

Shamanhood and Mythology
Archaic Techniques of Ecstasy and Current
Techniques of Research

In Honour of Mihály Hoppál, celebrating his 75th Birthday

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Edited by Attila Mátéffy and György Szabados
with the assistance and proofreading of Tamás Csernyei

Hungarian Association for the Academic Study of Religions
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Hungarian Association for the Academic Study of Religions



HUNGARIAN ASSOCIATION
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“Oh! You mean you have no balance!” Symmetry, science and shamanism

Sacred geometry refers to the study of archetypal patterns of which the material world is composed and that are considered to be core patterns of creation. Mathematics interprets these patterns as ‘symmetrical’; traditional shamanism equates symmetry with ‘balance’. When someone is ‘balanced’, they are integral, and in harmony or union with themselves, their family, community, and the spirit world. Shamanic cosmology is based on underlying principles that appear to be universal to all cultures. Science, particularly the language of mathematics, can provide a map for interpreting and understanding essential and archaic relationships embedded in the language and praxis of shamanism. ‘Symmetry’ seems to explain not only how shamanic cultures model their worlds and how shamanic praxis ‘works’ but also why.

Mathematics and Symmetry

The language of science for thousands of years has been mathematics; Einstein, for one, saw the world essentially as a geometrical structure (Rees 2009: 38). Other theorists, particularly in the field of consciousness studies, link mathematics and geometry with culture in a metasystem within which diverse disciplines, including parapsychology, may be integrated. Young’s *Geometry of Meaning*, for example, is a search for the unity of myth, mathematics and morphology; it points towards the unification of symbolic meaning with mathematical manipulation, providing a comprehensive metaphor with which to describe processes of consciousness. Such a metasystem links humankind, the individual, and the universe (Mishlove 1993: 82–86). Leonardo da Vinci’s understanding of geometry and art revealed certain “roots” such as the golden section and the Fibonacci series – basic and universal languages that are found in every human culture and, of course, in nature (see Lundy 1998 and Wade 2006).

Mario Livio, an astronomer with a degree in theoretical astrophysics whose work is cited throughout this paper, uses symmetry to explain and understand the underlying structure and order of the natural and human-made worlds. He discusses how symmetry has become a pivotal concept “in our ideas about the cosmos around us and in the fundamental theories attempting to explain it” (Livio 2005: 2) and is a crucial aesthetic element. Symmetric pattern also provokes intense emotional response. There is even a preference for symmetry in animal mate selection.

The word “symmetry” comes from the Greek *sym* and *metria* meaning “the same measure” and originally had to do with proportion and its ensuing beauty. In the 18th century, it was introduced to mean, in the mathematical sense, “immunity to a possible change”. “Group theory”, a concept introduced by Évariste Galois (1811–1832), “is recognized today as the “official” language of all symmetries” and thus of all disciplines (Livio 2005: ix), as well as “the mathematical language that describes the essence of symmetries and explores their properties” (Livio 2005: 2). Livio goes on to describe the fundamental role of symmetry in nature:

With every step toward the revolutions of relativity and quantum mechanics, the role of symmetry in the laws of nature has become increasingly appreciated. Physicists are no longer content with finding explanations for individual phenomena. Rather, they are now convinced more than ever that nature has an underlying design in which symmetry is the key ingredient... symmetry is one of the most important tools in deciphering nature’s design (Livio 2005: 43–45).

Livio points out how symmetry “sits right at the intersection of science, art, and perceptual psychology, representing the stubborn cores of forms, laws, and mathematical objects that remain unchanged under transformations” (Livio 2005: 45). He then identifies these invariant cores in seemingly different disciplines from the financial world to abstract art. In the language of the social sciences, psychology, and shamanism, these invariant cores are surely prototypes, paradigms, and archetypes but with a numinous quality that refers to the divine order of the universe.

I apply Livio’s principles to shamanism, to suggest that symmetry is also ‘the essence’ of the paradigms and archetypes that are the language of culture. Livio identifies a limited number of symmetries in this universe; some of these are illustrated in shamanic traditions in which I have carried out fieldwork – Siberia, Mongolia, Southeast Asia and northern North America as well as tribal India and the Tibetan Bön tradition.

Shamanism and symmetry

Whereas Livio discusses the underlying order of the universe, Mircea Eliade sees shamanic traditions in sacred relationship with the cosmos, discussing how all “primitive” societies possess a consistent body of mythical traditions, a “conception of the world” that novices (Eliade is describing initiations) acquire as sacred teachings:

The world is the work of Supernatural Beings – a divine work and hence sacred in its very structure (Eliade 1958: x).

Eliade acknowledges “countless innovations” accepted by primitive societies, “But, in contrast to modern society, primitive societies have accepted all innovations as so many revelations, “hence as having superhuman origin” (Eliade 1958: xi). Further,

Nothing better expresses the idea of creation, of making, building, constructing than the cosmogony. The cosmogonic myth serves as the paradigm, the exemplary model, for every kind of making. Nothing better ensures the success of any creation (a village, a house, a child) than the fact of copying it after the greatest of all creations, the cosmogony (Eliade 1958: xii).

Here Eliade is suggesting that the same organizational principles underlie nature and culture in shamanic traditions and that these principles are based on the ‘origin’al design of the universe, the cosmogony.

Related to Eliade’s conception of the cosmogony as paradigm is Carl Jung’s interpretation of archetype. While the archetypal concept is associated with Carl Jung; it had been around for much longer, going back at least as far as the ancient philosophical texts of Plato and others. In Platonic terms, it refers to the unseen and fundamental or essential ideas from which objects and images manifest in the material world. Jung likewise viewed archetypes as archaic and primordial: “eternal ideas are primordial images stored up (in a supracelestial place) as eternal, transcendent forms” (Jung 1969: 33). Thus, an archetype is the fundamental and original principle of form and order out of which the psyche and also – for the purposes of this paper – culture emerge. Jung, further, considered the archetype to have a numinous or spiritual character.¹

Johnson, describing the Jungian concept of “self”, writes that, the awakening of the *symmetrical* unity of the self is the great goal of our psychological evolution:

The *self* is the sum of all the divergent forces, energies, and qualities that live within you and make you who you are – a unique individual. The self is the balanced, harmonious, symmetrical unity at the very centre of one’s being, which each of us senses within (Johnson 1983: 18–19).

Symmetry and shamanism

Shamanic cultures model social relationships, the built environment, and cultural expression (Walker 2010) on relationships in the natural world. Doing so maintains the harmony of humans and nature. Symmetry is the key explanatory and modelling concept for seemingly diverse phenomena – shamanic ritual, the shaman’s toolkit, songs and chants, the shamanistic relationship to the spirit world, layout of homes in indigenous communities, clothing... with respect to their underlying structure and their substance. In shamanic cultures, ‘balance’ is used to refer to this idea of symmetrical unity.

Nadjeda Duvan is Ulchi (pronounced Ulchee) from the Khabarovsk territory of Siberia. At the 2000 conference, *Musical Ethnography of Tungus-Manchurian Peo-*

¹ Jung (cited in M. Stein: *Jung’s Map of the Soul: An introduction*. Chicago: Open Court Publishing Company 1998: 127) confirmed that “Archetypes are not derived from culture; rather cultural forms are derived from archetypes”.

ples held in Yakutsk, Republic of Sakha, she played her jew's harp for me. I asked her if the jew's harp is used for medicine, therapy, if I have some health problems: "Oh, you mean you have no balance," she said. "... It's a good medicine instrument to give therapy. You get balance from playing drum, jew's harp, different rituals."² Similarly, an Evenki women shaman from South Yakutia said that shamans find a harmony to the elements when there are some problems.

To where do shamans travel to find help for the problems of this world? To the Upper and Lower Worlds, the Spirit World, the Inner World, the place where the ancestors or their spirit helpers reside... Are they not connecting with and in fact, reconnecting or bridging the severed seen and unseen worlds, thus reuniting them? When things get 'out of balance', a shaman investigates the causes to make restitution. Shamanism extends the individual symmetrical unity of the self, discussed above, however. Balance applies to the integration of the mind/body/emotions/spirit within the individual and also to relations between this world and the spirit world; between the individual and their family, community, and the natural world; between male and female, positive and negative, and even between good and evil. Opposites such as light/dark, heaven/earth, night/day must also be in balance for the universe to operate as it should. When things get out of balance, the shaman restores it, puts things back in order, recreating the symmetry and 'original order of the cosmogenesis.

Symmetry and symmetries

Livio (2005: 246) identifies a definitive quantity of symmetries in our cosmos: "there exist only 230 different types of spatial symmetry groups (just as there are only 7 different symmetry groups of linear strip patterns)". I illustrate Livio's symmetries with shamanic examples from my fieldwork.

Bilateral symmetry: In many dictionary definitions, symmetry is taken to mean the familiar bilateral symmetry (also called mirror-reflection symmetry), that is up/down, front/back, and characteristic of the human body, animals and many artifacts. These Siberian "male" and "female" standing stones, for example, represent the gender relationship as bilaterally symmetrical and in relationship, as the portal between the spirit world and this world (*Figure 1*). Siberian shaman Tatiana has just completed an 'opening of the way' ceremony.

By comparison, plants and some animals such as jellyfish, possess symmetry similar to that of a cone; that is, producing symmetrical mirror reflections through their central, vertical axis. Although it may represent different phenomena in different cultural contexts, four is a sacred number in shamanism and an example of bilateral symmetry (*Figure 2*).

² The circle dance of traditional cultures is essentially egalitarian and inclusive. Leadership is emergent. I participated in a Siberian circle dance in which men, women, shamans, foreigners, government officials and representatives from a number of different ethnic groups held hands and danced together in a clockwise direction, discussed below as right-handed chirality.



Figure 1. Siberian Shaman Tatiana ‘opening the way’ at the 2001 *Environmental Studies of Shamanism & Other Traditional Magico-Medical Knowledge* (All photographs are by the author unless stated otherwise.)

In Himalayan shamanism, for example, the number four “symbolizes the spatial coordinate cross of the four directions of the heavens” (Müller-Ebeling 2002: vii). The Mi’kmaq of eastern Canada honour four sacred plants – cedar, sweet grass, wild sage/*Artemesia*, and tobacco and construct their medicine wheel based on the four directions and four stages in the circle of life.

Mathematics has identified many more types of symmetry including rotation, reflection, translation and glide reflection (as well as other transformations not geometrical in nature such as permutations.



Figure 2. Hill Tribe embroidery from Southeast Asia illustrating bilateral symmetry – note also the alternating and opposite left and right spirals (All artifacts in the collection of the author unless stated otherwise.)

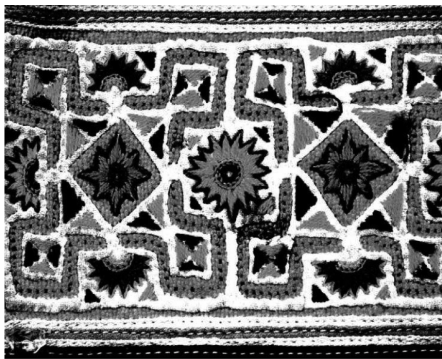


Figure 3. Flower designs exhibiting rotational symmetry. Hill Tribe, Southeast Asia

Rotational symmetry is characteristic of snowflakes – rotated by certain angles around an axis perpendicular to their plane (passing through centre), they remain the same (Livio 2005:10; Wade 2006: 4, 8). While snowflakes have 6-fold rotational symmetry, starfish have 5-fold. Many flowers such as the English daisy

and chrysanthemum possess an approximate rotational symmetry in that they look just about the same when rotated by any angle – this symmetry contributes to their universal aesthetic appeal (Livio 2005: 10). A shamanic example of rotational symmetry is the flower design of Hill Tribe costumes from Southeast Asia (*Figure 3*).

Circle: The circle is one of the simplest rotationally symmetric figures:

If you rotate it around its centre through, say, 37 degrees, it remains unchanged. In fact you can rotate it through any angle around a perpendicular axis through its centre and you will not notice any difference. The circle therefore has an infinite number of rotational symmetries. These are not the only symmetries the circle possesses. Reflections in all the axes that cut along a diameter...also leave the circle unchanged (Livio 2005: 14).

In shamanic cultures, the circle is a very common design element. Nikolai Oorzhak wears a disc – a bronze shaman's mirror (*Figure 4*). On the deerstones of Central Asia, the circle has been interpreted as an earring or the sun (Fitzhugh pers comm) (*Figure 5*). As a drum, the circle is said by Siberian shamans to represent



Figure 4. Siberian shaman Nikolai Oorzhak wearing shaman's mirror



Figure 5. Sun or moon on the top of a standing stone, Mongolia

the world or cosmos. About Himalayan shamanism, “The bands and the ties, which are wound around the wrist eight times, are also supposed to protect the people from evil influences with a ‘magical’ circle” (Müller-Ebeling 2002: 52). Likewise, amongst the Hill Tribes of Southeast Asia, a red string encircles children's wrists to protect them from bad spirits. And the Dukha reindeer-herders of northern Mongolia mark the spirit reindeer by a red string encircling its neck to protect the herd and the herders.

As with the sphere or the equilateral triangle, Livio describes how the same system can “have multiple symmetries, or be symmetric under a variety of symmetry transformations” (2005: 15). Extending this idea to culture, a “symbol” may have many interpretations or many derivatives since the circle is both elemental and ubiquitous in the natural world.

Sphere: About the sphere as a symmetrical form, Livio writes, “Rotating a perfect sphere about its centre, using an axis running in any direction, leaves it looking precisely the same” (Livio 2005: 14). The spherical sun or moon, when represented in two-dimensional form as on a deerstone, becomes flattened into a circle (Figure 5).



Figure 6. Repeating pattern symmetry (from Livio 2005: 3)

Equilateral triangle: “There are six symmetry transformations – three rotations and three reflections – associated with the equilateral triangle” (Livio 2005: 15). These forms, or derivatives of them, may represent or be interpreted as mountains as in this Hill Tribe pattern from northern Thailand (Figure 6).

Symmetry of repeating patterns: “One of the most familiar of all symmetric patterns is that of a repeating, recurring motif. From friezes... to carpets and even birdsong, the symmetry of repeating patterns has always produced a very comforting familiarity and a reassuring effect” (Livio 2005: 15). The symmetry transformation in this case is called *translation*, meaning a displacement or shift by a certain distance along a certain line. The pattern is called symmetric if it can be displaced in various directions without looking any different (Figure 7). In other words, regular designs in which the same theme repeats itself at



Figure 7. Embroidery showing repeated triangle motif, Hill Tribe, Southeast Asia



Figure 8. Ascending deer motif on standing stone, Mongolia

fixed intervals possess translational symmetry. Ornaments that are symmetric under translation can be traced all the way back to 17,000 BC in the Paleolithic era; a mammoth-ivory bracelet found in the Ukraine, for example, is marked with a repeating zigzag pattern. Other translation-symmetric designs are found in a variety of art forms such as the patterns of western artists M.C. Escher and William Morris. In nature, translation-symmetric creatures such as the centipedes have identical body seg-

ments which may repeat as many as 170 times (Livio 2005: 16). The ascending deer on Central Asian deerstones is an example of this type of symmetry in shamanic traditions (*Figure 8*).

Symmetry in music: In response to his own question about, “whether symmetry with respect to translation, and indeed reflection and rotation too, is limited to the visual arts, or may be exhibited by other artistic forms, such as pieces of music”, Livio gives several examples in western music. He points out that symmetry defined as other than purely geometric and referring to the sounds rather than to the layout of the written musical score, confirms translation-symmetric music. As Russian crystal physicist G. V. Wulff wrote in 1908:

The spirit of music is rhythm. It consists of the regular, periodic repetition of parts of the musical composition... the regular repetition of identical parts in the whole constitutes the essence of symmetry... Even more generally, compositions are often based on a fundamental motif introduced at the beginning and then undergoing various metamorphoses” (Livio 2005: 18).

About Mozart’s compositions, “British musicologist and composer Donald Tovey identified their “beautiful and symmetrical proportions” as one of the key reasons for their popularity (Livio 2005: 19). Isn’t it interesting that Mozart was called a shaman by his contemporaries? (Flaherty 1992)

A shaman’s song from northern Canada illustrates Wulff’s periodic repetition and fundamental motif that is metamorphosized. In a previous paper (Walker 2003), I analyzed the song and movement that accompanied it in terms of their “balancing” properties. In the following quote are several examples of symmetry including the circle and the left-right swaying of bilateral symmetry. Diamond Jenness (1923: 187) is writing of an early experience with shamanic incantations amongst the Copper Eskimos:

From generation to generation, from *inyuit sivulingni*, “Men of the first times”, as the natives say, various incantations, *akeutit*, have been handed down to appease or drive away the malignant spirits. The incantation is usually sung by all the people, with one of their shamans standing in the centre of the ring; and as they sing their bodies sway from side to side, though their feet remain stationary. At the conclusion of the refrain the shaman invokes his familiars, and with their aid produces the desired result. Children are generally excluded from these performances. Many of the incantations are very old and have lost whatever meaning they had originally; but this does not lessen their potency. I heard one sung during a snow-storm in the late summer of 1915. Tusayok and Kesullik had no tent, so they improvised a rude shelter by stretching some skins between two crags; but since in spite of this they were very cold and uncomfortable, Tusayok chanted an incantation and repeated it over and over again for about an hour. There were only about half a dozen words in it, and each taken by itself was intelligible enough, but no one had any clear idea of what the whole song meant. Tusayok thought, however, that the mere singing of this incantation, even though he was not himself a shaman, might have the effect of driving away the evil shades or spirits who were causing the storm and produce fine weather again. Literally translated the song ran:

I come again, I, again.
I come again, I, again. Do you not know?
I come again, I, again.*
(*A spirit is supposed to be speaking all through.)

The jew’s harp [*amar huur* in Mongolia] is commonly used throughout Central Asia and Southeast Asia. Considered to be one of the oldest instruments, shamans play it to go into trance. When shamans’ drums were confiscated in Russian under Stalin and many shamans were sent to the gulag or killed as threats to the sovereignty of the state, a jew’s harp was easily concealed in clothing and played unobtrusively. As it requires a regular breathing pattern (regular, measured breathing is itself symmetrical), the structure of a musical pattern is symmetrical; the music’s healing properties fit Wulff’s criteria above. Here, the Dukha shaman Haltsan relates the healing properties of his *amar huur*:

The shaman Haltsan told Oyumaa he was out of consciousness for a whole week – running around naked with no idea what he was doing. A cook took him to see a psychologist which didn’t help. Haltsan said when he played his jew’s harp, he was able to get his consciousness back.
(Walker Field Notes, Mongolia 2007).

That is, he became whole again in the sense of Johnson’s symmetrical unity described above.

Glide-reflection symmetry is described by Livio as a combination of translation and reflection symmetry (Figure 9). Translation and reflection can be combined into one symmetry operation known as glide reflection. The footprints generated by an alternating left-right-left-right walk exhibit glide-reflection symmetry. The operation consists simply of a translation (the glide), followed by a reflection in a line parallel to the direction of the displacement (the dashed line in the figure). Equivalently, you could look at glide reflection as a mirror reflection followed by a translation parallel to the mirror. Glide-reflection symmetry is common in classical friezes... Whereas patterns that are translation symmetric tend to convey an impression of motion in one direction, glide-reflection-symmetric designs create a snakelike visual sensation. Real snakes achieve these patterns by alternately contracting and relaxing muscle groups on both sides of their body – when they contract a group on the right, the corresponding group on the left is relaxed, and vice versa (Livio 2005: 21).

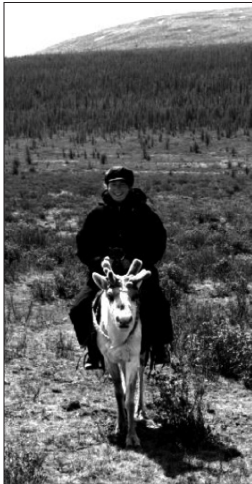


Figure 9. The author on a reindeer on the taiga, illustrating glide-reflection symmetry

The snake can form a circle and it has bilateral movement. On Central Asian shamans’ dresses, the snake is rep-

resented in the “ropes” that hang from each shoulder. These are classic motifs on the dress, even where there are apparently no snakes in the region. Livio also points out the fascinating interrelationship between symmetry and orientation: “Symmetrical figures do not change when rotated, reflected, or translated in certain ways” (Livio 2005: 38). The snake, as an elemental form and recurring symbol of immortality in many cultural contexts, is an example of this persistent orientation of symmetrical forms. Anthropologist Jeremy Narby, interestingly, discusses the snake motif in terms of the double helix DNA (Figure 10).

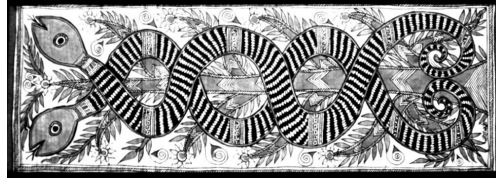


Figure 10. Tribal painting from India showing snakes as a double helix (collection of the author)



Figure 11. Sacred tree growing in corkscrew shape, draped with Buddhist scarves, Mongolia

3-dimensional symmetry: The preceding examples are rigid transformations that result in symmetries in two dimensions (“rigid” simply means that after the transformation, every two points end up the same distance apart as they were to begin with – we cannot shrink figures, inflate them, or deform them). In three-dimensional space, in addition to the symmetries of translation, rotation, reflection, and glide reflection, there occurs yet another symmetry known as *screw symmetry*. “This is the type of symmetry of a corkscrew, where rotation about some axis is combined with translation along that axis. Some stems of plants, where the leaves appear at regular intervals after completing the same fraction of a full circle around the stem, possess this symmetry” (Livio 2005: 22). An example from Mongolia of screw symmetry is this tree growing in a corkscrew shape (Figure 11). The explanation for its growth pattern is a metaphysical

one – it is said to be growing on the intersection of energy lines. Buddhist monks smear it with butter in recognition of its sacred nature

Permutations and perception: There exist many other symmetries but those shown above are some of the most obvious ones for the purposes of this paper. Permutation symmetry, however, deserves mention as a type of transformation that is not *geometrical* in nature, but involves different arrangements of objects, numbers, or concepts. A system can be symmetric (i.e. not change) under permutations, and symmetry under permutation appears in diverse circumstances, including abstract circumstances and mathematical formulae. Permutation symmetry is seen in the colours of a chessboard: “the image does not remain truly the same when black and white are transposed... However, the general impression remains the same” (Livio 2005: 28). Escher incorporated translation-symmetric and colour-symmetric pat-

terns. Perhaps the birch bark hat from Siberia (*Figure 12*) and other Siberian cut-out designs illustrate this type of symmetry. Paper cut-out, mandala-like patterns made for me by the Siberian shamanist and medium, Ludmilla, were described as a “healing” aid, “like meditation”; by meditating on one, I would regain the balance I was missing. Figures 13 and 14 are embroidered cut-outs that likewise illustrate permutation symmetry.



Figure 12. Birch bark hat, Siberia



Figure 13. Cut-out embroidery, Siberia



Figure 14. Embroidered bag, Siberia.

Permutation symmetry draws Livio’s attention to “the primitive process of perception, and the rules that underlie symmetry” (Livio 2005: 28). Pointing out that, “since all the information we obtain about the world comes through our senses, the question of symmetry as a potential factor in perception becomes of immediate relevance” (Livio 2005: 28), with vision in human perception being the most important means of perception:

Generally, recent psychological theories and experimental results confirm the important role of symmetry in perception. Many experiments show that bilateral symmetry about a vertical axis is the easiest to recognize (i.e. recognized fastest) ... Basically, symmetry is a property that catches the eye in the earliest stages of the vision process (Livio 2005: 37).

Bilateral symmetry, of primary importance in perception (Livio 2005: 39), is an obvious feature of a shaman’s dress. The left and right sides of the dress, like the left and right sides of the human body, are bilaterally symmetrical; thus, when we view a shaman in full dress, we quickly perceive its integrity and harmony (*Figure 15*).



Figure 15. Museum-made replica of Dukha shaman’s dress, Mongolia

The dress, amongst other shamanic elements, is immediately perceived by the onlooker in terms of its desired outcome due to human perceptive faculties. The dress also clothes the shaman in the “healing” or “balancing” elements that he or she is working towards creating or enhancing



Figure 16. Mongolian shaman Odkhuu in trance showing eye-curtain.

through shamanic ritual. As the Tamang shaman, Maile Lama demonstrates, “The cure consists primarily in the reestablishment of the psychic harmony of the community” (Müller-Ebeling et al 2002: 53).

Repetitive patterns that are very closely spaced and consisting of high-contrast motifs can induce a powerful illusion of motion. Livio gives the example of an op-art pattern of black wavy lines against a white background (or vice versa), all evenly spaced. The shaman’s eye curtain and the fringe along the hem of a shaman’s dress in motion contribute to the sensation of the shaman, in an altered state of consciousness, in motion or travelling between the worlds (*Figure 16*).

Shamanism and symmetry

Symmetry as an underlying concept of shamanism explains accepted characteristics of shamanism: that it is nature-based; that its artifacts are power-full; that it is an assemblage of consistent components; that it is both pragmatic and intuitive; both secular and sacred, serving the secular functions but also metaphysical purposes such as transcendence, transhumanism and cosmogenesis. Symmetry may also support some not so well accepted ideas – for example, that shamanism is both science and art.

Archaeologists are reinterpreting ancient sites in terms of their symmetry. Canadian scientist Gordon Freeman found similarities between the surface geometry of three ancient sites, all at approximately the same latitude – Stonehenge in Britain; Preseli Mountain in southwestern Wales; and, a 5000-year-old Sun Temple and calendar in Alberta, Canada (the latter used until 300 years ago) – all of which show evidence of astronomical sophistication and geometry to interpret the sun, moon, and the seasons. I interpret Freeman’s data as showing a balance or symmetry between the Sun and the Moon, manifested during Equinox, and between light and dark, and night and day:

The Full Moon is directly across the sky from the Sun, so the Full Moon rises opposite where the Sun sets, and sets opposite where the Sun rises. Therefore, the Full Moon near the Summer Solstice rises near where the Winter Solstice Sun rises, and sets near where the Winter Solstice Sun sets, when viewed from the same place. Near the Winter Solstice,

the Full Moon rises and sets near where the Summer Solstice Sun rises and sets (Freeman 2009: 70).

About eclipses, he writes:

The Moon's orbit around the Earth oscillates back and forth across the Earth's orbit around the Sun. Occasionally, the Sun, Earth, and Moon happen to be exactly in line, which causes either the Sun or Full Moon to be eclipsed! The Sun gets eclipsed when the Moon is exactly between the Sun and Earth, and the Full Moon gets eclipsed when the Earth is exactly between the Sun and Moon (Freeman 2009: 71).

Another study and reinterpretation of ancient sacred sites and monuments – Stonehenge, the Great Pyramids, Machu Picchu and others – by Flem-Ath and Wilson shows they formed a geometrical pattern, implying the existence of an ancient advanced civilization aware of symmetry in the cosmos. The Parthenon, built around 450 BC as a willing collective, not by slaves, has an interesting geometry:

... the Parthenon forms, if viewed from the sky, a perfect equilateral triangle with the Temple of Aphaea, on the island of Aegina, and the temple of Poseidon at Cape Souinion... each column of the Parthenon makes a very slight inward incline, so that if projected upward into space they would eventually steeple themselves together at a symmetrical point in the empyrean. The “rightness” is located somewhere between the beauty of science and the science of beauty (Hitchens 2009: 44).

It also has an interesting history. Five centuries after the birth of Christianity it was closed down. Later it was converted into a Christian church. A thousand years after that it became a mosque. During the German occupation of Athens, the Acropolis was made to fly a Nazi flag. Then in the early 19th century, half of its ornaments were sawed off by Lord Elgin and carried off to Britain (when this section of Greece was occupied by Turkey) and sold by Elgin in 1816 to the British Government to pay off his extensive debts. The temple had two massive pediments decorated with the figures of Pallas Athena, Poseidon, and the gods of the sun and the moon. How would the original geometry and its “rightness” have been affected by the different uses and appropriation? And will reconstruction be in line with its original purposes, if we can even divine what these were?

Dennard's research on Neolithic and Bronze Age monuments in Britain and Ireland looks at quartz and its frequent occurrence at such sites and in ritual contexts. Reverence is given to quartz in many cultures, past and present. The Mongolian shaman Maamaa, for example, showed me his medicine bag of quartz crystals collected from his ancestral home. The basic molecular structure of quartz crystal is a tetrahedron (an equilateral triangular pyramid). In his discussion of enantiomorphy (left and right-handedness), Wade describes how the human body-form is dorsiventral with pairs of appendages such as hands that are mirror-symmetric; we do, however favour right-handedness, in the same way that a majority of climb-

ing plants exhibit “right-handed” twisting (with a significant minority of humans and plants being “lefties” and some exhibiting randomness). This phenomenon is known in chemistry as chirality (exhibiting a shape that is not superimposable on its mirror-image). Quartz is the most common mineral with this trait:

Chirality is of particular importance in the field of organic chemistry, since many biological molecules are homochiral, that is to say, are of the same handedness, including amino acids (which are the components of proteins), and DNA (the DNA helix is right-handed). This, in effect, means that the entire chemical basis of life itself is chiral. At some early stage in the origins of life on Earth the earliest molecules to master the art of self-replication opted for a particular stereo-chemical profile, and in so doing determined the entire, right-handed, course of evolution (Wade 2006: 24).

Back to the beginning

Shamanism models itself on nature – on natural relationships such as the balance of opposites i.e. left/right, front/back, sun/moon, night/day, dark/light, male/female, sky/earth, this world/spirit world... Shamanism employs various techniques to exert influence on the world of polarities – to keep them in balance or reunite them if their “natural” holism and thus symmetry has been severed. The gender-neutral or trans-gendered role of the shaman in trance is one example of how the dichotomies of this world are confounded. Animals and birds are killed ritually to become artifacts in the shaman’s toolkit; attributes of these animals assist human endeavors. Shamans themselves are human/nature merged; while the shaman is neither animal nor divine, s/he embodies the integration of the physical and spirit worlds, of both “this-worldliness” and “other-worldliness”.

Shamanism manipulates (in the sense of “managing skillfully”) the energy/ life force/ sentience that is said to exist within all living things. This life force encodes symmetry, as some healing modalities recognize. Kundalini energy, for example, rises in a spiral from the root chakras up through the crown chakra along the central spine. The Tamang shaman Maile Lama explained it this way to the authors of *Shamanism and Tantra in the Himalayas*:

Energy (shakti) arises in the sexual chakra. From there it ascends into the heart chakra, where it is transformed into love. It is the shamanic healing power. If the energy climbs higher, into the forehead chakra, the love-energy is transformed into awareness. One is only complete as a human being when all the chakras are connected to one another by the flowing energy (Müller-Ebeling et al 2002: 3).

In discussing the western musician J. S. Bach, Livio points out the reflection and translation symmetry in his music on many levels, but particularly in his canons, pointing out that

“canons in general were considered at the time to be some sort of symmetry puzzles. The composer provided the theme, but it was the musicians’ task to figure out what type of symmetry operation he had in mind for the theme to be performed... this is not very different conceptually from the puzzle posed to us by the universe – it lies in all its glory open to inspection– for us to find the underlying patterns and symmetries” (Livio 2005: 21).

Surely this is what shamans do – some more expertly than others. Some shamans perform with a rational understanding of their praxis; for others, the sensitivities are more intuitive. Some innovate in expressing these patterns, perhaps receiving visions or instructions from the spirit world; others follow culturally specified patterns. Such approaches provide insights into why many cultures and shamans insist that ritual must be followed “exactly” and without deviation – *because the cosmogonic structure is thereby preserved*. In such contexts, “origin”-al, primordial and universal relationships remain recognizable and accessible. As Olsen (2006) suggests, consciousness may even reside in geometry itself, in the symmetry of the golden ratios of DNA and other natural forms. The last words I leave for Mircea Eliade. Eliade (1958: x) discusses how we live in a universe “that is not only supernatural in origin, but is no less sacred in its form, sometimes even in its substance”.

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