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# Cosmological interpretation of architecture: cases from Ancient China and Mesoamerica

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**Citation**
Chen, C. (2021, September 28). *Cosmological interpretation of architecture: cases from Ancient China and Mesoamerica*. Retrieved from https://hdl.handle.net/1887/3214089

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| Version: | Publisher's Version |
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# 1 Introduction

## 1.1 Architecture and Cosmology: Key Questions

Cultural heritage, especially architectural heritage, is an important medium for recording and transmitting the knowledge and ideas of ancient societies. Those who want to fully understand this heritage and its meaning have to do an in-depth study to identify its original meaning, i.e. the meaning that the builder or the first users gave to the monuments. In order to find the original meanings of architecture, one has to analyze its diverse aspects, such as form, space, environment, decoration, contexts, as well as those ideas or ideologies of their times, and understand these by studying the pertinent historical sources. Chinese and Mesoamerican civilizations have produced architectural monuments which are admired worldwide, some of which are believed to express specific cosmologies. The comparison of the formal aspects of the architecture with contemporaneous ideas about cosmos and time (including astronomy and calendar) as well as ritual practices, an indispensable part of a religion, which may have played an important role in imbuing the buildings and art with meaning, is the necessary point of departure for interpreting this type of heritage.

On the other hand: how do we know this? We have to ask ourselves: is the architecture really related to cosmology? If so, how were these associations remembered, experienced, rediscovered, and looked upon by later people? And what are the relationships, connections, and disjunctions between the successive inhabitants of the landscape or cityscape in which the architecture is located? Are there relevant historical sources available and are they sufficiently clear and explicit? These are indeed questions worth considering. Not so long ago, *Michael E. Smith*, a North American archaeologist specialized in Mesoamerica, published an article to question the credibility of the claims of a lot of recent research about the cosmological meaning of Maya cities, stating that their results “are vague, weak, and unconvincing” (Smith 2003). He criticized the authors for relying upon "assertions and subjective judgments” instead of "empirical evidence" to conclude the cosmological ideas of Mayan cities (Smith 2003), which makes their opinions lack credibility. Indeed, in the case of Mesoamerica, there is abundant archaeological data, but the textual sources are rare, fragmented, diverse and – specifically when they are later products from colonial times – sometimes biased. Smith’s challenge obliges those who try to interpret the cosmological meaning in architecture to ensure that those architectures do indeed express cosmological ideas and, furthermore, to develop good arguments for attributing specific meanings.

This thesis is inspired by that challenge. It is based on a comparative study of ancient Chinese and Mesoamerican architectures and discusses the possible cosmological meaning of the layout of sites, buildings, and monuments. The comparison is not undertaken to postulate some cultural-historical connections between these regions, but precisely in order to find out how cosmology may have inspired architects in different civilizations. For the Chinese part, due to its vast territory and diverse ethnic cultures through different historical periods, this thesis mainly takes the thoughts and theories of the traditional Han Chinese for cultural comparison. For Chinese architecture, there is a large amount of explicit historical

information on this topic, such as detailed architectural archives, relevant historical documents, oral folk accounts, and some well-known laws. In academia, many scholars have done extensive research on this aspect and have given positive answers to the question of whether ancient Chinese architecture could express cosmological meaning. Chinese scholars, such as *Yukun Zhang* (2004, 2011), *Qingzhou Wu* (1996, 1997, 2011), *Bin Xu* (2014), *Chang* (1976), and others, have explored the cosmological characteristics of Chinese architecture and cities from different perspectives. Some western scholars have also been interested in this issue, for example, *Paul Wheatley*, a famous scholar who focused on Asian studies, carried out a great deal of research on the cosmological characteristics of ancient Chinese architecture and cities (Wheatley 1969, 1970, 1971, 1975), which has attracted the attention of many scholars and deepened peoples' understanding of Chinese architectural culture. Other scholars, such as *Steinhardt* (1999,2002), also made relevant contributions.

In contrast with the situation in China, there are very few ancient textual sources available for Mesoamerica. The Spanish conquest (1521) meant a large-scale destruction of the ancient writings; only a few books (codices) have survived, folded strips of deerskin or native paper, with texts in hieroglyphs (Maya culture in Eastern Mexico and neighboring Central America) or pictography (Aztecs, Mixtecs and other peoples in Central and Southern Mexico). These are products of the Postclassic period (± 900 - 1521). From earlier periods there are also inscriptions and painted scenes on stelae, ceramics, etc. They are complemented by works created in this same tradition during the early colonial period and by Spanish chronicles. Together with archaeological findings, these texts still fail to give a complete image of the pre-colonial religion. There are no records, much less explanations, of the construction history or design ideas of Mesoamerican architecture. The cosmological aspect has to be reconstructed in an indirect manner on the basis of (often speculative) interpretations of those few ancient texts and of the visual art itself. A series of important scholars, such as *Anthony F Aveni* (1975, 1986, 2000, 2004, 2008), *Horst Hartung* (1986, 1988), *Ivan Šprajc* (1993, 2000, 2005, 2009, 2010, 2014), *Wendy Ashmore* (1989, 2000, 2003), *Lindsay Jones* (1993, 1995, 2000, 2016), *Manuel May Castillo* (2014, 2014, 2018), and others, have tried to reconstruct and understand the architectural ideas of Mesoamerica from different angles.

As *Ashmore* said in response to *Smith*'s article, the cosmological characteristics of Mesoamerican architecture can be researched in many ways, such as (1) through detailed examination of textual evidence, including the indigenous manuscripts and the sources written by the early Spanish missionaries, as well as inscriptions and works of visual art from religious and funerary contexts; (2) through field investigation and scientific analysis of existing heritage, and (3) the study of oral traditions, on-going ritual practices and local legends of indigenous peoples (“living heritage”). Moreover, (4) the comparison with other, similar cultures (such as the Chinese culture), may help to create a plausible interpretive framework by identifying general similarities and differences. By combining these different approaches, this thesis wants to contribute to assessing the meaning of architecture in China and in Mesoamerica.

The identification of the cosmological significance of architecture is a necessary element in the study of civilizations, as it can (1) reveal the original meaning of the architecture; (2)

reflect the prevailing ideology of the society at that time; (3) reveal many historical facts and sources; and (4) provide references for contemporary architects and academic researchers.

The starting point for cross-cultural research and comparison is the observable similarity of cultures, based on the homology of human activities and thoughts in the process of cultural formation. Historical and archaeological evidence suggests that the cosmological theories of Mesoamerica and ancient China had several aspects and concepts in common, such as the importance of the four directions, associations between specific colours, animals, deities and other symbols, the veneration of ancestors, ideas about the afterlife. However, since the two civilizations developed separately, the precise manifestations of these cosmological theories in their architectures and cities, though similar, are also notably different.

Through the comparative analysis of some representative architectural highlights from both civilizations, this thesis will try to answer successively the following questions:

1. Do both architectures manifest underlying ideas about a universal order and cosmic structure and, if so, how? Can the process of standardization, the layout of the spatial dimensions, the forms, and principles of architecture, with the use of specific numbers and symbols, for example, be interpreted as a reflection of concepts concerning cosmic order and structure? What are the correspondences and the differences between the cultures in this respect? This issue will be discussed in Chapter 2.

2. Can both architectures be analyzed as "bridges" between human beings and gods? Do we find indications of (ritual) human interaction with the gods, uses of liminal space, and notions of a sacred space? Does architecture give form to a residential place of the gods, and/or does it represent a certain god's body or a central religious symbol? This will be studied in Chapter 3.

3. How can we identify concrete expressions of ancestor veneration and afterlife concepts in the design of tombs and funerary monuments in both cultures? Chapter 4 will examine relevant examples.

4. Can we find indications about the relationship of architecture with rituals and memory, with the calendar and the perception of time? This will be discussed in Chapter 5 of the thesis.

In the rest of this Introduction, these general guiding questions will be further detailed and explored in the Chinese and Mesoamerican contexts.

### 1.2 In Search of Commonalities

Both China and Mesoamerica are comparable as forms of early statehood with highly developed architecture as well as abundant visual art and the presence of written sources, which inform us about their cosmologies. Making more specific intercultural comparisons, however, is a hazardous enterprise because it presupposes a detailed knowledge of the cultures (languages, religions, and philosophies) concerned. Both ancient China and Mesoamerica are very complex worlds with long histories and important internal variations, changes and developments through time and space. The terms 'Chinese' and 'Mesoamerican' are used here for the sake of brevity; in fact – as the discussion of examples will show – this comparison selects cultural aspects that are characteristic of (and may be limited to) certain places and certain periods within those complex wholes. There is no evidence of any direct

historical connections or mutual influences between these two large regions. The comparison of the ways architecture may express worldviews, therefore, does not try to contribute to speculations about historical intercultural contact, but, on the contrary, aims at discovering and discussing some general commonalities and differences in cultural developments that are independent from each other.

It is already an enormous challenge to achieve a general overview of knowledge of one (part) of these civilizations. Furthermore, as mentioned earlier, the breadth and reliability of the sources is quite different in each case and demands long, detailed research. Also, my own position has clear limitations; I am familiar with Chinese language and culture, particularly the history of Chinese architecture, but I do not know any Mesoamerican language, and my access to Mesoamerican culture and history is mainly limited to secondary literature. That makes the comparison necessarily speculative and superficial. On the other hand, a comparative method is an important tool in achieving a better understanding of the original meanings of architecture in both cultures. With all the mentioned limitations, this thesis undertakes such a comparison as a contribution to assessing the possible value of applying the (better documented) relation between architecture and cosmology in China as a model for suggesting plausible interpretations of Mesoamerican architecture. In a general sense, this comparison has the following purposes:

### 1.2.1 Identify Common Aspects of Human Thoughts and Activity

Although ultimately having a common origin in the remote *Paleolithic* past (Carrasco 2013:xix; Cameron 2006, 2008), both civilizations have developed separately, without attested connections in historical time. It is therefore interesting to identify many specific differences and also several underlying commonalities in their development (Graña-Behrens 2009). Both civilizations have produced ceremonial architecture and many other public monuments. Here we will assess if and in what measure these are based on ideas about how to locate, to orient, to organize and to establish the human being's building spaces, such as cultural landscapes, cities, palaces, temples, villages, houses, and altars, within the world or *Cosmos* in a correct way, i.e. the ideas of the cultures in question about how to ensure a proper connection and a harmonious relationship between the living space of humans and the agency of the divine powers of the universe.

On a higher level of abstraction, we find comparable general traits in the development and function of writing systems, for example, as well as in a nature-centred religious worldview and in certain aspects of social organization. The work of *Bruce Trigger* (2007) offers a worldwide comparison of diverse cultural aspects, showing the many elements that human societies have in common.[1] Valuable general insights are further to be gained from general theoretical perspectives such as rhythm analysis (Lefebvre 2004), modern space syntax (Hillier & Hanson 1984; Hillier 1999), and environment-behavior studies (Rapoport 1990, 2005), which focus on the social function of architecture. For understanding the religious dimension, the classic work of *Roy Rappaport*, *Ritual and Religion in the Making of Humanity* (1999), provides fundamental orientation. Contributions of specific interest for the

[1] Bajema (2017) offers a detailed comparative archaeological study of Ancient Greece and the Classic Maya.

interpretation of Mesoamerican architecture are architectural-hermeneutic studies (Jones), archaeo-astronomical studies (Aveni, Sprajc) and the studies of orientations and visual alignments (Hartung, Tichy), as well as the connection of heritage research with present-day topics such as the identity and rights of indigenous peoples (May Castillo 2018).

This thesis will reassess the commonalities between ancient China and Mesoamerica in terms of cosmological structures, ideas about life and death, ritual architecture, astronomical systems, and so forth. On that base, it will bring together, compare and evaluate the possible meanings of sacred architecture (e.g., temples, imperial buildings, and tombs) and cosmology as proposed by earlier investigators of both cultures.

In this context, the aim of this comparative study is not limited to finding out what the similarities and differences in the two cultures are, but instead, is to provide a basis for identifying and explaining the meanings behind those similarities and differences, particularly the role of symbolism, as manifested in the ceremonial and public buildings of both civilizations, and for assessing the ways in which this ancient architectural symbolism is perceived in the present.

### 1.2.2 Find Missing Evidence: Analogy from a Different Perspective

Chinese and Mesoamerican architectures have their own unique features and pose specific challenges to identifying and understanding the cosmological significance of buildings. For example, Chinese investigators habitually search for ancient books or documents to find the text records or drawings that date from the construction period or other scholars' books from that time. This preference for consulting primary sources stems from the wealth of historical documents available, however, it also has a limiting effect on the interpretations of scholars, as they tend to disregard hypotheses or possibilities that are not firmly grounded in the ancient records. This strong historical perspective has influenced the study of the original meaning of ancient Chinese architecture. On the contrary, for Mesoamerica, scholars are accustomed to using a variety of research perspectives (with a strong presence of archaeology and anthropology) to understand its architecture. This may provide new perspectives for the study of Chinese cases.

Mesoamerican cultural history suffered a major interruption, disjunction, and destruction because of the European (Spanish, English) conquest and colonization. Consequently, there are many historical puzzles, which often can only be solved by hypotheses. This brings many obstacles to understanding the ancient monuments and other remains of the past. As a similar civilization to Mesoamerica, but with a different history, China has abundant, explicit, and accessible historical records concerning all aspects of ancient society, people's way of thinking and acting, etc. These descriptions could be used as a cultural frame of reference for exploring human behavior in Mesoamerica in comparable conditions. The analogy with Chinese culture may help to formulate hypotheses about the original intentions and the use of symbols in the creation of this architectural heritage.

In general, comparative research can be inspiring and a good way for finding clues, for supplementing missing parts of the record, and for understanding ancient cultures from a new angle.

### 1.2.3 Heritage Awareness: by Cultural Interpretation

The comparison between cultures also implies a reflection on the present-day dealing with heritage in their respective regions. Obviously, the social and political histories of China and Mesoamerica over the past centuries have been quite different, yet in both regions, we find processes of continuity and disjunction, albeit in very different ways. In the process of cultural comparison, I hope that more people can come to understand and appreciate the original meaning of architecture in a worldwide perspective, and so improve their awareness of, their active interest in and their personal contact with their ancestral cultural heritage, attitudes that are fundamental for the preservation of the monuments and for the creative continuation of culture.

## 1.3 Non-negligible Foundation: Theoretical Review of Chinese Cosmological Architecture

As a civilization that respected many gods of nature, paid attention to the origin of the universe and worshipped the God of Heaven, China has developed and perfected its cosmological thoughts for thousands of years. Cosmological ideas, as an advanced cultural achievement, were strongly present in its city-life and architectural design in each of the historical periods.

### 1.3.1 *Cosmos* in ancient Chinese Philosophy

*Cosmos* (宇宙 *Yu Zhou*), a composite term that refers to the whole universe, first appeared in a famous book named *Zhuang Zi* (庄子) in the *Pre-Qin* Period (Paleolithic period ~ 221 BC) (Xi 2001), however, in those days it did not yet clearly indicate the concept of the universe in its full spatial and temporal dimensions. Later, *Shi Jiao* (尸佼), a thinker of the *Warring States Period* (475 BC-221 BC), gave it a more precise meaning in his book *Shi Zi* (尸子): "*Yu* is all the spaces including the four directions plus above and below, *Zhou* is all the time from the ancient times till the present and future".[2] He argued that the universe includes two aspects: space and time. The *Yu* refers to the totality of space while the *Zhou* symbolizes infinite time. *Cosmos* (宇宙 *Yu Zhou*) in Chinese culture, became a term that covers everything including all space and infinite time. Today, *Cosmos* is broadly defined as the general term for all things, the unity of time and space. A narrower definition is the space and matter outside the Earth's atmosphere (Chen 2014).

There are six major theories about *Cosmos* in ancient China, namely, *Gai Tian Theory* 盖天说, *Hun Tian Theory* 浑天说, *Xuan Ye Theory* 宣夜说, *Xin Tian Theory* 昕天说, *Qiong Tian Theory* 穹天说, and *An Tian Theory* 安天说 (Dong & Yao 1990). The main concerns of these theories are the shapes and relationships of Heaven and Earth, which constitute the focus of ancient Chinese cosmological theories. *Gai Tian Theory* and *Hun Tian Theory*, which among the six theories, played an important role as the main ideologies in ancient Chinese philosophy and society.

[2] *Shi Jiao* (390-330 BC), a *Pre-Qin* Period scholar, in his book *Shi Zi* (尸子):四方上下曰宇，往古来今曰宙.

*Gai Tian Theory*，first mentioned in the *Jin Shu*/*Book of Jin*(晋书)，originated in the early *Zhou Dynasty*(周朝，1046BC-771BC).[3] It mainly focused on the theory of *Round Heaven and Square Earth* 天圆地方, which was clearly recorded in the ancient Chinese classic book *Zhou Bi Suan Jing*(周髀算经).[4] The theory became widely known through a famous song named *Chi Le Ge* (敕勒歌) during the *Southern and Northern Dynasties (*南北朝时期, 420 AD-589 AD), it portrayed the sky as a dome that covered the Earth with its "four directions" (天似穹庐，笼盖四野). From the term “dome”, mentioned in the song, we may deduce that the sky shape at that time had been deepened from the simplified shape of "circle" to a dome-shape in three dimensions. As for the Earth, *Zou Yan* (邹衍), a famous scholar in the *Warring States Period* (战国时期, 475 BC-221 BC), further explained the square form. He said that the Earth was a flat and huge extension of the land with nine continents, each of which was surrounded by a sea. In the four corners of this huge surface of the land, surrounded by a big sea, stood four huge pillars to support Heaven.[5] The shapes of Heaven and Earth were explicitly defined and recorded in *Jin Shu ·Astronomical Records* (晋书·天文志), "the sky is round like a pot lid, and the Earth is square like a chessboard 天员如张盖，地方如棋局”, which determined final forms of the Heaven and the Earth (Yi 1988) (Figure 1-1).

Figure 1-1 Chinese ancient mirror shows Round Heaven and Square Earth (*Tang dynasty*618-907)

[3] The earliest form of expression of *Gai Tian Theory* refers to the shapes of Heaven and Earth, which can be found in the book *Zhou Bi Suan Jing*, it records that in early Zhou Dynasty, people believed that “the Heaven is circular and the Earth is square”.

[4] *Zhou Bi Suan Jing* (周髀算经, the oldest surviving Chinese astronomical and mathematical work in China, was written in the first century BC. It mainly clarified the Gai Tian theory and the Quarter Calendar (四分历法).

[5] Refer to (Western Han) *Si Maqian* book *Historical records.* In the chapter of *Biography of Meng Zi and Xun Qing* (孟子荀卿列传).

*Round Heaven and Square Earth*, the basic tenet of the *Gai Tian Theory*, used to have a dominant position in Chinese cosmological concepts with their sensory correlates before the *Han Dynasty* (202 BC-220 AD)(Wang 2002). Early clues can be found in the square and circular temples in the site of Niuheliang (Figure 1-2). It had a profound influence on early Chinese philosophy and culture, and directly promoted the formation of the Chinese *Hipped Roof* (庑殿) which was the most important Chinese traditional roof that covered a building on a square architectural plane (Wang 1990). The *Hipped Roof* is a clear case in which the (dome-shaped) roof symbolizes Heaven and functions to cover the house that represents Earth (square plane). The added cosmological symbolism made it so that this kind of roof didn't become outdated for thousands of years in the history of Chinese architecture.

*Hun Tian Theory*, another cosmological theory from the *Warring States Period* (Liu 2012), replaced the *Gai Tian Theory* and occupied the dominant position among the cosmological theories in the *Eastern Han Dynasty* (25 AD -220 AD) (Yi 1988). Its theory was further developed by a famous astronomer, *Zhang Heng* (张衡,78 AD-139 AD), who lived during the *Eastern Han Dynasty*. *Zhang Heng* claimed that the *Cosmos* had the shape of an egg, Earth looks like an egg yolk floating in the water while Heaven as egg white covering the Earth.[6] The Earth was in the Centre of the sky while the sky rotated around the Earth. There were also other opinions about the substance of the sky, opposing his idea: some scholars believed that the Earth was not in the water but in the air.[7] The *Hun Tian Theory* is similar to the theory of spherical astronomy, which has played a guiding role in the formulation of calendars in Chinese history. However, as a theory of cosmic structure, the *Hun Tian Theory*, in its time, was supposed to be an ideal concept of the universe, but it was not in line with the earlier mentioned *Gai Tian Theory* about the shape of the *Cosmos*.

Figure 1-2 Square and Circular temples in Niuheliang, Liaoning (5300 years ago, https://new.qq.com/)

[6] Refer to *Zhang Heng* book *Notes of Hun Yi* 浑仪注,"The celestial body is like an egg, the Heaven rounds like a boll, the Earth likes the egg yolk living in Heaven, Heaven is big and the Earth is small. There is water in the sky, and the Earth wrapped in sky. 浑天如鸡子。天体圆如弹丸，地如鸡子中黄，孤居于天内，天大而地小。天表里有水，天之包地。"

[7] *Zhang Zai*(张载), a scholar of the *Song Dynasty*（960-1279）wrote in his book *Zheng Meng* 正蒙，"the Earth is in the air", which showed his idea that the outside of the Earth is the air, not the water.

Confucianism, popular in ancient China, eventually led to an association of the Heaven and the Earth with social inequality, expressed in the concept of *Heaven Rich and Earth Poor* 天尊地卑.[8] In the beginning, the sky was only a natural object that could be seen by people, that is, it is a natural dome-shaped sky as perceived by many people (Luo 2012). Then, Heaven became qualified as a sacred, divine entity. An ancient Chinese religious narrative about cosmogenesis explains that the universe changed as the result of a war. A god named *Gong Gong* (共工) fought a terrible war with another god whose name was *Zhuan Xu* (颛顼), competing for the position of a tribal leader. *Gong Gong* was so angry that he hit the mountain of *Bu Zhou* (不周山); finally, one of the pillars supporting the southern sky was knocked down. The sky, consequently, tilted from the northwest to the southeast, which made the southeast corner of the Earth collapse. As a result, the Sun, the Moon, and the stars started to move around.[9] The narrative casts a basic understanding of the shape of Heaven and the movement of heavenly bodies, – natural phenomena such as the rising and setting of the Sun and the Moon as the result of the agency of primordial forces, represented as mysterious beings, the gods that took a prominent role in the process of creation. Finally, Heaven itself became seen as a god and several distinctive characteristics were bestowed on it, as attributes of supreme power (Luo 2012).

For the ancient Chinese it was evident that there were many divine forces in the world: gods, who could take many forms and who were associated with different realms of the *Cosmos*. This polytheistic worldview replicated the organization of an empire. The Heavenly Emperor, the master of the *Three Realms* (Heaven, Earth, and Underworld), was considered to reside in the Centre of Heaven (Liu 2016). The Heavenly Palace (天宫), a huge and well-organized heavenly society, the most important part and Power Centre of the sky, was considered to be composed of many celestial bodies who were the incarnations of different gods (Zhao 2012). Each of the constellations, such as the *Four Images* (四象),[10] the *Three Enclosures* (三垣)[11] and the *Twenty-Eight Lunar Mansions* (二十八星宿),[12] composed of

[8] The theory came from the chapter of *Xici* 系辞 of the *Book of Changes*, "*Heaven Rich and Earth Poor* 天尊地卑."

[9] The story was recorded in the chapter of *Lan Ming* (览冥)in the book of *Huainan Zi*(淮南子).

[10] *Four Images*(四象) are four Chinese mythological creatures closely linked with the Chinese constellations along the ecliptic, and viewed as the guardians of the four cardinal directions. They are the *Azure Dragon*/*Qing Long* (青龙) in the East, the *Vermilion Bird/ Zhu Bird* (朱雀) of the South, the *White Tiger/Bai Hu (*白虎) of the West, and the *Black Tortoise/Xuan Wu* (玄武) of the North. Each of the creatures is most closely associated with a cardinal direction and a colour, but also additionally represents other aspects, including a season of the year.

[11] The *Three Enclosures* are the three star groups, which were, for the most part, composed of the Chinese ancient Heavenly Palace in the northern sky. They include three star group: the *Purple Forbidden Enclosure* (紫微垣), the *Supreme Palace Enclosure* (太微垣) and the *Heavenly Market Enclosure* (天市垣). Each of them consists of many stars.

[12] *Twenty-Eight Lunar Mansions* (二十八星宿) are 28 small star groups divided into four parts called *Four Images*(四象) along the ecliptic, each of *Four Images* consists of seven mansions, they are: The *Azure Dragon*(青龙) occupies the eastern sky consist of seven constellations which are Horn (角), Neck (亢), Root (氐), Room (房), Heart (心), Tail (尾), and Winnowing basket (箕); the *White Tiger* (白虎) occupies the western sky consist of seven constellations which are Legs (奎), Bond (娄), Stomach (胃), Hairy Head (昴), Net (毕),Turtle Beak (觜) and Join-Three Stars (參); the *Vermillion Bird* (朱雀) occupies the southern sky and the seven constellations called Well (井), Demon (鬼), Willow (柳), Star (星), Growth (张), Wings (翼) and Deep emotion (軫); the *Black Tortoise* (玄武) occupies the northern sky and the seven constellations named Dipper (斗), Ox (牛), Woman (女), Emptiness (虚), Danger (危), Room (室) and Wall (壁) (Walters 2009). The four animals from the composition of the stars above are collectively referred to as the four images. Ancient Chinese observed the *Four Images* and *Twenty-Eight Lunar Mansions* over long periods to judge the coming and going of the seasons. The four animals are located in four directions, hence the common saying: Left (East) *Azure Dragon*, Right (West) *White Tiger*, Front (South) *Vermilion Bird* and Back (North) *Black Tortoise* (Chen 2015).

many stars, as a small community in its heavenly area, played an important role in heavenly society. Every star or mansion was linked with a god and, as a member of the Heavenly Palace, handled his work (Zhao 2012). Earth was a living being, home to several earthly gods such as the Mountain God, Water God, Stone God, Animal Gods, Plant God, and others. The Underworld, the lowest level of the *Cosmos*, housed not only specific gods but also ghosts, demons, devils, and monsters. All the beings and natural elements of the *Three Realms* were under the rule of the Heavenly Emperor who was the supreme god of everything.

With the rapid development of philosophy, the absolute dominance of the Heavenly Emperor was weakened in the late *Warring States* period (Luo 2012). At that time, thinkers emphasized the importance of nature, advocated the harmonious relationship between Heaven and human beings, considering that a "Human" as an individual could be in parallel with Heaven and Earth (Yi 2013). This concept is commonly known as *Heaven and Man* 天人合一 and advocates the harmony between humans and nature. This is an important proposition in the history of Chinese philosophy and has had a profound impact on Chinese traditional culture and architecture design (Yang 2009；Meng & Wang 2004). The theory of *Heaven and Man* is based on the idea that the people could be in parallel with Heaven in specific circumstances, while people preferred to believe in themselves rather than rely on gods. This idea was further discussed in the book of *I Ching / Book of Changes* (易经), which tells people that Heaven, Earth, and humans can be united together. In that book, the human is placed in a central position between Heaven and Earth, which illustrates the importance of human status in ancient China.[13] Following up on this idea, the Chinese considered that human beings are one of the organic parts of nature, that is, Heaven, Earth, and humans together compose the whole world. Other philosophical theories associated with this idea, such as the theories of *Tai Chi* (太极), *Yin* (阴) and *Yang* (阳), *Five Elements* (五行), *Eight Diagrams* (八卦), *Feng Shui* (风水), and so on, had an in-depth influence on the creation of ancient Chinese architecture (Dong 2012; Shao 2012: 1-3).

### 1.3.2 Chinese Traditional Architecture and Textual Sources

The review of authoritative works that pay special attention to publications on cosmological information in ancient sources is important for this thesis research. The sources for this topic are relatively limited compared to documents associated with other aspects of ancient society. The documents that explicitly inform about the relationship between the cosmology and architecture are not particularly rich, but the books that focus on relevant theories, such as *Heaven and Man*, *Feng Shui*, *Yin and Yang*, *Five Elements*, and that are relevant for the study of architecture are abundant enough.

Let us briefly review the type of information which we may encounter in such sources:

**1. *Pre-Qin* books**

Information on the God of Heaven and his supreme power we can find in many *Pre-Qin* books, for instance: the book of *Shang Shu* (尚书), *Book of Rites*(礼记), *Zhuang Zi* (庄子), *Mo Zi* (墨子), and so on.

[13] Cf. the sentence from *Zhuang Zi*: "Heaven and Earth are living with me, and everything is one with me. 天地与我并生，而万物与我为一".

**2. Official history books**

The so-called official history books refer to historical records, personal notes, and etc., which are the fundamental documents for the later scholars to compile and revise the previous histories. Historical information on ancient astronomy or astrology we can get from ancient history books, such as *Tian Guan Shu* (天官书), the *Records of History (*史记), *Astronomical Records* (天文志), *Jin Shu* (晋书) and *the Twenty-Four Histories* (二十四史)，and similar works，which summarize the previous cosmological theories and give more details on aspects such as constellations, philosophical ideas, and astronomical events (Bo 1982).

**3. Unofficial history books**

The unofficial history books refer to those books that are beyond the official history books in the past dynasties. They may be ancient literary works or some research notes in a certain professional field, even historical novels. Although they are excluded from official history books, some of them have high historical reference value in certain fields.

Some unofficial books, such as *Shan Hai Jing* (山海经)，*Huainan Zi*(淮南子), and the *Inner Canon of the Yellow Emperor* (黄帝内经), discuss the shapes or forms of Heaven and Earth.

**4. History books with cosmological ideas**

The classic books that contain philosophical theories about the universe, for example, *Book of Changes, Tao Te Ching* (道德经)，*Suwen* (素问)，and *Zhuang Zi* (庄子), are also taken as the basic literature for this research.

Besides these，many modern books explore the mentioned ancient cosmological or philosophical theories in many ways, dealing for example, with the theory of the *Round Heaven and Square Earth* (e.g. Chen 2006), with the theories of *Heaven and Man* (e.g. Chen 2007), with the basic ideas about *Yin* (阴) and *Yang* (阳)[14] (e.g. Chen 2007), or with the form of the Heavenly Palace (e.g. Lu 2008). There is a lot of interest in the theories related to harmonizing the relationships between human beings and nature, like *Feng Shui* (e.g. Wang 2005). We have to classify the results of all this current research according to the role and influence of relevant theories on architecture. This brings us to distinguish the following categories:

**A. Research on Cultural Thoughts based on *Yi* (易学)[15] *Philosophy* and *Confucianism***

The achievements in this area can be summarized as follows:

(1) Research on the theories of *Yin* and *Yang*, *Five Elements*, *Feng Shui*, and other *Yi* aspects. The most popular research object for this line of research is the cultural interpretation of the Ming Beijing City. Many scholars have paid attention to *Yi* theories (such as *Feng Shui*) when analyzing the city's site, urban layout, building shapes, and the orientations of its Central Axis and buildings. A representative book on *Feng Shui* theory is *Beijing City Feng Shui Building Planning* (Chiang et al., 2011). Two other books – *Chinese Architecture and*

[14] The theory of *Yin* and *Yang* was formed very early. It is said in the *Book of Changes*: "The alternation of *Yin* and *Yang* is what is called *Tao*." (Bodde 1981:239) In the earliest explanation of the *Lao Zi* (around 4-3 centuries BC): "The movement of the *Tao* is that of reversal." It was further developed by *Zou Yan* in the Warring States period.

[15] *Yi* (易) is a discipline that studies the *Book of Changes* and its related theories. Most of the research content belongs to the philosophical category, such as *Tai Chi*, *Five Elements*, and *Eight Diagrams*.

*Zhou Yi (*Cheng 2000) and the *Study of Ancient Chinese City Building Thoughts* (Wen 2009) – explore how the theories of *Yi*, *Feng Shui*, and *Five Elements* played important roles in traditional architectural design.

(2) Research on how cosmological theories have impacted architecture and city design by studying philosophical ideas, especially the theory of *Heaven and Man*. In China, most of the ancient architectural discipline was influenced by its early philosophical ideas. Thus, studying philosophical theories can help us to discover the original meanings of architectural design. Research results in this area, for example, *Architectural Art Philosophy* (Zhang & Zhang 2018) and *Chinese Traditional Architecture: The Harmony of the Heaven and Man* (Yang 2009), elaborated in detail on the relationship between *Heaven and Man* and Chinese traditional architecture, and therefore may be used as a good base for studying the impact of philosophy on architecture.

(3) Research on the influence of Confucianism on architecture. Confucianism has dominated society and state ideology in China for more than two thousand years, which has profoundly influenced the architectural thoughts. Thus, studies about this aspect are obviously helpful for the research of this thesis. The achievement of this topic focuses on studying how Confucianism impacted on the rigor, symmetry, and respect of cities and buildings, especially on the spatial order in which the central government was respected. Important and popular case studies are Chang'an City of the *Han and Tang Dynasties* (汉唐长安), Daxing City of the *Sui Dynasty* (581 AD-618 AD), Dadu of the *Yuan Dynasty* (1271 AD-1368 AD), and Beijing City of the *Ming and Qing Dynasties* (1368 AD-1912 AD).

**B. Research on "External Cultural Symbolism" based on Celestial Bodies, *Star Officials* (星官)[16], and the Heavenly Palace**

Chinese ancient astronomy was not a pure astronomical science since it combined astronomical observations and time measurements with diverse subjective factors. Emperors imposed political ideologies as directions that the astronomical studies had to obey. They obliged Chinese traditional astronomy to mix with religion, *Yi*, *Confucianism*, astrology, *Heaven and Man*, and currents that were related to or served the interests of the rulers, such as "Destiny" (Zhang 2013). This makes it complicated to study the relationship of Chinese architecture with astronomy and cosmology.

The association buildings with celestial bodies and phenomena was generally achieved through symbolism, mainly in two ways:

(1) The explicit reference to cultural symbols, e.g. the use of the name of the *Star Officials* in the building or the use of decorative figures that were associated with the celestial bodies. The forms of celestial bodies, widely used in Chinese traditional architectural design, were often based on ideas of traditional culture and/or literary works and do not necessarily coincide with the forms observed by modern science. The reference *Round Heaven and Square Earth*, for example, as described in history books, is just a literary imagination of

[16] In order to facilitate astronomical observation and recording, ancient Chinese astronomers divided stars into groups, each of which was called a *Star Official* (星官) (Chen Dan 2007). The Names of the *Officials* came from ancient Chinese society, each *Star Official* corresponded to an official of government (Guan Zengjian 1992).

Heaven and Earth, not a precise description of a real state, but is widely used as the basic *Cosmogram* in ancient Chinese architecture design. Quite a few works on this topic have been published in recent years, such as those of *Lu Sixian* (2000), *Feng Shi* (2001), and *Wang Lumin* (2002). An important case in the discussions is the cosmic form of *Gai Tian Theory* and *Four Images* in Tomb M45 in Xishuipo (西水坡) of Puyang (濮阳), China. In addition, literary symbolism is often associated with the celestial bodies through names, shapes or number of components, etc. One good example is to paint a star map on the roof of a tomb to symbolize a starry dome-shaped sky, as evidenced in the tomb of Emperor Qin (秦始皇) (Liu 1983). The naming system of the Forbidden City, another famous case of symbolizing the Heavenly Palace, was designed in accordance with the nomenclature of the *Star Officials* (Wan 2015).

(2) The practice of shaping buildings or cities in ways that refer to the celestial bodies, consequently, creating buildings or cities as microscopic models of the stars on the ground, provides a communication channel between the Heaven and the Earth for those who make use of the architecture (generally in a ritual context). *Imitate Heaven and Earth* (象天法地), understood as a precept to make the architecture on the ground imitate the shape or layout of the heavenly stars, was widely applied in Chinese traditional architecture design and city planning. *Wu Qingzhou*, a representative modern scholar who is active in this field of research, has pointed out that most of the Chinese traditional capitals used the *Imitate Heaven and Earth* rule for city planning (Wu 1996). Similarly, some scholars have proved that this principle was used in the city planning of Xianyang City (咸阳) and Chang'an City (长安) of the *Qin and Han Dynasty*. *Chen Xibo* (2001) suggests that the curved walls of Chang'an City were inspired by the shapes of the constellations of the *Purple Forbidden Enclosure* (紫微垣), the *Big Dipper* (北斗七星), and *Little Dipper* (南斗六星). *Guo Lu* (2014) holds that Xianyang City mimicked the layouts of the *Four Images* and *Twenty-Eight Lunar Mansions*. Another scholar *Zhu Zuxi* (2007) proposes that the precept *Imitate Heavenly Palace in Capitals* (象天设都) came from the perspective of ancient celestial worship. *Zhao Zhen* (2012), a scholar who focuses on ancient astronomy, pointed out that everything in the earthly emperors' palaces, such as the system of officers, buildings, shrines to worship gods, and even the commodity economy, was implemented to correspond to the elements of the Heavenly Palace.

**C. Research on "Inner Scientific Connection" associated with Orientation and Layout of Celestial Bodies**

The symbolic relationship between architecture or city plans and the celestial bodies is not only reflected on the surface – which can be easily observed – but may also be hidden in intrinsic scientific connections, for example, in cases where buildings or cities were connected to astronomical observations, aligned with the celestial bodies, or followed the layout of stars. Some early buildings or cities have played an important role in assisting humans to implement and register astronomical observations. For example, a city's central avenue may have been followed in such a way that serves as an alignment for observing the sunrise or sunset on

Winter Solstice, or a building was located as a standpoint reference for observing a special celestial body on a particular date. Several scholars have concentrated on demonstrating such connections in their research. *Du Zhongchao* (1997) and *Chen Xibo* (2000) have pointed out that the axis of Xianyang City was aligned with a (scientifically observable) astronomical phenomenon. *Feng Shi* (2001) proposes that the urban axis of the tombs of Xishuipo followed the direction of the meridian. The research of *Lv Yanhang* (2011) and *Chen Chunhong* (2012) suggests that the main reason for early architecture and urban axes facing East was the tracking of the sunrise directions. *Chen Chunhong* (2012) also pointed out that the Chinese traditional building positioning system of *Facing South and Sitting North* (坐北朝南) is subject to the Midday Sun (日中之阳) and the Polar Star (北极星). In several cases, buildings or cities seem to have oriented their axes towards the North Star or to the rising or setting of the Sun on specific days; similarly, architecture or city planning seems sometimes to have been designed to track the positions of the *Officials* in the sky. In addition, *Du Zhongchao* (1997), *Wang Xueli* (2000), *Chen Chunhong* (2012), *Lv Yanhang* (2011), and *Chen Xinyu* (2015) have analyzed some representative cases in order to show the influence of celestial orientation and layout on ancient architectural design. Such observable connections suggest that these are early cases of attempts to connect society to the heavenly bodies (based on sound astronomical observations), probably in combination with ritual activities, as a way to express the inner (religiously charged) connection between them.

### 1.4 Irreplaceable Background: Historical Review of Mesoamerican Cosmological Architecture

In ancient China, religion in Mesoamerica was polytheistic: this complex worldview, with its large number of gods, rituals, and related sacred narratives, had, of course, its impact on art and architecture. Many scholars believe that cosmology and astronomy played an important role in Mesoamerican urban planning and architecture design, especially among the ancient Maya (Mathews & Garber 2004; Šprajc 2009). From early archaeological explorations onwards, investigators noted visual alignments among buildings in the sites and between the buildings and points at the horizon that might have astronomical significance. Paradigmatic in this respect is *Frans Blom*'s analysis (1926) of a temple complex (the so-called E-group) in the Maya site *Uaxactun* as an arrangement of buildings that marked the sun's position at the horizon during the solstices and equinoxes. This type of analysis was in line with the earlier discovery by the German scholar *Förstemann* at the end of the 19th century, namely that a chapter of the Maya *Codex Dresden* contained a register of the periods of visibility and invisibility of the planet Venus as "morning star" and "evening star" over a 104 year period, clearly based on astronomical observations (see for a contemporary evaluation of this topic: Bricker and Bricker 2011). In the 20th century, this led to a stereotypical image of the Maya as a culture dominated by wise astronomers. Similar observations of alignments and archaeo-astronomical interpretations were made in other Mesoamerican sites (see for example the fundamental studies of *Hartung* and *Aveni*). There have also been critical studies in recent years, however, which caution against a tendency to reduce sites and buildings too easily to numbers and alignments and to interpret these

exclusively in an astronomical sense (May Castillo 2018). As in China, astronomy in Mesoamerica was entangled with religiously charged cosmology.

### 1.4.1 *Cosmovision* and Divine World

The different Mesoamerican peoples had (and sometimes still have) specific sacred narratives about the creation of the *Cosmos*, which often are quite different in detail but also show some underlying conceptual unity and coherence. Many scholars have studied the sources and commented on Mesoamerican creation concepts and worldview (see for the Maya: Thompson 1966, 1970; Chase and Chase 1998; Ashmore 1991; Freidel et al. 1993; Girard 1948; Guderjan 2004; Houston 1981). All the information indicates that ancient Mesoamerica was a world full of deities. Consequently, the *Cosmos* was considered to have been created and to be controlled, protected, or guarded by many gods. This worldview determined that the most important architecture had religious associations, serving the gods, and was used for rituals (Taube 2012; Bassie-Sweet 2002).

The creation of the world was often seen as a complex set of events, leading up to a "First Sunrise". Several creation stories mention a sequence of such "First Sunrises" or "Suns", i.e. Eras (Taube 2012; Bassie-Sweet 2002). The sacred book of the Quiché Maya (in Guatemala), the *Popol Vuh*, tells that the world was created and destroyed several times because of the failed attempts by the creator deities to make humans from different kinds of material until they finally succeeded in making humans from corn. According to Aztec texts, the Sun God *Nanahuatzin* and the Moon God *Tecuciztecatl* threw themselves into a sacrificial fire, and then became the Sun and the Moon in Teotihuacan's narrative (Bierhorst 1992:147–149; Garibay 1979:109; Mendieta 1980:79–80, Sahagún, Book III: chapter 2). Another version (e.g. in Codex Vaticanus A, f 4v- 7r, and on the monument known as the Calendar Stone) mentions four earlier "Suns" or creations, which all were destroyed, the present one being the Fifth Sun (Anders and Jansen 1996: 54-69).

The *Popol Vuh* tells the story that the Sun and the Moon came into being after the Hero Twins *Hunahpu* and *Xbalanque* defeated their opponents in the Underworld and rose into the sky to be the Sun and the Moon (Coe 1973, 1977, 1989; Taube 1985, 1992; Tedlock 1985; Bassie-Sweet 1996, 1999).

The ancient Mesoamerican representation / description of the universe was layered and thus can be described in vertical termsas basic tripartite structure of Heaven, Earth, and Underworld, which we may call: "the Three Realms" (Figure 1-3). This structure is relatively well documented by Spanish and Nahuatl sources of the early colonial period, for example, the *Florentine Codex* of *Bernardino de Sahagún* (especially Books III and VII) and the *Codex Vaticanus A*, f 1v-3v (cf. Anders and Jansen 1996: 39-53; but see also the discussion by Nielsen & Sellner Reunert 2009 and the volume edited by Díaz 2020). This worldview is often simply projected onto other Mesoamerican cultures, but likely there may have been many important local and temporal differences. This may lead to an unwarranted conflation of

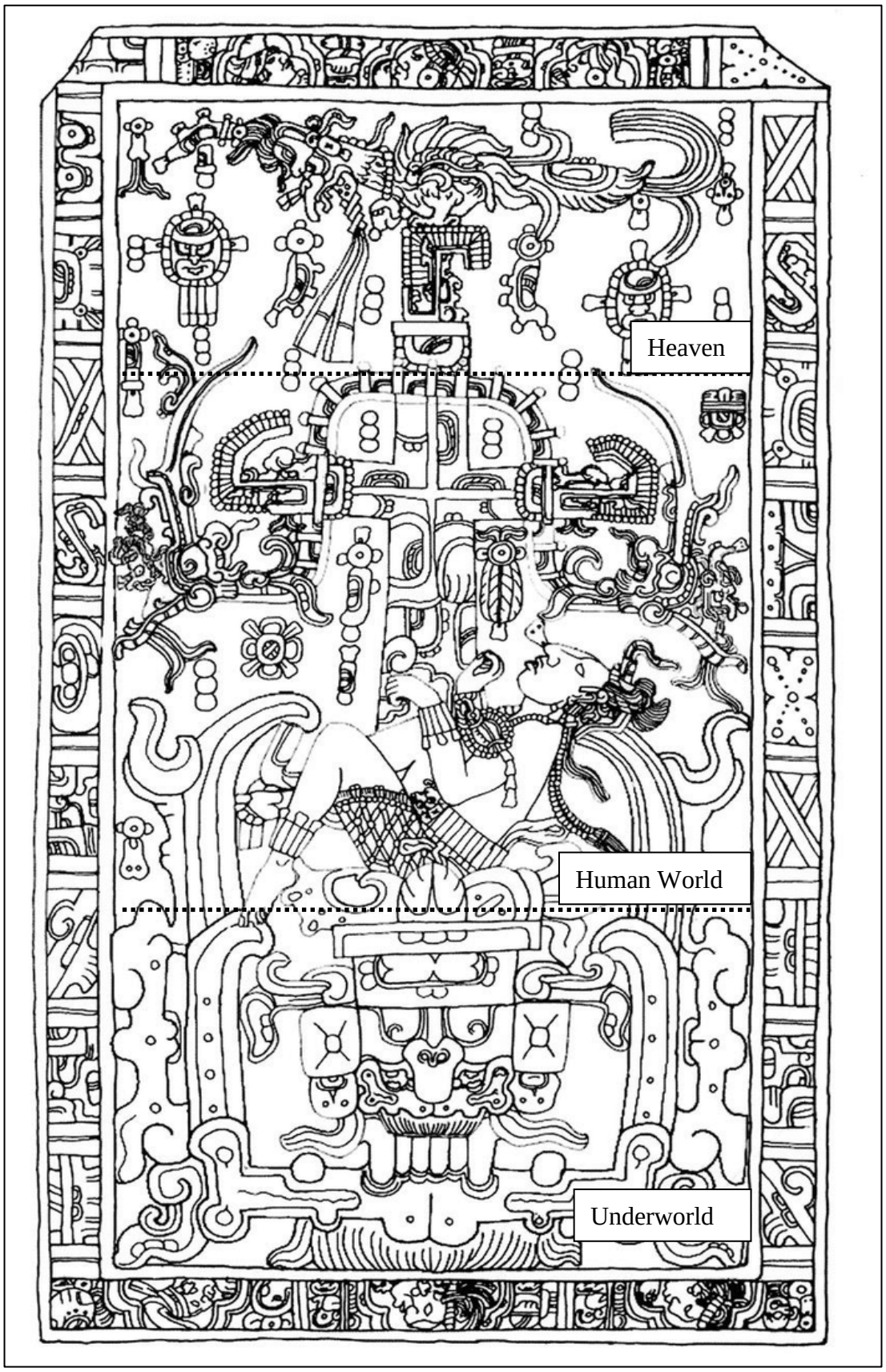


Figure 1-3 Three worlds showed on Sarcophagus Lid (drawing by Merle Greene Robertson [1983: Figure 99]).

– for example – the *Nahua-Mixtec* sources (15th-16th Century A.D.) and Classic Maya art and inscriptions (from ± 1000 years earlier and situated in a very different region). On the other hand, as the local and temporal variations in worldview are unfortunately often not well known, some degree of speculation is inevitable in attempts to reconstruct the ancient worldview as a coherent whole and to interpret works of visual art and symbolism.[17]

The sky-dome, as a cover on top of the Earth, looks like a Sky-Serpent with two heads, and bending, the body crosses the heaven from East to West (Dowd & Milbrath 2015:91; Stross 1996). There are many deities in the sky that have an important influence on the human world, not only Sun, Moon, Venus, star constellations, as well as Rain, Whirlwind, Lightning and other atmospheric forces. Heaven is also the place where Aztecs and Mixtecs situate the creator deities in the form of a primordial couple (Codex Vaticanus A, f. 1v, and Codex Yuta Tnoho / Vindobonensis, p. 52).

The Earth is considered as an enormous caiman, crocodile or turtle floating on and surrounded by the primordial sea (Taube 2012; Reilly1990:12), but this is by no means the only representation of the Earth. Like the Chinese, the Mesoamerican peoples saw the Earth as a square (or rectangle) with four giant beings, trees or columns standing on the four corners and supporting the sky (Taube 2003, 2010). The crocodile or turtle, as well as the four directions with four directional trees, played an important role in the ancient Mesoamerican view of the *Cosmos* (Garibay 1979:32; Taube 2010). A sculpture of the Late *Postclassic* period from the northern Maya lowlands portrays a darkened sky raining upon the earth turtle, depicting the basic model of the Mesoamerican world (Taube 1988; Finamore & Houston 2010:85).

The Aztecs distinguished several realms where the dead ancestors dwelled. One was *Mictlan*, a subterraneous place, the Underworld, the lowest level of the *Three Realms*. It had several subdivisions and the road towards it had several stations. It was home to a number of death-related deities and it was associated with the number 9, even called *chicunauh-mictlan*, "9 - place of death" (Sahagún, Florentine Codex, Book III Appendix 1)..In the Mixtec precolonial codices this realm was represented as a Skull Temple, where the Goddess Lady 9 Grass ruled. The entrance to this realm of Death was a cave, situated on Earth, associated with one of the four directions – South for the Mixtecs, North for the Aztecs (Jansen and Pérez Jiménez 2017: chapter 2).

[17] The overall tripartite layering of the cosmos is a hypothesis proposed and shared by many scholars, but merits further in-depth research in the different areas and among the different peoples of Mesoamerica. We should be aware here of the notable differences in landscape and ecology throughout Mesoamerica between highlands dominated by impressive mountains (among which several active volcanoes) and tropical lowlands, especially the coastal plains and the Yucatán peninsula with its karst topography. Water – often originating in cave-like environments – comes in different forms, ranging from springs to *cenotes*, from small lakes to lagoons, from rivulets to broad rivers. In the whole region it is obviously crucial for agriculture and life in general. In several areas, especially during the dry season it is painfully missing, even producing dangers of desertification. Thus it is possible to focus on the special place of water and to distinguish: sky, earth (or the landscape of people), water and Underworld. In some visual representations water is part of the "mountain and water" concept for the human life environment, in others the water appears associated with the Underworld.(see the next chapter).

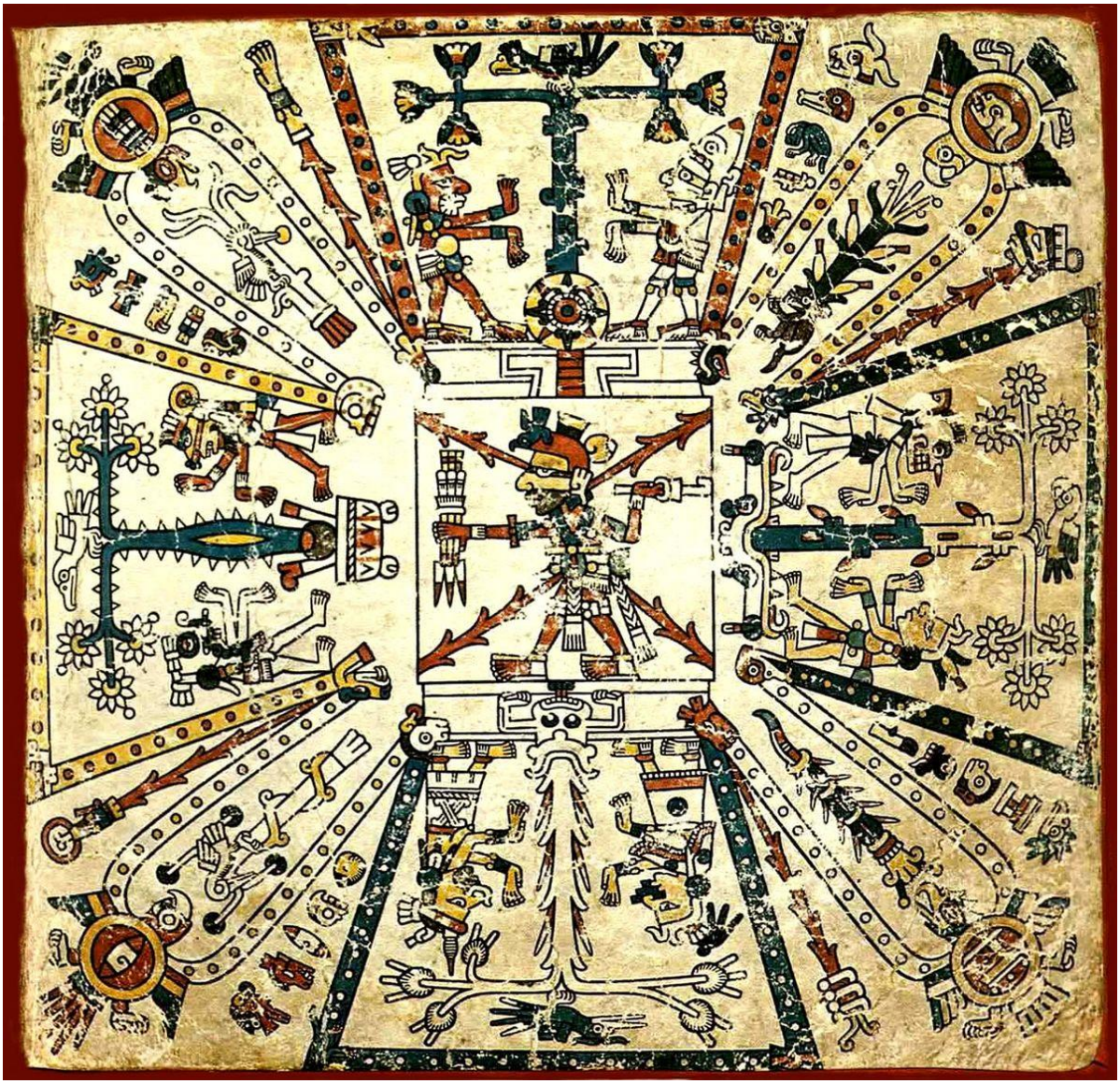

Figure 1-4 Directions and trees on the first page of *Codex Fejérváry-Mayer*

The *Three Realms* were connected by a central "axis", represented as a World Tree growing in the Centre of the Earth, with its roots extending down into the Underworld and its upper branches reaching into Heaven (Freidel et al. 1993:129–130; Reilly 1990:38). Similar trees were situated in the four directions. The concept that we now refer to as *Axis Mundi*[18], obviously, played an important role in the orientation and design of the ceremonial centre, with its corners, altars, temples and other buildings (Freidel et al. 1993:129–130; Reilly 1990:38, 1994:83–84; Taube 1996:44). Further historical evidence indicates that the concept of the four directions of the world has affected the house construction and the basic architectural plane design in ancient Mesoamerica (Tozzer 1941:135; Bassie-Sweet 2002) (Figure 1-4), while the vertical aspect of the Three Realms of the universe, with their specific

[18] The *Axis Mundi* (also called cosmic axis, world axis, world pillar, centre of the world, World Tree), in many beliefs and religions, is the world centre or the connection between Heaven and Earth (Eliade 1991:48-51).

deities and symbols, may have influenced the concept and design of the Mesoamerican pyramids[19] (Coe 1973:15, 83).

### 1.4.2 State of the Art

Astronomy and cosmology had a paramount role in Mesoamerican architectural and urban planning (Nelson et al., 2010). The colonial sources make clear that most of the architecture in Mesoamerican ceremonial centres (temples) had a ritual and religious dimension, in veneration of a wide variety of deities, in accordance with local world view and cosmology (Šprajc 2010). Civic buildings, situated in the ceremonial centre, took part in this dimension. These religious and civic-ceremonial buildings could be aligned to directions that were relevant in terms of cosmology, the calendar and/or memory, as well as those sacred caves and mountains. Particularly the sunrise or sunset positions of the sun on the horizon on certain dates, such as solstices, equinoxes, and zenith passages, were marked in these orientations and alignments (Aveni and Hartung 1986, 2000; Aveni 2001, 2003; Galindo Trejo 1994; Šprajc 2001a, b; Tichy 1991). In this way, a ritual connection of human society with the sun, and consequently with the seasons (so crucial for agriculture) was achieved as a permanent religious memento.

This thesis will consider the advances in the interpretation of some important ancient Mesoamerican sites with their related rituals and symbolism, also considering the information from pre-colonial texts. This examination of the research on the relations between Mesoamerican architecture and cosmology has the following four foci:

**1. Research on Astronomical Alignments in Mesoamerican Urban Planning**

Over the past decades, there have been quite a few archaeo-astronomical explorations in Mesoamerican archaeological sites, looking for evidence of the alignment of buildings with astronomical phenomena. Indeed, in a number of major sites, such as *Teotihuacan*, *Chichen Itza*, *Tikal*, indications for alignments with the sunrise or sunset directions on the dates of Winter Solstice or Summer Solstice, or with other special directions associated with the spatial positions of celestial bodies, were found in the orientations of buildings, the urban layout, axes or the inner planning of the ancient cities (e.g. Aveni & Hartung 1986; Šprajc 1993, 2000, 2005, 2009, 2010, 2014; Carrasco 1987, 1992, 2000, 2013; Dow 1967; Broda 1991; López Austin 1980; Freidel & Schele1988, 1992, 1993; Boone 2007; Smith 2003, 2005, 2013).

**2. Research on the Design of Buildings as an *Axis Mundi***

In Mesoamerican sites, the ceremonial centre is clearly recognizable, which suggests a religious focus on a pivotal point or *Axis Mundi*. Several scholars have pointed out the relevance of this concept, which originally was made popular by the work of *Mircea Eliade*[20]in the comparative study of religion, and also by the work of *Wheatley* in China.

[19] The Mesoamerican Pyramid, the most prominent part of the Mesoamerican architecture, is similar in some ways to the Egyptian pyramid but has obvious characteristics such as multi-layer rectangular or square platforms or terraces, and most importantly, a small temple (building), in general, located on the uppermost platform and with stairs ascending to its faces front.

[20]*Mircea Eliade* was a Romanian historian of religion and philosopher who once served at the University of Chicago. He enjoyed worldwide fame in the area of interpreting religious symbolism (in myth and ritual) from a comparative perspective and established paradigms in religious studies that persist to this day (specifically in the studies of ancient Mesoamerica). On

Especially the Mesoamerican temple pyramid has clearly the appearance of an *Axis Mundi* symbol, a house of the deity on a clearly visible vertical elevation, with a horizontal square(or rectangular) ground plan, which facilitated orientation towards the cardinal points (Milbrath & Dowd 2015; Belmonte 2010; Klein 1982; Carrasco 1987a, 1992, 2013; Aguilar Moreno 2008; Evans2016; Townsend 1982; McCafferty 2018; Klokočník, J. 2007; Aveni & Gibbs 1976; Broda 2000; Dow 1967; Smith 2005). Several scholars have also pointed out that the basic shape of the pyramid was motivated by the shape of a mountain, which is often considered a sacred being in Mesoamerica.[21] The expression "mountain, water" is used to refer to the concept of a human community (in its typical ecological niche) in several Mesoamerican languages. In this manner, the shape of the pyramid may have represented (as microcosm) the typical shape of the earth as dwelling place for divine forces (macrocosm). Such associations give additional meaning to the architecture (cf. Jones 1993, 2000,2007; Jones & Desmond 1995, Houston 1998, and Gillespie 2001).

### 3. Research on Ancient Texts, Visual Art and Calendar

In the past 120 years, great progress has been made in the deciphering and interpreting Mesoamerican writing systems and visual art. Images are found in abundance in archaeological and historical contexts, varying from wall paintings, sculptures, relief carvings, decorated ceramics, mosaics to hieroglyphic inscriptions and pre-colonial and early colonial manuscripts (codices and paintings on cloth). Such imagery, originating from different cultures within Mesoamerica over a period of ± 2500 years, is of obvious importance for understanding human thought and behavior in the past, particularly as these media express the point of view of the Mesoamerican peoples themselves. In-depth studies of these sources have opened up new ways of understanding the ancient society and its history, the most spectacular being the decipherment of the Maya hieroglyphs and its reconnection to living languages and cultures (see for example (Freidel, Schele & Parker 1995; Grube & Martin 2008; May Castillo 2014). Similarly, advances have taken place in the interpretation of the religious codices (the Teoamoxtli Group or Borgia Group) and of the Mixtec codices (Ñuu Dzavui group) from Central and Southern Mexico (see for example Jansen & Pérez Jiménez 2004, 2007, 2010, 2017, as well as Boone 2000, 2007)

### 4. Research on Symbolism and Metaphors

A specific field of study within the just mentioned research on Mesoamerica's ancient texts, visual art and calendar focuses on the interpretation of architectural expressions of cosmic ideas or *Cosmograms* through "symbolic shorthand or artistic metaphor" (Hendon & Joyce 2004: 326). The investigation of *Cosmograms* involves the study of temporal-spatial cosmology as well as the symbolic complex of the four directions, associated with particular deities, trees, birds, colours, and other elements (Carrasco 1999; Boone 2000, 2007;

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the other hand, a great deal of controversy surrounds his synthetic representation of 'archaic' religious mentality and his distinctive methods for handling and interpreting religious data (Ginzburg 2010). There have long been vociferous individual skeptics, many attacks on or evaluations of his work have been published in diverse academic journals.

[21] In the Maya lowland region, where mountains do not play a prominent role in the landscape, the corresponding Maya concept, symbolised by the high terraced platform, was *witz*, which is often superficially translated in the literature as "mountain" but which is actually the term for a mound or rise with a hollow/cave within, as well as water, common in karst topography (Elizabeth Graham, personal communication 2021).

Brotherston 1976; Lopez Austin 2001). A related theme is that of the world of the ancestors. References to these aspects of Mesoamerican worldview are often formulated in ceremonial discourses, religiously charged narratives and ritual practices, which make use of metaphorical expressions and other symbols. Several scholars have opted for an approach that combines iconographic analysis with the study of literary expressions and contemporary oral traditions (Schele & Mathews 1999; Mathews & Garber 2004; Christenson 1997; Carlsen & Prechtel 1991; Whittaker 1993; Métuzin 1987; Carrasco 2013; Jansen & Pérez Jiménez 2017; Klein 1976).

My own understanding of these matters has benefitted particularly from the possibility to participate during several years in the seminars of the research team of the ERC Advanced Grant project 'Time in Intercultural Context: the Indigenous Calendars of Mexico and Guatemala', directed by *Maarten Jansen* and *Gabina Aurora Pérez Jiménez* at Leiden University, which involved a strong group of Mesoamerican scholars, including several native speakers of Mesoamerican languages with in-depth personal knowledge of indigenous cultures (Maya, Nahuatl, Mixtec, and Mixe).

### 1.5 Methodology: Hermeneutical Interpretation and Comparison

This thesis, then, for the most part, concentrates on cosmological interpretations of architecture by comparing ancient Chinese and Mesoamerican built heritage. It will discuss the role of architecture in relation to ideas about *Order* in human society, based on the cultural awareness of a sacred order in *Cosmos*, nature, and landscape. It will pay attention to the way this awareness influences people's interpretation of history and the construction of cultural memory. The cosmological aspects will be addressed in a comparative perspective considering architectural remains from the Chinese and Mesoamerican (including Maya) civilizations, with incidental references to European art (cf. Heilbron 1999, 2009).

Focusing on meaning, the thesis will follow a hermeneutical approach, in which it is guided by the classic theoretical works of authors such as *Jones* (1993, 1995, 2000, 2016), *Rapoport* (1990, 2005), *Tilley* (1994, 2004, 2014), and *Ingold* (1985, 2000, 2011, 2013). The following paragraphs introduce the main interpretive contents which have nurtured this thesis research.

#### 1.5.1 The Hermeneutics of Sacred Architecture (*Lindsay Jones)*

A building's meaning, in general, is interpreted by people's subjective judgments or influenced by the thoughts of others through texts, languages, images, and general impressions. And those meanings, which are considered to be universal, traditional, and general, are much harder to interpret in a different way. The advantage of *Lindsay Jones*' hermeneutic approach is that he breaks the limitations of traditional methods and perspectives and uses a completely new way to reinterpret the meaning of architecture, which allows us to understand architecture from a new angle. This approach inspires me to rethink the accepted meanings of architecture and gives me a new understanding of it. *Lindsay Jones*, a historian of religions and an erudite scholar who focused on the hermeneutical analysis of architecture, examined the hermeneutical approach as a means to interpret many ancient architectures from the perspective of change with time and cultural context. He had a wide interest in the

methods, theories, and cultures associated with religious studies in cross-cultural perspective all over the world, paying special attention to the religious study of Mesoamerica.

What is most admirable about his research method is that he interprets architecture based on dynamic features from new or multiple perspectives (Jones & Desmond 1995: 189). For me, his approach inspired and helped me in writing my dissertation in several ways:

**1. Theoretical Framework of Sacred Architecture**

In his work, *Lindsay Jones* gave a theoretical framework for interpreting sacred architecture and discussed several possibilities for discovering and examining its divine characteristics by paying attention to observable factors such as homology, commonality, and symbolism (Jones & Desmond 1995: 211). This greatly promoted the construction of the basic framework of this paper. For example, Chapter 2 of this thesis discusses the Universal Order and cosmological characteristics of the two architectures from the perspective of *Homology*; Chapter 3 considers the rules of *Commonality*.

**2. Architecture is Divinity**

*Jones* said: "A sacred Architecture can be the body, abode, and the soul habitation of a god" (Jones & Desmond1995: 230-234), which inspired me significantly in writing my thesis. In the eyes of most people, Architecture is an immobile and non-emotional inorganic, manmade object, used passively for various human activities. However, *Lindsay Jones* proposes to consider that architecture, in certain circumstances, is a positive participant and agent in a ritual rather than a tool to be used, it could even be seen as a *Leader* in an "*Event*" (Jones & Desmond1995: 186-189). That means that architecture could be conceived as a being, a god, or even a person with emotions and capable of directing the ritual. This was indeed a novel idea at the time. However, in those worlds which were full of divinity, it is understandable that the architecture was seen as a spiritual god in the ritual. Architecture can use its shapes, special spaces, colours, and decorative components to attract/guide people towards, away from or close to itself, moreover, it can control people's emotional fluctuations and resonate with their thoughts.

Using this perspective of positive agency to consider the position and role of architecture in a ritual *Event* might yield different research results. Consequently, I will re-examine the historical role and divine characteristics of both Chinese and Mesoamerican architectures in different historical stages.

**3. Architecture has Dynamic Characteristics**

*Jones* also described architecture as having dynamic characteristics therefore, the results of research on an ancient building can differ for each offer those people in the "multilateral endorsement of philosophers, theologians, literary critics, art historians, anthropologists, and historians of religions" (Jones & Desmond 1995:190). That is, architecture could be interpreted differently by diverse peoples and individuals living in different historical contexts and/or having different professional or cultural perspectives. Some architectural heritage, for example, that existed for many years, might have participated in the war, might have protected civilians, or might have been hit by an earthquake. Some people regard it as a treasure, some people hate it, and others try to destroy it. In short, as the times change since it

was built, so too the people who use it have changed. Comparing cultural aspects of architecture should be based on their original meanings, which need to be fully considered or interpreted in their historical contexts and in accordance with the effects they had on different users. As a result, my thesis will consider the dynamic characters of architectural heritage and try to reconstruct the original meaning of architectural creation in the context of historical stages, before beginning my comparative study.

**4. Architecture can be Studied from Both Sides**

Researchers can search for different options by examining the perspectives of opposite sides, such as researchers and research objects, observers and the observed, or participants and the participated (Jones & Desmond 1995: 186-190). *Jones* considers that, when researching something, we need to consider both these different aspects and the impacts they have on each other. When studying the meanings of architecture, on the one hand, we need to take into account the perspective of the positive characters, i.e. the observer/researcher/participant, while on the other hand, we need to consider the thoughts of those observed/investigated/participated as well; only then can we strive for a reasonable explanation for the research objects. Therefore, my discussion here will fully consider the meanings of architecture from two sides, before drawing my conclusions.

### 1.5.2 The *Nonverbal Communication* approach (*Amos Rapoport)*

Similar to those ideas of *Jones*, *Amos Rapoport* also states that the understandings of the meanings of architecture differ between those people who have different backgrounds, such as designers, users, observers, and others (Rapoport 1990: 15-30). *Amos Rapoport*，a prominent architectural educator, who has explored the theoretical dimension of architecture, has suggested several ways for studying the meanings of the built environment from a theoretical perspective. He advocated in particular the use of *Nonverbal Communication* methods. In his book *The meaning of the built environment: A Nonverbal Communication approach,* he discussed in detail the advantages and disadvantages of this method and how to use it correctly. He proposed three major approaches to the interpretation of architecture, which will be used as orientation points in my dissertation:

**1. The *Semiotic* Approach**

The *semiotic* approach, a popular and widely used research method in architectural design from ancient times until now, as the "study of the significance of elements of a structured system" is well known (Rapoport1990:38). *Syntactics*, *semantics*, and *pragmatics*, the three components of *Semiotics* he distinguished in his book, are the most important focus points. He also gave reasons to criticize the *semiotic* approach in researching the built environment. For instance, "working on meaning is done apparently within the semiotic tradition" but this does not always need, nor "relate to semiotic theory" (Rapoport1990:37). Furthermore, he found that the method of *semiotics* could sometimes use an "extremely high level of abstraction and the rather difficult and esoteric vocabulary full of neologisms, which makes much of it virtually unreadable" (Rapoport1990:37). Consequently, the semiotics approach can be difficult to understand for people. *Semiotics* in architecture can be described in language easily, but is difficult to observe. The architectural forms, in general, are taken as

special ways, expressing significance in their planes, spaces, and components, which may include the denotations of function as well as connotations of cosmological ideas. Although it is difficult to prove whether this truly happened in the architectures under study, I was inspired to research if such ideas help to understand the design of Mesoamerican and Chinese architectures. Can semiotics help us to identify symbols that have become formulas or design principles, such as squares, circles, pyramids, etc., as signifying cosmological meanings?

**2. The Symbolic Approach**

The symbolic approach, the second method *Rapoport* mentioned in his book, derived from many theories such as structuralism, symbolic anthropology and even cognitive anthropology (Rapoport 1990:43). It was widely used in those fields, to comment on aspects that seem strongly connected with the power, wealth, position, world directions, and even the universe (Vale 2014:1-3; Bennett 2007; Lewis-Williams 2004). Several schools of thought recognize the importance of this perspective in the case of Mesoamerican and Chinese architecture. For example, *Wheatley* held that many ancient capitals were designed as symbols (1990: 412-415); *Belsky* says that Beijing City has the powerful symbolism of the Centre (2005: 74-97). Symbolism is present in many ways within the context of the architecture, such as sacred numbers, materials, colours, shapes, decorations, components, and so on, which is strongly suggested by ancient Chinese and Mesoamerican architectures. Therefore, it will be one of the main points of attention and methodical concern throughout this thesis.

**3. The *Nonverbal Communication* Approach**

The *Nonverbal Communication* Approach, Rapoport's most important theme, implies a focus on the transmission of information by visual, auditory, tactile, and kinesthetic channels. It has developed quickly in recent years in several fields, especially in psychology and anthropology (Rapoport 1990; Albert 2017; Knapp, Hall & Horgan 2013; De Paulo & Friedman 1998; Weitz 1974; Henley & Henley 1977). *Rapoport* suggests that in the *Nonverbal Communication Approach* to architecture design we should pay attention to: Analogy, and Nonverbal Behavior. *Rapoport* gave a detailed list of possible potential cues of physical elements (vision, sound, and smells) in Nonverbal Behavior, some of which apply to the area of built environment and architecture, such as shape, size, scale, height, colour, materials, textures, details, decorations, spaces, quality, light and shade, type of planting, age, type of order, etc. (Rapoport 1990:106-107). This inspired me to further explore the meanings of both architectures from such a perspective taking into account their shapes, sizes, scales, heights, materials, and so on, which supplied a lot of information about the ancient heritage. Specifically, this thesis will consider the *Nonverbal Communication* between the divine powers of the cosmos and humans in both architectures.

### 1.5.3 *Phenomenology* and *Perception* of Landscape (*Christopher Tilley* and *Tim Ingold)*

In addition to the methodological focus points described above, I will draw on the approach of *Phenomenology* and *Perception* of *Christopher Tilley* and *Tim Ingold* to explore how the qualities of the designable world – for example, colours, decorations, materiality, forms, and spatiality – express the embodiment of the divinity in solemn architecture and environment. *Christopher Tilly*, a British scholar known for his fundamental book

*Phenomenology of Landscape* (1994). He pointed out that the sensory experiences ("tactile sensations, sonorous qualities, colour, and visual impressions") could be used to review and interpret an archaeological site or (cultural) landscape. He maintained that scholars or investigators could enter the sites they are studying, and use their senses of vision, smell, and hearing to find out how ancient peoples would have used or interpreted these sites. He utilized the "*intuitive"* study of material in archaeology, especially in landscapes (Trigger 2006:472–473), and tried to find out from there the original meanings in the past. That "*intuitive"* approach in the study of historical material has been criticized by other scholars for being fanciful and not verifiable, but, when applied carefully and connection with in-depth study of the culture in question, it seems to me indeed a possible way to interpret buildings. *Tim Ingold*, a British anthropologist, who links environmental perception and skilled practice, focuses on studying how the human skill of *Perception* develops within cultural contexts. He illustrates and explains his approach in his book *The Perception of the environment: essays on livelihood, dwelling and skill* (2000), and other works in which he examines the relationship between architecture, anthropology, art, and design. He declared that *Perception*, a way of *intuition*, could be used to explore the meaning of architecture, to "provide a link between the biological life and environment"(Ingold 2000:3).

In Mesoamerica and China, there are many ancient architectural ruins that, to this day, can not be understood and interpreted well. But they are visible and tangible, people can see, touch, feel, and get their colours, materials, shapes, and even layouts. Consequently, for the phenomena that cannot be exactly explained in ancient buildings of Mesoamerica and China using traditional methods, Ingold's *Perception* approach may provide a way to come closer to them.

In this dissertation, I will apply the above methods when they seem to offer a road to understanding, in connection, of course, with a detailed examination of the archaeological, art-historical, and historical data. Based on these methodological considerations, this study attempts to examine illustrative examples of possible cosmological meanings in the architectures and related visual art of both Mesoamerica and China. In many cases information is lacking or not conclusive so that interpretative exercises such as this one are bound to remain speculative; similarly, our theoretical approaches are to a large extent determined by the concerns of modern thought and thus may not do justice to the ideas of the ancient peoples. Despite these challenges, I hope that these discussions and intercultural explorations may serve to stimulate – among students of architecture and the public at large – a renewed interest in the meaning of architectural heritage, and, in general terms, to more self-reflection on our attitudes toward the past.