology. In this way, theology is interpreted as merely the primitive ideological support needed to promote the social integration of individuals. This interpretation is actually compatible with the aforementioned theological (or neurotheological) concept of “the face of God” (face of the other” (face of “the face of God” or, in Levinas, “the face as infinite”). But this “infiniteness” could well denote the dissolution of the individual in a wider, subjective abstract being, i.e., in the group entity understood as the abstract subject with which all can identify. An allegorical, simulative, metaphorical activity is a crucial part of the process by which consciousness acquires new dimensions. Hence primitive religion becomes a symbolic sphere, a metaphorical dimension, a consciousness construct, wherein mimicry, imitation and metaphorical behaviours can be expressed. But what is actually being “simulated”, “dramatised” and acquired by consciousness through this religious “gymnastics” is the formal structure of the model of all social (and political) interactions.

Thus, according to Feuerbach, each celestial vicissitude is always a transfiguration of terrestrial events, or a “fanciful way” of narrating human stories. The man-to-God relationship is the allegory of the man-to-man relationship. But the most important follower and continuator of Feuerbach, the young Karl Marx (15), tried to eliminate all residual abstraction in Feuerbach’s anthropology. The man-to-man relationship is itself an abstract relationship, a further allegory. The concrete reality of this man-to-man relationship is in truth a man-to-woman relationship. Thus, Feuerbach’s “dissolution of theology” concludes its path in the sexual sphere.

Philosophy too, advancing intuitively, long ago identified a “dopaminergic circle” as a pleasure system or reward mechanism linking religious ecstasy with sexuality, an interpretation supported by Newberg’s idea (9) that, from an evolutionary neurobiological perspective, the mystical experience might, in part, be bound up with the reward mechanisms of sexual instinct.

**Concluding remarks**

Previc’s research does not fully exploit his brilliant hypothesis of a four-way division of space. The humanistic sphere that might immediately fit into in a theory on the mapping of distal space is the aesthetic sphere. Indeed, so-called figurative art (drawing, painting, sculpture) shows us the evolution of mankind’s perception of visual space (16). But Previc seeks, instead, to frame his research in the classical neurotheology field, making express references to the works of Newberg, d’Aquili, Ramachandran and Persinger (17).

Even though Previc’s studies probably offer an important model both for probing the most obscure dynamics of consciousness and for revising our view, or increasing our understanding, of some crucial, early stage in human evolution, it has to be recognised that these theoretical tools are no longer applicable to modern forms of religion. Indeed, religion today can be interpreted, increasingly, as an ethical or intellectual system, in which mystical or visionary raptures no longer play a part. Other fields of inquiry in which Previc’s theories might be relevant are the neuropolitical and geopolitical spheres. Some authors have speculated that the asymmetrical distribution of the dopamine and serotonergic systems in the left and right brain hemispheres (with a prevalence of the former or the latter system), can determine a priori (or genetically) an individual’s ideological orientations. This might also be the reason why individuals rarely change their ideological orientations during their lifetime. It is also possible to distinguish between two ideological types, which we can term, basically, maniacal (dopaminergic) and depressive (serotonergic); to each of these basic types opposing behavioural and theoretical tendencies can be ascribed. The maniacal type would be characterised by fanatical, conservative, self-centred, traditionalist attitudes, but also proselytising and invasive tendencies, while the depressive (serotonergic) type would be inclined to display hetero-centred, heterodox, tolerant, “liberal” (or libertarian) attitudes. Thus, political (or ideological) differences might be related to the prevalence of neurochemical activity in the left or right brain hemisphere. Research in neuropolitics and neurosociology is still in its infancy and there is little literature available. However, we can mention Brack and Zhang’s attempt to collect and categorise US citizens’ electoral orientations (expressed by a conservative/ liberal dichotomy), associating them with a remote maniacal or depressive psychological characterisation, and with a hemispheric predominance (left or right) of neurochemical activity (18). These conclusions are perhaps too assumptive. Further analytical and methodological evaluations are called for. In the same way, however, we can intuitively presume that the historical political movements and ideologies, like the personal ethical choices (19), that we tend to regard as repugnant may not have only cultural origins, but also genetic or even neurochemical ones. How can we fail to see, for example, that politically maniacal systems, like Nazism et similia, present, in an amplified way, a sequential model that can be inferred from Previc’s general theory. It is, in fact, possible to trace, in this tragedy of the twentieth century, a phenomenological sequence extending from a state of social misery and hunger (presumably associated with dopaminergic stress and thus functional alterations in the left brain hemisphere) to a fresh proliferation of mystical and mythological thought, leading, in turn, to a new opening up of distal space-time dimensions (mil-
lennialism, “Lebensraum”), to racism and xenophobia (a disorder of the symbolic primary process of socialisation, the “face of the other”), and to military expansion. By suggesting the presence of genetic or neurological influences in these historical processes, might it become possible to talk of a “natural” disseminated “madness”?

We have here referred to an extreme (and recent) historical context in order to emphasise the structural valence of the relationship between symbolic geometrical features and the construction of a mythological world. The crisis of the symbolic and distal spatial mapping system is characterised, initially, by a pathological dysfunction of the linear-symbolic, geometrical process of recognising the “face of the other”, and then by the emergence of a maniacal “mythology of the territory” as a symptom of a primary activation of a process of mapping distal space. Both processes generate a primary emotional effect along the limbic mydagical reactive pathway (the “fear of the other”, xenophobia), and a secondary ideological effect along more “constructive” pathways, with stimulation of the imaginary and visionary mental system and the construction of mystic or mythological (or political) worlds.

So, to return to the ancient world and ancient myths, we can only repeat our previous aphorism, i.e. that the drive of the human imagination to explore distal celestial spaces, as far as the most remote house of the gods, also constitutes a framework and support for terrestrial “projections”. As mentioned before, heavens and earths are often conquered together. Heaven (the hyperuranic world), apart from being a space in which pure geometrical figures and lines may live, is not only the home of the immortal gods, but also a home for “immortal” heroic figures and lines may live, is not only the home of the immortal gods, but also a home for “immortal” heroes – an eternal residence for soldiers, conquerors and martyrs: people who have struggled to extend or defend the immortal gods, but also a home for “immortal” heroes – an eternal residence for soldiers, conquerors and martyrs: people who have struggled to extend or defend an ideal or factual, military or ideological, “terrestrial, but also celestial” spatiality.

It is all about creating a vast ideal geographical space in which to organise a new, active system of perceiving the world – the expanding and flourishing space that is reflected in so many archetypal legends, stories of hypothetical, mythical, original journeys: the journeys of Moses, Odysseus, and Aeneas. Through them, man endeavours to explore, through his imagination, the vague confines of a much wider concept of territoriality. And what mysterious and celestial events may befell these wayfarers along their way! Hence we see, marching through history, migrant processions of humans and gods walking together towards promised lands – lands imagined, dreamed of and eventually glimpsed, but always a distance.

References

4. Raschke H. Das Christusmysterium. Bremen; Schüneman 1954
14. Feuerbach L. Grundsätze der Philosophie der Zukunft. Frankfurt am Main; Klostermann 1983