GRAPHIC PROJECTIONS IN THE BUDDHIST STUPA

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Including a special Paper on How Stupa are built today

1. **References and direct quotes from brilliant articles such as:**
2. **Symbolism of a Stupa by Supriya Sinha**
3. **Conference: International Conference of Architectural Science Association 2019,Geethanjali Raman,Shubham Jaiswal,Avlokita Agrawal https://www.researchgate.net/publication/339676008_GENESIS_OF_STUPAS)**
4. **TETRADIC (4 SIDED) settings of Buddhist and Eastern Religious Architecture.- https://quadralectics.wordpress.com/3-contemplation/3-2-temples/3-2-5-eastern-religious-architecture/**
5. **STUPA: VERTICAL FORM & SYMBOLISM by Robert Aaron Gulick III https://mind-matrix.net/the-ascension/the-mind-matrix-kingdoms/multi-dimensional-realities/12c-3-stupa-vertical-form-symbolism/#:~:text=The%20base%20of%20the%20domed,causes%20and%20abatement%20of%20suffering.**

The beginnings of the Buddhist school of architecture can be traced back to B.C. 255 when the Mauryan emperor Asoka established Buddhism as the state religion of his large empire. Buddhism spread rapidly throughout India and other parts of Asia. Buddhism was, as it were, a graphic creed, and correspondingly its expansion was accompanied by a distinctive style of architecture that expressed the teachings of the Buddha. In India this early Buddhist art was influenced to a large extent by Asoka. He was responsible for the construction of several *stupas*, which are sacred mounds of brick commemorative of the Buddha. Asoka also constructed stone pillars symbolizing his creed. These were lofty free-standing monolithic columns erected on sacred sites. The most famous of these is at Sarnath.

The Mauryan dynasty crumbled after Asoka's death in 232 B.C; in its wake came the Sungas, who in turn were succeeded by the Andhras. Both these Brahmanical dynasties treated the Buddhists with toleration. The initial steps of the new architectural movement involved enlarging Asoka's *stupas*. For instance, the *stupa* at Sanchi was enlarged to nearly twice its size and elaborate gateways were added.

At about the same time that the Buddhist communities were elaborating Asoka's *stupas*, an entirely different form of architecture was developing in western India. These structures were not, however, built of stone or wood, but carved out of living rock. It is therefore unfortunate that these structures are now referred to as "caves", as though they were natural grottoes in the mountainside, since they are actually large and well planned temples. Some of the finest specimens of this rock cut architecture are to be seen at Ajanta.

Under the reign of the 8th century ruler Lalitaditya, the central Kashmir valley became an important artistic site. A magnificent Surya temple was constructed at Martand. Though now ruined, this remains the masterpiece of Kashmiri architecture. Mahayana Buddhism flourished in the arid valleys of Ladakh, beyond the first high range of the Himalayas. The monasteries at Alchi, dating from the 11th century, have beautiful paintings depicting the Mahayana pantheon. Cave temples were constructed in the 13th to 15th centuries at Saspol and Karsha. The monasteries at Leh and Phiyang continue to be renovated even today, and the recent resurgence of Indian Buddhism, associated not only with the conversion of lower-caste Hindus to Buddhism under the influence of Ambedkar but with the establishment of Tibetan Buddhist communities, particularly in north India, has introduced a fresh chapter in the history of Buddhist architecture in India.

From at least the third century B.C., Buddhist ritual focused on stupas, stylized replicas of the mounds of earth in which early Buddhists interred relics of the Buddha. Beginning in the first century B.C., Buddhist monks in western India began manipulating the physical shape of monastic stupas to make them appear taller and more massive than they actually were.

These manipulations were used to help assert authority over the Buddhist laity. Employing theories of practice, materiality, and semiotics, later stupas became symbols of the Buddha and Buddhist theology.

The Buddhist image cult and Mahayana Buddhism emerged in the first through fifth centuries A.D. due to this change.The development of Mahayana Buddhism and Buddha images signified a return to iconic worship of the Buddha. [1]

Buddhist Architecture and Sculpture

The Stupa in India first built in the second century BCE to house the Buddha's relics was later used as symbolic or commemorative purposes. Then Buddhism which started in India reached China at the Han Dynasty (67CE). Together with the literature of teachings came the need for architecture to receive the holy relics as well as to establish educational institutions for Buddhism. So this is the beginning of Buddhist architecture in China. With the fusion of Buddhism and the Han culture and technology, pagodas were built. These buildings find their shapes and sizes in great variety as they appeared in different places. How these forms relate to the philosophy of Buddhism will be discussed. On the other hand, Buddhism was disseminated directly into Tibet in the seventh century. Indian Stupas were also transformed through local culture and technology into Tibetan Chorten. These can be placed within temples or individually. different symbolic meanings of these Stupa, Pagoda and Chorten in the context of the philosophy of Buddhism.

1. Stupa, Pagoda and Chorten: origin and meaning of Buddhist Architecture W.Wong,2014https://www.semanticscholar.org/paper/Stupa%2C-Pagoda-and-Chorten%3A-origin-and-meaning-of-Wong/512d89e26a97af79c13b81d7d231525fb4ab86ba#paper-header

- Stupas evolved over time from simple funerary monuments to elaborately decorated objects of veneration.
- Emperor Ashoka, who ruled from 274–236 BCE during the Maurya Dynasty , is said to have redistributed the relics housed in the original stupas of the Buddha into thousands of stupas throughout India.
- All stupas contain a treasury , a Tree of Life, and small offerings known as Tsa-Tsas. It is believed that the more objects placed into the treasury, the stronger the stupa's energy.
- There are five types of stupas: Relic stupas, Object stupas, Commemorative stupas, Symbolic stupas and Votive stupas. A stupa is thought to bring enlightenment to the one who builds and owns it; it is also considered a placed of worship for many Buddhists.

Structure and Style

While they can vary visually, all stupas have a few features in common. Every stupa contains a treasury filled with various objects—small offerings, or Tsa-Tsas, fill the majority of the treasury, while jewelry and other precious objects are also placed within. It is believed that the more objects placed into the treasury, the stronger the stupa's energy.

The Tree of Life, a wooden pole covered with gems and mantras , is an important element of every stupa and is placed in the stupa's central channel during an initiation ceremony , where participants' most powerful wishes are stored.

There are five types of stupas:

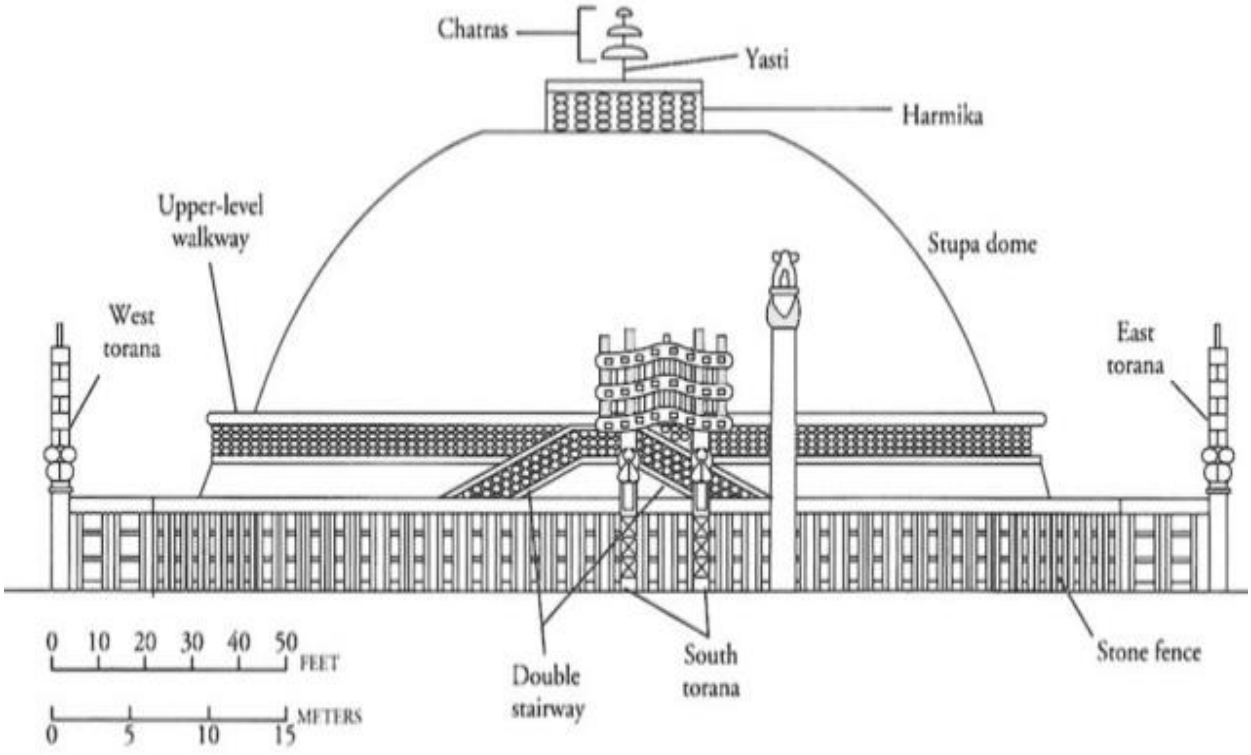
1. Relic stupas, in which the relics of Buddha and other religious persons are buried.
2. Object stupas, in which the objects belonging to Buddha or his disciples are buried.
3. Commemorative stupas, built to commemorate events in the life of Buddha and his disciples.
4. Symbolic stupas, built to symbolize various aspects of Buddhist theology.
5. Votive stupas, constructed to commemorate visits or gain spiritual benefits.

In the Buddhist religion, it is believed that a stupa brings enlightenment to the one who builds and owns it. In addition, the stupa is considered a place of worship, and many Buddhists complete pilgrimages to significant stupas.

According to Shubham Jaiswal in his paper Genesis of Stupas (Conference: International Conference of Architectural Science Association 2019,Geethanjali Raman,Shubham Jaiswal,Avlokita Agrawal https://www.researchgate.net/publication/339676008_GENESIS_OF_STUPAS)

Architecturally speaking, the earliest and most basic interpretation of stupa is nothing but a dust burial mound. However, the historic significance of this built form has evolved through time, as has its rudimentary structure. The massive dome-shaped "anda" form which has now become synonymous with the idea of this Buddhist shrine, is the result of years of cultural, social and geographical influences.

The beauty of this typology of architecture lies in its intricate details, interesting motifs and immense symbolism, reflected and adapted in various local contexts across the world. Today, the word "stupa" is used interchangeably while referring to monuments such as pagodas, wat, etc. This paper is, therefore, an attempt to understand the ideology and the concept of a stupa, with a focus on tracing its history and transition over time. The main objective of the research is not just to understand the essence of the architectural and theological aspects of the traditional stupa but also to understand how geographical factors, advances in material, and local socio-cultural norms have given way to a much broader definition of this word, encompassing all forms, from a simplistic mound to grand, elaborate sanctums of great value to architecture and society as a whole.

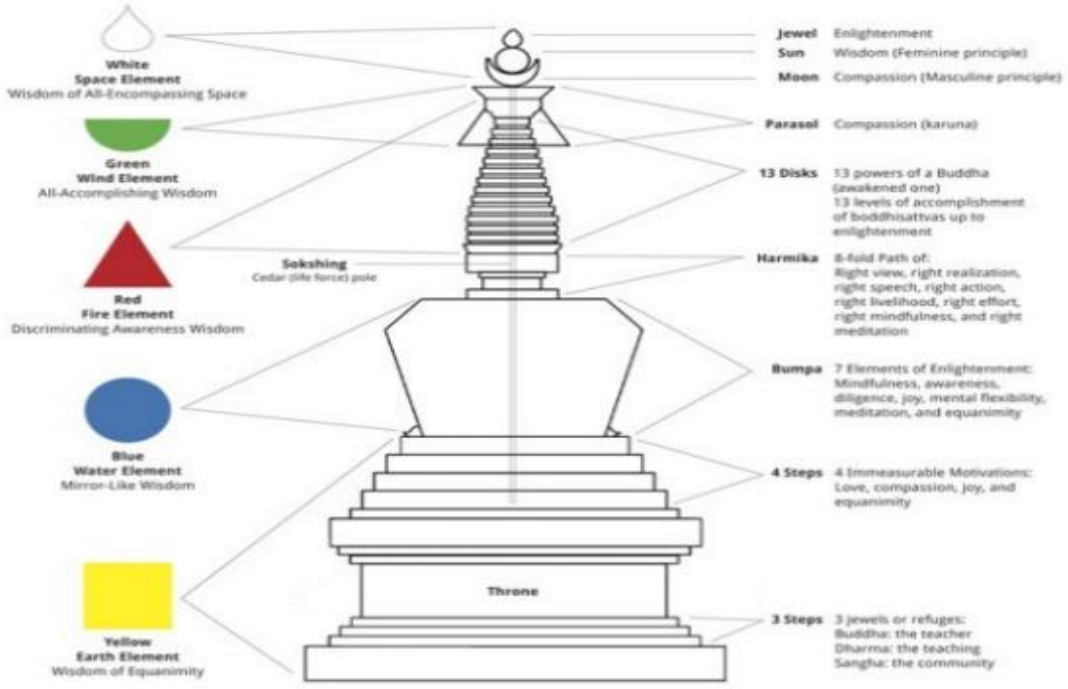


This word is now used for the pre-eminent type of Buddhist monument, which is at least a freestanding mound, usually with a circular drum (Medhi) forming the base for a massive solid dome (anda) topped by a turret (chattri), while the bell or dome-shaped mound covers the relics or holy objects At its simplest, a stupa is a dirt burial mound faced with stone. Stupas exist all over the world and are one of the oldest Buddhist monuments.

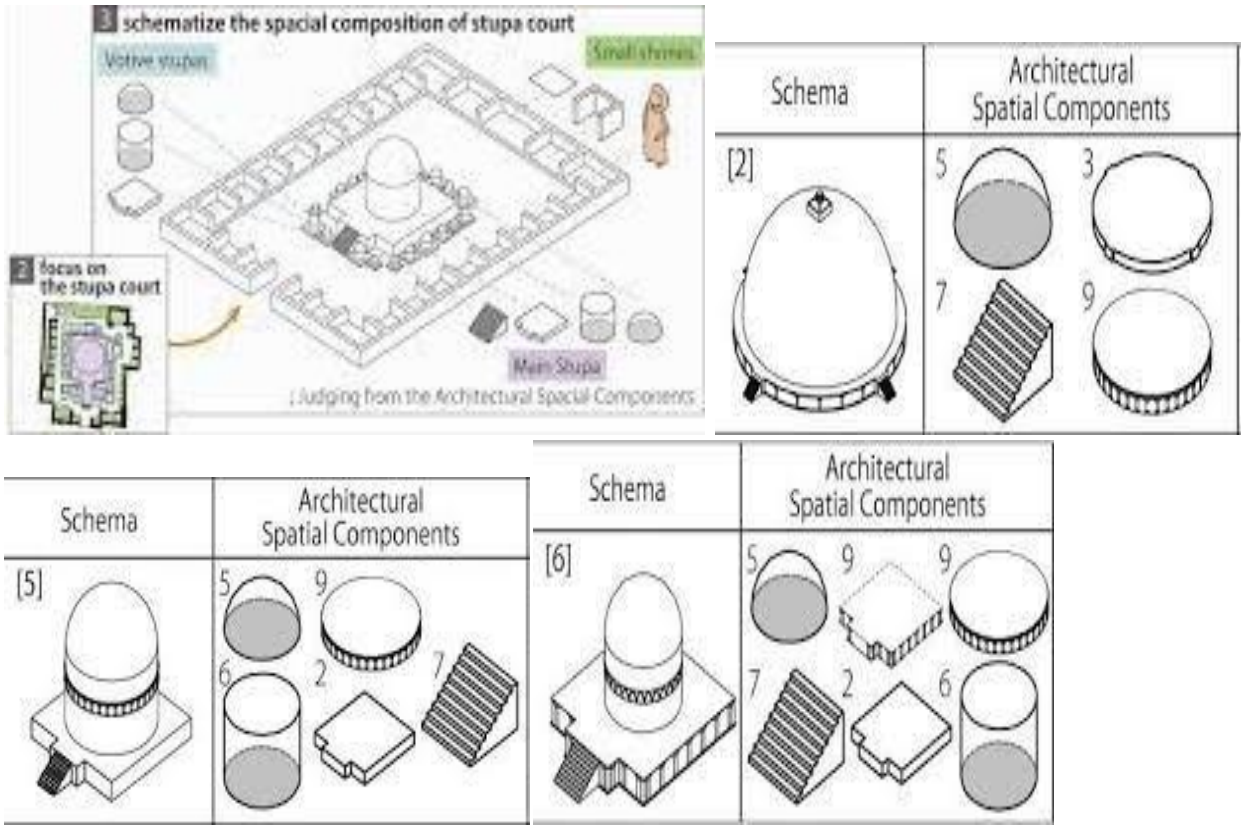
Historically, stupas have been symbolize and represent the following elements:
1. The Buddha,
2. The path to Enlightenment,
3. A mountain and
4. The universe all at the same time.

A stupa, which was conceived as a simple monument for the Buddha's corporeal relics, has over time transformed in its form and nomenclature and resulted in various types of structures all over the world. In some regions, even supplementary structures like monasteries have come up alongside stupas, fuelling the inception of new Buddhist orders and sects.

However, the core ideology of the stupa remains constant throughout each new development, as does its symbolism and several crucial architectural features. These characteristics must, therefore, be given due consideration and importance while designing any stupa project.



Stupa Symbolism

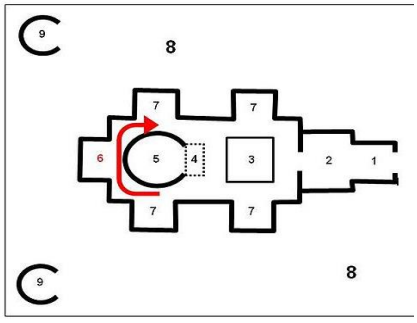


In her article on Symbolism of a Stupa, Supriya Sinha (http://thesacredspace.in/?p=163#:~:text=In%20its%20most%20fundamental%20essence,the%20remains%20of%20the%20Buddha%20.&text=In%20its%20earliest%20meanings%2C%20the,the%20remains%20of%20the%20Buddha%20. believes that Containment finds significance in the vedic corpus, and, antedates it, as is evident from depictions in Indus valley seals .This decryption at the emblematic level begs an obvious question. What would compel a heterodox religion to attach itself with conventional symbolism? The dichotomy is explicable if one views the stupa as a product of its times. A time when structural aspects were based not on functional, utilitarian foundations but on deeply spiritual conceptions. The act of creation, as Coomarswamy has famouly said, was an act of replication."We must do what the gods did in the beginning. Thus the gods did; thus men do." The stupa, in its meaning, is replete with this primordial injunction and its appropriation reflects fundamental, primal, human motivations.

At another level, this inclusion may have been necessitated by the dynamics of the existing religious milieu. A rudimentary situation analysis of the moment in time when this fledgling religion operated, and, when the first stupa was instituted, reveals the case of a relatively new entrant jostling for space against a dominant ideology. Of an incumbent mythology replete with cosmological interpretations and paradigmatic creator gods. In this setting, legitimacy would require equally potent antecedents. What better way to consecrate the remains of the one, who, like the Vedic god, Indra was born from his mother's side than to have the sacred place of his interment evoke the archetypal feat of Indra?

Parikrama or Pradakshina refers to circumambulation of sacred places to imbibe their energy in Sikh, Hindu, Jain or Buddhist context, and the path along which this is performed. **Parikrama** means "the path surrounding something" in Sanskrit, and is also known as **Pradakshina** ("to the right"), representing circumambulation. Both words are mostly used in the context of religious deities in a temple, sacred rivers, sacred hills and a close cluster of temples, and "doing a parikrama" as a symbol of prayer is an integral part of Hindu worship. In Hinduism and other Indian religions, the Parikrama inside temples or sacred sites is traditionally clockwise.

Most Hindu temples and Buddhist Stupa include various Pradakshina paths. Pradakshina paths are defined. as:
Circumbulatory or pathway around the shrine of the temples by keeping time is a common form of prayer in India.It includes Narmada,Shetrunjaya,Girnar. This pathway made of stone around the shrine is called Pradakshina path.
Parikrama is also practiced in Buddhism, Jainism and Sikhism.



1. Ardha mandapa
2. Mandapa
3. Maha mandapa
4. Antarala
5. Garba griha
6. Pradakshina
7. Transepts
8. Jagati
9. Subsidiary shrines

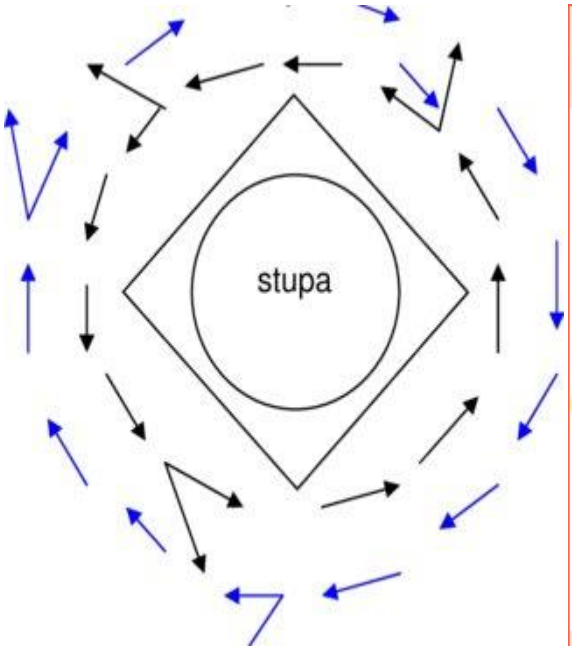
Plan of Kandariya Mahadeva Temple

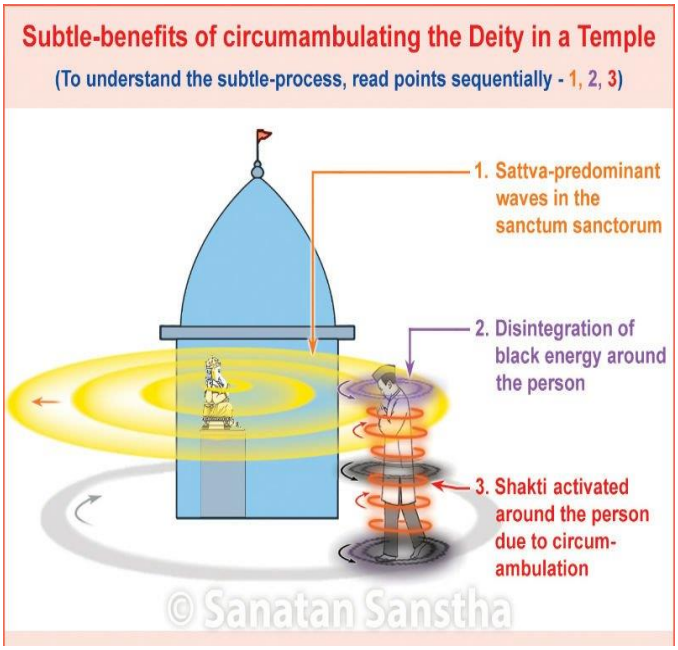
Pic shows circumambulatory path of a STUPA(Left Pic) and Hindu temple.

There could be one surrounding the main deity, other paths could be broader being concentric to the main path. However, it is not uncommon to find non-concentric parikrama paths in a single temple structure. At times the outermost parikrama path covers the whole village/town/city, thereby implying that the length of the path can stretch.

Parikrama is done around sacred fire (Agni – the fire God), Tulsi plant (Ocimum tenuiflorum) and Peepal tree. Parikrama of Agni or Agni Pradakshina is a part of the Hindu marriage ceremony. Some of the Parikramas are Narmada River, Govardhan hill, Vrindavan, Vraj Mandala, Dwadash Madhav parikrama Tirthraj Prayag, Ayodhya, Girnar, Chitrakoot hill, Varanasi, Mathura, and Mathura-Vrindavan yugalabandi in Kartik .....
Typically, Parikrama is done after the completion of traditional worship (puja) and after paying homage to the deity. Parikrama is supposed to be done with a meditative mood.

- The pathway made of granite stone around the shrine is called the Pradakshina path.
- Pradakshina around the sacred fire is a part of the Hindu marriage ceremony.





Schematic drawing of traffic (in black) and circumambulation (in blue) routes around stupa, south end of Zhongdian Town.

In Buddhism circumambulation or pradakhshina has been an important ritual since early times. Sacred structures such as stupa or images have a pradakhshina path around them. The chaitya is a distinct ancient type of building that only survives in Indian rock-cut architecture, a hall with a stupa at the far end, always built with a rounded apse-like end, to allow pradakhshina.[14] A mandapa (prayer hall), added in the front transforms the original stupa into the stupa shrine — as a sacred entity which requires a circumambulatory path around it for the purpose of worship. The whole structure is planned in such a way that it becomes the centre of the mandala and symbolically represents Mount Meru.
Buddhist faithful may perform pradakhshina by prostrating themselves at every step, thus greatly prolonging the process. The most extreme pradakhshina is that of the sacred Mount Kailash in Tibet, a mountain trek some 52 km (32 mi) long, at altitudes between 15,000 ft (4,600 m) and 18,200 ft (5,500 m). This may also be undertaken by Hindus and Jains, and some pilgrims progress by prostration, taking some weeks.

Further according to Ms. Supriya Sinha in her brilliant article" Thus in the design of the Stupa the vedika enclosure marks off a path (Pradakshina Path) for the ritual of circumambulation. An important rite, it involved a physical engagement with the stupa and was performed by entering the precinct through the east gate and walking clockwise. The directional emphasis related the devotee to the passage of the sun, "the transcendent centre of the universe" , "cosmic intelligence" whose light is "intellectual wisdom". In vedic mythology Indra is credited with releasing the sun , setting its "wheel in motion" and "making a pathway through the darkness" . The Buddha, whose birth is likened to the rising of the sun , compares his abhijana ("superknowledge") to a rediscovery of ancient wisdom , " clearing of an ancient jungle path from the brush that has overgrown and concealed it for generations" – a veritable pathway, a casting of light on what has been hidden in the darkness. And thence he proceeds to "turn the wheel of law". With these inherent parallels, the ritual act performs the important function of linking the worshipper with the wheel turning Buddha, and the Sun , on a path that is homologous with the archetypal path .A further instrument to re-emphasize this symbolism is seen in the alignment of the gateways, which form a cosmological diagram in the form of a swastika- a metonymical symbol evoking the wheel and the movement of the light giving sun.
This act, replete with cosmological significance puts the worshipper in harmony with the cosmos while it also reminds him of the Buddha and his odyssey across several lifetimes to attain final liberation-transcendental nirvana.

At the centre of the stupa complex is the solid hemispherical dome described variously in Buddhist texts as garbha, container or alternatively as anda . It bears within itself the seed (bija)-relic. Symbolically this links the dome to the cosmic womb eg: the vedic hiranyagarbha (golden womb) which emerges from the primordial waters of chaos . This analogy is explicit in reliefs at Sanchi and on some early coins where the stupa is shown floating on water .So deep are the cosmological interlinkages that the mythic womb, the embodiment of life and prosperity, was said to encompass the riches of the universe. In a ritual enactment of the myth, the relic caskets are often made of precious metals/stone and routinely suffused with precious elements. In the brahmanical context, the womb represents the creative unity. In the Buddhist context, it is the enfolder of the seed and signifies the involutional tendency of the spiritual path- the return to

the centre, to unity. "The stupa symbolically designates this centre to which the seeker directs his life's pilgrimage". and it bears within itself the "pivotal presence" of the wheel turning Buddha .

This is significant in the light of inscriptions , which state that the corporeal remains of the Buddha are "endowed with life" ("prana sammada") for it implies that the dome not only allows the devotee to experience proximity to the Buddha, but also makes him aware of his involutional unity.

The cosmological theme continues with the axial pillar which represents the world axis . This pole is symbolic of the link between the human and the divine worlds. It indicates a pathway of spiritual acscent, an upward movement away from the confines of the physical world , to the limitless realm. In this sense, the pole is a beacon, a representation of the devotee's goal, for in its verticality, one can measure one's own progress towards the supreme attainment, a goal triumphantly achieved by the Buddha in nirvana. http://thesacredspace.in/?p=163#:~:text=In%20its%20most%20fundamental%20essence,the%20remains%20of%20the%20Buddha%20.&text=In%20its%20earliest%20meanings%2C%20the,the%20remains%20of%20the%20Buddha%20.

Perspective or View or position in design architecture

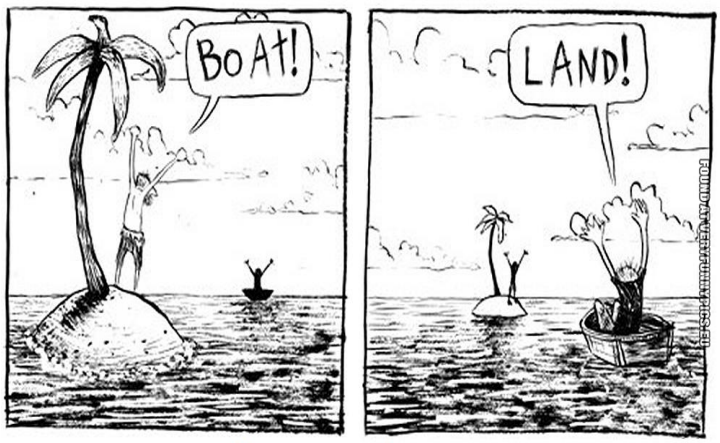
Linear or point-projection **perspective** (from Latin: *perspicere* 'to see through') is one of two types of graphical projection perspective in the graphic arts; the other is parallel projection. Linear perspective is an approximate representation, generally on a flat surface, of an image as it is seen by the eye. The most characteristic features of linear perspective are that objects appear smaller as their distance from the observer increases, and that they are subject to *foreshortening*, meaning that an object's dimensions along the line of sight appear shorter than its dimensions across the line of sight. All objects will recede to points in the distance, usually along the horizon line, but also above and below the horizon line depending on the view used. The main characteristic of perspective is that objects appear smaller the further they are from the observer. Perspective is often used to generate 'realistic' images of buildings to help people understand how they will look on the inside, from the outside, or within their context. Perspective is the space in which the drawings – and the architecture that they propose – occur. ' This unique wall hang according to the logic of vanishing points and perspective lines provides the viewer with their own unique perspective on artwork by some of the most talented designers in history.

Perspective works by representing the light that passes from a scene through an imaginary rectangle (realized as the plane of the painting), to the viewer's eye, as if a viewer were looking through a window and painting what is seen directly onto the windowpane. If viewed from the same spot as the windowpane was painted, the painted image would be identical to what was seen through the unpainted window. Each painted object in the scene is thus a flat, scaled down version of the object on the other side of the window. Because each portion of the painted object lies on the straight line from the viewer's eye to the equivalent portion of the real object it represents, the viewer sees no difference (sans depth perception) between the painted scene on the windowpane and the view of the real scene. All perspective drawings assume the viewer is a certain distance away from the drawing. Objects are scaled relative to that viewer. An object is

often not scaled evenly: a circle often appears as an ellipse and a square can appear as a trapezoid. This distortion is referred to as foreshortening.
Perspective drawings have a horizon line, which is often implied. This line, directly opposite the viewer's eye, represents objects infinitely far away. They have shrunk, in the distance, to the infinitesimal thickness of a line. It is analogous to (and named after) the Earth's horizon.
Any perspective representation of a scene that includes parallel lines has one or more vanishing points in a perspective drawing. A one-point perspective drawing means that the drawing has a single vanishing point, usually (though not necessarily) directly opposite the viewer's eye and usually (though not necessarily) on the horizon line. All lines parallel with the viewer's line of sight recede to the horizon towards this vanishing point. This is the standard "receding railroad tracks" phenomenon. A two-point drawing would have lines parallel to two different angles. Any number of vanishing points are possible in a drawing, one for each set of parallel lines that are at an angle relative to the plane of the drawing.
Perspectives consisting of many parallel lines are observed most often when drawing architecture (architecture frequently uses lines parallel to the x, y, and z axes). Because it is rare to have a scene consisting solely of lines parallel to the three Cartesian axes (x, y, and z), it is rare to see perspectives in practice with only one, two, or three vanishing points; even a simple house frequently has a peaked roof which results in a minimum of six sets of parallel lines, in turn corresponding to up to six vanishing points.
Of the many types of perspective drawings, the most common categorizations of artificial perspective are one-, two- and three-point. The names of these categories refer to the number of vanishing points in the perspective drawing.

View or position (Pali *diṭṭhi*, Sanskrit *dṛṣṭi*) is a central idea in Buddhism

View or **position** (Pali *diṭṭhi*, Sanskrit *dṛṣṭi*) is a central idea in Buddhism. In Buddhist thought, a view is not a simple, abstract collection of propositions, but a charged interpretation of experience which intensely shapes and affects thought, sensation, and action. Having the proper mental attitude toward views is therefore considered an integral part of the Buddhist path, as sometimes correct views need to be put into practice and incorrect views abandoned, and sometimes all views are seen as obstacles to enlightenment.



Perspective…

In describing the highly diverse intellectual landscape of his day, the Buddha is said to have referred to "the wrangling of views, the jungle of views".

Views are produced by and in turn produce mental conditioning. They are symptoms of conditioning, rather than neutral alternatives individuals can dispassionately choose. The Buddha, according to early texts, having attained the state of unconditioned mind, is said to have "passed beyond the bondage, tie, greed, obsession, acceptance, attachment, and lust of view."[

Those who wish to experience nirvana must free themselves from everything binding them to the world, including philosophical and religious doctrines. Right view as the first part of the Noble Eightfold Path leads ultimately not to the holding of correct views, but to a detached form of cognition.

KARMA: The term "right view" (*samyak-dṛuṣṭi* / *sammā-diṭṭhi*) or "right understanding" is basically about having a correct attitude towards one's social and religious duties. This is explained from the perspective of the system of karma and the cycle of rebirth.[7] Used in an ethical context, it entails that our actions have consequences, that death is not the end, that our actions and beliefs also have consequences after death, and that the Buddha followed and taught a successful path out of this world and the other world (heaven and underworld or hell). Originating in the pre-Buddhist Brahmanical concerns with sacrifice rituals and asceticism, in early texts the Buddha shifts the emphasis to a karmic perspective, which includes the entire religious life. The Buddha further describes such right view as beneficial, because whether these views are true or not, people acting on them (e.i. leading a good life) will be praised by the wise.

They will also act in a correct way. If the views do turn out to be true, and there is a next world after death, such people will experience the good karma of what they have done when they were still alive. This is not to say that the Buddha is described as uncertain about right view: he, as well as other accomplished spiritual masters, are depicted as having "seen" these views by themselves as reality. Although devotees may not be able to see these truths for themselves yet, they are expected to develop a "pro-attitude" towards them.[10] Moral right view is not just considered to be adopted, however. Rather, the practitioner endeavors to live following right view, such practice will reflect on the practitioner, and will eventually lead to deeper insight into and wisdom about reality.

According to Indologist Tilmann Vetter, right view came to explicitly include karma and Rebirth, and the importance of the Four Noble Truths, when "insight" became central to Buddhist soteriology. This presentation of right view still plays an essential role in Theravada Buddhism.

A second meaning of right view is an initial understanding of points of doctrine such as the Four Noble Truths, not-self and Dependent Origination, combined with the intention to accept those teachings and apply them to oneself. Thirdly, a "supramundane" right view is also distinguished, which refers to a more refined, intuitive understanding produced by meditative practice. Thus, a gradual path of self-development is described, in which the meaning of right view gradually develops. In the beginning, right view can only lead to a good rebirth, but at the highest level, right view can help the practitioner to attain to liberation from the cycle of existence.

Buddhist Studies scholar Paul Fuller believes that although there are differences between the different levels of right view, all levels aim for emotional detachment. The wisdom of right view at the moral level leads to see the world without greed, hatred and delusion.

Misunderstanding objects as self is not only seen as a form of wrong view, but also as a manifestation of desire, requiring a change in character.

No VIEW: The Buddha of the early discourses often refers to the negative effect of attachment to speculative or fixed views, dogmatic opinions, or even correct views if not known to be true by personal verification. In describing the highly diverse intellectual landscape of his day, he is said to have referred to "the wrangling of views, the jungle of views".He assumed an unsympathetic attitude toward speculative and religious thought in general. In a set of poems in the early text Sutta Nipata, the Buddha states that he himself has no viewpoint. According to Steven Collins, these poems distill the style of teaching that was concerned less with the content of views and theories than with the psychological states of those who hold them.

Buddhism is devoted primarily to liberation from suffering by breaking free of *samsara*, the cycle of compulsory rebirth, by attaining *nirvana*. Many types of Buddhism, Theravada, Mahayana and Vajrayana (or Tantric), emphasize an individual's meditation and subsequent liberation from *samsara*, which is to become enlightened.

Thus, the fundamental reason that the precise identification of these two kinds of clinging to an identity – personal and phenomenal – is considered so important is again soteriological. Through first uncovering our clinging and then working on it, we become able to finally let go of this sole cause for all our afflictions and suffering.

However, the Pure Land traditions of Mahayana Buddhism generally focus on the saving nature of the Celestial Buddha Amitābha. In Buddhist eschatology, it is believed that we are currently living in the Latter Day of the Law, a period of 10,000 years where the corrupt nature of the people means the teachings of the Buddha are not listened to. Before this era, the *bodhisattva* Amitābha made 48 vows, including the vow to accept all sentient beings that called to him, to allow them to take refuge in his Pure land and to teach them the pure *dharma*. It is therefore considered ineffective to trust in personal meditational and even monastic practices, but to only trust in the primal vow of Amitābha

***The Buddha of the early discourses often refers to the negative effect of attachment to speculative or fixed views, dogmatic opinions, or even correct views if not known to be true by personal verification. In describing the highly diverse intellectual landscape of his day, he is said to have referred to "the wrangling of views, the jungle of views". In a set of poems in the early text Sutta Nipata, the Buddha states that he himself has no viewpoint. According to Steven Collins, these poems distill the style of teaching that was concerned less with the content of views and theories than with the psychological states of those who hold them.**

Perspective in the World

Linear perspective originates in the common appearance of the real world, yet it seems to follow the abstract constraints of geometry. It can visualize the infinite reach of three dimensional space by organizing everything around a single, precisely located viewpoint. These foundation topics are presented in this page.

If you already have some perspective training, then my approach will be unfamiliar. Most perspective tutorials are focused on the object you want to draw. My emphasis is on the viewer: linear perspective is **the two dimensional image of a unique viewpoint and direction of view**. I introduce linear perspective as embedded in our natural view of the physical world and as connected to basic facts of vision, then present a geometrical summary of the perspective method, the assumptions behind its presentation in pictorial art, and the ways its limitations can be used in effective artistic design.

I postpone the "how to" drawing tutorial because awareness of the foundation themes can cure a student's hackneyed or mechanical application of perspective construction. To get a feel for what perspective is really about, one must realize that it is visible everywhere and in everything — even when architectural edges and corners are nowhere

to be seen.

Vision creates an image of the physical world from the weave of light around us. How does it do this? One way to address that question is to answer a more specific one: how do we "see" that an object is near or far from us?

Anything that helps us see the relative distance of objects in space is called a **distance cue**. Fundamentally, all distance cues are made possible by the **geometrical regularity of three dimensional space**, and it is this regularity that linear perspective attempts to simulate.

First, vision takes advantage of the fixed characteristics of our two eyes to make sense of what we see. The most powerful distance cue, **binocular parallax**, is the disparity between the images created by the two eyes that arises because they are located about 5cm to 7cm apart. This causes near objects to shift back and forth against a distant background as we close first one eye and then the other. The mind uses this parallax to infer the distance of objects in the field of view: the larger the left to right shift, the closer the object. We also use **motion parallax**, which occurs when we move our head, stoop or turn, walk or run through the environment. Parallax is a very powerful and accurate distance cue, and it is effective across an enormous range of distances — binocular parallax from the tip of our nose out to about 20 meters, and motion parallax (depending on the speed of movement) out to several kilometers.

Parallax cues depend so heavily on the fixed attributes of space and the location of our eyes that it takes infants only about four months to learn how to use parallax to guide reaching and grasping. Other cues related to eye position, such as lens focusing (**accommodation**) and crossing the eyes to see close objects (**convergence**), are comparatively weak — they are only useful within a few feet.

However, in the two dimensional, fixed surface of a painting, all the cues from parallax, convergence and accommodation disappear. So the artist must rely on other distance cues to create the illusion of three dimensional space.

Some cues appear in the **optical properties** of monocular (single eye) retinal images. In three dimensional space, objects close to us appear larger than those far away, so **retinal image size** is an important distance cue, especially for objects we recognize. Objects at our feet or just overhead appear much lower or higher in relation to the horizon than objects far away, so the **vertical position** of objects in our visual field — compared to each other or to the horizon — also serves as a distance cue in natural environments.

All these distance cues seem related to our view of detached objects. However, equally powerful depth cues arise in the visual appearance of surfaces, especially the textures and colors of the natural world.

distance cues in changing textures

The American photographer Ansel Adams had a superb eye for perspective facts in visual design. His photograph of an arid landscape contains not one straight edge anywhere, and confronts the world head on, making the landscape appear flat. Yet the sense of depth in space is powerful and pervasive.

In the foreground, within our physical range of motion, we usually distinguish separate objects, in part by using the **occlusion** of one object outline by another. The simple rule is, **whatever covers is closer**, and this rule applies across any distance (even when the sun sets behind a far mountain).

distance cues in overlapping forms

This collection of circles illustrates that a complete break in the outline of one form by another indicates the unbroken form is closer (in front), opaque and probably solid. If the covered outline is partly visible (like the mountains through the shafts of light), we infer the closer form is partly transparent. If two objects meet in an outline that is irregular to both (large circles at right), then the distance relationship between them is ambiguous.

However, the main distance cue in the Adams photo is the change in **visual**

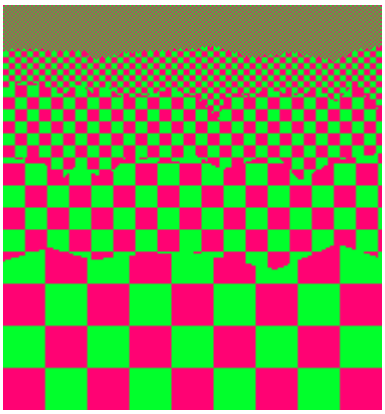
textures across space, called a **perspective gradient**. The foreground rocks appear large and extremely rough; with distance they grow smoother, the spacing between them becomes smaller, and the rocky surface appears flatter, less irregular. Beyond the rocks, the mountains and clouds have irregular outlines but appear smoother than the rocky plain. And beyond everything is the sky — the only perfectly textureless "surface" in nature.

If the object or surface is far enough away, it is "behind" a considerable distance of atmosphere, which can obscure the object with suspended particles of dust, smoke or molecules of water vapor. The cumulative effect of these obscuring particles creates **aerial perspective** in large objects visible from a great distance, especially mountains, buildings and desert or ocean horizons. Depending on the time of day and strength of light, aerial perspective can make distant objects appear less distinct, less saturated and darker or lighter in value. Smoke or dust shifts the hue of distant objects warmer (toward red, yellow or yellowish white), while water vapor shifts landscape hues toward blue.

We have to use the recognizable continuity of an object's outline, or its "completeness of form," to see occlusion, which is more difficult if objects are far away or very small, dimly illuminated, or unfamiliar to us. Look again at the Adams picture, and you'll see that one rock clearly covers another at the bottom of the image, but in the middle distance these overlaps become harder to see. Instead, everything merges into the average spacing or **spatial frequency** of the rocks — that is, the rocks do not separate themselves from the texture as distinct forms. Wherever objects become too small or complex to show occlusion clearly, texture takes over.

This transition from form to texture means that visual experience is **a combination of objects filled in by visual textures**. Increasing distance in space transforms the appearance of objects into structurally or visually related textures. And at extreme distances, texture itself dissolves into pure color. So we have the following sequence that applies to large vs. small or near vs. far visual elements:

pattern —> texture —> color



perspective transforms pattern into texture and color

In this illustration, the band at the top of the image is made of the same green and red squares as the band at the bottom, but the squares are too small to see individually: instead they mix visually to make yellow or gray. There is a **fusion threshhold** for every texture, beyond which it is blended by the eye (in **visual fusion**) into a single homogenous color. Color TV screens, a distant mountain slope and a sandy beach are all composed of tiny discrete forms beyond the visual mixing threshhold.

Occlusion works because we can **compare the outlines we see with our idea of the objects** we look at: anything partly covered is a "broken" or "altered" form of itself. So our *knowledge and expectations of the world* are essential to create effective distance cues. However, the boundary between what we "see" with our eyes and what we "know" with our memory and mind is not at all clear. In fact, we can create the illusion of a recognizable form entirely through the **visual completion** induced by forms around it.

Finally, these transitions from occluding objects to patterns to textures to colors as distance increases do not happen in the same way for all objects — unlike the effect of aerial perspective or fog, which causes all forms to fade equally from view. **Increasing distance creates characteristic visual transitions in different objects**, especially in natural forms where there is a distinctive structure at different scales of view. Trees are the classical example, much studied by 19th century artists, because different species of trees express a different branching pattern that is recognizable from twigs up to large branches; the tree's branching pattern, in turn, determines the tree's overall form and the clumped appearance of the trees in copses or forests.

the unique sequence of patterns created by perspective changes in oak trees

Many kinds of vegetation, rock formations, clouds and water flows show similar interrelated patterns across large changes in viewing distance. The point is that the painting brushstrokes, color mixtures and shading that artists use to represent the objects must change with the object's distance: **a distant tree is not a miniature image of a tree nearby**, as crude perspective thinking might suggest. It has a completely different visual character. The artist's challenge is to find the right representation for the object's appearance at the appropriate distance, not just to paint larger or smaller versions of the same thing. This can be done by understanding the fundamental structure of the object, and how this structure changes in apparent form, texture and color across perspective space.

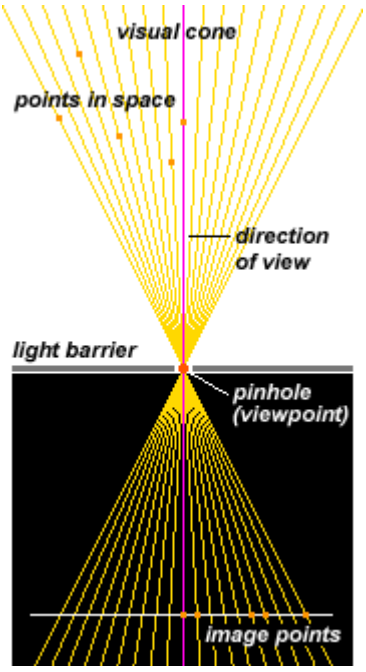
Linear perspective is space drawn as the geometrical idea of itself. But we do not see the idea of space: we see a world of light, colors, textures, objects and opportunities for action. As we explore the artistic uses of perspective, we will repeatedly grapple with the fact that our visual experience of the world is much richer and more complex than our idea of the geometrical space in which it appears.

4 perspective facts

Linear perspective simplifies the world in order to create a coherent visual representation of the world. It includes *some* facts that determine our view of the world (three dimensional space, light, surfaces) but excludes others (movement, atmosphere, texture). It includes some features of visual experience (recession in space, convergence of parallel lines) but not others (color, optical fusion, binocular parallax). All these restrictions arise from the four key facts on which perspective methods are based (diagram, right).

3. Visual rays through the viewpoint define a visual cone centered on a direction of view. We can't see light through the back of our head, and light does not enter a camera through both sides of the pinhole screen. In nearly all optical systems, images are created by light arriving from the "front half" of the surrounding space (diagram, right).

points on an image pl



The visual rays from the "front half" of space form a cone, known as a **visual cone** or *visual pyramid*, with the viewpoint at its point or apex. This cone has a central axis, known as the *optical axis*, which defines the center of a camera image or our visual field. In linear perspective this optical axis is called the **direction of view** (or sometimes

the *central ray* or *principal visual ray*).

The human visual field actually has a very complex structure — crisp central vision and fuzzy peripheral vision — but linear perspective assumes that any visual ray inside the visual cone contributes equally to an image. This is a specific example of how linear perspective does not represent what we actually *see* with our eyes, but rather what we *know* about optics and the geometry of the physical world.

4. Every image is a cross section through a visual cone. An image is not formed *at* the viewpoint, because a point has no dimension. Instead the image is formed by making a slice *through* the visual cone at some point other than the viewpoint, either in front of or behind it.

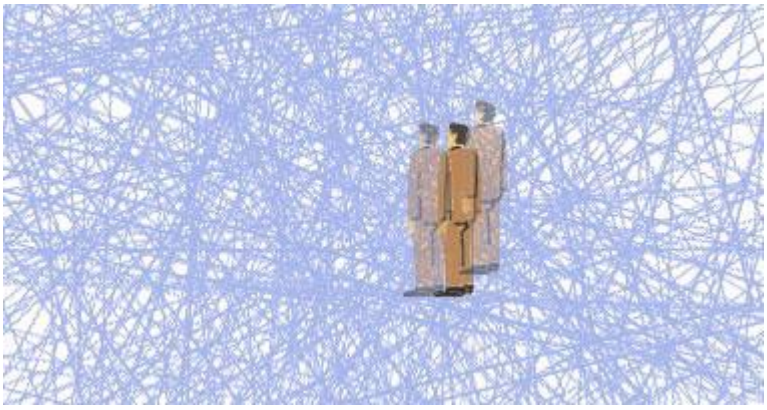
This slice cuts across all the visual rays, so that we only see visual rays "end on" within the visual cone. As a result, **all visual rays appear as points on an image plane**. The image is really a surface of compacted points, each point signifying a visual ray that has reached the viewpoint from a specific location in physical space.

This description of light rays as straight lines, arriving from objects in space to a viewpoint with a specific direction of view, allows us to use a **geometrical method for describing the visible world on a two dimensional surface** from a single point in space. This is called a *central projection.* Geometry in turn gives us the procedures necessary to construct these central projections using the simplest tools: a pencil, a straight edge and a compass.

creating the perspective view

Now let's apply the four perspective facts to create a standard **perspective setup**, which will be the mechanism that the the artist can use to construct representational drawings. My explanation proceeds in small steps so that you can see how the mechanism actually works and understand the assumptions that it is based on.

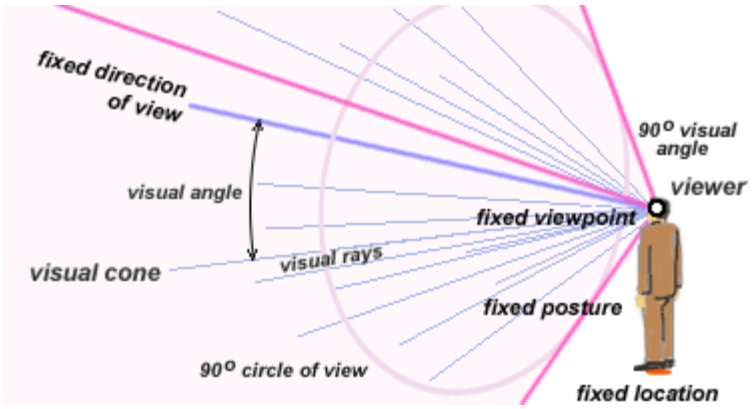
The Light Environment. We start with the light environment as a viewer would experience it naturally. The space around the viewer is filled with a dense, rich scattering of light, coming at him from all directions and distances, reflected from every surface and even scattered by the atmosphere.



the light environment

The viewer is also alive and continually moving — shifting his gaze, turning his head, leaning to one side or another, stepping forward or backward, walking or sitting or lying down. Before motion picture cameras, there was no way to capture this dynamic complexity.

The Stationary Viewer. The first step in perspective is to exclude all the dynamic aspects of visual experience and limit the problem to a **stationary viewer**. The viewer takes in visual rays only from a fixed location in space, in a fixed posture (including both body position and orientation of the head), and facing in a fixed direction (with a fixed position of the eye or eyes). To my knowledge this is not explicitly characterized in perspective texts, but a stationary viewer is the fundamental premise of a perspective drawing.



the stationary viewer

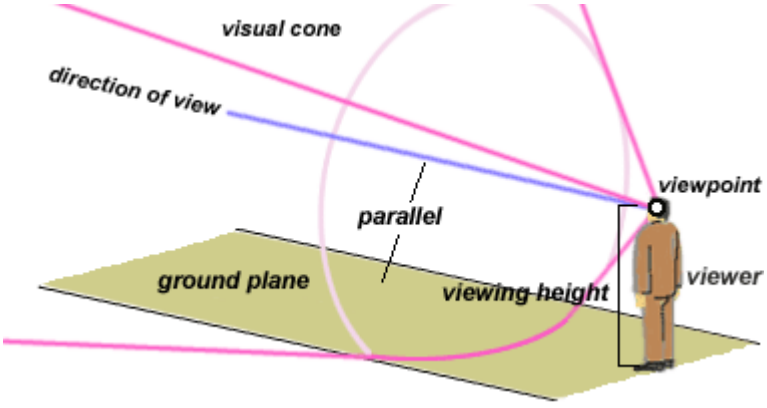
Once we freeze the viewer's location, posture and gaze, we necessarily fix the viewer's **visual cone** (what we would call the **visual field** in other contexts). The light comprised by this fixed visual cone represents a single place, a single view of the world, experienced uniquely by a single viewer: no one else can experience exactly the same stationary view at the same time.

The fixed visual cone is defined by a fixed apex, the **viewpoint**, and a fixed **direction of view** (also called the *central ray, axis of sight* or *principal visual ray*), which represents foveal ("in focus") vision at the center of the visual field.

The third and final dimension is the *width of the visual cone*. Any two visual rays within the visual cone define a **visual angle** measured at the viewpoint, which corresponds to the *visual distance between two points* in the visual field. So what is the visual angle of the visual cone? This was determined by medieval optics to be 90° (one quarter of a full circle), and later perspective practice adopted this 90° limit as a convenient standard (for reasons **explained below**). This creates a circular diameter to the visual cone, centered on the direction of view, know as the **90° circle of view**.

We know from our own visual experience that we see clearly only in foveal vision, at the center of view: we can't read unless we look directly at the words. However this central clarity is not acknowledged in linear perspective. Because of the fixed position and viewpoint, motion parallax and binocular parallax are excluded as well. We also cannot decide whether the image represents a glance or a steady gaze, the view of a moment or of eternity. These omissions give the images created by linear perspective their surreal clarity and static perfection. Clarity and perfection are really *cognitive,* not perceptual, attributes: perspective commits us to draw what we *know,* not what we actually *see.*

The Ground Plane. The perspective act — the fixed visual cone, viewpoint and direction of view — looks out on abstract space. We have a point of view, but nothing to look at. So the next step is to establish a **physical space** that creates the visual rays converging on the viewpoint. The simplest and most elegant way to do this is simply to provide the viewer with someplace to stand: the **ground plane**.



the ground plane

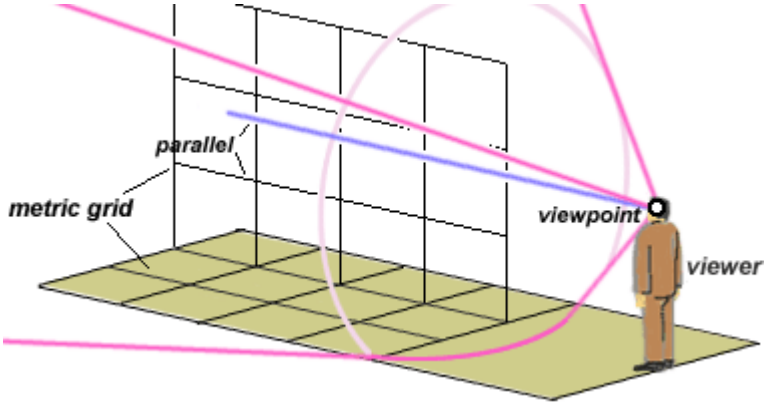
The ground plane is essentially the representation of spatial extent: it goes off into the distance. By convention, the ground plane is made as abstract as possible: **flat and perfectly level**. In terms of visual experience, it represents the spatially largest or dominant *level surface* below the viewpoint. In this location it symbolizes all

architectural surfaces and the great flat layers of geology — tilled fields, alluvial meadows, dried lake beds, and large bodies of water. By convention, the viewer is normally standing or sitting, spine upright and head erect to balance the downward pull of gravity, with eyes facing forward. This puts the viewpoint at a fixed distance above the ground plane: the **viewing height**.

As it extends outward in all directions, the ground plane cuts the visual cone almost in half, blocking the range of vision downward. This naturally orients the direction of view straight ahead, which is fixed by a second convention: the **direction of view is parallel to the ground plane**. The viewer stands or sits upright and perpendicular to the ground plane, head upright, balanced against the downward pull of gravity.

Although it is abstract, the ground plane is extraordinarily rich with significance. It is the *here and now* of the perspective act, and signifies that this place is important to experience. It also characterizes the **perspective stance** of the viewer — his location, posture and focus of attention within a specific physical setting.

Distance Measurement. The ground plane is our reference for *location in space,* and therefore the *distance from the viewer* to any objects in space. To specify these concepts of location and distance, the next perspective step is to **define a metric grid on the ground plane**.



dividing the ground plane with a metric grid

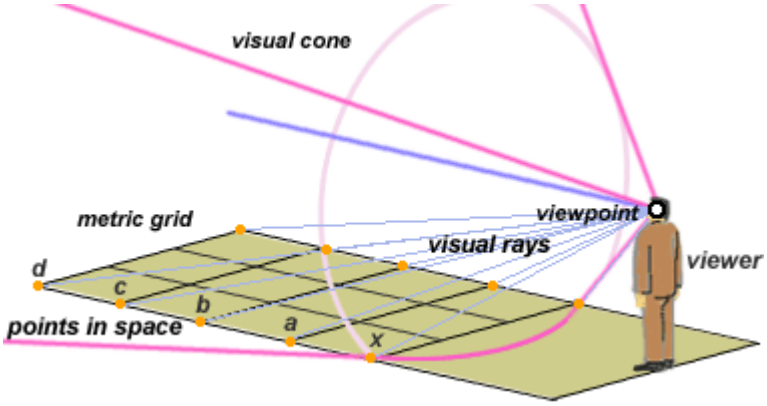
The most convenient approach is to partition the ground plane by a grid of squares 1 meter on a side. We can if desired create a second grid in a plane perpendicular to the ground plane, so that we can measure distance in three dimensions.

By convention, all lines in the grid are defined either **parallel or perpendicular to each other and to the direction of view**. This allows us to measure distances in any direction in relation to the viewpoint — 10 squares ahead, 2 squares to the left — in the same way we would locate points on a sheet of graph paper. The vertical grid allows us to measure distances in height above (or below) the ground plane or the direction of view. This metric space allows us to extend or verify the facts of linear perspective by means

of **geometrical proof**.

This grid on the ground plane is one of the most primitive conventional elements of linear perspective. Early Renaissance artists actually included the measurement grid in their finished paintings and frescos, as a **pavement of square tiles**, often in a strongly contrasted checkerboard pattern.

The Physical Geometry. The visual cone is filled with an infinite number of visual rays, arriving to the viewer from every visible object and surface in physical space. However, thanks to the metric grid, we can define the spatial location from which visual rays originate. For example, we can limit our attention to visual rays from *intersections in the metric grid*, and ignore the rest. We assume (correctly) that any insights we obtain from these few visual rays will apply to any other visual rays in the visual cone.



visual rays in physical space

In the figure, five of these points are shown in orange, and labeled **d**, **c**, **b**, **a** and **x** along one side of the direction of view; a matching row of unlabeled orange points is shown along the opposite side. Each row of points lies on a single straight line, and the two lines are *parallel* to the direction of view. At the same time, the matching pairs of points define the sideways or transverse lines in the metric grid, *perpendicular* to the direction of view.

The visual rays from these points define the geometry of visual rays in physical space. And they allow us to address two fundamental questions about **recession**, or changes in object appearance with object distance:

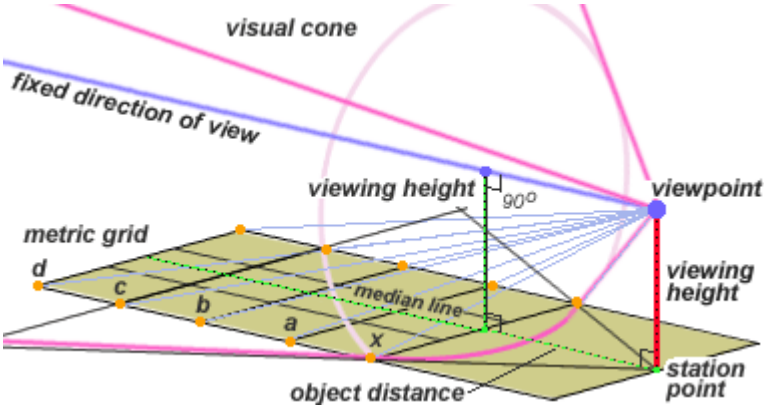
• What happens visually at different distances to objects arranged along a straight line *parallel to the direction of view* (as defined by the line **dx** and the matching line on the opposite side)?

• What happens visually at different distances to objects arranged in equally spaced rows *perpendicular to the direction of view* (represented by the transverse lines ending at

each labeled point)?

The next perspective steps clarify the answers to these questions.

The Perspective Geometry. By limiting the perspective view to a handful of visual rays from the intersections of the metric grid, we have started to simplify or abstract the viewing situation, reducing it to its geometric essentials. Let's complete that process.



the basic perspective geometry

First, we excuse the human viewer and retain only the fixed location of his **viewpoint**.

The viewpoint has a specific location in relation to the ground plane directly underneath it. This is called the **station point**. A line between the station point and viewpoint is perpendicular or "square" to the ground plane, signified by the small square at the base of the line.

(Traditional perspective tutorials refer to the viewpoint as the station point, but I feel it is very useful to have a separate term for the viewpoint and its ground plane location.)

The distance between the viewpoint and station point is the **viewing height** above the ground plane. As we've seen, this depends on the viewer's physical height and location in relation to the ground plane (sitting, standing on the ground, or standing at the top of a tower).

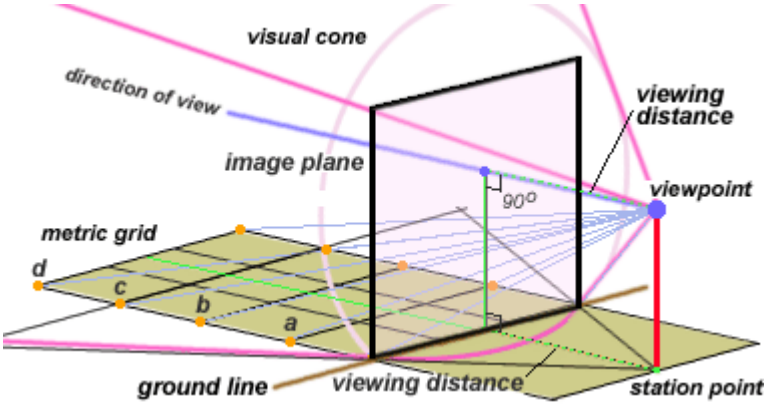
The viewpoint is at the tip or apex of the visual cone, and the origin of the direction of view. We have already conventionally decided that the direction of view is **parallel to the ground plane**. So we can define a **median line** on the ground plane, extending from the station point and parallel to the direction of view, which divides the ground plane into symmetrical left and right halves.

Finally, we can specify a **object distance** between the viewpoint (or station point) and any object within the visual cone.

At this point linear perspective becomes a precise measurement system. All the distance measurements within the metric grid, and the visual angles of visual rays from the grid to the fixed viewpoint and direction of view are defined by basic trigonometry. In fact, as linear perspective developed during the Renaissance, it was closely associated with developments in surveying, mapmaking, navigation and astronomical observation. The tools and procedures for measuring the physical world and for making perspective images were often explained in the same book.

Making the viewing situation geometrically abstract imparts a similar abstraction to the identity of the viewer of the image. Paintings that create an identity or presence for the viewer as an individual recognized by persons in the painting, as in Velázquez's *Las Meninas*, are rare in the perspective tradition, especially in **academic or history paintings**. More often the perspective viewpoint implies a timeless or universal witness, an abstract vantage that can be filled equally well by any anonymous passerby.

The Image Plane. Next we turn to making a perspective image. To do this, we insert an **image plane** through the visual cone. This corresponds to the fourth **perspective fact** described above: an image is a cross section through the visual cone. It is the "window" of perspective imagery.



an image plane in the basic perspective geometry

To keep the geometry simple, and to mimic the vertical viewing position of a vertically hung painting or wall fresco, the image plane is conventionally a **flat surface perpendicular to the direction of view and to the ground plane**. (Linear perspective works just as well if there are no right angles in the setup, or if the image plane is curved rather than flat, but these situations are geometrically more complex and were not clearly analyzed until the early 18th century.)

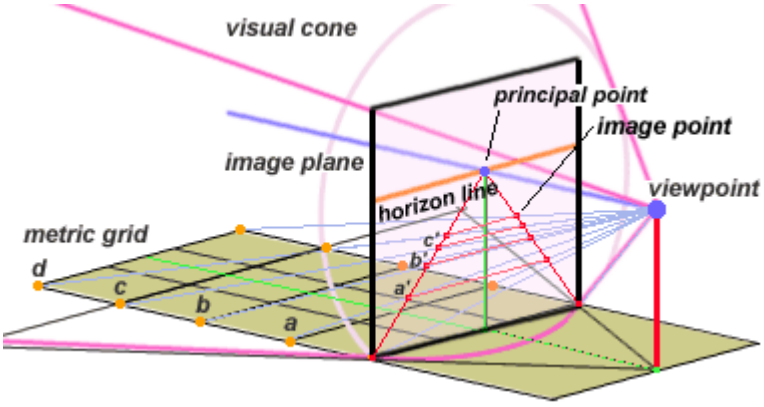
The image plane does not have fixed dimensions — its limits are only determined by the size of the visual cone or by the size of the support that we make the image on.

However, the image plane does have a fixed location: the **ground line** directly underneath it. This is equivalent to the base of a vertical wall on which the painting or

fresco is displayed.

Finally, the ground line is at a fixed distance from the station point: this is the **viewing distance**.

The Perspective Image. The image plane is commonly described as a window looking onto the world. This means all visual rays *pass through* the image plane on their way to the viewpoint.



perspective image on the image plane

The final step is to identify *where* each visual ray passes through the window — the *point* where it intersects with the image plane. This point is its **perspective image**. In the figure, point **a'** is the intersection between the image plane and the visual ray from point **a** on the ground plane to the viewpoint; that is, **a'** is the image in *perspective space* of the point **a** in physical space. Point **b'** is the image of real world point **b**, **c'** is the image of **c** ... and so on for all the points on those **two parallel lines of points** we decided to study.

Physical lines — edges, tracks, borders, wires — can also be projected onto the image plane. The collection of all projected image points and image lines is the perspective image of the corresponding points and lines in physical space.

We have defined a way to *map three dimensional space onto a two dimensional surface*, by locating the image points for every detail of the visual cone. For an optical image, these points are plotted for us by rays of light. In artistic practice, perspective constructions are typically made by plotting visual rays **point by point**. To simplfiy this task, the emphasis is on *significant points*, especially vanishing points and corners or edges that can be connected by straight lines or freehand curved lines. Perspective drawing does not proceed by mechanically connecting dots with lines, but by choosing the dots that locate all essential elements in the perspective image.

The image plane is conventionally divided by two representations of the viewer's perspective stance. The **horizon line** corresponds to the visual limit of the ground plane

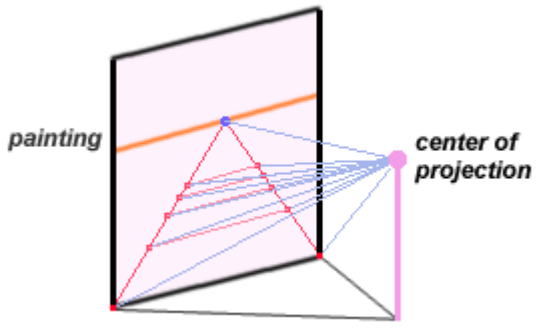
if it extended infinitely far. This divides the image plane horizontally. The **median line** corresponds to the median line on the ground; it extends vertically upward from the ground line and is perpendicular to the horizon line. The two lines intersect at the **principal point**, which locates the direction of view as it passes through the image plane.

Because we have defined all the relevant elements as parallel or perpendicular to one another, the principal point anchors two basic dimensions of the perspective image. The distance between the principal point and the ground line is **viewing height** to the image plane; the distance between the principal point and the circumference formed where the 90° circle of view intersects the image plane is the **viewing distance**.

Two important details: the horizon line is not necessarily defined by the visible horizon on the surface of the earth; we conventionally assume this. As we'll see later, it can alternately be defined as the **pupil line** (visual horizontal) of the artist's head. (There would be a horizon line in outer space.) Similarly, the image plane does not have to be perpendicular to the ground plane, or even to the direction of view, but defining it that way makes it easier to work out practical perspective problems.

The Viewing Geometry. Once the artist has used these principles to transfer the three dimensional world onto a two dimensional canvas, and from the significant points and lines developed a completed perspective painting, a second situation arises that must be governed by perspective principles: the **cultural encounter** between the perspective image and a human viewer.

If we whittle this encounter down to its essentials, we are left with the vertical (wall hanging) orientation of a faceless museum or gallery **painting**, and the ghostly **center of projection**, perpendicular to a line from the center of the painting, which is the viewpoint implied by the perspective facts in the image.



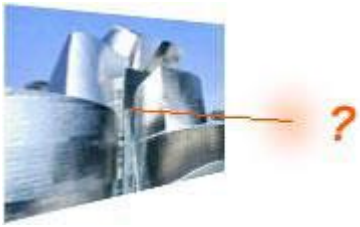
the visitor and the artwork

If the museum visitor stands so that his viewpoint **from one eye** (or through a peephole) exactly coincides with the center of projection of a perfectly consistent perspective painting, all the visual rays from the surface of the painting will recreate the visual rays

from the original scene, within the limits of accuracy of the painter's representation.

This is the **illusionistic use of perspective**, and it is only effective when (1) the drawing is in strict perspective, (2) the drawing contains the kinds of receding lines and planes that make the strict perspective construction visible, and (3) the drawing is viewed through a peephole or eyepiece at the center of projection. (Most photographs, excluding most wide angle photographs and including all telescopic photographs, are also in linear perspective.)

It should be said that most paintings from most historical periods contain perspective inconsistencies, such that they define several similar centers of projection; and indeed most images (the Adams landscape photograph above, or a photograph of the Museo Guggenheim in Bilbao; photo, right) do not clearly define a center of projection because they lack the edges, corners and distance cues that identify clear vanishing points or vanishing lines. In these cases, viewers by default assume a viewing position that centers the image in their field of vision, perpendicular to their direction of view, at a distance that brings the whole image into a comfortable circle of view. This intuitive "center of projection" is simply **eye level, facing, and comfortably far away**.



most images do not define a distinct center of projection

Imagination does the rest. Because the viewers of paintings and frescos rarely choose (or are able) to stand at exactly the center of projection, the *symbolic* or **informal use of perspective** — to convey the *idea* of being in a certain place at a certain time — plays a much greater role in the stance viewers typically take toward a painting or photograph. Paradoxically, the linear perspective in the image must be reasonably consistent and accurate to be acceptable, but the linear perspective of the painting in the viewer's eyes does not. We see the painting surface as an object, not a window.

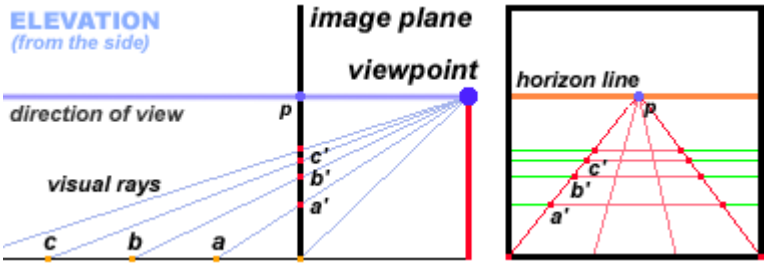
Even when a painting is viewed from exactly the center of projection, a perfect perspective drawing may create apparent **perspective distortions** that become intrusive or objectionable when the painting is viewed with both eyes or from different points of view. As this is how people normally look at paintings, artists spent three centuries attempting to understand and minimize these effects. Eventually, in the process, they learned to use the distortions for expressive purposes.

the perspective setup

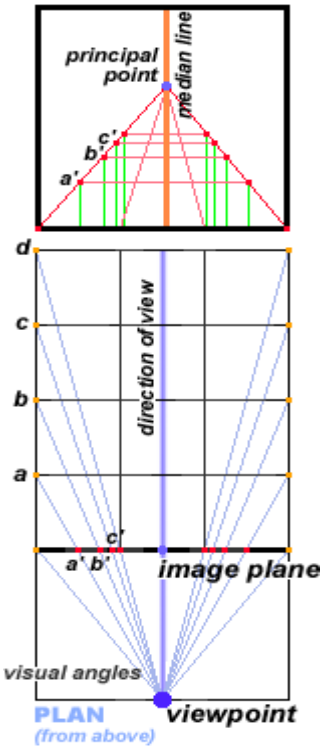
We have progressed by logical steps from the **four perspective facts** to a basic geometrical framework for mapping objects in space onto a two dimensional image plane. Now it is time to step into the viewpoint and examine this framework as the viewer sees it.

To do this, I will create the perspective image of my running example, the point intersections in a **metric grid**. The most primitive and explicit way to do this, which was the standard method in **early Renaissance paintings**, was to define the perspective geometry in paired horizontal and vertical diagrams of the entire viewing situation — the viewpoint, image plane and every object to be drawn on the image plane.

These diagrams are known as the **elevation** and **plan**, as shown in the figures below and at right.



the perspective framework in elevation (above) and plan (right)

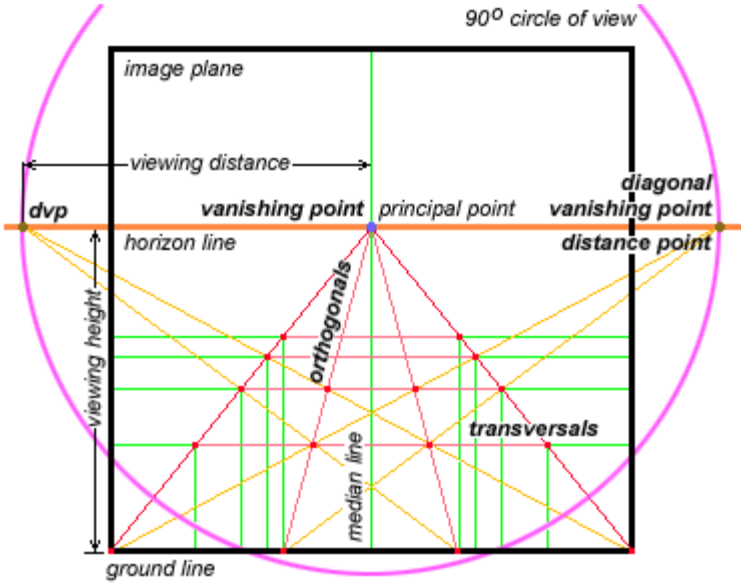


The plan (view from above) is based on an image plane parallel to the ground plane, with all points in physical space projected onto it by parallel vertical lines perpendicular to its surface. The elevation (view from the side) is always perpendicular to the plan and ground plane (like a wall), again with points behind it projected onto its surface by parallel horizontal lines. (There is no convergence to a viewpoint in a plan or elevation.) Conventionally the elevation is parallel to the sides of the architectural form it portrays, but for our purposes it is parallel to the direction of view.

If we make a plan and elevation at actual size, and very accurately specify the locations of the viewpoint and the image plane, then we can draw visual rays from objects to the viewpoint, measure where they intersect the image plane in these views, then transfer these horizontal and vertical measurements to the painting format.

The figures (above) show this done twice: horizontal green lines for measurements done on the elevation (which gives the distance of the points above the ground line), and vertical green lines for measurements from the plan (which gives the distance of the points to the left or right of the median line).

If we make and measure these schematic drawings carefully, then connect the dots to construct the **perspective image** of our **metric grid** on the image plane, we discover that the *receding* **rows of points** appear as *converging* lines of image points, as shown below.



perspective image of the metric grid on the ground plane

Terms introduced in the discussions of **perspective geometry**, **the image plane** and **the perspective image** are shown in plain italics; if any are unfamiliar or unclear, please

review those sections carefully.

Now we see that the image plane roughly fills the visual field; it slices through the visual cone to create the **90° circle of view** (or any other size circle of view we want to define), centered on the principal point — the intersection of the direction of view with the image plane. The principal point and horizon line also show the viewing height.

Now let's examine the perspective image of the metric grid. First of all, we find that it still consists of straight lines (in red). Connecting pairs of metric points *parallel to the direction of view* has created the image **orthogonals** (the mathematical term for "perpendicular," which reminds us that the orthogonals are perpendicular to the image plane).

Now we immediately *see* that **image lines parallel to the direction of view converge at the principal point**, which is therefore their **vanishing point** (abbreviated **vp**) — the term coined by the English mathematician Brook Taylor in 1715. Because this vanishing point is identical to the principal point (the direction of view), it controls recession in space toward the focus of attention. (Perspective drawings based only on the principal point are in **central perspective**, as discussed on the next page.)

Despite what we see, we *know* the lines in the **metric grid** on the ground plane are constructed parallel to the direction of view and are equally spaced (we can confirm this in the plan view, above). So we can conclude that the **orthogonals define an interval of constant width in perspective space**.

Connecting pairs of metric points *parallel to the image plane* creates the image **transversals**, which are parallel to the ground line. Again we immediately *see* that transversals become more closely spaced as they approach the horizon line. Yet because we *know* they represent equally spaced lines in physical space, we can conclude that the **transversals define intervals of equal depth in perspective space**, from the ground line toward the horizon.

We can hardly appreciate today the extraordinary sense of discovery that **early Renaissance artists** experienced as the first perspective drawings took shape under their hands, and the paradoxical relationship between *see* and *know* came into view. We sense their delight and awe in their manuscript attempts to solve more and more intricate perspective problems, and in the reverent accuracy with which they transformed these drawings into finished works of art.

A basic principle was recognized early: the spacing between transversals narrows more quickly with distance than the spacing between orthogonals (the vertically elongated squares of the metric grid at the ground line become horizontally elongated rectangles in perspective distance). Artists had unlocked the fundamental proportions of **foreshortening**, which is the **compression of the visual angle of a dimension** or distance as the dimension becomes *more parallel to the direction of view.* Indeed, the

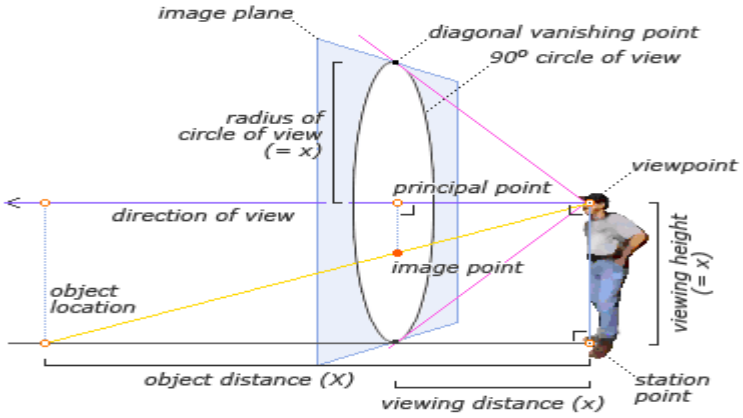
earliest illustrations of artists studying perspective problems usually show them studying the effects of foreshortening — for example, in Dürer's illustrations that show how to draw, point by point, a **foreshortened lute** or a **human figure**.

Several decades later, artists also realized that that the two *diagonals* within the squares created by the orthogonals and transversals must also be parallel lines (like the parallel diagonals of a chessboard) and therefore must also converge to vanishing points on the horizon line on either side the principal point. These are the **diagonal vanishing points** (abbreviated **dvp**), first described by the French cleric and diplomat Jean Pélerin in 1505.

Pélerin described how contemporary artists used the **dvp's** to find equal intervals of depth (the transversals) from orthogonals of equal width measured along the ground line. For this reason the **dvp's** were traditionally called **distance points**, because in central perspective they are used to transform a measure of **physical distance** along the ground line into an *image recession* in perspective space. (They are also called distance points because the distance on the image plane between a **dvp** and the principal point is exactly equal to the **viewing distance** from the viewpoint to the image plane. This means the diagonals can be used to **reconstruct the center of projection** implicit in a perspective painting.)

The Circle of View Framework. The final step is to standardize or abstract the insights we have drawn from the perspective image of the metric grid, and formulate them as a perspective machine. This is the **circle of view framework**.

The key element is that the viewing distance (**x**, the distance of the viewpoint from the image plane), the viewing height (the distance of the viewpoint from the ground plane or plane of orthogonals) and the radius of the circle of view are all equal. We also require, as a simplification of the perspective problems we want to analyze, that the direction of view is parallel to the ground plane and the image plane is perpendicular to both the ground plane and the direction of view. This creates the physical arrangement illustrated and labeled in the diagram (below).

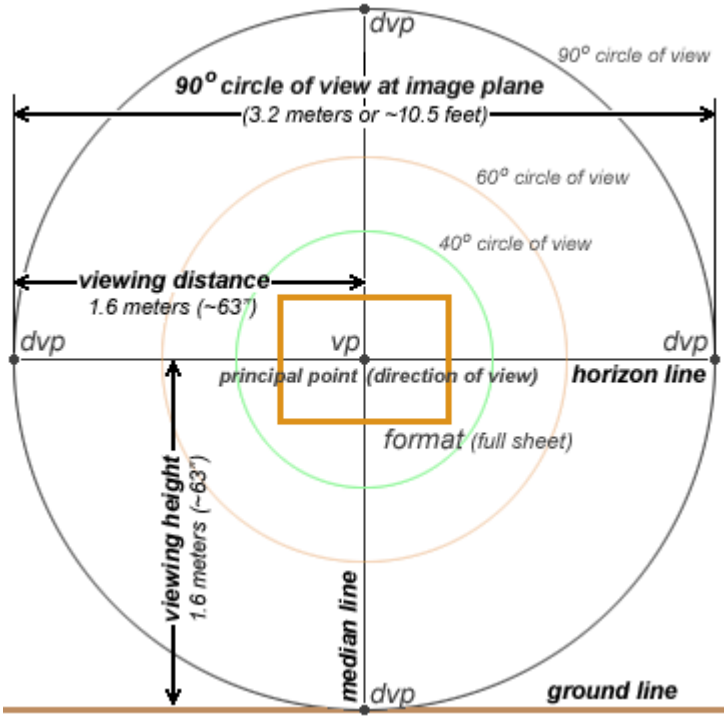


the circle of view framework: basic terms

the 90° visual cone with viewing distance set equal to viewing height

We choose the **90° circle of view** as the framework for perspective operations because this circle has a radius of 45° visual angle around the principal point, so it contains all possible diagonal vanishing points. In addition, 90° is the visual angle accepted since the Renaissance as the outer limit of images projected onto a plane, so we have no use for a larger visual span.

To create the 90° circle of view, we simply **define the viewing distance as equal to the viewing height**, which aligns the ground line with the base of the circle of view. Then the framework proportions integrate the diagonal vanishing points, the viewpoint, the viewing distance to the image plane, the viewing height and the ground line around the **powerful central recession** toward the principal point that is created by the direction of view.



the circle of view framework

the 90° circle of view as it appears from the viewpoint

The central **vanishing point** (**vp**) defines recession along all lines parallel to the direction of view — the convergence of all **orthogonals**. The **horizon line** and **median line** intersect at the principal point, dividing the circle of view into quadrants. Two pairs of **diagonal vanishing points** lie on the horizon and median lines on opposite sides of the circle of view. And because the viewing distance is equal to the viewing height, the

ground line, median line and circle of view all intersect at a single point, the bottom **dvp**.

If we need to be precise in how the perspective view is implemented, then the specific measurements depend on the stature or vantage of the viewer. However, as a general rule, an average size adult has a viewing height of about 1.6 meters (63 inches), so the circle of view at the image plane will be about 3.2 meters (10.5 feet) wide. (Note that the viewing height is always measured from a viewer's *eye level,* not the top of her head.)

The 90° circle of view is a very convenient framework for working out perspective problems, but drawings that completely fill the circle are subject to **perspective distortions** that most artists find objectionable. For that reason, the actual image area typically is fitted into a much smaller circle of view, such as the 60° or 40° circles shown in the diagram. For example, a watercolor **full sheet** (22"x30") would appear as shown in the diagram — nicely contained within a 30° circle of view. Even the massive emperor sheet (40"x60") only fills a 50° circle of view at a 3.2 meter viewing distance.

Because the 90° circle of view framework explicitly links together the principal point, viewing distance, viewing height, ground line and all diagonal vanishing points, it can be applied to solve any perspective problem. It does not just provide a system for **copying nature point by point** in order to make a painting. We've actually invented a **system of perspective construction** which can be used to create new images at our pleasure and imagined worlds from any viewpoint.

Basic rules of perspective

At this point you should have a clear understanding of how linear perspective connects the three dimensional physical world to a two dimensional perspective image. So this is the appropriate point to review some of the basic and always trustworthy perspective rules that can guide you in making a perspective drawing. The rules can be pounded out by geometrical deduction, but I will simply state them in a logical order.

A Perspective Glossary. First, a summary of the key terms. (1) **Physical space** refers to the three dimensional, real world; (2) the **ground plane** is an idealized flat, level surface representing the pedestrian surface of architectural forms (lawn, pavement, floor), or the average of flat natural terrain (desert, salt flat, surface of a lake or ocean); (3) the **viewpoint** is the unique location in physical space of the *nodal point* of the observing eye or camera, the convergence point or *center of projection* for light; (4) the **station point** is the point on the ground plane directly underneath the viewpoint; (5) the **direction of view** is the optical axis of a camera or the line of sight of a viewer located at the viewpoint, typically aligned so that it is parallel to the ground plane; (6) the **image plane** is a two dimensional, flat surface, aligned so that it is perpendicular both to the ground plane and to the direction of view, on which the perspective image is projected; (7) a **visual ray** is any line that intersects (passes through) both the viewpoint and the image plane; (8) the **visual cone** is a cone, with apex at the viewpoint, axis along the direction of view, and a base diameter on the image plane just large enough to

comprise all the visual rays contributing to an image.

(9) An **image point** is the intersection of a visual ray with the image plane; an **image line** is a line drawn on the image plane between two image points, or the line formed by the intersection with the image plane of a plane in physical space; (10) the **principal point** is the intersection (image) of the direction of view with the image plane; (11) the **ground line** is the intersection of the ground plane with the image plane; (12) the **median line** is a line on the ground plane directly underneath the direction of view, and also the image of this line as a line perpendicular to the ground line and through the principal point; (13) the **horizon line** is an image line through the principal point, parallel to the ground line and coincident with the horizon in physical space of a "flat" surface such as the ocean.

For an image plane perpendicular to the ground plane and to the direction of view, (14) the **viewing distance** is the distance between the viewpoint and image plane and/or between the station point and ground line; and (15) the **viewing height** is the distance between the viewpoint and the station point (in physical space) and/or between the ground line and the principal point (on the image plane); (16) the **circle of view** is the intersection of the visual cone with the image plane, measured as a visual angle from the viewpoint or as a radius from the principal point on the image plane.

(17) A **perspective image** is the projection of physical space onto the image plane by visual rays converging at a viewpoint; (18) a **plan** is the projection of physical space onto a horizontal image plane (e.g., the ground plane) by parallel vertical lines; and (19) an **elevation** is the projection of physical space onto a vertical image plane by parallel horizontal lines.

Again, as *simplifying assumptions*, (a) the image plane is perpendicular to the direction of view; (b) the image plane is perpendicular to the ground plane; (c) the direction of view is parallel to the ground plane; (d) the viewer is standing or sitting upright on the ground plane; and (e) the viewing distance and viewing height are equal. These assumptions define the 90° circle of view framework and make the perspective rules easier to understand and apply.

The Basic Rules of Perspective

1. The image of a visual ray is a point on the image plane. A visual ray is any line that intersects the viewpoint and passes through the image plane. The intersection of a line and a plane defines a point. This corresponds to the fact that when we look straight down any line or edge in physical space, its image is only a point in our visual field. Thus, the direction of view only appears as the principal point, the **origin of any visual ray** appears as a point, and any number of separate points on a visual ray all appear as a single point on the image plane.

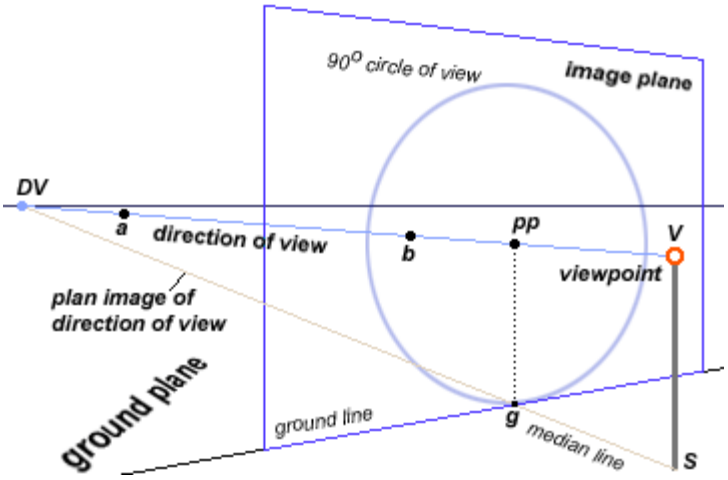


figure 1

In **figure 1**, the visual ray (the line from the viewpoint **V**) intersects the image plane at a single point; in this case, because the visual ray is the direction of view, this point is the principal point (**pp**). Points **a** and **b** are located on the same visual ray, therefore their point images are identical with **pp**.

Figure 1 also shows that any feature of **physical space can be projected downward as a plan** in the ground plane. The point **g** is the image of the principal point projected into the ground plan (as shown by the dotted line); the station point (**S**) is the image of the viewpoint in the ground plan, and the median line is the image of the direction of view.

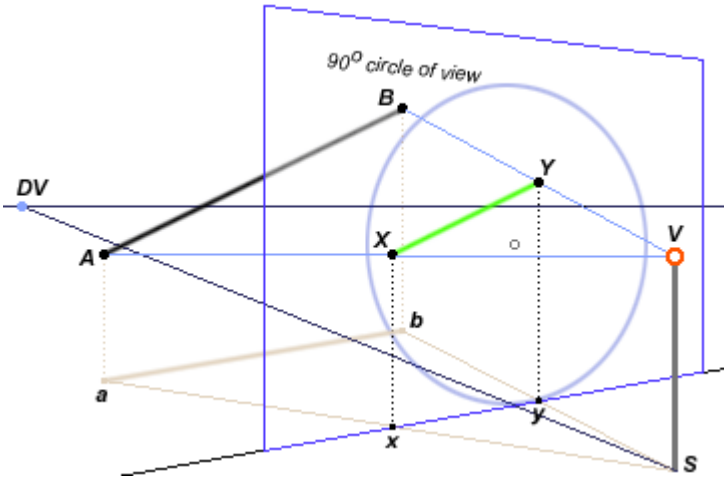


figure 2

2. Any straight line in physical space that is not contained in a visual ray projects a straight line on the image plane. That is, a straight line or edge in physical space always appears as a straight line in the perspective image, no matter which way the line is turned to the direction of view. (The sole exception is when the physical line is

contained in a visual ray, when according to **rule 1** it appears as a point.)

In **figure 2**, the line **AB** in physical space does not intersect the viewpoint **V**, and therefore it is not a visual ray. The visual rays **AV** and **BV** do intersect the viewpoint, and therefore they also intersect the image plane at **X** and **Y**. All the points between **A** and **B** can be projected in the same way, and these create the image line **XY** (green line) on the image plane.

The image of line **AB** in the plan is the line **ab**. Note that when the points **a** and **b** are connected to the station point **S** by lines in the plan, they intersect the ground line at **x** and **y**, the plan image of the points **X** and **Y**. Note than the plan image is constructed by parallel lines perpendicular to the ground plane (as shown by the dotted lines).

3. Any two points on a straight line, projected onto the image plane, define that line on the image plane. Thus, a straight line drawn between the two points **X** and **Y** creates the image line **XY** in **figure 2**.

Note that if the line has infinite length, then any two distant points will serve; but if the line has a fixed length (a *line segment*), then the two **end points** are necessary to define its length. This leads to the most economical method of perspective construction: we project only the end points of a line onto the image plane, then connect them by a straight line. For example, we can define the edges of a cube by **projecting only its significant points** or defining elements — the six corner points — onto the image plane, and then connecting the appropriate corner points with straight lines to construct the edges.

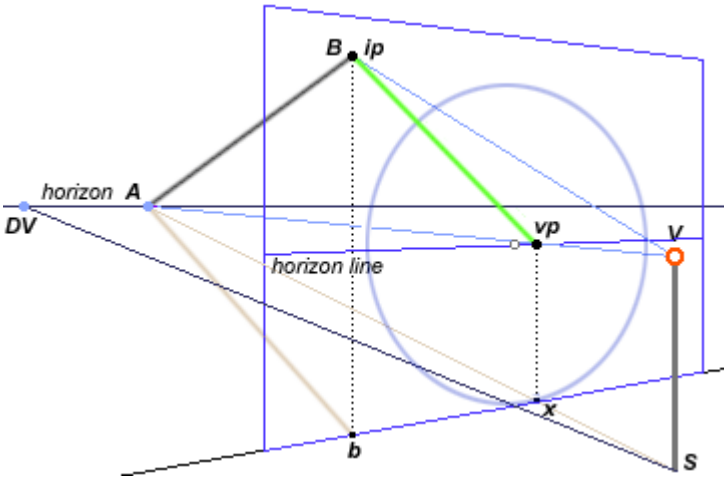


figure 3

4. The image of an extended line must end in two points: its *intersection* with the image plane and its *vanishing point.* If we have drawn a cube in perspective, what would happen if we extended an edge of the cube to make an infinitely long line in physical space? Would that make the image line infinitely long as well? The answer is

no: the image line must end in two points: its intersection with the image plane and its vanishing point.

The only exceptions to this rule are lines parallel to the image plane (they never intersect the image plane, and they do not converge to a vanishing point), and visual rays, for which the intersection and vanishing point are the same (see **rule 1**).

In **figure 3**, the infinitely long line **AB** in physical space intersects the image plane at **B** and recedes toward the virtual point **A**, which is *not* a physical point (and therefore is shown in blue) because vanishing points are only points on the image plane, not points in physical space. The vanishing point is also the intersection of visual ray **AV** with the image plane. The vanishing point projects into the plan as **x**, and **x** lies on the line **AS**, the plan image of the visual ray **AV**.

This rule, which the English perspective theorist Brook Taylor called "the principal foundation of all the practice of perspective," has important consequences that we will explore in the next page.

5. The vanishing point of a line is the intersection of the parallel visual ray with the image plane. If our direction of view is exactly parallel to any line, then we are looking directly at the vanishing point for that line; and given a fixed viewpoint, there is only one vanishing point for any physical line and therefore only one visual ray parallel to that line. (These fundamental principles of recession were first proved geometrically by the Italian mathematician and astronomer Guidobaldo del Monte in 1600.)

In the metric grid perspective example used above, the **elevation and plan** show that the direction of view is parallel to the gridline of points **abc**, so those two lines never actually meet in the real world. Even so, the **visual angle** between the direction of view and any point on the gridline becomes smaller as the point moves farther away from the viewer — the visual angle between point **d** and the principal point **p** is much smaller than the visual angle between **p** and **a**. When the points are very distant from the viewpoint, the visual angle between the points and **p** becomes imperceptibly small and the points merge with the principal point, as we see in the **converging orthogonals** of the metric grid.

In **figure 3** (above), the visual ray **AV** passes through the vanishing point for image line **AB**, as does its image **AS** in the ground plan; therefore **AB**, **AV** and **AS** are parallel.

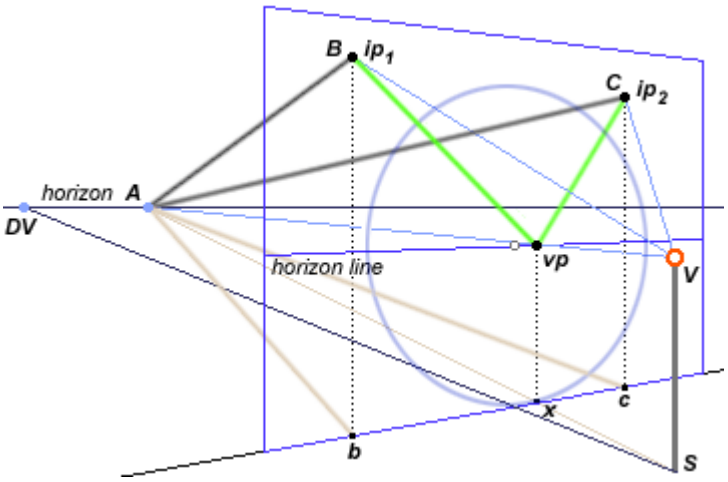


figure 4

6. All parallel lines in physical space converge to the same (single) vanishing point. If any two lines are parallel to a third line, then they are parallel to each other, which generalizes rule 5 to any number of lines. Note again that vanishing points only exist on the image plane, they have no location in physical space.

An important corollary: **any visual ray defines the vanishing point for *all* physical lines parallel to that ray**. This allows us to work backwards, from the perspective image to physical space. Thus, in **figure 4**, if we pick any arbitrary point **C** on the image plane, and draw the image line **Cvp** (green line), then this is the image of the line **AC** in physical space, and we can deduce that lines **AB**, **AC**, **AV**, **AS**, **Ab** and **Ac** are all parallel.

7. Lines parallel to the direction of view appear to converge at the principal point. This is only a specific case of rule 6, but it is very useful. We concluded in the **previous section** that orthogonals define a constant width across the receding transversals in an image. The principal point, and its associated orthogonal lines, define the primary dimension of depth or recession in any perspective image.

This is a fact of everyday vision as well. Straight railroad tracks on level ground (right) are the most striking example. (Here a camera lens, rather than the eye, creates the perspective viewpoint.) Sunlight provides another case — the sun is so far away that its light "rays" are essentially parallel at the earth's surface, and therefore seem to converge when broken into shafts  .

parallel railroad tracks converge toward the horizon

parallel sunbeams converge towards the sun

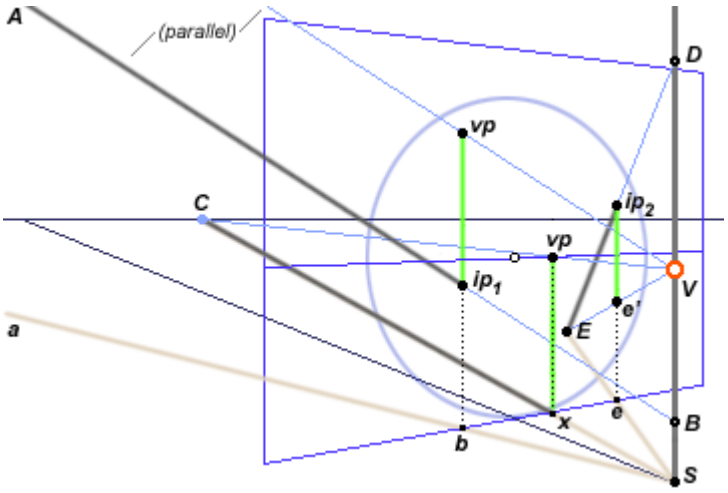


figure 5

8. Lines through the image plane that intersect the extended line VS create image lines perpendicular to the horizon line. The exceptions are visual rays, which pass through the viewpoint **V** and therefore appear as image points on the image plane (perspective **rule 1**).

The key is that line **VS**, the *viewing height* from the ground plane to the viewpoint **V**, is perpendicular to the ground plane at the station point **S**. Extended without limit, this line is equivalent to the **head midline** of a standing viewer. If a line intersects **VS**, its plan line will intersect **S**, and the two lines will lie in the same plane as **VS**, which is perpendicular to the ground plane. Therefore the line image of the plane (perspective **rule 10**) will also be perpendicular to the ground plane, the vanishing line of the ground plane (horizon line) and its intersection with the image plane (ground line).

Three examples in figure 5 demonstrate that the direction of the line or its intersection point with **VS** do not affect the vertical orientation of the image line. Line **AB** intersects

the line **VS** at **B**, and creates the plan line **ab** which intersects the station point **S**; **BS** is perpendicular to the ground plane; the image line is vertical from the intersection $\mathbf{ip_1}$ to the vanishing point **vp**. Line **CS** in the ground plane is its own plan line; it forms a triangle with the visual ray **CV** and its image line is perpendicular from **x** to **vp**. Finally line **DE** intersects the ground plane at **E** and forms the plan line **ES**; its image line extends from $\mathbf{ip_2}$ to the image point **e'**.
In each case, the plane figures (**ABSa**, **VCS** and **DES**) contain some part of the line **VS**, which is perpendicular to the ground plane, so the plane figures and their intersections with the image plane are also perpendicular to the ground plane.

Rule 8 explains why reflections from bodies of water always form a vertical smear directly under the light source (image, right): the reflections all lie along a line from the base of the light source to the station point, and therefore form a vertical line on the image plane.

reflections appear vertical in all directions

As a corollary of this rule: **for an extended line VX through V and perpendicular to a plane at X, lines that intersect VX will form image lines perpendicular to the vanishing line of the plane**. This means reflections on a wetted wall will be horizontal, perpendicular to the vanishing line for the wall, and reflections on a sloping wet street will appear at an angle from vertical perpendicular to the sideways slope of the pavement in the direction it is viewed.

The rules developed for lines can also be applied to planes. By knowing the location and orientation of a plane, we also partially define the location and orientation of any lines it contains. In a perspective construction, points are used to define line edges, and edges define the planes that contain their lines.

9. A plane that contains a visual ray intersects the image plane as a line. This matches **rule 1** for lines. If a plane contains a visual ray then its surface disappears, like a playing card viewed edge on, and all we see is its straight line intersection with the image plane.

A useful corollary: any straight line through a point in perspective space is the intersection with the image plane of the plane that contains the visual ray passing through that point.

10. The perspective image of any two lines, that either are parallel or intersect in physical space, defines the image of the plane containing those lines. This is the matching principle to **rule 3** for lines.

In **figure 4** (above), the two image lines **Bvp** and **Avp** are parallel, because **vp** is a vanishing point; therefore the perspective image of lines **ABC** defines the plane **ABC**. The same would be true if **vp** were a point where the lines intersected in physical space.

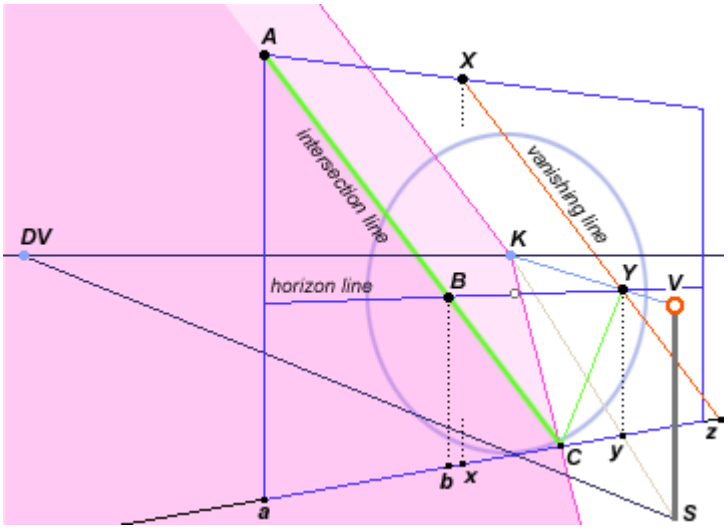


figure 6

11. The image of an extended plane must end in two lines: its *intersection* with the image plane and its *vanishing line.* This is the matching principle to **rule 4** for lines, and similarly the only exceptions are planes parallel to the image plane and planes that contain a visual ray — for these the intersection line and vanishing line are the same.

In **figure 6**, a plane (magenta area) intersects the image plane at **ABC** (green line). All lines in this plane that are not parallel to the image plane recede to its vanishing line **XYz**. I have drawn this plane so that it is tilted to intersect the ground plane also; this intersection is the line **CK** in physical space. The vanishing point for **CK** is **Y**, the point where the image vanishing line intersects the image horizon line; and the line **YC** is the perspective image of the line **CK**. Note as before that **y** lies on the plan line **KS**.

As a important corollary, **the intersection line and vanishing line of a plane are always parallel** on the image plane. Thus, in the figure above, the lines **ABC** and **XYz** are parallel. In **figure 4** (above), the parallel lines **AB** and **AC** define the image of the plane **ABC** as the image lines **Bvp** and **Cvp**; the intersection of this plane with the image plane is the straight line passing through **B** and **C** (**rule 3**); and the vanishing line for the plane is the line that passes through **vp** parallel to **BC** (**rule 9**). Similarly, the ground plane defines the ground line (its intersection with the image plane) and the horizon line (its vanishing line), and these

two lines are always parallel to each other in a perspective image.

12. The vanishing line for any plane is the parallel plane containing a visual ray, or the line connecting the vanishing points for any two lines parallel to the plane. A plane that contains a visual ray intersects the viewpoint **V**, which means the plane is seen "edge on" as a line on the image plane (**rule 9**). This matches **rule 5** for lines.

13. All parallel planes converge to the same (single) vanishing line. This matches **rule 6** for lines. In the standard perspective setup, the horizon line is the vanishing line for the ground plane and all planes parallel to it, such as floors, ceilings, water surfaces and **cloud layers**.

14. The vanishing line of a plane contains the vanishing points for all lines in the plane and all lines parallel to the plane. This is an extremely powerful rule, because it makes the vanishing line of an important plane the "attractor" for all lines parallel to it. Thus, the horizon line, which is the vanishing line for the ground plane, contains the vanishing points for all lines constructed level to the ground — that is, the horizontal edges found in nearly all buildings and their diagonals — even when the building walls are not parallel to the image plane.

15. The vanishing line for any plane parallel to the direction of view intersects the principal point. This matches **rule 7** for lines.

All planes parallel to the ground plane any distance above or below it must converge to the vanishing line for the ground plane, which is the horizon line (**rule 13**). In the vertical dimension, all vertical planes parallel to the direction of view on either side of it must converge to the vanishing line for the median plane, which is the median line. Finally, any plane tilted at an angle to the ground plane but parallel to the direction of view will create a similarly tilted vanishing line, which again will pass through the principal point on the image plane.

16. Any plane that contains both a line and the plan image of the line is perpendicular to the ground plane, and defines a perpendicular intersection line and vanishing line on the image plane. This matches **rule 8** for lines. Reciprocally, if the vanishing line of a plane is not perpendicular to the horizon line, then none of the lines contained in that plane will be perpendicular to the ground plane. Rule 16 is useful for the construction of inclined lines, and for defining the **light plane** of shadows.

•

17. Finally, although they are not rules per se, it is important to memorize the *criteria* for the **four different types** of perspective drawings (discussed in later pages):

• in **one point perspective** (or *central perspective*) there is only *one* vanishing point, which is identical to the principal point located on the horizon line *and* the median line. Central perspective or 1PP requires *all six faces of all square solids* to be either parallel

or perpendicular to the image plane and direction of view.

• in **two point perspective** (2PP) there are *two* vanishing points, neither of which is the principal point, that define a single vanishing line, usually (but not necessarily) the horizon line. 2PP requires that *two faces of all square solids* must be perpendicular (not parallel) to the image plane and parallel (not perpendicular) to the direction of view.

• in **three point perspective** (3PP) there are *three* vanishing points, none of them the principal point, that define three vanishing lines, none or any one of which may be coincident with the median line, the horizon line or any other line on the image plane. 3PP requires that *no face of any square solid* is perpendicular *or* parallel to the image plane or to the direction of view.

The most common type of drawing requries **mixed perspective**, in which some objects appear in one type of perspective and some objects in another. In this case each object or group of similarly arranged objects must be treated as a separate perspective problem; they are combined as a single image because they share a common circle of view.

image plane, viewpoint & direction of view

Now it's appropriate to come back to the *specific viewpoint and direction of view* that are the core of any perspective image, and consider how these relate to the image plane and to the features of the scene or landscape.

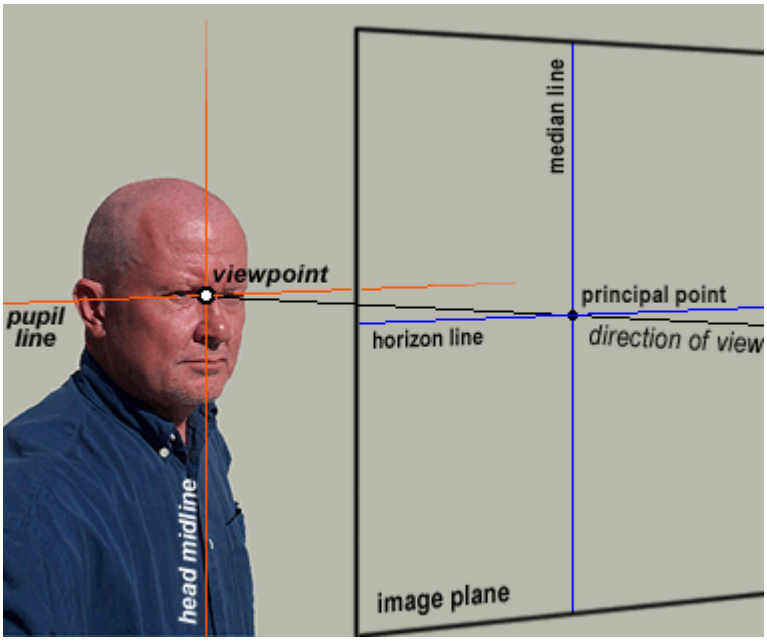
Image Plane Orientation. First, let's revisit the point **mentioned earlier** that the image plane is not necessarily perpendicular to the ground plane (for example, in a **3PP image**), but is always considered to be a flat surface, perpendicular to and centered on the direction of view.

In terms of projective geometry, we can just as easily and accurately record the optical facts of the world on an image plane that is not perpendicular to the direction of view (or to anything else). And we can use a curved surface just as effectively as a flat one, as was commonly done with the ceiling frescos created for the domes and barrel vaults of European Baroque churches and palaces and, more recently, is used as the image plane in **curvilinear perspective**.

In other words, the flatness and perpendicular orientation of the image plane are essentially *conventional.* The convention arises from the way we typically (conventionally) make and show art. We assume the image plane is perpendicular to the ground plane because we expect the finished image will be hung for viewing on a vertical gallery or museum wall. We assume the image plane is flat because stretched canvas and drawing paper are flat. We might think of these as **display**

conventions contained in the perspective geometry.

We display images the way we conventially do because that makes them easy to view for people who adopt a convenient posture and position: that is, standing in front of the image surface. We might call these the **viewing conventions** contained in the idea of the image plane, because "the right way to hang the painting" depends on our assumptions about "the right way to look at the painting." We can specify these in terms of the **the orientation of the viewer's head** in relation to the image plane, as shown below.



viewing conventions toward the image plane

The human sense of visual orientation ("up" and "down") depends on the head, not the body. The head orientation is defined in three dimensions: a **pupil line** drawn through the pupils of both eyes, a **direction of view** perpendicular to the pupil line, and a **head midline** perpendicular to both the pupil line and the direction of view and usually parallel to the erect spine. (This is the posture for binocular vision. If the image plane represents a **"peep show" view** from one eye, then the direction of view is the optical axis of that eye.)

By convention the standard rectangular format of the painting or photograph are aligned so that (1) the direction of view is roughly through the center of the format and perpendicular to its surface; (2) the pupil line is parallel to the top and bottom edges of the format or the horizon line within the image; and (3) the head midline is perpendicular to the floor and parallel to the image plane. All these conditions are met if the viewer is standing squarely in front of the painting with head erect, and the painting is hung at eye height and level to the floor — display and viewing conventions that are summarized as *eye level, facing, and comfortably far away.* Note that despite these ideal viewing conventions, paintings are routinely displayed at heights or in locations that

make that impractical.

Finally, there is a third kind of structure folded into the image plane, which is the **projection assumption** that defines the artist's view of things. The convention here is simply that the "artist's view" (or camera view) at the time the image was created explains the appearance of the world in the image. The projection assumption governs the interchangeable use of "we" or "the artist" in art critical narratives ("in this painting, we are looking down into Niagra Falls" or "in this painting, the artist is/was looking down into Niagra Falls"). We expect, for example, that if the horizon line is parallel to the top and bottom of the image plane, then the artist's pupil line was parallel to the horizon, even though the artist may have been **leaning or crouching** while working. We experience the book reproductions of Michaelangelo's Sistine Chapel paintings as vertical and flat, even when they are located on curved walls or over the viewer's head — and in execution required the painter to lean backward or lie on his back.

The crux is that the display convention, viewing convention and projection assumption fuse the artist's view, the painting image and viewer's stance within **a common, conceptual visual framework**. The "right view" of a visual image and our interpretation of it is anchored in spatial orientation: we cannot recognize faces, or correctly judge the relationships among objects, when they are "turned the wrong way" (images, right). The "right orientation" is embedded in our head axes, and these must align with the image contents and its format borders to produce an acceptable image display.

images are uninterpretable in the "wrong" orientation

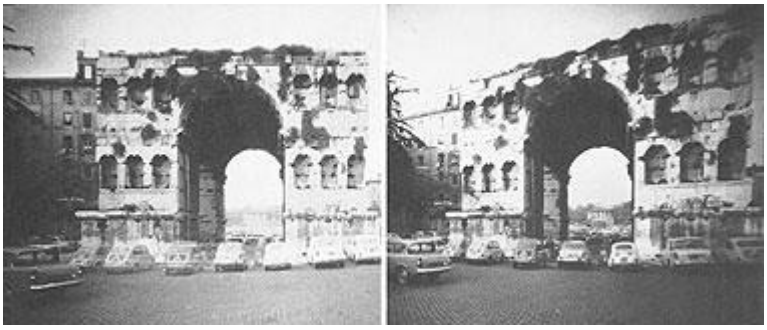
These conventions are so powerful, and so basic to visual experience, that we enforce them even for paintings by Jackson Pollock or Bridget Riley, where they mean nothing to the visual texture of the work; or in the "conceptual" wall drawings of Sol Lewitt, where echoes of the display or viewing conventions belie the claim that the drawing instructions only respond to the limitations of the drawing site.

Paintings gain visual drama or impact when there is an obvious difference between the projection assumption and viewing convention — for example, when the artist's direction of view was downward or upward in relation to the ground plane. These *elevation differences* are acceptable because they still imply a shared upright stance ("balance") in both the artist and viewer. In contrast, we are usually intolerant of *image tilt* in which the artist's pupil line or horizontal camera frame are not parallel to

the ground plane (as if the artist's head was tilted toward one shoulder, or the camera was askew when the picture was taken).

Object Orientation to the Direction of View. Dramatic changes in the image occur by changing the angle between the direction of view (or camera sightline) and the surfaces of a primary form. That is, image perspective changes with the direction of view, even when the *viewpoint* stays the same.

Two photographs (below) show a Roman arch in two separate views from *exactly the same viewpoint*, made with a *pinhole camera* — a camera that focuses light through a tiny hole instead of a lens. This exactly reproduces on film the perspective optics from a single center of projection.



effect of changing only the direction of view

the viewpoint is fixed and the direction of view remains parallel to the ground plane; from M.H. Pirenne, Optics, Photography and Painting (1970)

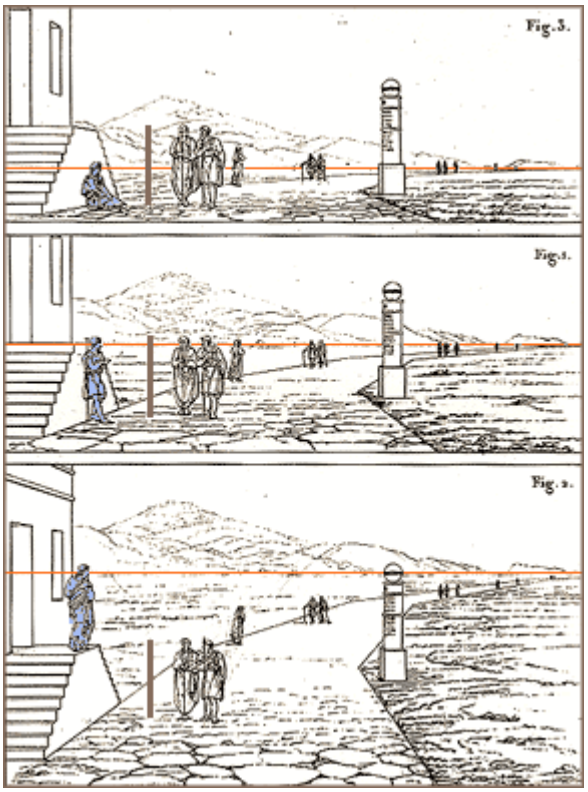
The only difference between the two photographs is in the direction of view, and therefore in the orientation of the image plane in relation to the frontal planes of the arch — the pinhole was kept in exactly the same location. The image at left shows a direction of view perpendicular to the face of the arch; the horizontals appear parallel to each other and to the horizon line. When the direction of view is shifted 25° to the left, the horizontals now appear to converge, and only those at the horizon are parallel to the horizon. That is, simply by changing the direction of view, we've transformed a central perspective view into a **two point perspective** view.

If the camera were instead rotated up or down, so that the direction of view was no longer parallel to the ground plane, the image would morph into a two point perspective image with the vanishing points on the median line; if it were rotated both horizontally and vertically, the image would shift into the even more complicated **three point perspective** view. Linear perspective is not just about a viewpoint or about a direction of view: it is defined by **a specific viewpoint *and* a specific direction of view**.

The crux is that the design of a perspective image does not consist simply in the choice of viewpoint onto a primary form such as a building, but the direction of view (location of the principal point) as well. The guidelines for adjusting or choosing the viewpoint

and direction of view are somewhat subjective, and depend heavily on the intended impact of the image, but some suggestions are provided in the section on drawing from **blueprints or plans**.

Horizon Line and Viewpoint. An important and useful fact of perspective is that all **objects at the same height as the viewpoint are intersected by the true horizon line**. This rule holds regardless of how far above level ground the viewpoint may be, and even when the direction of view is not parallel to the ground plane.



horizon line and viewpoint in landscape perspective

from J.T. Thibault, "Application of Linear Perspective in the Graphic Arts" (c.1860)

The French artist J.T. Thibault created a compact illustration (above). The top, middle and bottom views correspond to the sitting, standing or elevated standing viewpoint of the blue figure at left, who represents the viewing height of the artist in each image. (Blue man's standing height is indicated by the brown line fixed in front of the stairs.)

All the perspective relationships between other figures or objects in the image and the *true* horizon line (the orange line, not the apparent horizon line defined by the hills) change with the **viewing height**. When the viewer is sitting, the horizon line passes through his head and therefore appears to cross the waist of standing figures around him. When he is standing on level ground, the horizon line passes through his head and

through the heads of all standing figures as tall as he is — no matter how near or far they are from the viewer. When the viewpoint is from a raised platform, all figures on the ground below appear below the horizon line. (Note also the changing location of the horizon line against the roadside pillar.)

This fact arises from **rule 12**: all parallel planes converge to the same vanishing line. In this case, the first plane is the ground plane, whose vanishing line is the horizon. The viewing height, extended in all directions, creates a second plane parallel to the ground plane, like the surface of a large lake up to the height of the viewpoint. This surface will also converge to the horizon line. Regardless of the direction of view, all objects lower than this plane will be "under water" and therefore below the horizon line. All objects above it will be "above water" and above the horizon line.

In the **photo of train tracks** above, the horizon line intersects the bottom edge of the red passenger car, just above the wheels. This is somewhat lower than the standing height of a man, so we can infer that the photographer was crouching or sitting (or the camera was on a low tripod) when the picture was taken.

Many visual illusions of size depend on the position of the object relative to the visible or presumed horizon line, even when other perspective cues are removed. The famous and delightful **Ames room** (right), contrived by Aldebert Ames Jr. in the 1940's, is a large trapezoidal enclosure that appears perfectly square and level when viewed through a peephole near one corner. Figures appear to grow or shrink in opposite corners of the room because the "short" corner on the left is substantially lower and farther away than the "tall" corner on the right, reducing both the apparent size of the figure and her relative position to the "horizon line" defined by the windows and floor.

an ames room

perspective distortions

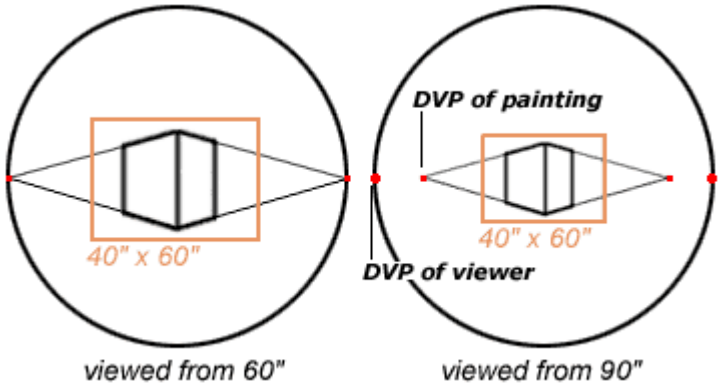
The standard demonstration of linear perspective — **drawing on a sheet of glass** the view from a fixed location as seen through one eye — shows that the geometry of linear perspective really works: what you see is what you get!

Viewing Distortions. However, a perfect perspective drawing or optically flat photograph reproduces three dimensional space on the viewer's retina only when we view it with a single eye, located at the center of projection and looking along the correct

direction of view implied by the perspective geometry.

And there's the catch. Even if the perspective drawing accurately represents a specific viewpoint, **we typically don't look at the perspective drawing from the "correct" center of projection**. The drawing may be done at a scale that conveniently fits the space available within the picture format, but creates a center of projection that is too close to or too far from the picture surface; the painting or fresco may be positioned too far above the floor; or the painting may be viewed from different distances or angles as it is hung in a room or gallery; and, of course, we always look at it with two eyes.

What happens if we look at a perspective drawing from a different location? The following diagram illustrates the crux of the problem.



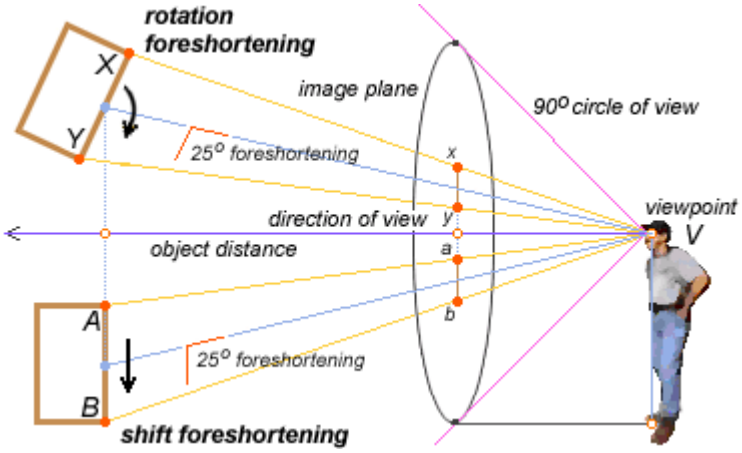
perspective geometry and viewing distortion

We start by viewing from a distance of 5 feet (60") a very large (40" x 60") painting of a rectangular office building, conveniently drawn so that its vanishing lines are at 45° to our direction of view. This places the diagonal vanishing points of the drawing exactly at the diagonal vanishing points of our 90° circle of view, and the drawing perfectly recreates the illusion of three dimensional space.

But this is a large painting, so we decide to step back a few feet (to 90") and look at it again. Now the **drawing vanishing points no longer correspond to our visual vanishing points** as defined by our 90° circle of view. As a result, the edges and angles of the building seem to place the vanishing points too close together, and the building appears exaggerated in perspective proportions — the front angle of the building seems more like 70° than 90°.

Of course, linear perspective *can* produce compelling illusions, but not easily — the image must be in exact perspective, the edges of the image must be hidden, and the image must be viewed with a single eye from the center of projection, in what is called a **"peep show" or peephole** arrangement. Binocular photography and a special binocular apparatus that presents each image to a separate eye can create very vivid depth illusions, but even slight changes in the point of view will destroy the effect.

Foreshortening Distortions. There is a second problem caused by *oblique* (sideways, upwards or downwards) angles of projection onto the image plane. This is related to the perspective fact of **foreshortening**, but a distinction between two kinds of foreshortening is necessary to understand what is going on.



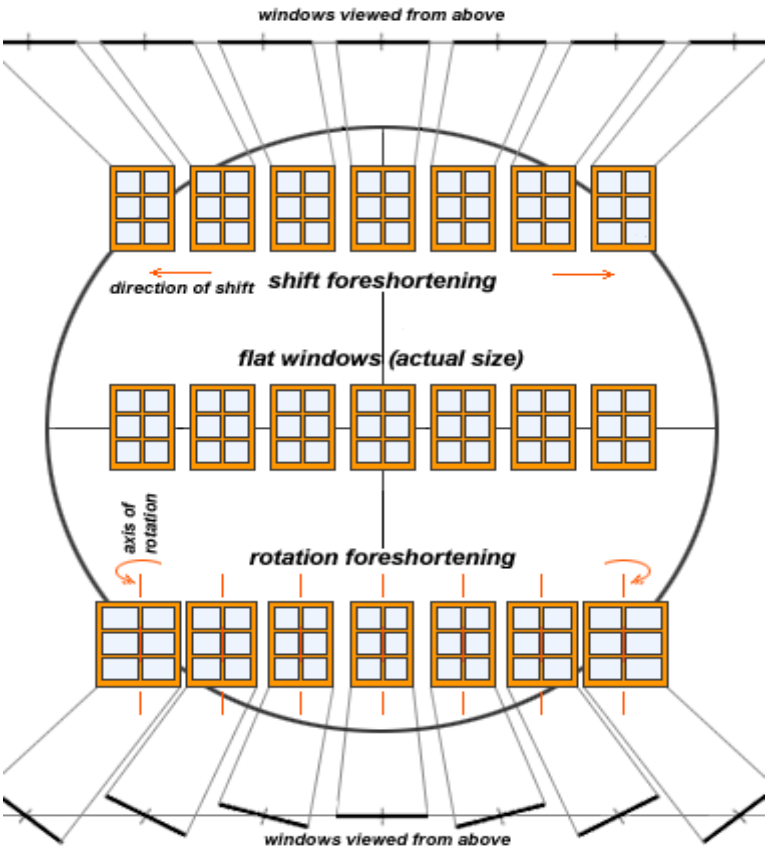
foreshortening and the triangular proportions

(top) ***rotation foreshortening*** *causes the object surface* ***XY*** *to become oblique to the image plane; (bottom)* ***shift foreshortening*** *causes the object surface* ***AB*** *to remain parallel to the image plane; both examples are an equal distance from the direction of view and appear identically foreshortened (by 25°) at the viewpoint*

In **shift foreshortening**, a two dimensional surface is shifted away from the direction of view (the principal point) but remains parallel to the image plane; the actual surface *always* appears foreshortened because it is at an oblique angle to the viewpoint.

In **rotation foreshortening**, the surface is rotated so that it is no longer parallel to the image plane; the actual surface may or may not appear foreshortened, depending on whether it is at an oblique or perpendicular angle to the viewpoint.

These different types of foreshortening have different perspective effects.



perspective image of flat forms

shift foreshortening has no effect on the perspective image of a two dimensional surface parallel to the image plane

The figure above shows the correct perspective projection of an identical row of windows (center). In the top row, the windows are kept parallel to the image plane but become increasingly oblique to the direction of view (*shift foreshortening*); in the bottom row, the windows are rotated in place to remain perpendicular to the viewpoint, which puts them at an oblique angle to the image plane (*rotation foreshortening*).

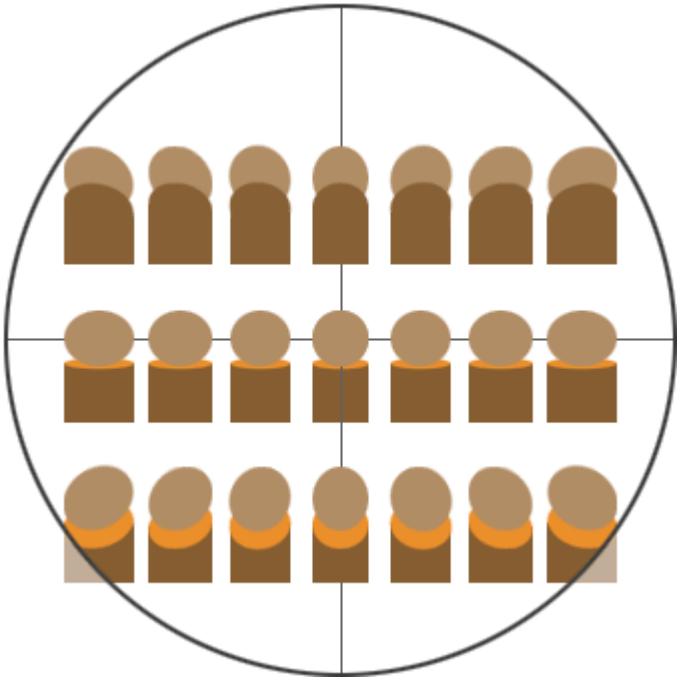
Surprisingly, even though it produces a foreshortened view of the actual two dimensional object, **shift foreshortening has no effect on a perspective image**. A window shifted 45° to one side is exactly the same size *on the image plane* as a window centered on the direction of view. This occurs because, at the location of the perspective image of the window, **the image plane is also foreshortened** by the same oblique angle of view, and this "secondary" foreshortening matches the foreshortening seen in the surface.

In contrast, **rotation foreshortening *always alters* the perspective image**. The image becomes "distorted" in the direction *perpendicular to the axis of rotation*, regardless of whether the object is central or peripheral in the circle of view and even when the rotation eliminates any foreshortening in the actual object! Remember: rotation

foreshortening is still a completely correct perspective view of the rotated object, when viewed from the center of projection; it just *looks wrong* when we view the image from farther away.

The distorting effects of rotation are caused by the recession that creates vanishing points. As explained in the discussion of the **orthogonals**, an equal physical displacement of the object from the direction of view produces a smaller and smaller perspective displacement from principal point as the object is farther from the viewpoint. Rotation pushes one half of the surface farther away from the image plane, the other half closer to the image plane, which makes the recession shift unequal on the two sides.

The objectionable perspective distortions occur in the **oblique view** of a three dimensional object that has only been shift foreshortened on the image plane. In these cases, what "rotates" is not the plane surface of a two dimensional object but our view of a plane cross section through its three dimensional form.



perspective image of rounded forms- ***in a 90° circle of view; from M.H. Pirenne, Optics, Painting and Photography (1970)***

The diagram (above) shows a perfectly correct perspective image of a regular row of cylindrical columns with flat top surfaces supporting regular spheres. If you could use one eye to examine this figure from the true center of projection (directly in front of the central sphere, at a distance equal to the radius of the circle of view, roughly 5cm or 2" from your computer screen), you would discover that all the forms really are in perfect perspective.

But because we view the drawing from much farther away (and with both eyes), the

spheres and columns appear grossly distorted. The columns give the illusion of being viewed head on, when in fact those near the circle of view are seen from one side, so that the front and back of the forms define their cross section. These are not the same distance from the image plane, so they display unequal recession toward the principal point, which elongates the form.

These distortions have distinctive features worth memorizing:

• **Radial thickening**. The spheres and columns displaced from the direction of view appear thicker than those at the center of view; this thickening is along a line from the object to the principal point.

• **Displacement exaggeration**. The amount of thickening or distortion depends on the displacement of the object from the principal point (the visual angle between the object and the direction of view); the distortion becomes more extreme toward the 90° circle of view.

• **Diagonal exaggeration**. The distortions appear most extreme in the diagonal directions, because these combine the effects of the height and width displacements.

• **Radial tilting**. Horizontal surfaces, such as the orange flat tops of the columns, appear tilted along the radial line of thickening rather than downward or upward in relation to the viewer.

• **Peripheral crowding**. Equal intervals between three dimensional objects (such as the spaces between columns) close together as displacement increases; eventually the spaces between the columns disappear and the columns seem to overlap.

Cures for Perspective Distortions. If we keep in mind that these rotation "distortions" are in fact accurate perspective images when viewed from the center of projection, then it is clear that the reason they appear as distortions is because the image is viewed from somewhere else. Managing the distortions is therefore a concession to the uncertain **viewing geometry** that governs image display.

The traditional diagnosis for perspective distortions is that **the width of the drawing is too large in relation to the 90° circle of view**. This is equivalently expressed as "the vanishing points are too close together", or "the distance points are too close to the principal point", or "the viewing distance is too close to the image plane." In effect, the **viewing distortions** are more obtrusive when a painting encompasses a large circle of view.

If the image vanishing points were much farther apart (that is, if the image were enclosed by a smaller circle of view), then the drawing would represent objects as they appear from a viewpoint **much farther away**, and changes in the the viewing geometry

would cause smaller proportional changes in the image circle of view.

In effect, the viewing distance to the image is a smaller proportion of the apparent distance to the objects in the image, so the drawing can be acceptably viewed from a wider range of viewing distances. In addition, the rotation distortions and crowding of serial forms that become exaggerated toward the 90° circle of view are cropped out of the image entirely.

The practical limit for an acceptable visual cone has historically been a **60° circle of view** — a suggestion first made by Piero della Francesca in c.1470 and repeated often since then. In fact, depending on the geometry of the principal form and the location of the vanishing points, a 40° circle of view *or less* is much more typical.

Leonardo da Vinci devoted many pages in his notebooks (c.1490) to the analysis of perspective distortions, and he especially disliked the exaggerated apparent size of the perspective grid as it reached the ground line of the image plane (for example, as in the ground squares of **this image**). He recommended painting an object as it appears from a distance of **3 to 10 times its actual dimensions** (e.g., a standing figure 1.75 meters tall should be viewed from 5 to 18 meters). This is equivalent to placing the figure within a **19° to 6°** circle of view. In fact, modern vision research has found that most people say an object "fills their field of view" once it occupies approximately a **20° circle of view**; the classical French rule has been to contain the image within a 30° circle of view. I use a **25° circle of view** as a rule of thumb when designing or analyzing an image, which corresponds to a **viewing distance** to a finished painting of about 2.5 times its height, width or diagonal. (These issues are explored further in the section on **display geometry & image impact**.)

So the restricted circle of view "cure" for perspective distortions was well known to artists from the beginning of perspective practice (even if the necessary "dosage" was ambiguous). But these artists also realized that **some distortions are more intrusive than others** to a casual viewer. Apparent distortions in rectangular forms are more objectionable than distortions in curved forms; distortions in the horizontal direction are more obtrusive than distortions in the vertical direction (in part because the format is usually wider than it is high); distortions in unfamiliar objects are more acceptable than distortions in familiar objects; distortions in the apparent location of vanishing points are more acceptable than distortions in the outline of forms; distortions in a mixed perspective drawing are more objectionable than those in a rigorous perspective drawing; and so on.

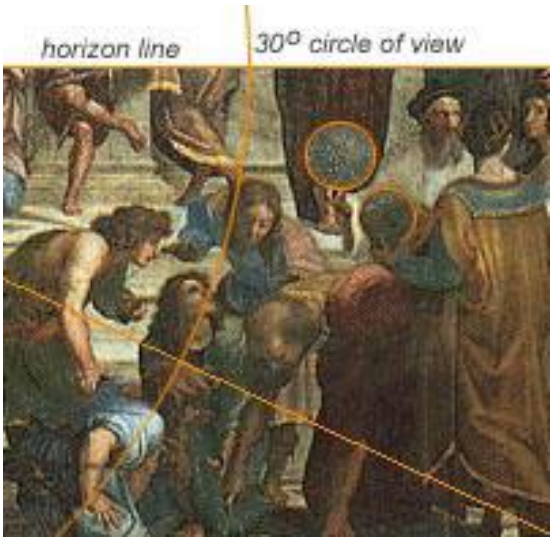
As a result, if artists were working with a large fresco or canvas format, or wanted a panoramic effect, they adopted a radical practice guided by the context of the painting: they would simply **"correct" or disguise perspective distortions wherever they appeared objectionable**. This was almost always done for figures, rounded forms, the spacing between columns of a facade, and so on. Often several kinds of "corrections"

were used at the same time.

raphael's *school of athens* (1511) from an elevated viewpoint

A fine example is Raphael's large fresco *The School of Athens* which fills an almost 30 foot wide section of Vatican wall. This huge format clearly imposes a panoramic context on the image design, which Raphael utilized in novel ways. He framed the perspective construction within a relatively restricted 40° circle of view, which crops extreme distortions from the image — although as a result the correct perspective viewing point is **not even in the room**.

The perspective distortions are disguised through numerous clever omissions from the picture space. The vanishing point of the enormous central passageway is hidden by the two approaching figures. Most of the picture space is filled by walls parallel to the picture plane. The pair of square columns on each side are cropped at the top and hidden at the bottom by standing figures, eliminating the repeated sideways intervals or diagonal corners that would accent perspective distortions. The semicircular front arch of the barrel vault is cropped at the top, because it would otherwise appear to be elongated vertically. The floor tiles on either side of the foreground are hidden by groups of figures. The foreground stairs help to separate the figures vertically and interrupt the perspective continuity of the tile floor.



***Athens* (1511)**

Most important, **all figures are drawn as if centered on the direction of view** — that is, with no perspective distortion. This is easiest to see in the two astronomers shown holding celestial globes (at right). Both figures are located at the righthand edge of the fresco, beyond the 30° circle of view. Rather than draw the spheres with the **correct but elliptical** perspective projections, Raphael simply drew them perfectly round.

Thus, the architecture enclosing the figures is cropped and oriented as a carefully edited and arranged perspective speace, while each of the figures is drawn in its own, "head on" perspective space. Yet this hodgepodge of perspectives appears coherent and harmonious.

The last piece of the puzzle is that the fresco is normally viewed from a vantage too close to the image plane and several feet below the center of projection, which causes a distinct upward convergence in the image verticals (image, below). Yet in context the convergence lends a soaring grandeur to the image, and by means of this esthetic impact the overall perspective space appears harmonious and convincing.

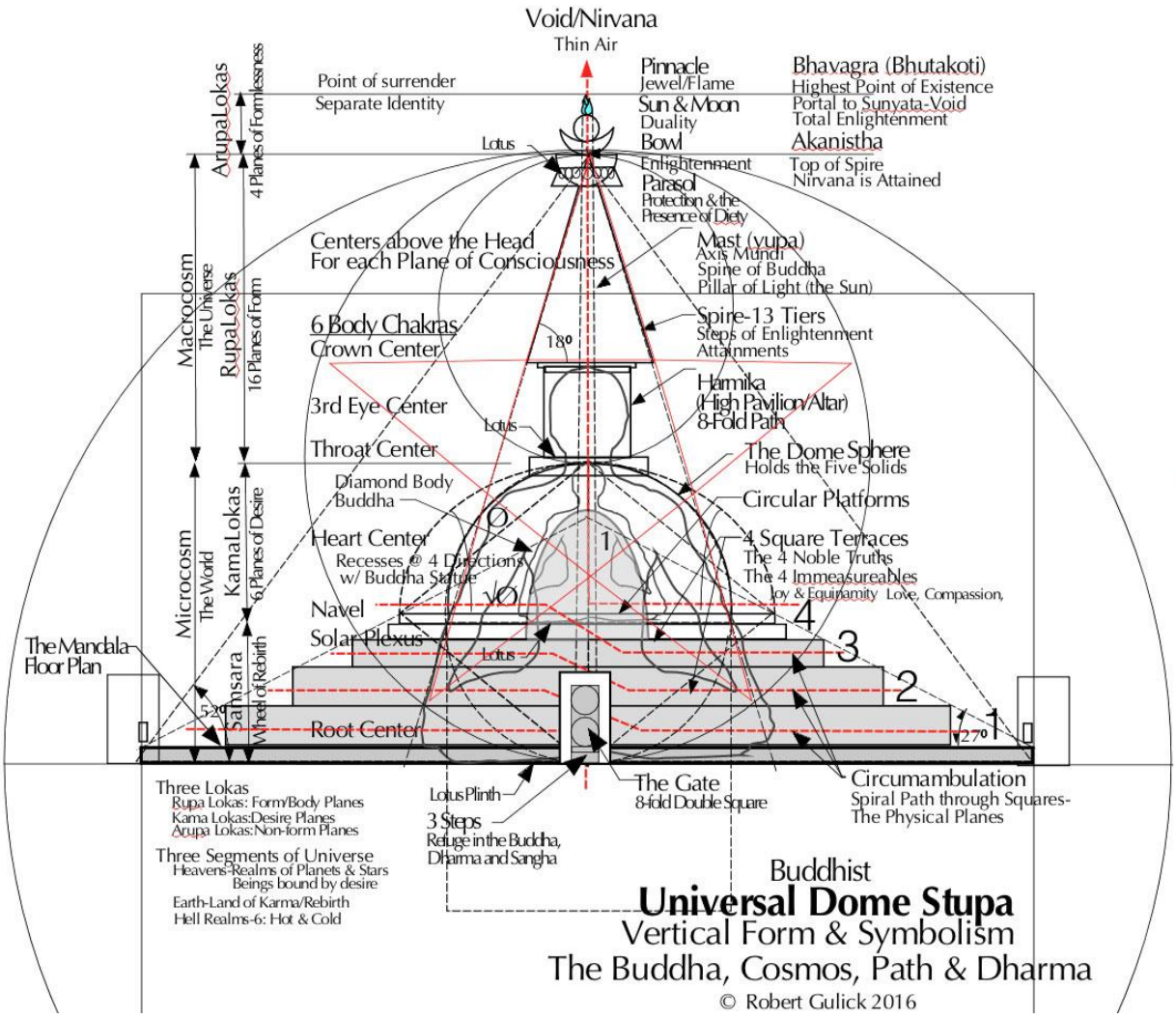
relative scale of figures high and low in Michelangelo's "Last Judgment"

STUPA: VERTICAL FORM & SYMBOLISM

The form of the stupa follows from the sequence of the five elements. These are qualities of substance of which reality is made in various combinations. The ascend from the base/bottom up as earth, water, air fire and space. The last being all pervasive and holding the other four together. They are in essence states of energy or consciousness as well as states of density. Thus earth is solid, impervious, water is fluid, transparent, air is gaseous or vapor, fire is plasma, atoms free electrons, space is empty-still, formless. The space in each of the elements also increases as they proceed from earth to fire as does their molecular structure.

As stated before, each level along the path marks stations of enlightenment and are associated with specific deities, practices, visualizations and mantras to stimulate the development of wisdom and compassion and other Bodhisattva qualities and eliminate the ignorance and attachments that are the limitations to achieving enlightenment. The stupa embodies the whole Dharma and, as well, is a part of the Dharma as a holon is both whole and part of the hologram.

The vertical form of the stupa rises up out of the mandala as if extruded. The stupa is essentially a three-dimensional form of the mandala. (See Stupa Form and Symbology). Each level of the stupa represents an ascending staget of the Buddhist path to enlightenment and thus also the Path of Return through the levels of multi-dimensional reality. The Buddhist cosmology defines 31 planes of consciousness in the ascending structure. (See Mandala #11 & Stupa #12 models of MDR.)



VERTICAL FORM & SYMBOLISM

At the bottom are the first three steps, which give access to the plinth upon which the whole structure sits. These represent the three refuges of Buddha (the Teacher), Dharma (the Teachings) and Sangha (the Spiritual Community). The plinth or platform is surrounded by a wall, which defines the sacred precinct. The 3 steps are often framed by four gates for each of the four directions which serve to both protect the access to the stupa and prepare the aspirant who applies for entry. The mandala plan is drawn out on this plinth.

The lowest level of the Chorten type stupa is the Lion Throne base which symbolizes the Buddha's mastery over the entire universe. The treasure vase placed within it often contains relics or spiritual objects which symbolize the eight noble riches. At the base of each of the major levels there is a band of lotus petals representing unlimited love, compassion, joy and equanimity; they are both the foundation and the expression of the universe, embodying the entire teaching.

Terraces

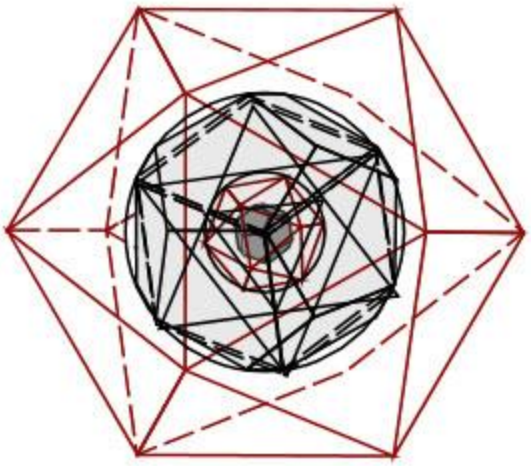
MODEL
Boudhanath Stupa, Kathmandu, Nepal

BOROBUDUR to RIGHT

The base of the domed stupa has a number of terraces for circumambulating the dome, These vary in number, usually three or four, symbolize the four "Immeasureables": love, joy, compassion and equinimity and the Four Noble truths regarding the causes and abatement of suffering. They also correspond the lower body or legs of the Buddha. Altogether they take the form of a shallow stepped pyramid. These are square in plan and represent the lessons of physical lifetimes to be experienced and mastered on the path to enlightenment. The terraces are circumambulated in a spiral path up to the base of the Dome. . The walls of the terraces along this part of the path may be decorated panels depicting various deities, teachings and events of the Buddha's life. The wall of each terrace is capped by a frieze representing the four outer rings of the mandala. They begin at the lowest with the rainbow, then the fire of purification that burns off imperfection and distortion, then the band of diamond vajras of the purified mind and finally the 64 lotus petals of protection.

The Steps and Balustrades that connect each level take the form of the cosmic serpent which both brings the Buddhas to earth and the ascending initiates to up enlightenment. The stairways symbolize both upward and downward flow of prana, the vital breaths or currents that flow in the ida and pingula that spiral around the sushsumna, central energy column of the body.

Dome/Bumpa



THE LESSER MAZE
Nested Sacred Platonic Solids

Sitting on the terraces is the "Bumpa" or dome which represents the Buddha's torso or upper body. It typically was solid with surrounding niches or alcoves for icons or statutes. The shape of the dome corresponds to the cosmic egg, source of the universe, and is also called a garhba, meaning "womb" found in Indian temples. A hollowed Dome could serve as an inner space for meditation but also be a resonance chamber to amplify the energies produced and focalized by the dome shape. As a perfect hemisphere with a virtual full sphere that includes the terraces below it is then the whole universe in which the sacred solids: tetrahedron, cube, octahedron, icosahedron and dodecahedron appear as vibrational structures. These are analogs geometrically of the sphere which can be nested within each other…seed forms of the universe. The dome is designed with an outer, flattened dome having an radius that is in golden Ø ration to the inner dome.Inside the dome there would be a central mast called the "yupa", which rises from either the base of the terraces or the base of the dome and rises to the top of the pinnacle. It is also called the sok shing, the world or life-tree or the Tree of Enlightenment, made from a living tree. This represents the axis mundi of the earth, the vertical Path to the Sun, which sits at the center of the universe. It also represents Buddha's spinal column or sushumna and is marked at the five chakra points. Alternately there could be a standing quartz crystal to amplify and radiate the energies of the dome.

Harmika

The "Harmika" or high altar, representing the Buddha's head, sits on top of the dome and may have the Buddha's all seeing eyes on its 4 faces. The harmika represents the ancient fenced area or separated sacred space having a square masonry fire altar at the base of a tree, representing the world and the whole body of teaching. Its form is a cube, which having 8 vertices symbolizes 8-fold path of right realization, speech, action, livelihood, effort mindfulness and meditation. Harmika repeats in a higher/smaller format the symbolism of the square steps and dome below it. The Harmika is accessed by a circular opening at the top of the Dome called the "Sun Door" which admits light into the universe-dome. The sun which sits eternally at the top of the stupa is the goal of the vertical path the portal to the center of the universe.

Spire

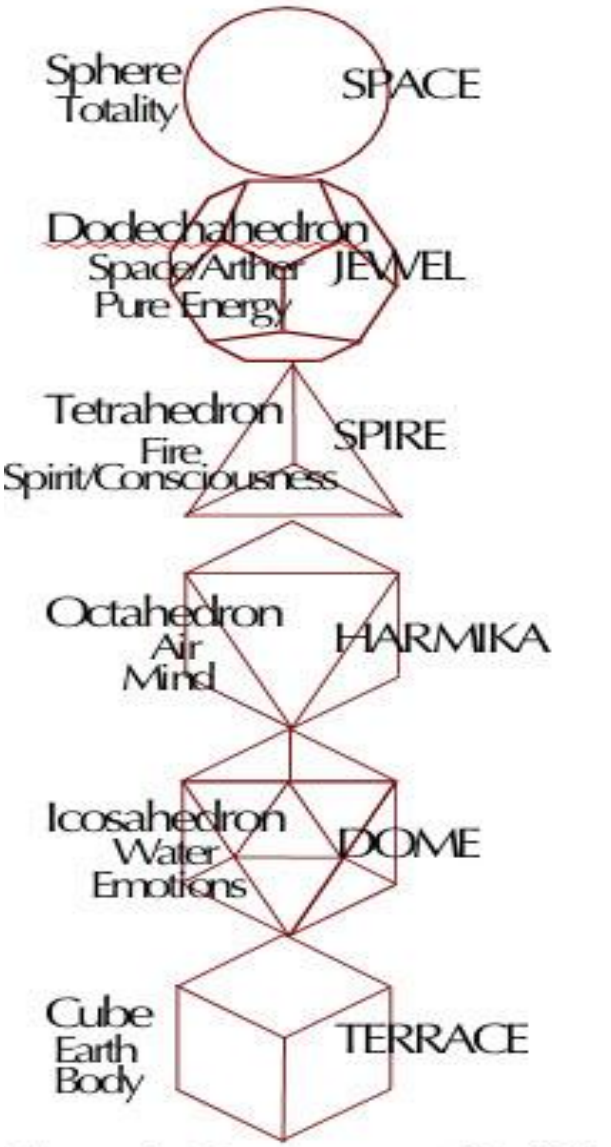
Above the harmika is a pyramidal or conical structure called the Spire that has thirteen ascending rings or disks representing the thirteen steps of enlightenment (or accomplishments of the Bodhisattvas). They can be thought of as the layered dimensions of heavens corresponding to ascending stages of consciousness. This form, like pyramids all over the world, channels subtle etheric energies into the earth.

Pinnacle

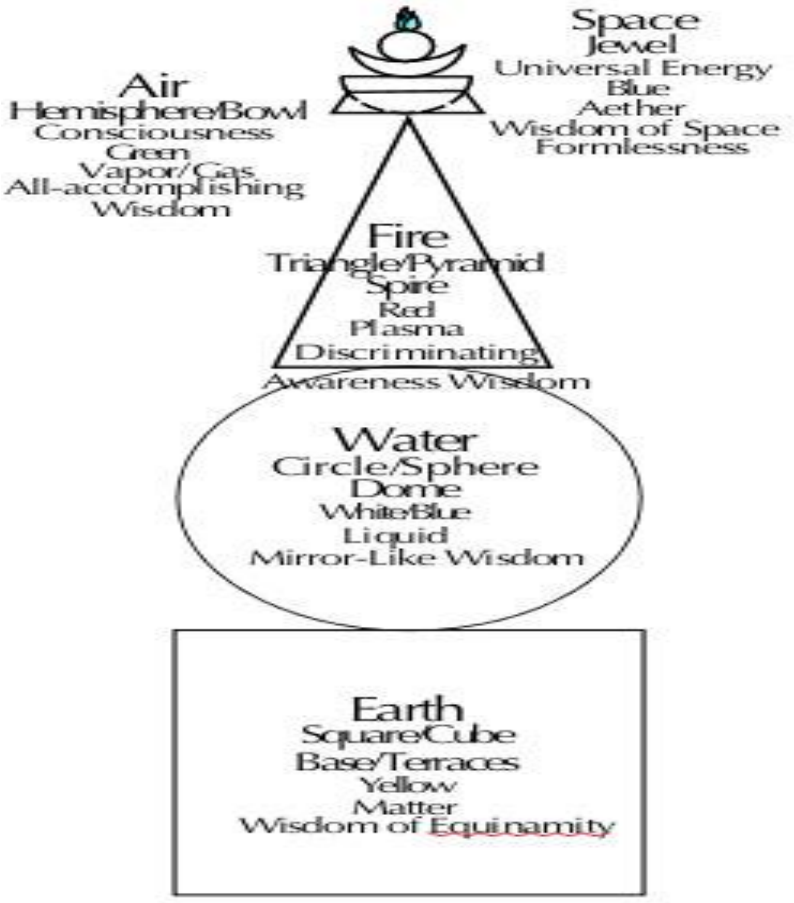
The spire is crowned with a parasol attached as a skirt around a bowl, which provides protection for the stupa and indicates the presence and compassion of the Buddha. The bowl or vase holds the elixir of enlightenment, the nectar of immortality. The full bowl represents perfected enlightenment. The sun sitting in a crescent shaped moon sit on top of the bowl representing the non-dualized reality of wisdom (female principle), 1000 lights or Bodhichitta joined with compassion (male principle), thus undivided totality. Finally above this is a blue flame representing the achievement of ultimate enlightenment and Buddhahood. The entire assembly of the bowl. Sun/moon and flame is sometimes known as the "Jewel" or the Pinnacle. Above this, thin air, the void, emptiness beyond enlightenment, the last step requiring the surrender even of the teachings which brought one to enlightenment.

Boudhanath Stupa, Kathmandu, Nepal

Elements



Platonic Sequence of Solids
Nested with in the Sphere of the Dome



The Elements

Stupa by the Numbers

0-Void/Nirvana

1-Jewel/Flame
Singularity/The One

2-Sun & Moon-Duality

3-Spire-Form/Manifestation
Pyramid/Energy

4-Harmika
Volume/Body

5-Dome-Life/Perfected Being
Sphere of Being-Platonic Solids

6-Terraces- The World
Stage of Life/Experience

7-Spiral Path-Growth
Evolution

8-The Gate-Experience-the Path
To Nirvana/Enlightenment

9-Nirvana
Heaven

The stupas on terrace at Sanchi lie in one of the three well defined areas; the others being the Eastern Area and the Southern Area, all lying within an eleventh-twelfth century AD stone circuit-wall. The monuments of Sanchi, thus, may be divided into two groups, one comprising those situated on the hill-top and the other, the isolated ones on the Western Slope of the hill. The plateau on the top of the hill is oblong in shape and measures about 384 metres from north to south and 201 metres from east to west.

Stupas on Terrace

The gateway leading to the stupas to the terrace is slightly over 5 metres high. Its decoration and constituents are similar in subject and style to those of the gateways of Stupa 1, though the workmanship is definitely inferior. With the exception of the scene carved on the front side of the lowest architrave, which has been interpreted as the paradise of Indra (Nandana-vana), where Lord Indra is seated at the centre on a throne under a pavilion surrounded by attendants, the reliefs have their analogues on the gateways of Stupa 1.

The importance of this stupa lies in the fact that the relics of Sariputta and Maudgalyayana, the two foremost disciples of the Gautama Buddha, were found enshrined at the centre of its dome on the level of the terrace. Inside the relic-chamber, which was covered by a large stone slab of over 1.5 metres, were two stone boxes with their lids respectively inscribed with the words Sariputta and Maha-Mogalanasa.

Sariputta's box contained a white steatite relic-casket, covered by a thin earthen saucer of lustrous blackware, along with two pieces of sandalwood. Inside the casket were found a small fragment of bone and seven beads, variously of pearl, garnet, lapis lazuli, crystal and amethyst.

On the inner surface of the lid was written in ink the letter sa, the initial of Sariputtam. In Maudgalyayana's box was found another casket, somewhat smaller, containing two small fragments of bone. The lid was initialled in ink with the letter ma.

Besides these two conspicuous stupas, there are the remains of a large number of other stupas on the main terrace around the north-east, south-east and south-west quadrants of the Great Stupa.

They are either monolithic or structural. The former, often with the relief of a Buddhist divinity, are portable. None of the masonry stupas, however, is intact, and most survive only up to their plinth.

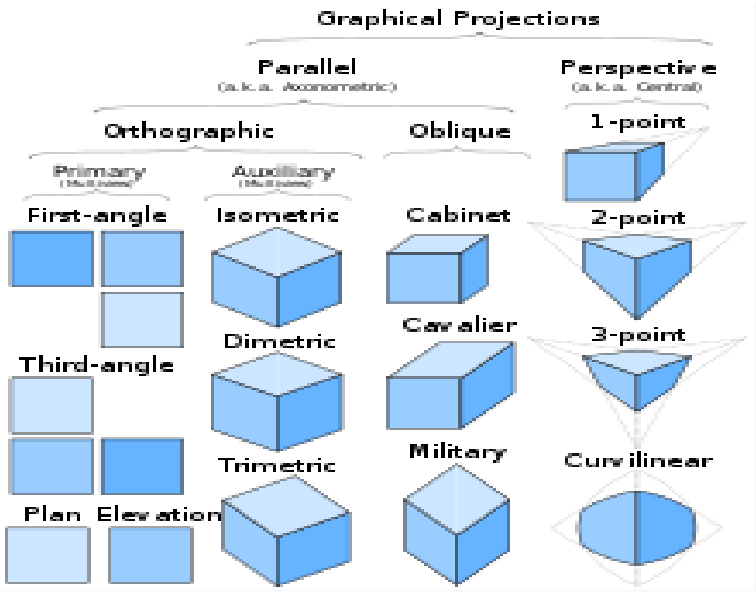
Behind Stupa 3 is Stupa 4, ascribable to the second century BC, which exists only in a heap of loose stones without the trace of any ground balustrade. A coping stone, relieved with an undulating stem containing within its foils lotuses, buds, leaves and birds, was found near the stupa; it might have formed part of the balustrade around the harmika. Stupa 5, to the south of Stupa 3, is remarkable in its having an image of the Buddha in the dhyana mudra on a moulded pedestal built against its southern side. The stupa is built on a circular plinth with narrow courses of masonry and with footings; it is ascribable to about the sixth century AD. The two small stupas, 28 and 29, are to the east of Stupa 5. Both have high square bases with cornices and footings characteristic of the early Gupta age. Stupa 29 presents interesting features, not only in its having a core of large-sized bricks, but also in its having contained, within a small relic-chamber, a bone-relic along with the fragment of a highly-polished vase of the Maurya or Sunga age, placed in a cup of coarse ware with a second cup serving as the lid.

The size of the bricks and the presence of the early vase suggest that the relic was transferred here after the original stupa, which might have been of the Maurya period, had fallen to decay. The group constituted by Stupas 12, 13, 14 and 16, about 61 metres south of Stupa 5, is characterised by square plinths strengthened by footings; it belongs to the sixth-seventh century AD. The stupas are built of rubble and earth, faced with well-dressed courses of stone.

Some of them contain relic-chambers. In the fallen debris of Stupa 12, the relic-chamber of which had been completely destroyed before its excavation, was found the foot and pedestal fragment of an inscribed image of Maitreya. Another image, that of the Buddha in the dhyana-mudra, made of Mathura sandstone and belonging to the early Gupta period, was found against the western wall of the relic-chamber of Stupa 14.

Immediately to the south of this group is Stupa 6. Its core is built of heavy blocks of stone interspersed with chippings as in Stupas 3 and 4, with which Stupa 6 was contemporaneous. The existing facing both the superstructure and the plinth, the latter square on plan and provided with footings characteristic of the early medieva1 stupas of this site, dates from the seventh or eighth century AD. Stupa 7, about 30 metres to the south-west of the West Gate of Stupa 1, has the same structural features as Stupas 12, 13, 14 and 16. It rises to a height of 2.13 metres and is surrounded by the remains of a terrace, probably of a later date.
https://www.indianetzone.com/61/stupas_on_terrace.htm

Axonometric projection is a type of orthographic projection used for creating a pictorial drawing of an object, where the object is rotated around one or more of its axes to reveal multiple sides.



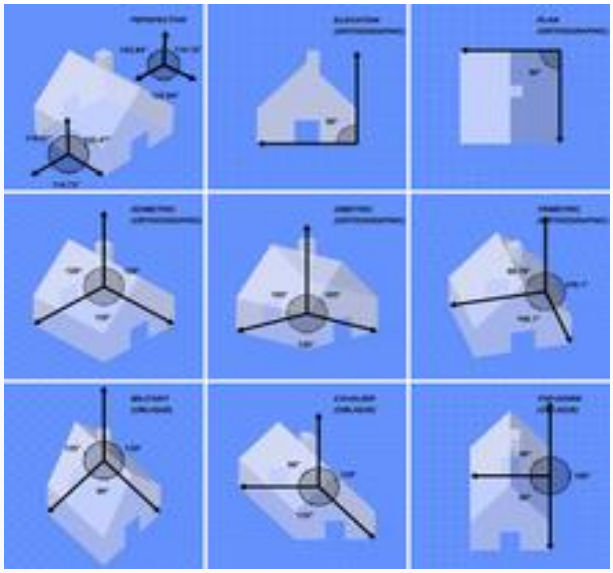
Classification of axonometric projection and some 3D projections

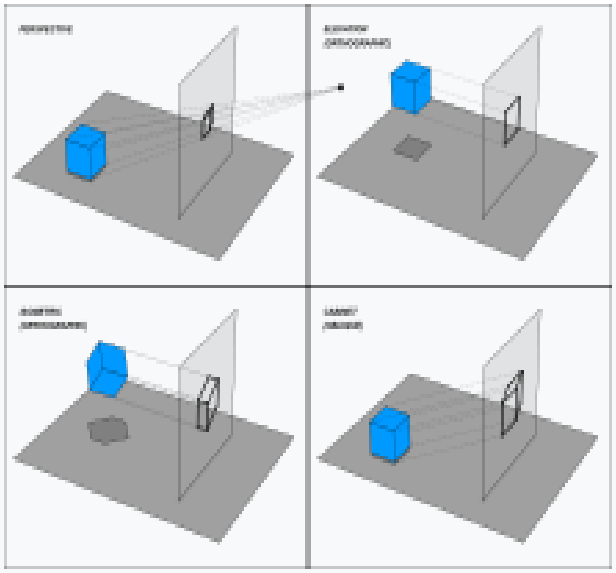
"Axonometry" means "to measure along the axes". In German literature, axonometry is based on Pohlke's theorem, such that the scope of axonometric projection could encompass *every* type of parallel projection, including not only orthographic projection (and multiview projection), but also oblique projection. However, outside of German literature, the term "axonometric" is sometimes used only to distinguish between orthographic views where the principal axes of an object are *not* orthogonal to the projection plane, and orthographic views in which the principal axes of the object *are* orthogonal to the projection plane. (In multiview projection these would be called *auxiliary views* and *primary views*, respectively.) Confusingly, the term "orthographic projection" is also sometimes reserved only for the primary views.

Thus, in German literature, "axonometric projection" might be considered synonymous with "parallel projection", overall; but in English literature, an "axonometric projection" might be considered synonymous with an "auxiliary view" (versus a "primary view") in an "multiview orthographic projection".

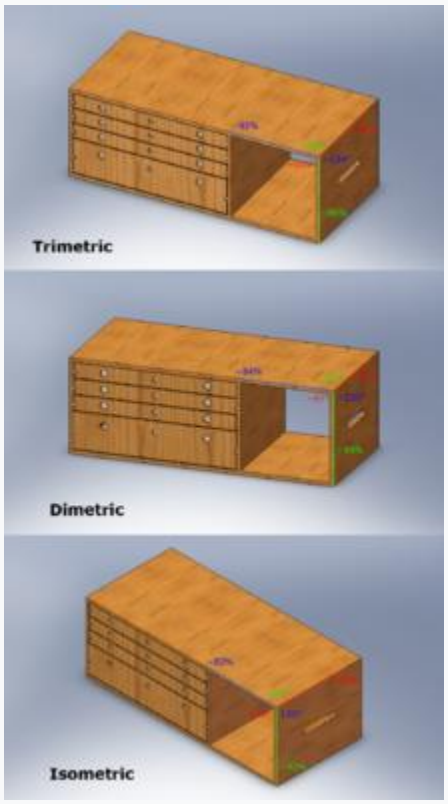
With an axonometric projection, the scale of an object does not depend on its location (i.e., an object in the "foreground" has the same scale as an object in the "background"); consequently, such pictures look distorted, as human vision and photography use perspective projection, in which the perceived scale of an object depends on its distance and location from the viewer. This distortion, the direct result of a presence or absence of foreshortening, is especially evident if the object is mostly composed of rectangular features. Despite this limitation, axonometric projection can be useful for purposes of illustration, especially because it allows for simultaneously relaying precise measurements.

3 TYPES:





Comparison of several types of graphical projectionRIGHT Various projections and how they are produced



The three axonometric views. The percentages show the amount of foreshortening.

The three types of axonometric projection are *isometric projection*, *dimetric projection*, and *trimetric projection*, depending on the exact angle at which the view deviates from

the orthogonal. Typically in axonometric drawing, as in other types of pictorials, one axis of space is shown to be vertical.

In **isometric projection**, the most commonly used form of axonometric projection in engineering drawing, the direction of viewing is such that the three axes of space appear equally foreshortened, and there is a common angle of 120° between them. As the distortion caused by foreshortening is uniform, the proportionality between lengths is preserved, and the axes share a common scale; this eases one's ability to take measurements directly from the drawing. Another advantage is that 120° angles are easily constructed using only a compass and straightedge.

In **dimetric projection**, the direction of viewing is such that two of the three axes of space appear equally foreshortened, of which the attendant scale and angles of presentation are determined according to the angle of viewing; the scale of the third direction is determined separately. Dimensional approximations are common in dimetric drawings.

In **trimetric projection**, the direction of viewing is such that all of the three axes of space appear unequally foreshortened. The scale along each of the three axes and the angles among them are determined separately as dictated by the angle of viewing. Dimensional approximations in trimetric drawings are common, and trimetric perspective is seldom used in technical drawings.

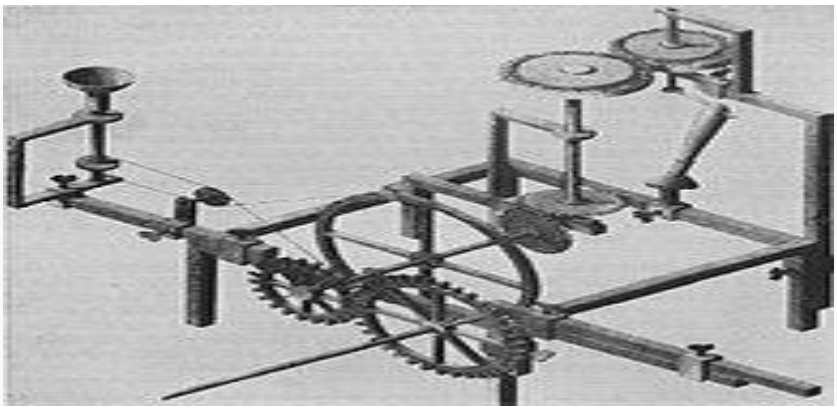
HISTORY: Axonometry originated in China. Its function in Chinese art was unlike the linear perspective in European art since its perspective was not objective, or looking from the outside. Instead, its patterns used parallel projections within the painting that allowed the viewer to consider both the space and the ongoing progression of time in one scroll.[6] According to science author and Medium journalist Jan Krikke, axonometry, and the pictorial grammar that goes with it, had taken on a new significance with the introduction of visual computing and engineering drawing.

The concept of isometry had existed in a rough empirical form for centuries, well before Professor William Farish (1759–1837) of Cambridge University was the first to provide detailed rules for isometric drawing.

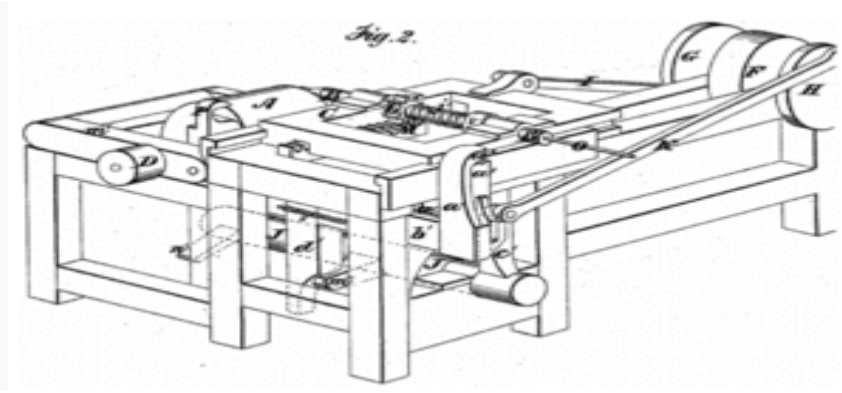
Farish published his ideas in the 1822 paper "On Isometric Perspective", in which he recognized the "need for accurate technical working drawings free of optical distortion. This would lead him to formulate isometry. Isometry means "equal measures" because the same scale is used for height, width, and depth"

From the middle of the 19th century, according to Jan Krikke (2006) isometry became an "invaluable tool for engineers, and soon thereafter axonometry and isometry were incorporated in the curriculum of architectural training courses in Europe and the U.S. The popular acceptance of axonometry came in the 1920s, when modernist architects from the Bauhaus and De Stijl embraced it".De Stijl architects like Theo van Doesburg used axonometry for their architectural designs, which caused a sensation when exhibited in Paris in 1923".

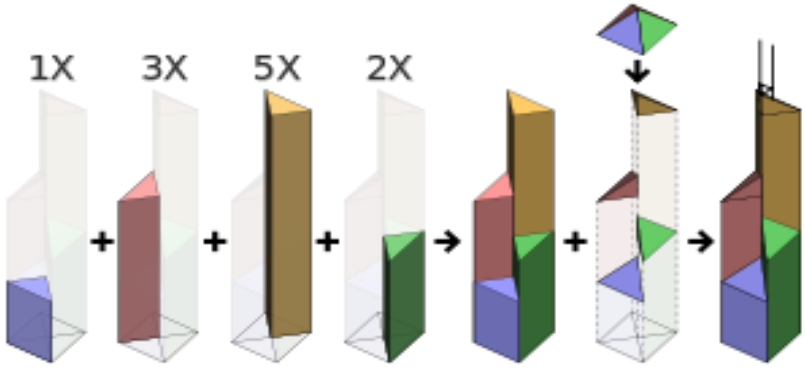
Since the 1920s axonometry, or parallel perspective, has provided an important graphic technique for artists, architects, and engineers. Like linear perspective, axonometry helps depict three-dimensional space on a two-dimensional picture plane. It usually comes as a standard feature of CAD systems and other visual computing tools



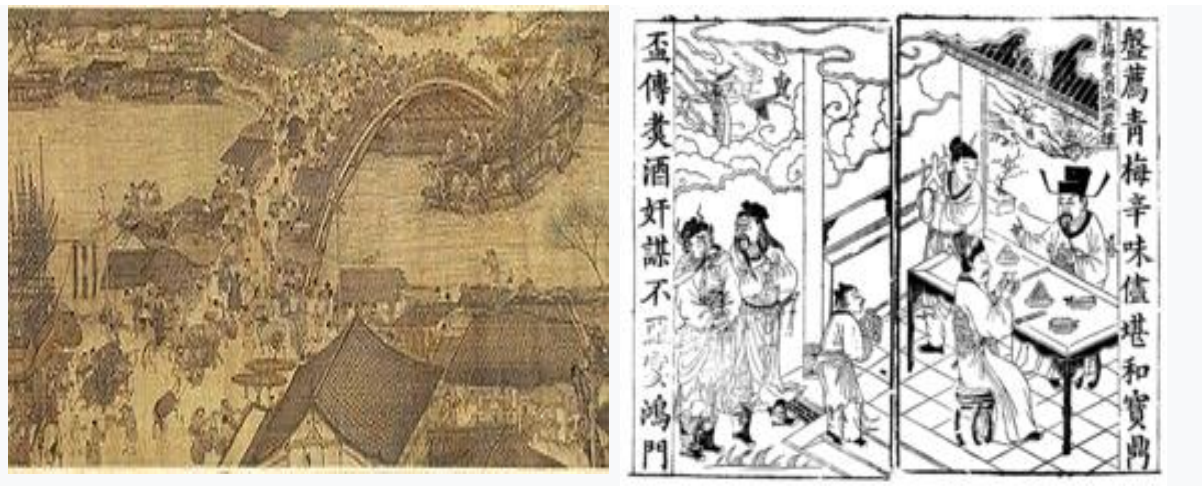
Optical-grinding engine model (1822), drawn in 30° isometric perspective



Example of a dimetric perspective drawing from a US Patent (1874)

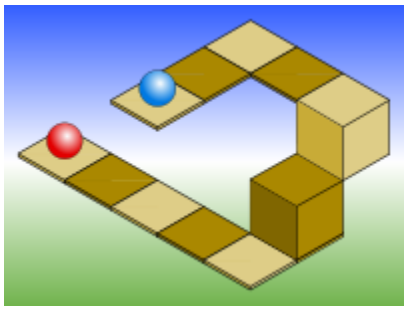


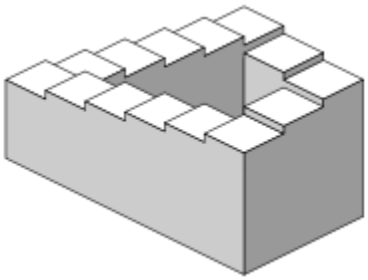
Example of a trimetric projection showing the shape of the Bank of China Tower in Hong Kong.



Detail of the original version of *Along the River During the Qingming Festival* attributed to Zhang Zeduan (1085–1145). Note that the picture switches back and forth between axonometric and perspective projection in different parts of the image, and is thus inconsistent.RIGHT Example of isometric projection in Chinese art in an illustrated edition of the *Romance of the Three Kingdoms*, China, c. 15th century CE.

LIMITATIONS:





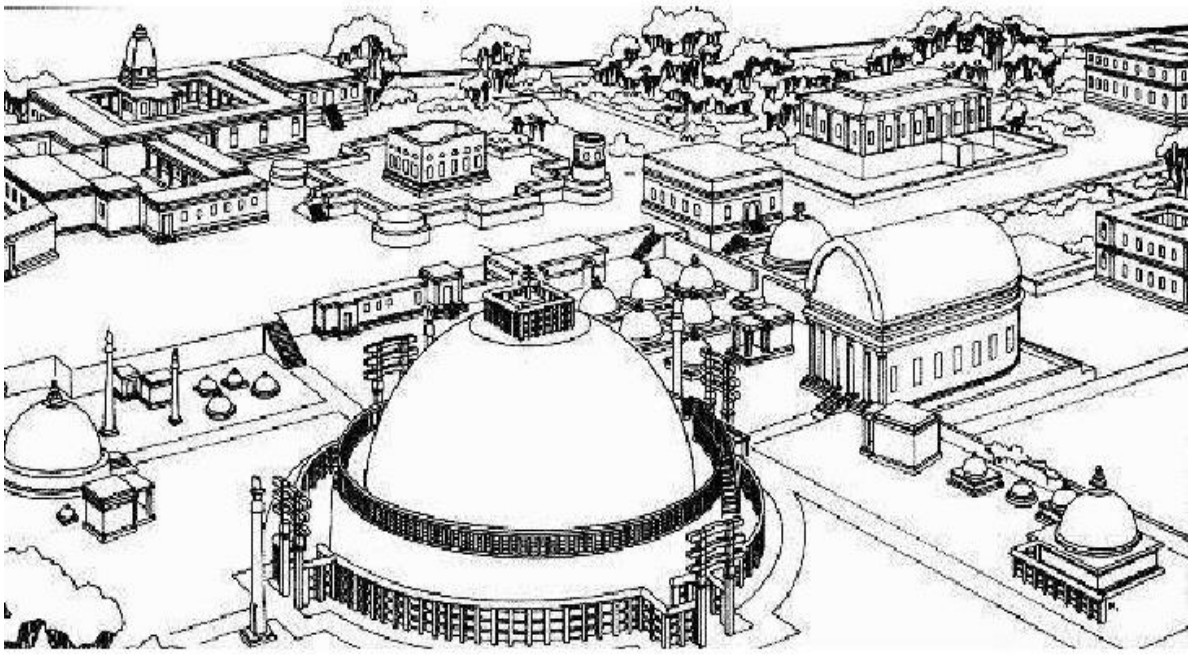
In this drawing, the blue sphere is two units higher than the red one. However, this difference in elevation is not apparent if one covers the right half of the picture.RIGHT The Penrose stairs depicts a staircase which seems to ascend (anticlockwise) or descend (clockwise) yet forms a continuous loop.

As with other types of parallel projection, objects drawn with axonometric projection do not appear larger or smaller as they lie closer to or farther away from the viewer. While advantageous for architectural drawings, where measurements must be taken directly from the image, the result is a perceived distortion, since unlike perspective projection, this is not how human vision or photography normally works. It also can easily result in situations where depth and altitude are difficult to gauge, as is shown in the illustration to the right.

This visual ambiguity has been exploited in op art, as well as "impossible object" drawings. Though not strictly axonometric, M. C. Escher's *Waterfall* (1961) is a well-known image, in which a channel of water seems to travel unaided along a downward path, only to then paradoxically fall once again as it returns to its source. The water thus appears to disobey the law of conservation of energy.

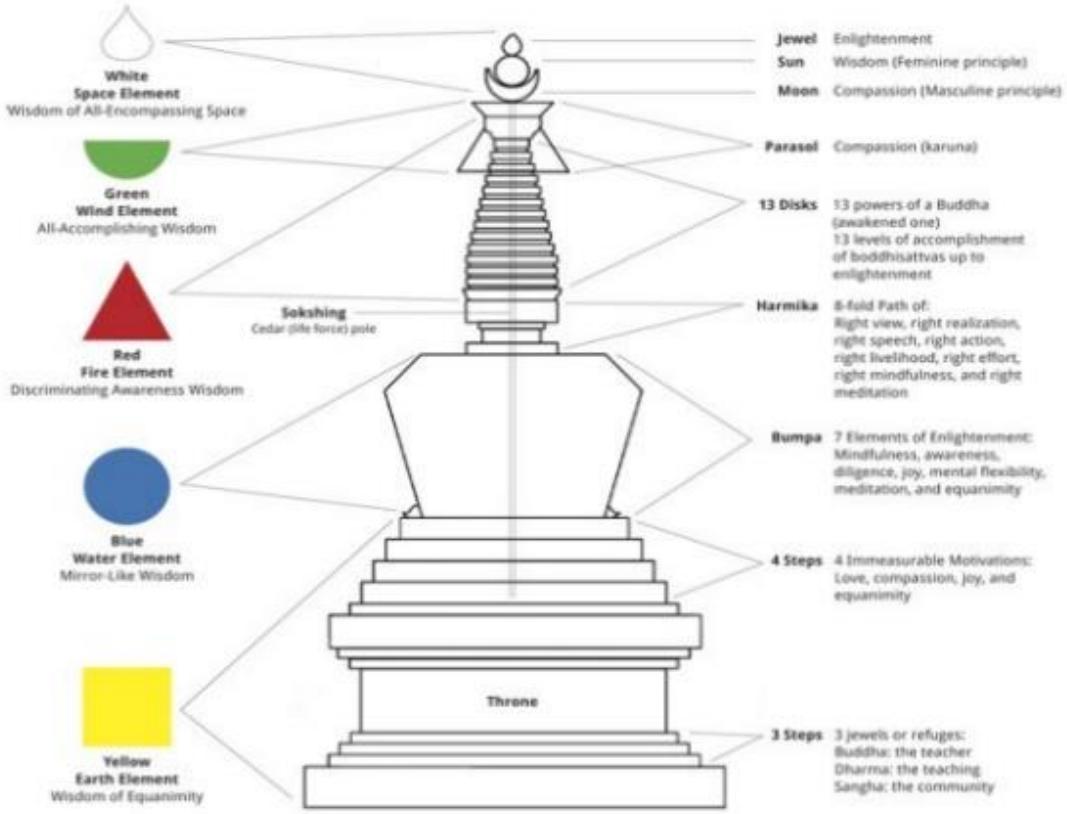
Cappella brancacci, Guarigione dello storpio e resurrezione di Tabita (restaurato), Masolino

In isometric **projection**, the most commonly used form of **axonometric projection** in engineering **drawing**, the direction of **viewing** is such that the three axes of space appear equally foreshortened, and there is a common **angle** of 120° between them. ... Dimensional approximations are common in dimetric drawings.



Axonometric drawing

Minimum and optimum areas for mono functions. to get a grip of the functional and spatial aspects of the space, eg. - a classroom (mono functional) and a staircase (static/transitional), pavilions & open/ enclosed spaces (multi-functional). User's data, movement and circulation diagrams. Method of learning: Observation & Study Drawings of the human body in various postures with required measurements. Drawing exercise of artefacts, eg. - a table (object) with the human body - contextual. • Measured drawing exercise of spaces – 4. Introduction to Design process – • Understanding the relationship between idea, context, space (form & structure), and functional requirements. • Introduction to the various methods of idea / concept generation - use of form, patterns in nature and in geometry, music, text, and other allied fields. • Space planning based on activity, which will involve the entire body, and its movement in space. Method of learning: Observation & Study • Understanding the difference and similarity while design of a non-enclosed space, a semi-enclosed space, an enclosed space. • Study of patterns and use the pattern, both physical and material patterns as well as patterns of transformation and Integration. Appreciation of the difference between architecture and the chosen pattern. • Design of functional furniture layout with requisite circulation, lighting and ventilation for a specific function. • Design of Spaces such as pavilion, gazebo, kiosk, bus stop, stage, living/dining, bedrooms, Architect's office, Doctor's clinic etc,. • Submission will include Idea generation, Study models, Sketches and drawings to achieve the desired results.

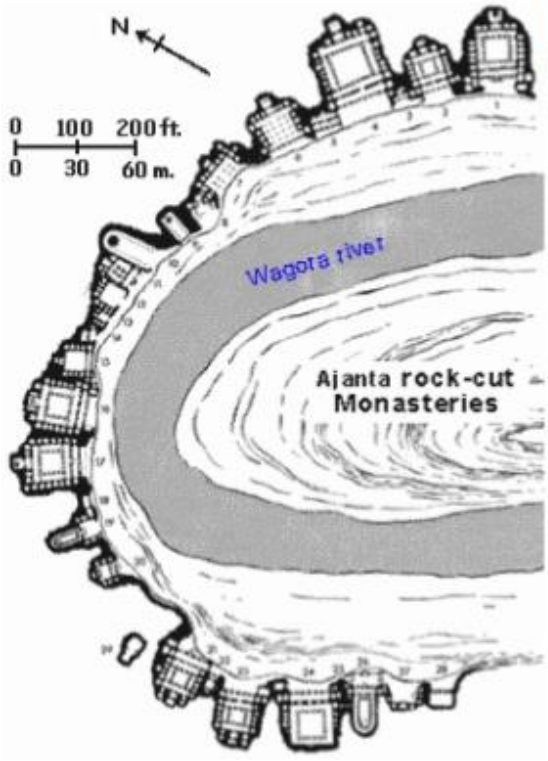


Stupa Symbolism

HINAYANA / EARLY PHASE -2nd c BC – 2nd c. AD

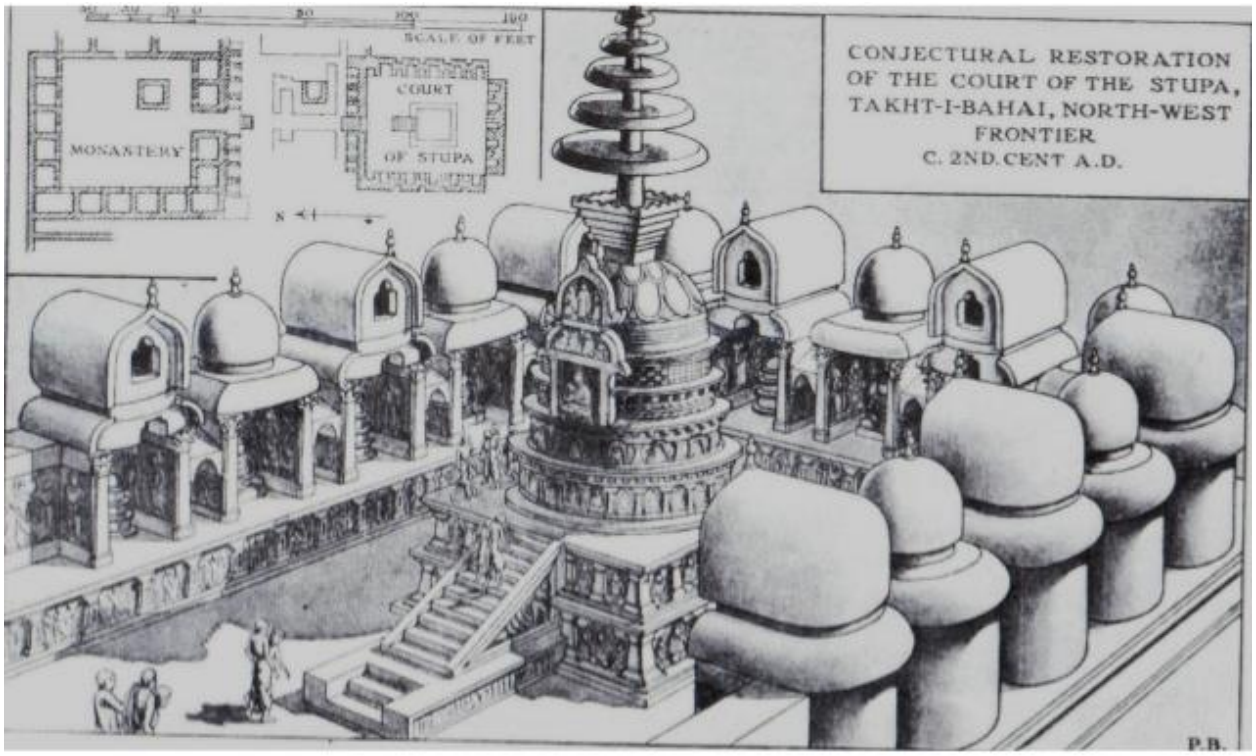
Evolution of the Chaityas and the Viharas

Earlier the huts of the monks were grouped around an open space to form the first monasteries

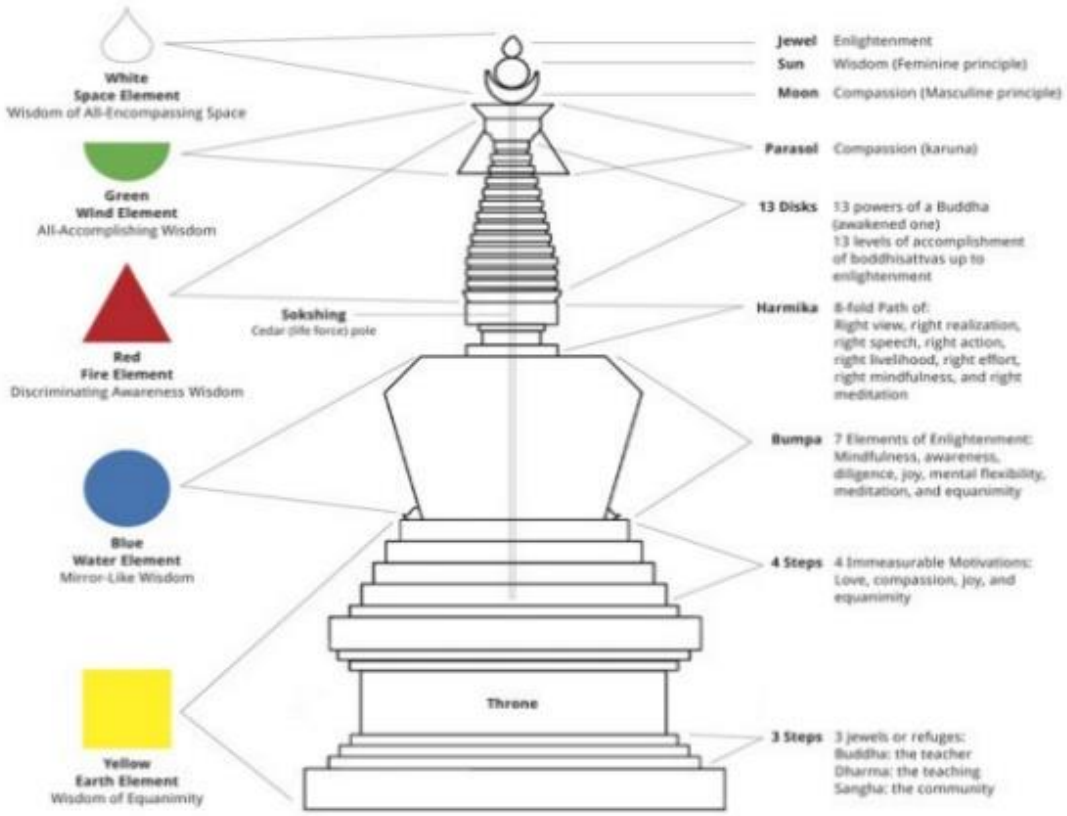


Evolution of the Vihara:

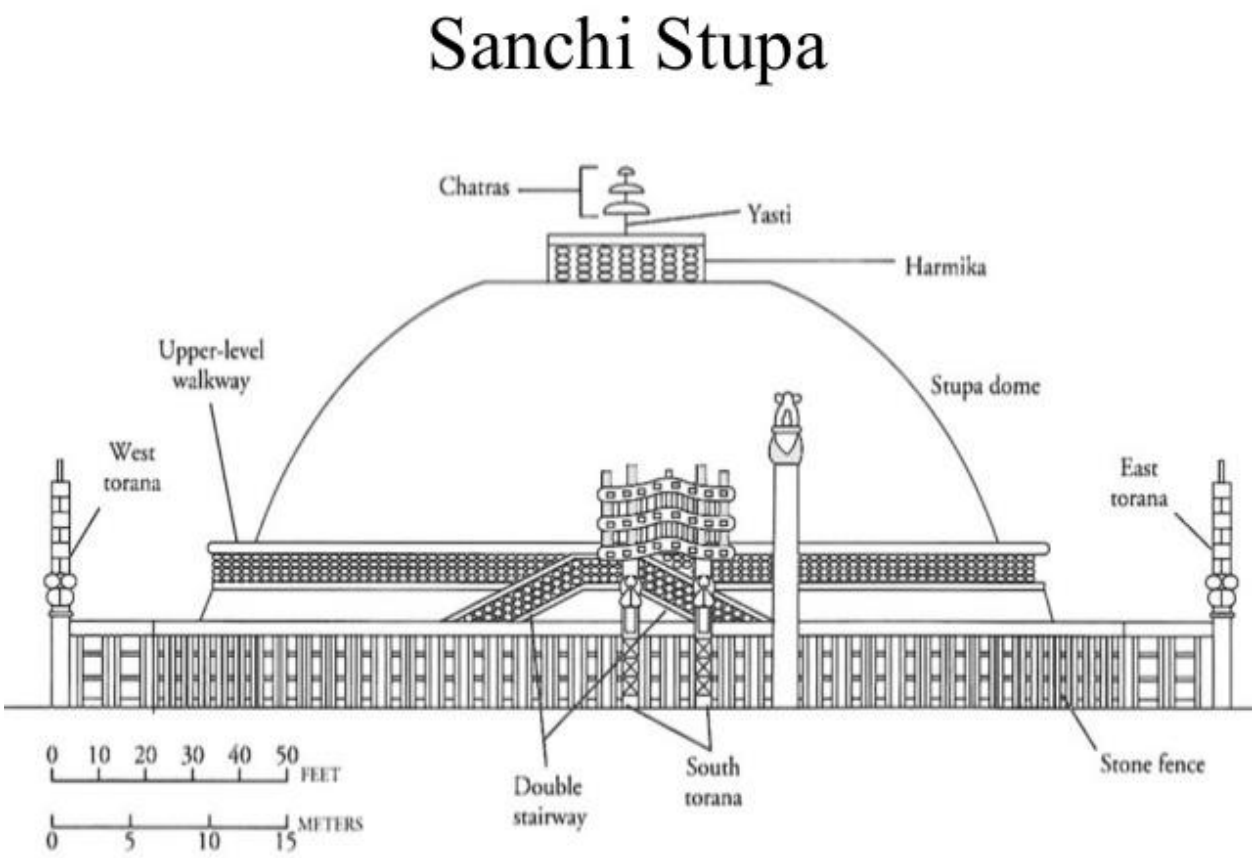
- An arrangement of a series of cells enclosing the 3 sides of an open courtyard
- The other side is left open for the entrance
- Spatial planning:
  - rooms normally opened onto an interior quadrangle with the backs forming an outside wall
  - This maintained the privacy and security
  - An inside verandah was added along the perimeter of the square for the monks
  - A number of viharas are attached to a chaitya hallresembling cloisters in the abbey church of the west
  - Built mainly of wood and other perishable materials
  - Evidence from bas reliefs
  - Frequently a 2 storeyed structure, barrel vault, horse shoe gable ends, light admitted through dormer windows
  - Outer façade containing an entrance with woodwork, including a pillared portico supporting a balcony- view processions and ceremonie
  - Modest structures of utilitarian character changing


SCALE OF FEET
MONASTERY
COURT
OF STUPA
CONJECTURAL RESTORATION
OF THE COURT OF THE STUPA,
TAKHT-I-BAHAI, NORTH-WEST
FRONTIER
C. 2ND CENT A.D.
P.B.


KONARK
SUN TEMPLE
THE ASTRONOMICAL MARVEL



Stupa Symbolism



TETRADIC (4 SIDED) settings of Buddhist and Eastern Religious Architecture

The architecture of places of worship in Asia is an expression of the way of thinking in much the same way as elsewhere in the world. However, to cover the whole field of religion and architecture – even if it is narrowed down to the four-fold – is a Herculean task, which cannot be performed in a single chapter of a book. Both entities (Eastern religion and architecture) are so diverse and varied that even a brief survey would do no justice to the immense field of various beliefs and the material expressions thereof in architecture.

The easiest solution to scale this mountain of relevant information would be to abandon the operation right from the very start and leave the chapter on 'eastern' tetradic architecture completely out of this book. Some promise could be made to cover the subject another time in a separate book. However, to leave such an important contribution to the field of investigation out of the present survey would be unacceptable too. So a compromise had to be made and only some of the most outstanding examples of tetradic (temple) architecture in Asia are singled out for a short review, without a deeper quest for their religious and/or philosophical background and with no intention to be exhaustive.

A temple might be built for the primary purpose of worship, but it also demands a wider reading in relation to its material presence. It can function as object of devotion, as a mean to construct a

personal reality, as a proof of power, and – last but not least – it can point to the state of mind of the architects, who designed the building in line with its spiritual purpose. This latter, psychological reading is of particular interest in the present investigation. It is well known that the building of sanctuaries was inspired by the symbolism of the religion, but also provided the visible enhancement of that symbolism in a practical way.

The Hindu world view is based on a cycle of creation to destruction, which is divided into four ages (*yugas*). According to the Indian view, the universe is destroyed by fire and subsequently dissolved into a cosmic ocean out of which a new universe is created and another era begins (MICHEL, 1977). Man's position in this cycle is like a spell or illusion (*maya*), which should be broken (in a release or *moksha*) to understand the reality behind it. Geometric considerations occupy an important place in Hindu thoughts. Number is seen as a mean to express the relation between man and the universe. Indian temple architecture as a whole is greatly inspired by proportional measurements and dimensions.

The holy Mount Meru stands in the center of the universe and is the axis of the world (fig. 127). The sanctuary as a whole is called a *vimana*, which means 'well-measured' or 'well-proportioned'. The pyramidal or tapering roof above the *vimana* is called the *shikhara* and is a representation of Mount Meru. The *Brihatsamhita* was an early treatise on astrology, which also included a chapter on temple building. Time is of essence and the cardinal points have a symbolic meaning, with a major orientation along an east-west axis. The mountain Kailash (6714 meters) in western Tibet is regarded by many believers as the representation of Mount Meru on earth and as the central axis of a spiritual universe.

Vaastu Shastra deals with the knowledge and principles of the physical environment. It exerts an all-embracing influence on the traditional Hindu architecture. This knowledge was written down in three major texts. The *Viswakarma vaastushastra* has a North Indian origin. The *Manasara Silpa Shastra* and the *Mayamatam* are derived from Southern India. The latter (Dravidian) text concluded that 'if the measurements of the temple are in every way perfect, there will be perfection in the universe as well.'

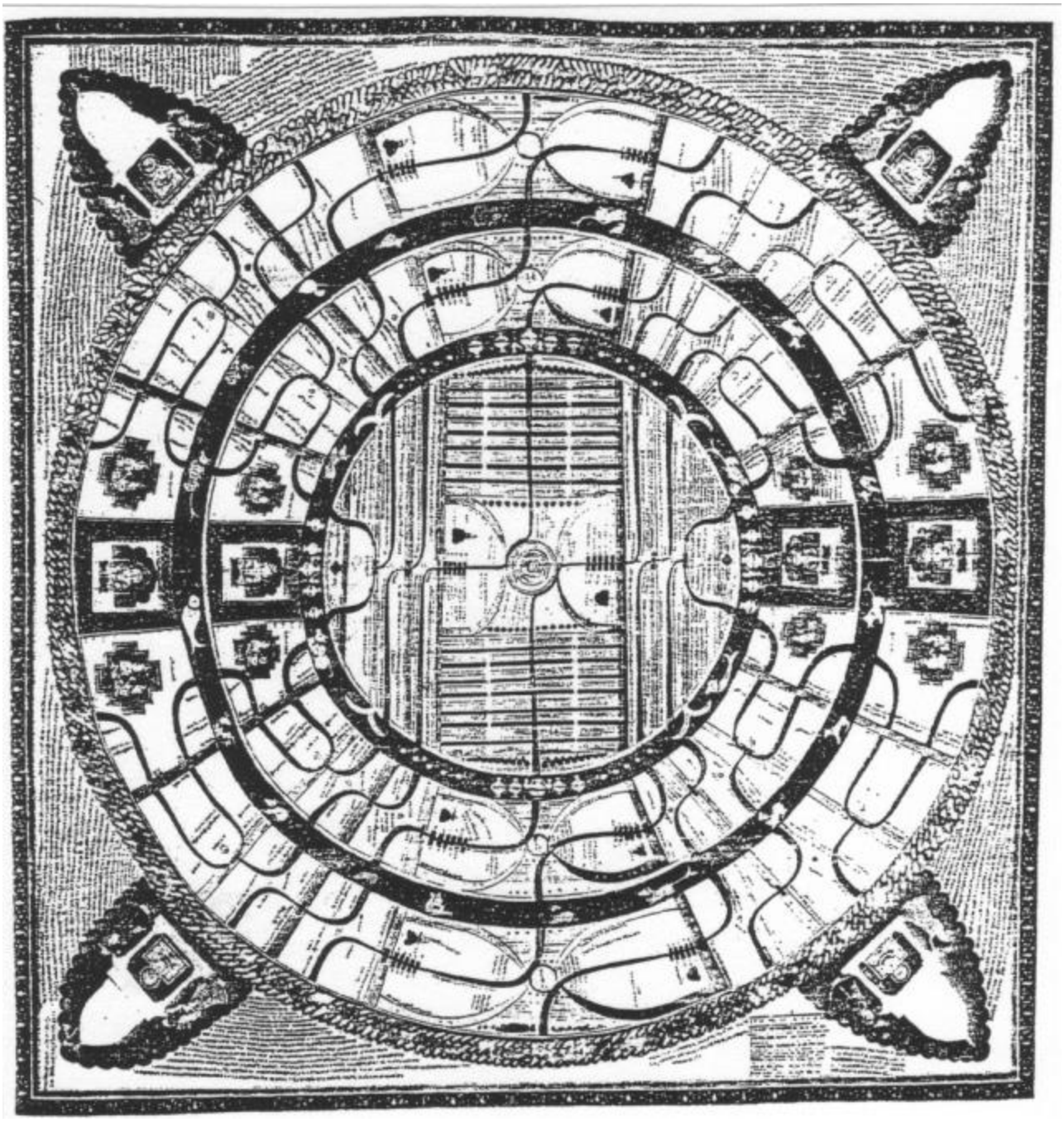


Fig. 127 – Mount Meru is seen here at the center of a quaternary scheme of the world (Gouache on cotton, eighteenth century, Rajasthan, West India).

The *mandala* is a central entity in Hinduism and Buddhism and is the generic name for any plan or chart, which represents the cosmos (MICHEL, 1977). In Sanskrit *mandala* means 'circle and center' or 'Holy Circle' and points to its cyclic character. This circle is often embedded in a square, being a symbolic rendering of the surface of the earth (*Prithvi*). The earth is '*Caturbhsti'* or 'four cornered'.

The *Vaasta Purusha* mandala is a specific type of mandala used in Vaastu Shastra, representing a metaphysical plan of a building or temple in relation to the course of the heavenly bodies and supernatural forces. Purusha refers to the energy and power, which is generated by the understanding of this cosmic presence. The form is a square, subdivided in smaller squares. The number of subdivisions can vary and each type has a distinct name and is used in a specific context. The central area is called the *Brahma-sthana*, because Brahma or some other prominent deity concerned with the creation usually occupies it. The building (of a temple) takes place from a chosen grid, dedicated to a particular deity. Planetary divinities are arranged around the Bramasthana. The central place, being the most important part of the building, remains unbuilt (fig. 128).

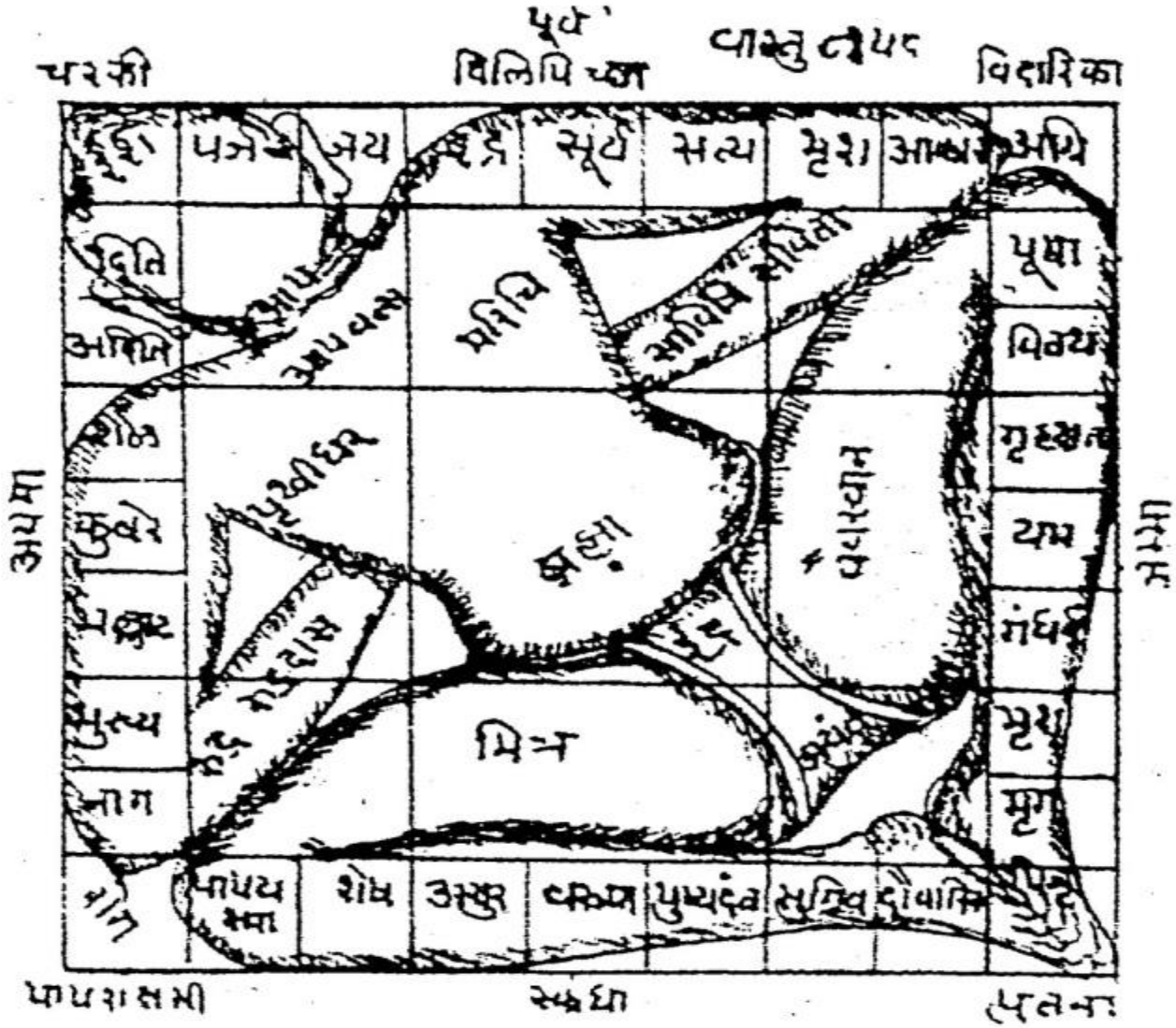


Fig. 128 – The cosmic man or *mahapurusha*, drawn on a temple *mandala* indicates the relation between parts of the body and the meaning of its position within the architectonic setting. The outlay of a temple is subject to the principle of *vimana*, meaning 'well-measured' or 'well-proportioned'. This picture is derived from an ancient manual of architecture. The main axis runs

here from south-east to north west (head), but an orientation from south-west to north-east is also known.

The '*Encyclopaedia of Indian Temple Architecture*' by Michael MEISTER (1988/1991) is a treasure house of descriptions and ground plans of temples and temple complexes in northern and southern India. Even a superficial glance of the books will leave an impression of the richness and exuberance of Indian temple architecture (fig. 129/130). It would lead much too far to go into detail of the styles in time and place, but one important conclusion can be drawn just by looking through Meister's encyclopedia: *the Indian temple architecture, both in its northern and southern variety, are deeply inspired by a tetradic consciousness*.

The square and rectangular outlay, if possible orientated along an east-west axis, with the entrance to the east, is the main characteristic. In front of the doorway is often a pillared hall, or *mandapa*. The attention to the four directions, either in the form of entrances or stairs, is prominent.

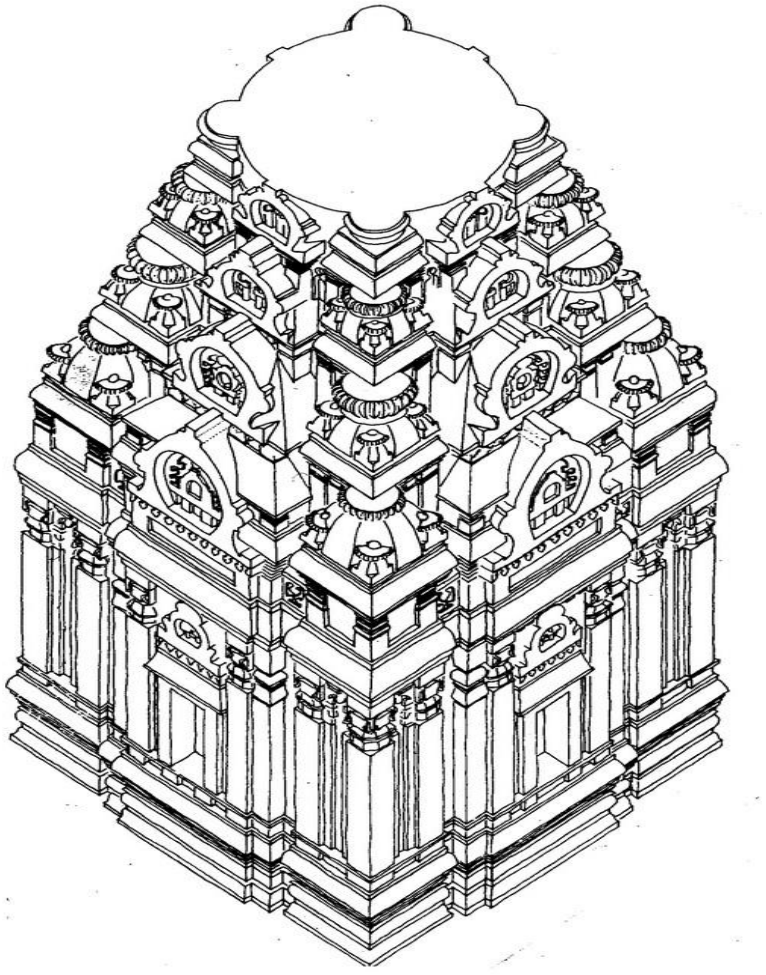


Fig. 129 – An axonometric drawing of the Rajivalocana temple at Rajim (Chhattisgarth, forty-five kilometers southeast of Raipur) shows the variance on the tetradic theme. The temple dated from around A.D. 600 and is dedicated to Lord Vishnu.

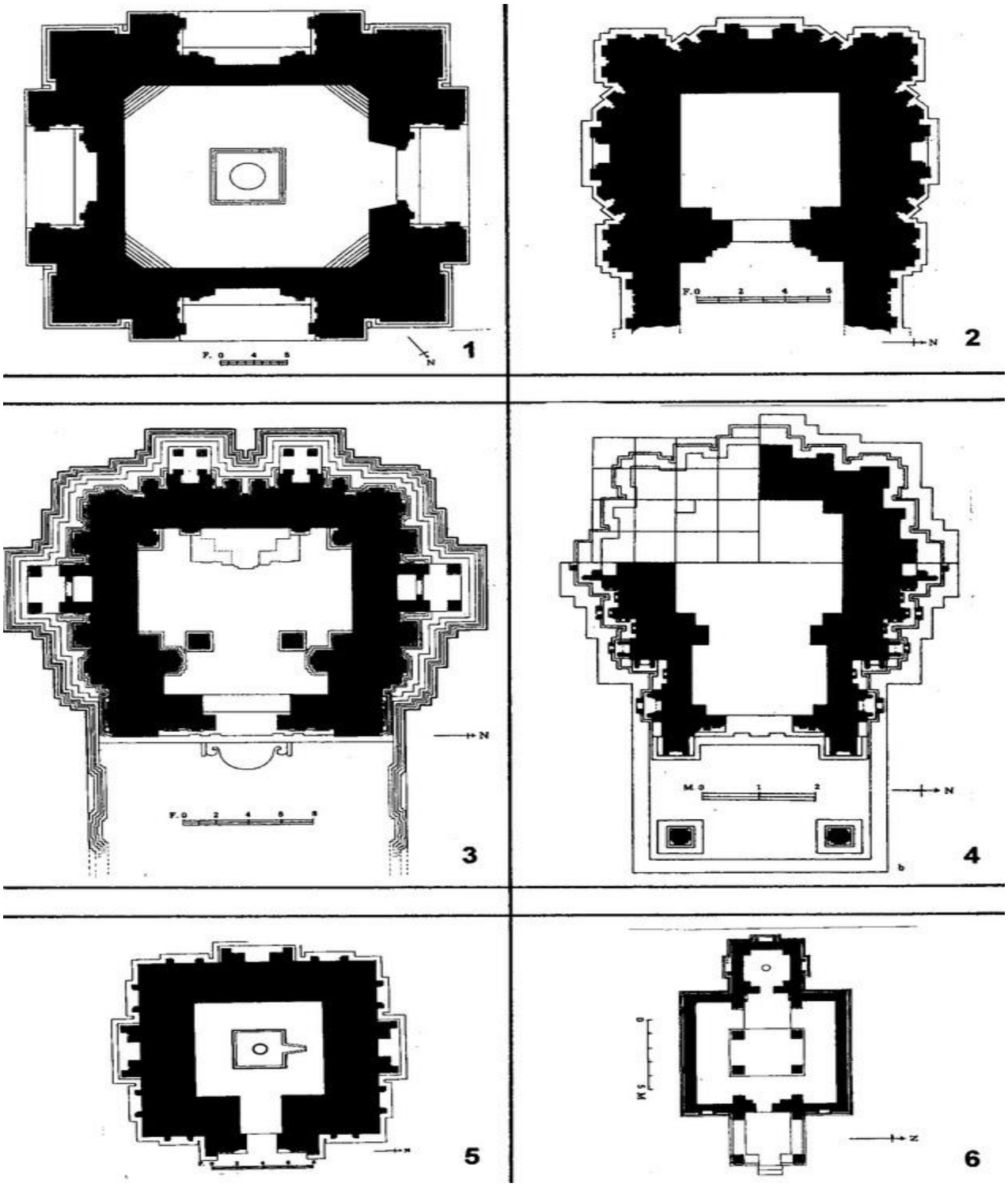


Fig. 130A – A variety of Indian temples indicating a preference for a tetradic setting. 1. Shiva's temple in Fathgadh (Fatehgarh, Kashmir); 2. Savarinarayana temple in Kharod; 3. Jaikamath in Barwasagar (Jhansi, Uttar Pradesh); 4. Suraya temple in Madkheda (Madhya Pradesh); 5. Svarnajalesvara temple at Bhuvanes-vara (Bhubaneswar, Orissa); 6. Huccapayya temple in Aihole (the '*Cradle of Indian Architecture'*; Karnataka, near Begalkot).

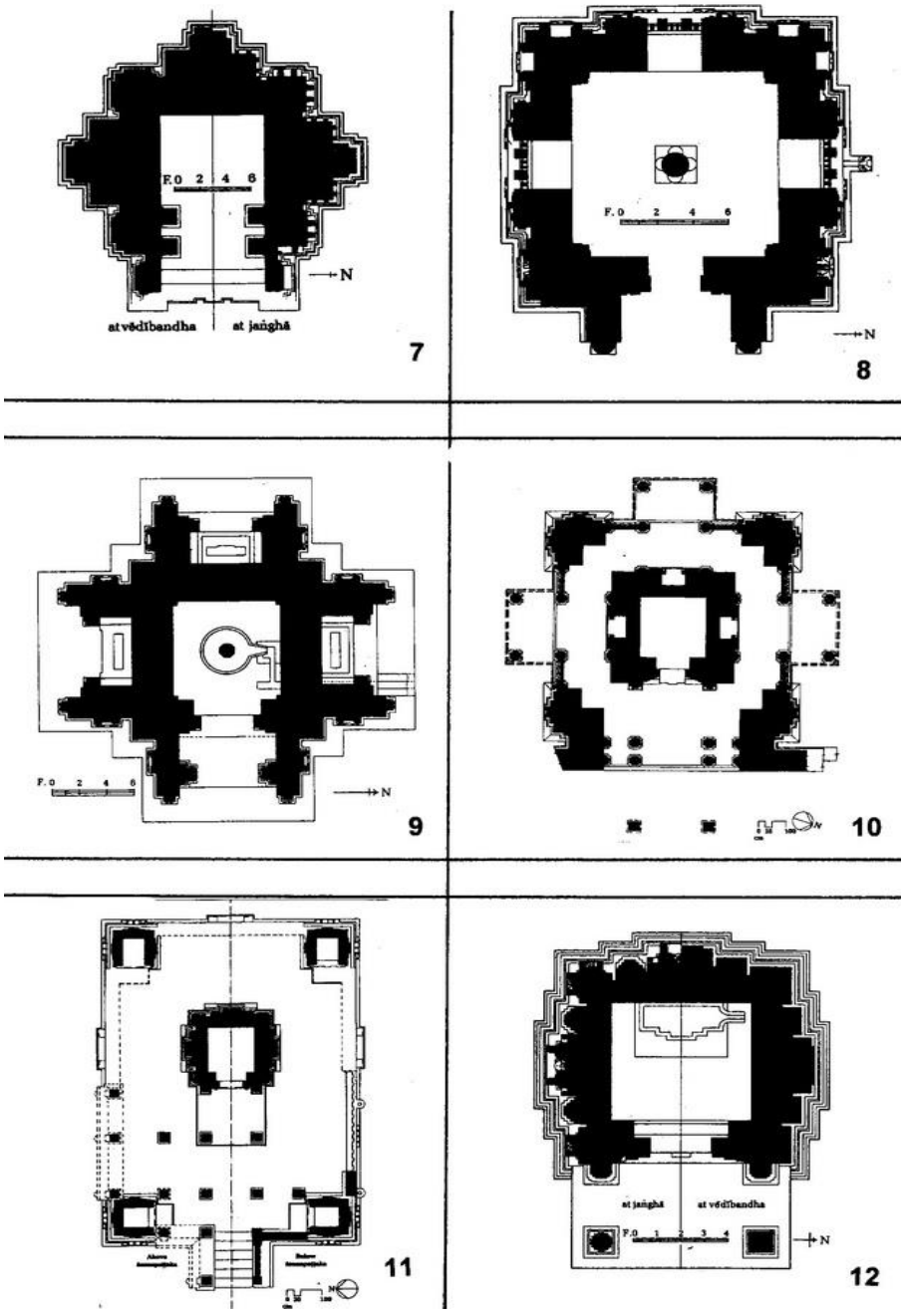


Fig. 130B – A variety of Indian temples indicating a preference for the tetradic setting. 7. Shiva temple in Binaika (near Sagar, Madhya Pradesh); 8. Caturmukha ('four-faced') Mahadeva temple in Nacna; 9. Basesar Mahadeva temple in Bajaura (Kullu; Himachal Pradesh); 10. Mahadeva temple in Bithu; 11. Harihara temple no. 2 in Osian (Jodhpur, Rajasthan); 12. Naktimata temple in Bhavanipur (Uttar Pradesh).

LEONARDIS (2002) pointed, in a detailed description of the plan of the S. Sofia church in Benevento (Italy, see p. 329*ff*), to the ground plan of two temples in northern India, with a rotated square as a design tool. The Siva Temple at Adbhar and the Dhobini temple (fig. 131) dated from around 700 AD. They were only slightly earlier than the building of the S. Sofia in

Benevento around 760 AD. It is unlikely that any direct influence was communicated over such geographical distances, but the conclusion is warranted that similar (tetradic) ideas could lead to resembling architectonic solutions.

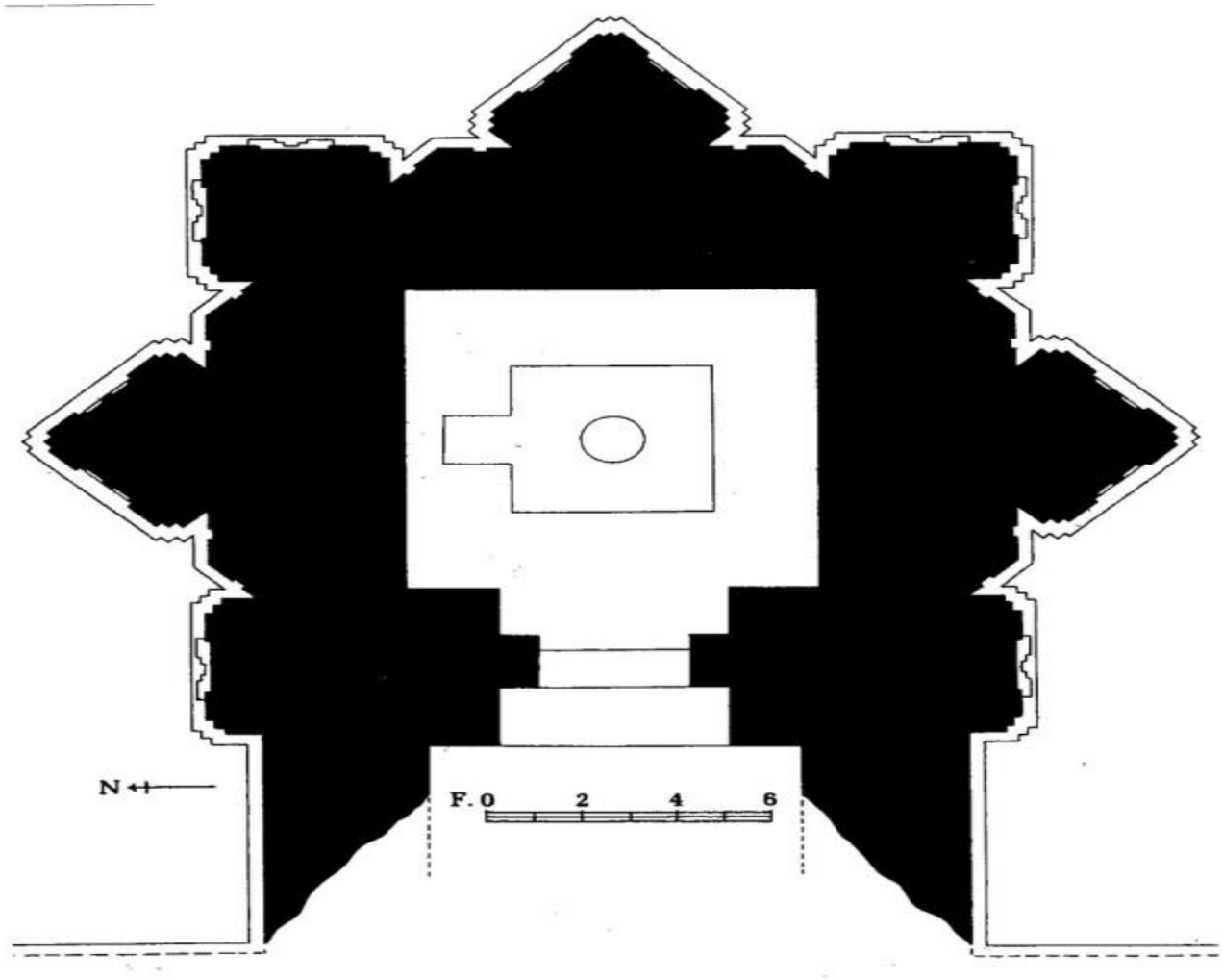


Fig. 131 – A plan of the temple at Dhobini, southwest of Damakheda (sixty kilometers south west of Bilaspur), a pilgrim center for the religious sect of the Kabirapanthis. The outlay of the temple is – in the same way as in the Siva temple in Adbhar – designed by placing two squares at an angle of forty-five degrees.

The temple of Sri Venkatesware, near the town of Tirupati in Southern India (Andhra Pradesh), is a fine example of the use of Vaasthu Shastra in religious building in India. The temple is situated on one of the seven hills, called Tirumala or 'sacred hill' and regarded as one of the richest temples in the world. The cupola over the *sanctum sanctorum* of the temple is gold plated. Some fifty thousand pilgrims visit the place every day and are thereby probably eclipsing Rome, Jerusalem and Mecca as far as the numbers of visitors are concerned.

The Brihadeshwara Temple at Thanjavur (Tanjore) is another famous temple, dating from the Cholas Period (900 – 1155 AD), when temple architecture reached its climax in Southern India.

The temple is dedicated to Lord Shiva and built in the tenth century by Raja Raja Choila. The temple is capped by a monolithic cupola weighting 81.3 tonnes. Within the shrine is the gigantic Mahalingam, the phallic symbol denoting the primeval energy of the Creator.

Many more examples can be given of Indian temples with tetradic features. There is little doubt that the four-fold had a prominent place in Hindu temple architecture. This observation has to be placed – just like the Roman Catholic cathedral building in Europe during the Middle Ages – in the context of time and place. It is not enough to point to certain tetradic features to draw conclusions about a cultural and/or religious state of mind. Architecture has to be place in a full specter of a historical consciousness. Further study of the Hindu and Buddhist architecture within other fields of human visibilities is therefore required, but cannot be done within the present book.

David LOY (1988) distinguished the nonduality (of subject and object) as a major characteristic of (Advaita) Vedanta, (Mahayana) Buddhism, and Taoism. He elaborated on this theme by placing division thinking in a wider context, but without mentioning the four-fold as an option. Quadralectic thinking is, undoubtedly, a non-dualistic experience and has an immediate interest in the philosophical treatment of this theme.

Nonduality is a major characteristic of the philosophical traditions of India and China and is associated with a non-dual perception, which seemed to be more prominent in the Eastern mind than in its Western counterpart (this suggestion is in itself an obvious duality!). 'The non-dualistic perspective can understand the dualistic experience, but not vice versa' is an observation (by Loy), which is directly related to the quadralectic rule that every (revolving) communication is limited by the division-type of the 'smallest part' participating in the interaction. The non-dualistic perspective of *Mahayana* Buddhism and *Advaita Vedanta* is reflected in the (temple) architecture resulting from this world view.

Buddhism began as an offspring of Hinduism in India in the sixth century BC. The founder of the creed was Siddhartha Gautama, who must have lived around 560 BC in northern India. His life is clouded in myths, but his decision to change his life was taken after he saw four things: an old man, a sick man, a dead man and an ascetic. He decided to start a quest to find the answer to the problem of pain and suffering. In his life of meditation, he found the *Four Noble Truths* (indicating the way of salvation):

——— 1. There is pain and suffering in the world

——— 2. The cause of suffering is desire

——— 3. The suffering will cease when desire stops

——— 4. To extinguishing all desire is to follow the Eighth-fold Path

In this road to salvation Gautama became a Buddha, the '*enlightened one*'.

Buddha's teachings spread all over India and Southeast Asia during the reign of Emperor Asoka (third century BC). The earliest written texts (canon) of his life are known as the *Pali Canon* or '*Theravada*'. The 'historical' school of Buddhism, which followed the 'Doctrine of the Elders', is called **Theravada** or **Hinyana Buddhism** (or Lesser Vehicle).

Buddha's teachings were systematically arranged and organized into three basic divisions known as '*Tipitaka'* (or three baskets).

1. The basket of discipline deals with rules and customs of the Sangha (the community of monks and followers);
2. The basket of discourses contains sermons by the Buddha and his close disciples and
3. The basket of higher or special doctrine gives a philosophical and psychological analysis of the *Dharma* (the eternal and impersonal Law).

A further tribute to the three-division in Buddhism is found in the so-called '*Three Jewels*':

1. The Buddha,

2. The Dharma (Law) and

3. The Sangha (Community).

The main virtues are compassion, moderation and humility. This *Theravada* Buddhism stressed monasticism and avoided belief in a god. The emphasis is on self-salvation. The creed moved to the east and survived in Sri Lanka, Thailand and south east Asia and is called 'Southern Buddhism'.

A more liberal type of doctrine changed the conservative-monastic Buddhist teachings in the second century AD. The idea of a *Bodhisattva* (being of wisdom) was developed: a 'saint', who is qualified to achieve the highest Buddha-nature (*Nirwana*), but voluntarily stays behind in a cycle of rebirth to help the rest of us.

A further innovation was called the Middle-Way (*Madhya-mika*), aiming at a cultivation of an inner tranquility by maintaining the balance between the extremes of self-indulgence and self-mortification. These teachings became known as **Mahayana Buddhism** (or Greater Vehicle). Its imagery appealed to a growing number of people in Afghanistan, India, Kashmir and Central Asia (in the third century), to China (fourth century), Nepal (fifth century) and subsequently in Korea and Japan (sixth century). The major migration northward is known as 'Northern Buddhism'.

Two additional practices developed in India. Tantrayoga was a system of yoga practices, which had originally no ties with Buddhism and consisted of 'secret' knowledge of an esoteric nature. Tantrayoga joined with Buddhism in the six century AD to form a new branch of Mahayana Buddhism called **Tantryana**. The doctrine was written in Tantric Sutras. The emphasis was directed towards the opposition between micro- (interior world) and macrocosmos (exterior world), the escape from dualities into a multiplicity of opposites, the acceptance of an all-

embracing Absolute in which the multiplicities and polarities unify and ultimately a salvation in the unification of opposites.

The way to salvation, which is an essential aim in Tantryana Buddhism, can be found in meditation techniques, using the five senses. In particular the visual stimuli are experienced in a specter of macrocosmic personifications, represented in *mandalas* and *thankas*.

The five *Djani-buddhas* were part of a system of meditation exercises called **Vajrayana**. The name Vajrayana is derived from the emblem of the fifth Djanibuddha (Vairocana), which was a thunderbolt (or *vajra* in Sanskrit). The flash of lightning symbolizes the speed and clarity of insight (OLSCHAK & WANGYAL, 1973). The Vishva-Vajra emblem is composed of two crossed *vajras*, pointing to the tantric symbol of indestructible essence of the appearances and the diamond-clear truth. The higher intentions of the fivefold (division) and the real consciousness of the four-fold (division) join their forces in the graphic and artistic manifestation of the Vishva-Vajra (fig. 132).

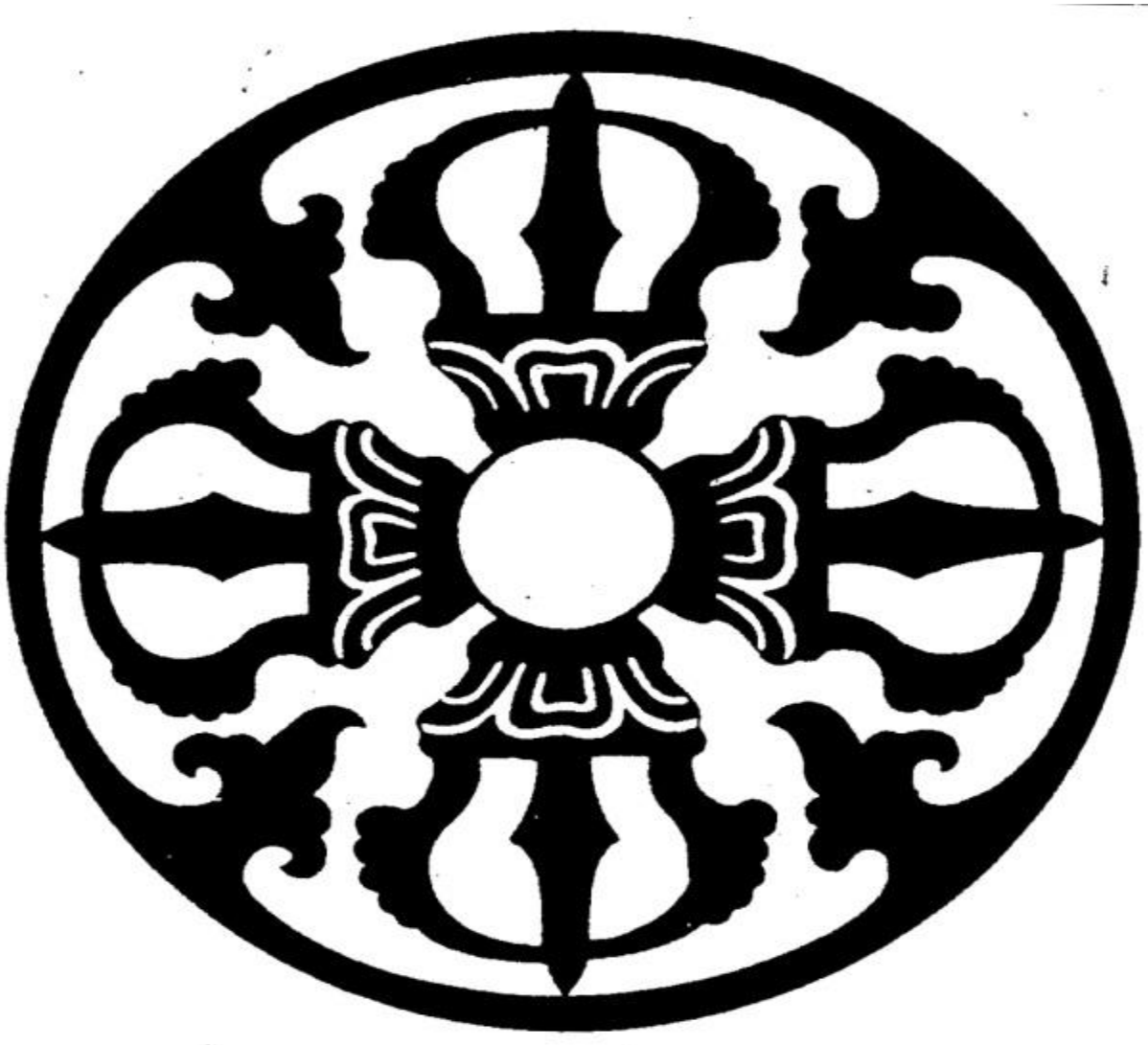


Fig. 132 – The *Vishva-Vajra* is the emblem of the fifth Djanibuddha (Vairocana). The two crossed thunderbolts (*vajra*) of this tantric symbol represents the indestructible truth.

The first appearances of *Djanibuddhas* in print dated from the early eighth century in Gansu (China). Tantryana Buddhism reached its zenith in Kashmir. This location at the crossroads of China, India and the West was a center of trade and exchange of ideas. The 'basic' Indian Buddhism and yoga were exposed to Iranian Manicheism, Nestorian Christianity and Chinese Taoism. This amalgam of beliefs entered Tibet, which had itself a history of animistic practices. The original shamanistic belief was called Bön and originated, according to tradition, in Iran (and not India).

The painted two-dimensional *mandala*, which appeared in the eighth and ninth century AD with the rise of the *Vajrayana*, became the major iconic image of Tibetan Buddhism. Its area of influence covered Tibet, Nepal, Bhutan, Mongolia and northwestern China (fig. 133).

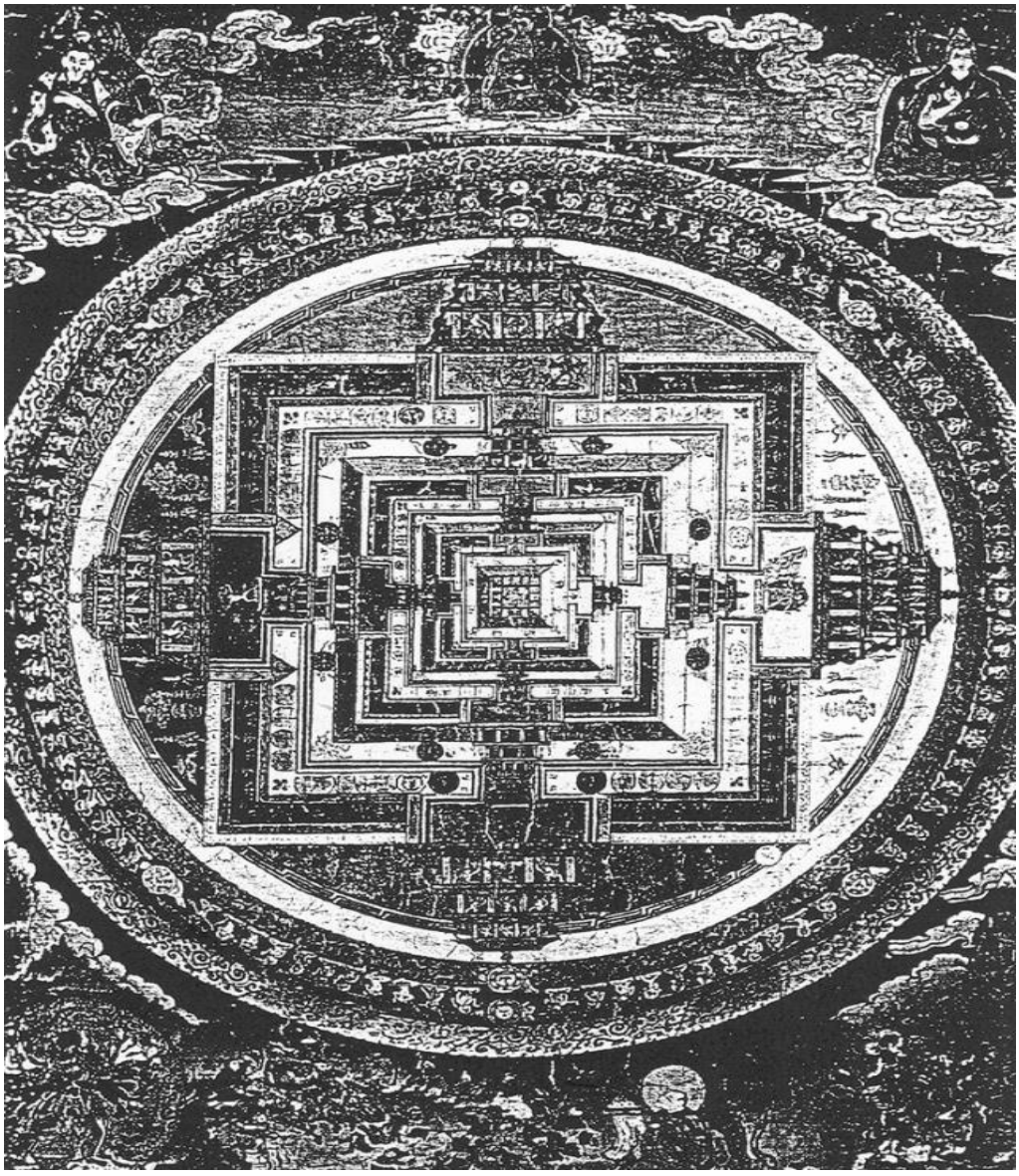


Fig. 133 – A gouache of a Kalachakra *mandala* with Mount Meru as the center of the world (Tibet, eighteenth century).

Everything in the Kalachakra *mandala* is a representation of some aspect of the deity and the universe. The word *kalachakra* means cycles of time (Wheel of Time). The Kalachakra Tantra consists of three such cycles.

1. External (laws of time and space, macrocosmos),

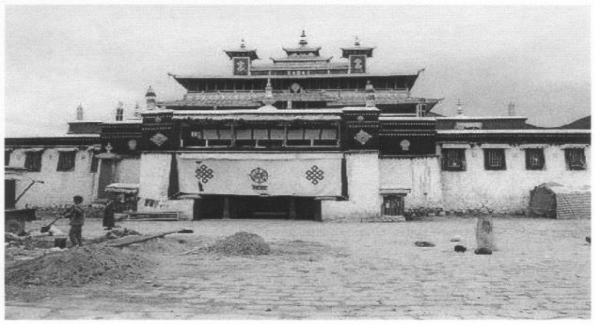
2. Internal (the elements and structure of the human body, micro-cosmos) and

3. Alternative (the doctrine of the meditational deity and its mandala, liberation).

Mandala's in Tibet are often made of colored sand and later destroyed as a lesson about the impermanence of life. Believers use the painstaking creation of the sand-mandala as an exercise to visualize, in meditation and reality, the steps along the 'Path of Enlightenment'.

The *mandala* found its expression in architecture, in particular in relation with the ground plan. The tetradic ground plan became the messenger of an ideal representation of building-in-general (the universe). The four-fold was lifted from its earthly dimensions into a cosmic awareness.

The Tibetan sanctuary of Samye Gompa, founded around 800 AD by King Tresong Detsen and *guru* Padmasambhava, is an example of the mixture of a *mandala* and a tetradic design (fig. 134). The central temple represents Mount Meru, while the surrounding temples are visualizations of the oceans and continents that encircle the sacred mountain.



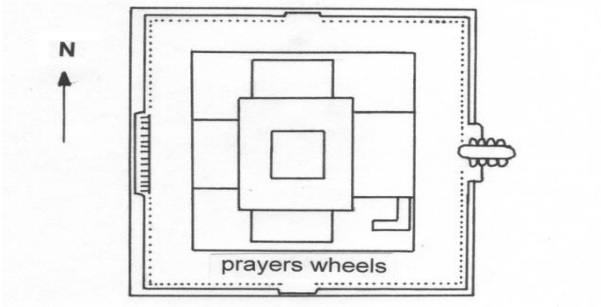


Fig. 134 – The Tibetan sanctuary of Samye Gompa is a monastic complex with the ground plan of a *mandala*.

The southern branch of the Silk Road was less used in the fourth and fifth century because of drought. The isolation of this part of central Asia resulted in a characteristic brand of Buddhism, before the influence of the Islam (KLIMKEIT (1988). The sanctuary of Rawak, in the desert north east of Khotan, was a perfect Buddhist building. Its *mandala* design can still be recognized in its present ruinous state (fig. 135).

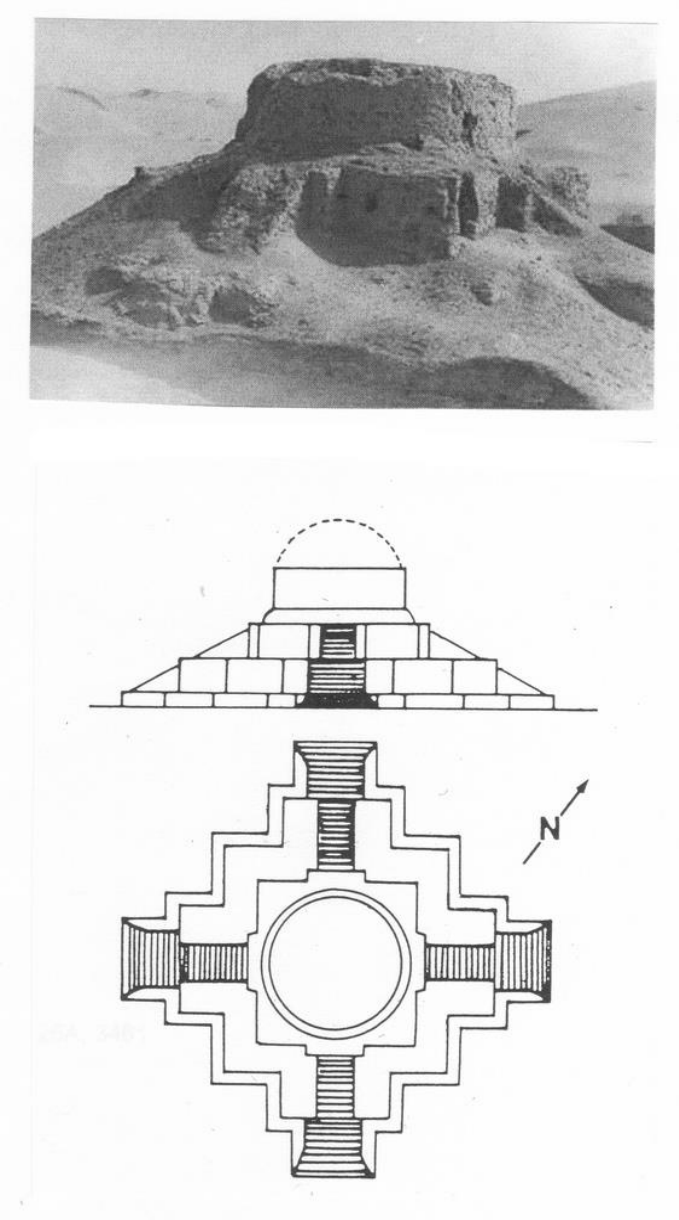


Fig. 135 – The Stupa of Rawak near Khotan represented a *mandala*. Khotan was one of the important places on the Silk Road. Marco Polo visited the city at the end of the thirteenth century.

The Swedish explorer Sven Hedin (1865 – 1952) discovered the '*Pompeji der Wüste*' after he left Khotan (Chotan) on the 14th of January 1896 with a party of four man, three camels and two donkeys (in order to test the latter's endurance in an extended desert march). They followed the track to the north and rested at the village of *Tavek-kel* (HEDIN, 1919; II, p. 44). From here they went eastwards into the desert and crossed the sand dunes to a place called *Takla-makan* (which is also the name for the western extension of the Gobi Desert). Hedin indicated this place on the map as '*Ruinen einer alten Stadt*' (fig. 136).

Fig. 136 – This map in the travelogue by Sven Hedin (Band II) gives the position of Chotan and his discoveries in the Takla-makan Desert. He indicated the same name (Takla-makan) to the '*Ruinen einer alten Stadt*', east of Tavekk-kel, where he found ancient writings ('Papier'), small

Buddha statues and kitchen utensils. The place was five years later identified by Aurel Stein as Dandan-Uiliq and yielded much more antiquarian material.

The ruins of a complete city, later called Dandan-Uiliq, were buried in the sand. Hedin and his men did some diggings in houses with a square ground plan. He mentioned in his book the paintings on the walls of a house, showing kneeling women, with their hands folded as in praying and men, who were dressed like the Persians (fig. 137). Furthermore, dogs, horses and boats (!) were depicted. Hedin did not mention any *stupa*, although there was a house, which was called by his guides the '*Bud-chane*' (Buddha temple).

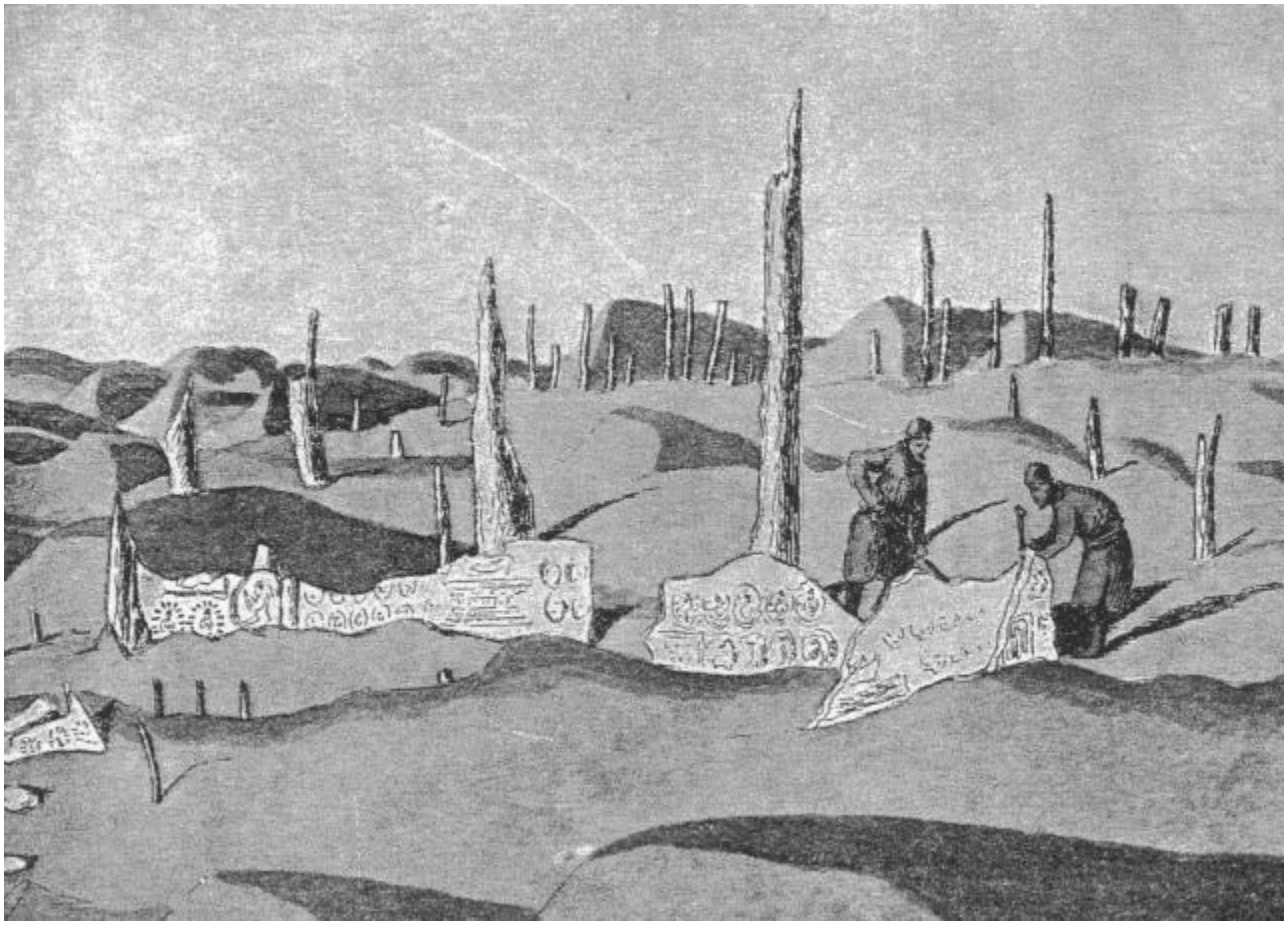


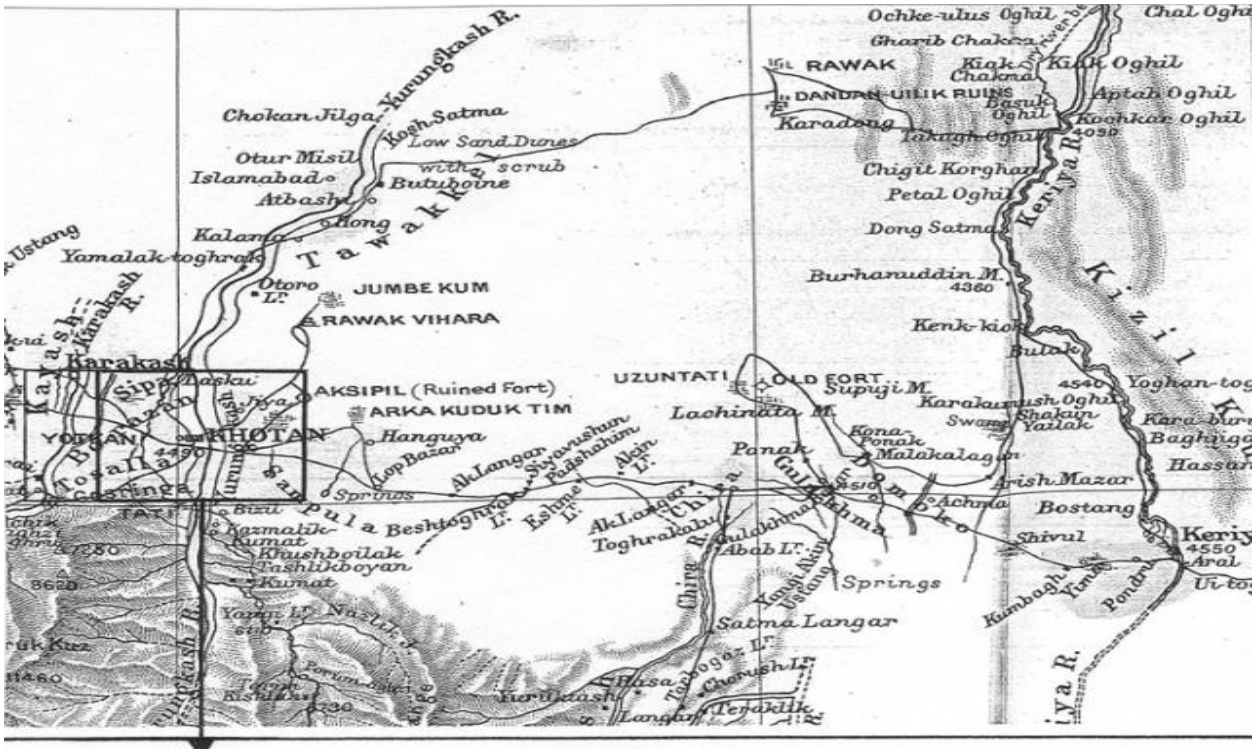
Fig. 137 – The house with the painted walls as Sven Hedin found it on the 23rd of January 1896 in the sand-covered city of Takla-makan.

Hedin made an estimate with regards to the age of the sand-buried city, by using the speed of the moving sand dunes as an indication (HEDIN, 1919; Band II, p. 49). With a yearly movement in a southern direction of about fifty meters, he calculated an age of some thousand years for the ruins. However, the predominantly southwestern direction would make the total fifteen hundred years, and he added (?) some five hundred years for winds from the opposite direction. Therefore, the city of Takla-makan dated, in Hedin's rough estimate, from the first century BC.

The Hungarian-born explorer Aurel Stein (1862 – 1943) and his team followed the tracks of Hedin some five years later (1900-1901). The description of the wanderings around Khotan and the subsequent discovery of the *stupa* of Rawak as 'by far the most imposing structure I had seen among the extant ruins in the Khotan region', reads like an adventure story (STEIN, 1903; p. 446, Chapter XXX). However, some doubt about the nature of his antiquarian tours can be cast by a modern observer. Stein is nowadays seen by some as a ruthless raider and typified as a 'foreign devil' (in particular after his third expedition between 1913 – 1916 and his failed fourth expedition).

By comparing the two travelogues it can be noticed that Stein's knowledge of the region, the culture and the language was more thorough and complete than Sven Hedin's understanding. He went, for instance, after the completion of the work in Dandan-Uiliq (on the 4th of January 1901) to Rawak, about seven miles to the north of the Dandan-Uiliq ruins. At this place – not to be confused with the place of the same name near Khotan – Stein did some more 'semi-topographical and semi-antiquarian' work under difficult wintry circumstances. His Stormont-Murphy Arctic Stove provided the heat and his dog Yolchi Beg, a little fox terrier, gave company.

Further explorations to the east yielded ruins of deserted villages, like Endere, with interesting historical material. The greatest success came, after he returned to Khotan and set off to a 'ruined site known to treasure-seekers as Ak-sipil' ('the White Walls'). When he continued on the 10th of April 1901 and marched north about fourteen miles, he arrived in the evening at the ruins called 'Rawak' ('High Mansion') (fig. 138).



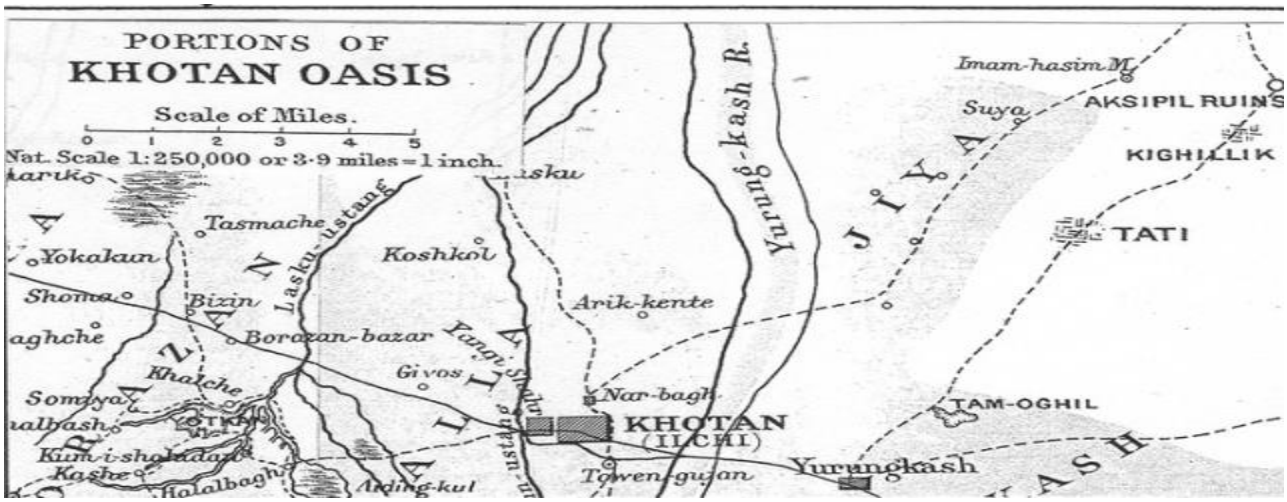


Fig. 138 – Aurel Stein wanderings around Khotan in the years 1900 – 1901 are shown here on a map accompanying his travelogue in the Geographical Magazine of 1902. The names of local places and the details of the map are more precise than those of Sven Hedin's map (in fig. 136). The stupa of Rawak Vihara (in fig. 135) is nearer to Khotan, behind the ruined fort (circumvallation) of Aksipil.

When Aurel Stein started his excavation on the morning of the 11th of April 1901, he soon realized that the sanctuary of Rawak (meaning 'High Mansion' or 'The Pavilion'), offered scope for extensive excavations and ordered reinforcement of labourers. And Stein was right: he stood at the brink of excavating one of the most impressive relics of ancient architecture ever found.

Some rows of colossal stucco figures of Buddha and Boddhissattvas were found near the inner south corner of the quadrangle, which were discarded by treasure seekers. The diameter of the *stupa* dome measured a little over nine meters. The top of the structure had been broken of, but the extant masonry reached about ten meters above the court. He discovered four well-preserved Chinese copper-pieces, deposited as votive offerings. The numismatic evidence of a further hundred copper coins with the '*Wu-tchu*' symbol, gave a clue to the probable age of the *stupa* (Han dynasty).

Stein was unable to transport the extremely friable stucco and the large relievos and decided to bury them again after they had been photographed and described. '*It was a melancholy duty to perform, strangely reminding me of a true burial, and it almost cost me an effort to watch the images I had brought to light vanishing again, one after the other, under the pall of sand, which had hidden them for so many centuries*'. When he returned some five years later, he found that most statues were smashed.

The introduction of Buddhism in China can be traced back to 255 BC, when the Indian Mauryan emperor Asoka established Buddhism as a state religion in his empire. Further advance of Buddhism took place during the Han Dynasty (200 BC – 200 AD), when many trade contacts with Central Asia also favored an intellectual exchange – although Confucianism was the official state orthodoxy. A Chinese Buddhist community came into existence in the first century BC.

Buddhism was mixed with the Taoist tradition in China, because Taoist terms were often used by the translation of the teachings of Buddha. With the rise of the Tang Dynasty, in the beginning of the seventh century AD, Buddhism expanded and became an important part of the Chinese culture, with a great influence on art and architecture. However, in the ninth century there was persecution by a Taoist emperor, which lasted a short time, but was sufficient to mark the end of an era of influence in China. Buddhism remained a major factor in religious life, but Confucian teachings became dominant in the court.

The four Buddhist schools (Hinyana, Mahayana, Tantryana and Vajrayana) shared the form of the *stupa* as the first representation of the Buddha. Emperor Asoka, who ruled India from 274 – 232 BC, constructed many stupas, or sacred mounts, throughout India to worship Buddha. The *stupa* is not a building in a traditional sense, but originally a burial or reliquary mound, which developed into a symbolic object. The Emperor also erected many stone pillars and monolithic columns, as a focal point of worship – like the famous one with the four lions in Sarnath, near Benares, where Buddha preached his first sermon.

The Hill of Sanchi near Vidisha in Madhaya Pradesh (seventy kilometers northeast of Bhopal, India) was chosen by Emperor Asoka to build a great religious center. The places of worship cover the whole period of genesis, development, flowering and decay of Buddhist art and architecture over the period from the third century BC to the twelfth century AD.

The Great Stupa at Sanchi, with its present height of sixteen and a half-meter, encases an earlier one, which was made of burnt bricks and mud. Stone casing was used in the reconstruction in the middle of the second century BC when a terrace with a double flight of steps, balustrades and a paved processional path were added. A triple 'parasol' – set within a square railing or *harmika* – tops the hemispherical dome. Entrances of Stupa No. 1 were added in the first century AD. They make a right angle with the cross design of the *stupa*, forming a *swastika* (GLAUCHE, 1995; fig. 139).

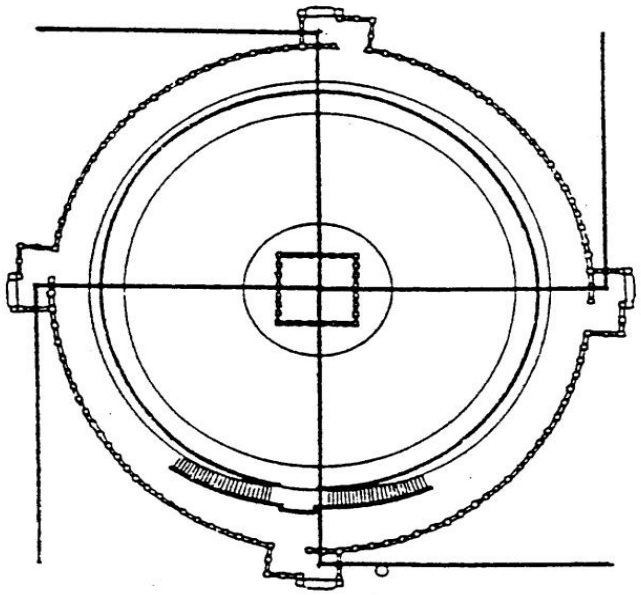


Fig. 139 – This ground plan of the 'Great Stupa' of Sanchi (India) indicate the four gateways (or *toranas*), which were later added to make the plan look like a *swastika*.

The outer railing and the gates of the 'Great Stupa' are richly sculptured. The southern gate reveals the birth of Buddha, the northern gate is crowned by the wheel of law, the eastern gate depicts the young Gautam leaving the house to seek enlightenment and the western gate gives the Seven Incarnations of Buddha (four trees and tree *stupa*).

The worship of Buddha was not made visible through figures at Sanchi, but through the artistic use of symbols.

1. The **lotus** represents Buddha's birth,

2. The **tree** signifies his enlightenment,

3. The **wheel** (of Law, *Dharmachakra*) points to his first sermon

4. The **stupa** is his *nirvana* or salvation.

These various stages are mirrored in the four sacred Buddhist pilgrimage centers in Nepal and India as mentioned in the '*Mahaparinirvana Sutra'* (The Book of the Great Decease) in Chapter V:

1. His birthplace at Lumbini, east of Kapilavastu (Nepal);

1. Buddha Gaya (Bihar), where he attained enlightenment under the sacred pipal tree (*Ficus religiosa*). The nearby Mahabodhi Temple has a beautiful pyramidal spire and is situated on the location of Buddha's original Bodhi Tree;

1. Sarnath or Isipatan (Uttar Pradesh), where he delivered his first sermon and

1. Kushinara or Kashinagar (Uttar Pradesh), where he died.

These four places/stages are, by and large, in agreement with the Four Quadrants of the quadralectic world view. Characteristics of these areas are given in terms of (a dualistic) visibility. The First Quadrant (I) is designated as a place of the invisible invisibility. It contains an indeterminable and arbitrary 'beginning', before any division took place. The Second Quadrant (II) is regarded as the realm of ideas and the first division, creating an invisible visibility. The Third Quadrant (III) harbors the consciousness of limitations and the establishment of a visible visibility, known as empirical reality. Finally, the Fourth Quadrant (IV), with its visible invisibility, is the summary of previous and future experiences.

The symbolism of the elements is reflected in the different architectonic parts of the *stupa* (fig. 140). The lower part of the *stupa* consists of a square or cube with terraces and steps in various forms. This square/cube symbolized the earth, the most stable and static geometric body. The covering dome is related to the mass of a world all-encircling sea (water). The triangular shape

of the conus points to the highest aims, in the same way as flames reach for the sky (fire). The calyx, symbolizing Buddha's upturned begging bowl, was associated with the sky (air) and the flaming drop is a reference to space (quintessence).

Element	Representation	
	Architecture	Graphic
Ether/ Space	Flaming drop	-
Air	Calyx	-
Fire	Conus	Triangle
Water	Sphere	Circle
Earth	Cube	Square

Fig. 140 – The symbols of the (five) elements are reflected in the architectural parts of the *stupa* and its symbolic rendering is given in geometrical figures. The *stupa* can be viewed as an architectural representation of the path to enlightenment. It is note-worthy that a quadralectic interpretation of the elements lacks this evolutionary aspect.

The most famous of all the *stupa* temples is the Borobudur, forty kilometers northwest of Yogyakarta (Indonesia). The form recalls a *stupa*, a hemisphere or segment of a globe. Some say that the Candi Borobudur is designed as a *mandala* rather than a *stupa*, but both can be true: the former refers to the ground plan as representation of the world (fig. 141), while the latter is the three dimensional symbol of *nirwana* (fig. 142).

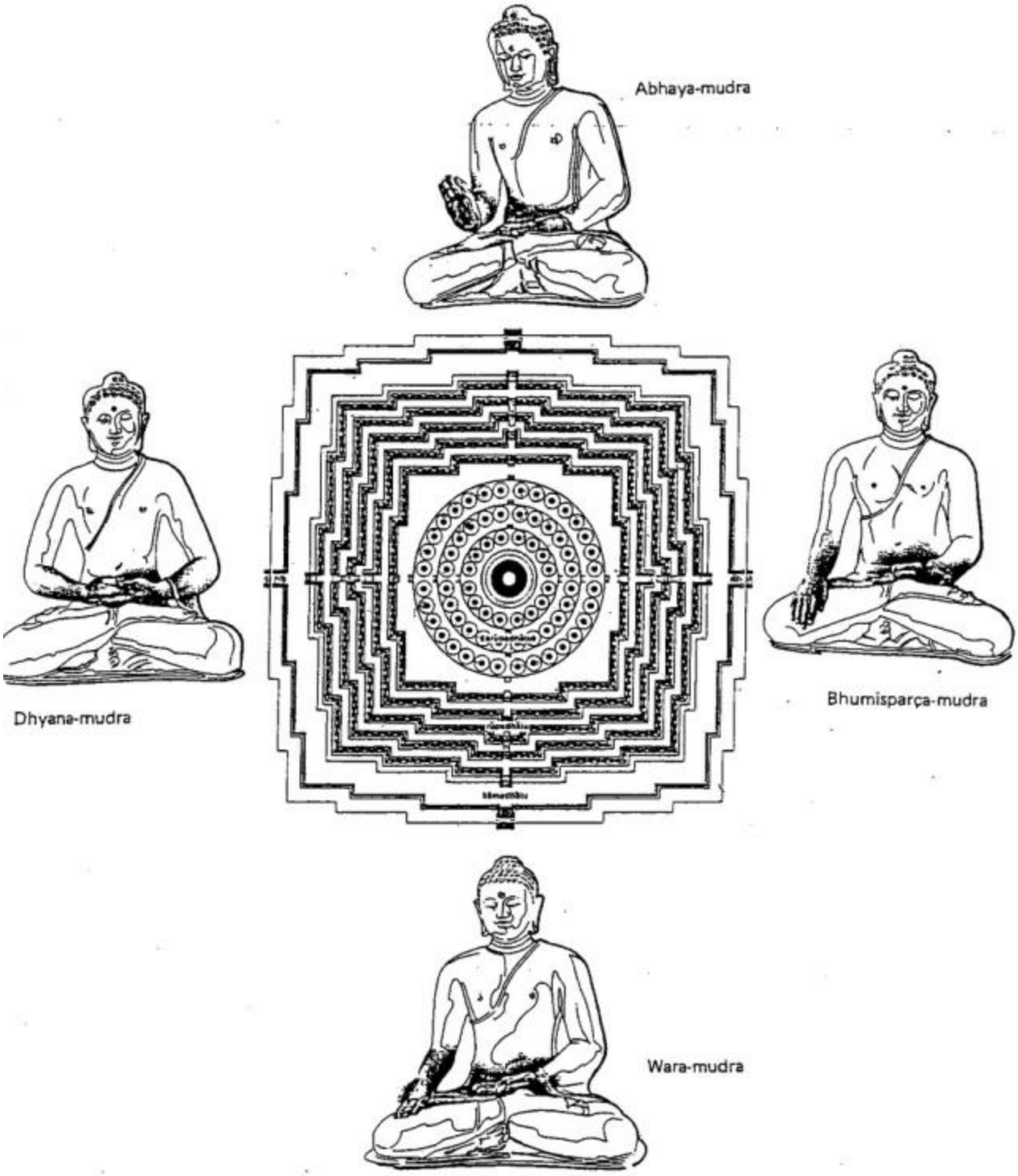


Fig. 141 – The ground plan of the Borobudur Temple on the island of Java, Indonesia. The positions of the hands of Buddha (*mudras*), which are given in the sculptures of the galleries, have a symbolic meaning. They not only indicate directions, but also the phases of human development. The Bhumisparsha *mudra* signifies the 'touching of the earth' (east). The Varada (Wara) *mutra* symbolizes charity and compassion (south). The Dhyana *mudra* points to the

principle of wisdom (west). The triangle shape is an identification with the mystic fire and the Three Jewels of Buddhism. The Abhaya *mudra* means fearlessness, associated with protection and peace (north). It is a sign of good intentions. Finally, the Dharmachakra *mudra* is related to the 'Wheel of Dharma' – pointing to the middle. It sets the teaching of the Buddha in motion.

Buddhism had reached the island of Java in the fourth century, although no architectural remnants of this period are present. The highlights of temple building took place during the Shailandra Dynasty (750 – 850 AD). The Mahayana Buddhism was introduced during this period, but also the more esoteric variety of Vajrayana Buddhism took hold in much the same way as it entered Tibet and Nepal and the Far East during the Indian Pala Dynasty (750 – 1200).

The construction of the Borobudur, the largest Buddhist temple, took place in four different stages. Stage I (775 – 780) comprised the base and two galleries. Two more galleries were added in Stage II (790) added and the foundations were improved. Stage III (810) consisted of dismantling of the round structure, which was built at the end of stage II and three new circular terraces were made. Stage IV (in 820 and 840) consisted of further modification and improvement of the existing structure, with no major changes. The finishing touches were probably made around 900 AD.

The site was then abandoned in the middle of the tenth century, just like the other places of worship in Central Java, when the power base shifted to eastern Java. The Islam religion came to the island of Java in the thirteenth and fourteenth century and the abandoned Borobudur was further covered in volcanic ash and vegetation. Some of the mythical stories about '*the mountain of a thousand statues*' were recorded in the middle the eighteenth century, in the '*Babad Mataram'* (History of the Kingdom of Mataram).

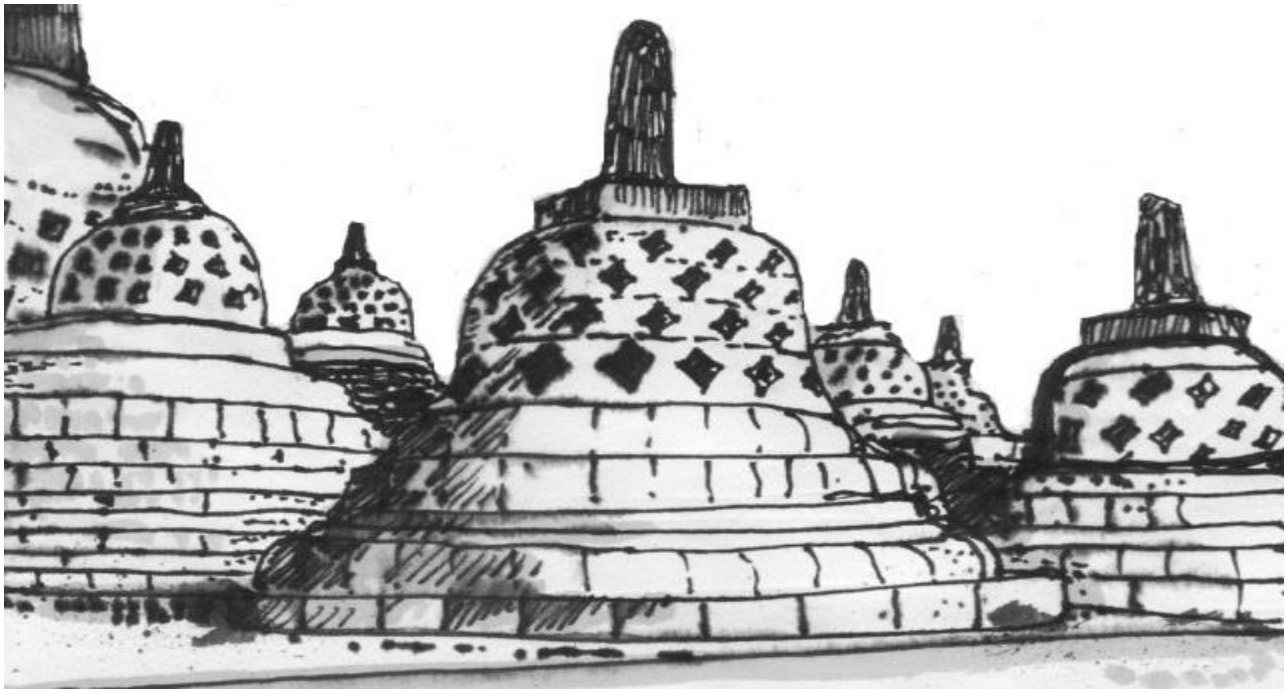


Fig. 142 – The Borobudur temple can be interpreted as a large *stupa*. The five-storied pyramid is subdivided into the three main spheres of Buddhism. 1. The square base (*kamadhatu* or World of Desire) symbolizes the worldly life. 2. The four terraces above the base represent *rupadhatu* (World of Forms) with reliefs of Buddha's life. 3. The following three circular terraces are related to the World of Formlessness (*arupadhatu*). Seventy-two smaller stupas (above) adorn these latter terraces, reflecting the unity of the whole into the multitude of the parts. 4. An eight-meter high stupa, with a diameter of about fifteen meters, crowns the upper terrace. 5. Finally, a *lingam*-like spine, symbolizing the calyx and flaming drop, tops the stupa (*nirvana*).

It was only when Java became under British rule (1811 – 1816) that the Borobudur caught the attention of the Western world. Sir Thomas Raffles, the English governor of Java, rediscovered the monument in 1814 and paid a visit on May 18th, 1815. Raffles ordered the Dutch engineer H.C. Cornelius to clear the place. The photographic work of Van Kinsbergen (1821 – 1905), during the year 1873, resulted in a series of forty-three photographs, which gave the ruins a further publicity. The hidden base was discovered by J.W. IJzerman, the Chairman of the Archaeological Society in Yogyakarta, in 1885 and a Borobudur display at the *Exposition Mondial* in Paris in 1900 added greatly to the temple's fame.

Serious restoration started at the beginning of the twentieth century by Theo van Erp (1874 – 1958), a Dutch army engineer. He replaced missing Buddha heads and panel stones and dismantled and rebuild the upper three circular terraces and stupas. Many sculptures were cleaned of moss and lichen, but he was unable to solve the recurrent drainage problems, which caused sagging of the gallery walls. N.J. KROM (1920/1930) gave a detailed description of the restoration, with many photos of the sculptures of the galleries. The tide of structural instability turned when the Indonesian government and the UNESCO launched the 'Save Borobudur' campaign in 1968. The project was completed in 1983 and the temple was put on the UNESCO's World Heritage list in 1991.

The Shivaistic (Hinduistic) temple-complex of Prambanan is situated some forty kilometers to the east of Borobudur. It matches the beauties of the contemporary Borobudur temple in many respects.

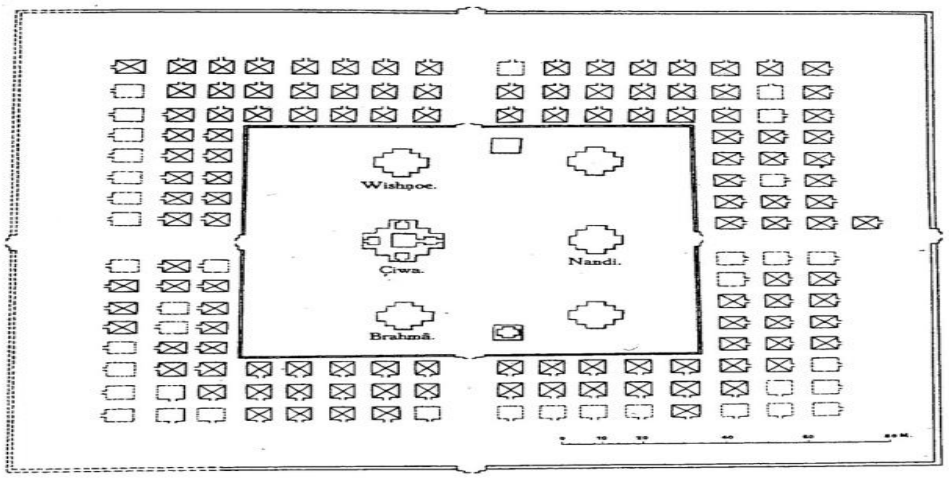


Fig. 143 – A Map of the Prambanan temple complex by N.J. Krom (1920).

Prambanan is Java's largest Hindu temple complex (fig. 143). The Lara Djong-grang group (also spelled as Lorojonggrang) consists of three large structures and five minor temples surrounded by a wall. The main temple is nearly fifty meters high and is dedicated to Shiva (Ciwa), the Destroyer. The Vishnu (Wisnu) temple is situated at the north of the Shiva temple and the Brahma temple to the south. The complex originally consisted, in Krom's reconstruction, of two-hundred-and-fifty-six (16 x 16) minor temples, called *candi perwara*. The middle square was enclosed by a second wall of 220 x 220 meters (modern sources give the figures 110 x 110 meters) The openings in the walls were orientated towards the four wind directions. A possible third boundary wall was located (by Krom), enclosing a terrain of 400 x 400 meters (or more recent 222 x 390 meters) This outer wall also had four openings, but was not parallel to the inner walls.

The (Buddhist) *Candi Sewu* lies one kilometer north of Prambanan. Its name means 'Thousand Temples', because some two hundred-and-fifty minor temples are placed around the central temple. The complex, dating from the first half of the ninth century, was built in the shape of a *mandala* (fig. 144) and covers an area of 185 x 165 meters.

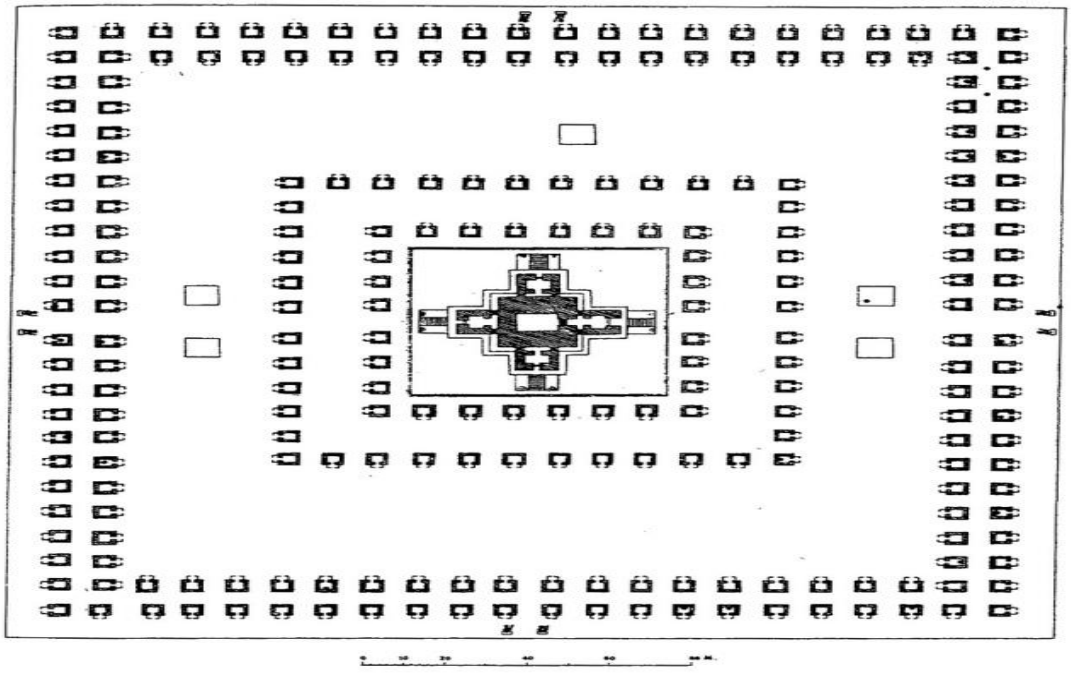


Fig. 144 – A map of the *Candi Sewu* (Tjandi Sewoe) complex, near Prambanan (Indonesia) shows the general plan of a *mandala*. The cruciform main temple is positioned in the middle of an enclosed area and surrounded by the 'Thousand Temples', protected by a second wall.

The *Candi Sewu* has a cruciform ground plan and four stairs in the wind directions (fig. 145). The central part of the building is surrounded by four *cellas*, one of which leads into the main room (from the east).

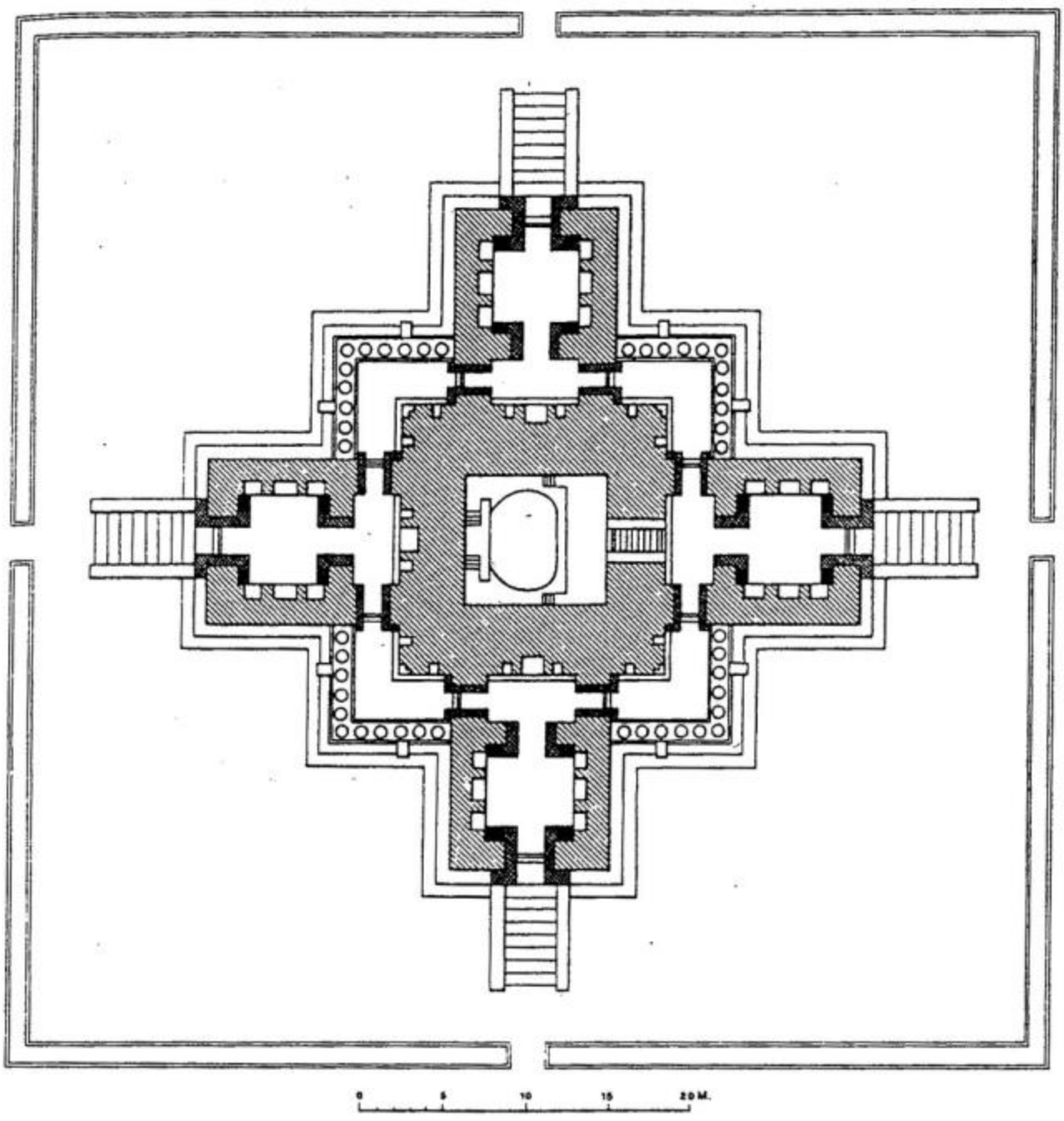


Fig. 145 – The main (central) temple of *Candi Sewu* (Tjandi Sewoe) is an example of a perfect tetradic building, bearing all the symbolism of the one-, two-, three- and fourfold in its architectonic layout.

Many more '*candi*' (temples) and sanctuaries in Indonesia could be mentioned as representatives of Hindu and/or Buddhist devotion to higher division thinking. The general intention is not exhaustive, but the general conclusion of Indonesian religious architecture has to be one of recognition.

Further study is necessary on the connection of the Hindu religious views and the worship of Buddha on the one side and the modern conception of four-fold thinking on the other side. A search for deep-seated links on a psychological level should rise above the level of numerology. Ways can be explored in the earlier mentioned terrain of non-duality (LOY, 1988; p. 163 and 180). This major characteristic of the philosophical and religious traditions in India and China – and other countries under their sphere of influence, like Indonesia) – might hold the key to an understanding. Both views aim to escape the rigid bonds of oppositionality and point to a world of higher division thinking.

The Buddhist temples of Myanmar (formerly Burma) are another major contribution to the tetradic way of building. Unfortunately, the access to the country was a long time restricted by the government, which wanted to protect its culture from Western influences. Only recently the doors were slightly opened and regulated visits to the country are possible.

More than two thousand temples and pagodas can be found in Bagan, in central Myanmar. Bagan, or Pagan as it was sometimes known, stood as the capital of Myanmar from 1044 to 1287. The golden Shwe-Zigon temple (No 1.) is regarded as the most national of all Myanmar's pagodas (fig. 146).

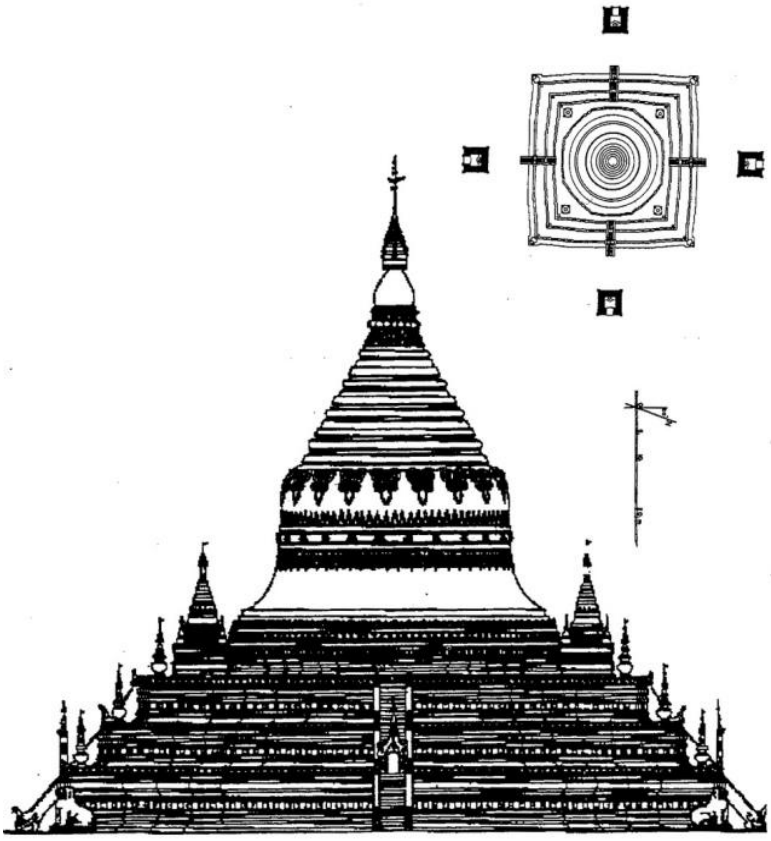


Fig. 146 – The Shwe-Zigon temple in Bagan (Myanmar), built in the eleventh century, became the prototype for the later pagodas in the country.

The Ananda temple (no. 2171) also rates high as one of the finest temples in the country. The building activities started in 1091 during the reign of King Nanwrahta (1044 – 1077 and was finished under King Kyanzittha (1084 – 1113). Major restoration and reconstruction took place in 1979. The ground plan is cruciform and the temple square can be entered from all four sides through projecting porches (fig. 147). The central shrine has four large standing Buddha images representing Gautama (west), Kakusandha (north), Konagamana (east) and Kassapa (south).

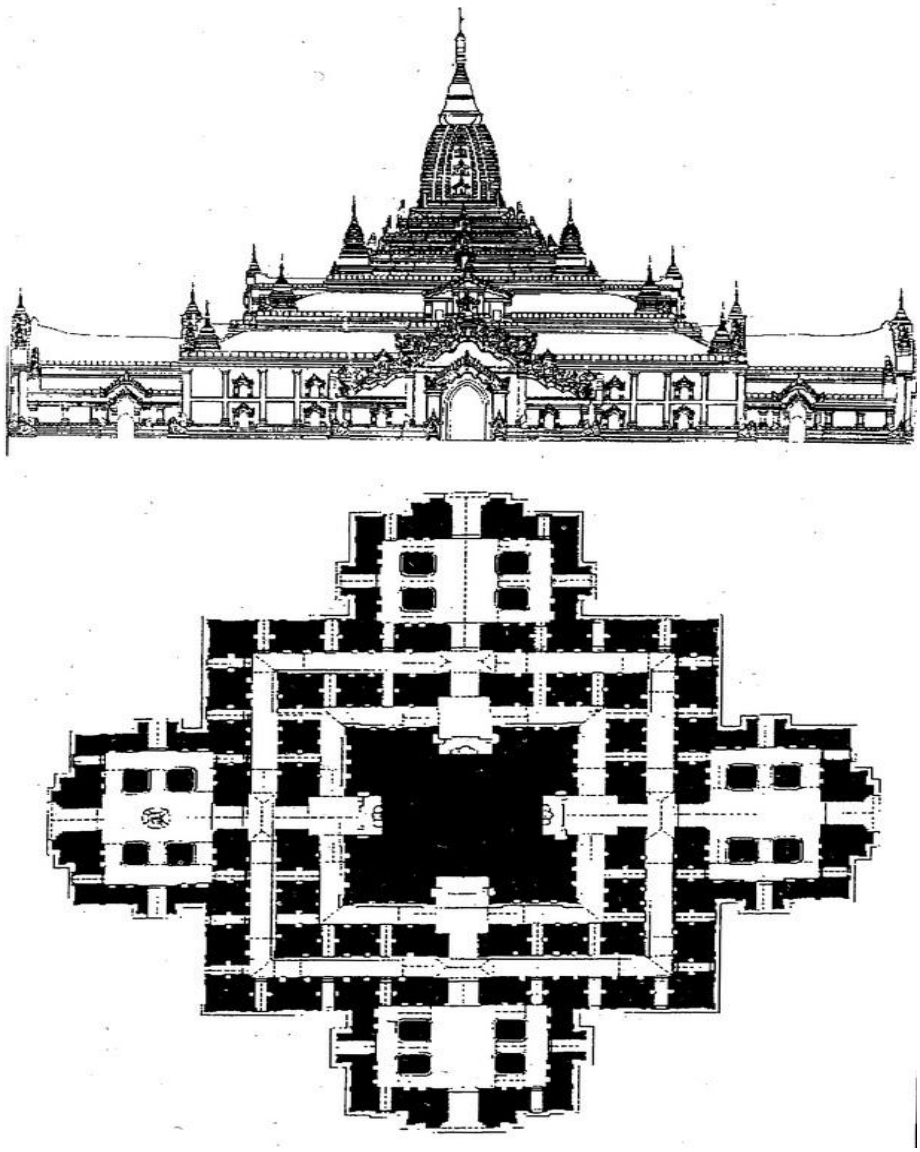


Fig. 147 – The elevation (above) and ground plan (below) of the Ananda temple in Bagan (Myanmar/Burma). The temple shows different styles and forms of the Early Period, which had come to rest. An enclosing wall and four gateways are integrated in the entire composition.

Paul STRACHAN (1989) provided a comprehensive overview of the architecture in Imperial Pagan in Myanmar. The compilation of some ground-plans of temples (fig. 148A/B), do hardly justice to his informative book, but they are a good illustration of the general 'tetradic' character

of Buddhist architecture in the country. The wide field of temple and pagoda building in Myanmar will be left unexplored at the present time, despite the fact that it represents a major concentration of 'tetradic' buildings in the world.

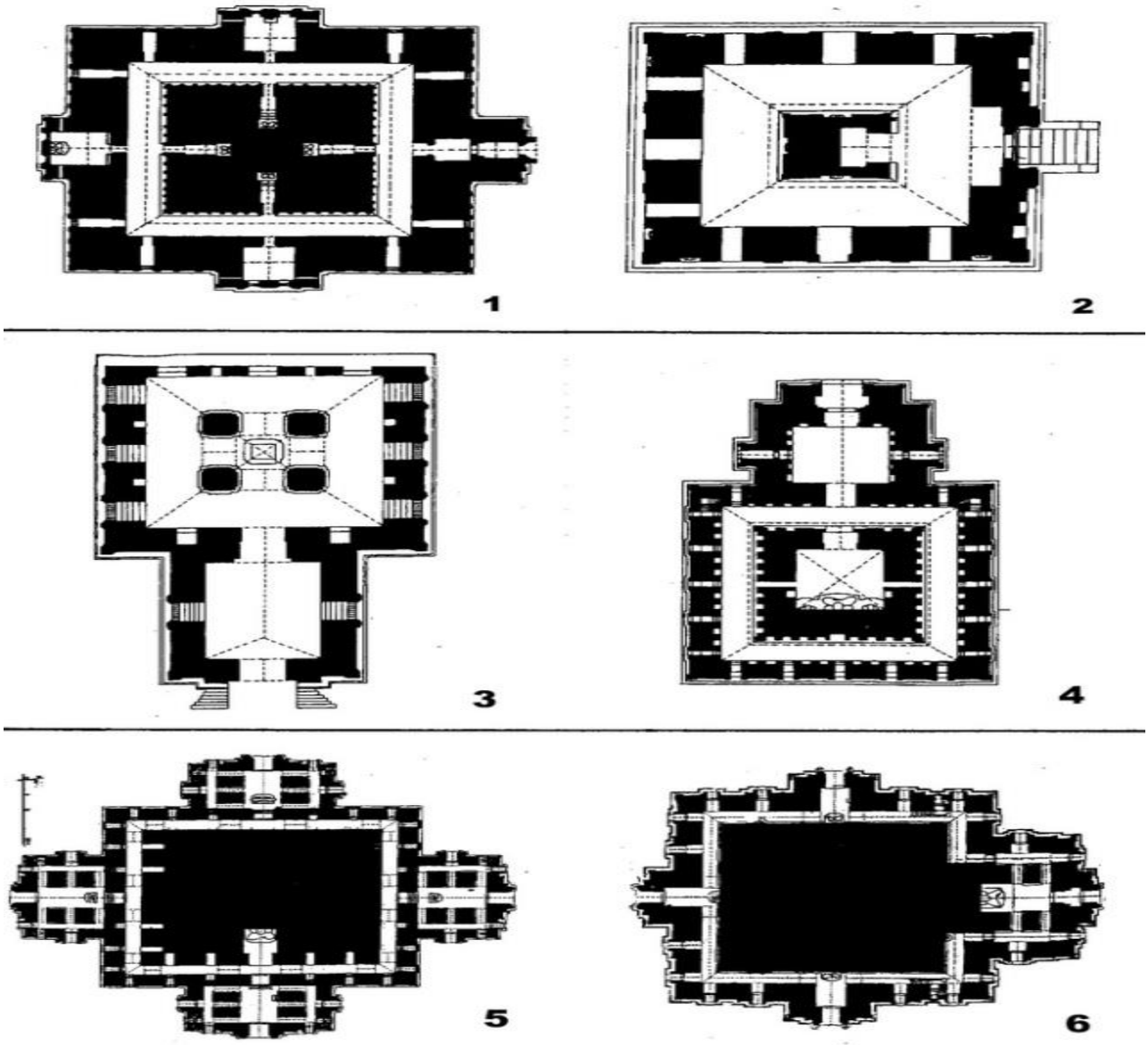


Fig. 148A – The pagodas in Myanmar (Burma) indicate a strong preference to a tetradic way of building. **1.** Myin-pya-gu plan forming a *lei-myet-hna*; **2.** Groundplan No.1600 Nat-Hlaug-Kyaung. Shrine confining the Devas. Warly Period, c. 850 – 1120; **3.** No. 1239 Nan-hpaya ground plan. Perfect *gu* temple. Reign of Anawrahta, first free-standing Buddhist 'cave' at Pagan. The sikhara is carried by four freestanding piers; **4.** No. 1192 Naga-Yon groundplan; **5.** Ground plan of No. 771 Dhamma-Yan-Gyi. Grondplan based on the Ananda's Greek cross type of plan; **6.** No. 758 Sulamani ground plan. The Later Period 1170 – 1300. Inner Circle Monuments. Sithu II (1174 – 1211), tireless temple builder. In: STRACHAN (1989).

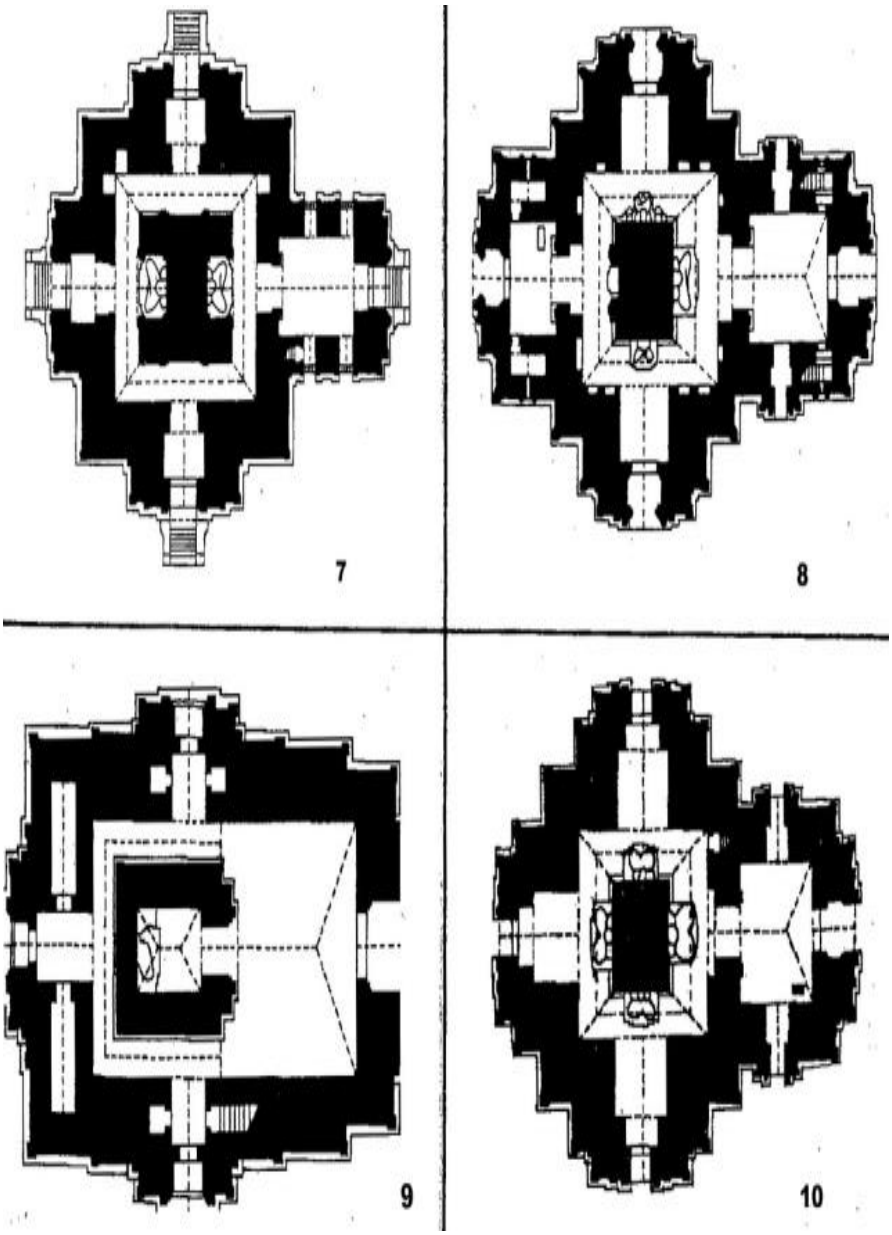


Fig. 148B – The pagodas in Myanmar (Burma) indicate a strong preference to a tetradic way of building. **7.** Plan of Sein-nyet Ama. No. 1085-6 Sein-Nyet Ama (elder sister); **8.** Ground plan of No. 1391 Myinkaba Kubyauk-Nge. Late Period; **9.** No. 995 Bogyoke-mi groundplan; **10.** No. 482 Thambula ground plan. Late Period. In: STRACHAN (1989).

A different story – as far as the number of visitors is concerned – can be told about the famous temple complex of Angkor Wat (Cambodia), which has a high score on the list of the world's most-favored tourist attractions. The Khmer civilization was almost unknown in the West before the nineteenth century. However, Chinese travelers – in particular Zhou Daguan, who wrote a travelogue on his visit to Cambodia at the end of the thirteenth century – were familiar with the country. The French naturalist and explorer Henri Mouhot (1826 – 1861) is credited to bring Angkor under the attention of the West, when his account was published in English in 1864.

Mouhot died three years earlier from malaria in Laos. His tomb was accidentally found near Luang Prabang in 1990, overgrown by the jungle.

The history of Cambodia can be put together by the many inscriptions, in Sanskrit and Khmer, which were found within the area of the Angkorean Empire. Mouhot's questioning (in his '*Travels in Siam, Cambodia and Laos*', 1864) that 'one cannot but ask what has become of this powerful race, so civilized, so enlightened, the authors of these gigantic works?' is fully justified. The Angkorean period covers the period between 802 – 1327 and listed some twenty-eight kings. Yashovarman I (889 – c. 900) founded the first capital in the Angkor area and made his 'state' into the largest and the most influential political power of Southeast Asia. He built his temple-mountain on the hill of Phnom Bakhen, which was considered the geometric center of the town. Under the rule of Rajendravarman (944 – 968) the Baksei Chamkrong, East Mebon and Pre Rup temples (fig. 149) were built, respectively 1.5 kilometers to the north west (Baksei Chamkrong) and six kilometers to the northeast of Angkor Wat.

The early (Pre-Ankorean) temples in Kmer architecture followed the Indian tradition of a temple-mountain until the tenth century. The temple was surrounded by a ditch and had a raised access along the axis of the shrine's main entrance door. This basic idea was further developed in the eleventh century when a stepped pyramid with a sequence of terraces covered the original hill. This design became more complicated with additions like the *gopuras* (gateway buildings) and annexes to the shrine ('libraries').

The plan of the temple evolved from square to cruciform to central-circular. Two major types can be recognized in the Angkorean period: a centre plan with buildings grouped within the concentric enclosure (like the earlier Pre Rup, fig. 149) and a plan with the buildings arranged along a linear axis (ROVEDA, 1997).

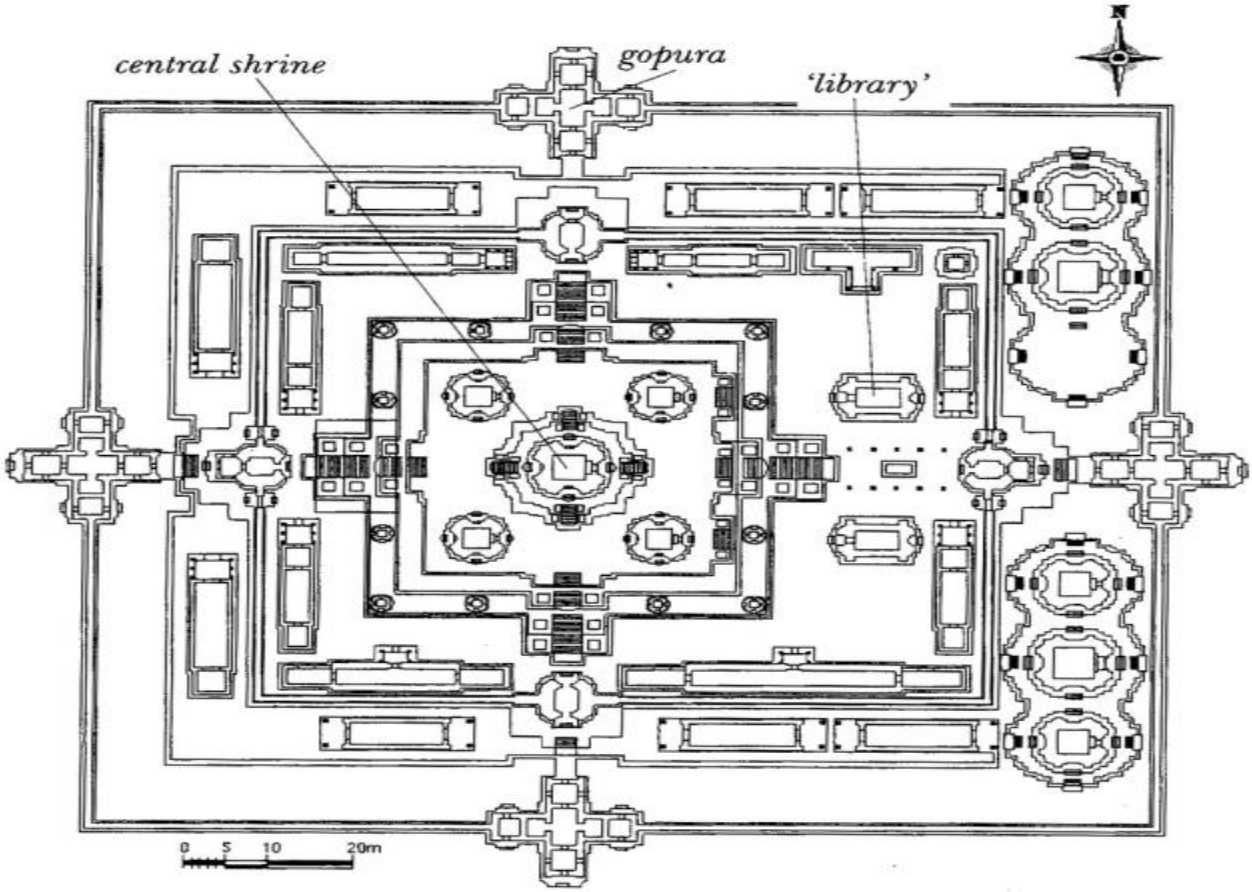


Fig. 149 – The concentric plan of Pre Rup, a small temple which is situated some six kilometers north east of Angkor Wat. The building functioned as King Rajendravarman's state temple and was built in 961. It consists of two enclosures with gateways at all four sides, a pyramidal structure and five shrines on top.

King Udayadityavarman II (1050 – 1066) was engaged in the building of the colossal temple-mountain of Bapuon, situated three and a half kilometers north of Angkor Wat (fig. 150). The temple was built around 1060 and dedicated to Shiva. The three-stepped pyramid has four enclosures and contains many relief panels, in particular in the *gopuras* of the second enclosure. The temple is poorly constructed and collapsed several times, but restoration is now in progress.

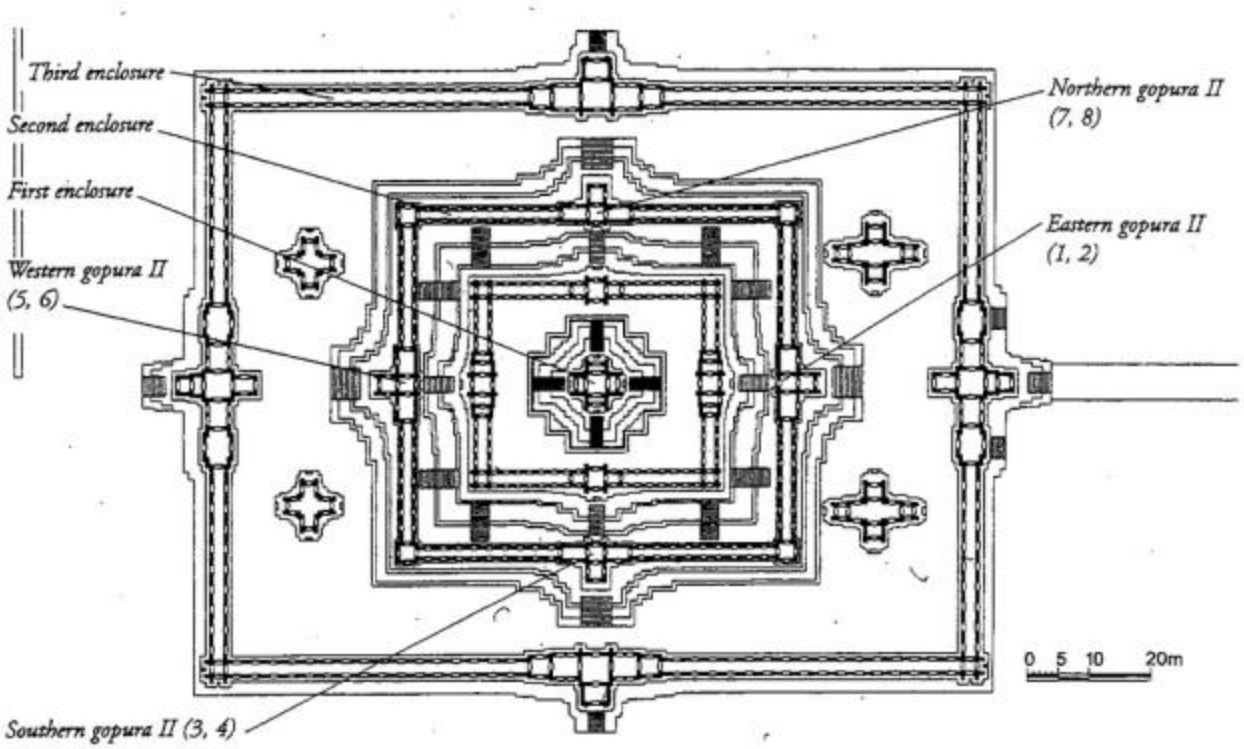


Fig. 150 – A plan of Bapuon temple, which was built around 1060 by Angkorean King Udayadityavarman II.

The most important Khmer ruler was probably Suryavarman II (c. 1100 – c. 1150), who built the Angkor Wat temple during the first half of the twelfth century as a mortuary temple (Late Angkorean). The complex was situated in the southeastern quadrant of the old Angkor city of King Suryavarman I. The orientation system is reversed – with the main doors opening towards the west instead of the usual east, which points to a special function as a temple of the underworld.

Angkor Wat reached its fame not only by its architectonic outlay (fig. 151), but also by the many sculptures, which adorn the galleries. The panels depict such subjects as the Battle of Kurukshetra (western gallery, south wing) and the Battle of Lanka (western gallery, north wing). The life of King Suryavarman II is given in the reliefs of the southern gallery (west wing). Other subjects are the Heavens and Hells (southern gallery, east wing), the Churning of the Ocean of Milk (eastern gallery, south wing) and the Victory of Vishnu (eastern gallery). Many more scenes can be seen in the corner pavilions, the hall (*preau*) and the courtyards.

Just to the north of Angkor Wat is the much larger complex of Angkor Thom, which consist of the Royal Palace, (the earlier) Bapuon, a number of smaller shrines and the Bayon on the crossing of the gateways.

The Bayon has a central position in Angkor Thom and was built in the heart of the new capital of King Jayavarman VII (1181 – 1219). The king was devoted to Mahayana Buddhism, although Hindu gods were also venerated. A Buddha was installed in the central sanctuary, but the

sculptural reliefs do not make many references to the Buddhist world view. The scenes cover the day-to-day life of the Khmer people and refer to contemporary topics. The central shrine had a circular plan and the entrance faces towards the east. The inner and outer galleries are richly decorated with a continuous frieze of reliefs with soldiers and a military parade (outer eastern gallery), naval battles (southern gallery), but also religious themes and everyday life.

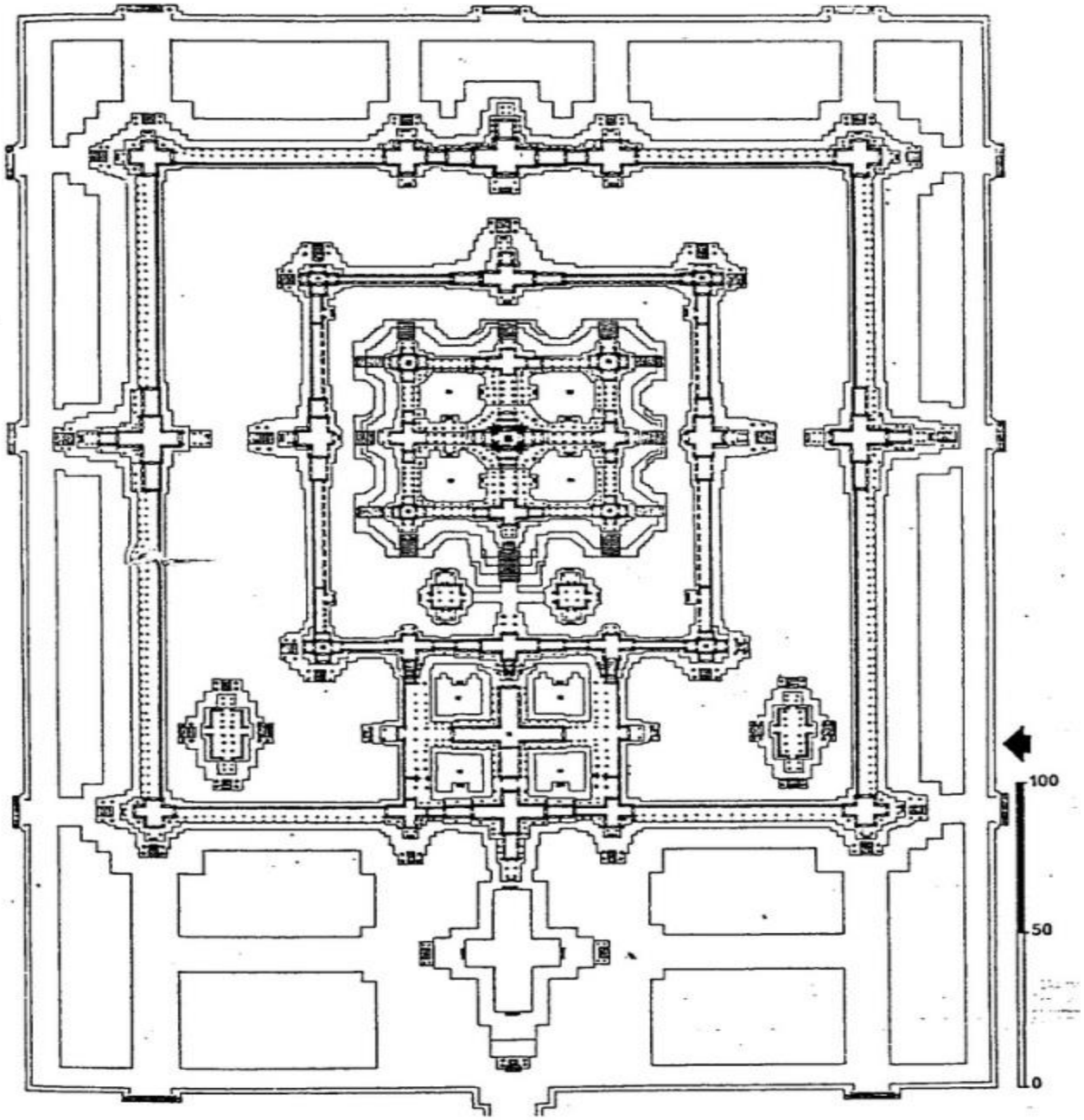


Fig. 151 – The central complex of Angkor Wat, as seen on this map, was constructed in the first half of the twelfth century by Suryavarman II and dedicated to Vishnu.

The eastern religious temple architecture cannot be parted without at least a brief look at China. It is realized that this subject is far too extensive to cover in a limited space. One outstanding example of its rich cultural heritage will be included here to complete this brief survey.

The most sacred of all Chinese structures is the Great Altar of Heaven in Beijing (Peking). The emperor prayed every year in the middle of the first lunar calendar month for a good harvest. The ritual was established in the third century BC. The Circular Hall of Prayer for Good Harvest (Tiantan) was built for this purpose during the Ming Dynasty in 1420 (fig. 152). It became, together with the Forbidden City and the Summer Palace, a symbol of Beijing and a major attraction for tourists. The complex follows tetradic lines, with a reference to time and division thinking.

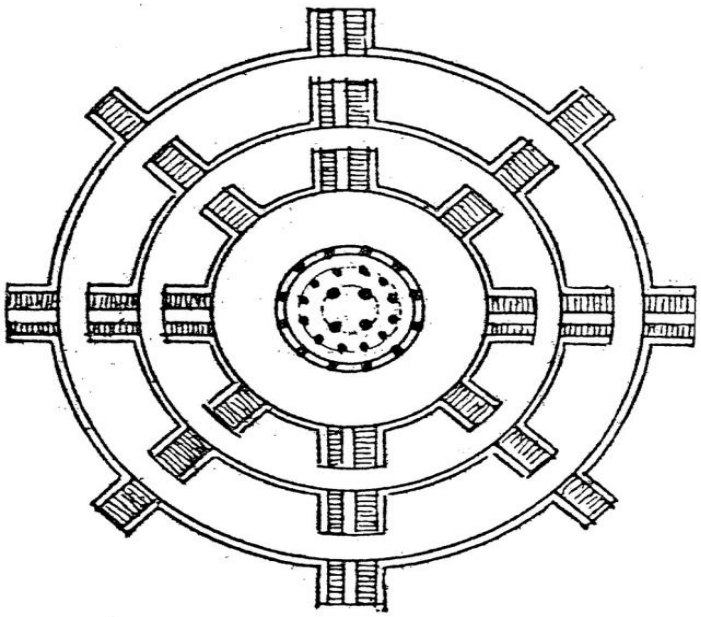


Fig. 152 – The Great Altar of Heaven in Beijing (China) consists of three circular terraces with marble balustrades (called the Altar for Grain prayers).). There are four staircases to the four cardinal points and four lesser intermediate staircases. The wooden structure – without iron nails, steel rods or cement – is thirty-eight meters high and thirty meters in diameter. The four pillars in the center represent the four seasons of the year, while the inner twelve pillars symbolize the months. The coffer ceiling of the hall is carved with dragons and phoenixes.

The most-rewarding and interesting overview of Asian religious architecture has to be completed here. A preliminary conclusion can be, that the (religious) thoughts, which motivated the architects and builders of temples, shrines and pagodas in the eastern hemisphere – and resulted in such prominent buildings – are not far removed from the basic four-fold ideas. Division and movement are recognized (in the East as well as in the West) as the prime movers of a communication and the elementary appearances find their spiritual translation in the material reality of sacred buildings.Further research in the religious architecture of Asia from a quadralectic point of view will, most likely, give a conformation of these first findings. The field is still wide open and inviting for any serious scholar. https://quadralectics.wordpress.com/3-contemplation/3-2-temples/3-2-5-eastern-religious-architecture/

CHAPTER
Some Aspects of Stūpa Symbolism

Anagarika Brahmachari Govinda. "Some Aspects of Stūpa Symbolism." *Journal of the Indian Society of Oriental Art* II/IV, no. 2/1 (1936): 25-44.
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I. Origin of the Buddhist stūpa.

Wherever Buddhism has flourished it has left its visible traces in form of monuments which have their origin in the tumuli of prehistoric times. These tumuli were massive structures in form of hemispheres, cones, pyramids and similar plain stereometrical bodies which contained the remains of heroes, saints, kings or other great personalities.

In India the more or less hemispheric form, as we know it from the first Buddhist stūpas or caītyas (p. 95 Figs. 1, 3), has been the prevalent type of such monuments. That they were erected for great rulers (cakkavattí) in pre-Buddhistic times according to the oldest Aryan tradition—perhaps in connection with the prehistoric nordic Kurgans—is to be seen from Dígha Nikāya XVI, 5, where the Buddha mentions in his conversation with Ānanda that "at the four cross roads they erect a cairn to the king of kings."

The Buddha proclaims that the same honour should be given to the Awakened Ones and to their true disciples.

"As they treat the remains of a king of kings, so, Ānanda, should they treat the remains of the Tathāgata. At the four cross roads a cairn should be erected to the Tathāgata. And whosoever shall there place garlands or perfumes, or paints, or make salutation there or become in its presence calm in heart that shall long be to them for a profit and a joy.

The men, Ānanda, worthy of a cairn, are four in number. Which are the four?

A Tathāgata, an Able Awakened One, is worthy of a cairn. One awakened for himself alone (Pacceka-Buddha) is worthy of a cairn, a true hearer of the Tathāgata is worthy.

And on account of what circumstance, Ānanda, is a Tathāgata, an Able Awakened One (or 'a Pacceka Buddha, ' etc.) worthy of a cairn?

At the thought, Ānanda, 'This is the cairn of that Able Awakened One' (or 'This is the cairn of that Pacceka Buddha' etc), the hearts of many shall be made calm and happy; and since they had calmed and satisfied their hearts, they will be reborn after death, when the body has dissolved, in the happy realms of heaven. It is on account of this circumstance, Ānanda, that a Tathāgata, an Able Awakened One (or a Pacceka Buddha, etc.,) is worthy of a cairn." (Transl. by Rhys Davids in Vol. II., Dialogues of the Buddha.)

In this way the Buddha gives a new meaning to the stūpas. They are no longer intended to be the abodes of souls or spirits or mere receptacles of magic substances as in prehistoric times, but memorials which should remind later generations of the great pioneers of humanity and inspire them to follow their example, to encourage them in their own struggle for liberation and to make their hearts "calm and happy".

Thus the caītya is elevated from the service of the dead to the service of the living. Its meaning does not remain in cantered in the particular relics, or the particular personality to whom those remains belonged, but in that higher actuality which was realized by the Holy Ones. The Buddha does not say 'a stūpa should be erected for me or for my disciples' but 'for the Awakened Ones and their disciples'.

Thus the stūpas did not become objects of hero worship but symbols of nibbāna, of illumination.

In this connection it may be mentioned that some of the old stūpas were covered from top to bottom with small triangular recesses for oil lamps, so that the whole monument could be illuminated and appeared as one huge radiating dome of light.

The universality of the principle of enlightenment (bodhi) and the boundlessness of the Enlightened One who has surpassed the limits of individuality, who is deep and immeasurable like the ocean;—this universality is expressed in the cosmic symbolism of the stūpa. Its main element, the cupola, in fact, imitates the infinite dome of the all embracing sky which includes both, destruction and creation, death and rebirth. The early Buddhists expressed these principles by comparing the cupola of the stūpa to the water bubble and the egg (aṇḍa) as the symbol of latent creative power (as such 'aṇḍa' was also a synonym for the universe in the oldest Indian mythology), while the kiosk or altar-like structure (harmikā) which rose on the summit of the cupola (p. 95), symbolised the sanctuary enthroned above the world, beyond death and rebirth. Nepalese stūpas, which in many respects have preserved archaic features, decorate the harmikā with painted human eyes, thus suggesting a human figure in the posture of meditation hidden in the stūpa: the crossed legs in the base, the body up to the shoulders in the hemisphere; the head in the harmikā. This also corresponds to the psycho-physiological doctrine of the cakras or centres of psychic force, which are located one above the other in the human body and through which consciousness develops in ascending order: from the experience of material sense-objects through that of the immaterial worlds of pure mental objects, up to the supramundane consciousness (lokuttara-cittaṁ) of enlightenment which has its base-in the crown cakra of the head (sahasrara cakra). The latter would correspond to the harmikā.

The symbolism proceeds in two lines, the cosmic and the psychic; they find their synthesis in the psycho-cosmic image of Man, in which the physical elements and laws of nature and their spiritual counterparts, the different world planes (loka) and their corresponding stages of consciousness (lokiya cittāni) as well as that what transcends them (lokuttara-cittaṁ) have their place. That such ideas go back to the earliest periods of Indian history can be seen from representations of the Jain world system in the shape of a human figure.

The altar-shaped harmikā on the summit of the cupola was crowned by one or more honorific umbrellas of stone and served, in accordance with its symbolical importance, as a receptacle of relics; in pre-Buddhistic times these were buried most probably in or under the massive and more or less flattened stone hemisphere or its (round) terrace-like base if such a one existed. The resemblance of the harmikā to a sacrificial altar is perhaps not unintentional, because the Holy One, instead of sacrificing other beings, sacrifices himself to the world. As the Buddha teaches:There is only one sacrifice which is of real value, the sacrifice of our own desires, our own "self".[1] The ultimate form of such a sacrifice is that of a Bodhisattva who renounces even nirvāṇa until he has helped his fellow-beings to find the path of liberation.

From the standpoint of the sacrificial alter also, the later idea, which compares the harmikā with the element of fire, gets a new significance. Even the eyes on the harmikā of Nepalese stūpas fit into this symbolism, because according to the Tantras, fire (agni) corresponds to the eye (faculty of vision, also of inner vision).

The stūpas were surrounded by great stone fences (vedikā) originally made of wood, as their architectural character indicates, separating the sacred place from the profane world. Most of them were decorated with auspicious signs in order to ward off evil influences and to prepare the minds of the worshippers before entering the sanctuary. Four beautifully carved gates, (toraṇa), the climax of the decorations of the fence, opened towards the four quarters of the world, emphasizing the universal spirit of the Buddha Dharma, which invites all beings with the call: 'come and see!' The inner space, between the fence and the stūpa, and the circular terrace (medhi) at the basis of the cupola were used as pradakśinā patha for ritualistic circumambulation in the direction of the sun's course. The orientation of the gates equally corresponds to the sun's course, to sunrise, zenith, sunset and nadir. As the sun illuminates the physical world, so does the Buddha illuminate the spiritual world. The eastern toraṇa represents his birth (buddha-jati), the southern his enlightenment (sambodhi), the western his 'setting in motion the wheel of the Law' (dhammacakkapavattana) or the proclamation of his doctrine, and the northern his final liberation (parinibbāna).

The entrances were built in such a way that they appear in the ground-plan as the four arms of a svastika (p. 95, Fig. 2), which has its centre in the relic shrine on the top of the hemisphere in other words: in place of the cosmic centre, which according to ancient Indian ideas, was mount Meru with the tree of divine life and of knowledge (in Buddhism the Bodhi tree), there stood the Buddha, the Fully Enlightened One, who realized that knowledge in his own life.

II. Stages in the development of the stūpa in India and Ceylon.

It is interesting to see how closely the architectural development follows the spiritual growth of the Buddha Dharma. The early schools of Buddhism are mainly realistic. They are still under the influence of the historical personality of the Buddha. The fact that he lived in this world, as a human being and attained his aim in this earthly life, is still in the foreground and urges them to imitate his career. Their mind is directed on the practical fulfilment of his precepts and the monastic rules as given by his first disciples. The Vinaya stands in the centre of their attention; to them the life here is more important than the life to come, the empirical world more actual than the worlds beyond, the objects of perception have comparatively more reality than the perceiving subject: concentration and pacification of the mind are the highest virtues.

The original elements of the stūpa speak the same language if we analyse them from the psychological point of view. The ground-plan and starting principle of the stūpa is the circle, the symbol of concentration. As a three-dimensional form the stūpa is essentially a hemisphere; it represents the principle of concentration in a higher dimension which does not only co-ordinate the forces of one plane but creates an equilibrium of all the forces concerned, a complete relaxation of tension, the harmony of coming to rest within oneself. Every point of the surface is equally related to the centre, gets its meaning and its importance from there, immune against external influences or disturbances, combining concentration and restfulness.

The earliest stūpas did not attain the shape of a perfect hemisphere but rather of a spheric calotte (p.95, Fig.I) which, together with the cubic harmikā structure on its crown, produced an earth-

drawn effect. The cube by virtue of its own inherent principle of resistance, inertia or heaviness deprives the spheric contour of its abstract or transcendental effect, just as the early Buddhists rejected transcendental problems and metaphysical speculations, contenting themselves with the empirical world. But this was not a narrow or materialistic contentment. According to the Buddha's teaching, the empirical world does not denote a constant factor but something that grows and expands its limits according to the growth of our mind and experience so that even what we call metaphysical may come into the range of the physical and empirical. The higher jhānas for instance, and the worlds corresponding to them are transcendental only to those who have not experienced them. For the Buddha they are part of the empirical world. His anti-metaphysical attitude is not a negation of higher realities but, quite on the contrary, an affirmation of the possibility to attain them, which would be precluded if people would content themselves with intellectual definitions and speculations.

This also shows the limits of rationalism, which has been declared the main feature of the early Buddhists by misinterpretation of their realistic and empiric tendencies. They accepted 'ratio' as a means of expression or an approach to the Dharma but never as the ultimate principle for the attainment of enlightenment.

This we have to keep in mind if we call the archaic type of stūpas realistic, empirical or earth-drawn: specially the last term is well to be distinguished from earth-bound. All these terms are to be regarded as synonyms of experience, as opposed to speculation, transcendentalism, philosophic idealism, etc. The architectural relationship to the earth corresponds exactly to the spiritual connection of the Buddhist with the earth as the foundation of his experience, as the firm ground on which, ever conscious, the structure of his life and thought is erected.

While in other religions heaven or the life to come form the centre of gravity, Buddhism has re-installed the life here in its legitimate rights. Man creates his own hells and his own heavens. Why then to wait? Why should one not begin right now to bring down the heaven into this life here? Thus the true Buddhist stands with both his feet firmly planted on the earth, without a glance towards heavenly rewards and delights, solely bent upon liberation.

The bhūmisparsa-mudrā, the gesture of touching the ground which has become one of the characteristic features of Sakyamuni, the historical Buddha (and this not without reason) is the iconographical counterpart of the archaic ('historical') type of the stūpa and the most perfect expression of 'this-sidedness' or earthliness in a new and higher sense.

Those schools which centered round the tradition of the historical Buddha naturally preserved the archaic type of the stūpa; not only on account of their conservativism, but mainly because this type of architecture was the most adequate expression of their mentality and their religious ideal.

It is not surprising that Ceylon as the country of Vinaya and as the home of one of the orthodox schools of early Buddhism has almost perfectly preserved the original shape of the stūpa. The monumental dāgobas of Anuradhapura for instance (pp. 96, 97), which were built in the period between the third century B.C. and the third century A.D., and even those of Polonnaruva, which are as late as the twelfth century A.D., (p. 98, Fig. I) do not essentially differ from their Indian prototypes, in Sanchi and Barhut. The cupola has retained its dominating importance in the shape of a plain hemisphere: the harmikā in some cases is even decorated in the old Indian fashion, imitating the structure of a railing (vedikā), which originally surrounded the altar-like relic

shrine. But the honorific umbrellas on top of it have changed into a more architectural form. They appear as an elongated cone with a number of horizontal notches, or rings, progressively diminishing towards the summit

It seems that the idea of the honorific umbrellas, which were held parallel one above the other as the insignia of royalty, had been fused with the idea of the tree of life on the summit of mount Meru or the tree of enlightenment which stands in the corresponding centre of the Buddhist world. In fact, the latter idea seems to have overgrown finally the first one, for in later times the honorific umbrella was actually fixed above the cone, thus showing that the cone was not regarded as a set of umbrellas. Furthermore it is explained in later scriptures that the different strata of the cone correspond to certain psychic faculties or stages of consciousness on the way to enlightenment and to their respective world-planes. This goes well with the symbol of the world-tree on the axis of the universe, representing the higher worlds which spread one above the other in innumerable planes beyond the summit of the sacred Meru like the branches of a gigantic tree.

The relation between the hemisphere and the socle has become closer. The substructure is no longer sharply separated from the cupola so as to form a terrace for circumambulation, but it is composed of several (generally three) projecting rings each a little narrower than the lower one. In this way the continuity of the general outline of the stūpa is not all at once interrupted, but the dynamic power of the main curve is gradually broken in the 'cascades' of the socle and finally arrested in the basic step. The basis has lost its independent importance and has become part of the greater body of the dome.

Railings (vedikā) of the Sanchi type have not been preserved in Ceylon, though there was a kind of an enclosure or demarcation of the sacred place around the monument serving as circumambulatory path (pradakṣinā patha). The oldest stūpa of Ceylon, the Thūparāma dāgoba, which goes back to the times of Asoka (272-232 B.C.) has its pradakṣinā patha on an elevated round platform which, together with the monument seems to have been protected by a roof. There are still two concentric rows of stone pillars, the inner ones higher than the outer ones, so that there can be hardly any doubt about their function. Even nowadays we can find 'roofed' dāgobas in Ceylon, for instance at Danbadeniya (westward from Polgahawela) and Gadaladeniya near Kandy. But in all these cases the dāgobas are of small dimensions. The Thūpārāma dāgoba too, according to the proportions of the stone pillars, must have been much smaller originally, and we can not take its present shape as representative of the oldest stūpa architecture in Ceylon.

The platforms of the other old stūpas at Anuradhapura, like Mirisveti, Ruvanveli, Jetavana, Abhayagiri etc. (which are to be dated from the second to the first century B.C.) were quadrangular, the sides corresponding to the four chief points of the compass as in the case of the toraṇas. But in place of the latter there were four small shrines or altars annexed to the base of the dāgoba. These shrines are also to be found at the main dāgobas of Polonnaruva.

The modern Sinhalese dāgoba (p. 98, Fig.2) on the whole remains true to the original character of its predecessors. The several elements of the structure, however, enter into more intimate relations with one another and merge into one organized whole. The hemisphere grows into a bell and acts as a mediator between the base and the crowning structure so that these parts enter into closer relation with its plastic body.

This fusion of architectural elements coincides with the progressive organisation of the Buddhist doctrine and its tradition, in a solid system which is worked out in commentaries and

subcommentaries, leaving no gap unfilled. The old teaching has been preserved carefully, but new layers of thought and explanatory work, not excluding scholastic speculation, have crystallised around the kernel and have given it a smoother, well organized surface, rich in details but simplified as a whole.

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STŪPAS OF SANCHI.

Fig. 1: Simplified ground-plan of the Great stūpa of Sanchi (third century B. C.). Diameter of the cupola, ca. 120 feet, height 54 ft. The terrace which was added after the completion of the cupola, is 14 ft. high and 5½ ft. wide. The next addition was the railing, of which the Southern gate was erected first, then the opposite one, and finally the east-western pair.

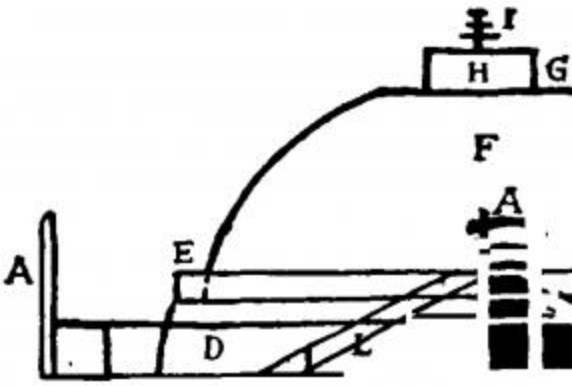
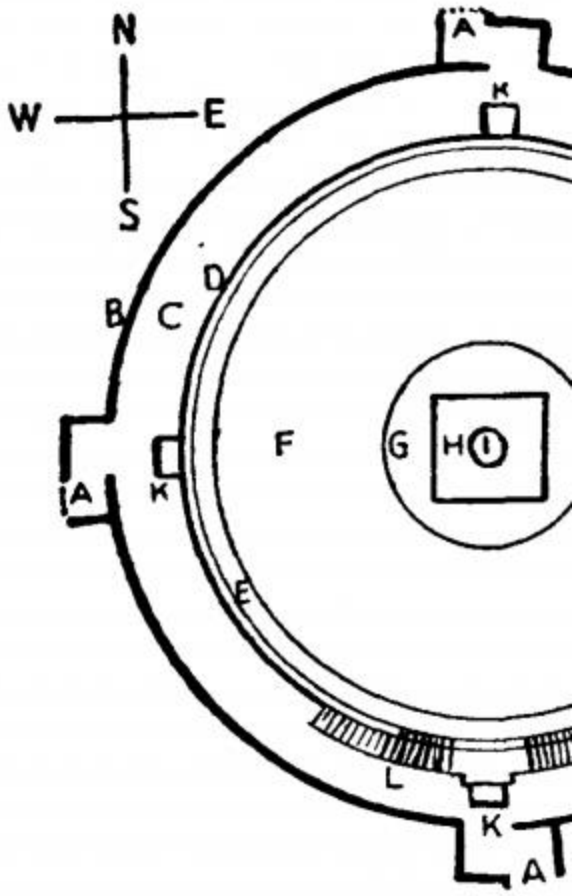


Fig. 2: Elevation of the Great stūpa (restored according to Sir John Marshall's plan, on which also Fig. 1 is based).

Fig. 3: Outline of a smaller Stūpa (No. 3 according to Sir J. Marshall's enumeration), about half the size[1] of the Great stūpa and of later origin (probably IInd century B. C.). Note the development from the flat cupola (Fig. 1) to the complete hemisphere (fig. 3).



DETAILS:

A = toraṇa (entrance-gate).
B = vedikā (stone fence, railing).
C = pradakṣinā patha (circumambulatory path).
D = foundation, base.
E = medhi (terrace or upper pradakṣinā patha).
be = stone railing of the terrace.
F = aṇḍa (hemispheric cupola or dome).
G = terrace on top of the cupola.
H = harmikā (kiosk) in shape of a stone fence, containing the relic shrine, which in case of the Great stūpa consisted of a stone cylinder of ca. 6 feet in diameter. The lid of it had a hole, into which the pole of the stone umbrella was fitted.
I = hti, catta (honorific umbrella); in the

STŪPAS OF SANCHI, Figure on JISOA., Vol II/2 pp. 95

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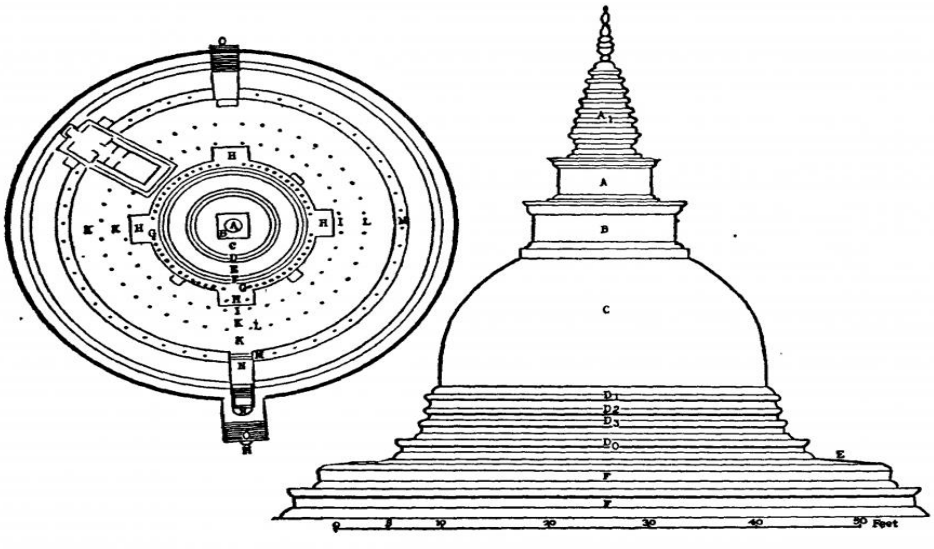


1 2

THŪPĀRĀMA DĀGOBA, ANURADHAPURA.
(Third century B. C.)

Fig. 1 : Ground plan, showing the original composition : a stūpa with a round platform, the four main places of worship, and the four rows of pillars accompaning the pradakṣinā patha.

Fig. 2 : Elevation, showing the modernized shape of the stūpa or dāgoba, as it is called in Ceylon (from dhātugarbha, i. e. relic chamber, originally designating only one part of the stūpa, the receptacle in the harmikā, and later the whole building) with its tendency to subdivide or to multiply the original parts of the stūpa.

Both plans are adopted (with slight simplifications) from James G. Smither "Architectural Remains, Anuradhapura".

DETAILS :

A_1 = spire (htī) with seven strata (bhūmi)
A = stem or base of the spire
B = harmikā
C = bell-shaped dome (aṇḍa)
D_1—D_3 = rudiments of the three-fold base of the archaic Anuradhapura type
D_0 = actual base of the dāgoba proper.
E = terrace of the socle
F = twofold socle
G = first (inner) row of pillars
H = main places of worship
I = second row of pillars
K = pradakṣinā patha
L = third row of pillars
M = fourth (outer) row of pillars, bordering the sacred place instead of the railing.
N = main entrance
O = staircase

THŪPĀRĀMA DĀGOBA, ANURADHAPURA. (Third Century B.C.), Figure on JISOA., Vol II/2 pp. 96

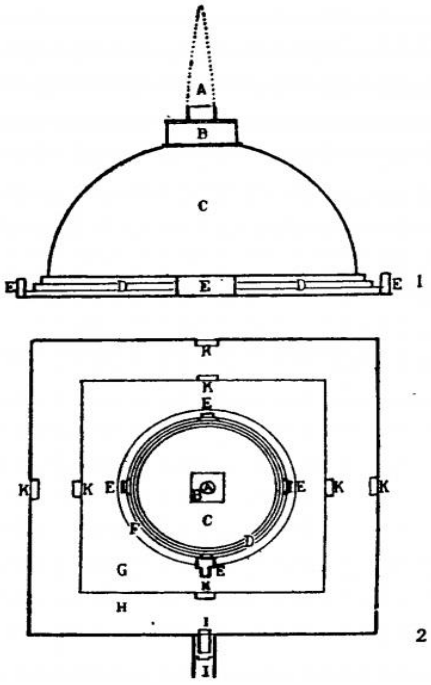
jsioa-ii-symbolism-stupa-page-11.png

RUVANVELI DĀGOBA, ANURADHAPURA

(IInd—Ist century B. C.)

Fig. 1 : Elevation (restored) showing a threefold basic terrace. The original simple base has been subdivided into three cylindric steps. The four main places of worship are strongly marked by altars and opposite entrances (in place of toraṇas).

Fig. 2 : Ground plan : the platform has changed from the round to the square form, as can be seen also in the later stūpas of Sanchi. At the same time the platform has been doubled : the inner enclosure being some steps higher than the outer one. There is only a rudiment of a round platform in the shape of a circular terrace close to the base of the dāgoba. From the four chief points of the compass steps are leading up to the platforms, the main entrance being as usual in the south, because the enlightenment, the most important of the four great events in the Buddha's life, corresponds to the sun in its highest position, i.e., in the south. The 'htī' has grown into a high cone which probably was interrupted by several stone discs or at least crowned by one.



DETAILS :

A=spire ('htī')
B=harmikā
C=hemispheric cupola
D=threefold base
E=main places of worship (altars)
F=circular terrace
G=upper (central) platform
H=lower (outer) platform
I=southern (main) entrance
K=steps (entrances)

RUVANVELI DĀGOBA, ANURADHAPURA (IInd—Ind Century B.C.), Figure on JISOA., Vol II/2 pp. 97

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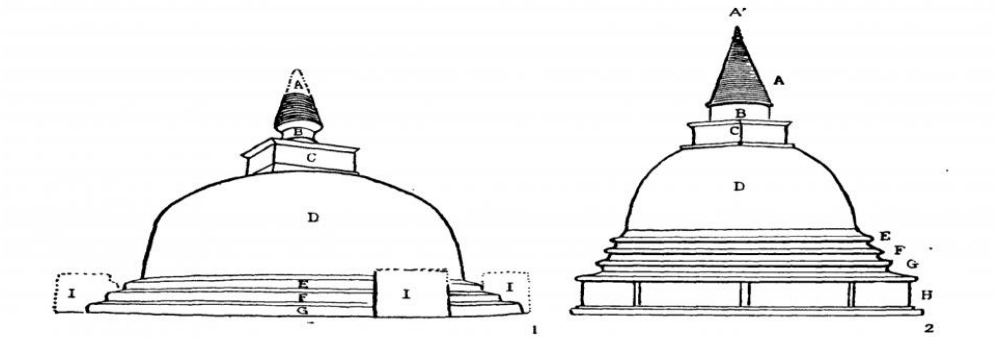

TYPES OF MEDIEVAL AND MODERN DĀGOBAS IN CEYLON.

Fig. 1 : Kirivehera dāgoba, Polonnaruva, XIIth century A. D. (perspectivic outline). The Anuradhapura style has been preserved, though the threefold basal terrace is higher in proportion to the dome. The main places of worship are marked by shrines.

Fig. 2 : Type of a modern dāgoba. The monument proper has been put on an octagonal pedestal, isolating it from the ground (just as the religious doctrine has become isolated from experience by dogmatic tradition). The hemisphere has lost much of its monumental heaviness by growing into the more pleasing form of a bell. The threefold basal terrace is symbolised by three rings at the base of the bell. The horizontal lines of the spire are close together, forming a merely ornamental surface without interceding or crowning umbrellas.

DETAILS :

A = spire ("hti"), "kunta". Sinhalese : koṭa.
A' = end of the spire, pinnacle, Sinhalese : koṭa kæraḷḷa.
B = stem or base of the spire, Sinhalese : devatā kotuva.
C = harmikā, "catussurākoṣṭha" (caturasra koṣṭha) ; Sinh. hataraes kotuva.
D = cupola (aṇḍa), "garbha" ; Sinh. : gæba.
E, F, G = in fig. 1 the threefold basal terrace ; in fig. 2 the corresponding three rings.
H = octagonal pedestal (trimāḷā) Sing. ; tun-māl pesāva.
I = shrines at the four main places of worship.

TYPES OF MEDIEVAL AND MODERN DĀGOBAS IN CEYLON, Figure on JISOA., Vol II/2 pp. 98

III. Proportions of the dāgoba.

"Thūpesu tramā kṛata pañca-bhāgam/Guṇaṁ pamāṁrh tribhāga-tuṇgam/Ghaṇṭākāra-ghaṭākāram/Bubbulākāra-dhānyakam/Padmā-kārāmbala-saṭvidham./Thūpsu tāram kṛta-pañca-bhāgam/Guṇṁ pamāṇaṁ catuvisa-bhāgam/Trimāla-pañcārdhaka-garbbham aṣṭam/Catus-surākoṣṭha-yugarddha-yugmam/Sasṭānta-kuntam puṇarddha-chatram/Vadanti cātaḥ munihiḥ purāṇaiḥ."

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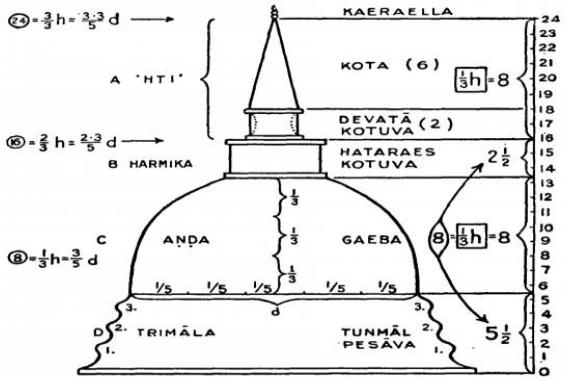

Figure on JISOA., Vol II/2 pp. 99

According to these verses which are quoted by H. Parker, Ancient Ceylon p. 336, one has to divide the width of the stūpa into five parts. Three of them represent the height of the cupola, which has six types: bell-shape, waterpot-shape, bubble-shape, heap-of-paddy-shape, lotus-shape and Nelli-fruit-shape. The height of the dāgoba is divided into 24 parts: five and a half of them are counted for the three basal rings or "garlands" (trimāla), eight for the cupola (garbbha, lit. "womb"), a couple and a half for the quadrangular enclosure (catussurākoṣṭha), i.e. the harmikā, two for the base of the spire, the last six for the spire, and again half a unit for the umbrella. In Parker's opinion one and a half parts should be counted for the base of the spire, because summing up all the other items, including half a unit for the chatra only, one and a half parts remain. But the verse simply mentions a 'pair' (yugmam) at this place and the term sasṭānta, the "last six" indicates that the half unit for the umbrella is an additional one (the word 'puṇa' itself emphasises the additional character). The modern practice supports my view, as it counts two parts for the base of the spire, leaving out the umbrella, which shows that the chatra was not regarded an essential part of the dāgoba.

The main proportions of the dāgoba can be expressed in the following way: The height of the cupola, which is three-fifth of the diameter of its groundplan, represents one-third of the height of the entire building, and is equal to the height of the spire (including its base) and to the height of the threefold base (trimāla) plus that of the harmikā.

As these proportions generally do not agree with those of the archaic Ceylonese dāgobas, the rules of the verses quoted above cannot go back to pre-Christian times, but according to Parker there are sufficient reasons to say that they are not later than the fifth century A.D.

Nevertheless there is a fundamental principle which reveals itself as well in the original proportions of the stūpa as in the later measurements. As we can see from our summary, the key-number in the vertical composition of the dāgoba is three. This is not a mere accident but it is characteristic even of the earliest Buddhist monuments. Besides the three main parts of the stūpa, namely basis, cupola and kiosk, of which the cupola was three times the height of the basis,—the railing as well as the toraṇas were formed by three bars, or architraves, of purely symbolical meaning, corresponding to the Buddhist trinity: Buddha, Dhamma, Sangha.

The three is characteristic for the dimension of space, the four characterises the extension on the plane, the second dimension. It appears in the ground-plans as the four gates, four main places of worship, four-cornered platforms, four staircases, finally as four- or eight-cornered substructures.

If we see the Buddha-Dharma as a spiritual building, we can find a similar tendency: to develop at the same time in two directions or dimensions which penetrate each other. The one may be called the individual one, the other the universal one. Their relationship is like that of plane to space. The individual one corresponds to the plane, the universal one to space.

The individual principle is bound up with morality and ethics. It is the foundation, the spiritual ground-plan on which the 'vertical' development into the next higher dimension, the universal aspect of the Dharma is based. Just as the four is the prominent principle in the architectural ground-plans of Buddhist monuments, this number prevails also among the ethical categories or individual aspects and conditions of truth in the Buddhist doctrine: as for instance, the four noble truths, the eightfold path, the four foundations of mindfulness (sati-paṭṇhāna), the four great efforts (sammappadhāna), the four fundamental (or sublime) meditations (appamañññāya:

'illimitable' state of mind), the four trances (jhāna: 4 in rūpa, 4 in arūpa), the four psychic powers (iddhipāda), etc.

The universal aspect of the Dharma which I compared to the dimension of space, is expressed by categories in which the number three prevails in the same sense as in the vertical development or composition of Buddhist architecture. There are, for instance, three universal planes or conditions of conscious existence: kāmaloka, rūpaloka and arūpaloka; three principles of life or universal characteristics (lakkhana): anicca, dukkha, anattā; three fundamental motives (hetu): lobha, dosa, moha (and their opposites); three principles of action (in the broadest sense): kamma, vipāka, kriyā; three principles of existence: paṭisandhi, bhavaṅga, cuti. Just as the third dimension can not exist without the second, or an elevation apart from its ground-plan so are all these categories inseparable from the individual and yet they go beyond it. They are universal in the sense of inherent principles or laws. Though being part of our subjective experience they belong to the 'objective side' of life, i.e., they exist wherever life exists, while the other categories, which I called individual and ethical, are to be acquired or perceived by the individual as they do not exist in it automatically. It is only from this point of view that a distinction between 'individual' and 'universal' can be made here, but not in the sense of mutual exclusiveness. In a more general sense any state of mind which overcomes the limits of individuality may be called universal, as for instance the 'appamaññāya's, but it is neither a constant factor of consciousness nor a universal function or principle of life.

IV. Symbolical terminology of the main elements of the dāgoba.

Not only the proportions but also the names of the different parts of the dāgoba as preserved by the Sinhalese tradition (cf. Parker, Ancient Ceylon) are of some interest to us. The decorative function to which the threefold terrace has been reduced is indicated in the Sinhalese term tun-māl pesāva or pesāvalallu, 'the three-story ornaments' or 'ornamental bangles'. The bell-shaped cupola is called gaeba, generally translated as 'chamber'. The same word is used for the holy of holies. But it means much more than that, being connected with one of the most significant term s of Indian architecture. The holy of holies, the shrine or sanctuary of Hindu temples is called garbha-gṛha, lit. womb. The sanctuary, be it the cella of a temple or the relic chamber of a stūpa, is regarded as a centre of creative forces, which like those of the motherly womb generate and transform the seeds of the past into the life-forms of the future. The same function is represented by the egg (aṇḍa), and it is not difficult to understand that both terms, aṇḍa and (dhātu-)garbha could be applied simultaneously to the stūpa-dome.

This indicates that the stūpa is the continuation of an age-old tradition which has its roots in the telluric symbolism of prehistoric, matriarchal religions, in which the creative force of the earth (soil) as the mother of all visible life was worshipped in caves or subterranean sanctuaries or dark temple chambers. The early Buddhist cave temple (caītya-halls) may be reminiscences of these chthonic cults[2] in which the motherhood of matter and the mysteries of life and creation were the centre of religious attention.

The 'dynamic materialism' of Sāṁkhya with its philosophy of Prakṛti and the 'biological materialism' of the Jains—in which even mental properties were reduced to substances which 'flow' into the soul, substances which can be mixed and separated and which act upon each other like chemical fluids or elements, are the religious and philosophical followers of the telluric tendencies or the earliest religions of humanity. Matter was regarded a living reality—not something mechanical or opposed to spiritual forces or to consciousness. It was not by accident

that the temples and monuments of old were· built of huge blocks of stone, each of which was in proportion to the weight of the entire structure and represented a definite fraction of the whole. It was not in vain that immense masses of stone were piled one upon the other, and that walls were constructed of an almost unbelievable thickness, regard less of the labour required and of mere utility or expediency; for in those days, men still knew the value of solid masses.

The historical an philosophical neighbourhood of Sāṃkhya and Jainism agrees with the realistic attitude, the this-sided-ness of Buddhism and its appreciation of the cosmic qualities of matter, in the sense of being the basic state and the most fundamental function in the development of the world. The 'materia' itself contains this meaning: denoting that which is the mother of all phenomena, of all things. It is latent energy, life at rest, but full of hidden activity (like the egg, which is taken as a simile of creation). It is magic substance, endowed with the memory of the past (seed) and charged with potential forces which though continuously radiating and influencing the surroundings are capable to convert themselves into visible life and activity.

Matter is not only the exponent of physical forces, as apparent in the laws of gravitation, resistance, continuity, cohesion, indestructibility (though it may change its form or even its state of aggregation) and in its conformity to certain laws of growth or crystallisation—but also an accumulator of spiritual forces, which are not fundamentally different from those of matter but only intensified to a higher potentiality and transformed into a higher dimension which includes the visible and the invisible, matter and space, the unconscious (i.e., that which is not yet conscious) and the conscious. There is no essential difference between matter and mind, between the outer and the inner world, between the movement of the wind and the movement of breath.

This attitude was not only preserved by the Buddhist doctrine, but it had been, facilitated and developed by the idea that the elements of mind and matter are in constant flux and correlation. In the sixth chapter of Abhidhammattha-Sangaha (a compendium of the Theravāda Abhidhamma) for instance, we see that among the eleven qualities or principles of rūpa, the material as well as the immaterial elements are enumerated. Throughout the history of Buddhist philosophy and psychology we find the statements of definite relations between elements, forms, colours, sense organs, sensations, states and properties of consciousness, world-planes, stages of meditation, etc.

If we can see matter from this point of view, we shall also be able to grasp the real meaning of relics and sacred objects like amulets, etc.. Both are saturated with spiritual influences—the former by the nature of their own past, the latter by an intentional concentration of conscious forces upon them through the elaborate execution of their shape. In both cases it is the action that matters, the act of shaping, the concentration of consciousness, of intention, of will-power, in which life is focussed on a particular unit of matter. The amulet is, so to say: an imitation of a materialized life process. It is an abridged growth, artificial process of reshaping certain life forms or potential moments of consciousness in the condensed form of symbols.

This applies exactly to the stūpa, which is not only a centre of accumulated forces by virtue of the relics, but just as well, and later on mainly, by virtue of its own symbolical composition, which reflects and reconstructs the eternal properties of the Enlightened Ones and the essence of their life. Though these eternal properties manifest themselves individually in ever new incarnations, they are supra-personal and reflect the cosmic order. For this reason the cosmic symbolism of the pre-Buddhistic tumulus could serve the Buddhists as a starting point for their

religious architecture and thus preserve one of the most venerable monuments of pre-historic civilisation.

"In the stūpa one of the oldest and most profound cosmic symbols has been preserved for us, a symbol that humanity has created in its remotest past and in its sacred awe before the wonders of the creative power of the world. Without Buddhism this symbol might have never come down to us." (E. Diez).

Originally the term dhātu-garbha referred only to the harmikā, which actually contained the relics (dhātu) and preserved them as precious seeds for the future of humanity. Later on the aṇḍa became identified with the dhātu-garbha; in fact the dome, on account of successive enlargements grew in many cases beyond (above) the original relic chamber, thus including it and taking over its function, also in the material sense: finally the whole-monument was called dhātu-garbha, Sinhalese dāgoba, in Burma and the neighbouring countries, pagoda. That this name does really justice to the fundamental character of these monuments becomes clear if we take into account all their symbolical elements: the latent creative power of the egg, in which life is condensed into the smallest unit, the womb in which these powers are transformed and developed, the sacrificial altar which effects a similar transformation through the purifying force of the fire, and the dhātus, the 'magic elements', which were not only purified by the fire of the pyre, but through the fire of self-denial, in which the Holy One consumed himself during his life-time, nay, during innumerable lifes.

And as the Phoenix rises from the ashes so the tree of life and enlightenment grows out of the ashes of the sacrificial altar (harmikā; Sinhalese: hataraes kotuva, the four-sided or square enclosure), which crowns the dome, the monumental world-egg and the womb of a new world which has been fecundated by the seeds of a glorious past, receiving the dhātus, the potential elements for the spiritual rebirth of the world. The spire (Sinhalese: kota) of the dāgoba represents this tree of life with its higher worlds, which are realized in profound meditation on the way to enlightenment. Thus the spiritual rebirth of the world starts in the mind of man and the tree of life grows out of his own heart, the centre of his being, the axis of his own world.. And while he experiences the different world-planes, the tree of life sprouts and develops within him and spreads its branches in ever new infinities; in fact, he himself turns into a tree of life, into a tree of enlightenment.

A lonely wanderer on a similar path, Angelus Silesius, has expressed this experience in the following verse:

Shall the life tree free thee from death and strife,
Thyself must tum divine a tree of life." [3]

The Sinhalese term for the stem of the spire, devata kotuva, 'the enclosure of gods', is closely connected with the mythical mount Meru with its tree of divine world-planes, inhabited by hierarchies of gods. How strong this tradition has been and how great its influence on the imagination of later generations, even in the remotest places of Indian colonisation, like the Sunda Islands to the east of Java, is shown by the fact that on the island of Lombok in the park of Cakranagara there are pagodas with nine-and eleven-storied roofs and these pagodas are called Meru. But they are not at all dāgobas or stūpas, as they are without the main body, i.e. the dome and its basal terraces. They consist only in the hypertrophic spire of the dāgoba, which has been

separated and developed independently as a representation of mount Meru in the shape of the cosmic tree with nine or eleven world-planes.

V. Pre-buddhistic origins of stūpa symbolism[4]

In Mahāyāna Buddhism the transcendental symbolism of the crowning parts of the stūpa got a new impetus. Their structure became more and more elaborate and extensive and the number of stories steadily increased from five to seven, to nine, to eleven, and finally to thirteen Bhūmīs. The general outline of the stūpa was no longer dominated by the dome but determined by an upward movement which raised and multiplied the substructure, narrowed the dome, enlarged the Harmikā and elongated the spire. The direction of the religious outlook had turned from a completed past to the growing future, from the ideal of an accomplished Buddha to that of a becoming one, from the world as it is to the world as it should be and as it had been dreamt of in the vision of mount Meru's supramundane realms. In this vision the religious aspirations of the Buddhists and the followers of the Vedas met; on this ground only their compromise was possible. We are therefore justified in thinking that it was not a mere accident that at the time when Mahāyāna was in its bloom, at about the fifth century, a type of religious architecture came into existence which realized the spiritual and structural tendency of this vision (which was embodied in the crowning parts of the stūpa) in a parallel but otherwise independent form, developing into what is known to us as the Śikhara type of temple.

The earliest stages of this type are still wrapped in darkness. It seems that they did not originate before the Gupta period. The earliest example dating from the fifth century is a votive Śikhara temple found at Samath.

The village hut itself is the prototype of these shrines. And as the hut serves the earthly life, the shrine serves the cult of life-giving and life-preserving forces (generally personified in the sun-god). It stood in the shadow of the sacred tree and was surrounded by a fence as a demarcation of the sacred place. The ground-plan of the shrine, like that of the altar, was almost square and the roof high, either on account of the fire or in order to distinguish it from ordinary huts. The development of pyramidal and conical forms (as in the case of the spire of the stūpa) was more or less pre-conditioned.

The temples were erected within the village, while the tumuli which served the cult of the dead were built outside their walls. The Buddhist stūpa which combined the elements of the village sanctuary with that of the ancient tumulus recognized in its form that life and death are only the two sides or poles of the one reality of the world, complementing and conditioning each other, as the co-existent principles of Viṣṇu and Śiva.[5]

To think them separate is illusion and only as long as the veil of Maya has not been lifted, the worship of these two forces proceeds separately, some times even as two different forms of religion. But once it has been understood that the plant cannot be born to the light before the seed has perished in the dark womb of the earth, that the egg must break in order to give life to a new being, that transformation is that which conditions life, "that we are living our death and dying our life"—if this has been understood, then the great synthesis takes place, and the foundation of a world-religion is established. Existence is constant transformation, i.e. it combines the elements of stability and change. Transformation without constancy, law, or rhythm is destruction. Constancy without transformation means eternal death. He who wants to 'preserve' his life will lose it. He who does not find his inner law (dharma) will perish. The principle of 'Śiva' without

the regulating force of 'Viṣṇu' is destruction. The principle of 'Viṣṇu' without the creative dynamics of 'Śiva' is stagnation. The same holds good for all the other pairs of opposites under which the universe appears to us. Their mutual relations and their interpenetration in every stage of existence are illustrated by the architectural composition and development of the stūpa and the ideas connected with it.

The hemisphere stands for the dark and motherly forces of the earth, the transforming power of death (and rebirth), the concentration of yoga and asceticism (ascetics and yogins always preferred cemeteries).

The cone as well as the similar pyramidal forms, characterised by one pointedness and vertical direction stand for the forces of the sun: light and life, represented by the fire-altar (harmikā) and the tree (spire). The tree later on includes all the other symbols representing the universe (mount Meru). The sun and the stars are its fruits, and its branches the different world-planes. Tree worship has been preserved in Buddhism until the present day, the worship of light in that of Āmitābha (the Buddha of infinite light, the sun-Buddha, who emanates innumerable 'enlightened beings', the worship of life in that of Āmitāyus (who is only another form of Āmitābha). The idea of the Ādibuddha and his emanations shows that with the advent of Mahāyāna the symbols of the solar cult came again to the foreground.

VI. Relations between stūpa and Hindu-architecture

With the revival of Brāhmaṇīsm Śiva became the exponent of all those principles that were connected with the hemisphere of the stūpa while Viṣṇu continued the tradition of sun worship as represented in the conical or pyramidal spire.

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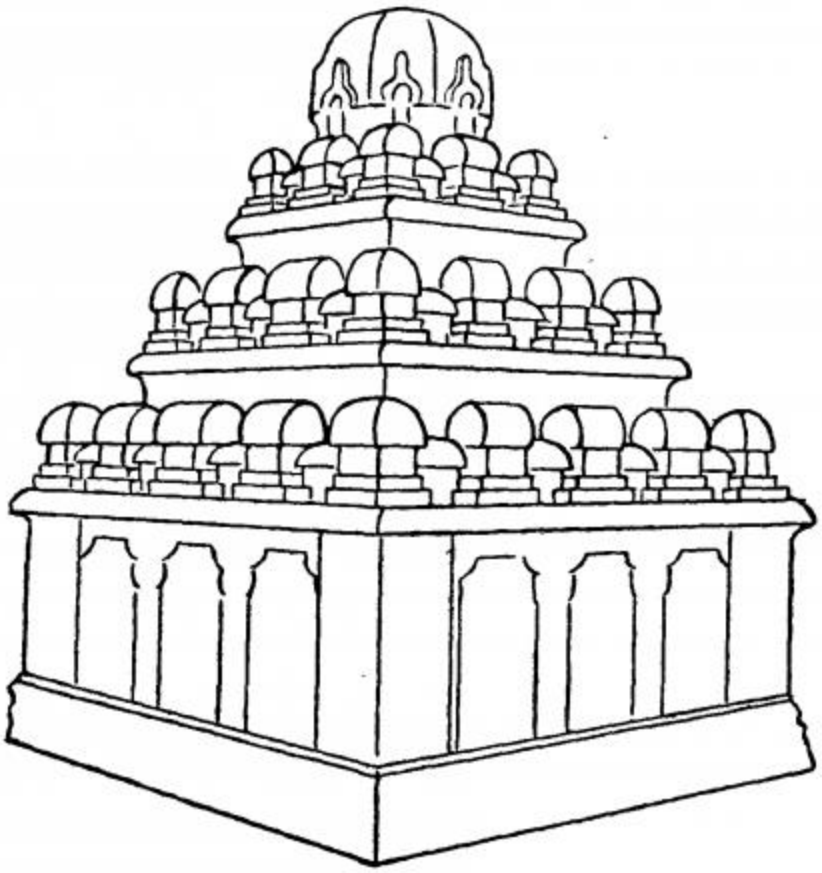

Stūpi-principle in Vimāna-architecture

Outline of the Dharmarāja ratha in Mavalipuram as an example of the Vimāna-type of temples, in which the cupola (stūpi) or pavilion-principle governs the system, and in which each unit expresses centralisation. In the general composition the horizontal character is stronger than the upward movement.

Stūpi principle in Vimāna-architecture: Outline of the Dharmarāja ratha in Mavalipuram as an example of t the cupola (stūpi) or pavilion-principle governs the system, and in which each unit expresses centralisation. In th character is stronger than the upward movement.Figure on JISOA., Vol IV/1 pp. 27

Śiva is called the yogin among the gods; he unites in himself asceticism and ecstasy, concentration and activity; he is the liberator, the destroyer of the world of illusion, the transformer, the creative principle. (līṅgam), the potential force of the womb (therefore moon and water are his attributes).

Viṣṇu represents the law, the direction in movement, the sun that rotates and moves in its prescribed course; he is the preserver of life, the protector of the world, the illuminator, who rides in his sun car (vimāna) from horizon to horizon, the loving friend and helper of all creatures (cf. avatārs). His main attribute is the wheel of the law (dharmacakra).

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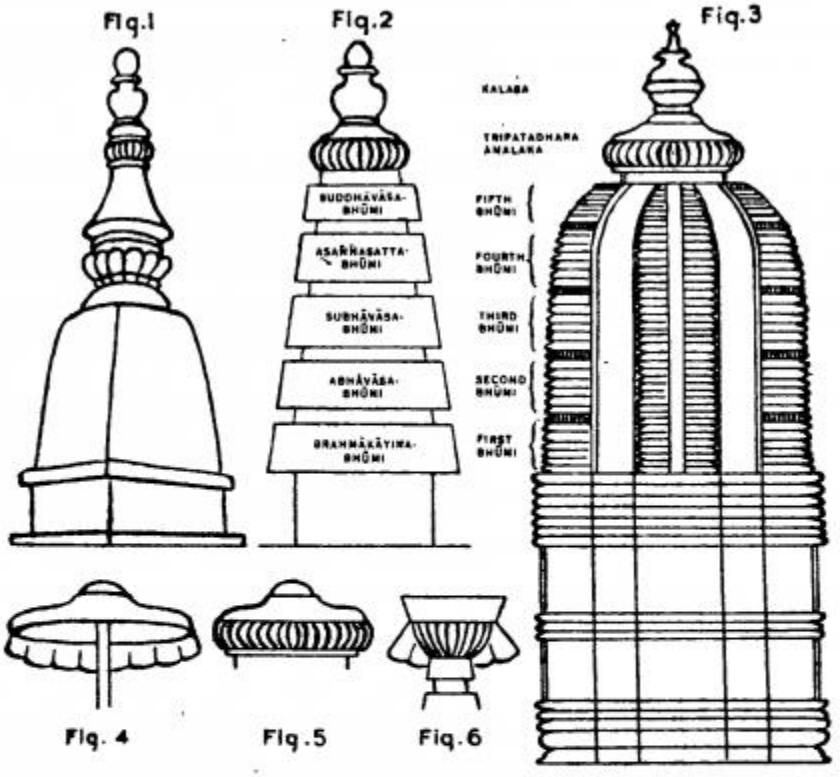


Architectural and symbolical relations between the Śikhara and the crowning part of the stūpa

Simplified elevation of an Orissa Śikhara (fig. 3) with its five Bhūmis, comparable to the Rūpaloka-bhūmis of the Buddhist psychocosmos, represented by the spire of a stūpa with tentative reconstruction of an Āmalaka-kalaśa-termination (Fig. 2). Fig. 1 shows a similar termination of a modern Nepalese stūpa. The combination of Āmalaka and Tripatadhāra (Fig. 5) has been preserved in the termination of the Tibetan stūpa (mchorten) (Fig. 6). Tripatadhāra is here replaced by an honorific umbrella from which most probably it has been derived. The shape of the Tripatadhāra is exactly the same as that of the original honorific umbrella (Fig. 4 and upper part of Fig. 5).

Architectural and symbolical relations between the Śikhara and the crowning part of the stūpa: Simplifie 3) with its five Bhūmis, comparable to the Rūpaloka-bhūmis of the Bud hist psychocosmos, repreented by reconstruction of an Āmalaka-kalaśa-termination (Fig. 21. Fig. I shows a slmilar termination of a modern Āmalaka and Tripatadhāra (Fig. 5) has been preserved in the termination of the Tibetan stūpa (mchorten) (Fig. 6 honorific umbrella from which most probably it has been derived. The shape of the Tripatadhāra is exactly the umbrella (Fig. 4 and upper part of Fig. 5).Figure on JISOA., Vol IV/1 pp. 28

The south of India is mainly Śivaitic and has preserved the dome as the crowning part of the temple. Up to the present day the technical term for this dome or cupola is "stūpi" (see drawing on p. 27 — Figure 1). The north, however, which is more inclined towards Viṣṇuism, prefers the

Śikhara (see drawings, below, — Figure 2). This fact proves, that psychologically and symbolically the cupola is closer related to the principle of Śiva, the Śikhara to that of Viṣṇu.

The crowning spire of a stûpa with its Bhūmis or strata of world planes, in this respect corresponds to the Śikhara. In the Orissa temples (Figure 3) it is divided into five Bhūmis, which are sub-divided again into smaller strata (just as the Bhūmis in the psycho-cosmic world system of Buddhism: there are, for instance, five Rūpaloka-bhūmis, each of them subdivided into three and more classes). The Bhūmis culminate in the Vedikā, the sacred quadrangular enclosure (Sinh. "hataraes kotuva, " corresponding to the Harmikā and the Vedic altar), which is crowned by the Āmalaka or Āmalasāra, the 'pure kernel', upon which the Āmṛtakalasa, the vessel with the water of immortality—which is also the attribute of Buddha Amitāyus is placed. According to the Divyāvadāna the primitive Caītya ended in a kind of pot, which was called Kalasa (Tucci, "lndo-Tibetica" I, p. 47, nI).

There can be no doubt about the symbolical relationship between the Mahāyāna-Buddha Āmitābha, the Buddha of infinite light (and life, in his aspect of Amitāyus) and Viṣṇu, the sun-god. Both of them are supposed to incarnate their love and compassion in the form of helpers and teachers of humanity: as Bodhisattvas and avatārs. Both of them have the wheel of the law as their attribute. The Dharmacakra is also ascribed to the historical Buddha Śākyamuni. But it was only used to represent him in his Viṣṇutic aspect, as the establisher of the Dharma, in the act of setting in motion the wheel of the law at h is first sermon at Sarnāth. The other great events of his life, his enlightenment and his Parinirvāṇa, were hinted at by the tree of enlightenment and the Caītya. This means that the historical Buddha cannot be connected exclusively with either the Viṣṇutic or the Śivaitic aspect. He represents the one or the other according to the period of his life. The orthodox school has never given any attribute to their Buddha image because their worship was centred on the one historical Buddha and even when his predecessors were depicted he could easily be recognized by his position. Later on, when other Buddhas were introduced by the Mahāyānists, Śākyamuni was characterised by the alms-bowl, the symbol of the ascetic, which shows that his quality of a yogin, his Śivaitic aspect, was felt as his main characteristic by the followers of Mahāyāna. And in fact the orthodox schools themselves emphasised strongly the ascetic side of Buddhism (vinaya) and in their architecture the tumulus or dome shape of the stūpa prevailed. The followers of the Mahāyāna on the other hand tried to avoid the exclusiveness of asceticism by taking the whole world into their scheme of salvation and emphasised the Viṣṇutic qualities of the Buddha which transcend the historical personality and remain a permanent source of light to the world. Thus the solar symbolism of the world tree came again into prominence, while the hemisphere of the stūpa became one element among others and the vertical development of the monument proceeded further.

VII. Fundamental form-principles

Before we continue our description it may be useful to summarize the main ideas suggested by the two fundamental form-principles, hemisphere and cone: the former standing for centralisation, the latter for vertical direction and one pointedness, which may also be represented by tapering pyramids with square or polygonal base.

Hemisphere:	Cone:
lunar worship	solar worship

motherhood—earth	Fatherhood—sky
symbols: moon, taurus, Triśūla, yoni-lingam	symbols: sun, disc, wheel, lotus, tree
night (unity of interpenetration)	day (unfoldment, differentiation)
cult of the dead	cult of life
tumulus	village sanctuary
hemisphere of the stūpa	conical or pyramidal spire
cupola, pavilions, barrel-vaulted roofs	pyramidal and conical towers with square and poly
horizontal development	vertical development
concentration	emanation
inner activity	outer activity
inner transformation	inner stability
asceticism (hermit life)	worldly or practical morality (family life)
revolution (parāvṛtti)	evolution
intuitive	discursive
yoga	pūjā
help from within	help from without
self-deliverance	deliverance by grace
belief in the divine quality of man Śiva, the yogin	belief in the human quality of god Viṣṇu, the solar
the transformer	the preserver
creative (potential)	stimulative (growth)
becoming and dissolving	being
freedom (nirvāṇa)	Law (karma)

these two categories of principles complement each other and were never completely separated, as the history of religion and religious architecture shows. There was, on the contrary, a constant tendency towards fusion which succeeded more or less in the periods of highest religious culture and experience. But the equation Śiva-Viṣṇu was never completely solved, because there is an irrational residue beyond expression and calculation which has its root in the fact that the world cannot be divided into equal halves, because there is a third principle which takes part in the other two. In this way there are no complete contrasts—even in opposites there is something in common—and on the other hand that is no absolute identity between anything existing in the world.

The third great principle which partly overlaps the other two is the Brahmā principle. Its main features are those of extension, unfoldment, birth, manifestation, materialisation, universal

expansion. In its expansive character it is not determined by one direction like the principle, but acts in all detections simultaneously. Its stereometrical equivalent is the cube.

We have not yet spoken of this fundamental form, because it has been combined with both the other principles of architecture and has no deciding influence on our classification. Just as in Hindu religion, Brahma is supposed to inherent in the aspects of Śiva and Viṣṇu, and is not considered and worshipped separately, so the principle of Brahma, of materialisation, is immanent in the other two principles, in so far as they take material shape, come into appearance and unfold themselves.

The Buddhist starts from the experience of the world of sense perception and frees himself from its overpowering diversity and its unsatiable thirst of becoming by analysing its elements and reducing them to their fundamental laws. He thus overcomes the Brahma aspect of the world by the Viṣṇu aspect of the law ('dharma' in its noumenal character, 'karma' in its phenomenal appearance, in its relation to action). This struggle is the foundation of the Buddha-sāsanā, represented in the basis of the stūpa, the mass of which is reduced step by step, from its greatest unfoldment to its greatest concentration. The personality of the seeker of truth, however, with progressive understanding loses the narrowness of particularity. He becomes the embodiment of the ineluctable law, of the living and yet so rigid procedure of the world. And so the new aim presents itself, not only as freedom from the limitations of personality and the impulses that form and maintain it, but equally as freedom from the law of the world, which is the world itself; for the world does not possess this law as something additional but consists in this conformity to law, i.e., in action and reaction (karma-law-cosmos-world). In this sense the Enlightened One is able to overcome the world within his own being by the annihilation of karmic tendencies (saṃskāra) and the chain of dependent origination (pratityasamutpāda) by which nirvāṇa is realized. This is the last step from the principle of Viṣṇu to the principle of Śiva—as symbolized in the stūpa's hemisphere—the deliverance from the formed, to the un-formed: the ultimate transition from law to freedom. While the first stage seeks freedom in the 'cosmos', the deliverance from becoming into being and from the undirected and indiscriminate thirst for existence, the 'chaos', to the consciously directed existence, the last stage seeks freedom from the 'cosmos'. The term cosmos as used here, denotes the experience of the world under the aspect of the law. Buddhism itself also belongs to the 'cosmos', that is, as far as its mental form is concerned. Only in meditation, with attainment of the Arūpaloka stages, does the breaking loose from the 'cosmos' begin, and nirvāṇa lies beyond these.

But in order to be freed from the 'cosmos'—the ultimate object of suffering in the stage of the highest, most refined consciousness—one must be capable of experiencing it, must really experience it. One must first have found one's way to freedom in the law before one can attain to freedom from the law, that is to freedom final and complete.

The Parinirvarāṇa of the Buddha becomes the starting point for his followers and for the future world, to go his way again, on the basis of his Noble Eightfold Path, into which he condensed his experience. This new basis is represented by the Harmikā from which the tree of life rises as a symbol of future attainments, fulfilling the sacrifice and the message of the past. The spire shows again the gradual reduction of the world (cosmos) until it reaches the point of complete unity which transcends all 'cosmic' experience and realizes the perfect Śūnyatā or metaphysical emptiness. The cone is crowned with a ball [6] (kaeraella) or similar forms of the Śivaitic principle.

It goes without saying that the formal and symbolical development in conformity with the principles of Brahma, Viṣṇu and Śiva took place automatically, i.e., in accordance with the inner necessities of the human psyche, without being conscious to the originators of those monuments, —at least not in the earlier periods. later on, specially among Indian Buddhist architects, these principles may have become known to those who were initiated into the esoteric meaning of architectural forms and metaphysical symbolism.

In the Manasara the four-sided pillar is called Brahmakānda, the eight-sided ne Viṣṇukāṇḍa, the round column Candrakāṇḍa (candra, the moon: symbol of Śiva). This harmonizes well with our respective classifications of the main elements of the stūpa (though we arrived at our conclusions in a different and safer way): the Brahma character of the square platform and (later on) the square terraces of the base; the Śivaitic character of the dome; the Viṣṇutic character of the Harmikā which, as we shall see later on, was identified with the Eightfold Path. But we have to keep in mind that in architecture the ground-plans of the different parts are not alone decisive, but there is also their development in the third dimension and the relations among themselves, which are determined by their architectural composition and modify their meaning. The cubical Harmikā, for instance, which starts already from the principle of Śiva (hemisphere) cannot have the same symbolical value as a cubical element in the actual basis of the monument. The basal terraces grow narrower with every step, which means that the Brahma principle decreases and gives room to another. The vertical and one pointed tendency itself is a feature of the Viṣṇutic principle. In the ground-plan the hemisphere and the cone show the same shape, which means that also symbolically they have something in common, namely the Śivaitic principle; but in the third dimension the cone is quite different from the hemisphere, expressing a one-pointed vertical movement, which means that the Viṣṇutic principle is combined with it. In this sense we can say that the cone itself represents the Viṣṇutic character and that the shape of its ground-plan only modifies it towards the principles of Brahma or Śiva.

In later Buddhist symbolism the four-sided pillar is associated with the Buddha, the eight-sided with the Sangha, the sixteen-sided one or the round column with the Dharma. Buddha has been put in the place of Brahma, because he is the originator, the creator of the Buddhist religion, the Saṅgha is compared with Viṣṇu, as the preserver of this doctrine, and the Dharma is compared with Śiva, because it is not the world-preserving law of god Viṣṇu but the law that proclaims the impermanence, the suffering and the non-substantiality of the world.

This transformed terminology is of no importance as far as our architectural definitions go and is interesting only in so far as it shows that god Viṣṇu's Dharma is not to be considered an equivalent of the term Dharma as used in Buddhism.

VIII. Scholastic symbolism

Scholastic symbolism though it had its origin in the philosophy and psychology of orthodox schools existed side by side with the symbolism of later periods.[7]

The extension of the name Mahāyāna was, and is, of a vague and fluid kind. Those to whom it was applied formed no closed unit. And this is true of m of the so-called 'sects'. They frequently overlapped in their heretical views."[8]

This overlapping can be observed also with regard to the symbolism of the stūpa and there to an even greater extent, as architecture is more apt to express fundamental ideas than small dogmatical differences. These fundamental ideas were those of the Abhidhamma which contains

the philosophical and psychological foundation common to all schools of Buddhism, whether realistic or idealistic, empirical or metaphysical, objectivistic or subjectivistic, etc.

In this way we find in the Tibetan Tanjur a description and explanation of the stūpa (mc'od rten)[9] in terms of the orthodox Abhidhamma, which throws a new fight on the ideas that were connected with the stūpa even in pre-Mahāyāna times.

As we have seen in the case of the Ceylonese Dāgobas the socle of the stūpa which was formerly of a low cylindrical shape had been divided into three steps to which later on a new basis was added, while the three concentric steps slowly merged into the cupola in the form of 'ornamental bangles'.

A similar process took place in the development of the Indian stūpa: the cylindric socle was first raised and later on subdivided into a number of steps, but instead of losing its independence it gained in importance by taking in the railings and Toraṇas. The railings became decorative elements of the surface of the elevated substructure and in place of the Toraṇas there were staircases leading from the four quarters of the universe to the terrace on top of the socle.

These staircases which emphasised the universal character of the monument were apparently fore-runners of the square basal structures, which led up to the cupola in several steps. This change coincided with the advent of Mahāyāna Buddhism and was, it seems, equally accepted by all Indian schools of Buddhism just as the universal attitude itself of the Mahāyāna.

jsioa-iv-symbolism-stupa-page-14.png

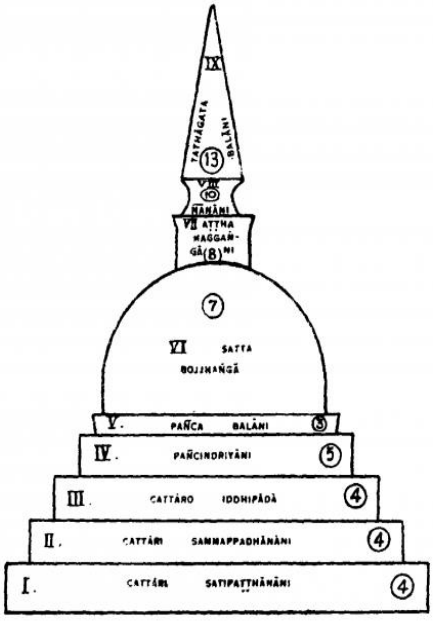


Figure on JISOA., Vol IV/1 pp. 36

The symbolical meaning of the different parts of the stūpa according to the description of the Tanjur is as follows (cf. scheme, in elevation on p. 36, and in horizontal projection on p. 40):

I. The first step of the four-sided basal structure, i.e., the foundation of the whole building corresponds to the Four Foundations of Mindfulness (cattāri satipaṭṭhānāni), namely:

(1) mindfulness as regards the body (kāyānupassanā satipaṭṭhānaṃ); (2) mindfulness as regards sensation (vedanānupassanā satip.); (3) mindfulness as regards the mind (cittāinupassanā satip.); (4) mindfulness as regards the phenomena (dhammānupassanā s.).

II. The second step of the four-sided basal structure corresponds to the Four Efforts (cattri sammappadhānāni):

(1) the effort to destroy the evil wilch has arisen (uppannānaṃ pāpakānaṃ pahānāya vāyāmo); (2) the effort to prevent the evil which has not yet arisen (anuppannānaṃ pāpakānaṃ anuppādāya vāyāmo); (3) the effort to produce the good which has not yet arisen (anuppannānaṃ kusalānalṃ uppādāya vāyāmo); (4) the effort to cultivate the good that has arisan (uppannānaṃ kusalānalṃ bhΐyobha vāyā vāyāmo).

III. The third step of the four-sided basal structure corresponds to the Four Psychic Powers (cattāro iddhipādā):

(1) the desire to act (chandiddhipādo); (2) energy (viriyiddhipādo); (B) thought (cittiddipādo); (4) investigation (vΐmaṃsiddhipādo).

IV. The fourth step or the top of the four-sided basal structure corresponds to the Five Faculties (pañcindriyāni):

(1) the faculty of faith (saddhindriyaṃ); (2) the faculty of energy (viriyindriyaṃ); (3) the faculty of mindfulness (satindriyaṃ); (4) the faculty of concentration (samādhindriyaṃ); (5) the faculty of reason (pañāindriyaṃ).

V. The circular basis of the cupola corresponds to the Five Forces (pañca balāni) which are of the same kind as the Faculties, namely the forces of faith, energy, mindfulness, concentration and reason. These two groups represent the passive (latent) and the active side of the same properties and they can be regarded practically as one category. The same holds good of their architectural counterparts: they were originally one element, the mediator between the cubic substructure and the hemisphere, and were split into two according to the usual tendency of later periods to subdivide or to multiply the original elements.

Obviously only the three fourfold categories were to represent originally the cubic basal structure and in fact the older types of square-terraced stūpas show only three steps, as we can see from the usual Ceylonese, Nepalese and Burmese Dāgobas and from certain Tibetan Chortens which represent replicas of ancient Indian Stūpas. A good example of the latter kind is a Chorten built by one of the kings of Western Tibet at Shen in the Upper Indus Valley (Plate V).

VI. The cupola (aṇḍa) represents the Seven Factors of Enlightenment (satta bojjhaṅgā):

(1) mindfulness (satisambojjhaṅgo); (2) discerning the truth (dhammavicāya sambojjhaṅgo); (3) energy (viriya sambojjhaṅgo); (4) rapture (pΐti sambojjhaṅgo); (5)serenity (passaddhi sambojjhaṅgo); (6) concentration (samādhi sambojjhaṅgo): equanimity (upekkhā sambojjhaṅgo).

VII. The Harmikā corresponds to the Eightfold Path (aṭṭha maggaṅgāni):

(1) right views (sammā diṭṭhi); (2) right aspirations (sammā saṃkappo); (3) right speech (sammā vācā); (4) right action (sammā kammanto); (5) right livelihood (sammā ajΐvo); (6) right effort (sammā vāyāmo); (7) right mindfulness (sammā sati); right concentration (sammā samādhi).

VIII. The stem of the tree of lif e corresponds to the Tenfold Knowledge (ñāṇaṃ):

(1) knowledge of the law; (2) knowledge of other persons' thoughts; (3) knowledge of relations; (4) empirical knowledge; (5) knowledge of suffering; (6) knowledge of the cause of suffering; (7) knowledge of the annihilation of suffering; (8) knowledge of the way that leads to the annihilation of suffering; (8) knowledge of the things connected with despair; (10) knowledge of the non-production of things.

Up to the Harmikā or the seventh element in the construction of the stūpa, the Tanjur follows word by word the enumerations of the Pāli-Abhidhamma as found for instance in the third paragraph of the seventh chapter (Samuccaya-Saṅgaha) of Anuruddha's Abhidhammattha-Saṅgaha. Though this work cannot have been written before the eighth century A.D., it is exclusively compiled ftom the canonical Abhidhamma books and if we see a Tibetan text like the one mentioned based on a parallel Sanskrit version which does not only have the same subject-matter but even the same arrangement down to the smallest details like the order in which the respective terms follow each other, we witness the faithfulness of tradition and the accuracy of Indian and Tibetan compilers and translators. While Thera Anuruddha was compiling his Abhidhammattha-Saṅgaha in Ceylon, thousands of miles away in Tibet pious monks were translating Sanskrit texts into their own language. And though both drew their knowledge from a source that lay at least thousand years back, their results were in almost perfect accordance! Where however certain differences occur, they cannot be attributed to misunderstandings but to later additions which are necessary expressions of a historical development.

In our particular case for instance, it is characteristic that the categories representing the stūpa up to the Harmikā are identical with those of the orthodox canon while those which correspond to the tree of life show certain deviations. This indicates that the development of the more elaborate shape and symbolism of the crowning parts of the stūpa (htΐ) took place in later periods and under the influence of post-canonical ideas closely connected with the growth of Mahāyāna.

The deviations of the post-canonical categories can be seen by a comparison with the corresponding group, as found in the Pali canon (Dΐgha-Nikāya Ill, 33):

(1) dhamme ñāṇaṃ; (2) anvaye ñāṇaṃ; (3) paricchede ñāṇaṃ; (4) sammuti ñāṇaṃ; (5) dukkhe ñāṇaṃ; (6) dukkha-samudaye ñāṇaṃ; (7) dukkha-nirodhe ñāṇaṃ; (8) magge ñāṇaṃ.

The last two items of the Tibetan classification are not contained in this group, though they may be found in other combinations (for instance as anuloma and paṭiloma paṭiccasamuppāda). More typical deviations are to be found in the next group, representing

IX. the thirteen discs or layers of the tree of life which correspond to the mystical powers of the Buddha. Ten of them are mentioned in Aṅguttara-Nikāya, Dasaka-Nipata xxii.

The 13 mystical powers according to the Tanjur:

(1) The mystical power, consisting in the knowledge of the places which are suitable for the preaching and the activity of the Buddha; (2) the knowledge of the ripening of the different kinds of karma; (3) the knowledge of all the (states of) meditations, liberations, ecstasies, and unions with higher spheres: (4) the knowledge of the superior and inferior faculties; (5) the knowledge of the different inclinations of other beings; (6) the knowledge of the different spheres of existence; (7) the knowledge of those ways which lead to any desired end; (8) the knowledge and recollection of former existences; (9) the knowledge of the time of death and of rebirth; (10) the destruction of evil forces; (11 to I3) the three foundations of the particular mindfulness of the Buddhas (āveṇikasmṛtyupasthāna).

The 10 powers (dasa-tathāgata balāni) according to Aṅguttara-Nikāya:

(1) The Enlightened one perceives what is possible as possible, what is impossible as impossible in accordance with reality; (2) he perceives the results of actions done in the past, the present, and the future according to circumstances and causes, etc.; (3) he perceives every result, etc.; (4) he perceives the world with its different elements, etc.; (5) he perceives the inclinations of other beings, etc.; (6) he perceives the superior or inferior faculties of other beings, etc.; (7) he perceives the purity or impurity of the states of trance and of liberation, of concentration and its attainments, etc.; (8) he remembers innumerable former existences, etc.; (9) he perceives with the celestial eye, the purified, the supra-human how the beings re-appear according to their deeds, etc.; (10) by conquering his passions he has attained, perceived and realized by himself the passionless liberation of heart and mind, etc..

At first sight this scholastic symbolism will appear rather arbitrary, but if we examine it more carefully we flnd that it is consistent with the constructive principles of the stūpa and their ideology. It represents the way to enlightenment, revealing the psychological structure of the Buddha-Dharma and the qualities of the Enlightened One in whom the Dharma is realized. The stūpa, accordingly, is as much a memorial for the Buddhas and saints of the past as a guide to the enlightenment of every individual and a pledge for the Buddhas to come.

jsioa-iv-symbolism-stupa-page-18.png

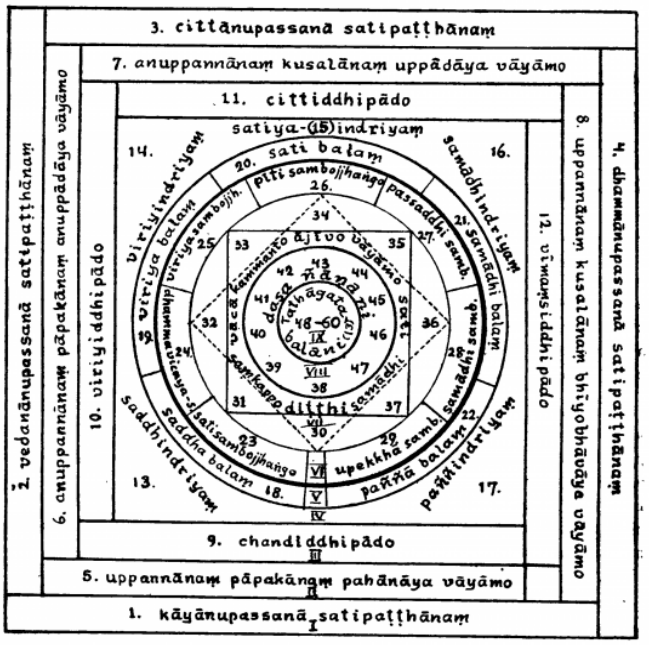


Figure on JISOA., Vol IV/1 pp. 40

As the stūpa consists of three main elements, socle, hemisphere and crowning parts, the spiritual development also proceeds in a threefold way. The first part (foundation) contains the preparatory, the second one (hemisphere) the essential conditions or psychic elements of enlightenment, the third one (Harmikā and tree of life) consists in its realisation. Each of these main parts has again three subdivisions.

The first, preparatory step is mental and analytical. Just as the foundation of the monument rests on the natural ground, the foundation of the spiritual building of Buddhism rests on the experience and analysis of nature as far as it is accessible in the psycho-physical constitution of man.

The second preparatory step is moral: morality based on the insight into the nature of life.

The third preparatory step intensifies the mental and moral achievements and, converts them into a psychic dynamism which arouses those latent forces which are the essential conditions or elements of enlightenment.

These elements form the static axis of the Buddhist system and occupy the central part of the stūpa: the hemisphere, its basis and the uppermost terrace on which it rests. The fact that the latter represents the same five psychic elements as the circular basis of the hemisphere justifies its combination with the central group, though from the standpoint of architecture it forms only the link between the original substructure and the hemisphere.

jsioa-iv-symbolism-stupa-page-19.png

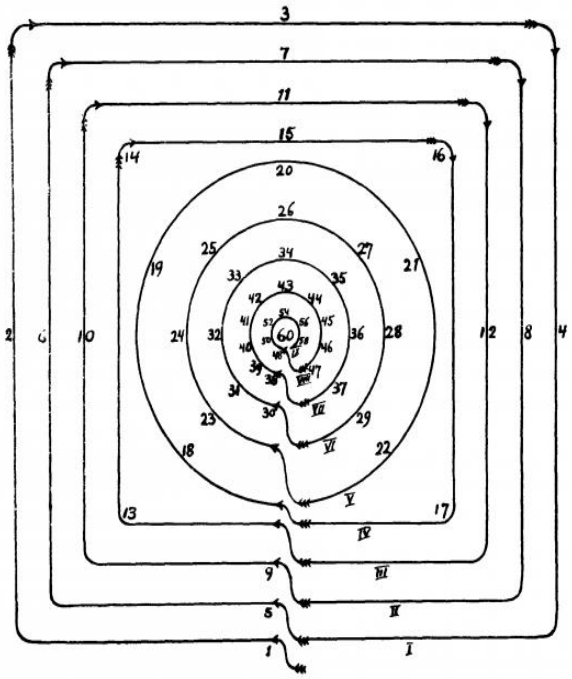


Figure on JISOA., Vol IV/1 pp. 40 - *facing*

The first step of the upper triad (the Harmikā) corresponds to the three steps of the substructure: it starts with right views and aspirations (sammā diṭṇhi and sammā saṃpkappo) which are the outcome of the analytic knowledge (pañṛa) prepared in the flrst step; it continues with right speech, right action, and right livelihood (sammā vācā, s. kammanto, s. ajΐvo), which is the fulfllment of morality (sΐlaṃ); it culminates in right energy, concentration and meditation (sammā vāyāmo, s. sati, s. samādhi) in which the dynamic forces of psyche reach their greatest potentiality.

jsioa-iv-symbolism-stupa-page-21.png

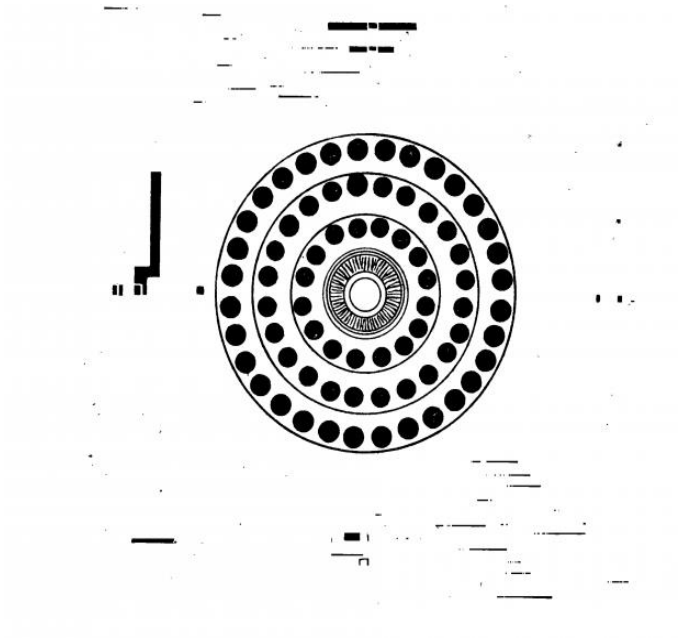


Figure on JISOA., Vol IV/1 pp. 41

Knowledge, morality, and concentration (paññā, sĺlaṃ, samādhi) are; the pillars of the Buddha-sāsāna. Morality has no meaning or value without knowledge. Therefore knowledge is placed before morality. Concentration on the other hand without morality is like a house without foundation. Morality is the discipline in the outer life on which concentration the discipline of the inner life, is built up. Morality thus has to precede concentration. Concentration again is of no value in itself; it is an instrument for the attainment of insight (vipassanā) and wisdom (paññā), which in its turn produces a higher form of morality and concentration until by this spiral-like progression (in which the same elements re-appear on each higher stage in greater intensity) Bodhi or enlightenment is attained. On the first step Paññā is not more than an intellectual attitude, based on investigation and reflection (vitakkavicārṇa). On the corresponding step of the higher triad it is wisdom based on the experience of meditation (inner vision) and in the last two stages it is enlightenment as the true nature of a Tathāgata. These two highest stages (represented by the stem and the 13 Bhūmis of the tree of life) correspond to the factors of, enlightenment (bojjhaṅgā) and to those faculties and forces which form their basis.

jsioa-iv-symbolism-stupa-page-22.png

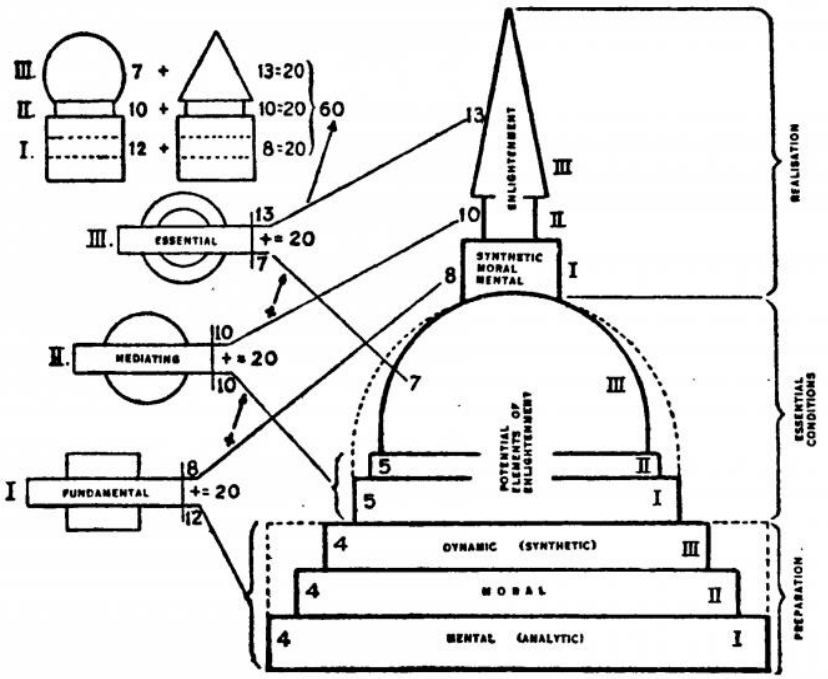


Figure on JISOA., Vol IV/1 pp. 42

The parallelism is also obvious in the architectural forms and in the numerical composition of their elements. The ground-plans of substructure, intermediate part, hemisphere, Harmikā, stem and cone of the tree of life are: square, circle, circle, square, circle, circle. Their further relations may be seen from the drawing on p.42 and the following table:

jsioa-iv-symbolism-stupa-page-23.png

	ground-plan :	square	circle	circle
	function :	fundamental	mediating	essential
upper half :	formal designation :	harmikā	stem	cone
	numerical designation :	4 + 4	5 + 5	13
lower half :	numerical designation :	4 + 4 + 4	5 + 5	7
	formal designation :	substructure	intermediate parts	hemisphere
	sum of elements :	5 × 4 = 20	4 × 5 = 20	13 + 7 = 20
				60

The fundamental functions are expressed by even numbers, the essential by odd numbers, and the mediating by even numbers (10) composed of odd halves. The intermediate parts belong

essentially to the next higher elements, i.e., to the main parts of the stūpa (hemisphere and cone: stūpa and Śikhara principle). This is proved by the fact that the hemisphere includes nearly all the elements of the preceding two steps, namely Viriyaṃ, Sati, Samādhi and Paññā (in form of dhammavicāyaṃ) and the cone contains similar elements as the stem, namely different aspects of Paññā. In the stem they are more fundamental and general, and in the cone more differentiated and specialised.

The symbolism of numbers is well developed in Buddhist philosophy, art and architecture. The following example may suffice to give an idea of the numerical relationship between the scholastic stūpa and the co-existing psycho-cosmology. Within the three worlds (ti-loka) or main forms of consciousness (cittāni), Kāma-, Rūpa-, and Arūpa-loka, there are fifteen word-planes (six in kāma-, five in rūpa-, four in arūpa-loka), thirty classes of beings (ten in kāma-, sixteen in rūpa-, four in arūpa-loka, according to their states of consciousness), and there are sixty elements of spiritual development, as represented by the stūpa. In figures[10]:

	3 =	3 = (key-number)	= 60/20
I)	15 =	5 x 3	= 60/4
II)	30 =	5 x (3 + 3)	= 60 /2
III)	60 =	5 x (3 + 3 + 3 + 3)	= 60

These sixty elements constitute a continuous way ascending through the three worlds and its different states of existence in the form of a spiral, spiritual Pradakṣinā. This idea has been materialized most perfectly in the great terrace-stūpa of Barabuḍur. Though this monument belongs to the later Mahāyāna period (VIIIth century) it can be seen from the drawing on p. 41 that the actual ground-plan of Barabuḍur fits exactly on the spiritual ground-plan of the orthodox stūpa as explained by scholastic symbolism. Barabuḍur has the unbroken tradition of a millennium, and instead of more or less justified speculations which have been made about its symbolism, we are now in a position to know at least the fundamental ideas which were accepted by the Buddhists of all schools and which hold good even for the Burmese and Siamese pagodas of later periods, in which Mahāyāna and Theravada meet in a new synthesis.

- 1.In the Kūṭadanta Sutta, Dĭghanikaya I, 5, the Buddha discusses the value of sacrifice with a Brahmin who holds the view that there can not be religion without sacrifice. The Buddha does not deny this, but while rejecting the bloody Brahmanical sacrifices he shows in their place a number of higher sacrifices, each better than the previous one, and finally he explains the best and highest of all, the sacrifice of one's own selfish passions श्रासव)in the attainment of sainthood. "This, O Brahmin, is a sacrifice less difficult and less troublesome, of greater fruit and greater advantage than the previous sacrifices. And there is no sacrifice man can celebrate, O Brahmin, higher and sweeter than this."

- 2.E. Diez, Die Kunst lndiens, emphasises this idea (p. 182 f.), which, I think, holds good specially for the earliest cave-temples, though I am quite conscious of the fact that also other reasons came in, for instance the necessity for those who wanted to lead a life of meditation, to

retire into the loneliest and most undisturbed places. The Buddha himself recommended caves for this purpose.

- 3.Soll dich des Lebens Baum
  befrein von Todsbtchwerden,
  So masst du selbst in Gott
  ein Baum des Lebens werden."
  'Cherubinischer Wandersmann" II, verse 230.(First Edition 1675).

- 4. See J.I.S.O.A., Vol II, pp. 87-105.

- 5.It must be understood, however, that while considering the principles of Śiva and Viṣṇu we are not so much concerned with the historical aspect of architecture but with the basic tendencies of their inherent symbolism.

- 6.Perhaps derieved from the kalaśa

- 7.The division of Mahāyāna and Hinayāna has probably never been so strict as some scholars believe and if we like to use these terms we should be conscious of their limited historical meaning. They originated at Kanṣika's famous council, where a discussion se about die ideals of Buddhism. According to the Tripiṭaka, liberation can be attained in three ways: by that of an Arahan, by that of a Paccekabuddha, and by that of a Sammāsambuddha. While the Sammāsambuddha does not enter Parinibbāna before having taught to the world the Dhamma which he has found through his own efforts in innumerable existences, the Pacceka-buddha and the Arahan are realizing this Dhamma (the former independ ently, the latter under the guidance of a Sammāsambuddha) in the shortest possible way, without possessing or cultivating the faculties of a world teacher.

  It seems that originally the Arahan, the Paccekabuddha and the Sammāsambuddha were merely classified as three types of men, while in Kanṣika's time they were conceived as ideals, and from this point of view there could be no doubt that the ideal of a Perfect Enlightened One was the highest. It is not probable that any Buddhist school rejected this ideal, but there may have been individuals who preferred the shorter way of an Arahan either because they found it more congenial to their own temperament and character or because they thought that there was little chance of ever attaining the highest ideal. Thus in each school of Buddhism there must have been followers of the greater (mahāyāna) as well as of the lesser (hinayāna) ideal.

  In fact even nowadays it is a custom in the southern countries of Buddhism, that all those who are earnestly interested in their religion choose one of these ideals, and most of them decide for the ideal of Buddhahood, the Bodhisattvamārga. The Mahāyāna ideal is recognized and followed even in the countries of so-called Hinayāna Buddhism and the terms Hinayāna and Mahāyāna should not be used as distinctive characteristics of two separate groups or

schools of Buddhism but only in the sense of individual ideals or in the strictly historical sense of the two parties at Kaṇṣika's council at which, by the way, the Theravādins, though they were later on wrongly identified with Hinayānists, were not present, while from those who were present only the followers of the exclusive Mahāyāna ideal have survived. The different schools should be called by the names they give to themselves, and as there are non who call their school Hinayāna this term may be dropped altogether.

The fact that the Theravādins did not enter into the discussion about these two ideals is not only asserted by the impartial attitude of the Pāli Tipiṭaka which leaves the choice to the individual, but also by the Kathāvatthu, the latest book of the Abhidhamma, dealing with the points of controversy with regard to the early eighteen schools of Buddhism, among which neither the term Mahāyāna nor Hinayāna occurs.

Where among all these schools does the rise of Mahāyānism come in? The Chinese pilgrims speak of Mahāyānists and Hinayānists, of Mahaṁsākas, Mahāsāṅghikas, Sarvāstivādins and Sammitiyas, of Sthaviras, Lokottaravādins, of the Pubbasela and Aparasela Viharas. The date assigned to Fa-Hian is about A.D. 400. The commentary, as we have it, written either by Buddhaghoṣa, or, possibly, by 'one of his school' is probably half a century later. Why are these well-known divisions in the Buddhist world omitted by the latter writer?

One thing seems fairly clear in this yet unsolved problem, namely that Fa-Hian and Yuan-Chwang whose chronicles brought the distinction into prominence have given the Chinese versions of the names Mahāyāna and Hinayāna to institutions which they recognized as such, either by first-hand observation or by hearsay, institution; which in Buddhaghoṣa's school were known under quite different designations.

- 8.C.A.F. Rhys Davids, "Points of Controversy" (Kathā-Vatthu). pp. XLV-XLVI.
- 9.Cf. Tucci: lndo-Tibetica l; "Mc'od rren e Ts'a rs'a nel Tibet lndiano ed Occidentale".
- 10.CF. part III, proportions of the Dāgoba: The universal aspect of the Dharma which I compared to the dimension of space, is expressed by categories in which the number three prevails in the same sense as in the vertical development or composition of Buddhist architecture.

CHAPTER

STEP by STEP STUPA CONSTRUCTION

Stupa Garden of Merit Construction – Archive 2013-by Lama Karma Chötso

After living in Florida for a while, I noticed that every time I mentioned it to a Tibetan Lama I would hear, "Florida really needs a stupa." For a stupa to have a strong enough effect, it would have to be at least 35 feet tall to give enough room for consecrated tsatsa, bumpas and relics.

Open Awareness Buddhist Center had purchased property a few years ago, but there wasn't room for a 35′ stupa, nor would it be allowed. There even seemed to be a problem with putting in a small stupa as they are normally placed in the northwest corner of the land, which happens to be our rather small front yard.

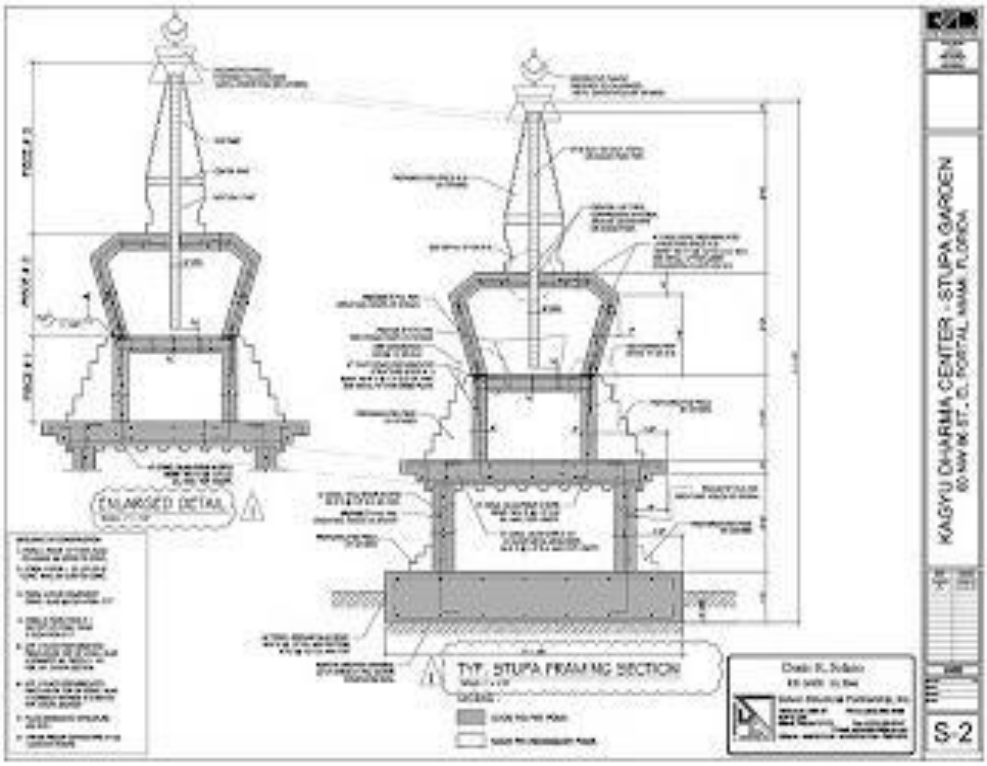
Khenpo Tsultrim Gyamtso Rinpoche took care of that problem, however. When I mentioned it, he said, "There is no North. There is no South. There is no East. There is no West. Put the stupa wherever you want!"

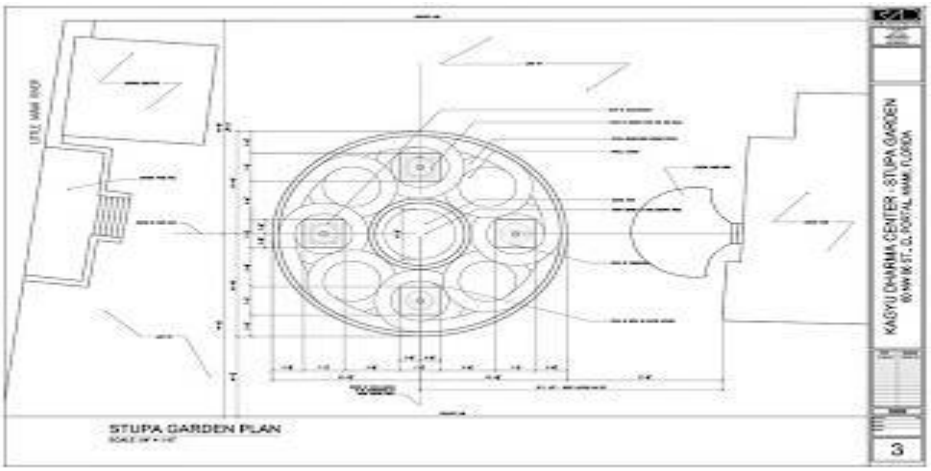
So, that taken care of we still spent some time hoping to get some land nearby through friends. When that didn't work out, I finally had the bright idea of asking Lama Rinpoche if we couldn't just built 4 small stupas in the back yard instead of one large one. The stupas would still afford us the space needed for enough tsatsa and other substances that a stupa of 35′ would give us. He

thought it was a good idea and gave permission for the sangha of Open Awareness Buddhist Center to get started.

And… here we go! 

The next steps — long before the consecration — were to get a local architect to draw the project out, get engineer's drawings, take it all to the Village and pray for a permit.





Luckily for Open Awareness Buddhist Center, these steps were not difficult. When we first acquired the property an architect, Rafael Amuchastegui, had visited with his wife, Dikka, who had recently taken refuge with Lama Norlha Rinpoche. He indicated then that he would be interested in a stupa project, so I called him — years later. It didn't matter. Rafael was here within a couple of days and soon after we had our site drawings. They were beautiful — the stupas sat in a mandala of circles so that people could circumambulate all four stupas and/or follow paths that encircled each individual stupa. At that time we thought we'd keep a pond in the center, but that has since been scratched. Rafael and Dikka were incredibly supportive and generous. He would not do anything but donate all his work, the drawings, everything.

Lama Norlha Rinpoche was asked throughout these few weeks about when he would come to consecrate the land but the answer was always, "Wait till you get your permit." And there was no indication that a permit would be easy to get. But another auspicious occurrence happened at the right time — a new meditator just happened to be a lawyer for land use and zoning. With Tony Recio's expertise, we had our permit in about three weeks.


So I called Lama Norlha Rinpoche again to ask him when he could come and consecrate the land. He said he was still in retreat and would not travel any time soon and that I should do it myself. Around that time, Shamelle Gonzalez decided she would like to visit the monastery in NYS, invited me along and I was able to meet with Rinpoche. He gave me a copy of the text needed, the oral transmission *(lung*) and instructions for the consecration


Part of *Gelek Trinpung* includes offering drinks like tea and coffee.Rinpoche chose the date of March 8th, Guru Rinpoche Day in the Tibetan calendar, and we began to prepare. (Above is the outdoor shrine to Guru Rinpoche set up for the consecration.)

First, there was a large fire puja called *Gelek Trinpung*. Since that text is long and only in Tibetan, I chanted it by myself as the sangha members made the offerings. This practice is done at Open Awareness Buddhist Center once every month now so the practitioners are good at it and

organize it well. They have also begun chanting along in parts.For the actual consecration after the fire puja, we gathered together a large bowl of semi precious stones and crystals which were offered along with *torma*.



This is part of the outdoor shrine set up for the consecration which included bowls of saffron water, flowers, incense, a traditional Tibetan butterlamp, food and a conch shell as a symbol of music.Then the Lama sits holding the *dorje* on the ground, meditating and chanting the mantra.


Once the consecration concluded, the land was free for building the stupas. These photos show the land just before work begins. It takes a day or two (or three?) to mark out where the mandala will be so the ground is prepared in the right place. Here are a couple of stakes and a collapsed pond.

Rafael visited to check it out and made a few changes. Other than that, we're set to go. Main reason? A long-time member of the sangha who wishes to remain anonymous offered a large chunk of cash to get us started!!!!

So the gold Buddha will rest for a while under the bougainvillea while we make an even better place for him to stand in the future.

We have foundation boards



What we thought would take two weeks was accomplished in only 4-1/2 days — the preparation of the ground and getting the fill in. While they were doing that, the construction crew of two — Butch and Phil — built the boxes for the first pour.These bottom slabs are a bit over 7 feet square and are in the four cardinal directions.

Adding the Rebar


The rebar is in. The inspection has been passed. We're ready for the treasure vases.

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Treasure Vases Arrive!

When I visited Lama Norlha Rinpoche at the monastery (Kagyu Thubten Choling) in February, the sangha in Florida purchased treasure vases and shipped them so quickly they arrived before I left. I thought we only needed 16 but Rinpoche ended up making 26. Some of them are marked "Naga" and are for the nagas and earth gods.

Others are for Gonkar, White Mahakala.These are Dzambala.

The treasure vase is a Tibetan tradition that goes back to the time of Guru Rinpoche, who gave specific instructions on how they were to be made and their purpose. These vases can help balance the environment and promote healing of all kinds. Here in South Florida the basic elements of earth, water, fire, air and space are all out of balance. These vases are part of the reason the stupas will be balancing them and will help avert negative forces of all kinds — storms, wars, etc..

Placement of the vases

Lama Rinpoche sent some messages along with the shipment of consecrated vases, but we still had questions. After asking around a bit, he finally gave the specifics of how they were to be placed in the first slab. For example, the naga/earth god vases went in the middle of the slab in the bottom, two for each stupa.


Other vases had to end up in the top half of the pour so that they would not end up underground. James Walton brought wire and an hour before the cement truck rolled in we were all busy trying to wire the vases in their respective corners or sides. The rebar was certainly helpful then!Tony and James are working here and below the two vases in the middle of the pour are waiting to be wired down.


We finished with the last one as the cement truck pulled up outside and the pump was set up to send the cement all the way to the back yard to fill in the slabs.

First Pour!


And, here we go!

The vases are holding up. The pourers are very careful with them and let James know whenever they think one of them is moving. We have to keep them right side up.


They're holding up well here.


This one needs a bit of help!With photos like these, there isn't much need to write.


Butch levels off the pour.

Checking out drawings — a constant activity these days.

And they're all done. We even have extra cement piles all over the ground that may be used for another project on the land. First pour, best pour!

.**Walls are going up**


With the rebar already coming up out of the bottom slab, boxes are built around them to pour the walls.

However, the inner space will have to be filled with consecrated substances so a small space about 18″ x 12″ is left. That's supposed to be large enough, but looking at it now, it's obvious we're going to have to be a bit creative in order to fill in the entire chamber.


This photo of the yard gives a good idea of how large the stupas will be and how the mandala will fill up the space. The way the yard is landscaped after the project is completed will be important.


Smoke from the most recent fire puja spreads over the site.

.**Pouring The Walls**

The second day of pouring begins early as Florida days are now getting very hot. Happily, once the forms are made, the actual pouring doesn't take much time at all.


With all the rebar in there, we're wondering how much cement can get in the form!Butch watches carefully and pounds the outer boards to get rid of air bubbles.


Leveling off the top of the pour so it's fairly smooth. The next stage will be to pour the slab that covers the chamber and finishes off the throne parts of the stupas..

We Have Walls!

We are removing the plywood forms that held the wet concrete in place. Removing the inside forms was tough due to the wood getting wet from rain and swelling up. We used very large pry bars to do the work.


Here is the beginnings of the Stupa taking shape. On the ground is the remaining rebar for the next couple of pours of concrete.Two more pours to go on site. The bumpa and spire are being made off site and are being trucked in.

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Getting Ready For Next Step

Butch and Phil are putting the wood up for the Deck pour. It was hot enough this day that we had Umbrellas out for shade.We are laying out where the steel for the next rise of walls is to go. In the background is the smoke from the Fire Puja offering we had that morning.

One complete form, three to go.

Little by little the Stupas take shape. In the next few days the steel will be put in place and then time to pour!

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More Pouring

The steel has all been put in place and it is concrete pouring time.

We had about 150 feet of hose in order to be able to reach all the Stupas.

Leveling off the pours and finishing the concrete.

The concrete is dry and now the forms are off. On the stupa at the left the form can be seen sitting on the edge.

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Pouring Continues

These are interesting shots taken by James, I think, looking down at the forms made for the primary pours on top the thrones. Two of the stupas will have square "boxes" and two forms have been made octagonal to allow for round levels on the secondary pours.

This was a real work of art!

Cement fills in to make the second chamber of the stupa. All chambers will be filled to the brim with consecrated satsa, relics, etc.

Last day of work on this project for Butch and Phil. Open Awareness Buddhist Center truly appreciates their involvement in the stupa project and the time and care they took to make sure each one was done perfectly.

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Dried Concrete, Boards Come Off

These shots show the stupas in the Garden of Merit, now awaiting only the outer secondary pours and the parts being made off-site by Herpel Casting. The outer pours will add steps both on the bottom slab and on top of the throne section which is actually everything in the photo below other than the top block.

The three steps that will be poured on the bottom slab represent the three sources of refuge: The Buddha, The Dharma and The Sangha.

On top of the throne section, these two stupas will have four square steps poured. On the farthest one shown here, those steps will be where small doors will be placed as this is the Stupa of Many Doors.

The two stupas that have octagonal blocks on the thrones will have round levels poured on top the throne sections. The stupa on the left here will have 4 levels, each covered with lotus petals. The other will have three round levels poured each of them with a small extention on the top.

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Bumpa

On your right is Rick Herpel, owner of Herpel Casting, and on the left a man he brought in just for this project. (I hope to find his name one day, too.) This photo gives an idea of the size of the *bumpa* and shows clearly the *gau* at the front. Since the *gau* is here cut from a piece of wood, we can easily see it. In the space of the *gau* will be an opening for a statue of Buddha Shakyamuni. Four statues have been commissioned by Lama Norlha Rinpoche to be made in Nepal, and four crowns for the tops of our stupas.

Working on the lathe forming the model for the mold of the *chu kor* at Herpel Casting in West Palm Beach.

The wooden part shown here is called the *harmika*. When the stupa is painted, this is where the eyes will be painted.

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Spire

First of all, I have to apologize to all our blog followers (and all sentient being,s of course) for the *bardo*, or the time in between, the last post I wrote and this one. A little event called "The First American Kagyu Monlam Festival" held in the woodstock, NY center — the American seat of His Holiness the 17th Karmapa — took up some time. It was a wonderful aspiration prayer festival with Khenchen Trangu Rinpoche leading and giving teachings each day; and with Khenpo Kathar Rinpoche and Lama Norlha Rinpoche in attendance for the full five days of chanting, it could not have been better. Karmapa's sister was also there and Karmapa himself gave a short talk that was live stream from India. I was able through a friend to give Karmapa's sister one of our cards to take to him. Maybe some day he will read this blog and send his blessings.

After the Kagyu Monlam, a few more people flew up from Florida to attend an empowerment Lama Norlha Rinpoche gave on Sunday July 25th. The next day Sengay the Dharma dog received his blessing from Lama Rinpoche, who actually threw Sengay's favorite ball a few times! Sengay was ecstatic and did his very best fetches and highest jumps just for Rinpoche. He also, thankfully, did his prostration to Rinpoche on command.

On the third day of driving home Sengay and I stopped at Herpel Casting to see the finished model of the *bumpa, harmika, chu kor* they will use to make the molds and pour the rest of the stupas' main parts. Under the guildance of Rick Herpel, they created the lathe (see photo above) used to make the model of the spire, *the chu kor* part. *Chu* means Dharma (teachings of the Buddha) and *kor* means circle. There are 13 circles in all, ten symbolizing the 10 Bodhisattva levels and the other three representing three essential remembrances. It is sometimes said that these 13 rings represent 13 Bodhisattva levels as the levels are sometimes spoken of as 13 rather than 10.

The models were beautiful. Herpel Casting is doing a great job — and with great enthusiasm, too.

Here is the top of the *chu kor*, where the crown will eventually be attached. This top wil be poured as a separate piece, fitted into the top of the rings and sealed against any water intrusion.

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Young Buddhists Circumambulate the Stupas

Last week the participants of Young Buddhists' Day learned what circumambulation meant and how to do it. This month's YB Day they learned how to enhance circumambulation practice by adding the recitation of the MANI mantra.

Some new children joined us this time and, of course, since it was the day before Halloween, all went home with treats… and pumpkin baskets to hold them.

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Stupa Steps

The three steps added to the bottom slab represent the Three Sources of Refuge — the Buddha, the Dharma and the Sangha. Here, boards are in place around the rebar, forming the first two steps.

A few closer looks. These steps can be formed and poured by Sangha members because they are not structural.

Close up of the work prior to pouring the cement.

Even the smallest and the youngest can find a job on the stupa site — carefully supervised, of course!

JP (Juan Pablo) on the left and his older brother Alejandro help out.

As with any good crew, every bit of work has to be discussed and the proper way to proceed has to be determined. This stupa work is serious stuff!

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Installing The Bumpas

Last November, Rick Herpel and crew installed the main portion of the bumpa, the next level of the stupa. Here Rick is checking a diagram made at Herpel, Inc. that shows the installers points that need to match up on each stupa.

Drilling for installation.

The first bumpa is in place! The pieces were picked up by slipping wire rope attached to the bumpa over a forklift, raising it up about 8 feet until it was higher than the existing structure, then lowering it into place.

Rick Herpel checks out the first bumpa in place. It's on the Stupa of Complete Victory and we all felt victorious to have the first one up!

Working on a bumpa as it hangs from the forklift.

It's up and coming! Installers wait for it to get close enough to attach.

And it arrives on its stupa.

The fourth one is on! This one was interesting as it didn't have the attachments for the wire rope to lift it. Instead, it was lifted on the forklift and slid into place. These pieces are very very heavy and the installers had to hold it in place a couple of times which was amazing to watch. It was no trouble, however, and while it slid a bit on the mortar, the installers had control the entire time.

A good look at the bumpa held by the forklift.

Lovely — all four bumpas are installed and photographers (myself included) are clicking away.

Cleaning up the mortar in between the base and the bumpa. These men did an incredible job.

OK, here's the crew but sadly, I've lost the paper where I had printed their names. All I'm sure of today is that Rick Herpel is on the left and the other three are happy the job is completed and has been done so well.

A beautiful shot of the sun behind the bumpa. The door it's shining through is the opening of the "gao" — also the name for amulets, some of which have this shape.

We couldn't resist placing one of the Buddha statues where it will live when the entire stupa mandala is complete. The statues were ordered by Lama Norlha Rinpoche, custom made in Nepal, and shipped to the US. Lama Rinpoche consecrated each of these beautiful statues which, as you can see, fit perfectly in the space set aside for them.

Now the sangha of Kagyu Shedrup Choling is making the tsatsa that will be placed inside the stupas. The power of a stupa doesn't depend solely on the structure or architecture, but on the substances that are sealed inside. The more consecrated tsatsa that can be placed inside a stupa, the more powerful that stupa's effect on the area it will protect. A stupa that has only a few tsatsa will not be of as much benefit. So, the stupas in the Garden of Merit will each be filled with thousands of tsatsa and with relics of masters of the past. The blessings of these stupas will have a beneficial effect on South Florida for hundreds of years to come.

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Painting Sa Tsa's

The first painting of the first satsa! The tops are yellow and the bottom half will be red, as is traditional in Tibet. These are the first of 32,000 satsa that will be made, painted, consecrated and then placed inside the chambers of the stupas. Each stupa should hold about 8,000 satsa.

Shamelle finds a place to paint in the back yard on top of banana leaves from our trees. We're trying two different spray paints for the tops. Brushes will be used to paint the bottom parts.