

Symmetry, Science and Shamanism: Towards a “Theory of Everything”?

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This paper considers whether commonalities underlie seemingly disparate disciplines and paradigms. Could the humanities, arts, and social sciences share the “theory of everything” that the sciences propose? The sacred geometry¹ underlying the cosmology of shamanic cultures is modelled on relationships of the natural world. It is discussed in terms of archetypes and prototypes found cross-culturally and common to all disciplines. Science, particularly the language of mathematics, can provide a map for interpreting and understanding these relationships.

In Siberia, Mongolia, Southeast Asia and northern North America, as well as in tribal India and the Tibetan Bön tradition, I found commonalities that have not been fully explored in the literature on indigenous cultures. Symmetry seemed to explain not only how shamanic cultures modelled their relationships with the natural and human worlds and how shamanic praxis “worked” but also why.

Mario Livio, an astronomer with a degree in theoretical astrophysics, provides an innovative glossary for discussing shamanist beliefs and praxis. Livio discusses symmetry as composed of invariant cores that do not change under transformation. Sciences such as new physics and mathematics have identified symmetry as a pivotal concept in both the natural and human-made worlds.

His categories of symmetry in the sciences I then apply to cultural praxis, particularly shamanism (with examples drawn from material culture) to suggest that symmetry is also the essence of the paradigms and archetypes that are the language of culture.

I also show how symmetry underlies western dichotomous categories such as sacred/secular and culture/nature and how shamanism can inform current discussions in varied fields such as aesthetics and psychology.

ART AND SCIENCE

A recent discussion of art by Martin Rees in *New Science* magazine² discusses art as genetically determined or as serving a wider range of functions but nevertheless discusses instinct versus culture, and materialist versus metaphysical explanations. Mircea Eliade's work on shamanism provides alternatives and is applied here to question whether explanations have to be materialist or metaphysical, natural or cultural. Can we instead identify more essential principles or concepts?

In *The Art Instinct* (a book about our natural tendency to create and appreciate art) Denis Dutton views art as a genetic characteristic that conveys an adaptive advantage – a product of evolution in the strictly biological sense. Reviewer Martin Kemp (Emeritus Professor of the history of art at the University of Oxford) points out that we are only at the beginning of a programme to understand “how image-making capacity, including art in Dutton's sense, serves a range of functions, including pleasure in the aesthetic sense, and how these relate to those intellectual, intuitive, inventive, imaginative and mimetic capacities that we have indeed evolved” (Kemp 2009: 45).

Mircea Eliade, whose work I will compare to this essentially materialist view of “art”, refers to 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:

For what he learns concerning the world and human life does not constitute knowledge in the modern sense of the term, objective and compartmentalized information, subject to indefinite correction and addition. The world is the work of Supernatural Beings – a divine work and hence sacred in its very structure (Eliade 1958: x).

In such societies, art is another representation of the sacred. 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, Eliade goes on to say,

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).

Can these contrasting views on science and art be reconciled or even considered via a common discourse? Kemp points out that, at present, “we are not even within touching distance of a ‘biology of art’. Artists and scientists still have to define mutually relevant problems in aesthetics, the history of the arts, biology and the brain sciences” (Kemp 2009: 44). And while science continues to search for a “theory of everything”, it remains contentious as to whether such a theory (if it exists), would have applications in the everyday world. Symmetry may provide these. There may be essential, archetypal relationships in all “art” forms regardless of the cultural context and symmetry may underlie them.

SYMMETRY AND SCIENCE

“Mathematics has been the language of science for thousands of years, and it is remarkably successful” (Rees 2009: 37). Einstein, for one, saw the world essentially as a geometrical structure (Rees 2009: 38). Other theorists, particularly in the field of consciousness studies, link up mathematics and geometry with culture in a metasystem within which diverse disciplines, including the data of parapsychology, may be integrated. Arthur M. 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: 82-6). 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 illustrations in Lundy 1998 and Wade 2006).

What synergistic concept might draw from or inform such a broad, interdisciplinary and intercultural discussion? 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).

In a broader sense, 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. There is even a preference for symmetry in animal mate selection and symmetric pattern provokes intense emotional response.

In shamanism, symmetry is a (and perhaps 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, et cetera, if we consider both their underlying structure and their substance. Illustrations of symmetry from my field research follow synopses of symmetries from Mario Livio’s scientific perspective.

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” (ibid: 2).

Livio goes on to describe the role of symmetry:

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: 43-5).

Livio points out how symmetry "sits right at the intersection of science, art, and perceptual psychology. It represents the stubborn cores of forms, laws, and mathematical objects that remain unchanged under transformations" (ibid: 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 and psychology, these invariant cores are surely prototypes, paradigms, and archetypes.

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.³ Jung, further, considered the archetype to have a numinous or spiritual character.⁴

SYMMETRY AND SYMMETRIES

Livio suggests that we can identify the quantity of different types of symmetry, e.g. "there exist only 230 different types of spatial symmetry groups (just as there are only 7 different symmetry groups of linear strip patterns)" (Livio 2005: 246). Here, I detail some symmetries I have identified in shamanic traditions.

In many dictionary definitions, symmetry is taken to mean the familiar *bilateral symmetry* (also called mirror-reflection symmetry), such as up/down, front/back. Bilateral symmetry is 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 are the portal between the spirit world and this world – both relationships must be maintained in a state of balance and thus bilateral symmetry. (Figure 1).



Fig. 1. Siberian Shaman Tatyana Kobezikova following the “Opening The Way” ritual, Khakassia 2001 (all photographs are by the author unless stated otherwise).

Plants and some animals such as jellyfish, on the other hand, possess symmetry similar to that of a cone; that is, producing symmetrical mirror reflections through their central, vertical axis. In shamanism, four is a sacred number (although it may represent different phenomena in different cultural contexts), and it is an example of bilateral symmetry (Figure 2). In Himalayan shamanism, for example, “it symbolizes the spatial coordinate cross of the four directions of the heavens” (Müller-Ebeling 2002: vii).

Although bilateral symmetry is commonly recognisable, mathematics has identified many more types of symmetry such as rotation, reflection, translation and glide reflection, as well as other transformations not geometrical in nature such as permutations.

Rotational symmetry is characteristic of snowflakes – they can be rotated by certain angles around an axis perpendicular to their plane

(passing through centre) and they remain the same (Livio 2005:10; Wade 2006: 4, 8). While snowflakes have 6-fold rotational symmetry, starfish have 5-fold. Many flowers (for example, the English daisy, chrysanthemum; see flower design in Figure 3) 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). Thus aesthetics and science, culture and nature are linked through the symmetry of such flowers.

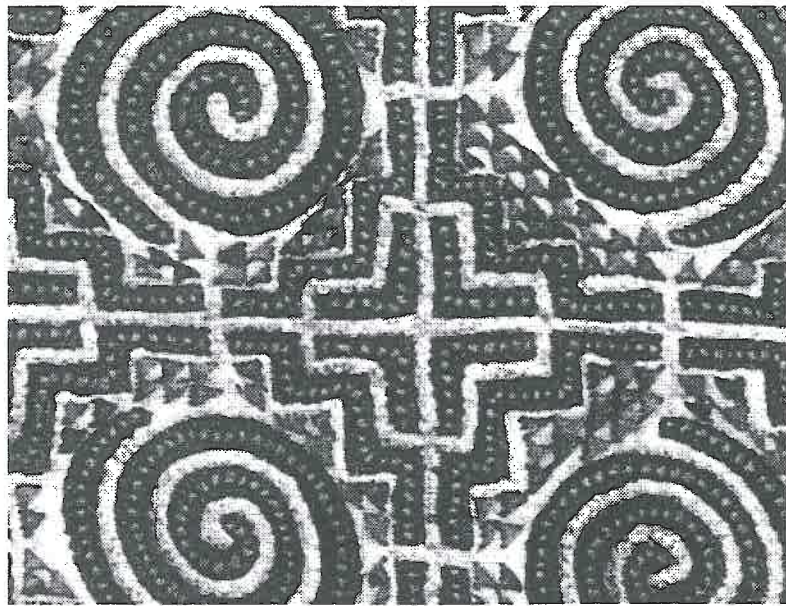
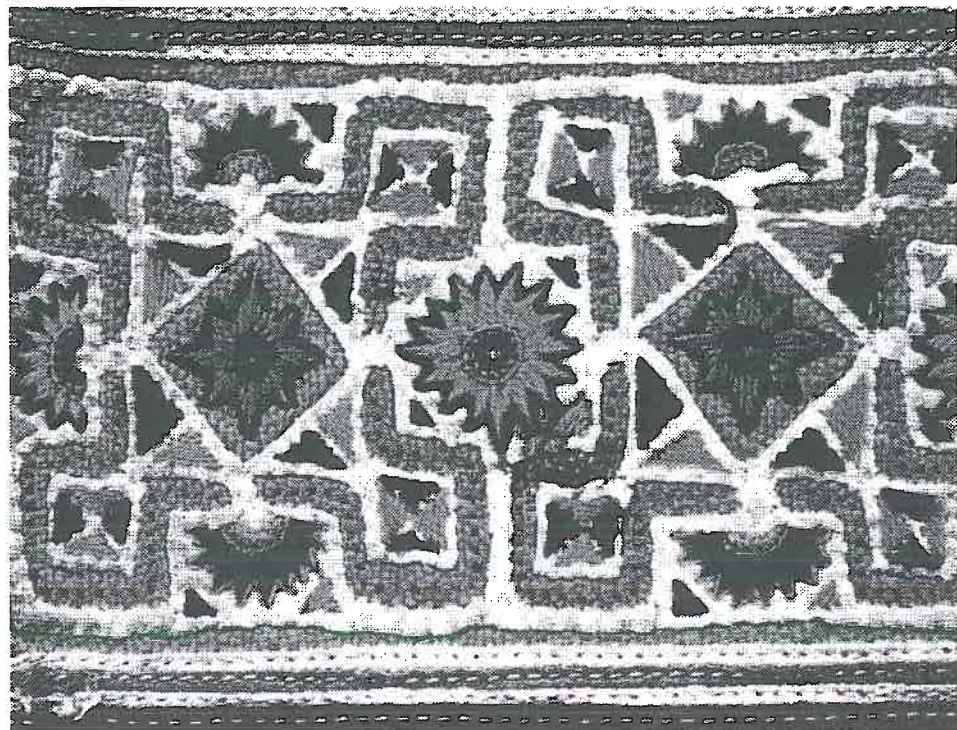


Figure 2 (left) and Figure 3 (below). Hilltribe embroidery, Southeast Asia 1989 (author's collection)



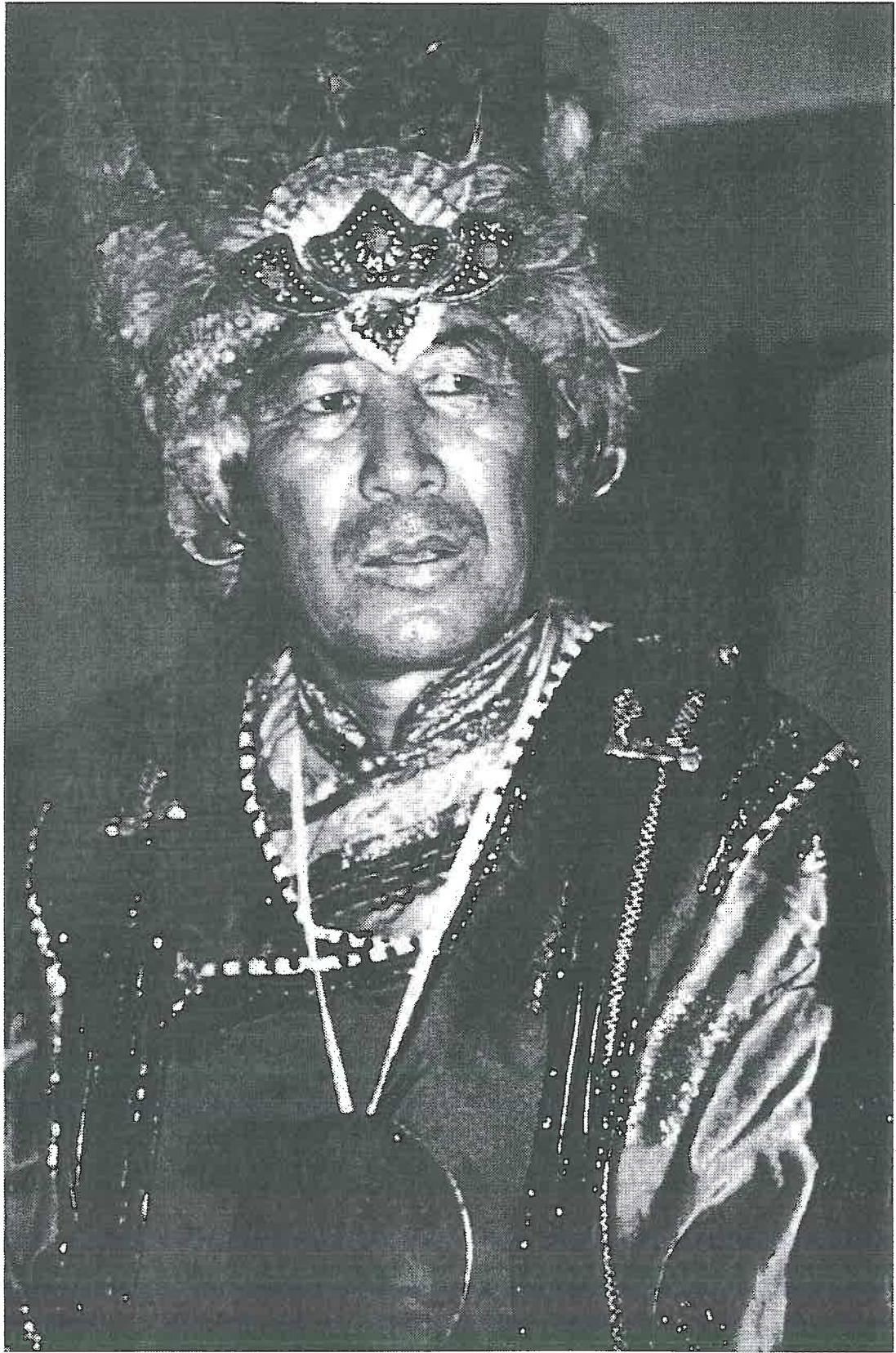


Fig. 4. Siberian shaman and Master throat-singer Nikolay Oorzhak, Tuva 2001.

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).

The circle is a very common element in shamanism. As an artefact in the shaman's toolkit, it becomes the shaman's mirror (Figure 4). On the deerstones of Central Asia, it has been interpreted as an earring or the sun or moon⁵ (Figure 5). A shaman's round drum is said to be the world or cosmos. In 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 Hilltribes of Southeast Asia, a red string is put on children's wrists to protect them from bad spirits. And the Dukha reindeer-herders of northern Mongolia (called Tsaatan by outsiders) encircle the neck of a "spirit reindeer" with a red string – the chosen animal protects the herd and family from harm.

Livio points out that the same system "can, therefore, have multiple symmetries, or be symmetric under a variety of symmetry transformations" (2005: 15) as with the sphere or the equilateral triangle. 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 sun or moon, when represented in two dimensional form as on a deerstone, becomes flattened into a circle (Figure 5).

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, are often represented or interpreted as mountains, as in Hilltribe patterns from northern Thailand (Figure 6).

Fig. 5. Standing deerstone, Mongolia 2007.



Fig.6.Hilltribe embroidery, Southeast Asia 1989 (author's collection).

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 fixed intervals possess translational symmetry. Ornaments that are symmetric under translation can be traced all the way back to 17,000 BCE (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 segments which may repeat as many as 170 times (Livio 2005:16). The ascending deer on the Central Asian deerstones is an example of this type of symmetry (Figure 8).

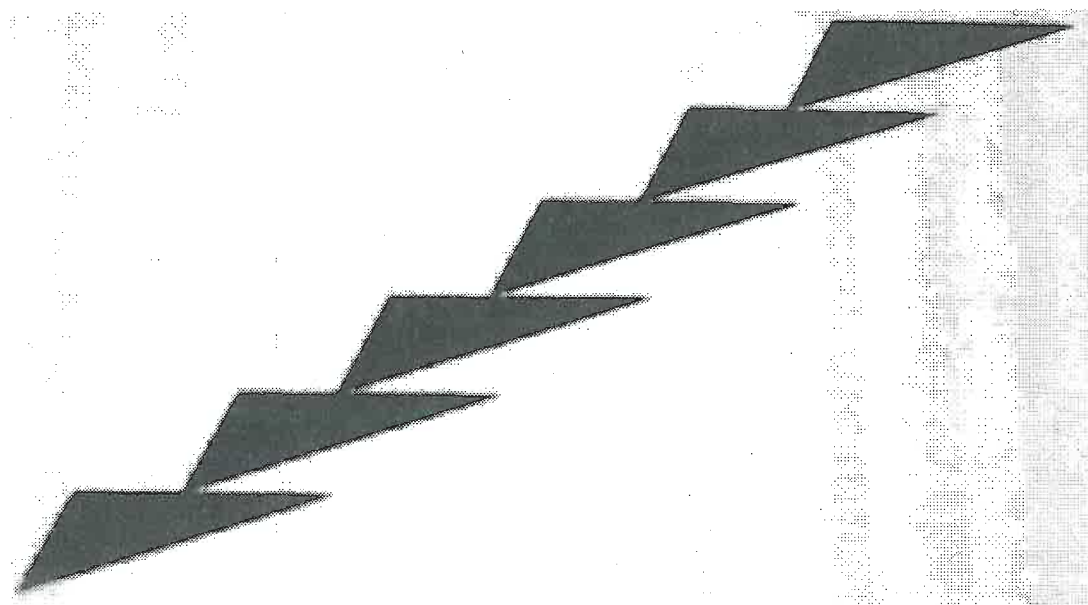


Fig. 7. Repeating pattern symmetry (from Livio 2005: 3).

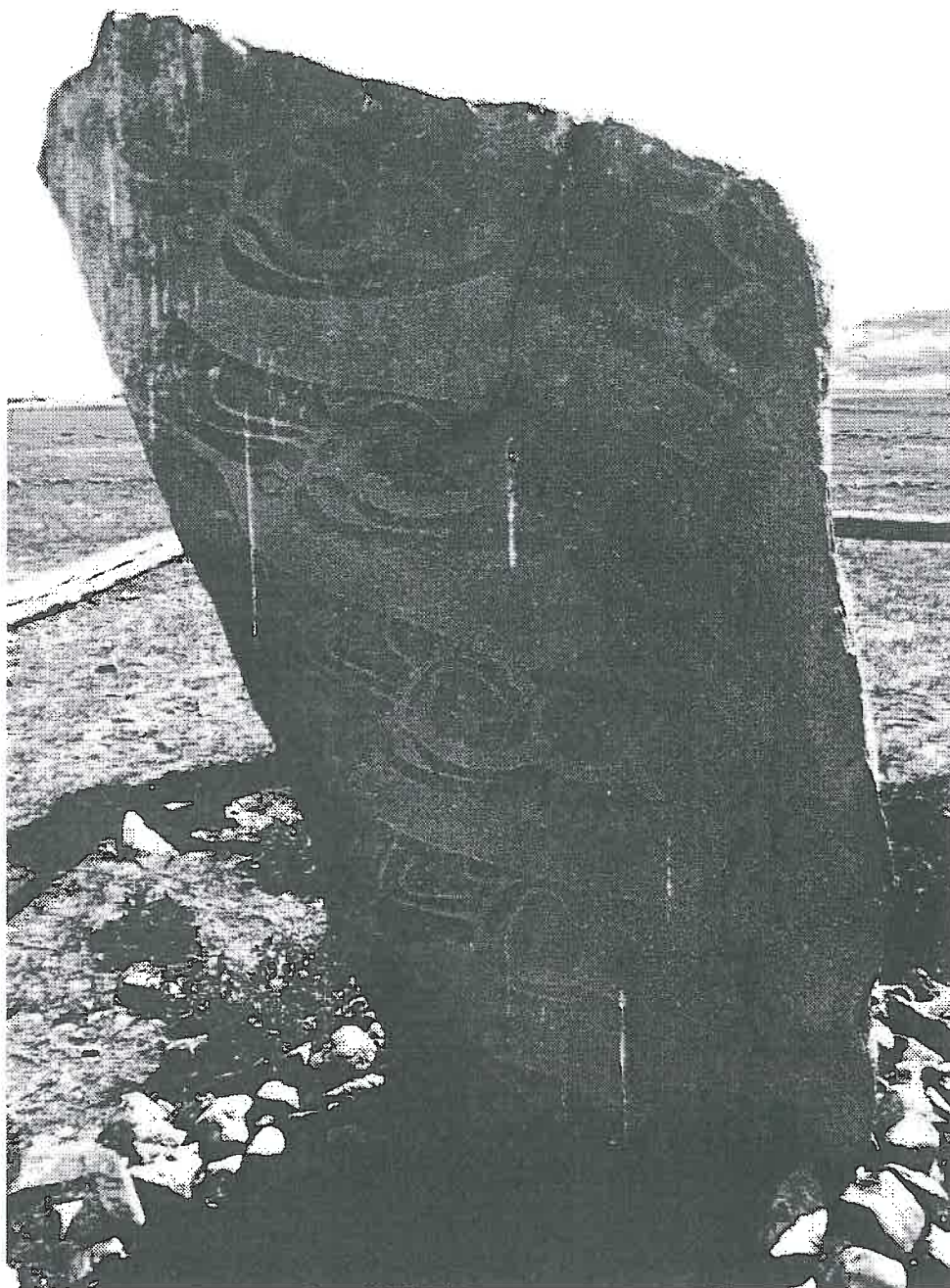


Fig. 8. Standing deerstone, Mongolia 2007.

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 provides several examples of symmetry 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 reported by Diamond Jenness illustrates Wulff’s periodic repetition and a metamorphosed fundamental motif. Jenness, is describing an early experience with shamanic incantations amongst the Copper Eskimos in the 1920s. In a previous paper (Walker 2003), I analyzed the shaman’s song and movements that accompanied it in terms of their balancing properties which is discussed in terms of symmetry here. The passage illustrates the rotational symmetry of the circle (with the shaman at the centre) and the bilateral symmetry of the left-to-right swaying movement. The structure of the incantation is also symmetrical, that is based on a fundamental motif introduced at the beginning and then repeated in slightly different form. Unfortunately, the song in the original language of Inuktitut is not available and so the analysis is limited.

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.*

(*Footnote: A spirit is supposed to be speaking all through.) (Jenness 1923: 187).

The jaw's or jew's harp (*amar huur* in Mongolian) is commonly played throughout Southeast Asia and Central Asia in ritual and also for entertainment. It requires regular, controlled breathing which is itself symmetrical. Central Asian sounds played by accomplished musicians or shamans include bird songs and galloping horses (both are symmetries) taken from nature and transposed to culture. Here, the shaman Haltsan⁶ describes the healing properties of the *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 *amar huur*, he was able to get his consciousness back.⁷

That is, he became "whole" again in the sense of "the balanced, harmonious, symmetrical unity of the self" Johnson describes above (1983: 18-19).

Glide-reflection symmetry is described by Livio as a combination of translation and reflection symmetry. These types of symmetry are sacralised in the walking and running meditations of Buddhist monks in some lineages. Riding a horse (which is a sacred animal) in Siberia and Mongolia or a reindeer in northern Mongolia can “balance” the rider and harmonises the energies of the rider and the ride (Figure 9):



Fig. 9. The author on a Dukha reindeer, northern Mongolia 2006.

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 (figure 14). 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).

The snake is a common motif in shamanic cultures even where no snakes exist. It is an elemental form and recurring symbol of infinity, immortality and the cyclical nature of life in many cultural contexts. Jeremy Narby, interestingly, discusses the snake motif in terms of the double helix of DNA (Figure 10) and DNA as the origin of knowledge. One expression of snakes is in the “ropes” that hang from each shoulder of a Central Asian shaman’s dress. Snake can form a circle and it has bilateral movement. It illustrates the fascinating interrelationship between symmetry and orientation: “Symmetrical figures do not change when rotated, reflected, or translated in certain ways” (Livio 2005: 38). In Figure 10, various symmetrical forms have been incorporated into this painting – the double helix and glide-reflection symmetry of the snake pair forming circles and spirals, the bilateral symmetry of the foliage and the chevron, and permutation symmetry (discussed below).

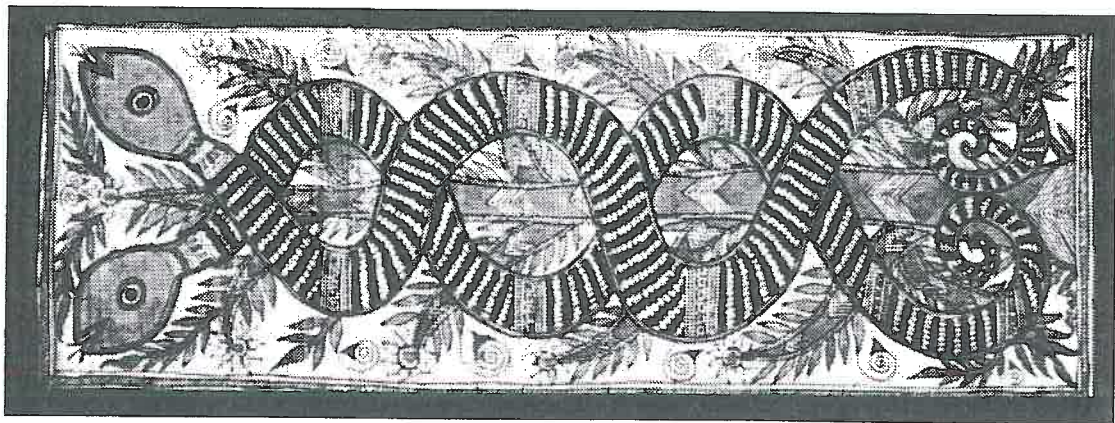


Fig. 10. Tribal painting, India 2005 (author’s collection).

3-dimensional symmetry: All the above examples are the 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 is this tree (Figure 11) which is growing in an unusual corkscrew pattern. The explanation for its growth is metaphysical – it is said to be living at the intersection of energy lines. Buddhist monks smear it with butter and drape it with blue-coloured scarves in recognition of its sacredness.



Fig. 11. Sacred tree,
Darhad Valley,
Mongolia 2007.

Permutations and perception: There are many other symmetries but, for the purposes of this paper, these are the most obvious ones. 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). The western artist, Escher, incorporated translation-symmetric and colour-symmetric patterns into his popularized paintings and drawings. This birch bark hat (Figure 12) and the embroidered bag from Siberia (Figure 14), are these symmetrical forms. A paper cutout in a mandala-like pattern similar to Figure 13 was made for me by the Siberian shamanist and artist, Ludmilla. It was described as a “healing aid, like meditation”: by meditating on it, I would regain the balance I was missing.



Fig. 12. Birch bark hat, Amur region, Siberia 2002 (author's collection).

Fig. 13. Cloth appliqué, Siberia 2002 (author's collection)



Fig.14. Embroidery, Siberia 2002 (author's collection).

Permutation symmetry addresses “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” (ibid: 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. recognised fastest)... Basically, symmetry is a property that catches the eye in the earliest stages of the vision process (Livio 2005: 37).

The left and right sides of a shaman’s dress are bilaterally symmetrical; watching a shaman in full dress, we quickly perceive its integrity and harmony of elements (Figure 15). The “balancing” a shaman seeks in a client is facilitated, even orchestrated, by the symmetries of which shamanic ritual is constructed. The shaman is also clothed in the balanced and balancing elements that are the expected outcomes of shamanism. As the Tamang shaman, Maile Lama, describes: “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 as with an op-artist pattern of evenly spaced black wavy lines against a white background. The shaman’s eye curtain and dress fringe and ropes (Figure 16) contribute to the onlooker’s perception of the shaman during ritual as “in motion” or travelling between the worlds.

SHAMANISM AND SYMMETRY

Both pragmatic and intuitive, the sacred and the secular are also in balance in shamanism. In comparison to the discussion by Dutton at the beginning of this paper about the secular and materialist functions of art, shamanism incorporates the metaphysical, involving transcendence, transhumanism and cosmogenesis as per Eliade and Jung.

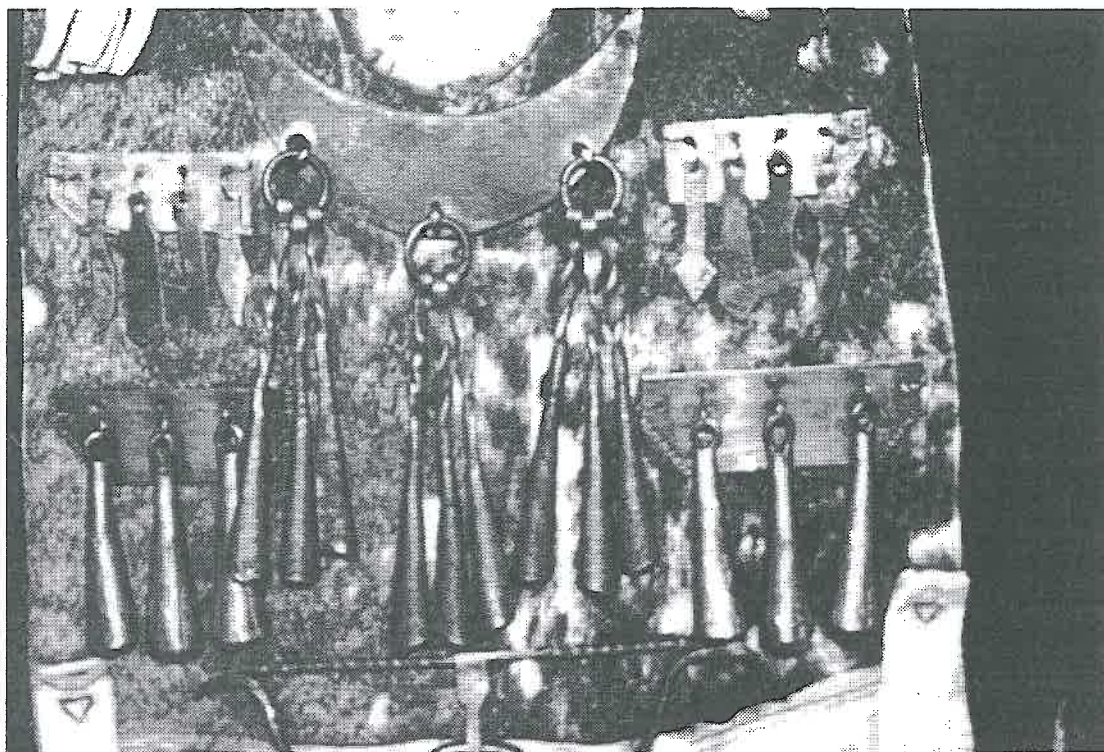


Fig. 15. Close-up of museum-made replica of Dukha shaman's dress, Mongolia 2007.



Fig. 16. Mongolian shaman Odkhuu in trance, Mongolia 2007.

Symmetrical relationships in shamanic cultures world-wide, represent esoteric relationships in two-dimensional form. In writing about Irish megaliths, for example, Zucchelli interprets the spiral, circle, cup marks, and zigzag lines, triangle and serpentine lines as cultural icons:

The most common motifs are spirals, which are generally taken as symbols of the constant flow of energy and the cycle of life, and accordingly for representation of the earth goddess; concentric circles and cup-marks, widely believed to symbolize the sun, or else the navel from which all life comes; zigzag lines standing for water; triangles and serpentine lines, again represent the earth mother (2007: 17).

Archaeologists are using symmetry to reinterpret ancient sites. Canadian archaeologist and chemical physicist, Gordon Freeman, has found similarities between the surface geometry of three ancient sites – Stonehenge in Britain; Preseli Mountain in southwestern Wales; and, a 5,000 year old Sun Temple and calendar in Alberta, Canada (the latter used until 300 years ago) – all of which, he argues, show evidence of astronomical sophistication and geometry to interpret the sun, moon, and the seasons:

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).

I interpret Freeman's data as showing a "balance" or symmetry between the Sun and the Moon, manifested during Equinox⁸, and between light and dark, and night and day.

At the conference on "Interactions with the Sacred", held in Edinburgh in June 2009, I was interested in the paper "Archaeology and the Sacred", given by Claire Dennard. Her 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. In many cultures, past and present, quartz is revered. Quartz crystal has a symmetrical structure of a special kind that refers back to the cosmogony and the sacred origins of life. It is an elemental, universal and original set of relationships underlying natural phenomena which are then acculturated. The Mongolian shaman Maamaa, for example, showed me his medicine bag of quartz crystals collected from his ancestral home and used in his ceremonies. 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 climbing 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).

Shamanism is modelled on Nature. Natural bilaterally symmetrical relationships are perceived as opposites - left/right, front/back, sun/moon, night/day, dark/light, male/female, sky/earth – with each of the pair having the numinous character of the archetype. These are kept in balance through shamanic ritual and are also organising principles of the mundane world – the Central Asian *ger* (Figure 17) is laid out according to the four directions, with the doorway opening to the south or east.



Fig. 17. Mongolian *ger*, Mongolia 2006.

Shamanism employs various transformative techniques to influence the world of polarities. Offerings made to the spirits help to keep this world and the spirit world in balance and entreat the spirit world's assistance. Animals are killed through cultural action and made into artifacts of the shaman's toolkit, their attributes assisting the shaman's endeavours. Shamans themselves are human/nature merged; while a shaman is neither animal nor divine, s/he embodies the duality of the animal world and spirit world, of "this" and "other" worldliness. The gender-neutral or trans-gendered role of the shaman

in trance is one illustration of how shamans are transformed when shifting from the physical realm to the metaphysical.

Shamanism manipulates (in the sense of “managing skilfully”) 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 chakra⁹. 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).

This, and other Himalayan examples I have quoted in this paper, show the overlaying of shamanism by Buddhism which retains the underlying principle of symmetry to explain health and disease. Pressures of modern life – environmental and social – make it especially difficult to maintain these primordial energetic balances because the essential link between human and nature is broken. Such a model of health, however, shifts the focus from *culture* (as maladaptive, breaking down, in crisis, or in transition) to *context*. And it suggests that self-regulation is implicit in all life forms.

BACK TO THE BEGINNING

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

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. These approaches provide insights into why many if not most cultures and shamans are adamant that cultural patterns must be followed “exactly” and without deviation – *because the cosmogonic structure is preserved*. (“Symmetry”, as I pointed out at the beginning of the paper, implies “immunity to a possible change”.) Consciousness, as Olsen (2006) suggests, may even reside in geometry itself, in the symmetry of the golden ratios of DNA and other natural forms.

Shamanism, because it is Nature-centric, has a more direct and experiential relationship with these patterns and symmetries than arts, religions or sciences that are mediated by technology or texts. Even perception (which is highly responsive to bilateral symmetry) is less mediated in such cultures. In these contexts, “origin”al, primordial and universal relationships remain recognizable and accessible. The last words I will leave for Mircea Eliade (1958: x). They are relevant to the sciences and the arts, to culture and nature, to the physical and metaphysical realms, and to traditional shamanism. Eliade 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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Notes

- 1 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.
- 2 Martin Rees is professor of cosmology and astrophysics at the University of Cambridge. His work is about the relationship between mathematics and science. My application of his and others’ “scientific”

work to shamanism or “culture” is on my own initiative and is speculative.

- 3 Jung (cited in M. Stein: *Jung's Map of the Soul: An introduction*. Chicago: Open Court Publishing Company 1998: 127) stated that “Archetypes are not derived from culture; rather cultural forms are derived from archetypes”.
- 4 And thus (referring back to Dutton whose work on art as instinct introduced this paper) an archetype in this view is *not* an “instinct” which is related to patterns of behaviour and physiological drives.
- 5 William Fitzhugh, Smithsonian Institution, Washington, pers. comm. 2007 and 2006.
- 6 Haltsan is a Dukha Reindeer-herder from northern Mongolia.
- 7 Walker Field Notes, Mongolia 2007. Fieldtrips were made to Mongolia to study shamanism and traditional medicine in 2006 and 2007 with logistical support of The Smithsonian Institution and funding from Mount Allison University. In 1999, 2001, 2002 and 2004, I travelled throughout Siberia in association with the Russian Academy of Sciences. Several fieldtrips were made to Thailand between 1989 and 2000 to study traditional healing systems. Since the 1960s, I have carried out field research in the Canadian north on traditional knowledge amongst Indigenous Peoples. One field trip was made to India in 2005, including a visit to a Tibetan Bön monastery in the north.
- 8 Freeman finds the western range of dates for the spring and autumn Equinox to be incorrect; his data show a more accurate Neolithic calendar.
- 9 In Central Asian shamanism, the root chakra must equate to the sacred fire, the fire of cosmogony and origins, that Chulu, a Dukha Tsaatan elder, spoke about as central to shamanic cosmology. It must also equate to the layout of the home in which the fire or stove maintains a central location. The fireplace must thus be treated with respect; for example, garbage must not be thrown into the fire.

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