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# HANOK. 한옥.

Master thesis

A comparative analysis regarding the cross-cultural occurrence of tangible and intangible attributes that are characteristic for the traditional Korean house

Kulturvergleichende Analyse der materiellen und immateriellen Charakteristika des traditionellen koreanischen Hauses

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## PREFACE



## ABSTRACT

Korea has, for a long time, been closed off to the world and its influences, or so it seems. „The opening to the West“, which occurred only in the past century, brought drastic changes, both economic and cultural. This however, does not mark the advent of foreign transmissions to the peninsula, but rather made it susceptible to a much more alien variety. Prior to this, Korea has, for a long time, been exposed to the cultures of other East-Asian countries, especially that of China. This had effects on many areas, one of the most prominent being architecture, and with it, dwelling customs. Based on this, this thesis aims to demonstrate how Korea's vernacular residential building traditions were influenced by, and how they influenced, other cultures. To achieve this, features that are characteristic to the traditional Korean house, or what is generally understood to be one, will be compared to those found beyond the peninsula's borders. Pointing out similarities and differences, in both construction and lifestyle, will be vital in uncovering the background of their development. This will lead to a better understanding of why Korean architecture shares features with other places, even those it has no apparent connection to.

## ZUSAMMENFASSUNG

Korea war, allem Anschein nach, für eine lange Zeit der restlichen Welt und ihren Einflüssen gegenüber verschlossen. Die Öffnung dem Westen gegenüber, welche erst im letzten Jahrhundert erfolgte, führte zu drastischen ökonomischen und kulturellen Änderungen. Dies stellte jedoch nicht den Anfang fremder Einflüsse auf die Halbinsel dar, sondern machte sie vielmehr empfänglich für ein breiteres Spektrum dieser. Schon zuvor was Korea für eine lange Zeit anderen Kulturen ausgesetzt, gewesen vor allem jener Chinas. Dieser Einfluss wirkte sich, unter anderem, besonders auf die Baukultur aus und hatte folglich auch Einfluss auf die Lebensgewohnheiten der Menschen. Angesichts dessen, unternimmt diese Arbeit den Versuch aufzuzeigen, auf welche Art und Weise traditionelle koreanische Wohnbauten durch fremde Kulturen beeinflusst wurden, bzw. welche Einflüsse sie selbst auf diese ausgeübt haben. Um dies zu veranschaulichen, werden Charakteristika des traditionellen koreanischen Hauses, oder was generell als ein solches verstanden wird, jenen aus Baukulturen jenseits der Grenzen gegenübergestellt. Das Aufzeigen von Ähnlichkeiten und Differenzen, bezüglich Konstruktion als auch Lebensweise, soll dabei dazu dienen, die Hintergründe ihrer Entwicklung zu erörtern. Dies soll zu einem besseren Verständnis darüber führen, weshalb Korea architektonische Merkmale mit anderen Kulturen teilt, auch mit solchen zu denen das Land keinen augenscheinlichen Bezug hat.

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"You have to know the past to understand the present."  
C. E. Sagan







## INTRODUCTION

In order to understand why Korean vernacular architecture has developed certain characteristics, it is essential to look at both cultural and environmental influences the peninsula has been subjected to throughout its long history. The following sections represent a general overview, as the whole extent would go beyond the scope of this discussion. A more detailed description of this topic can be found in many other publications.

### *Land and state*

#### *Geography*

##### *Location in the world*

The Korean peninsula is located in the far East of Asia, bordered by China and Russia in the North. Japan can be found off its eastern coast. [OECD, 2001:26] (Fig. 1) The South, making up the lower half of the peninsula, has its 2,413 km long coastline bound by the Yellow Sea and the Sea of Japan. Its coordinates are 37° N and 127°3' E. [CIA (1), 2018:1] North Korea, which makes up the northern half, shares borders with China and Russia. Its coastline of roughly 2,495 km is bordered by the Korean Bay and the Sea of Japan. Its coordinates being 40° N and 127° E. [CIA (2), 2018:1] [Nemeth, 2003:2]

##### *Provinces*

Both Koreas are administered through nine provinces. In the South, these are North and South *Chungcheong*, *Gangwon*, *Gyeonggi*, North and South *Gyeongsang*, North and South *Jeolla* and the self-governing province of *Jeju*. The provinces of the North are *Chagang*, North and South *Hamgyong*, North and South *Hwanghae*, *Kangwon*, North and South *Pyongan*, as well as *Ryanggang*. (Fig. 2)

### *Size*

Size-wise, the South totals at 99,720 square km, about 45% of the peninsula, with 96,920 square km being land and 2,800 square km of water. [CIA (1), 2018:1] The North comes in at around 120,538 square km, with 120,408 square km made up of land and a water area of 130 square km. [CIA (2), 2018:1] In total, the entire peninsula amounts to around 221,000 square km, comparable in size to the United Kingdom. [OECD, 2001:26] [Nemeth, 2003:2] The area of the South alone, about 100,000 square km, is close in size to Austria. [Kwon et al, 2016:16]

### *Land use*

South Korea's 100,000 square km of land is distributed into 18.1% of agricultural land, 15.3% of arable land, 2.2% permanent crops and 0.6% of permanent pasture, with 63.9% making up forest and the rest being used otherwise. Irrigated land amounts to 7,780 square km. [CIA (1), 2018:1] The 120,000 square km making up the North is distributed into 21.8% of agricultural land and 19.5% of arable land, while 1.9% is used for permanent crops and 0.4% for pasture. Forest accounts for 46%, with the remaining 32.2% serving other purposes. Irrigation is thought to be provided to 14,600 square km of this area. [CIA (2), 2018:1] [Nemeth, 2003:5]

### *Terrain*

About 70% of the Korean Peninsula is mountainous, with most mountains being low in altitude and over half under 500 m. The peaks in the North and along the eastern coast are high and get lower moving west and south. [Kwon et al, 2016:27] [Nemeth, 2003:3] While there are no great ones, the most agriculturally significant plains are



Fig. 1: Korea's place in the world

concentrated along the lower reaches of the major rivers that flow into the Yellow and South Seas. Alluvial plains, used as paddy fields, make up the heart of the agricultural flatlands. Settlements and agricultural activity were at all times focused on the natural levees along the banks of rivers, whereas the lowlands, which were exposed to erosion, were used as dry fields, orchards, pasturage and woodlands. [Kwon et al, 2016:33-34] [Nemeth, 2003:3] Being surrounded by sea on three sides provides South Korea with a long coastline. Hills and mountains make up the majority of the interior, with wide coastal plains found in areas of the West and South. Its mean elevation comes in at about 282 m, the lowest point being the Sea of Japan at 0 m and *Halla* mountain, peaking at 1,950 m, serving as highest point. [CIA (1), 2018:1] Like the South, North Korea's topography is also mostly hilly and mountainous, although separated by deep and narrow valleys. The wide coastal plains of the West become discontinuous when they reach the eastern shores. The North's mean elevation is at around 600 m, which is higher than that of the South. Here, the Sea of Japan also represents the lowest point at 0 m, while *Paektu* mountain, peaking at 2,744 m, is the highest point. [CIA (2), 2018:1] (Fig. 3)

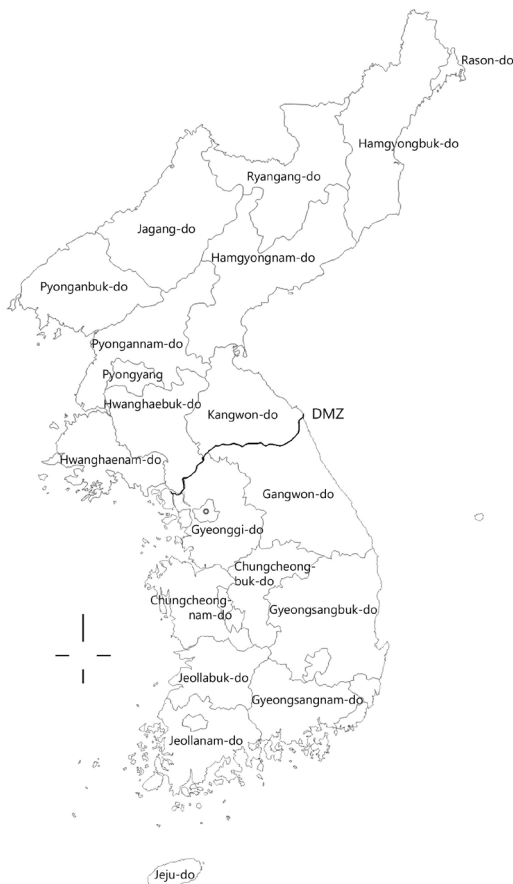


Fig. 2: administrative provinces of the Korean peninsula

## Climate Influences

The country is surrounded by the Yellow (or West) Sea, South Sea, and East Sea. Intense summers are brought on by the *Donghan* current and can be felt as far north as *Hamgyeongbuk-do*, whereas the *Bukhan* current is responsible for extreme winters felt as far south as *Gangwon-do*. [Kwon et al, 2016:35;38-40] Both, the North and the South are temperate. Rainfall in South Korea is heavier in summer than in winter, while in the North it is also concentrated in summer. Winters in both parts can get very cold, but can be harsher and longer in North Korea. [CIA (1), 2018:1] [CIA (2), 2018:1] The peninsula is subjected to four distinct seasons, with summers and winters being generally long, while spring and fall are rather brief. Due to its elongated formation, the generally temperate climate does vary rather significantly, depending on location. [Kwon et al, 2016:45] [Nemeth, 2003:4]

## Temperatures

The temperatures range from up to 40°C in the South, to about only 20°C in the North. Meteorological changes of the continental climate begin in the West, moving east. *Seogwipo* on *Jeju* island with 16,6°C and the *Changwon* region on the mainland with 14,9°C record the highest

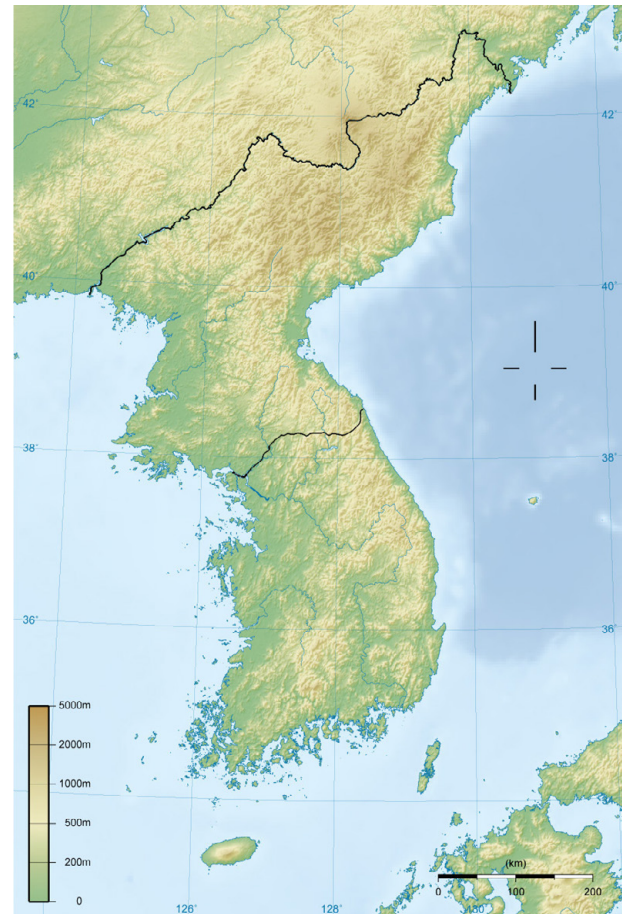


Fig. 3: topographic map of the Korean peninsula

average temperatures, while the lowest at 6.6°C is measured in *Daegwallyeong*. Summer arrives in June with temperatures gradually rising from 14°C to 22°C. July marks the start of a heat wave with about 25°C. In most areas, August is the hottest time of the year with temperatures reaching up to 26°C. The Korean winter generally begins in November with rapidly dropping temperatures, falling below zero in January. *Jeju* island and the southern coastal regions are exceptions. Spring usually begins in March, which is marked by noticeably rising temperatures. [Kwon et al, 2016:45-50] [Nemeth, 2003:4]

### **Precipitation**

Korea is a high-precipitation area with the highest ranges recorded along the southern coast and the mountain region around *Jirisan*. Widely varying levels bring both, frequent flooding and drought. Almost all areas receive over sixty percent of their annual precipitation in the rainy season (June to September). Winter, which accounts for only ten percent, brings heavy snowfalls to the alpine coastal regions of the West. The heaviest snowfalls however are recorded on *Ulleung* island off the western coast, which led to the development of a very specific and unique dwelling type. [Kwon et al, 2016: 51ff] [Nemeth, 2003:4]

### **Winds, fog and frost**

Winds appear in the form of seasonal monsoons. During winter, these can be primarily felt in the North-West. In Summer, the most dominant winds come from the South. This changes in the spring and fall, when they primarily blow from West to East. The large temperature range and humid summer cause frequent fog occurrences in the fall, especially in areas adjacent to a reservoir and encircled by mountains. The islands off the South-western coast see a frequent advection of fog, which is caused by hot and humid winds blowing over relatively cool water. In early October frost appears in the central interior, reaching the East in mid-December and the southern islands in mid- January, where it lasts until the end of April. [Kwon et al, 2016:57-60] [Nemeth, 2003:4]

### **Soil and vegetation**

In South Korea, the predominant type of soil is brown forest soil, typical for regions with high summer temperatures and ample rainfall distribution. The vegetation in the northern part consists of a warm and temperate forest zone with evergreen broad-leaved parts. The southern coastal areas and islands have a mixture of temperate broad-leaved evergreens and deciduous broad-leaved trees. About sixty percent of the inland mountain ranges are deciduous forest, with the remaining thirty percent being a mix of deciduous and coniferous forest. Furthermore, needle-leaved evergreen coniferous forest zones can be found in high alpine areas in the South, the Centre and the North. [Kwon et al, 2016:65-73] [Nemeth, 2003:4]

### **Natural hazards**

Regarding natural hazards, the South is occasionally subjected to typhoons, which come with high winds and floods. The South-West, where low-level seismic activity is common, is home to volcanic *Halla-san* (1.950 m) which, while considered historically active, has not erupted for centuries. [CIA (1), 2018:1] In the North, the droughts of the late spring are often followed by severe flooding. In its South, occasional typhoons occur in the early fall and historic recordings show volcanic activity from the 2,744 m high *Changbaishan* (also known as *Paektu-san*), located on the Chinese border. [CIA (2), 2018:1] [Nemeth, 2003:4]

### **Population Common Era**

At the start of the Common Era, the population of the whole peninsula consisted of about 3 million people, growing to about 7 million in the early *Goryeo* period of the 10th century. The population declined to about 5.5 million at the beginning of the 14th century, numbers at the end rose again to about 10 million. [Kwon et al, 2016:77] [Nemeth, 2003:2]

### **Joseon period**

The *Joseon* period from the 15th to 16th centuries saw a steady population increase, with two major conflicts responsible for a significant drop from the 16th to early 17th centuries. This pattern of rise and fall continued up to the 19th century. At the start of the Japanese occupation in 1910 (lasted until 1945), the population of the entire peninsula was at around 17.4 million. During these times (1920s), death rates began to decrease while birth rates maintained at a high level. By 1930, about twenty million people inhabited the peninsula, reaching 25.1 million in 1944. Most people were living in and around the major cities, the main factor being the mass exodus from the country's agricultural areas, due to the rapid population increase and Japan's exploitation of the rural economy. [Kwon et al, 2016:78-79]

### **After the division**

Since the 1948 division of the peninsula, precise population data can only be retrieved for South Korea, whose population grew from about 20 million in 1949 to over 30 million by 1967. This number rose constantly to over 40 million in 1984 and about 48.6 million in 2010. A further expansion to 51 million people was recorded in the latest census, which was carried out in 2015. [Kwon et al, 2016:80-82] The most populous South Korean areas are those of the lowlands. Their rather high density can be attributed to seventy percent of the country being clad in mountains. The region around the capital, which is a part of *Gyeonggi* province in the North-West, unsurprisingly, records the highest density, while *Gangwon* in the North-East is populated the least. [CIA (1), 2018:1]

As in the South, most North Koreans dwell in the lowlands and plains of the country, most are found in the western provinces around the capital *Pyongyang*. Also similar to its southern neighbour, the mountainous provinces, especially those bordering China, are scarcely populated. [CIA (2), 2018:1] [Nemeth, 2003:2]

### Society Structure Social classes

Due to the *Joseon* era's significance for the development of *hanok*, it is important to get a general idea of its social environment. The Korean society of that time can be described as one of two classes, with further distinctions down the line. (Fig. 4) These divisions into groups, which were done according to importance and occupation, determined the rights and duties of their members. While the upper class held all power and lived in privilege, the lower classes were trying their best to survive. It comes as no surprise that the greatest significance lay with the king (*wang*) and his immediate family. Next came the scholar gentry, referred to as *Yangban*, literally meaning "two classes". This group consisted of the *Dongban* (also *Munban*), civil servants or government officials, and the *Seoban* (also *Muban*), who were military officers. Together, they accounted for ten percent of the Korean population and, along with the Royal family, ruled *Joseon*. This consequently came with many privileges. One rank below the *Yangban* were the people of the upper middle class, known as *Chungin* or *Jungin* in Korean, followed by commoners referred to as *Sangmin* (also *Yangpan* or *Yangmin*), which translates to "good people". Lowest in the pecking order were the *Cheonmin* (also *Chonin*) or "low born", who were looked down upon as "vulgar commoners". These groups were distinguished even further, but delving into this would reach too far within the context of this paper. (Jung, 2014:69) [Magnant, 2015:1] [Fredericks, 2014:1] [Chan et al, 1998:181] [Sarvimaki, 2003:82] [Choi, 2007:17]

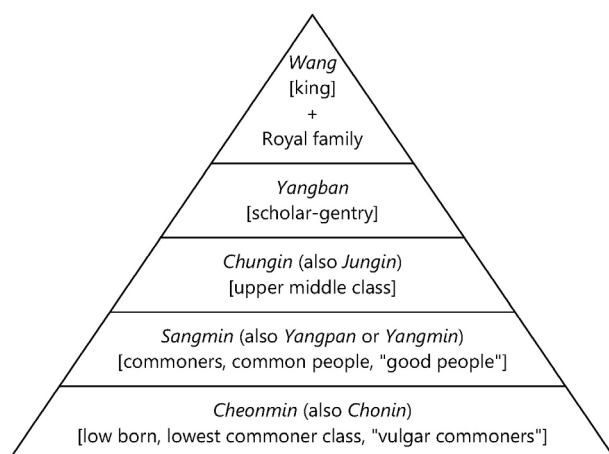


Fig. 4: social pyramid of Joseon

### Clans

Every Korean is part of a *bongwan* (clan), which are groups differentiated by their ancestry. Since surnames are often the same, the clans are distinguished by their location of origin. This system and its connotations had already existed for a long time prior to the *Joseon* period, but became more strict with the spreading of Confucianism during that era. Headed by the *Yangban*, these bloodlines were very important and, by enlisting Confucian laws and rituals, they regulated life. To this day, the comparatively few Korean surnames can be traced back to certain clans and their founding fathers. [Seth, 2010: 158-161]

### Beliefs and philosophies

Because of their impact on all areas of life, it is vital to look at the beliefs and philosophies that are at the core of Korean society. Value systems such as Buddhism, Confucianism and Taoism were capable of absorbing indigenous beliefs, while simultaneously being absorbed by them. This circumstance led to uniquely Korean forms of these practices. [Baker, 2008:30-57]

### Animism and Shamanism

Shamanism, known as *Musim* or *Shindo* in Korea, with *Jeju* island being its centre, is a religion-like practice done by tribal people around the world. Although it usually loses significance when world religions start gaining dominance, this was not the case in Korea, where it has remained vital to the population, from the beginning of *Go-Joseon* (2333 BC) until today. Having been the first religion on the peninsula, and the only one until the advent of Buddhism and Confucianism, practitioners of this prehistoric form believe in a world inhabited by spirits. A rather unorganized pantheon is thought to be occupying living and nonliving things such as mountains, trees, stones, households and villages. Spirits of this realm and their physical reality are held in high regard, as they are said to have the power to influence and change the fortunes of the living. *Mudang* (female shamans), are the links to this spirit world, and are enlisted to hold *kut* (services) to gain good fortune for their clients, cure illnesses by exorcising evil spirits or propitiate gods. These practices also hold significance when planning and constructing a building. With this in mind, many scholars regard Shamanism to be a kind of "medicine" rather than a religion. As members of the *Cheonmin* class during the *Joseon* period, shamans have traditionally held a low social status. Being strongly associated with the culture of fishing villages, these animistic beliefs are primarily found in rural communities. Although the government has dismissed Shamanism as superstition, aspects of *kut*, like songs and dances, still hold importance for Koreans. Even early missionaries in the *Joseon* era noticed the religious fervour and vigour of Shamanism, something the then state-sanctioned ideology of Confucianism lacked. [Baker, 2008:18-29]



### Confucianism and Neo-Confucianism

Korean society is still deeply rooted in its Confucian traditions. Its history on the peninsula goes back to the Three Kingdoms Period (4th-7th centuries AD), when the traditional religions of China began to make their way onto the peninsula. [Baker, 2008:30-57]

#### Joseon times

Confucianism became a major influence with the establishment of *Joseon*, when it filled the spiritual vacuum caused by increased Buddhist decadence, and held its place until the dynasty's fall in 1905. The implementation of Confucian principles, which were already a significant influence in neighbouring *Ming* China, also led to a new social order on the peninsula. [Yoon et al, 2001:2] Despite Confucianism being the new state ideology, most commoners and many upper-class women continued to hold on to Buddhism. [Sarvimaki, 2000:138]

#### Core teachings

A set of ethical values rather than a religion, Confucianism puts the welfare of the family before that of individuals. As a consequence, great importance is given to honouring ancestors with prayers and rituals. Contrary to this, western society lays an emphasis on exercising Christian-democratic rights and protecting the individual. Followers of the Confucian codex are primarily concerned with the fulfilment of responsibility, which shows through their devotion to cultivating relationships and maintaining harmonious bonds. With blood ties of the extended family being precisely defined, each relative is assigned a particular place and role. All of this can be attributed to Confucius' analects, believed to have been the first manual of morals and etiquette available to Koreans. [Baker, 2008:30-57]

#### Neo-Confucianism

Neo-Confucianism was developed during the *Song* dynasty in China by the Confucian scholar *Zhu Xi* (1130-1200 AD). By adding ideas from Taoism and Buddhism to Confucianism, he aimed to create a more rationalist "school of principles". The Chinese *Yuan* dynasty (successor to *Song*) had a great influence on *Goryeo* Korea, with many Korean scholars visiting China and *An Hyang* returning with *Zhu Xi*'s teachings. After Neo-Confucianism was adopted as the state ideology in *Ming* China (1368-1644), the newly established *Joseon* dynasty (1392-1910) soon followed suit. As a consequence, organized religions, especially Buddhism, were restricted in fear of having a bad effect on the Neo-Confucian order. In order to promote education, Neo-Confucian academies (*Seowon*) and schools (*Hyanggyo*) were founded throughout Korea. Many of their scholars went on to develop new Neo-Confucian theories, among them *Yi Hwang* and *Yi I* in the 16th century, who are regarded as key figures of Korean Confu-

cianism. By the start of the 17th century, Neo-Confucianism had ousted all other models, thus causing a split, first between the West and East, then the North and South. Central to this was the question of succession in the Korean monarchy and the treatment of opposing factions. [Baker, 2008:30-57]

#### Gender and regard

Very few, if any, societies are exempt of being influenced by status concerns regarding gender, Korea being no exception. On the peninsula this was mainly based in Confucian beliefs. Korean boys and girls used to be separated from a young age. Boys rarely left their father's side, and girls kept their mothers' company. This was due to boys generally being held in higher regard than girls, with elder brothers additionally viewed more favourably than their younger counterparts. [Savage-Landor, 1895:78-79] [Lehner, forthcoming:18] Compared to earlier times, overall women's rights and their roles took a step backward in the *Joseon* era. Having to conform to Confucian rules, *Yangban* women had to remain hidden from the public sphere and were at the mercy of men. They not only had to oblige to their fathers and husbands, but also to their firstborn sons and fathers in law. Seen as "nobodies" in the household, they were often even excluded from celebrations. [Savage-Landor, 1895:81]

#### Filial piety and ancestor worship

Deeply rooted in Confucianism and a main Korean value, filial piety regards ancestors highly and sees them worshipped at annual ceremonies. Influencing all aspects of life, filial piety is not only a core value in Korea, but also in other Confucian societies, especially China. Respecting one's elders and caring for them is also present in Japan, albeit to a lesser degree. [Raymo et al, 2015:471]

#### Family structure and lineage

East Asian families traditionally put a great emphasis on their lineage and perceive individuals, especially males, as temporary preservers and transmitters of their values. [Raymo et al, 2015:471] Confucianism was the main reason for the spread of patriarchal family structures, first in China, then in Korea and to some extent in Japan. The attitude of Koreans towards their family and society thereby directly reflects Confucian teachings. All relationships and interactions are therefore based in patriarchy, filial piety and parental sacrifice, which have been the cultural backbone for a long time. This had influences on areas such as the inheritance of names and titles, as well as property and general rights. [Raymo et al: 2015:471] Although Confucian ideals are followed to this day, they are not as prevalent as they used to be. This may be related to economic developments and, as a result thereof, changes in family structure. Extended families are being replaced by nuclear ones, which also brings changes to

living arrangements. Traditional compounds built for housing several generations, a result of Confucian kinship ideals, are thereby no longer suitable. [Yoon, 2007:10]

### **Buddhism**

*Savage-Landor* wrote in 1895, that “[...] The generality of people in [Korea] are not religious [...]”. This can be traced to laws banning religion altogether, a reaction to revolutions and internal disputes, which erupted after the Buddhist stronghold during Chinese invasions (10th to 14th centuries). [Savage-Landor, 1895:216-217] Buddhism, with its teachings going back to India, first seeped into Korea from the former *Qin* dynasty of China in 372AD. Compared to the introductory Indian version and rather sectarian Chinese form, early Korean Buddhist monks aimed for a more holistic and coherent approach in order to overcome inconsistencies they believed to be apparent in *Mahayana* Buddhism. As dominant religious and cultural influence during the *Silla* (668-935 AD) and *Goryeo* (918-1392 AD) periods, Buddhism has played a significant role in Korea until the founding of the *Joseon* dynasty in 1392. It has also greatly contributed to the country’s most impressive cultural assets. Its status as government-sanctioned ideology for a millennium has invited abuse by those in power, which triggered calls for reform. A main contributor was the monk *Wonhyo*, whose interpretation of the canon is quintessentially Korean, as he never made it to China to study classical Chinese Buddhism. The Korean version’s inclusiveness and adaptability allowed for an absorption of elements of the indigenous religions, with its tendency toward Syncretism leading to the inclusion of shamanistic beliefs and practices. Although monastic Buddhism calls for the renunciation of worldly desires, most believers utilize it for personal gain or to benefit their families, a practice which has blurred the boundaries between Buddhism and Shamanism. [Baker, 2008:30-57] [KBRI, 1993:281-283]

### **Taoism**

Among the three religions of Chinese origin, Taoism had the least noticeable ideological or political impact on Korea. Its focus lay on the individual in nature rather than the individual in society. By following principles of Taoism, Buddhism and Confucianism, *hwarang* knights (sons of *Silla* aristocracy) embodied the essential traits of good character in traditional Korean culture. The Taoist qualities were patience, simplicity, contentment and harmony, Confucianism taught loyalty, filial piety and righteousness, and Buddhism contributed compassion. *Joseon* scholars, who performed duties as officials of the Confucian government during daytime, also immersed themselves in a Taoist or Buddhist study, although this was reserved for lower ranks. Many scholars aimed to become a *sinseon* (Taoist hermit), possessing supernatural powers and eternal life, by immersing themselves in na-

ture. The call to duty however, was often stronger. [Yu et al, 2010:29-35] [Baker, 2008:30-57]

### **Christianity and Catholicism**

A growing religious power until today, Christianity was introduced to the peninsula when the first Roman-Catholic missionaries arrived in Korea in 1794. Mostly due to converts refusing to perform Confucian ancestor rites, the government of the time prohibited Christian missions. After the implementation of an anti-Christian law in the early nineteenth century, some Catholics were executed. The enforcement however was not strict and by the 1860s there were about 17,500 Roman-Catholics in the country. A more rigorous persecution started in 1884, with thousands of Christians killed. However, that didn’t stop Protestant missionaries from converting a great number of Koreans, receiving help from Catholic priests, they established schools, universities, hospitals, and orphanages and played a significant role in the modernization of the country. Nevertheless, during the Japanese colonial occupation, it was the Christians who struggled most for independence. With Korean Buddhism in a degenerate state, Protestantism was enabled to grow, when educated Christians were made to reconcile Christian and Confucian values (social ethic rather than religion). They encouraged self-support and self-government among members of the Korean church, while connecting Christianity with Korean nationalism. As Confucian influence was not as strong as in the South, a large number of Christians lived in the northern part of the peninsula. With the establishment of the communist regime however, they had to flee to the South. Foreign missionaries to Korea were more conservative, anti-communist and more liberal. This led to a better education for Christian families, a subsequent higher standard of living and a significant influence on social, economic and political issues. Although Korea remains rooted in its Confucian heritage, with a great effect on society and government, the social mobility of Christians has also affected non-Christians family ethics. The loosening of tradition Confucian requirements has lead to a democratization of the family culture. [Baker, 2008:58-77]

### **Timeline: Eras and dynasties**

[Lee, 2009:1] [Asia for educators, 2017:1]

#### **Prehistory**

Paleolithic period: 500 000 BC - 8000 BC  
*Jeulmun* pottery period: 8000 BC - 1500 BC  
*Mumun* pottery period: 1500 BC - 300 BC

#### **Ancient period**

*Go-Joseon* (Old *Joseon*): 2333 BC - 108 BC  
*Jin* State: 4th to 2nd centuries BC



### Three Kingdoms period

*Baekje*: 18 BC - 660 AD

*Goguryeo*: 37 BC - 668 AD

*Silla*: 57 BC - 668 AD

*Gaya Confederacy*: 42 AD - 562 AD

### Later Three Kingdoms period

*Hu-Baekjae* (Later *Baekjae*): 892 AD - 936 AD

*Hu-Goguryeo* (Later *Goguryeo*): 901 AD - 918 AD

*Hu-Silla* (Later "Unified" *Silla*): 668 AD - 935 AD

### Unitary Dynastic period

*Goryeo*: 918 AD - 1392AD

*Joseon*: 1392 AD - 1897 AD

Korean Empire: 1897 AD - 1910 AD

### Colonial period

Japanese rule: 1910 - 1945

Provisional government: 1919 - 1948

### Recent times

Military governments: 1945 - 1948

Division into North and South Korea: 1948 - present

## Cultural Transmission

### General

#### *Influencer and influenced*

Cultural transmission knows no physical borders, but is rather passed on by people and often aided by proximity. Bordering China in the North and with Japan just over 30 km off its southern coast, Korea has always been a strategic post for transnational exchange. Historically, this conglomeration has not only affected the politics and economy of East Asia, but also its culture, including the building traditions. [Nemeth, 2003:3-4] In order to fully understand the development of dwellings on this peninsula, it is thereby essential to take a look at the varied influences Korea and its inhabitants have been subjected to since its colonization. The following is attempt at tracing these transmissions.

#### *Reception: voluntary vs. involuntary*

Regarding transmission, it must not be forgotten that not all influences are accepted voluntarily, but are often forced upon a society. Their physical manifestations are thus very often the consequences of wars. Voluntary adoption of foreign traits or features often occurs when they are seen as superior to domestic ones. Superiority also plays a role when a victorious force replaces local customs with its own. Regarding speed of transfer, it can be said that involuntary transmissions are often implemented faster, which is due to the simultaneous obliteration of the old and enforcement of the new. Change by choice, which often goes hand in hand with progression, may take a while to gain momentum. It can however

be assumed that voluntary-based implementations are more lasting, not necessarily because they are superior to involuntary ones, but due to the negative connotations of the latter.

### Indosphere and Sinosphere

Asia has mainly been impacted by two cultural spheres, the Indosphere (also Greater India or Indian sphere) and the Sinosphere (Chinese sphere). Although both have developed their own characteristics, there are still overlaps in certain areas. (Fig. 5)

#### *Etymology*

*Matisoff*, in 1990, was the first to use the term "Indosphere" and, while referring to linguistics, described it as "[...] the [...] Indian areas of linguistic/ cultural influence in Southeast Asia [...]". [Matisoff, 1990:113] In the same article in which *Matisoff* coined the term "Indosphere", he also referred to the Chinese areas of linguistic/ cultural influence in Southeast Asia as "Sinosphere". [Matisoff, 1990:113] The English Oxford dictionary defines "sinicize" as "[to] make Chinese in character or form" [OED, 2017:1], while *Merriam-Webster* describes it as "[...] to modify by Chinese influence". [Merriam-Webster, 2018:1]

#### *Origins*

Indian architecture, or what can be labelled as such, is said to have started in the *Asoka* period (268 to 232 BC) [Kosambi, 1964:142] Beginning with the *Han* dynasty (206 BC to 220 AD), Chinese emperors would invite Buddhist missionaries to spread their wisdom. Known to have been associated with overland merchants, they initiated the trade of cultural goods and knowledge. [Kosambi, 1964: 86-87] According to *Reischauer*, the Sinic world originate in Northern China [Reischauer, 1974:341-348], with *Sun* specifically locating the Yellow River basin. [Sun, 2002:154] *Huntington* assumed its origins to lie in either a single, distinct Chinese civilization, dating back to at least 1500 BC, possibly even a thousand years earlier, or two succeeding Chinese civilizations from the early Christian epoch. [Huntington, 1996:45]

#### *Influenced countries*

To *Toynbee*, the Far Eastern civilization was comprised of China, Japan and the Korean peninsula [Sun, 2002:15], with the same countries also making up *Reischauer's* Sinic world. [Reischauer, 1974:341-348] *Sadao* further added Vietnam, as well as the areas between Mongolia and the Himalayas to the East Asian Cultural sphere. [Wang, 2002:322] Mongolia was also on *Davis' list*. [Davis, 2006:197] *Huntington*, in "The Clash of Civilizations", brought the Chinese communities outside of China (especially those of Southeast Asia) and Vietnam into the mix. [Huntington, 1996:45]

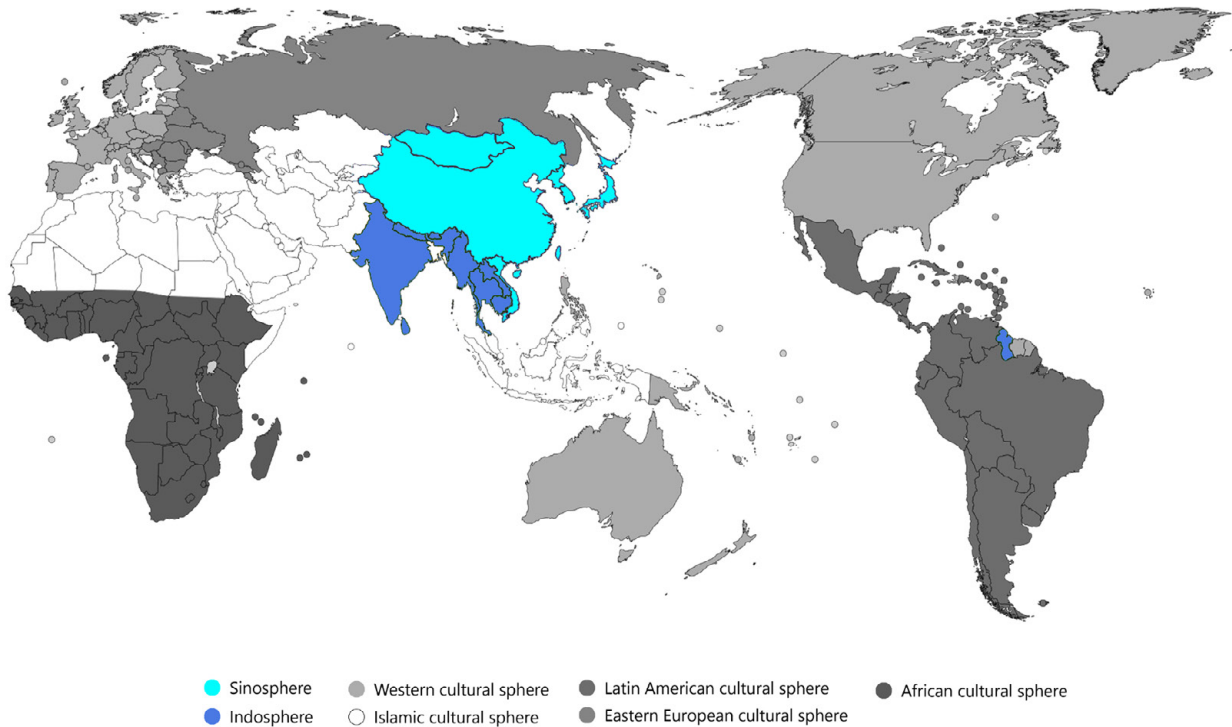


Fig. 5: Indian and Chinese cultural spheres

### Impact

*Kwon* explains, that the “[...] Korean people have since early times been receptive to cultural and material influences from the Chinese [...]”, with the peninsula passing those influences on to Japan and the rest of the Asian continent. [Kwon et al, 2016:15] This explains the impact Chinese building rudiments have had on the building traditions of these countries. [Knapp, 2004:17] Concerning Vietnam, the story is a different one. *Reischauer* writes, that even after achieving their independence from China (Korea in the fourth and Vietnam in the tenth century), the countries were “ [...] hardly aware of each other’s existence [...]”, thereby making mutual cultural transmission unlikely. [Reischauer, 1974:4] *Toynbee* likens the interaction between Sinic and Far Eastern civilizations to those of the Hellenic and Western. [Sun, 2002:154] To *Blinnikov*, the Sinosphere is based on culture, rather than religion. [Blinnikov, 2011:132] For *Sadao*, the Chinese and East Asian cultural sphere was a very isolated one, and thus developed very distinct characteristics. [Wang, 2002:322] The most evident parallels of the Sinosphere are the common origin of the writing systems and the ethics of various philosophies. *Reischauer* cites Confucian ethics and a centralized state as the main aspects for inclusion in the Sinic sphere [Reischauer, 1974:341-348], while *Sadao* adds Buddhism to the list. [Wang, 2002:322]

### Society

Although Asian countries differ from each other as much as they do from the Western world, psychological and cultural similarities occur. Developments in Korea, as well

as Japan and Vietnam can be traced back to the ancient centralized empire of Northern China, which was deeply influenced by the ethics of Confucianism. [Reischauer, 1974:3] Japan however, despite extensive cultural borrowing from China from the seventh to ninth centuries, has managed to retain its semi-tribal, greatly aristocratic society. This meant a rejection of the bureaucratic and more egalitarian Chinese customs. [Reischauer, 1974:6]

### Script and language

The Chinese script was, for a long time, the strongest connection between East Asian countries. Its significance can be compared to that of Latin for the Greco-Roman sphere in the West. Only in the 9th century did the Japanese develop phonetic syllables, with *Hangeul* (Korean alphabet) following much later in the 15th century. Today, the languages in this part of the world can be categorized into Sinic and Altaic, the former used by the Chinese and Vietnamese, while the latter refers to Korean and Japanese. [Reischauer, 1974:3; 341-348]

### Arts and architecture

According to *Reischauer*, the arts and culture of East Asia, including China, Japan, Korea and Vietnam, shared a very similar aesthetic. [Reischauer, 1974:4]

### Geomancy

Geomancy is a philosophy whose principles are used to bring the built environment in harmony with nature. *Pungsu* as the Koreans refer to it, is believed to have reached the peninsula by cultural exchange with China in

the form of *Feng Shui*. It has ever since been an important aspect of the culture and its building traditions. [Sarvimaki, 2000:138] [Yoon, 2007:9] According to Yoon, Chinese geomancy or *Feng Shui* can be traced back to cave dwellers, who used it to find the most suitable sites. [Yoon, 2007:8] Although generally regarded of Chinese origin, a similar Indian practice known as *Vastu Shastra* or “science of dwelling” (*Vastu Vidya*), with roots in Hinduism, is believed to have emerged between 4000 and 2000 B.C.. By adapting to local traditions, this knowledge has not only impacted Korea, China and India, but is also utilized in Japan and Vietnam. [Sarvimaki, 2000:137]

### Religions and philosophies

Korea and Japan have not only adopted Chinese cultural aspects like the script, but also its value systems. Among the most prominent was Confucianism, which was subsequently influenced by elements of Taoism, Buddhism and Shamanism. These imports, combined with Korean indigenous beliefs, all interwoven with daily life in numerous ways, made people rather eclectic than exclusive in their religious commitments. [Baker, 2008:30-57]

#### Animism and Shamanism: Musim and Shindo

As mentioned earlier, Shamanism was Korea’s first “religion” and has remained vital to its population from 2333 BC until today. [Baker, 2008:18-29] This explains the great respect people have for the earth and the spirits (good or bad) it is inhabited by, and why sacrifices are made in case of major happenings. [Savage-Landor, 1895:217-219]

#### Buddhism

With the help of Buddhism, the countries of East Asia formed a cultural bond, that would remain intact for centuries. Solidarity and filial piety among family members was valued, as was the focus on the group, rather than the individual. The quest for harmony within groups was also important for society at large. Furthermore, hard work was emphasized in order to achieve success in a proper way. Buddhism connected the countries of the East in the same way that Christianity connected those in the West. [Reischauer, 1974:4]

#### Confucianism

The authoritarian rulers of *Joseon* Korea, as well as *Ming* and *Ching* China, from the 15th to 19th centuries, sought to establish a new kind of social order based on Confucianism. [Yoon, 2001:2] The hierarchy was determined by social class and gender, which also encroached on housing. Restrictions were put on the scale and size of buildings, by specifying the number of *kans* (spatial units) allowed, as well as decorations. [Yoon, 2001:1] The *Yangban* elite further used Confucian principles to promote and strengthen the influence of patriarchy. [Han, 2004:113]

#### Neo-Confucianism

Neo-Confucianism, a more rationalist and secular form of Confucianism, rejects the superstitious and mystical elements of Taoism and Buddhism, which had influenced Confucianism during and after the *Han* Dynasty. [Kim, 2005:79] While Buddhists and Taoists saw metaphysics as a catalyst for spiritual development, religious enlightenment and immortality, Neo-Confucianists used metaphysics as a guide in developing a rationalist, ethical philosophy. Although critical of Taoism and Buddhism, Neo-Confucianists borrowed terms and concepts from both. This form developed in China as a renaissance of traditional Confucian ideas, as well as a reaction to the religious ideas of Buddhism and Taoism. Originating with *Han Yu* and *Li Ao* (772-841) in the *Tang* dynasty (618-907), its development came to a halt during the following Five dynasties and Ten Kingdoms period (907-960). It resumed in the *Song* dynasty (960-1279) when the philosopher *Zhou Dunyi* used Taoist metaphysics as a framework for his ethical philosophy. Despite denouncing Buddhist and Taoist metaphysics, Neo-Confucianists borrowed their terminology and concepts. The philosophy became the state ideology during *Ming* (1368-1644) and was promoted in unprecedented ways during *Qing* (1644-1912), when the Manchu desired to establish a moral order in which their rule would not be called into question. Neo-Confucianism prevailed in China until 1912, when *Qing* fell. During the time when the Korean *Goryeo* dynasty (918-1392) was in the last century of its existence and influenced by the Mongol *Yuan*, *An Hyang* (1243–1306) introduced *Zhu Xi*’s school of Neo-Confucianism to the peninsula. [Seth, 2010:120-123] [Kim, 2005:79-80] In the succeeding *Joseon* era (1392-1897), it was established as state ideology, having ousted all other models for the nation-state by the start of the 17th century. The new dynasty went as far as to persecute Buddhism, considered poisonous to the Neo-Confucian order due to being an organized religion. At the start of the 17th century, Neo-Confucian thought experienced a split, first in Western and Eastern, then Southern and Northern movements. This was due to questions of succession in the Korean monarchy. By the middle of the 17th century, Neo-Confucian scholars began to question particular metaphysical beliefs and practices and many people recognized the need for academic learning in order to improve their everyday lives. This was the very beginning *Silhak*, which developed amid efforts to introduce reforms and natural science from western countries. Literally “practical learning”, it was designed to counter the non-critical following of Confucian teachings, as well as the strict adherence to formalism and ritual. Counteracting this was the 1892 *Donghak*-movement (“Eastern Learning”), which started as a rebellion against *Sohak* or “Western Learning”. Followers believed that the opening to the West was causing the abandonment of the Chinese classics and Confucian rites, thus leading to

the loss of Korean society and culture. [Seth, 2010:216-218] [Kim, 2005:79-80]

*Neo-Confucianism*, characterized as humanistic and rationalistic philosophy convinced that the universe can be understood through human reason and that it was up to man to create a harmonious relationship between the universe and the individual, reached Japan during the *Kamakura* period (1185-1333). During the *Edo* (also *Tokugawa*) period (1603-1868), when it developed into Japanese schools, it was known as *Shushi-Gaku*. The philosophy took hold when the 17th century *Tokugawa* shogunate adopted its principles to control its people and established Neo-Confucianism as Japan's official ideology with the *Kansei* Edict (1789-1801). With Neo-Confucianism encouraging education, a number of Neo-Confucian schools known as *Seowon* and *Hyanggyo* were founded throughout Korea. During the *Goryeo* dynasty, king *Seongjong* (1083-1094), a key advocate for Confucianism, established the *Gukjagam*, the highest educational institution of that time. In 1938, the philosophy gained further importance with the establishment of the *Sungkyunkwan*, an academy with a Neo-Confucian curriculum. [Seth, 2010:122-123] [Kim, 2005:79-80]

*These schools* were based on the Chinese *Shuyuan*, academies or academies of classical learning, a type of school that originated during the *Tang* dynasty in 725 and then spread all over the country. Private establishments, built away from cities or towns, they provided a quiet environment for scholars to engage in studies and contemplation without restrictions or distractions. They started to decline during the *Song* dynasty in the 12th century, when, with government encouragement, many other academies were established. However, the main one was reopened in 1180 by the Neo-Confucian *Zhu Xi*, a trailblazer for Neo-Confucianism. The *Yuan* era (1271-1368) saw all academies placed under government control and used as preparatory schools for the national exam. The original system was revived under *Ming* (1368-1644) and *Qing* rule (1644-1911), but finally abolished in 1898 by the end of the *Qing* dynasty.

*During the Tokugawa era* (1603-1868), Japanese schools were under the patronage of *shoguns* and the *Shoheiko* academy became the premier authority on Confucian orthodoxy after the *Kansei* edict (1789-1801).

*Gwageo*, civil service examinations, were established on the peninsula by King *Gwangjong* (949-975AD) in the *Goryeo* era. These tests, held to select candidates for the state bureaucracy, gained great importance during *Joseon*, when they became the centrepiece of most education. [Seth, 2010:135-139] [Kim, 2005:72-73]

*The Korean* civil service examinations were based on their equivalents in imperial China. In order to pass these *Keju*, which started as early as the *Han* dynasty, it became necessary to master the interpretation of Neo-Confucian texts. They were however only widely utilized from the

middle of *Tang* and continued in the same way through the *Qing* dynasty, until its abolition in 1905. [Seth, 2010:55-56; 65] [Kim, 2005:72-73]



## BUILDING TRADITION

### *Settlements: Origins and evolution*

#### From nomadism to sedentarism

##### *Tents and caves*

Human tracks on the Korean peninsula can be traced as far back as 500,000 BC. In prehistoric times (prior to 10,000 BC), when farming had not yet begun, inhabitants of this part of the world relied on their hunting and gathering skills for food. As they had to cover wide arrays of land, people were nomads and sought shelter in tent-like structures and caves. [Jeon, 2016:20-21]

*Tents, or rather tipis*, were also the dwelling of choice among the Plains Indians of Northern America. They brought them along whenever they moved to another area. [Lehner (2), forthcoming:28]

*The use of mobile shelters* can, in some parts of the world, still be witnessed today. For at least parts of the year, a great number of Mongolians are nomads who dwell in *yurts*, which they disassemble and bring to new places.

##### *Pit dwellings: Hyeolcheo*

It was during the Neolithic period, dated from around 10,000 to 8,000 BC in Korea, when people started to remain in one place for longer. During this time, when food was mostly obtained from fishing and gathering, pit-houses called *hyeolcheo* made their first appearance. (Fig. 6) They consisted of a recessed floor being dug into the ground, covered by a roof close to the floor. [Jeon, 2016:20-21] The import of the Bronze Age culture from China, at around 1,000 BC, saw a further spread of agriculture, which had been introduced to the Korean peninsula at around 3,500 BC. This phase, lasting until around 300 BC, rung in a time of transition, with *hanok*-like structures making a first appearance. *Hyeolcheo* (pit houses) started to become shallower, with layouts taking on a rectangular shape as consequence of the increased space requirements from growing families. These advanced structures introduced walls and roofs, as well as early forms of *ondol* (underfloor heating running on hot air), whose surface was used as living space. [Jeon, 2016:24-25] During the



Fig. 6: reconstructions of prehistoric pit dwellings (hyeolcheo)

Iron Age from 400 BC to 400 AD, which coincides with the later stage of *Gojoseon* as well as the *Jin*-state in the South and the Proto-Three-Kingdoms (*Goguryeo*, *Baekje* and *Silla*), commoners continued to dwell in pit-houses made from affordable materials like stone, wood and earth. These had however gotten bigger and their floor plans more complex. [Jeon, 2016:24-25]

*In the early stages of the Neolithic period*, around 10,000 BC, their Chinese contemporaries found shelter in similar semi-subterranean pits called *banxueju*. Their circular, elliptical or rectangular layouts were dug about 50-80 cm below the surrounding area, had a shallow round fire pit near the centre and were protected by reed and plaster roofs. Shaped like cones or pyramids and with wide eaves, these roofs were carried by wooden pillars, which were tucked into the soft loess. When the pits grew larger with time and took on an oblong shape, wooden frames built directly on the ground were introduced, as were walls constructed from wattle and daub. An opening to the South then functioned as entry point. [Sarvimaki, 2000:17-18] Later Chinese societies, arranged as matrilineal clan communes, survived on farming millet, domesticated animals and fishing. They found shelter in dwellings within caves known as *xu'e*, with the oldest of their kind found in northern China and going back to around 6,000 to 4,000 BC. With their origins in the *banxueju*, *xue'e* were developed into shelters completely above ground, which consisted of a living area surrounded by a moat-like ditch of 5-6m in diameter. Their post-and-beam-structure is considered the predecessor to the basic Chinese framing system known as *tailiang*. [Sarvimaki, 2000:17-18]

*Similar types* are known to have existed during the *Jomon* period in Japan, which dates back to between 8,000 and 300 BC. (Fig. 7) They served as shelters for hunters and gatherers, groups of whom settled in close proximity to rivers. These *tateyana jukiyo*, earthen-floor dwellings consisting of pits dug about 30 cm below ground, had steep hipped roofs, covered by straw or leaves, which were held up by four posts. Circular, sometimes rectangular with rounded edges, these earth-floored single spaces



Fig. 7: Japanese Jomon period pit dwellings (tateyana jukiyo)

stretched five to ten meters and had a hearth placed in the middle, with an opening above serving as chimney. [Itoh, 2004:1] Sometimes up to 60cm deep, most spanned 5 to 7m in diameter. *Tateana jukyo* are believed to be the predecessors of common people's houses. [Higashino, 2003:11-27]

### Stilt dwellings: Sogeo

*Sogeo* or "house built on trees", traced back to 6,000 BC, were structures elevated from the ground by wooden stilts. (Fig. 8) Measured bays of 2 x 2 metres, with one to three on the long side and one or two on the short side, they were rather small and thus mainly used as storage spaces. *Sogeo* could be entered via a ladder on the front side, which was held up by stakes. These gable-roofed stilt houses are believed to be the origins of the *maru*, a wooden floored area without underfloor heating and a main component of the later *hanok*. Palaces and religious buildings of the Korean Iron Age (400 BC- 400 AD) were, unlike the aforementioned pit dwellings of commoners, wooden structures built according to imported techniques from China, with great adaptability to climates and quakes. [Jeon, 2016:24-25]

*Elevated vernacular* structures similar to the Korean *sogeo*, could also be found in other East and Southeast Asian countries. Among those was China with its well-developed agricultural system based on rice-cultivation. [Jeon, 2016:24-25] Referred to as *chao* or "nest", the origins of these freestanding buildings on pillars go back to a roofed hut in a tree. *Chao* were constructed with the *chuandou* (column and transverse tie), a method which viewed as the origin of the standard Chinese building technique. Even the oldest known examples, from around 7,000 BC, used mortise and tenon joints. Raised above the ground level by stilts, *chao* had walls and roofs made of wooden pilings, bamboo rods and branches. As heating was unnecessary, due to the well insulating building materials, the cooking stove was placed outside the lodging. [Sarvimaki, 2000:17] During the end of Chinese prehistory, the *Shang* dynasty (ca. 1600-1122/1027 BC)



Fig. 8: reconstructions of prehistoric stilt dwellings (sogeo)

arose from today's *Henan* province and rice cultivation started to flourish with the taming of the water buffalo. With the association of the ruler with heaven originating in this period, hierarchy was shown by placing the most important buildings on top of tamped earth platforms (*hangtu*). These high ranking buildings were rectangular in shape and had a post and lintel-constructed wooden framework, which supported a pitched roof with its overhanging eaves. [Sarvimaki, 2000:19] [Knapp, 2004:38-39] *Rice*, whose cultivation started in Japan during the *Yayoi* period (300 BC- 500 AD), was stored in *sogeo*-like raised-floor buildings, in order to safeguard the grains from rodents. [Itoh, 2004:1] (Fig. 9) These elevated structures, called *takayuka jukiyo*, are seen as predecessors of later aristocrat mansions. Made possible through advances in building techniques during the Iron age, these board-built dwellings were raised by posts, had plank floors and gabled roofs. [Higashino, 2003:11-17] In the 6th and 7th centuries (*Asuka* period), earth was applied to a third of the floor space, while the rest remained wooden. [Itoh, 2004:1]

### Typologies and main characteristics

Based on the distribution and arrangement of their dwellings, as well as their basis of sustenance, Korean settlements can be classified into several distinct types, each of which show certain characteristics.

*Unsurprising given* its history with Korea, China has brought forth similar developments.

*Similarities can* also be spotted in Japanese settlements, in spite of little contact between the countries during the *Joseon* era, as *Sekino* notes. [Jung, 2014:40-41]



Fig. 9: reconstruction of a prehistoric Japanese store-house



### Classification by dwelling distribution

In Kwon's words, "The Korean term *maeul* (village) designates a rural settlement comprising single-family dwellings." Confucian culture, which permeates village life and has brought forth a large number of single-clan *maeul*. Classified into dispersed and clustered forms (Fig. 10), most of the former are relatively new, while the majority of the latter show a long history. [Kwon et al, 2016:94]

#### Dispersed settlements

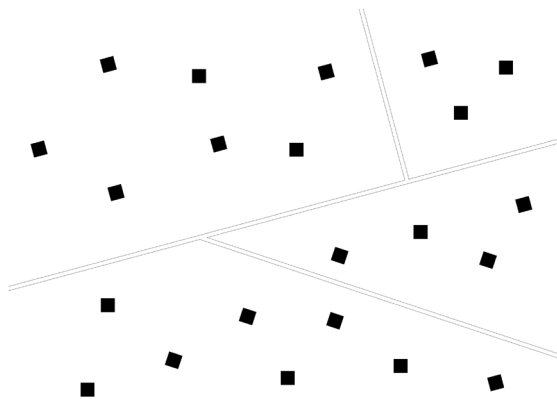
Dispersed rural settlements are composed of mostly stand-alone structures, which are scattered irregularly, rather than in a geometrical pattern. This enables the residents, who are generally engaged in dry-field farming, to have their fields in close proximity to their dwellings. [Kwon et al, 2016:101-103]

Similarly, the vernacular houses of Northern Europe stand alone and are scattered across wide areas. Not being equipped with a central courtyard, light is brought in via windows facing the surrounding areas. This room-based style goes back to Germanic nomads, who first introduced it to England and later France. [Jung, 2014: 111]

#### Clustered settlements

Dwelling in clustered settlements are, as the name suggests, clustered together. The dwellings are placed close together and often enclose courtyards. This organization supports the cooperative culture of farming communities, as saving time and labour are main considerations. As most of these are set in valleys or on foothills, land availability is limited, consequently also limiting the availability of sites considered auspicious under *myeongdang* (principles of *Feng Shui*). Although their location makes flooding a concern, it also brings better drinking water accessibility. [Kwon et al, 2016:101-103]

This form of settlement can stylistically be compared to those of Southern Europe, which have ancient roots. The dwellings found here, which bordering each other, come with only small windows in the public-facing outer walls and thus rely on a courtyard to bring light into the rooms. [Jung, 2014:110]



### Classification by dwelling arrangement

Korean villages can be further subdivided according to their road networks and geometric layouts. Here, compact villages, row villages and street villages are differentiated. [Kwon; et al, 2016:101]

#### Compact villages

Compact villages are made up of homes typically packed close together and separated only by walls or fences with narrow and winding alleyways between them. Most houses are small with relatively expansive courtyards, and built to fit in with the land and developed in harmony with nature and their surroundings in general. [Kwon et al, 2016:102-103]

#### Row villages

Row villages are situated in foothills or along the coasts and follow natural features such as roads or waterways. This type can be found among some of the planned communities found in coastal areas on reclaimed land, but is very rare. [Kwon et al, 2016:103]

#### Street villages

As special form of row villages, street villages have a particularly close relationship with the road. Formed parallel to it, they are primarily engaged in commercial activities. As traditional Korean society downplayed commerce, neglected the country's roadways, and much of the populace lived away from the main roads, street villages are less common in Korea than in other countries. In the past, many viewed roads as avenues of infectious diseases, malevolent spirits and ideas that undermined public morals. For this and other reasons, formation of street villages did not begin until the 18th century with its rapid development of national commerce. [Kwon et al, 2016:103-104] *Russian villages*, located within arable land, were similarly laid out in a linear structure, with a road separating two rows of homes. People grew produce in patches located on their plots. In the South, some lonely farm-compounds could be found in the middle of the farmland. [Pipes, 1995:144]

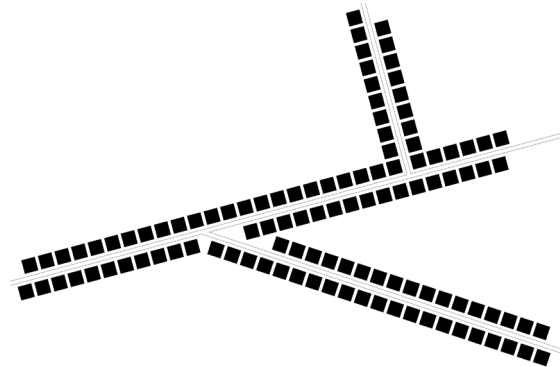


Fig. 10: difference in the organization of a dispersed and a clustered settlement

### *Classification by means of livelihood*

In Korea, there are three types of villages being differentiated by location and main activity. Farming villages, which are settlements located on wide and flat plains, come with mostly agricultural features. The occupants of fishing villages, which can be found on seacoasts, are largely engaged in fishing. Mountain villages, located in mountainous areas, are characterized by forestry and agricultural activities. [Kwon et al, 2016: 94]

#### **Farming villages**

The population of farming villages, which comprise the bulk of South Korea's rural settlements, has dropped dramatically. Influenced by *Pungsu*, the Korean form of *Feng Shui*, the locations of these settlements is tightly connected with the natural environment. Based on the custom of *baesan imsu* or "mountain in the rear, water in the front", which is considered to be propitious, they are typically situated on a gentle south-facing slope, where the mountain meets the plains, enabling direct sunlight. Seeking protection from the north-western winds of winter, they are surrounded by forests, which also provide firewood, building materials and food. The subsequently low water table of their location decreases danger of flooding, while facilitating easy access to potable water. The banks of the waterway in front of the villages, provide reservoirs and irrigation, thereby enabling rice farming. Harvest and farming equipment is kept in storehouses, which are found in every household, as is a large central courtyard for farming-related tasks. [Kwon et al, 2016:95-97]

#### **Fishing villages**

Most fishing villages, which are abundant in Korea, depend on both fishing and agriculture as means for living. They were developed on narrow plains at the embankment between headlands protruding out to sea, which act as natural breakwaters and protect the settlement from rough waves and high winds. Many face south and are situated in valleys, with three sides surrounded by mountains or hills with the remainder open toward the sea. [Kwon et al, 2016:97-99]

#### **Mountain villages**

As almost 70 percent of Korean territory is mountainous, there is a great number of mountain villages. Although they can be quite difficult to distinguish from farming villages, the mountain kind is found in areas with extreme variations. This is due to altitude bringing on different natural conditions in areas of the same geographical range. These mostly south-oriented villages face adverse weather and farming conditions and poor transportation links. In the past, agriculture was limited to subsistence farming, with some cash income from timber production or the collection of firewood. The positioning does not

differ much from that of a farming village, but directional placement is more crucial due to shorter period of daylight on flatter terrain. Homes are typically situated on small plots and on sloping ground and are usually enclosed due to the relatively low temperatures and harsh winds. Most of the work is carried out inside the house and, in traditional times, even the area for the livestock would be located within the home. [Kwon et al, 2016:99-101]

### *Vernacular housing: Influences*

Traditional housing styles all over the world may feature some surprising similarities due to comparable climate and topography, as well as cultural aspects. Different environmental influences and varying moral codes however, have brought forth differing styles in the Eastern and Western sphere. [Jung, 2014:105] In correspondence to this, *Sarvimaki* sees buildings as results of "[...] solutions to practical considerations and climatic conditions [...]", while also subjected to the ideological current. [Sarvimaki, 2003:86-87] Similarly, *Sekino* holds natural phenomena (e.g. climate and geology) and artificial factors such as social customs, religious and historical influences categories responsible for the way architecture develops. He further warns not to underestimate the relationships and exchange with other nations. [Jung, 2014:77] *Kon* too divides the influences on dwellings into geographical and cultural-historical ones, which he ascribed to different areas. Likewise, *Fazeli* states that "[...] combining the climatic factors with the dominant beliefs [of a] culture, may provide the characteristics of its traditional built space. [...]". He elaborates, that a buildings' appearance mostly changes when its cultural context does and that its interrelation with the environment should not be neglected. This explains how symbols and forms, developed from nature, are transmitted to later generations through design principles. [Fazeli et al (2), 2010:99] Influenced by all of this, Korean dwellings thereby reflect their inhabitants' lifestyle.

#### **Time and place**

*Chuta Ito* made out time as additional factor, writing that housing has to change over time, because lifestyles do too. He further opinionated that, as "[...] Architecture is infused with national characteristics, [...] It is a waste of time to imitate foreign architecture [...]" These peculiarities are results of not only the natural conditions of a region, but also its social and political environment during a certain era. Considering the amount of types that emerge due to this, he doubted that a single regional form of building could be internationalized. [Jung, 2014:163-164] With all of this in mind, it is somewhat surprising that the *Joseon* era has, although lasting over half a century, more of a decline than progress to the development of housing on the peninsula. [Jung, 2014:66]



### Cultural traits and transmission

Activity patterns within a dwelling are often regarded as being more important than the dwellers themselves, which is due to culture seen as shaped by space, time, meaning and communication, while cultural activities are regarded as performances within this realm. This explains why the same set of spatial organizations and architectural configurations can be found in cultures with differing climates. [Fazeli et al (3), 2010:99] *Sekino* mentioned three factors that could have played roles in the emergence and distribution of certain housing phenomena in Korea. Besides the architecture of previous eras, he regarded the styles of *Ming* and *Qing* China, as well simultaneous developments on the peninsula itself as influences. [Jung, 2014:40-41] For *Wajiro Kon* too, vernacular houses are a great indicator for the cultural influences a country has been subjected to throughout its history, differentiating them into spheres, namely the "old culture" and the "new culture". He put Korea, along with the Europe to Russia's west, China, Japan and India under the "old culture", while ascribing the regions between northern Europe and America to the "new culture". [Jung, 2014:105; 112] This correlates with *Kim's* belief that a culture's worldview has a great influence on where and how its people decide to live. The implications and distinct features shown in East Asian dwellings are consequently a result of the life-oriented worldview representative for that region. [Kim, 2008:1]

### Climate and topography

*Kon* explains, that besides being influenced by culture, vernacular buildings also reflect the climate and topography of a region, as well as determining which materials come to use. He categorizes by geographical terrains—those being mountainous, oceanic, desert and cold. In his opinion, dwellings in mountainous area, show similar characteristics all over the world, likening houses in the cold regions of Siberia to those in the far North of America. Also, the inhabitants of the numerous islands of the south sea, have come up with comparable shelters from heavy rains. [Jung, 2014:105; 112] The natural environment has a great influence on the use of materials, technologies and construction methods, the knowledge of which is passed on through generations. If surrounded by the same natural conditions, different cultures may develop similar building patterns, as locally available materials are used to create a micro-climate for human comfort and structural forms are thought to adapt to the prevalent climate. The size of a house, its properties and decorations are further influenced by the owners economical means. [Fazeli et al (1), 2010:99]



## II. HANOK



## INTRODUCTION

As explained before, vernacular dwellings all over the world are the results of various influences, that they have been subjected to throughout their existence, the Korean peninsula being no exception. Certain terms can thereby be of help in differentiating the distinct structures of a region or culture. This also rings true for *hanok*, the traditional homes of the Korean peninsula.

### Terminology

#### Styles: Hanok (Korean) and Yangok (Western)

Most Koreans associate the term *hanok* with the vernacular dwellings of aristocrats, which were developed during the *Joseon* dynasty (1392-1897). Translating to “Korean-(style) house”, the term was first coined in 1907 to distinguish these structures from Western-style ones, referred to as *yangok* (“Western house”). [Shin, 2012:160-161] Scholars define *hanok* as Korean traditional houses with a “[...] wooden frame structure [...] [and a] unique joint system”, which make use of natural materials. Further distinct features are a baked-tile roof and the underfloor heating called *ondol*. These compounds also often come with an inner courtyard and additional gardens. [Shin, 2012:164] Taking the term literally however, *hanok* can be applied to a wider spectrum of vernacular Korean dwellings, not only the tile-roofed kind.

#### Banga (upper class) residence) and Minga (lower class dwelling)

A clearer distinction of the different typologies representing Korean vernacular dwellings can be made through two terms mentioned by *Sarvimaki*, *Yun* and others. They bring up the term *banga* in connection with the residences of the *Yangban* elite, while ascribing the term *minga* (“folk house”) to the homes of commoners. [Sarvimaki, 2003:82] [Yun, 2011:27] While *banga* thus applies to the aforementioned, more elaborate tile-roofed structures (Fig. 11), *minga* are smaller homes built from less expensive materials and much simpler. (Fig. 12). Although not all too common, I consider these terms helpful for a better understanding of the subject matter, which is why they will serve as a guide throughout the paper.



Fig. 11: upper-class residence (banga)

### Wayo (Japanese style)

*Wayo* or “Japanese style”- buildings were introduced to Korea during the occupation period (1910-1945). The dwellings of Japanese officials in the capital, among other buildings, were constructed based on the four main building types found in Japan. These were Shinto shrines, aristocrats’ mansions, common peoples’ houses, with roots in prehistoric dwellings, and Buddhist temples of Chinese origin. Although a mix of all of these, *Wayo* still retained some basic, indigenous concepts. [Higashino, 2003:141-145]

### Cultural and social environment

The composition of *hanok* is best understood by looking at the cultural environment they emerged from.

### Beliefs and value systems

Traditional Korean dwellings were, besides the natural environment, to a large degree influenced by Confucianism and Buddhism. Introduced to Korea in the Early Kingdoms, Buddhism had contrasting values to those of Confucianism. Rejecting all worldly concerns, one of which was the family, this religion only applied to the individual and the upper classes, as only they had possessions to renounce. This anti-familial stance thereby did not have a great effect on society as a whole. [Park et al, 1995:119] Confucianism, with its emphasis on collectivism and social bonds, on the other hand, had a great impact on the peninsula. Adopted as state philosophy when *Joseon* succeeded *Goryeo* in 1392 and consequently suppressing Buddhism, it was fully integrated into Korean life by the late stages of that era. Remaining highly influential for almost two millennia, Confucian values intercepted on all aspects of life. [Park et al, 1995:119]

### Status and hierarchy

*Joseon* Korean society was built upon hierarchical relationships, not only governing the relationship between ruler and subject, but also between family members. [Park et al, 1995:124]



Fig. 12: lower-class house (minga)

### *Gender and regard*

Where women were concerned, the hierarchy system brought severe discrimination. Females, especially members of the *Yangban* class, were confined to their homes and prohibited from talking to men, except their close relatives. To leave the premises, a married woman was required to receive permission from her husband. For a wife, this meant sacrificing herself for the wellbeing of her husband and the family. [Park et al, 1995:124-125] Since sons were seen as essential in securing the status of a family, they were regarded much higher than daughters. This ideal of male superiority became even more prominent in the late *Joseon* era. [Park et al, 1995:129]

### *Succession and inheritance*

Although established in the "Great Code of *Joseon*", equality in inheritance regardless of gender, was not strictly observed. Generally by-passed regarding inheritance of property, women consequently lost their right to being head of the household. [Park et al, 1995:129] With the eldest son made to take over from his deceased father, he also inherited the family property and most of the money. Although he was expected to either divide it, or share it equally with the other family members, this was almost never the case. [Savage-Landor, 1895:78-79] Instead, he was obliged to pay for his sisters' weddings, whose share of the inheritance also went to him. [Park et al, 1995:129] If a husband died without male heirs, all money and property was left to his widow, a consequence of a bride becoming the co-proprietress of her groom's possessions upon marriage. However, a large part of the inheritance was given to astrologers and priests, who were to ensure the welfare of the deceased. [Savage-Landor, 1895:160] In *Mongolia*, succession solely falls in the male realm and the *ger* households are headed by the eldest male occupant. A *ger* is always gifted by the man's family and can only be owned by a man. [Lehner (2), forthcoming:18; 20] The culture of the Plains Indians of North America required the *tipi* to be provided by a bride's parents. Consequently owned by the woman and considered her home, men were viewed as guests. [Lehner (2), forthcoming:18]

### *Patriarchy*

With Confucianism being the state ideology of *Joseon* Korea (1392-1910) and family believed to be at its core, cohesion was considered essential for sustaining the community and consequently, the state. To ensure this, the entity was placed before individuals and directly was connected to the clan. In order not to harm the society as a whole, it was thereby essential to preserve the household. This was believed to be achieved by following three forms of obedience, that of daughters to their fathers, of wives to their husbands and mothers to their sons. [Park et al, 1995:119] It thus becomes clear, that the *Joseon* family was rooted in patriarchy. Patrilineality on the peninsula

however goes back to the social circumstances predating the introduction of Confucianism by about two millennia.

### *Filial piety and ancestral worship*

The relationship between parent and child, considered to be the most important within the family, was not horizontal but vertical. Thereby, instead of mutual love and equality, filial piety took precedence. This translated into the male head of the household having authority, receiving care and being obeyed to. [Park et al, 1995:124] Filial piety did not end with death, which can be seen in the importance that was laid upon ancestral worship.

### *Kinship*

Park explains that the kin played an important role in the clan-organized *Joseon* society. This was due to mutual assistance and cooperation being essential for the daily life, especially in farm villages. [Park et al, 1995:130] Regarding this, the paternal line was seen as more important than the maternal one, which is why the upkeep of social ties, e.g. contact with relatives, communal labour and property management, was primarily the task of the male household head. This view, setting in only during the middle period of *Joseon*, resulted in better organization and the expansion of patrilineal ties. Prior to this, until the early 17th century, Korean families did not distinguish between paternal and maternal decedents. [Park et al, 1995:131] With relatives expected to help each other, poorer clan members would stay those with those better off, often for years. At times, even strangers would settle in rich people's homes. [Savage-Landor, 1895:79-81]

### *Living arrangements*

In Korea, as in Japan and other Asian societies, showing off one's possessions was and is frowned upon. In line with this, living a simple life was believed to prevent oneself from attracting the envy of others. In line with this, *Joseon* noblemen were only appreciated if they practiced self-denial and endured discomfort, especially in regards to their living arrangements. [Savage-Landor, 1895:141-142]

### *Patrilocal residence*

In *Joseon* Korea marriage had a great influence on someone's living situation. Yet to be married sons and daughters would co-reside with their parents, in *banga* often occupying their own quarters. Upon marriage however, living arrangements changed. Since in *Joseon* succession fell in the male line, live after marriage was organized according to patrilocality. Newlyweds moved in with the husband's parents or resided in close proximity to them, with whom they also shared domestic sources. These types of households are generally headed by a male senior member, who assigns tasks to the individuals. A woman moving out of her home was a deviation to prior

times, as was the structure and rigour of marriage rituals. [Han, 2004:113] During the *Goryeo* era, the predecessor to *Joseon*, matrilocal residence was the standard. This practice expected from husbands to move in with their wife's family. Both patrilocal and matrilocal residence lead to the formation of large families reminiscent of clans, with up to four generations sharing one dwelling. This system is mostly found among labour intensive horticultural societies, where every helping hand is welcome. A third kind of post-marital residence, neolocality, has spouses reside away from either one's parents. Newlyweds are expected to establish an individual home, which then accommodates their nuclear family. This arrangement is primarily found among societies who depend on moving places based on subsistence considerations. Due to this, neolocal residence is found in developed nations, where monetary aspects are important, as well as among nomadic societies, who move to gather food.

*Although in Japan*, other than in the past, newlyweds tend to live on their own, a lot of them do eventually co-reside with their parents. [Raymo et al: 2015:484]

*In China*, like in Korea, traditional intergenerational co-residence meant that the eldest son was responsible for taking care of his aging parents. The numbers of these kinds of households are however declining, which has lead to a lot of problems. [Raymo et al: 2015:484]

### *Gender and hierarchy*

One of the most significant influences spatial organization in *Joseon* Korea was the Confucian social order. Its views on gender and hierarchy resulted in very distinct structures and formations. [Lee, 1991:69]

In *Joseon* Korean society, men and women were strictly separated. A reflection of this circumstance can be witnessed in the living arrangements within traditional houses, especially those of the higher classes.

As in Korea, a Northern American Plains Indians family had its status determined by the highly regarded male head of a household. [Savage-Landor, 1895:78-79] [Lehner (2), forthcoming:18]





## TYPLOGIES

In order to understand why different regions develop certain building traditions and house features, it is important to understand the influences the respective areas are exposed to. Regarding Korea, *Shin* emphasizes its varied topographies and regional characteristics in producing different housing configurations throughout history. [Shin, 2012:160-161; 164] *Iwatsuki* and *Park* too point out the regional differences in climate and topography as producers of wide varieties of vernacular houses. [Jung, 2014:167-168] Likewise, *Kon* states that house types differ in accordance to the characteristics of their location, such as mountainous terrains or wide plains. Additionally, availability and transport of materials, as well as local customs play a role in the appearance of a vernacular residence. [Jung, 2014:171] *Gauvain* recognizes that dwellings are subjected to cultural as well as environmental influences and that their shapes evolve by responding to "[...] individual motives [...] [and] requirements of society at large." [Gauvain, 1982:28]

### *Classification based on social environment* Determinants and approach *Social class*

Since the centralized and imperially ruled *Joseon* period (15th to 19th century) was the most crucial time for *hanok* development, it is essential to explore the social hierarchy of that time, in order to understand their division into different types. [Sarvimaki, 2003:82] As explained in the beginning, Korean society of that time was roughly organized into upper and a lower classes, which was also reflected in differing *hanok* styles. [Jung, 2014:69] [Savage-Landor, 1895:141] Homes of the upper classes, or *banga*, are what is today widely considered the epitome of the traditional Korean house. On the other end of the spectrum are *minga*, the dwellings of the lower classes. *Savage-Landor*, while exploring Korea, seems to not have noticed too many differences between the two typologies. In 1895 he noted, possibly exaggerating, that besides looking cleaner, traditional noblemen's



Fig. 13: parts of a typical tile-roofed upper-class residence (banga)

houses differed little from those of peasants. It surprised him that even royal homes had only a single story and were seemingly hardly better than upper-class houses. [Savage-Landor, 1895:136-137; 99] In a similar tone *Kim* states that, notwithstanding their importance, the basic elements of pre-modern Korean buildings, be it palaces, temples, schools or private homes, show remarkable similarities. [Kim, 1998:24] The main difference seems to lie in the fact that, while the homes of the poorer folk were strictly oriented towards functionalism, those of the wealthy additionally laid great importance on aesthetics.

### *Setting*

Related to the social standing, and also factoring into a home's appearance, was its owners occupation. Whereas the majority of rural *hanok* occupants, especially the lower classes, relied on agriculture and fishing for survival, urbanites worked in other sectors. This naturally resulted in different requirements posed to the dwellings.

### *Banga: Upper class residences of the Yangban* *Etymology*

*Sarvimaki's* description of a *banga*, is what most Koreans today refer to as the typical traditional Korean house. (Fig. 13) She explains that the term has roots in Chinese, with *ban*, the ideogram for "nobleman" found in both *banga* and *Yangban*. *Jia*, expressed as *ga*, stands for "home" [Sarvimaki, 2003:82]

### *Origins and setting*

Most built between the early 1600s and mid-1800s, the *banga* complexes incorporate the sociological, aesthetic and cosmological ideologies of their time. The majority of the *Yangban* family heads either served the administration in *Seoul* or were local officials and had their families take care of the households. Organized into clans, with their own villages, the *Yangban* dwelled in estates made up by a conglomeration of buildings (e.g. living quarters and stables) and courtyards, all of which were enclosed by outer walls. [Savage-Landor, 1895:136-137] The composition was built so that, despite fixed borders, a lateral extension of the buildings was possible. [Yoon, 2001:3] Although generally sprawling in extent, none of the buildings were more than one storey high, regardless of the owner's wealth. [Lee, 1991:66-67] *Banga* were placed according to the status of their owner, with the most important one taking up the highest place in the village. [Kim et al, 2018:1] Similar houses were also used as hermitages for scholars, where they could retire or cultivate their minds by practicing arts. [Sarvimaki, 2003:87]

### *Structure and materials*

Generally, tiled roofs were reserved for upper classes, because only the rich were able to afford their time- and cost-intensive production. These homes are classified as

*Giwa-jib*, which translates to “tile-roofed house”. For their construction, timber, stone and plaster were utilized. Jeon explains that, although similar in set-up, none of the larger *banga* were the same, a circumstance which can be attributed to the occupants’ preferences as well as topographical influences. [Jeon, 2016:42] [Savage-Landor, 1895:136-137] [Kim et al, 2018:1]

### Equivalents abroad

For a better understanding, *banga* can be compared to Chinese courtyard houses, which go back to the *Ming* (1368~1644) and *Qing* (1616~1912) dynasties. (Fig. 14) Since these coincide with Korea’s *Joseon* era (1392~1910), when the main development of *banga* occurred, similarities are not surprising. [Yoon, 2001:2]

*Yangban compounds* further show similarities to the *Shinden-zukuri* (*Shinden*-style) residences of Japan, developed during the *Heian* Period (9th to 12th century), and their successors. (Fig. 15) This is due to upper class Koreans of dynastic times leading lifestyles comparable to those of their counterparts in Japan. [Jung, 2014:126-127] *Russian khoromy* (“chambers”), mansion-sized wooden residences, can also be taken into account.



Fig. 14: traditional courtyard houses in rural China



Fig. 15: model of a Japanese Shinden-zukuri mansion

### Minga: Middle and lower class commoners’ houses Etymology

The term *minga* most likely derives from the Chinese *minjia* (“people’s home”), with *min* meaning “people” and *jia* translating to “home”. Regarding this, Yoon noted that, although lacking an universally accepted definition, the majority of Korean scholars acknowledge *minga* to be commoners’ houses, which retain traditional qualities. “Folk houses” can thereby be regarded as the English definition of these dwellings. Considering them to be the homes of the subjugated class (*minjung*), Kang made an association with the *Minjung*-movement. Furthermore, he believed there to be no noticeable differences to vernacular homes. Cho added, that while the characteristics of *banga* are based on social norms, the features of *minga* are rather ones influenced by region. [Yun, 2011:27] [Sarvimaki, 2003:82]

### Origins and setting

Since the majority of their lower class inhabitants were engaged in agriculture and the like, most *minga* could be found in rural areas. Built in various terrains, they were well adapted to topography and climate, while also making best use of locally available materials, which lead to the development of several different styles. When located within a village these homes were, unlike their upper-class counterparts, placed on the lowest grounds. [Kim et al, 2018:1] Unlike the wealthy, Korean lower classes were strongly dependent on locally available building materials for their dwellings. Their lesser means meant that they were not in the position to bring in certain materials from afar, but had to manage with what was at their disposal. *Minga* came in various types, some being wooden structures, while others were built from earthen materials. The latter ones came with very different spatial arrangements than their wooden counterparts. [Shin, 2012:160-161; 164]

*Japanese dwellings (minka)* too can be classified by setting, resulting in four types. These are *noka* (farmhouses), *gyoka* (fishermen’s huts), *sanka* (mountain dwellings) and *machiya* (townhouses). [Kawashima, 1986:66-67]

### Structure and materials

As mentioned before, a main difference in comparing *minga* and *banga* are the roofing materials. *Minga*, the homes of the lower classes, were most often equipped with thatched roofs, but could also be covered by wood singles or stone. (Fig. 16) Regarding house structure, commoners resorted to techniques involving wood, stones and clay. All of these materials were used untreated in their natural state and only if required, given a certain shape. A closer examination of the various *minga* types, which are differentiated by roofing and structure, will be made later on. [Kim et al, 2018:1] [Savage-Landor, 1895:136-137]





Fig. 16: typical thatched lower-class house (minga)

### Equivalents abroad

*China*, with its vast regional differences, has brought forth some vernacular styles similar to *minga*. One example are the thatched, adobe “boathouses” of the *Li* minority on *Hainan* island off the southern coast. (Fig. 17)

*In Japan*, the house type that comes closest to Korean *minga* is the *minka*. Although termed similarly, for *Sarvimaki* only farmhouses classify as *minka*. [Sarvimaki, 2003:82] *Higashino*, on the other hand, refers to all homes of all commoners as *minka*, including those of farmers, fishermen, merchants, tradesmen, craftsmen and master-less *Samurai*. *Kon* and *Sekino* used the word to describe human dwellings in general. [Jung, 2014:58] *Minka*, believed to have developed from the *tateana jukyo* (pre-historic pit dwellings), are rather closed off, which sets them apart from upper-class homes. [Higashino, 2003:29] The traditional Russian equivalent to Korean *minga* are *klet*, very basic quadrangular cabins made of wood or stone. Due to being unheated, they are only used during summer. *Izba* on the other hand, which are *klet* equipped with a heating source, can also be used during colder months. [Ivanova, 2011:1] (Fig. 18) Representing the national Russian dwelling, these crib or frame-constructed huts of peasants were ubiquitous until the early 20th



Fig. 18: Illustration of a Russian izba



Fig. 17: thatched house of the Li ethnic group on Hainan

century. [Ivanova, 2011:1] As these homes usually did not have a chimney [Pipes, 1995:143-144], therefore leaving the smoke unable to escape, these were referred to as black huts. Those that did come with a chimney, which were few, were called white huts. [Bivens, 2017:1]

*In Vietnam*, building materials likewise imply the wealth of their owner. Among the poorer folk, low-cost materials such as bamboo and rattan were common. In most cases, a bamboo frame served as main structure, with walls made of mud and roofs covered by thatch for better insulation. [Nguyen, 2014:44]

### Urban hanok

#### Origins and setting

The Korean provincial centres, especially the capital *Seoul*, were the breeding grounds of the city *hanok*. This type is a result from the economical changes occurring in the late 1920s and 1930s, which were triggered by the Japanese colonization (1910 to 1945). With people flocking to the urban areas, especially the capital, space became limited, which necessitated larger plots to be divided into several smaller ones. [Park et al, 2015:10; 12] Urban *bangga*, the homes of lower ranking government officials and merchants during the *Joseon* dynasty, thus started to be replaced by smaller houses of the middle classes. [Shin, 2012:157] Another consequence of space limitations was that these urban dwellings were not bound by city limits, but spread to the periphery. Today, the majority of urban *hanok* (or better *bangga*) in *Seoul* can be found in the *Bukchon* neighbourhood and come in configurations dating back to the 1930s. [Park et al, 2015:10; 12] In the 14th century, when the master plan of *Seoul* was created, the poorer folk were made to reside in the surrounding mountainside, a circumstance that had a rather strange consequence. [Shin, 2012:161] As these “slums” were situated higher up, their sewage was led into the central (and lower) districts, home to the middle and upper classes. Another nice side effect, although probably of little importance to these struggling people, were the nicer views from up top. [Jung, 2014:115-116]





Fig. 19: urban hanoks in Bukchon, Seoul

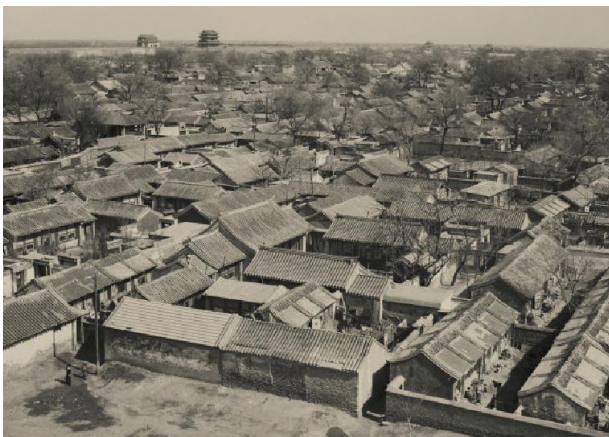


Fig. 20: conglomeration of Siheyuan in Beijing



Fig. 21: Japanese merchants' townhouse (machiya)

### Structure and materials

Building structure and materials were pretty much the same as to those of rural *banga*. A main change was that quarters were no longer physically separated, but attached to each other or combined into a common family space. [Park et al, 2015:10; 12] (Fig. 19) As men spent most of their time away home, this space mainly served female activities. [Jun, 2013: 165] Mitigating the effects of this size reduction was the fact that urban *hanoks* could do without stables, sheds and the like, which were essential to their rural counterparts. [Park et al, 2015:10; 12]

### Equivalents abroad

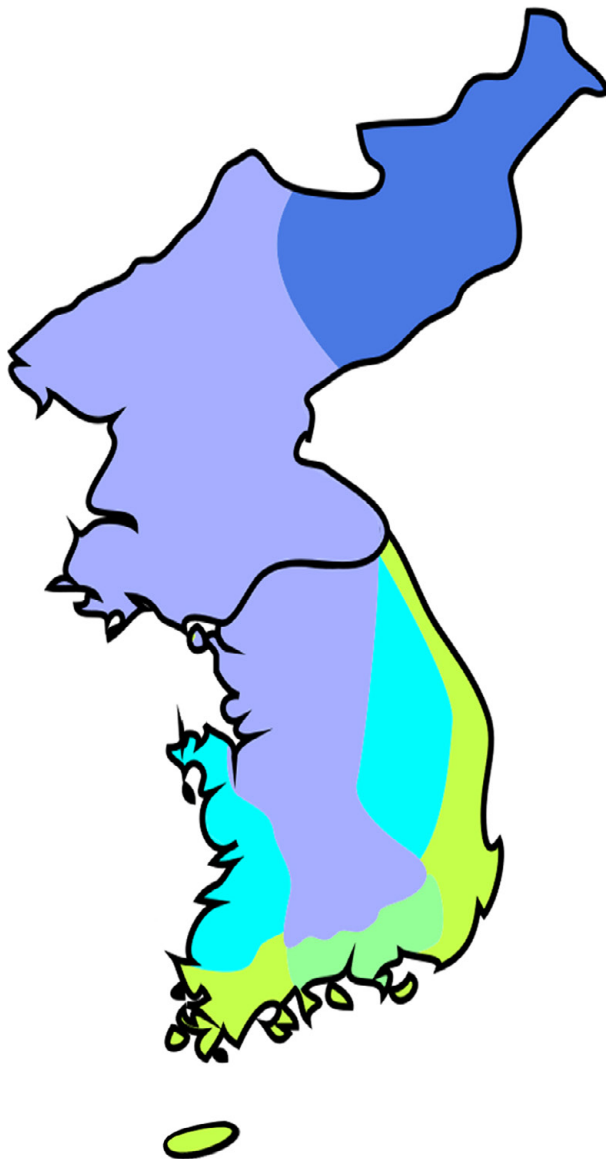
The best known Chinese example for urban dwellings are the courtyard houses of *Beijing* called *Siheyuan*. (Fig. 21) Dating back to the *Ming* (1368~1644) and *Qing* (1616~1912) dynasties, these compounds were, like city *hanoks*, closed to the outside. [Yoon et al, 2001:2] *Japanese cities of the Edo period* (1603 to 1867), which coincided with the Korean *Joseon*, were laid out as grid and consisted of blocks with a communal centre-space. These plots contained rows of townhouses called *machiya* ("city dwellings"), the only of the four *minka* types found in such an urban setting. [Itoh, 2004:4] [Kawashima, 1986:66-67] (Fig. 20) Being the dwellings of craftsmen and merchants, there was no need for an indoor space to perform farm tasks, a common feature of the rural *minka*. Here, this *doma* or "main space" rather functioned as an entrance area and corridor connecting the front and back parts of the house. While the front part served as workshop or retail space, the back was used for living. Like their Korean counterparts, these dwellings usually came with gabled and tiled roofs. [Higashino, 2003:29-47]

### Classification based on natural environment

#### Determinants and approach

#### Climate and topography

In order to understand why certain areas of Korea have developed different housing styles, it is essential to look at their topography and the climate they are subjected to. [Magnant, 2015:1] Quite varied throughout the peninsula, the differences in climate can be explained by its elongated shape. As a result, summers are generally very hot, while winters can get extremely cold, especially in the North. [Jung, 2014:77] A common feature of most areas is the limited rainfall, which leaves them with rather dry air. The occurring differences are well documented by the *Koepfen-Geiger* climate classification, which maps Korea as being predominantly influenced by a continental climate. (Fig. 22) While the centre, the East and the southern interior regions are warm, the North-East is temperate. Areas in the South and South-East, on the other hand, are subjected to a warm oceanic and humid subtropical climate. The respective building traditions, which have developed in certain areas, are reactions to these differenc-



- |                                                |                                                        |
|------------------------------------------------|--------------------------------------------------------|
| ● (Cfa) warm oceanic/<br>humid subtropical     | ● (Dwa) warm continental/<br>humid continental         |
| ● (Cwa) humid subtropical                      | ● (Dwb) temperate<br>continental/<br>humid continental |
| ● (Dfa) warm continental/<br>humid continental |                                                        |

Fig. 22: Koeppen-Geiger climate classification of Korea

es. Various researchers have attempted to locate these typologies, mainly differentiated by their room configuration, by region. (Fig. 23) *Iwatsuki and Park* proposed a northern, a central, the *Gyeongseong* (now *Seoul*), a western and a southern region. [Jung, 2014:167-168; 171] Another suggestion dissects the peninsula into the areas of *Gwangbuk* (North-East), *Gwanseo* (North-West), the centre and the South. [Kim (3), 2016:1] Other attempts included, dwelling types can be summarized into twelve areas. While *Hamgyeong*, *Gwanseo* and *Hwanghae* make up the upper part of the peninsula, the centre is comprised of the Central region, *Hoseo*, *Yeongdong* and *Andong*.



Fig. 23: regional classification based on building typologies

The lowermost part includes *Honam*, *Yeongnam* and the south-eastern coast. Since *Jeju-do* and *Ulleung-do* have developed very distinct building traditions, they can be considered as category of their own.

Comparable to Korea, the enormous size of China brings greatly differing topographies and subsequently, climatic influences. (Fig. 24) Simply put, the West is predominantly clad in mountains, high plateaus and deserts, while the East is comprised of deltas, hills, plains and coastlines. Due to this, and its long history, China has produced a variety of settlements and vernacular dwellings, even greater than in Korea. [Sun, 2013:144-145] [Knapp, 2004:13] *House types* in neighbouring Japan can likewise be categorized by their location. (Fig. 25) According to *Koeppen-Geiger*, the island nation is equally subjected to a continental climate, like the majority of Korea, and an oceanic one. Oceanic influences not only bring a large amount of rainfall and great humidity, but also cause lower summer temperatures compared to those on the Korean peninsula. [Itoh, 2004:4] [Jung, 2014:77]

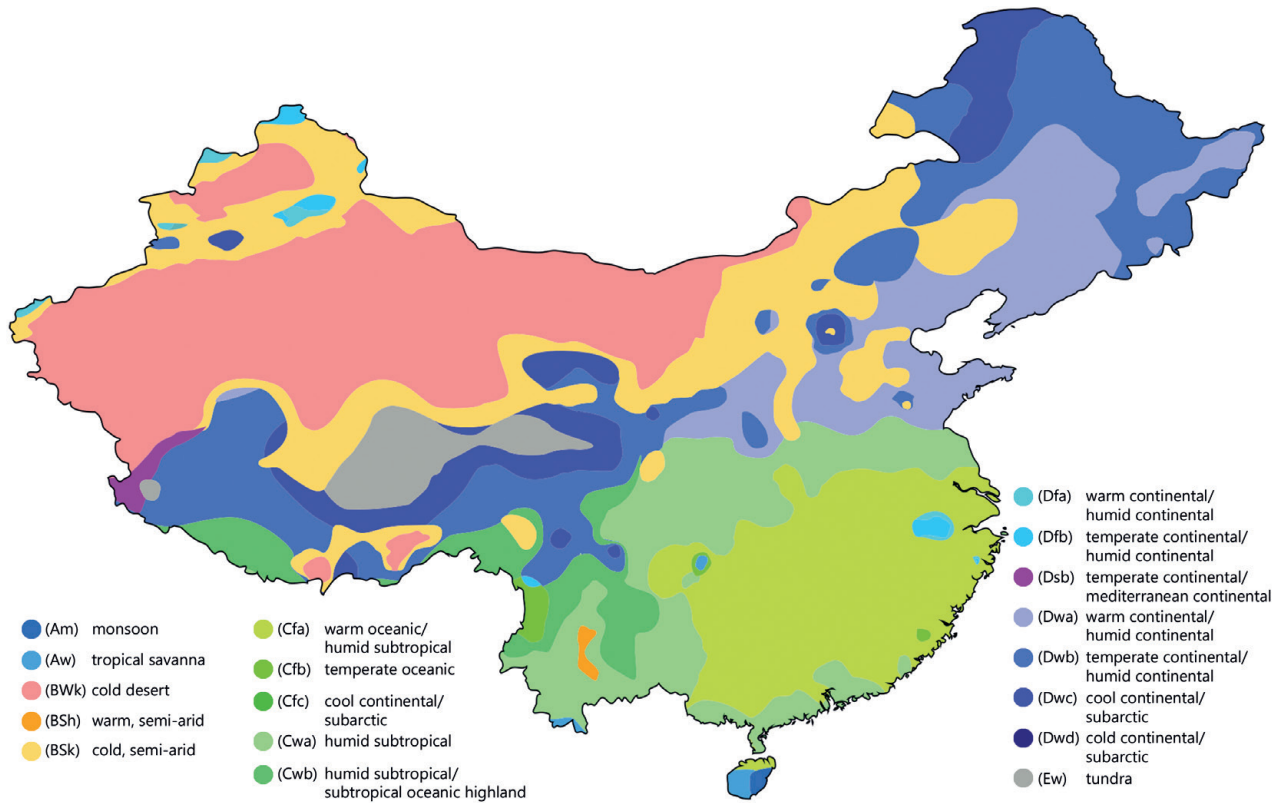


Fig. 24: Koeppen-Geiger climate classification of China

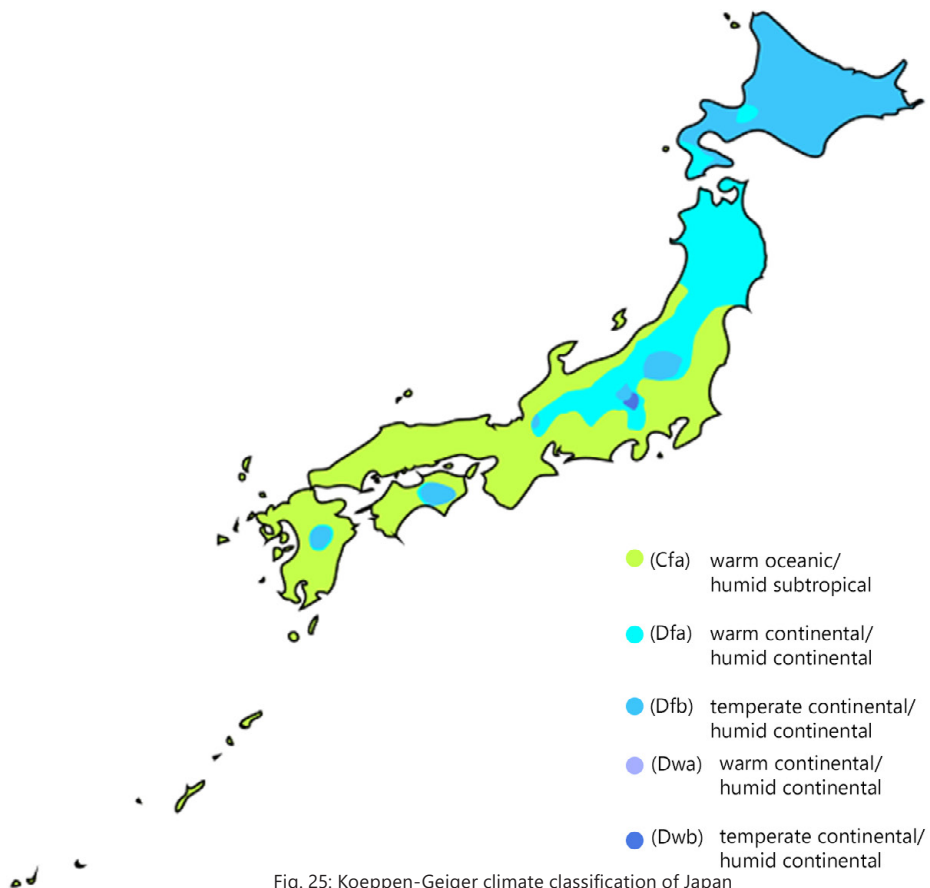


Fig. 25: Koeppen-Geiger climate classification of Japan



### North: square and rectangle-shaped

#### *Climate and topography: dwb, dwa*

The northern to north-eastern part of the Korean peninsula, today's North Korea, mostly falls under the *Koepen-Geiger* classification of *dwb*, describing a temperate and humid continental climate. These plain-clad regions, bordering China, are subjected to rather long and frigid winters, which has led to significant implications on building traditions. [Jeon, 2016:44] Areas further west are classified as *dwa*, which indicates warm and humid continental weather. [Kottek et al, 2006:259-263] [Peel et al, 2007:1]

#### *Layouts and structure*

The northern region type, square or rectangle-shaped, is bigger and incorporates more rooms than the houses found in other areas. This leads to a wider inner space compared to same-sized U- or L-shaped dwellings of those other regions. [Yoon, 1975:51-55] [Shon, 2014:21-32] (Fig. 26) *Hamgyeong* and *Hwanghae* structures had an intermediary space separating the service spaces, such as the kitchen and storage areas, from the rest of the rooms. This was especially necessary when stables were located within the dwelling.

#### Square-shaped (double-row)

The square shape, created by two rows of rooms and ubiquitous in the North-East, stands in connection with the settlers' self-sufficient lifestyle of farming, hunting and gathering. Due to the solitary placement of these dwellings, a consequence of the mountainous terrain, defence was a great concern. This resulted in a more inclusive structure, where even the stables were found inside the house and not detached, like in the South. Not only did this ensure protection, the shape also helped keeping heat inside longer. Furthermore, everyday-life was easier, since occupants did not have to expose themselves to the cold weather in order to tend to their livestock. Set up in several rows, the layout of these homes resembled Japanese homes more than other native types. Despite the wider and heavier roof requiring a more complex construction, the aforementioned advantages made this the preferred type in the northern regions. In order to counteract the additional weight, lighter roofing materials such as barks and wooden planks were favoured, which could be obtained from the surrounding tree-clad mountains. [Jeon, 2016:42-43]

*This composition is similar to the arrangement of a traditional Chinese house.*



Fig. 26: layouts in the upper part of the Korean peninsula

### Linear (single-row)

In the milder West, layouts take on a more linear shape with spaces arranged next to each other in a single row. Due to climate reasons and unlike other types, these homes come without a semi-open, wood-floored hall. Its tasks are taken over by the main inner room, whose arrangement within the house makes it usable year-round. [Jeon, 2016:44] [Jung, 2014:179]

### Types and characteristics

#### North-West: Gwanseo type

The most simple examples of the linear structure can be observed in the *Gwanseo* type of the North-West. These homes had the kitchen on one end, with two (or three) more rooms added to its side, and narrow wooden veranda to the front. [Jeon, 2016:44] [Magnant, 2015:1] [Yoon, 1975:51-55]

#### North-East: Hamgyeong types

The *Gyeop-jib* or “double house”, primarily found in the north-eastern *Hamgyeong* province, has the bedrooms and kitchen arranged around (and accessed via) a central living space for the family. [Kim, 2017:1] As a reaction to the frigid climate, this wall-free area called *jeonjugan* (transitional room) was equipped with a hearth. It was separated from the storage room and stables, located under the same roof, by a rather large kitchen. [Magnant, 2015:1] [Yoon, 1975:51-55] [Jeon, 2016:43]

The *Yangtong-jib* or “a carpenters house” (also “two-layered house”) has been developed for mountainous regions. Residents of such areas mostly survive on non-rice farming that does not require collective effort, which is why they tend to live independently rather than in villages. As a result, the layouts of their houses are based on defence considerations. Keeping heating in mind, all necessary spaces are arranged within one compact building, making a well considerate use of exterior spaces all the more important. This is in stark contrast to the plain areas, where several buildings form a compound-like house. The most commonly found type of *Yangtong-jib*



Fig. 27: shingled house in the North

is the *Yeokan-jib* or “house with six bays”. Inside, a *bong-dang* (work area with dirt floor) is sandwiched between two rooms, with a *maru* at the centre of the house. [Jeon, 2016:50f-51]

The *Gulpi-jib* (“oak-bark roofed house”) and the *Neowa-jib* or “shingled house” can be found along the north-eastern part of the peninsula. (Fig. 27) Typical for these more mountainous Korean areas, the rooms are set up in double-rows, so that cold winds are blocked out and the interior space remains warm. Consequently greater in width, roofs are larger and heavier. Roofing materials for both types are light (to reduce the additional weight) and can be easily obtained in the area. *Gulpi-jib* are roofed with the relatively thick barks of oak or cedar, while *Neowa-jib* roofs are covered with thin pine-tree shingles, which are split along the grain with a wedge. These latter were often remnants from woods cleared in order to gain farmland. [Kim et al, 2018:1] [Jeon, 2016:42-43] [Yi, 2015:42]

#### North-West: Hwanghae type

Very similar to the *Hamgyeong* floorplan is the *Hwanghae* variety of the central North-West. Unlike the former however, this variation does not include a *jeonjugan*. Rather, one room to the front has been turned into a transitional space between the kitchen and bedrooms. [Jeon, 2016:44] [Magnant, 2015:1] [Yoon, 1975:51-55] These northern homes lend themselves to use the *ondol*, a heating system which commonly provided warmth for up to four rooms, simultaneously. This was made possible by the sufficient amounts of firewood found in the region. [Jung, 2014:171-172; 179]

Representative for *Hwanghae* is the *Kkachigumeong-jib* (“magpie hole house”). (Fig. 28) This type is primarily built in mountainous areas, where the climate often does not allow for leaving the house for an extended period of time. This explains is why, like in the *Yangtong-jib*, all main life activities are accommodated in one building that can be accessed through a thick door. Although convenient, placing living, working and storage spaces under the same roof as the livestock comes with downsides.



Fig. 28: kkachigumeong-jib of the northern regions

Smoke from the open hearth (*kokeul*) and furnace (*hwat*) would quickly fill up the room and cause bad air, made even worse by the animals. To counteract this, a hole (*gumeong*) was left out at both ends of the roof ridge to enable better ventilation. These holes would occasionally be used by magpies (*kkachi*), Korea's national bird, to enter the dwelling, hence the name *Kkachigumeong*. On a positive note, having all spaces in a closed off building made protection from thieves and animals easier. Furthermore, the generated heat was kept inside longer. Regarding layout, the livestock was kept in a booth right off the entrance, with the kitchen attached to it at the back. This set-up proved to be helpful in making domestic work more efficient. Grain was stored in the area left off the entrance, which had its own opening to the outside, another effort-reducing feature. Considered newer in a traditional sense, the *Kkachigumeong-jib* can be compared to modern dwellings. Its dirt floored area right after entering, used for domestic work in winter, is reminiscent of the multipurpose rooms of today. [Nam, 2011:1] [Yi, 2015:148] [Hong, 2012:1] The *Ttwari-jib*, or "ring-shaped" house, is most commonly found in the coastal areas of the *Hwanghae-do* in the central-West and the islands of the West sea. Due to lower land availability, these square-shaped houses are smaller than those found further inland. The name stems from the small opening in the roof above the centre of the house resembling the *ttwari*, a ring-shaped object used for transporting something on one's head. [Jeon, 2016:51]

### Comparisons

#### Dwa: Warm/ humid continental climate

*Central China*, including its capital *Beijing*, with its extended summers and short winters, is influenced by a warm and humid continental climate. Classified as *dwa*, it comes with hot, humid summers and cool, dry winters with lots of wind. The timber and brick-built *Siheyuan*, typical for this region, has been successful in adapting to these conditions, by incorporating e.g. smaller courtyards compared to the north. [Sun, 2013:160-162] They provide their inhabitants with a sufficient thermal performance and comfort all year round. This is made possible by creating a microclimate through the control of solar radiation and natural ventilation, supported by a well adapted building envelope. [Sun, 2013:155] Differing from the North, open spaces in central regions decrease in proportion, while transitional spaces like verandas increase in extent, thereby adjusting to the prevailing conditions. [Knapp, 2004:17]

#### Dwb: Temperate/ humid continental climate

*Open spaces* make up a great part of the courtyard houses found in the northern and north-eastern parts of China, where a temperate and humid continental climate (*dwb*) prevails. In these generally dry and cold regions,

these sizeable outdoor areas provide protection from cold winter winds, while simultaneously enabling sunlight to penetrate the interior. [Knapp, 2004:21] Subterranean cave-like dwellings, known as *Yaodong* are also found in the cold and dry regions of the central North-East, parts of the North-West and in the entire South-West. [Knapp, 2004:274-276] These residences, with their sunken courtyards, were excavated from the firm soil of the hillsides as early as the Neolithic age. Living spaces are dug into the surrounding mass via the courtyard, which provides for great thermal comfort by keeping the dwellings cool during the summer and warm in winter. [Sun, 2013:150-151; 155]

*In Japan*, *Gassho-zukuri*, with their steep and high-gabled roof are well adapted to the south-western areas of the main island (*Honshu*), which receive lots of snow.

### Centre: L-shaped

#### Climate and topography: *dwa*, *cfa*, *dfa*

The central regions of Korea, including the areas around the capital *Seoul*, have been labelled *dwa* by *Koeppen-Geiger*, which stands for a warm and humid continental climate. Differing from this are the landlocked areas further east. While these are subjected to a warm, oceanic and subtropical climate (*cfa*), the coastal regions and islands are exposed to a warm and humid continental climate, known as *dfa*. [Kottek et al, 2006:259-263] These differences can be attributed to the mountain chains running parallel from North to South and close to the eastern coast. [Nemeth, 2003:3]

### Layouts and structure

#### L-, U-, and square shaped

Characterized by their simple appearance, houses in the central part of the peninsular generally come with L-, U- or square shaped layouts. [Shon, 2014:21-32] (Fig. 29) This set-up is the result of land shortage caused by the increase in people living in the central areas, especially around the capital *Seoul*. The formerly rather linear *hanok* thus developed into L-, U- and square shapes. These angular buildings with courtyards could be placed side by side or right next to the streets, leading to a better utilization of space and greater density in residential areas. [Jeon, 2016:44-45] The most common type was the L-shape, which combined the northern and southern styles. [Jung, 2014:180]

### Types and characteristics

#### Centre and Central-East: Central region type

As mentioned before, layouts in the central region show a L- or U shape. (Fig. 30) With two linear buildings connected at a right angle, the dwelling was provided with a bigger yard, but came with a decreased interior space compared to square or linear layouts built on similar-sized plots. The fact that the kitchen, located in one



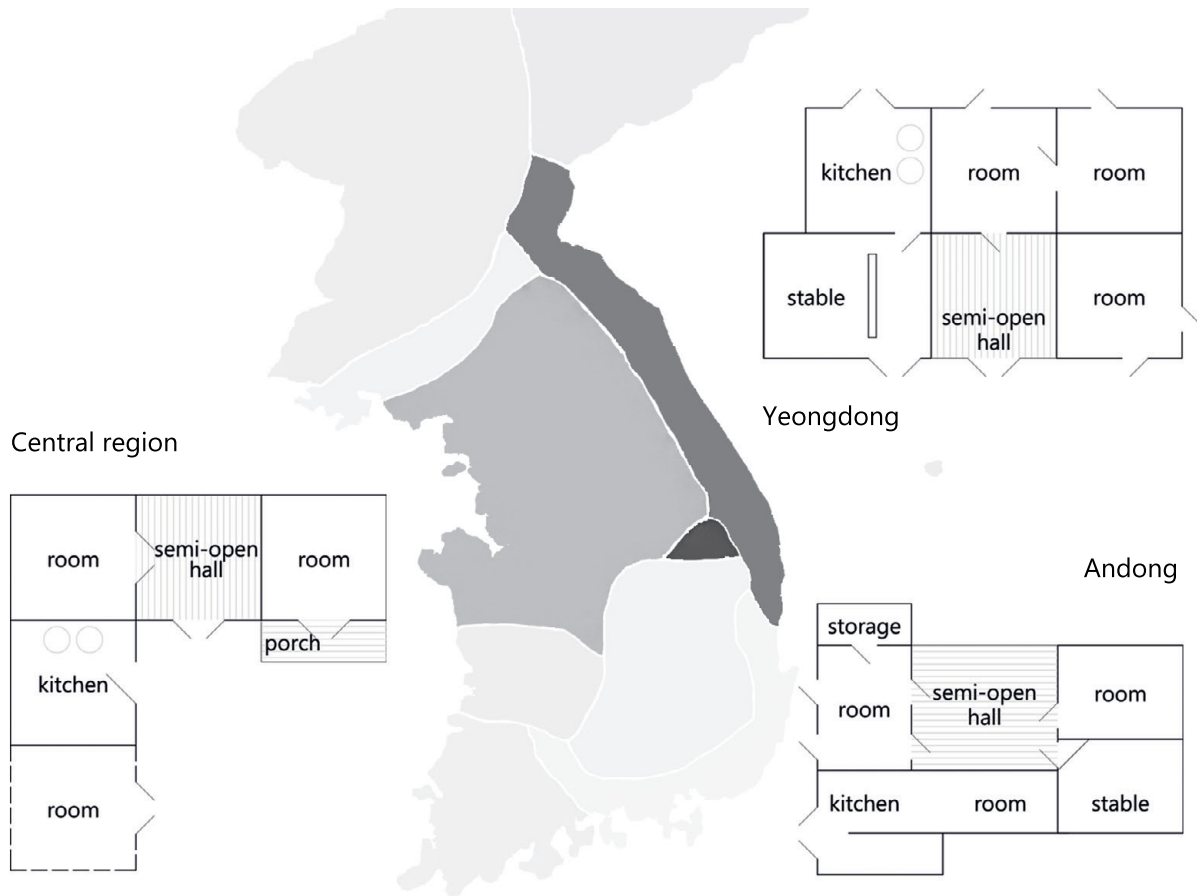


Fig. 29: layouts in central Korea

wing, lay in close proximity to the central space increased efficiency. While people refrained from putting windows in the northern walls of their homes, in order to protect themselves from too much sunlight and wind, they incorporated a *daecheong* into the house. This wooden-floor area, set in-between the bedrooms, was semi-open thus making use of sunlight and ventilation. [Yoon, 1975:64-68] [Jeon, 2016:44] [Magnant, 2015:1]



Fig. 30: central region type

#### Central-West: Yeongdong type and Andong type

Both, the *Yeongdong* and the *Andong* type, call the eastern central part of the peninsula home. While the former is found on the coast, the latter is built in more interior regions. Very similar in their layouts, both have a semi-open wooden-floor hall in the centre, surrounded by rooms on three sides, one of which is a stable. [Jeon, 2016:43] (Fig. 31)



Fig. 31: Andong-type of the central East

### Comparisons

Dwa, dwb: Warm/ humid and temperate/ humid continental climate

The moderate regions of north-eastern (dwa, dwb) and south-western China, with their warm temperate zones have, since ancient times, been inhabited mostly by minorities, dwelling in stilt houses. Timber-based constructions, these buildings mostly incorporate locally sourced materials such as bamboo and other woods. The roofs of these stilt-structures come with sloping eaves and are covered with thatch. Inside, bamboo mats are laid out on the floors to offer comfortable sitting. Generally incorporating three to five rooms, most activities occur on the damp-free first level. Furthermore, the elevation provides protection from robbers and roaming animals. Wide and open corridors are used to dry clothes, as they keep away harsh solar radiation and rain, while allowing breezes to cool the home. [Sun, 2013:156-157]

Cfa, cfb: Warm/humid subtropical and temperate/oceanic climate

In the hilly south, massive and multi-storied fortresses called *tulou* (clay building) have left their mark. Found in Fujian province, these homes of the *Hakka* tribe are round or square in their layout, with several storeys offering space for up to 800 people. [Knapp, 2004:184] As every *tulou* belonged to one clan and rivalries were common, these dwellings needed to be built in a way to offer protection. This was achieved by orienting all spaces toward a big, open courtyard space, with a single entry point and windows only from the first floor upwards. The high, fortified walls made of mud (or clay), were covered by tiled roofs and protected by broad eaves. Three meters wide at the base, the thickness of the walls decreased with height, being 1.5 meters on the first floor. While the exterior appeared rather plain, the interior was decorated and provided comfort. Spaces were divided vertically, with each family allotted two to three rooms on each floor. Cooking and dining were done on the first floor, while the second floor contained storage spaces, leaving the third floor and those above it for bedrooms. The centre of the *tulou* held an ancestry hall, a stage and a school. Although the shape of the *tulou* does not allow for cross ventilation and solar control, its thick clay walls are very efficient in controlling temperatures. Their thermal mass stores the heat of the day and releases it at night, which provides a balanced room ambience. [Sun, 2013:167]

Dfa: Warm/ humid continental climate

Central Japan is home to the *Kabuto-zukuri* houses, a name taken from their single ridge roof, which resembles a *Samurai* helmet (*kabuto*). [Higashino, 2003:29-47] (Fig. 32) The design of these thatched dwellings allows for more light and air to enter. Specific to northern Honshu, the main island, are the L-shaped *Magariya*. [Ittoh, 2004:4]



Fig. 32: kabuto-style, thatched house in Japan

### South: linear and rectangle-shaped Climate and topography: cfa, cwa and dfa

As the lowlands and river valleys of the South lend themselves for agriculture, the population is more concentrated in these areas. [Nemeth, 2003:3] The coastal areas of the South-East and South are subjected to a warm oceanic and humid subtropical climate, labelled as cfa and cwa by *Koeppen-Geiger*. South-eastern areas further inland and the South-West on the characteristics of dfa and dwa, which suggest a warm and humid continental climate. [Kottek et al, 2006:259-263] (Peel et al, 2007:1)

### Layouts and structure

#### Straight-lined/ linear

The humid and warm climate of the peninsula's South, specifically its mild and long summers, required a set-up that would allow for good ventilation. A great way to achieve this was by arranging rooms in a linear way. (Fig. 33) *Ondol* rooms, a *maru*, and the kitchen, connected side by side, formed a single row. The *daecheong-maru* (wooden-floored space), positioned in the centre and open on one or both sides, served as the main living space. This alignment allowed the front and rear walls to remain free, with ventilation and lightning insured by placing the entrance at the front side and windows on the back side of the room. The fenced compound consisted of several straight-lined buildings, each with a certain function and its own courtyard. Although houses in the region were generally set up in the same manner, there were variations based on topography. Compared to other layouts, these buildings were more compact and came with more openings, which proved beneficial for better ventilation and natural lighting. Also beneficial to this was the openness to all four sides, a feature unique to the South, which furthermore provided more options for expansion. As the areas of the south lacked firewood, only the rooms in use were heated and just temporarily. [Jeon, 2016:45-46] (Yoon, 1975:69-73) [Magnant, 2015:1] [Jung, 2014:171-172]

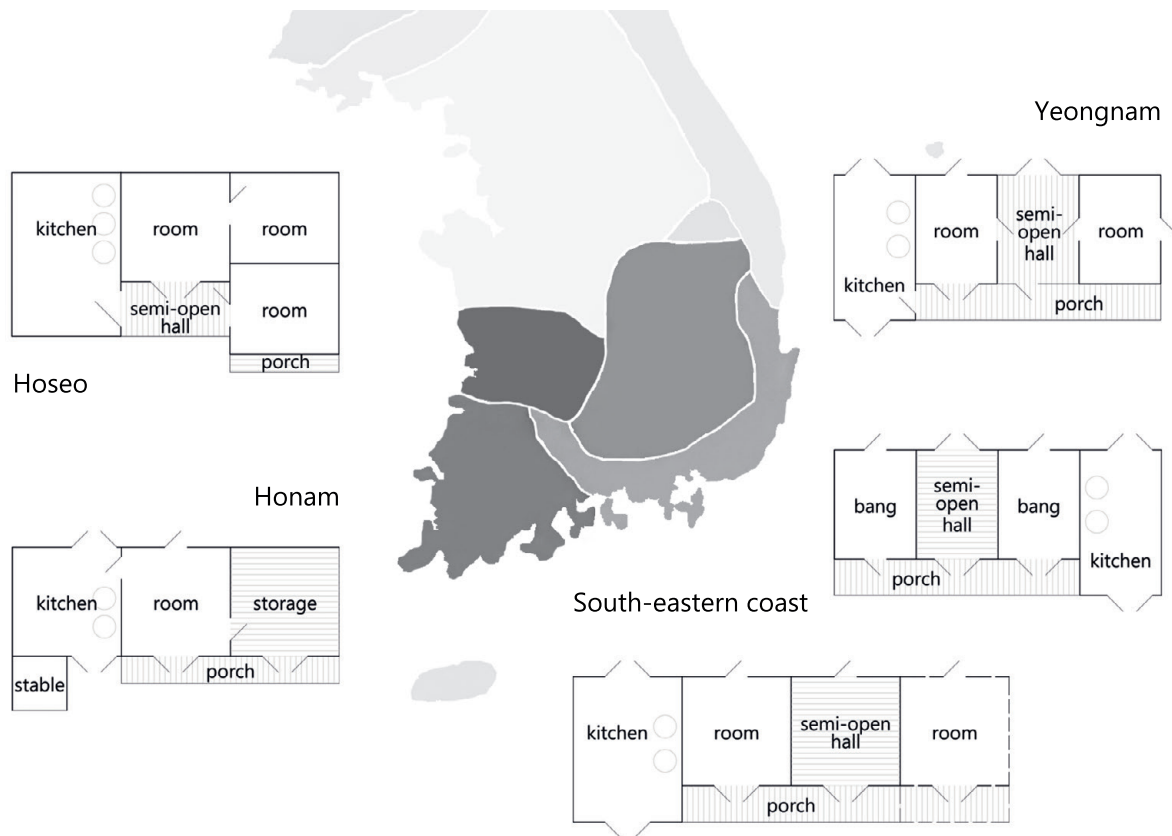


Fig. 33: layouts in the lower-most part of the Korean peninsula

### Rectangle-shaped

Although less common, smaller rectangle layouts are also found in these areas. They are open in all four directions and are not only airy, but they also provide a wider range of options for addition. [Shon, 2014:21-32]

### Types and characteristics

#### South-East: Yeongnam type, South-East-coastal type

The *Yeongnam* type, common in the interior regions of the South-East, has its kitchen on its western end, with two rooms attached to it, which sandwich the *maru* space. The South-East-coastal type, which can be found in the coastal regions as the name suggests, is more or less a mirrored *Yeongnam* type. [Jeon, 2016:43]

#### South-West: Hoseo type and Honam type

The most common type in the South-West is the *Hoseo* one, its layout being the result of a population increase in the late 19th century. During this time, dwellings had spaces added to one end in a way that extended their width. These spaces could be part of the interior or a veranda-like, wooden platform. Unlike length extensions, which do not require structural changes, these width expansions demanded different building techniques. The roof structure had to be adapted to its increased width, which was achieved by using bigger members and materials. [Jeon, 2016:47-48]

### Comparisons

#### Cfa: Warm oceanic/ humid subtropical climate

*In China*, the cfa climate (moist from monsoons), which suggests four distinct seasons and a better balance between these, is characteristic for the southern and south-eastern coasts, as well as the *Hainan* and *Taiwan* islands. Winters here are rather mild, while summers are hot and humid with heavy rainfall, which is prevalent throughout the year. Both spring and fall are temperate and longer. Providing shade and natural ventilation are thus of utmost importance. This is why the *Siheyuan*, a courtyard house with wide a overhanging roof, is the most common type. [Sun, 2013:166-167]

*Regarding Japan*, this kind of weather affects the southern prefectures on *Honshu* (main island), as well as the southern-most islands. *Nagano* prefecture, at the end of the 17th century, saw the development of the *Honmune-zukuri*. These big-scale houses, entered gable-side, had a multi-ridge, gabled roof. Covered by stone-held wood shingles (*ishioki- itabuki*), these *minka* were usually reserved for commoners of higher social status such as upper class farmers, village headmen (*shoya*) and land lords (*meishu*), an expression of social status. Decorative elements called *suzume-odori* were placed on the roof ridges. [Itoh, 2004:4] *Saga* prefecture and north-western *Kyushu*, the southern-most island, are the main areas for *Kudo-zukuri* houses, which most likely derive from *Bun-*



*to-zukuri*. Roughly rectangular in their set-up, they consist of adjoining wings, which come with separate hipped and thatched roofs. [Itoh, 2004:4] This shape is a result from connecting the originally separated *omoya* and *kamaya*. *Osaka* and the *Nara* prefectures are home to the *Yamatomune-zukuri* (also *Takahe*-style). Here, two ridge-poles are aligned at different heights, a feature that is only visible from the facades. The tiled roof above the working and cooking area (*kamaya* or *doma*) is gabled or hipped-gabled and higher than the thatched, gabled roof of the main dwelling (*omoya*), which it is attached to. High, plastered gable walls (*takahe*) serve as fire prevention from the *yagura* (smoke turret), which is built between the *omoya* and the *kamaya* roofs. Popular in the 17th century, its ornamental gables and impressive silhouette was representative for wealthy merchants or landowners. The interiors however, were rather simple like those of folk dwellings. Found in *Fukui* prefecture (central-western Japan) and originating from around the 17th century, the *Tsunoya-zukuri* (horn-shaped style) has the *zashiki* (*tatami* room), kitchen and stable added to the main house. If entered gable-side, the stable is added to the *shimote* (lower end-corner), with the kitchen added to other corner and the *zashiki* protruding from the back. With an entrance to the side, the *zashiki* protrudes from back and the kitchen is added up front. In both cases, the added parts may be bigger than original house. [Higashino, 2003:29-37] [Itoh, 2004:4]

#### Cwa: Humid subtropical climate

Found throughout southern China, especially the hot and humid South-east, are dwellings with sky-wells (*tianjing*), a result of courtyards shrinking down in size. As in the central part, transitional spaces increase significantly and assist with ventilation as well as blocking sunlight. [Knapp, 2004:21-22] *Tianjing* are typical for the multi-storied merchant dwellings of the *Huizhou* region, with their number varying according to dwelling size. Reminiscent of squat boxes or elongated loafs, the exterior walls of these houses are solid with only a few windows. Surrounding perimeter walls and structures shut them off from the outside, thereby keeping the open spaces on the inside quiet and private. [Knapp, 2004:24]

#### Islands

##### Climate and topography: cfa

The islands, that are unique in climate and topography, brought forth very specific types of homes. Most noteworthy are the islands of *Jeju* and *Ulleung*, which are, according to *Koeppen-Geiger*, subjected to a warm oceanic and humid subtropical climate (cfa). A warm and humid summer with no dry season is characteristic for these regions, as is a cold and damp winter with heavy rainfall and little sunshine.

#### Types and characteristics

##### Layouts and structure

The islands have brought forth their own and very special typologies. (Fig. 34) These were, due to the climate, mostly linear in their set-up.

##### Dol-jib: Stone house of Jeju island

Korea's biggest island *Jeju-do*, south off the peninsula, is of volcanic origin. It is thus not surprising that the houses unique to here are made of the local basalt, fittingly referred to as *Dol-jib* ("stone house"). (Fig. 35) *Jeju-jib* were built on sites lower than the neighbouring streets and with land in close proximity. A compound consisted of several detached buildings, which enclosed a central courtyard and were surrounded by high fences made of volcanic rock, with the *junngang* (gate) being the start to a curved entrance sequence. The rooms within the buildings were laid out in a double-row, creating a linear shape. In contrast to mainland houses, these buildings were not distinguished by function, but served as independent living spaces for parents and their married children. This deviation from Korean standards is rooted in the fact that *Jeju* families are nuclear ones, rather than extended as is the norm. Known as *angeori* (or *anchae*), the main space was occupied by the parents and not reserved for women as it was on the mainland. A subordinate building called *bakgeori* (or *sarangchae*), was the residence of married children, which was occupied by men in other regions. As the people occupying the *angeori* (parents) were responsible for all things regarding the family (e.g. contact with relatives, communal labour and property management), the *angeori* was considered more important than the *bakgeori*. The core part of the *angeori* consisted of the *sangbang* (main floored room) and the *gudle*, a room affiliated with the former located opposite from the kitchen (*jungji*), which contained the *gulmook* (space for heating). Behind the *gudle* lay the *gopang*, a space which could only be entered by the mistress of the house and served as storage room for family belongings. The *chatbang* (also known as *anbang*), in other regions reserved for the women, served as dining room and space for conducting rituals. Like the *angeori*, the *bakgeori* too consisted of a *sangbang*, the *gudle*, the *jungji* and a *gopang*. Structurally, all features were the results of the adaptation to the climate, foremost the heavy winds. This is why the thatched roofs, varying in shapes but always with comparatively low slopes, were tied down with straw ropes. Their eaves were also kept rather short to reduce the surface exposed to wind. In contrast to houses on the mainland, *Jeju-jib* were not equipped with *ondol* floors or *buttumak*, which can be attributed to the rather mild winter climate. The whole arrangement of *Jeju* dwellings reflects the self-sufficient lifestyle of their residents, while simultaneously emphasizing communications with neighbours and communal trust. [Jeon, 2016:43-47] [Kim, 2010:1] [Yi, 2015:240]





Fig. 34: layouts on Jeju-do and Ulleung-do

#### Udegi-jib (also Tumak-jib or Gwiteul-jib): Walled house of Ulleung island

The climate on *Ulleung* island, located to the central-east in the middle of the East Sea, resembles the west coast of Japan much more than it does the Korean peninsula. Not only is this region the most prone to snow among all of Korea, it is also affected by the strongest winds. These influences have triggered the development of the *Udegi-jib* ("walled house"), where secondary structures like

sheds and barns, are attached to the main building. (Fig. 36) A simplified version has the kitchen in the middle, with the living quarters, to its right on the eastern side and the cowshed on its left. The living quarters incorporate a main living room beside the kitchen, with a smaller living room right next to it. *Udegi*, thick and free standing walls located under the eaves, enclose the buildings, leaving a corridor called *chukdam* lying in between. With these walls usually installed on all sides, rarely on three (then



Fig. 35: typical stone-house (dol-jib) of Jeju island



Fig. 36: typical walled house (udegi-jib) of Ulleung island

open to the back) or just placed up front, this system protects inhabitants from snow and winds while moving around. While the *udegi* were built by weaving cornstalks and silver grass into wooden columns, the main building was constructed from logs coated in mud. Stacking them up parallel to the ground resulted in a solid box-frame structure, strong enough to withstand the heavy vertical snow-load. Using logs stems from the early days, when forests were cleared to create fields. Straw mats, which could be rolled up, were hung above and covered the gateway. After the 1950' liberation, these were replaced by single or double sliding glass doors. Likewise, the woven columns had to make way for wooden planks and galvanized iron sheets. Originally thatched with eulalia, roofs were later replaced by pine shingles and corrugated iron sheets, before slate and tiles were brought in from the mainland in the late 1970s. Sometimes *Udegi-jib* were also referred to as *Guiteul-jib* (square shaped log house) or *Tumak-jib*, timber-log houses made of clay and reed. [Frostdale, 2010:1] [Jeon, 2016:50] [Kim, 2015:1] [Cicccone, 2005:1] [Yi, 2015:166]

*Japan's Shirakawa-go and Gokayama*, also subjected to an abundance of snow, have developed different structures to deal with this. The *Gassho-style* homes, which are unique to these mountainous regions, have high-gabled and steep roofs which resemble folded hands with fingers pointing upward in prayer. To allow the snow to slide off the thatch, the roofs are angled between 45 to 60 degrees. These structures are, as usual for Japanese vernacular buildings, built assembled without nails or other metal materials. Three to four storeys tall, they provide efficient space for extended families. This plethora of space and their unique use of the attic are, besides their unique roofs, what sets them apart from other farmhouses. [Itoh, 2004:4]



## SPATIAL STRUCTURE

Notwithstanding typologies, all *hanok* implement certain base principles, which are illustrated by shape grammars such as vocabulary, syntax, semantics and style. [Chiou, 1996:690-691]

### Composition

The structures of *hanok*, whether consisting of one or more buildings, are generally composed of compartments of rooms, based on either *ondol* or *maru*, and a kitchen. There are however distinct functional differences when comparing *banga* and *minga* layouts. [Yoon, 2001:4]

### General Flooring

As just stated, the composition of *hanok* layouts can, to a great degree, be attributed to *ondol* and *maru*, two uniquely Korean types of floors. [Kim, 2009:74] Their installation has implications on the design of spaces, not only structural and regarding materials, but also function-wise. Like other features, this distinction can be associated with balanced dualism. [Kim, 2008:6] This philosophy, which can be found throughout Korean vernacular architecture, will be discussed in detail later on.

### Ondol

*Ondol* refers to heated floors consisting of stone slabs over funnels, through which hearth-generated warm air is sent. (Fig. 37) With a clay surface covered by paper, these floors are installed in *bang* or enclosed rooms. The term is a combination of *on*, which in Korean translates to "warm" and *dol*, meaning "stone". Found in all regions and used throughout the year, *ondol-bang* are heated during cold periods, but left unheated in warmer times, thus providing a cool surface. [Cho, 2013:142]



Fig. 37: ondol flooring

### Maru

*Maru* are unheated wooden floors, placed in an elevated position and used for halls and semi-open spaces. [Yoon, 2001:4] (Fig. 38) The word *maru* is assumed to stem from the Chinese term *malu*, which the *Oroqen* people, who dwelled near the Korean border, used when referring to the section located behind the fireplace in their tents. [Kim, 2017:1] *Maru* spaces are essential to houses in warm areas, as their elevated position allows for ventilation and cooling. [Cho, 2013:142]



Fig. 38: maru flooring

### Heulkbadak

A third kind, *heulkbadak* (dirt floors), although less prominent, is also significant. (Fig. 39) These earthen floors are used for service areas such as the kitchen and storage spaces, as well as barns and stables.

### Positioning: Status and hierarchy

As mentioned before, based on the Confucian ideology, spaces in *hanok* of all classes were separated and placed according to gender and hierarchy. This was done through orientation, as well as distancing and elevation.

### Orientation: Cardinal directions and axes

The placement of buildings or spaces in traditional Korean houses was, among other factors, determined by cardinal directions. Based on *Pungsu*, and with roots in *Feng Shui*, they were oriented alongside a North to South axis. [Jung, 2014:170] In *banga* compounds, the area of the women could be found in or towards the North, while





Fig. 39: dirt flooring (heulkbadak) in the kitchen

men stayed in the South or towards it. The ancestral shrine, the most important of all spaces, was generally found in the North to North-East. Secondary spaces for servants, livestock and storage were most often placed in the South to South-West. (Fig. 40) Although other factors played a role in positioning, cardinal directions were prioritized when topography made compromises necessary. *Spatial distinction* based on orientation can be found in diverse cultures and dwelling types all around the world.

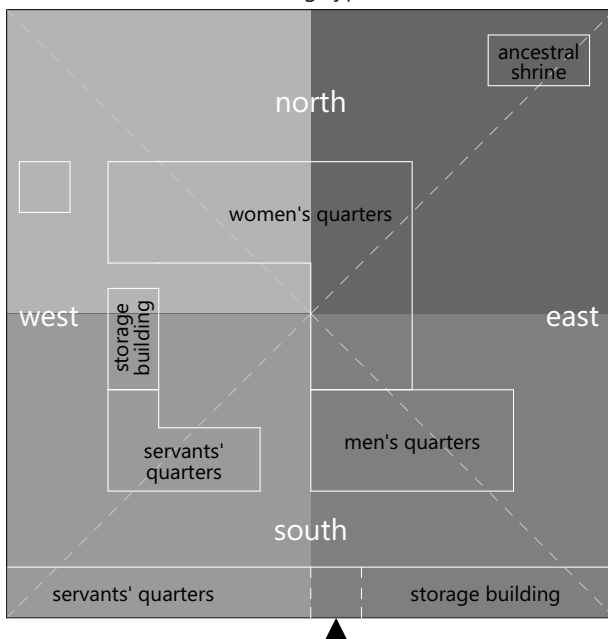


Fig. 40: spatial allocation based on orientation

*Chinese geomancy*, with its emphasis on cardinal directions and the four corners, also places the axis of a house in North to South direction, which is considered to represent the Confucian social order. [Sarvimaki, 2000:146] Like their Korean counterparts, Chinese compounds also assign individuals to certain sectors. While the North-West (*ken*) is reserved for the father, the youngest son resides in the North-East (*gon*). The mother can be found in the South-West (*kon*) and the eldest daughter has her place in the South-East (*son*). Residing in the North and East respectively, are the middle and the eldest son, with the middle daughter placed in the South, leaving the West to the youngest daughter. [Sarvimaki, 2000:150] This set-up can be witnessed in *Siheyuan*, whose orientation follows the cardinal directions, with the main halls facing South or South-East and lying symmetrical side to side. A well defined axis organizes the space by hierarchy. [Knapp, 2004:20]

Although also based on Chinese geomancy, the Japanese *Hogaku*, deviated from the North to South positioning. In this context better referred to as *Kaso* (physiognomy of the house), it aligned residences with the intermediate directions of North-West to South-East. [Sarvimaki, 2000:143] This rule can be witnessed in *Shinden*-style homes. [Higashino, 2003:25-28] Although the alignment differed, the assignment of individuals to certain directions was practiced just like in Korea and China. The North-West, also known as direction of the "gate of heaven" (*tenmon*), was ascribed to the head of the household (not necessarily female). So was the South-East or "gate of the wind" (*fumon*) where, additionally, the eldest son and eldest daughter could also be found. [Sarvimaki, 2000:150-151]

In *Fijian* houses, the eastern wall was considered most important and thus reserved for the chiefs. [Rapoport, 1969:54]

*Mongolian yurts* had their most significant space in the North, opposite and furthest from the entrance.

The allocation of areas based on direction is also present in Indians' *tipis*. While the northern side is reserved for men, women sit in the South. [Lehner (2), forthcoming:26] In *Bedouin* tents, men took over the eastern end, which is also where guests were entertained. This area was marked by carpets and pillows on the floor and a fire-place in the centre. The western end, where women lived and worked at the eastern end which, since they rarely saw visitors, was also used as storage area for food and utensils. [Gauvain, 1982:38-39]

#### Distance from the main gate

As mentioned before, all buildings were, based on their significance, placed in a certain area within the compound. (Choi, 2007:83) Not only was this determined by the cardinal directions, but also by distance from the main gate. (Fig. 41) This concerned upper-class residence-

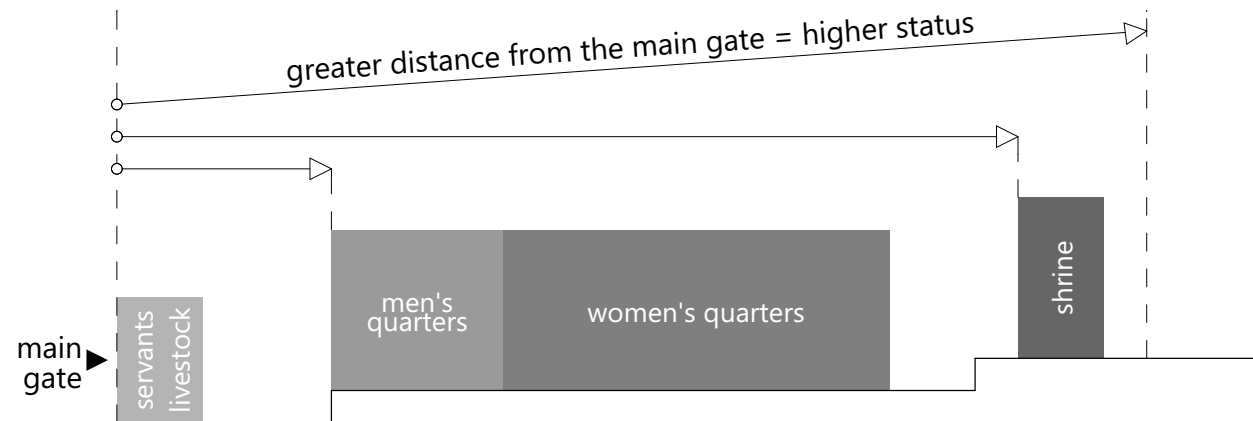


Fig. 41: distance from the main gate signifying hierarchy

es more than it did *minga*, since the latter often consisted of only one building. In *banga*, the quarters for men (*sarangchae*) and women (*anchae*) were placed in close proximity to, or next to each other, but were separated by a low wall. These areas, which formed the central part of the complex, were located second-furthest from the gate. [Cho, 2013:145] Behind these buildings, at the very back, was the area reserved for the ancestral shrine, a placement that signified its great status. The servants' quarters, along with other secondary buildings, could be found in the front closest to the entrance gate, which was the least desired area. [Choi, 2007:61] Generally, this means that privacy and significance increase with distance from the main gate. [Cho, 2013:145]

In a Mongolian *ger*, guests were generally asked to the rear part, while those with dubious intentions were placed to the side. [Lehner, forthcoming:22-24]

North American *tipis* kept lower ranking individuals in close proximity to their entrance. The owner on the other hand, was seated in the most revered area opposite of the entrance. This place was also designated for special guests and the altar. [Lehner, forthcoming:22-24]

#### Levels and elevation

Hierarchy was not only reflected by allocation to certain areas and cardinal directions, but also by elevation. While practiced by both, upper and lower classes, it was more

apparent in the homes of the former. The elevation was achieved by either topography or construction, often a combination of both. Based on this, the most important people or functions were placed at the highest level, then declining in order of status. (Fig. 42) This explains why the ancestral shrine of upper-class compounds was provided with the greatest elevation. Placed a level below it were the male and female quarters, which were positioned so that onlookers were required to raise their view in order to look into the main halls. This further emphasized their status. Less significant structures, such as the servants' accommodation and spaces for the livestock, were placed lowest and often levelled with the ground. [Choi, 2007:61] Structural hierarchy was not limited to the outer appearance, but continued inside. Living spaces were elevated, whereas service spaces such as the kitchen remained at ground level or were placed even lower. Although this feature was found among all classes, it was not as prominent in *minga*. This usually meant that most rooms were positioned on the same level, with only the kitchen being an exception, which had a practical rather than symbolic background. The reason for this was the heating system, which will be discussed in detail later on. [Lee, 1991:66] Similar to their Korean counterparts, the buildings within Taiwanese compounds were also arranged by levels, with height, and thus importance, decreasing from the rear to the front. [Chiou, 1996:691]

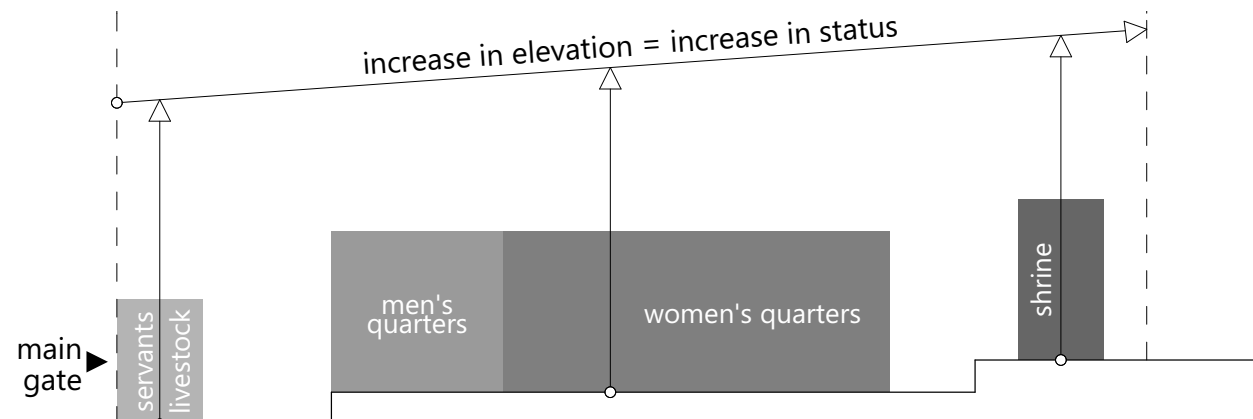


Fig. 42: spatial hierarchy shown through elevation

### Restrictions

As previously explained, social class had great implications on how Koreans went on about their lives. One's social standing thereby also played a key role when it comes to building possibilities. *Sarvimaki* explains, that no East Asian country was without building restrictions based on social rank. Regarding Korea, *Kil-Ryong Park* observed that the social status of the inhabitants was reflected in their *hanok*. [Jung, 2014:167] Rooted in Confucian traditions, laws went as far as to regulate not only the dimensions of buildings, but also their appearance and detailing. [Sarvimaki, 2003:90]

*The Japanese* also had to oblige to a code of restrictions on building materials and styles, in order to insure that people lived in houses reflecting their social status. Commoners were restricted from using elements of feudal lords' mansions, which were revoked only with the collapse of the shogunate in 1867. [Higashino, 2003:29-47]

### Size

The extent of traditional Korean houses was determined by their owner's social status and thereby directly connected to financial means. [Joon, 2001:2] Size was measured in *kan*, a spatial unit whose dimensions grew with the status of the homeowner. One square-*kan*, the area enclosed by four columns, averaged at around 5.80 square metres. [Sarvimaki, 2003:94] A detailed deduction of this will be given later on. Rules did not only restrict the size of the units, but also their number. Generally amounting to around 45 square metres (eight square-*kan*), commoners' or non-titled citizens' houses could not exceed ten square-*kan*. Middle classes were allowed up to twenty *kan* and third class aristocrats (lowest *Yangban* rank) a maximum of thirty *kan* or about 170 square metres. Second class aristocrats' residences could measure up to 40 *kan*, with homes of princesses and princes (from the king's secondary wives) allowed 50 *kan*. [Sarvimaki, 2003:94] A nobleman's mansion could be several tens of *kan* in size, with palaces reaching up to 99 *kan*. Despite restrictions however, residences often exceeded the permitted size, by not including the servants' quarters into the house area. [Lee, 1991:66-67] [Sarvimaki, 2003:94]

As in Korea, the appearance of Taiwanese buildings was also regulated by laws. [Chiou, 1996:689]

Among the nomadic Berber tribe of North Africa, the size of a tent signifies the status of its owner, with those of the wealthier and higher regarded families being bigger. [Gauvain, 1982:31]

### Materials

Rank and consequently wealth also naturally played a huge factor in the ability to acquire certain materials. Considering this, *Kim* explains that its roofing is one of the most noticeable features in determining the affiliation of a traditional Korean house to a certain social class.

This matches with *Savage-Landor's* observation of roofing materials being among the few differences between upper and lower class homes. [Savage-Landor, 1895:136-137] [Kim et al, 2018:1] Materials also influenced a home's structural composition, as upper-class roofing required a more massive substructure than that used for lower-class dwellings. [Kim et al, 2018:1]

### Banga

In *Joseon* times, a compound of the landed gentry was not only considered a home, but also place to accommodate social life and Confucian education. Different periods and philosophies had a great influence on the residences, which consequently impacted their layouts. [Choi, 2007:61] Within *banga* compounds this translated to providing certain residents or functions with their very own buildings (*chae*) [Barrera et al, 2013:205], whose status was determined by their location within the complex. [Park et al, 2015:12] Although the buildings primarily served to group different spaces into one interior, the attached outdoor areas were also of significance. [Choi, 2007:63]

### Exterior

A basic *banga* setup included separate quarters for men (*sarangchae*) and women (*anchae*), as well as a standalone structure for the ancestral shrine (*sadangchae*). [Park et al, 2015:12] (Fig. 43) Most compounds also included detached spaces for servants (*haengnangchae*) and storage units (for tools, grain, etc.). [Lee, 1991:66-67] Large *banga* additionally came with buildings for lower-ranking members of the family and sometimes, libraries (*juiljae*). [Yoon, 2001:3] All of these were enclosed by a perimeter wall. [Jeon, 2016:35-36] Since the upper-class *banga* come with several buildings, these compounds are noticeably bigger in size than the houses of the lower classes. [Sarvimaki, 2003:94] [Park et al, 2015:12] The homes of moderately well-off owners were equipped with at least two, but most often three *chae*, while very high officials were permitted a greater number. [Savage-Landor, 1895:139] Built in accordance with a modular system, all of these quarters (*chae*) were made up of several units called *kan* (bays). [Barrera et al, 2013:205]

Acknowledging the imposing appearance of these 15th to 19th century *banga*, *Sekino* found size similarities in the Japanese *Shinden*-style homes of the *Fujiwara* (900-1200) and *Kamakura* (1185-1333) periods. Generally built on plots of 120 square metres, they consisted of several, symmetrically arranged buildings. [Jung, 2014:63; 69] [Neighbour-Parent (1), 2018:1] *Shoin*-style residences, which developed from the *Shinden-zukuri*, also have a set-up similar to that of *banga*. Originally a single building, the addition of too many spaces meant that, at some point, it became too narrow, which is when the interior was then extended out from the main hall. This led to the



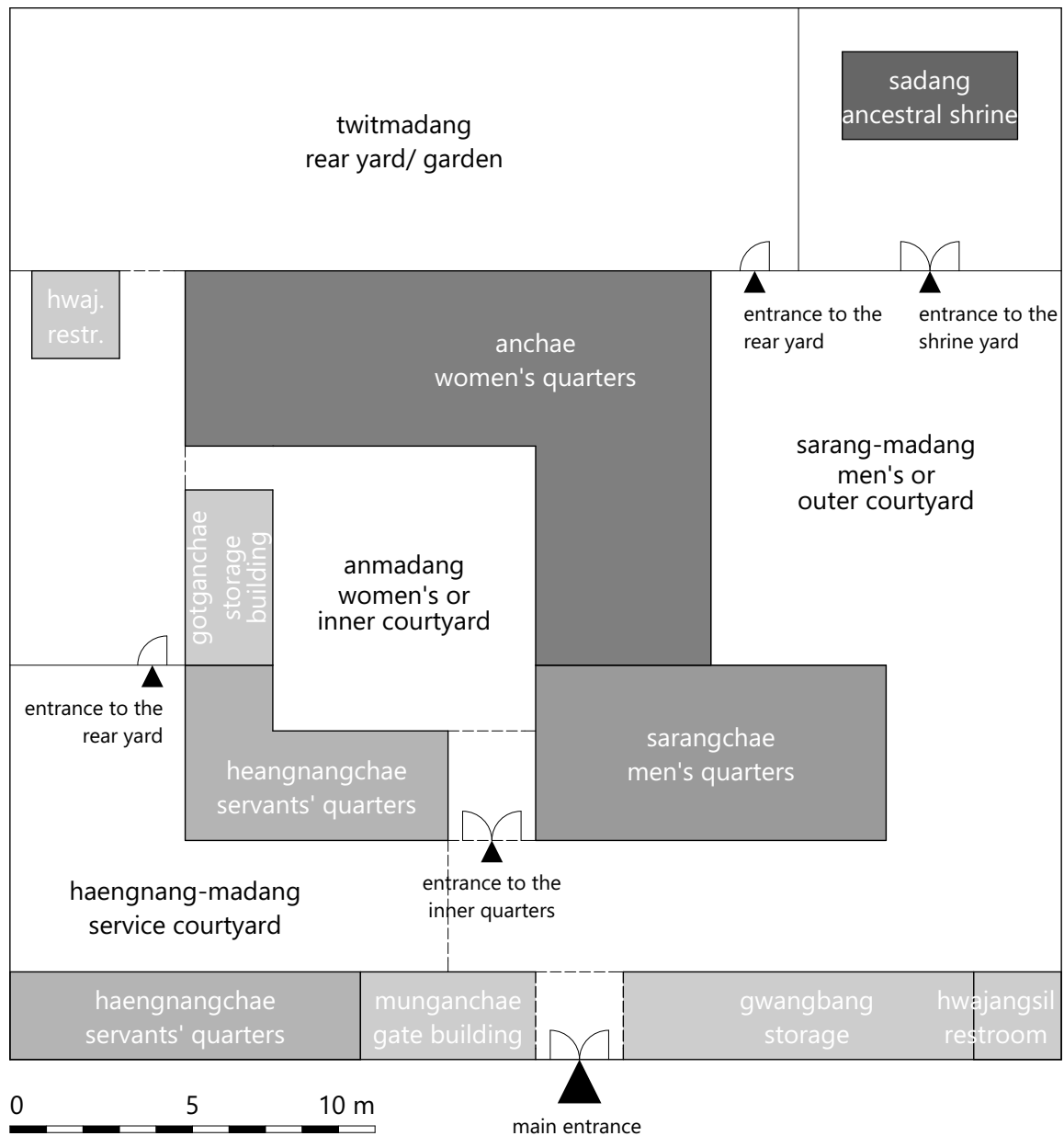


Fig. 43: general layout of a Korean bangsa

appearance of enlarged corridors, which consequently became buildings of their own, turning the concept of halls connected by corridors, into one of halls connected by walls. [Higashino, 2003:25-28] A variation of the *Shoin-zukuri* are *Sukiya-zukuri*, *suki* translating to "refined. These houses were made up of small rooms, usually four and a half *tatami* mats in size, sometimes less. [Kodansha, 1983:265] The result of the evolution of different housing styles, it is today seen as the epitome of traditional Japanese residential architecture. [Ito, 1972:2-3] [Sarvimaki, 2003:82] [Higashino, 2003:25-28]

Also comparable are Chinese *Siheyuan*, whose scale is often smaller than that of comparable dwelling types, one example being 11m in width and 24m deep, resulting in about 400 square metres. Although the, usually

two, courtyards are also reduced in size, the main one can spread over 40 percent of the entire complex and come with additional subsidiary ones to the front or rear. [Knapp, 2004:20] Depending on social status and wealth, their number could rise up to nine. [Yoon, 2001:3]

In Taiwanese compounds, the scale of bays (*jian*), which form a building, is based on the fortunate dimensions of its central bay, which could not be exceeded. [Chiou, 1996:692]

Comparisons can be made with Chinese courtyard dwellings, which are amongst the most significant housing types in this very diverse country. The *Beijing*-style *Siheyuan* being representative, its buildings are placed on at least two sides, but most often on all four sides of a courtyard, one of which may be only a wall. [Knapp,



Although similarly introversive, Chinese dwellings differ in their use of spaces and furniture compared to Korean *bang*. [Yoon, 2001:3] What is the same however, is that the courtyards serve as meeting places and thus enable communication between occupants. [Wang, 2014:4]

Also partitioned, but only by screens, were the interiors of Japanese *Shinden-zukuri* mansions, whose rooms were open to the roof. [Itoh, 2004:1-2; 4] The residences of *Samurai (Buke-zukuri)*, whose lifestyles required more rooms, had their interior spaces partitioned by sliding panels. In *Shoin*-style residences on the other hand, single spaces were commonly connected in corner-wise blocks, with the *moya* (main space) also partitioned, according to function, by fixed partitions. [Sarvimaki, 2003:88]

### Minga Exterior

Most *minga*, considered by Savage-Landor to be the poorest form of the Korean house, consisted of only a single *chae* (building). [Savage-Landor, 1895:139] (Fig. 46) While barns and storage units were usually attached to it, some *minga* had separate structures, which resulted in an open-courtyard arrangement. [Lee, 1991:66] In some types of the cold North, livestock and grains were even put under the same roof as the living areas. Toilets however, were always placed separately. [Lee, 1991:66-67] The main house usually contained two to three bays (*kan*), with each of those representing one small room. [Savage-Landor, 1895:136-137; 139] [Park et al, 2015:12]

### Interior

Like upper class homes, most *minga* were composed of *maru* spaces and *ondol* rooms. Exceptions were some types found in the South, where heated floors were not required, due to the prevalent climate. One room was a bay of about eight to ten feet (2.4 - 3.0 m) in length and width, and a ceiling height of about seven feet (2.1 m). [Savage-Landor, 1895:139] The most basic type, often found in rural areas, consisted of only one *ondol-bang*

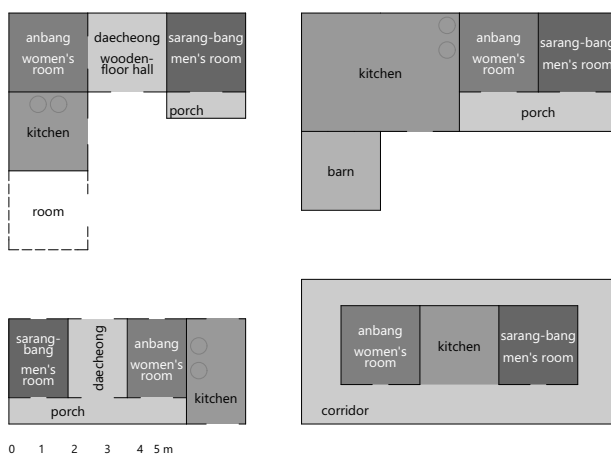


Fig. 46: general layouts of Korean minga

and a kitchen. Most homes however came with two or three *ondol* rooms, while some even had four heat-ed-floor spaces. *Maru* spaces were added later, a set up that required at least four bays. [Jung, 2014:142] [Jeon, 2016:35-36] A differentiation by structure or the arrangement of bays (*kan*), results in three general *minga* types. The single-line type, mostly used for peasant and servant dwellings or as storage units, arranges all spaces under a single ridge beam, which leads to limited indoor areas. Combining two single row results in a double-line structure, which has all rooms placed under one ridge beam. A third type, commonly found in the central region, comes with a bent L-shaped layout or a variant thereof. [Lee, 1991:67] [Jeon, 2016:42-44]

Similar in their set-up are Japanese *minka*, where a service area called *doma* is found beside the multi-purpose *hiroma* (living area). (Fig. 47) Indoor farm tasks were performed in the *doma*, which housed the *umaya* (stable) in one of its corners. The main room or *hiroma*, with its plank-wood floor and *irori* (sunken hearth), was used for family gatherings. Certain seating customs around the hearth, at some point, made the integration of a *zashiki* (reception room) necessary. [Higashino, 2003:29-47] Like *hanok*, Japanese *minka* underwent an evolution over time. Most notably, former multipurpose spaces were divided into separate rooms. The simplest type of these farmhouses contained a *doma* (service space) and one multipurpose room, which was divided into a maximum of four rooms. Besides the *doma*, a fully developed *minka* housed a living space (*hiroma*) with a *nando* (sleeping or storage area) and the *zashiki*, a formal space for the reception of guests. *Minka* spaces were differentiated along a hierarchical axis, with the *kamite* (area for formal rooms) at the upper end, farthest from the more humble *shimote* (including the *doma*), which was placed at the lower end. The *omote-ura* (front-back axis) lay perpendicular to the hierarchical axis. [Higashino, 2003:29-47]

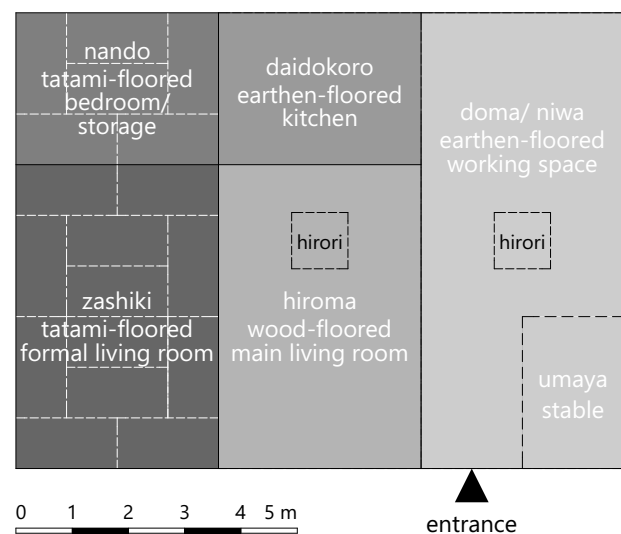


Fig. 47: general layout of a Japanese minka



Fig. 48: front view of the entrance gate house (daemunchae)

## Buildings and interior spaces

### Banga

#### Gate house: Daemunchae

The *daemunchae* or “entrance gate house” was the front-most building of the residence. It represented the transition from the public alleyway to the semi-public main courtyard. (Fig. 48) (Fig. 49)

#### Outer (or men’s) quarters: Sarangchae

The term *sarangchae* is, according to *Sarvimaki*, composed of *sa* for “housing” and *rang* for “corridor”, while the suffix *chae* indicates one or a group of independent buildings. (Fig. 50) These living quarters of the male head of the household were used for gatherings, studying and other purposes. [Park et al, 2015:12] [Cho, 2013:144] The entertainment of guests was also limited to this part of the house, as they were usually visiting the master. [Choi, 2007:84] [Yoon, 2001:5] A sign of its significance, the rooms within this building were bigger and their ceilings higher than those of others within the compound. [Choi, 2007:68] Although often described as men’s quarters, *sarangchae* rather had a connotation with the management of activities, a description that makes sense considering that the male head of the household was responsible for overseeing all of its affairs. Regardless of its given name, women also used the *sarangchae* for their purposes. [Barrera et al, 2013:210] Detached from the main space in wealthy households, this building was placed in consideration to its natural surroundings. [Choi, 2007:61]



Fig. 50: exterior of the sarangchae (men’s quarters)



Fig. 49: side view of the entrance gate house

and found towards the front (and East) of the compound, thereby attracting all views. [Rieh, 2003:74] The East has a special meaning, since it traditionally signifies the male sphere, symbolic for righteousness and justice. [Choi, 2007:68] The building contained the *sarangbang* or “master’s room”, the semi-open *sarang-daecheong* and sometimes a *chimbang* (bed chamber). (Choi, 2007:83) These quarters were exclusively found in the large houses of the elite, while in the *Gyeongseong* region they were often missed completely. [Jung, 2014:177-178]

Similar to the *sarangchae* is the *zheng-shen* (main building) of a Taiwanese house, consisting of one to nine spaces, with seven being the norm. Its most important area was a multi-purpose hall reminiscent of the *sarangbang*. Used for ceremonies, recreational and educational purposes, this space was directly or indirectly connected to all other rooms. [Chiou, 1996:691; 697]

A Japanese equivalent is the *shinden* or “sleeping” hall of *Shinden*-style residences, the living space of the master. This space not only served the master to meet guests, but rites and festivities were also held here. It was located in the centre of the residence, flanked by secondary buildings on each side and with a courtyard to the South. [Higashino, 2003:25-28]

#### Additional men’s quarters:

##### Keungsarangchae and Jageunsarangchae

*Banga* could have more than one *sarangchae*, according to who lived there. The head of the household would dwell in the bigger *keunsarangchae*, while the *jageunsarangchae* was occupied by sons.

#### Wooden-floor hall: Sarang-daecheong

The *sarang-daecheong* is the wooden-floored, semi-open space used to greet guests and spend time on during warm days. (Fig. 51)

In China, guests were received in a living room located in the southern *dao zuo fang* (also “house on the other side” or “opposite house”), which can be likened to the *daecheong*. [Yoon, 2001:7]

#### Main heated room: Sarangbang

The *sarangbang*, a part of the *sarangchae*, was the living





Fig. 51: sarang-daecheong (main hall of the men's quarters)

space for the household head. (Fig. 52) While it served as studying space during the day, it was used for sleeping at night, which is when certain areas would be closed off with screens to provide more privacy. [Kim et al, 2018:1] Primarily reserved for the master, the *sarangbang* was however occasionally offered to guests of great importance. [Choi, 2007:83]

#### Bedroom: Chimbang

Some *banga* had an additional chamber called *chimbang* for the master to sleep in, located inside the *sarangchae*. If there was no such separate room, the master would sleep in the *sarangbang*. [Yi, 2015:7] [Choi, 2007:83] [Jun, 2013:164]

A similar room could often be found in the main building of Taiwanese estates, where it accompanied the main hall. [Yoon, 2001:6]

#### Annex: Byeoldang

Some *banga* had an annex called *byeoldang*, which belonged to the *sarangchae* if used by the master of the house. If it served as place to study for unmarried males, it was termed *seodang*.

#### Inner (or female) quarters: Anchae

The *an* in *anchae* means "inner", while *chae*, as explained before, represents a solitary building or a group thereof. [Sarvimaki, 2003:96] Considered the "main building" of a compound, sometimes also referred to as *bondang*, was where the mistress of the house lived and raised the children. [Choi, 2007:68] [Jung, 2014:64] (Fig. 53) In the daytime, these family quarters were used for tasks such as preparing meals, dining and general household chores. [Rieh, 2003:74] If the mistress had guests, who were always relatives or friends, she would also entertain them here. [Choi, 2007:84] Together with the *sarangchae*,



Fig. 52: heated-floor room (sarangbang) in the male quarters

it formed the main part of the *banga* and was located to the west of its innermost part. On the same level as the male quarters, it was positioned higher than secondary spaces, but lower than the shrine. [Choi, 2007:68] Its location in the North of the complex was not only chosen to control and restrict the women's social activities, but also to shield them from men. They were, with the exception of the master, forbidden from entering the space. [Cho, 2013:144] [Jung, 2014:169-170] The *anchae* consisted of the *anbang* (living space), another room across from it, the *an-daecheong* and sometimes a daughter-in-laws' room. [Choi, 2007:99] Although a kitchen (*bueok*) and cooking area were also ascribed to these quarters, they lay separate on one of the ends. [Jung, 2014:68] The size of the *anchae* was dependent on not only the owners' social status, but also the number of servants, since they were sometimes also accommodated under the same roof. [Jung, 2014:70]

*Sekino* mentions that the Japanese *kitanotainoya* (northern opposite house) of *Shinden-zukuri* homes has similarities to the Korean *anchae*, or *naebang* as he refers to it. [Jung, 2014:63]



Fig. 53: exterior of the women's quarters (anchae)

### Heated-floor room: Anbang

The *anbang* or women's room, located inside the informal part of the house, was used for various activities. [Rieh, 2003:74] (Fig. 54) In order to facilitate this, furniture was placed mostly close to the walls, organized by hierarchy. [Yoon, 2001:5] During the day it was used for having meals, while at night it served as the bedroom, if no separate space was available. [Choi, 2007:84] The women slept on bed cloth, that was laid on the *ondol* heated floor. [Yoon, 2001:5]

### Daughter-in-law's room:

#### Geonnenbang (also sangbang or mobang)

As mentioned before, the *anchae* sometimes incorporated a *geonneonbang* or "daughter-in-law's room". [Choi, 2007:83] Also referred to as *sangbang* or *mobang*, this "opposite room" served as transition space for the daughter-in-law. When her husband's mother handed over all duties, they switched living spaces. Occasionally, a daughter would return home to give birth in this space. [Choi, 2007: 99]

### Separate cookhouse: Banbitgan

In the past, the kitchens of royal palaces and houses of the wealthy were separate structures rather than located within the living space. [Kim, 2017:1] It was deemed unnecessary to include them, since the upper classes did not cook themselves. [Lee, 1991:66-67] Termed as *banbitgan* (separate cookhouse) in the 17th century, this



Fig. 55: interior of the separate cookhouse (banbitgan)



Fig. 54: heated-floor room (anbang) in the female quarters

standalone space could be found behind the *anchae*, to which it belonged. [Park et al, 2015:12] (Fig. 55) Besides being used for cooking, this kitchen served preparation and storage purposes, and was also the place where servants did the laundry. [Choi, 2007: 97-99] Its detached set-up was adopted from Chinese dwellings, where braziers were used for heating instead of furnaces in the kitchen, which would've required the other rooms to be placed close to it. Building this type of kitchen not only helped in preventing fires and smells from spreading, but also allowed for a greater scale. [Cho, 2013:144] [Kim, 2017:1] The Japanese refer to the kitchen as *daidokoro* or *katte* a term going back to the *Heian* period. During this time, this was the place (*tokoro*) in palaces and noble homes where dishes were prepared to be served on *daiban* (a portable tray table). Later on, the term was used to describe the kitchen area in *Samurai* homes and large *min-ka*. [Kim, 2017:1]

### Wooden-floor hall: An-daecheong

*An-daecheong* refers to a *maru*-floored area, which connected the *anbang* and *geonnenbang* in the *anchae*. (Fig. 56) Like the main room, it was used for all kinds of purposes. A cool spot due to being well ventilated, the mistress used it quite frequently during summer. It was also used for ceremonies and on regular days, for household chores. [Choi, 2007:99] The area underneath the ceiling served as storage space for small tables and ritual items. [Yoon, 2001:7]





Fig. 56: wooden-floor hall (an-daecheong) of the female quarters

#### Inner courtyard: Anmadang

The *anmadang* (inner yard) contained and represented the outdoor area for the *anchae*, whose boundaries were [Choi, 2007: 99] signalled by earthen walls, while a gate allowed entrance. Usually quite small, the *anmadang* had an earthen floor with no trees. Due to being connected to the kitchen, it was sometimes used as an extension of it, especially when there was no rear yard. In such a case, the *anmadang* would serve as place to store the earthen jars containing condiments, as well as hold the kitchen garden. This inner yard was furthermore used for important occasions such as weddings. [Choi, 2007: 99]

#### Annex: Byeoldang

Like the *sarangchae*, the *anchae* could also have an annex for the women to utilize. If occupied by unwed daughters, this space was referred to as *chodang*.

#### Servants' quarters: Haengnangchae

Live-in servants of very wealthy households had their own separate quarters, referred to as *haengnangchae*. [Yoon, 2001:3] (Fig. 57) Sometimes however, this space was also used for storing crops. Due to hierarchy, it was situated closest to the main entrance gate and on the lowest level. [Cho, 2013:144] Some compounds included these spac-



Fig. 57: haengnangchae (servant's quarters)

es within the male or female quarters, but as separate buildings. [Park et al, 2015:12] Also found in some *banga* were houses for part-time servants or *Hoji-jib* in Korean, located on the outskirts of the premises.

Comparable quarters were provided in the Chinese *Siheyuan*. Placed in an *erfang* (wing), this area could also be the children's space.

#### Haengnangbang: Servants' rooms

Servants could also be provided with their own rooms inside the main quarters themselves. Called *haengnangbang* (servants' rooms), they were a common sight in the Gyeongseong region. [Jung, 2014:177-178]

#### Guest accommodation

Most compounds, regardless of their size, had no spaces specifically designated for overnight guests. They would usually be accommodated in the main space of the *sarangchae* or, if visiting the housewife, in the *anchae*. [Jung, 2014:177-178]

Like most *banga*, tents in the Orient too have no separate spaces for receiving guests. Instead, the first section upon entering serves as dining and sleeping area for visitors. [Wight, 1953:29]

#### Building for the ancestral shrine: Sadangchae

As one of the most important features of a *Joseon banga*, the family shrine (*sadang*) was placed in its own building, especially when part of a bigger estate. [Lee, 1991:67] [Park et al, 2015:12] (Fig. 58) The origins of this individual building (*sarangchae*) can be traced back to 1398, when an altar was built at the palace, where the king would worship his ancestors. Containing the ancestral spirit tablets, it was used for activities such as daily prayers and holding annual worship ceremonies. Found in the East or North-East of the rear garden, it lay detached from the residential area, which proved useful when guests would visit this sacred space, as they could be kept away from the inner court. [Cho, 2013:144] [Yoon, 2001:2; 7] [Rieh, 2003:77] [Jung, 2014:170] If a home had no separate building for the household shrine, worship rites were performed on



Fig. 58: exterior of the sadangchae (ancestral shrine building)



the *an-daecheong*, the wooden-floor hall of the *anchae*. Some families also commemorated their ancestors in the *sarangchae* or the *anbang*. [Choi, 2007:85]

A similar practice was the standard in the courtyard houses of *Ming* and *Ching* China, where the shrine was placed inside the main residence. Highly revered due to holding the ancestral tablets, this *zutang* was found in the main hall of the *zhengfang*. [Yoon, 2001:2; 7] Representing the symbolic centre of a compound and located in its the north, this space also functioned as living space for grandparents. [Yoon, 2001:4]

The Japanese, like the Koreans and Chinese, held their ancestors in high regard and had worshipped them in designated spaces. The equivalent to the Korean *sadang*, the Buddhist altar *butsudan* was given an area within the dwelling and especially important during the annual festival called *Bon*. [Ishii-Kuntz, 2018:1] In older farmhouses, it could be found in a space called *butsuma* or "room for the *butsudan*", which was most commonly located in an inner or rear part of the dwelling. This space was also used for sleeping, except during *Bon*. [Jeremy, 1989:60]

### Separate house: Byeoldang

As mentioned before, a *byeoldang* or "separate house" was only built in very large family compounds, then found in the backyard of the main building. If used by the mistress, this annex belonged to the *anchae*, if utilized by the master, it was attached to the *sarangchae*. [Cho, 2013:144] Furthermore it could serve as living space for unmarried daughters, then termed *chodang* and as *seodang* prove convenient as study for unmarried males.

Comparable to the *byeoldang* is the *tainoya* ("opposite house") of Japanese *Shinden-zukuri* residences. Subsidiary living quarters for family members and their servants, they were reached by hallways referred to as *wataridono*, which were attached to one or more sides. [Higashino, 2003:25-28]

### Entrance area/ reception space

Traditional Korean homes had no distinct entrance space. Family members would enter directly into the main space of the individual quarters, while guest were welcomed on the *daecheong* of the *sarangchae*. The act of entering itself was signified by a change in levels and surfaces, which started with the elevated wooden platform ("*toetmaru*") attached to the outer wall. Functioning as buffer space, it could only be stepped on before removing one's outer footwear, which was left on top of the foundation, below this narrow porch. [Choi, 2007:67]

Unlike their Korean counterparts, traditional Japanese homes did have separate entrance areas. To this day, the Japanese *genkan* is valued as a symbolic transitional space. [Buckley, 2009:170] In *Uchidas* words, the word *genkan* represents the gateway into the profound way as well as the border between the Buddha's world and the

earth. It further divides the inside world of a family from the world outside of the family. [Kuroishi, 2014:193]

In Peruvian homes, visiting acquaintances either remain at the front door or are asked on to a formal parlour. Friends, on the other hand, are allowed into more informal living areas like the kitchen. [Gauvain, 1982:43]

In suburban Northern America, guests are welcomed in the central living room, which is located in the front part and thus readily accessible from the main entrance. [Gauvain, 1982:43]

### Multipurpose spaces

Almost every room in a traditional Korean home is used for multiple purposes, unrelated to its location within the dwelling. [Rieh, 2003:68]

Multipurpose spaces can also be found in China, with the *zhengfang* or "main hall" of a Beijing *Siheyuan* being representative. Arranged symmetrically along the compounds centre, these quarters for the head of the household were not only used for receiving guests, but also served as dining space, for educational purposes and various ceremonies (e.g. ancestor worship). [Yoon, 2001:6] As the furniture, which was set up symmetrically by hierarchy was generally fixed, people ate while sitting on chairs around a table. Floor-sitting was only present on the *kang*. [Yoon, 2001:6]

Also a multipurpose space, the end room of a Taiwanese main building was used for occasions such as dining and family gatherings. [Chiou, 1996:699]

The *zashiki* ("living room") in Japanese homes also served several purposes. To signify its importance, this space was elevated about half a meter from the ground. [Spac-ey, 2015:1]

### Storage spaces/ areas

#### Interior storage spaces

There are only a few storage spaces inside a *bangja*, with all kinds of possessions kept out for everyone to see or stacked away in built-in closets. [Jung, 2014:126]

Unlike their Korean counterparts, storage spaces are plentiful in Japanese villas. [Jung, 2014:127]



Fig. 59: storehouse (gotganchae) attached to the entrance gate

Occupants of Chinese *Siheyuan* used the southern *daozufang* as storage space, which was simultaneously the servants' accommodation. [Yoon, 2001:4]

In Taiwan, storage rooms and the kitchen were placed at the end of a main building, where they had direct access to the outside. [Chiou, 1996:699]

#### Storehouse: *Gotganchae*

Tools and other items, necessary for the upkeep of the state, were kept in storehouses (*gotganchae*), attached to or separate from the main buildings. These could also be combined with the entrance gate house. (Fig. 59)

#### Personal hygiene

According to *Vierthaler*, there are very few historical records dealing with bathing culture on the peninsula by Koreans themselves. This has been attributed to washing being a regular, unremarkable practice and thereby not worth detailing. An exception are *Hanjeung*, facilities that were being used for medicinal purposes rather than physical cleaning, which were mentioned in the annals of the *Joseon* dynasty from 1472. [Vierthaler, 2018:5] A significant role in this can be ascribed to Buddhism, which has brought forth *mogyok hada* Korean for "bathing".

As they considered cleanliness of great importance, the inhabitants of the Japanese settlements in *Seoul* would take daily baths in rather hot water. [Savage-Landor, 1895:129-130]

#### Bodies of water

In the times leading up to the 20th century, people primarily bathed in rivers, with the sole purpose of getting physically clean. [Vierthaler, 2018:15]

#### Public bathhouse: *Hanjeungso* (also *Hanjeungmak*)

As mentioned before, Koreans visited *hanjeung* for health reasons, both mental and physical. With origins in Buddhism, this kilt sauna was used for spiritual cleansing through recreation and refreshment. Responsible for the upkeep, monks also offered treatments to the ailing. *Hanjeung* of the 15th century were state supported and thereby influenced by Confucian, which resulted in gender-separation. [Vierthaler, 2018:5] The country's natural hot springs, used for more than a thousand years, may have inspired the creation of these facilities, who are believed to be the predecessors to *Jjimjilbang*, the Korean public bathhouses popular today. [Sood, 2012:1] [TKH, 2010:1]

Comparable institutions are *onsen*, Japanese natural hot springs. Plentiful on the islands due to their volcanic activity, these thermal baths offer spiritual and physical benefits. Like in Korea, their origins are believed to lie in Buddhism, whose spread in the 6th century enabled monks to establish the first of these spots. [Sood, 2012:1] With a great emphasis on hygiene, all villages in ru-



Fig. 60: Russian banya

ral Russia offered a type of public sauna or bathhouse called *banya*. [Pipes, 1995:144] (Fig. 60) This facility has, throughout history, been enjoyed by all classes and was often the only way for manual labourers to wash themselves. Wealthier households had their very own *banya*. [Sood, 2012:1]

*Saunas* are also an important feature in Finland, where smoke saunas are referred to as *savusauna*. [Pipes, 1995:144]

#### Portable washing basins

*Choi* reports that, in *Joseon* times, servants would bring a basin of water into their *Yangban* master's room to wash their hands and faces, after which they carried it away again. Upper-class women took partial baths in a secluded corner of their room. [Choi, 2007:84]

#### Toilet house, restroom:

##### *Cheukgan* (also *dwitgan* or *byeonsoe*)

During the day, the *Joseon* upper class used a toilet (*cheukgan*) placed in an outhouse (*hwajangsil*) within the compound to relieve themselves, at night however, chamber pots were used indoors. [Choi, 2007:84] (Fig. 61)

#### Livestock

Horses and other livestock were often put in stables and barns that were part of the entrance gate house. (Fig. 62)

#### Minga

##### Entrance area

Like *banga*, *minga* did not have a designated entrance area. The space to be entered first was the semi-open *daecheong*. Before entering the enclosed part of the house, shoes were removed and left on the narrow porch on the outside. In cold regions, where houses did not come with such a wooden-floored area, this task was fulfilled by the multi-purposes space between the kitchen and the bedrooms. Since these dwellings often only came with dirt floors, shoes were not taken off.





Fig. 61: cheukgan (restroom)

### Multipurpose spaces

As mentioned just now, the houses in the North came with a transitional room between kitchen and bedrooms, which was used for multiple purposes. This was also the case for wooden-floored hall (*daecheong*) found in central and southern *minga*.

### Women's room: Anbang

The *anbang* (housewife's room) of a middle and lower class *hanok* is attached to the kitchen, which is placed in the north. This ensures privacy from visiting guests. [Jung, 2014:122]

### Men's room: Sarangbang

Lower-class homes, even though not equipped with a separate *sarangchae*, had a simple *sarangbang* ("masters room"). It was placed across the *anbang* or "woman's room", with a wooden floored hall (*daecheongmaru*) in between. In a commoners' farmhouse, which lacked a separate *sarangchae*, the room closest to the front gate was reserved for men. [Choi, 2007:61]

### Entrance area/ reception space

Like their upper-class counterparts, *minga* did not have a designated entrance area. Guests were welcomed on the *daecheong* or in the main living space.

In a Japanese *minka*, guests are received in the main room, *hiroma*. In there, the *kamiza* or "highest seat", which faces the *doma* (service area) is reserved for the



Fig. 62: stable as part of the entrance gate house

master. Guests sit on the *shimoza* (lower seat), located opposite the *kamiza* and nearest to the entrance. This arrangement made a separate *Shoin*-style *zashiki* (reception room) necessary, since higher ranking guests could only be offered the highest seat. [Higashino, 2003:29-47]

### Sadang: ancestral shrine

The *sadang* (ancestral shrine) of a middle or lower class home was not a separate space, but was given an honourable place within the dwelling. [Jung, 2014:170]

*Russian peasants'* homes (*izba*) had a designated sacred corner. This *krasnyi ugiolok*, translating to "red" or "beautiful" corner, contained an icon and was used for worship. [Pipes, 1995:144]

### Kitchen: Bueok (also Jeongji)

Unlike upper-class houses, the homes of commoners had their kitchens under the same roof as the living quarters. This *bueok* was generally attached to the female parts of the house, namely the *anbang* or, if there was one, the *geonnnenbang*. [Choi, 2007: 97-98] (Fig. 63) This was due to women doing all kitchen work, which would last all day long. Some houses had two kitchens, one for cooking (close to the *anbang*) and a secondary one, used for e.g. boiling water, located next to the *geonnnenbang*. [Choi, 2007: 99] Depending on region, Koreans refer to the kitchen as either *bueok* or *jeongji*. According to Kim, this likely stems from these kitchens being different types in the past. Whereas *bueok* is commonly used in the west-



Fig. 63: bueok (kitchen) with dirt flooring

ern parts of Korea as well as *Jeju* island, *jeongji* is predominantly used in the East. The term *bueok*, composed of *bu* (from *bul* for “fire”) and the place-indicating suffix *eok*, sounds similar to *buseop*, which means “furnace” in the *Jeju* dialect. The origins of *jeongji* can be traced back to the *gyeop-jib* or “double house” found in *Hamgyeong* province, whose rooms were arranged in two parallel rows in order to keep out the cold. This set-up led to the kitchen being placed in between. [Kim, 2017:1] The kitchen not only served for cooking the food, but also as preparation and storage space. Dishes found here were e.g. large earthenware vases for liquids and dried goods, as well as different-sized bowls. [Yoon, 2001:7] [Savage-Landor, 1895:142]

#### Outdoor kitchen: Handet bueok

Some homes incorporated a *handet bueok* (outdoor kitchen), situated in an annex and built near the main kitchen. Just like the *banbitgan*, this structure stood separate in order to prevent the spread of fire, keep away smells and provide enough space. These types of kitchens were adopted from China. [Kim, 2017:1] (Fig. 64)



Fig. 65: crop storage as part of a minga



Fig. 64: outdoor kitchen (handet bueok) of a lower-class house

#### Storage spaces/ areas

##### Inside

Like *banga*, *minga* had very few interior spaces designated for storage, with things rather being openly displayed. In some types of *minga*, crops were stored in a room attached to or inside the main dwelling. In order to facilitate work, this space had a separate door to the outside.

##### Outside

Some *minga*, especially those of farmers, had separate storage spaces for crops and the like. These could be huts or small structures made from straw. (Fig. 65)

#### Livestock

Livestock was either provided with an outdoor building, most often attached to the main house, or kept in a separate area inside the dwelling. (Fig. 66) A mostly northern custom, sharing a roof with animals was a result of climate and defence considerations. (Fig. 67) On *Jeju* island, Korea’s southern-most part, the famous black pigs of were kept in pigsties known as *tongsi*, which simultaneously served as lavatories.



Fig. 66: detached barn





Fig. 67: area for the livestock inside a minga



Fig. 70: pigsty on Jeju island (tongsi)



Fig. 68: people bathing in a stream

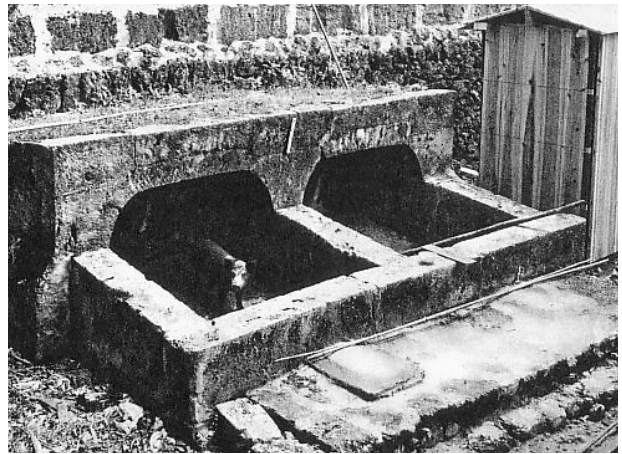


Fig. 71: pig toilet (huuru) on Okinawa

### Personal hygiene

#### Bodies of water

Lower-class people generally washed themselves in nearby bodies of water, such as rivers and streams. (Fig. 67)

#### Cheukgan: separate toilet hut

*Minga* generally had small huts, detached from the main building, for people to relieve themselves. (Fig. 68)



Fig. 69: separate toilet hut (cheukgan)

#### Tongsi: pig toilet

As mentioned before, *Jeju-do* residents used *tongsi* or "pig toilets" to relieve themselves. Stair lead up to these squat toilets, which were located above pigsties made of volcanic rock, thereby providing feed. (Fig. 69)

A set-up similar to the *tongsi* of *Jeju-do* could be found in *Okinawa*, Japan, were referred to as *huuru*, which also translates to "pig toilet". (Fig. 70) [Kato, 2000:112; 129] Such toilets could also be found in China and India.

#### Urban hanok

In order to adapt to the space limitations in urban areas, traditional rural floor plans were reconfigured for city *hanoks*. The decrease in size naturally also translated to the interior, with spaces now differentiated by function rather than occupant, as was commonplace in the countryside. [Jun, 2013: 166] This made urban *hanoks* more suitable for a nuclear family, as opposed to housing several generations. [Park et al, 2015:10] Most city *hanoks* came in standard shapes, which were based on *Hangeul* (Korean alphabet) letters. Large houses were rectangular in shape, resembling *mieum*, while the mid-sized U or C-layouts were reminiscent of *digeut* and small houses were formed as L like *giyeok*. [Park et al, 2015:10; 12]

The majority were slight abbreviations of traditional *Gyeonggi-do* houses, with their C-shaped layout usually formed by an "inner" building (*anchae*), formed like a reversed L, combined with a linear "outer" building (*bakatchae*). Facing each other, these two quarters formed a closed compound with a courtyard in the middle. [Jun, 2012: 231-232]

#### **Gate house: Munganchae (also Daemunchae)**

Some urban hanok had a detached *munganchae* or "gate building". [Jun, 2013: 165] Placed front-most to the street, its spaces were often used as shop, either by the owners themselves or rented out. [Savage-Landor, 1895: 92]

#### **Main living space**

A main novelty was the integration of the *sarangchae* into the *anchae*, resulting in one family space. [Jun, 2013: 165]

#### **Wooden-floor hall: Daechyeong**

Foregoing the *sarangchae* left the compound with only one *daechyeong*, as opposed to the standard two, which was now used for daily activities. Usually received in the eliminated, more formal hall, guests were now greeted in the living space. [Jun, 2013: 165]

#### **Kitchen: Bueok**

Although the kitchen was also affected by the size reduction, this had no influence on its lower positioning compared to the other spaces. [Park et al, 2015:12]



Fig. 72: maze-like alley (gosat) leading to a banga

### **Transitory spaces and thresholds**

Thresholds are physical or symbolic zones, which become apparent when casting aside any kind of separating structure. Realms in traditional Korean residential architecture are distinguished by the position of the onlooker. Here, neither outdoors and outside, nor indoors and inside mean the same. Outdoors and indoors generally refer to semi-private and private spaces, while the outside and inside can be understood as transitioning from the public into the semi-public sphere. [Sarvimaki, 2003:109] Looking at the set-up of *hanok*, it becomes clear that these buffer spaces play an important role, not only in pointing at borders, but also in providing a symbolic meaning. Koreans believe that a living person setting foot on a threshold leads to misfortune, a superstition related to death, which goes back to the Mongol invasions. During this time, it was better to die at home, from where the coffin with the deceased would be carried out by crossing the threshold of the front door, the boundary between the real world and the afterlife.

Similar to Korea, it is considered impolite and to be avoided to step on the threshold upon entering a Mongolian *yurt*. This is because it conveys the sanctity of the *yurt*, which itself represents the universe. [Gauvain, 1982:34]

Other cultures such as Finns, Egyptians and Syrians also refrain from stepping on a home's threshold and rather step over it, as they believe spirits to be living beneath it. In North America, unlike in Korea, thresholds and entranceways seem to hold little to no cosmological or religious affiliations. [Gauvain, 1982:33-34]

#### **Banga**

##### **Access area**

*Banga* are surrounded by rather high walls and come with an entrance gate, both elements which prevent intrusion of all sorts. Although possible intruders could not be seen from afar, this was compensated by the fortifications.

##### **Surroundings**

Within villages, the entrances to *banga* were situated at the end of maze-like paths. (Fig. 72) Often following topography, they emphasized seclusion and thus ensured privacy. These *gosat* ("alleys"), right outside the main gate, functioned as buffer in preparing oneself before crossing the threshold into the compound. [Kim et al, 2018:1]

Buffer spaces placed before a compound entrance are also found in Islamic cultures, where they are part of the sequence leading from public areas to private ones. Depending on the stage of progression, these are termed differently. [Rieh, 2003:72-73]

##### **Point of entry: Gate**

*Banga* come with two types of gates, differentiated by location and function. Gates are generally understood to be openings, which enable access to enclosed premises.





Fig. 73: main entrance gate (soseuldaemun) of a banga compound

es and thus “ [...] situated on the boundary between [...] [two] worlds”, as An explains. [An et al, 2017:117] While, in case of *bangha*, perimeter gates are used to leave the general public sphere and enter semi-public areas, other gates connect the yards of separate quarters within the compound. [Kim et al, 2018:1] The *soseuldaemun* or “front gate” of *bangha* was directly connected to the *daemun-gan* (“entrance building”) and levelled with it in height. [Cho, 2013:144] (Fig. 73) Signalling the entrance into the wall-enclosed compound, it was protected by an ornamented, pagoda-style roof. [Savage-Landor, 1895:138] Residences of generals or princes could have additional



Fig. 74: jungmun (gate to the inner quarters) of a banga

gates set before this main one. Also known “lofty gate”, the front gate was generally located in the South and if possible, built to face away from the main road or front, so that evil spirits would not find their way into the house. [Kim et al, 2018:1] [Yi, 2015:94] This is rooted in geomantic considerations as well as historical invasions, which generally occurred from the North. The *jungmun*, which translates to “middle gate” separated the *anchae*, the “inner” area, from the *sarangchae*, the “outer” part. [Yoon, 2001:3] [Cho, 2013:144] (Fig. 74) By facing different directions, the main and middle gates block intrusive views from the street. [Jung, 2014:63] [Yi, 2015:160; 197-198] Compared to the *soseul-daemun*, this type of gate is lower and more narrow. In smaller compounds it may be directly integrated into the building. [Choi, 2007:68] [Sarvimaki, 2003:91]

The main gate (*damen*) of Chinese courtyard residences, unlike its Korean counterpart, is located in the south-eastern corner [Yoon, 2001:4], which is due to the houses opening up to the South as consequence of the North being considered an “unlucky” direction. [Sarvimaki, 2000:137] (Fig. 75) This gate is the only entry point to the compound, which is enclosed by grey brick walls, the back and side one lacking windows and doors altogether. [Knapp, 2004:20] In order to derail evil spirits, who were believed to only be able to move straightforward, screen walls were placed right after the entrance gate. [Sarvimaki, 2000:124]

The Japanese, like the Chinese, regarded the North-East and South-West as dangerous for an entrance, which was due to demons believed to come from these directions. [Sarvimaki, 2000:149] This, and the fact that *Shinden-zukuri* homes were arranged from East to West, explains why the main gate *seimon* and rear gate *uramon* were located in the eastern and western walls, respectively. [Higashino, 2003:25-28]

Like upper-class Koreans, cultures all over the world make use of gates or courtyard doors to enter family compounds.



Fig. 75: entrance gate (damen) of a Chinese Siheyuan

### Verandas and porches

Wooden floors of varying width can, depending on their area of placement, function as transitional areas between the interior and exterior spaces of a *hanok*. (Yoon, 2001:3) Floors like these, in varying set-ups, can be found in many other cultures all over the world.

#### Wooden floor: Maru

As mentioned before, *maru* refers to elevated, semi-open areas with hardwood flooring, which are unheated and thus hardly used during winter. *Maru* are generally only found in dwellings of more than four bays, where they then make up the majority of spaces. Several types are differentiated by function, which varies with placement in the house, and by arrangement of the floorboards.

In Japan wooden-floor verandas like these are referred to as *engawa* or *en*. (Sarvimaki, 2003:105) While *kure-en* refer to those with the long sides of the board-flooring exposed, *kirime-en* have their cross-cuts visible. A special kind, *takesunoko-en*, comes with a floor made from slatted bamboo. [Neighbour-Parent (2), 2018:1]

#### Main wooden-floor hall: Daecheong-maru

The *daecheong* ("large hall"), with *maru* signifying a wooden floor, is usually the biggest space within a building (*chae*). (Fig. 76) In a *banga*, it is situated between the inner room and opposite room of the *sarangchae* or *anchae*. [Choi, 2007:84-85] This semi-open, multiple purpose-space is used for activities such as receiving guests, holding family events, relaxation and sometimes, dining. [Jackson et al, 2012:74-76] During summer, when used as living space, the shutters of the unattached sides are hinged open, connecting indoors and outdoors. [Choi, 2007:63] Privacy is provided by bamboo mats, which are hung in a way to still allow for breezes to pass through. [Rieh, 2003:70]

#### Pavilion-like veranda: Numaru

The *numaru* is a roofed area placed either in front of the entrance or at the corner of the *sarangchae*, less commonly the *anchae*. Attached at only one side, it was most often connected to the *sarangbang*. (Choi, 1999:93) (Fig. 77) Panels, installed on the three exposed sides, could be hooked up on the ceiling or folded, opening up the *numaru* and giving it a pavilion-like feel. [Sarvimaki, 2003:97] This technique, paired with its elevation of one to two *cheok* (about 60cm) above the other rooms, allowed for good airflow during the humid Korean summer months. On cold days, or if otherwise necessary, the panels would be closed, which resulted in a protected space. [Choi, 2007:61-63] While the *numaru* was primarily used by the mistress or master to receive guests, entertain them and generally enjoy the scenery [Jackson et al, 2012:76], in the summertime, it would also be used for dining. [Choi, 2007:84-85]



Fig. 76: wooden-floor hall (daecheong-maru) of an upper-class residence



Fig. 77: pavilion-like veranda (numaru) of an upper-class residence

#### Wraparound porch, walkway: Toetmaru

A *toetmaru* (also *toenmaru* or *toimaru*) is a wraparound porch or walkway, found on either side of a building and placed within the realm of the columns, thereby serving as a type of hallway from where the rooms are entered. [Choi, 2007:67] (Fig. 78) The appearance of this passageway changes with the state of the windows, closed or opened, which separate it from the interior. [Yoon, 2001:3] Laid out with wooden boards, this narrow floor is attached to the outside walls and placed underneath the eaves, which form a canopy and protect it from the weather. Facing the ground surrounding a building, it is elevated at the same level as the inside spaces, a height suited for adults to comfortably sit on when bending their legs. [Choi, 2007:67] The floorboards of the *toetmaru*, which could be stepped on only after having removing ones shoes, were most often arranged in a chequered pattern referred to as *umulmaru*. [Lee, 2012:1] [Choi, 2007:67] This structure not only served as a walkway, but was also used for having conversations.

The Japanese equivalent to the *toetmaru* is the *hiro-en* (also *hirobisashi*), the deep veranda of a traditional Japanese house. (Fig. 79) This extended area, attached to the core (*moya*) of the building, is covered by the elongated eaves and may be partially enclosed, [Sarvimaki,





Fig. 78: wraparound porch (toetmaru) of a banga



Fig. 79: hiro-en (broad veranda) of a traditional Japanese house



Fig. 80: ochi-en (narrow veranda) of a traditional Japanese house



Fig. 81: traditional Vietnamese long-house with veranda at the front

2003:105] Placed one step lower than the adjacent interior or the broad veranda (*hiro-en*) is the *ochi-en* (also *nure-en*). This narrow veranda, referred to as “wet” floor, is placed beneath the eaves, but may still be subjected to rain, hence the name. (Sarvimaki, 2003:105) [Neighbour-Parent (2), 2018:1] (Fig. 80)

Also in line with Korean *toetmaru* are the narrow porches spanning across the outside of Taiwanese rooms. [Chiou, 1996:697]

*Vietnamese houses* also have verandas placed at their front side, functioning as a transitional space between the courtyard and the interior. They are equipped with bamboo screens, which block the sun from heating up the inside spaces. (Nguyen, 2014:44) (Fig. 81)

#### Narrow side floor: *Jjokmaru*

The *jjokmaru* (“side” floor), located in front of doors and windows, is an outer veranda used instead of a *toetmaru*. [Jackson et al, 2012:76] (Fig. 82) Although also protected by the eaves, it is placed outside the pillar-zone and at a lower level. When installed on a high foundation, the open sides of this intermediary area would be secured with railings made of latticework (*gyolan*), which were placed between posts. (Fig. 83)

The Japanese equivalent to the *jjokmaru* is known as *ochi-en*. [Sarvimaki, 2003:105]

Sometimes it is constructed adjacent to, but offset and lower than a broader floor called *hiro-en*. A third type, referred to as *nure-en* might additionally be placed on the lowest level. Two or all three put together then assist in ascending to the top. [Neighbour-Parent (3), 2018:1]





Fig. 82: jjokmaru (narrow side floor) of a banga



Fig. 83: jjokmaru (narrow side floor) with railings (gyolan)



Fig. 84: narrow open entrance to a minga



Fig. 85: broad open entrance to a minga

## Minga

### Access area

#### Surroundings

Unlike *banga*, the fences or walls surrounding *minga* function as limitations rather than barriers. Low in height they let views in, as does the hole where a gate would be expected. These low boundaries and straight paths ensured that approaching visitors could be seen from afar, an important aspect due to the lack of fortifications.

#### Point of entry: Perimeter opening

Managing without entrance gates or locks, an empty spot in the fence points out the entrance to a rural *minga*. (Fig. 84) (Fig. 85) This signalled to villagers that they were welcome at all times, which facilitated communication, an important aspect in the countryside. [Arirang, 2013:1] While this was true for most *minga*, some homeowners

equipped the openings with hurdle doors called *bajamun*, constructed from readily available materials such as branches, reeds, straw and the like. On *Jeju* island, a log known as *jeongnang* marked the transition from the outside to the inside of the compound. [An et al, 2017:120] Similar to Korean homes, instant visual contact is also an important aspect in approaching a Mongolian *yurt*. Outsiders always come from the East, the direction in which the entrance is positioned. As it is always kept open, homeowners can spot visitors from afar, enabling them to make out their intentions.

### Verandas and porches

#### Main wooden-floor hall: Daecheong

Like *banga*, lower-class homes, especially those in the centre and the South, made use of a semi-open, wooden-floor hall (*daecheong*). It was of particular importance





Fig. 86: wooden-floor hall (daechong) of a lower-class house



Fig. 87: deulmaru (field floor)



Fig. 88: toetmaru (broad side floor) of a minga

when placed in the centre of the house, since it then served as connection between all other rooms, most of which were *ondol-bang*. [Jackson et al, 2012:73-74] (Fig. 86) In the North, where *minga* generally did not have a *daechong*, which was due to the colder climate, its tasks were fulfilled by the main living space situated between the kitchen and the bedrooms.

#### Field floor: Deulmaru

*Minga* dwellers most often employed *deulmaru* ("field floor"), elevated platforms made of wood, which could be transported to the most convenient spots. When placed next to the outer walls and before entrances, it was stepped on when walking inside. [Jackson et al, 2012:78] (Fig. 87)

#### Broad, wooden side floor: Toetmaru

Like the upper-class, the occupants of *minga* also equipped their buildings with *toetmaru*, wooden side floors, which functioned as transitional areas. (Fig. 88)

#### Narrow, wooden side floor: Jjokmaru

As previously explained, the *jjokmaru* is a narrow wooden floor placed next to the facade and under the eaves. (Fig. 89) Due to being protected from the rain, people would often store their firewood underneath it to keep it dry.



Fig. 89: jjokmaru (narrow wooden floor) attached to a lower-class house





Fig. 90: alleyway in-between urban hanoks

### Urban hanok

#### Access area

Unlike their rural counterparts, city dwellings were most often built adjacent to the street. The front-most parts of the house thereby served as a perimeter boundary, with their height blocking unwanted views and ensuring privacy. (Fig. 90) Like *banga*, city *hanoks* made use of high gates, which allowed access to the enclosed plot. Due to their smaller size and different set-up however, they only came with a main gate (*soseuldaemun*).

#### Verandas and porches

The decks used in urban *hanoks* were similar to those of rural ones, although reduced in scale and quantity.

#### Main wooden-floor hall: Daechyeong

As explained before, urban homes combined the main hall of the *anchae* and *sarangchae* of rural *banga* into one living area. This left the dwelling with only one *daechyeong*, instead the two of rural *banga*, which is why it was used for representative and everyday purposes.

#### Side floors: Toetmaru and Jjokmaru

While some urban hanok made use of *toetmaru* (broad, wooden side floor), the narrower *jjokmaru* were more suitable for the limited space.

### Exterior spaces

Although a building's envelope is often seen as determinant for a space to be considered interior or exterior, making this distinction regarding *hanok* is rather difficult. [Choi, 2007:63] Due to its often multi-fold set-up and segregation, within the compound or the buildings themselves, an onlooker's positioning is often the deciding factor. [Choi, 2007:67]

#### Banga

##### Courtyard: Madang

*Kim* explains that, despite differences in scale and spatial composition, the heart of a *banga* is always its courtyard or *madang*, which is enclosed by buildings whose openings face towards it. [Kim, 2008:5] *Cho* too describes courtyards as one of the three parts forming a *bang*, the other two being buildings and perimeter walls, respectively. [Cho, 2013:142]

#### Layout

While each *banga* had at least one courtyard, most incorporated more, with their actual number depending on the size of the residence. All courtyards were ascribed to individual quarters, assigned through status and gender, with walls representing their borders. [Lee, 1991:66-67] The *anmadang* or "inner yard" belonged to the inner quarters occupied by women and children. (Fig. 91) Men and guests used the *sarang-madang* or "outer yard". Big compounds had a third one (*haengnang-madang*), which was attached to the servant's quarters. Since the courtyards connected all structures ascribed to them by having windows or doors facing towards the void, built links like corridors were unnecessary. This set-up was not only ideal considering practicality and climate, but additionally met social and cultural needs. [Lee, 1991:68]

A *central* courtyard enclosed by rooms, comparable to a *banga's* individual yards, was also typical for Roman, Grecian and Egyptian dwellings. [Jung, 2014:112]

Many Chinese compounds, like the *Siheyuan*, were likewise based on this principle. Their main courtyard was a multifunctional space, not only used for entertainment and relaxation, but also for housework like washing and drying. [Yoon, 2001:7] (Fig. 92)

Also comparable are typical Taiwanese courtyards (*he-yuan*), which were enclosed by the *zheng-shen* (main building) and two *hu-longs* (side buildings). [Chiou, 1996:700]

Nature also plays a big role in Vietnamese houses, which come with one or more courtyards and a garden. Both of these contain water features and plants, which help in creating a microclimate that is cool in summer and warm during winter. The courtyard situated in front of the main house links the living quarters with the service areas, comparable to the courtyards of *banga*. [Nguyen, 2014:42; 44]



Fig. 91: inner courtyard (anmadang) of a banga

### Size

The scale of a courtyard was always directly linked to plot size, which in turn was determined by status and financial means. Based on importance, either the size of the buildings or that of the outdoor spaces was defined first, leaving the rest for the other. [Choi, 2007:63]

### Functions

Regarding their allocation, the courtyards served as transition between areas with different levels of privacy. [Joh, 1999:62-64] While the first courtyard (*sarang-madang*) connects the public with semi-private areas, making it semi-public, the semi-private inner yard (*anmadang*) protects the private women's spaces. [Jung, 2014:170] [Rieh, 2003:70-71] Referring to its purpose, Choi explains that "[...] the courtyard functioned not as a spare for viewing or appreciation, like a garden today, but as a practical place [...] [for] daily activities [...]." [Choi, 2007:63] It was furthermore a significant domain for social interaction, with users depending on their attachment to the individual quarters. The *anmadang* served as an extended work area for household chores, such as washing and drying clothes. [Yoon, 2001:7] Due to being enclosed, it also provided a cool spot during warm summer days and was ideal to supervise playing children. [Lee, 1991:68] Visitors would pass through the *sarang-madang* in order to reach the male quarters [Yoon, 2001:7], a space which would also be used for activities such as holding ancestral rites, weddings or funerals. [Lee, 1991:68] The *haengnang-madang*, allotted to the servant's quarters, served as workspace. [Lee, 1991:69] If required, the generally empty yards would be equipped with portable furniture, varying by occasion. [Yoon, 2001:3; 7]

### Characteristics and symbolism

A *madang* was, no matter how ornate or big the *hanok*, generally left empty rather than being equipped with plants or fixed furnishings. [Chiou, 1996:691] (Fig. 93) This seemingly little regard or necessity for ornamental gardens hadn't escaped *Savage-Landor*, who ascribed it



Fig. 92: main courtyard of a Chinese Siheyuan

to a lack of interest in flora and fauna. Koreans however, who sought harmony with nature in all they did, left their yards in their natural state because they didn't believe human intervention could bring improvement. [Sarvimaki, 2000:143] This organic and unpretentious character, which can be observed in all of traditional Korean architecture, brought seclusion and a calming environment into the compound. [Kim et al, 2018:1] The air that spread in the void furthermore symbolically connected the sky and earth. [Kim, 2008:5-6] "Beautified" gardens were, if at all, only found in very wealthy households and then small in size. Kitchen gardens however, had a place in every home, regardless of status. [Savage-Landor, 1895:138] *Although planned*, Chinese gardens were also rather free and organic. This was in stark contrast to the dwellings themselves, which followed axial symmetry. The yards aimed to convey a sense of relaxation and contemplation, whether for individuals or groups. [Sarvimaki, 2000:123-124] Based on Taoist and Buddhist principles, this approach aimed to recreate a landscape in miniature form. Upon passing through, glimpses behind, for example trees, rocks and the like, repeatedly opened new views, thereby conveying the feeling of larger environment. [Choi, 2007:61]

*Japanese gardens* on the other hand were manipulated to a high degree, which gave them a very neat and artistic appearance. They also followed the concept of recreating a landscape on a smaller scale. [Choi, 2007:61]



Fig. 93: vacant, outer courtyard (sarang-madang) of a banga



### Storage spaces and areas

#### Platform or stand for earthenware jars: Jangdokdae

Fermented produce and condiments, which are a large component of Korean cuisine, were stored in earthenware jars referred to as *onggi* or *hangari*. They were placed in groups on the *jangdokdae*, a designated platform lifted slightly from the ground, which was usually located in the yard of the women's quarters, right off the kitchen, or near a well. [Lee, 2012:93] Stored foods included soy sauce, *gochujang* (red chilli paste) and the national dish, *kimchi*. (Fig. 94) Situating the *jangdokdae* in the eastern corner of the yard, allowed *onggi* to receive lots of sun, thereby speeding up the fermentation process. [Lee, 2012:93]

*Onggi* are similar to *orci* found in Italy, terracotta jars used to store wine, water, barley and rice. [Savage-Landor, 1895:142]

### Minga

As mentioned before, the outdoor areas of *minga* were far less expansive than those of the upper class. [Choi, 2007:63]

#### Courtyard, threshing floor: Madang

Most *minga* came with only one *madang*, that was either placed before a sole building, or was partially enclosed by the main and subsidiary buildings. (Fig.95) [Choi, 2007:63] Besides practical purposes connected to farming, such as threshing grains during harvest season, it also served as meeting place for the family and neighbours. [Yoon et al, 2001:7; 9-10] When viewed in terms of transition, it served as guide from the public path to the semi-private main space, which gave it a semi-public connotation.

### Garden

While the majority of *minga* had a kitchen garden, their occupants had even less use for ornamental gardens than people of the upper class. This is not surprising, considering that the lower classes would have had neither time nor opportunity to indulge in enjoying the scenery. [Savage-Landor, 1895:138]

### Storage spaces and areas

#### Jangdokdae: Bay for earthenware jars

Unlike the podium-like *jangdokdae* of *banga*, those of *minga* were bays, either gravelled or laid out with stone slabs. (Fig. 96) Due to the lack of a spacious backyard, these were located in the front yard for everyone to see. Considered an indicator for the housekeeping abilities of the wife, they were always well looked after. [Lee, 2012:93]

### Granaries

Some *minga* had their own structures for storing grains or hay for feeding. Most often round in shape, they were protected by thatch. (Fig. 97)



Fig. 94: jangdokdae (platform for earthenware jars)



Fig. 95: courtyard (madang) of a minga



Fig. 96: jangdokdae (bay for earthenware jars) of a minga



Fig. 97: granary of a lower-class house



Fig. 98: storage beneath the eaves of a minga

### Under the eaves

Occupants of traditional dwellings were quite resourceful by making the best of what they had at their disposal. This can also be observed in how they stored certain things. The area below the eaves, protected from the weather, naturally offered itself to store farming tools, which were leaned on the facade or hung. Furthermore, foods like chillies, corn and garlic were left to dry on hooks, where they were out of reach for animals. Wood was also generally stored here, then arranged under the *toetmaru* (elevated wooden platform), which offered additional protection. (Fig. 98)

### Urban hanok

#### Courtyard: Madang

The limited space city *hanoks* had at their disposal affected both indoor and outdoor areas, which is why the amount of space granted to either was of greater importance than in the countryside. Increasing the outdoor space meant decreasing the living quarters and vice versa. [Choi, 2007:63] As a consequence, the several courtyards found in rural *banga* were combined into one *madang* which, although rather decent in size, provided the homes with sunshine and ventilation, thereby creating a pleasant microclimate. Enclosed by buildings, of both the own compound and neighbouring ones, this single outdoor space functioned as a buffer between the public

street and the private living areas, not only protecting it from glances but also noises. It furthermore served as extension of the interior work and living spaces. [Lee, 1991:68]

### Livestock

Occupants of urban *hanoks* were not farmers, which is why there was no need for buildings such as barns.

The same applies to Japanese *machiya*, townhouses of merchants and craftsmen.

### Boundaries and borders

#### Intangible: Spheres

Rieh explains that boundaries, both tangible and intangible, create different domains within the Korean traditional house. This distinction is rooted in the Koreans' belief of balanced dualism and its contradictory forces *yin* and *yang*. Regarding residences, they are reflected in spheres such as inside and outside, female and male, public and private, sacred and profane. [Rieh, 2003:72; 77]

The people of Java too, believe that the cosmos or "natural universe" is kept in balance by a variant of opposing concepts, such as day and night, light and darkness, heaven and earth, left and right, male and female. As they perceive their dwellings as microcosms within the universe, they seek for the same balance on their inside too. [Ju et al, 2018:71]

Western culture, unlike its eastern counterpart, favours "selective dualism", where one force is chosen and the opposing one refused. [Kim, 2008:6]

Russian upper class compounds called *khormy*, too had different areas for the head of the household and the rest of the family. The wife's chamber, as well as those of the children and other relatives were placed separately. These spaces were linked by passages and inner porches (*seni*). [Ivanova, 2011:1]

### Male and female

As mentioned before, the Neo-Confucian beliefs of *Jo-seon* society required women and men to occupy separate quarters. [Jung, 2014:149] Making this distinction was practiced throughout all social classes, albeit expressed in different forms. Whereas the poorer people had to make do with private rooms, the upper-classes utilized separate buildings or wings. [Barrera et al, 2013:205] (Fig. 99) (Fig. 100) Within *banga* compounds, females were relegated to the private inner part, while males resided in the more public, outer area. These were separated by walls, with only a gate allowing entry, which was arranged in a way to prohibit unwanted views. Small openings on the top and at the lower end however, made interaction possible. [Rieh, 2003:74] Not only was the function of the spaces impacted by gender, their location was too. As mentioned before, each space was assigned to a cardinal direction and was placed at a certain distance to



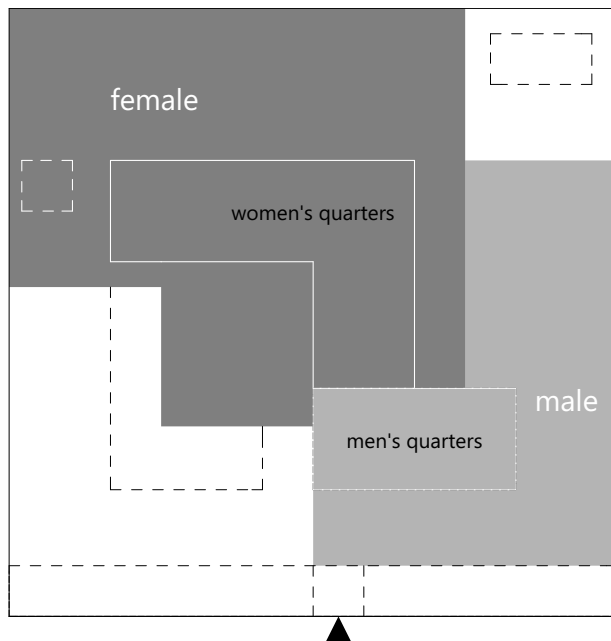


Fig. 99: male and female spheres of a banga compound

the entrance gate, both of which are practices that can be found in many other cultures. [Lehner (2), forthcoming:22-24] While the women's area could be found in the West, which Confucianism ascribes to injustice and darkness, that of the males was located in the East, the direction connected to righteousness and justice. [Lee, 1991:69] [Choi, 2007:68] The respective quarters were placed in such way, that the females could not leave the house without being seen by the men.

The distinction by gender not only dominates the structure of a *hanok*, but also the set-up of dwellings in Islamic cultures, where a strong need for privacy results in females being cloistered in the home. [Rieh, 2003:74]

*Bedouin tents* are split in a female and a male realm, with the former further divided amongst wives. This interior layout is identical among all classes, although more pronounced in some cases. [Gauvain, 1982:38-39] The division into the different areas is achieved with a curtain (*gata*), which extends to the outside. Females thus remain



Fig. 100: male and female spheres inside a minga

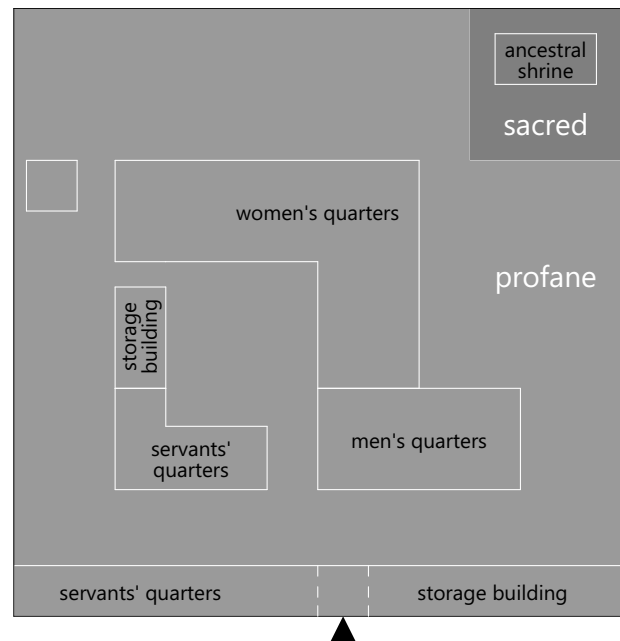


Fig. 101: separation of the sacred from the profane in a banga

hidden when passing food to male visitors, who would sit on the other side. When guests stayed overnight, they would also sleep in this section or lie down outside. [Gauvain, 1982:33; 41-43]

In Egypt, genders also always have their own spaces. While the wealthier have individual rooms, poorer people use different corners of the same space. [Rieh, 2003:74]

The Rajput caste in India often separates male and female quarters by large distances. While men's houses are placed on platforms and are visible, female dwellings are hidden by high walls. [Gauvain, 1982:42]

Although consisting of only one space, the tipis of the Plains Indians are subdivided into areas, mostly according to gender and age. Strongly influencing ones rank, these criteria assign people to certain places. [Lehner (2), forthcoming:16-20]

The Javanese relate women to the inner, rear portion of the dwelling and men to the front part. Females are furthermore associated with darkness and shadow, males on the other hand with brightness and reality. [Rieh, 2003:74]

### Sacred and profane

According to Rapoport, "The prevalence of sacred or privileged corners and sides is almost universal." [Rapoport, 1969:54] The correct placement of objects, especially those with sacred connotations, is as essential in Korean dwellings as it is in many other cultures. Neglect in this regard would cause a sense of disturbance, inevitably requiring rituals to purify the space. [Lehner, forthcoming:28] In Korean upper class compounds, the sacred ancestor worship space is located in the rear yard, separated by a gate from the profane main body of the living space, where everyday life is conducted in. [Rieh, 2003:77] (Fig. 101) Further emphasizing its status as most important



space within the *banga*, this *sadang* (ancestral shrine) was located furthest from the entrance gate. Lower classes, who did not have the financial means for a dedicated individual building, worshipped their ancestors by placing a shrine into one corner of the main hall. [Yoon, 2001:1] During the Ming and Ching dynasties, the Chinese of all classes placed their ancestral shrine inside the residence. [Yoon, 2001:1]

Inside a Mongolian *ger* or *yurt*, each object has its place, among them an altar representing the Buddha. This sacred area, the most revered of the four spaces found within a *yurt*, can be found on the opposite side of the entrance. [Lehner, forthcoming:28-30] [Rieh, 2003:75]

Likewise, the Plains Indians assign all objects and symbols to a certain place inside their *tipi*. Like in *yurts*, the altar is located in the area opposite of the entrance, which is considered the most sacred. [Lehner, forthcoming:28-30] A distribution of ritual spaces is also found in the Arab tent. The precise locations however differ by tribe. [Rieh, 2003:75-76]

The Javanese consider the centre of their house as sacred, which is why the area is highlighted by decorations and darkness. [Rieh, 2003:76]

In a Chinese home, although considered sacred as whole, the north-western corner is of utmost importance. [Rapoport, 1969:54]

### Upper (main) and lower (secondary)

Hierarchy was another factor distinguishing *banga* spaces. The *anchae* and *sarangchae*, women's and men's quarters respectively, were classified as "upper", while the servants' quarters (*hengnanchae*) were regarded as "lower". (Fig. 102) These areas were separated by the "middle" space, represented by the *junmungan* or "middle gate".

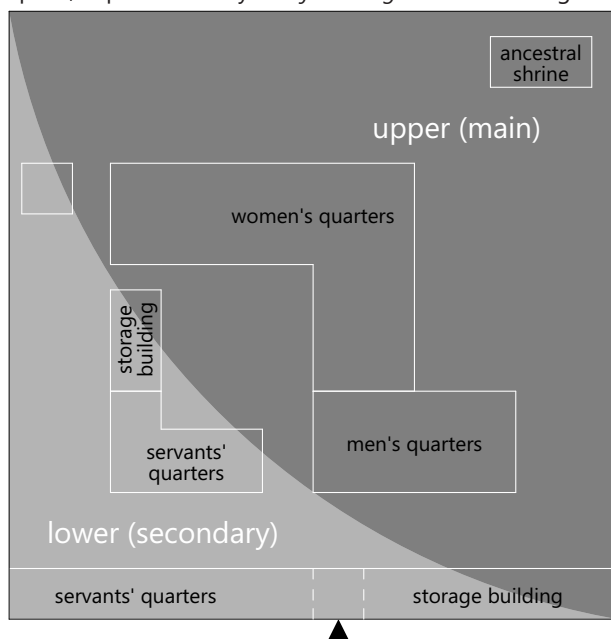


Fig. 102: distinction of upper (main) and lower (secondary) *banga* spaces

[Yoon, 2001:3] Its importance and necessity determined the value of a space, which is why the *anchae* and *sarangchae*, essential parts of all *banga*, were regarded as main or central spaces. This was also the case for the *sadang*, the most revered building of all. Although *hengnanchae* (servants' areas) were found in the majority of upper class dwellings, they were not seen as an integral part and thus regarded as secondary or additional spaces. This was also the case for the kitchen and other service spaces which, although necessary for running the household, were not being personally used by the master or mistress.

The same was true for traditional Taiwanese residences, where the main building (*zheng-shen*) was placed transverse to and centred on the axis. Additional spaces like the *hu-long*, were built parallel to it, on the left and right side, a sign for their secondary status. [Chiou, 1996:691]

A Mongol *yurt* is divided into four spaces. While the one opposite of the entrance is reserved for the altar, the allocation to the remaining areas may vary. The husband and wife may sit to the right side of the door, facing the guest of honour on the other side. Other guests may be seated to his left, descending according to rank. [Rieh, 2003:75-76]

### Light and darkness

*Ondol* rooms are rather compact and equipped with only the most necessary openings, especially in *minga*, all of which is based on heat preservation considerations. Due to this, these *bang* ("rooms") are quite dark by nature. *Maru* spaces on the other hand are either semi-open or have windows spanning entire walls, which allow for a considerable degree of opening. This enables daylight to flood these areas, and bestow them with brightness. (Fig. 103) Considering that *maru* floors are generally applied in gathering spaces such as the great hall or verandas, light can be associated with the public sphere. In contrast to this, *ondol* is usually installed in rooms used by only the family or individuals, making a connection of darkness the private realm plausible. As these relationships have



Fig. 103: view from dark *ondol-bang* onto the bright *daechyeong-maru*

a largely practical background, the association is more apparent in *minga* than in *banga*.

*The same* association is also true for Taiwanese houses, where the private bedrooms are darker than the semi-public central room. [Chiou, 1996:698]

*Comparisons* can also be made with *joglo*, traditional Javanese aristocrat compounds, whose basic type is made up of a front and a rear structure. Here, the privacy level and darkness increase with the depth of the dwelling. Reminiscent of a pavilion, the front part *pendapa* is the airy and bright portion. Placed under male authority, this space is used for receiving guests and holding gatherings, thereby essential for the social life. The *dalem* ("inner part") in the rear, on the other hand, is fully enclosed by thick walls. A dark and protected place, this female realm is used for nurturing the family and to worship ancestors.

### *Indoor and outdoor*

Korean houses are set up to enable a controlled interaction between the interior and exterior, with transitional spaces located at the point of connection. [Rieh, 2003:70] This link most often appears in the form of a change in flooring or semi-open spaces such as the *toet-maru* and *daecheong-maru*, which will be described later on. The degree to which the natural and built environment connect with each other is also very much dependent on the status of the openings placed in between. [Yoon, 2001:3] Since some of these span entire walls, opening them fully would mean an extension of the interior dwelling space, making a clear-cut distinction next to impossible. [Lee, 1991:67; 74] Only if this is neglected can spaces be divided into the exterior domain of the courtyard and an interior one, which is not necessarily fully enclosed. Examples for features that mark the difference are the protection by a roof and a change of flooring. [Choi, 2007:61]

### *Private and semi-private*

Being able to recognize the boundary between the private and semi-public domain in a Korean home, although not an easy task, is integral in determining who is allowed to enter which part of a house. An indicator for this can be the area where visitors are made to wait before they are formally received further in, with the contact point between the two representing the boundary. Looking at the structure of Korean dwellings, it becomes apparent that privacy, and with it difficulty in gaining access, increases with distance to the front gate. Playing a huge part in this is gender separation, which assigns the introverted back of the house to the females, while men occupy the extroverted front. This explains why guests, generally received by the master, are allowed only in the front-most part of the residence. This sense of hierarchy is not only enhanced by gates, but also by thresholds, screens, fences and walls. [Rieh, 2003:72-73] When mul-

tipurpose spaces, which make up the majority of Korean homes spaces, are concerned, privacy is determined by function and time of day, rather than physical boundaries. *The need* for protecting privacy can also be witnessed in traditional Japanese homes. Even the most simple ones have separating walls, albeit thin, placed between the bedroom in the rear and kitchen in the front. [Gauvain, 1982:43]

### *Semi-public and public*

Privacy concerns often call for features that can be used to regulate the degree of openness between the protective realm of a dwelling (inside) and the harsh outside world. Entrance doors or gates are just one possibility to signal the owners' desire (or lack thereof) for interaction, which can vary by factors such as the time of day. [Gauvain, 1982:39; 41] While *banga* made use of gates, the owners of *minga* left this area open in order to strengthen bonds with neighbours, which were very important, especially in rural areas.

*In some* areas of Asia and the Middle East, dwellings tend to have only blank walls with no windows facing the public sphere, thereby limiting bonds with the community. [Gauvain, 1982:31]

*In the* Japanese hamlet of *Taira*, dwellings are built so close to each other, that neighbours can converse while staying at home. The main living space, situated in the front can be fully opened to the outside, thereby allowing in views from the street. Properties are also arranged semi-publicly and are regularly crossed without permission. [Gauvain, 1982:41]

*Some communities* in Indonesia encourage social contact among residents, by allowing easy access to the dwelling during the daytime, which at night turn into a private domain. [Gauvain, 1982:41]

*Houses in Tarong* village, in the Philippines, are arranged in neighbourhood groups and thus easily accessible through footpaths, which enables social control. Building one's house away from the communal yard is considered antisocial and thus frowned upon. Front porches serve as main areas of activity, being used not only by their owners, but also by neighbours and guests. Slightly elevated above ground, they are climbed with the help of a ladder, which is put aside in the evening or when nobody is home. [Gauvain, 1982:31; 40; 42]

*Among the Rajput* in India, only the houses of males are visible from the public space. The compounds of the women on the other hand are closed off for privacy reasons. This is especially true for the courtyards, where they spend most of their time. They are enclosed by walls which, except for the single entrance, lack openings. [Gauvain, 1982:42]

*The Bedouins* of the Middle East let seasons define the degree of openness. During the hot summer months, tents are assembled close together, around water sour-

es, with entrances generally kept open to facilitate contact between neighbours. Only curtains, which are hung to keep out wind and sand, provide a certain degree of privacy. [Gauvain, 1982:40]

In North American culture, a sequence leads from the public front path to the semi-public front yard, then onto the semi-private front porch and from there, into the privacy of the house itself. [Rieh, 2003:72] While most often only a change in surface indicates the transition from the sidewalk to the front yard, people subconsciously remain in the public sphere. The rear area, which is for the family only, uses very noticeable physical barriers as protection from the public eye. [Gauvain, 1982:39-40] Privacy, increases with the distance to the street, which also influences the way appearances are kept up. Holiday decorations, for example, are placed in the front for everyone to see, while trash is hidden in the back behind the house. [Gauvain, 1982:29]

During the day, Hare Indians never lock their doors, thereby enabling people to enter as they please, even without announcing themselves. Instead, chimney smoke, or rather its absence, is used to inform of the occupants' wish not to be disturbed. Come night-time however, curtains are drawn and doors locked. [Gauvain, 1982:41]

Iroquois Indians of the US use sticks or poles, positioned in a certain way, to indicate the presence or absence of the occupant, a sign for outsiders to refrain from entering. [Gauvain, 1982:42]

### Community and individual

Although some spaces were enclosed and for personal use, most were used communally, even if only by certain groups. This was due to Korean culture placing community above the individual, a custom based in Confucianism. [Kim (1), 2016:7]

Western homes on the other hand, where practicality is the main concern, have their rooms separated by purpose. [Rieh, 2003:68] In North American homes this translates to an equal distribution of individual and communal spaces, which would be, for example, the kitchen, dining room, living room and bedrooms. Giving people the option to either pursue their interests undisturbed or enjoy the company of others reflects the rather individualist society. [Gauvain, 1982:37]

### Tangible: Structures

All Korean *hanok* compounds had, to varying degrees, structures that separated the semi-public inside from the public outside. [Yoon, 2001:3] This was true for *bang-ga* complexes, encompassing several *chae* (buildings), as well as *minga*. [Jun, 2012:232] Generally referred to as *damjang* (also *ultari*) or "fence", these barriers can be classified by material, shape or function, and indicate the transition from the natural to the human sphere. Unlike those of *bang-ga*, the perimeter structures of rural *minga*



Fig. 104: shrubs serving as fence for a minga

were low in height, which enabled occupants to look beyond their holding and enjoy the scenery. Furthermore, this openness also facilitated communication among members of the community. Although some barriers were "living" ones, "dead" structures were more common, in both *minga* and *bang-ga*. [Neighbour-Parent (6), 2018:1] Likewise, the Japanese use physical border-indicators in their architecture, which simultaneously hide unappealing views. [Peter: 2017:12] They are referred to as *kaki* or *hei*, a general description for fences, garden walls or partitions. [Neighbour-Parent (7), 2018:1] Long fences are known as *oogaki*, while *sodegaki* are rather short. *Shi-kirigaki* are light fences used as dividers in the garden [Neighbour-Parent (8), 2018:1]



Fig. 105: perimeter wall made from soil



### Hedges and shrubs

Although rather rare, some Koreans who did not have the means to build walls, grew plants to indicate borders. (Fig. 104) Most of these *saengultari* ("raw fence") or *sanultari* ("living fence"), were thorny plants and thujas. [Jackson et al, 2012:85]

In Japan, living barriers are known as *ikegaki*, with azaleas being the most common kind. [Neighbour-Parent (6), 2018:1] Some homes were also surrounded by trees or hibiscus hedges. [Gauvain, 1982:41]

Hedges and the like are also utilized in parts of the US, where they are seen as extended threshold to the public sphere. [Gauvain, 1982:34]

In some Canadian regions, high shrubbery or trees are planted in the front yard, in order to protect houses from unwanted views. [Gauvain, 1982:40]

Likewise, many European nations utilize plants to uphold the privacy of their homes. [Gauvain, 1982:34]

### Perimeter walls

In rural Korean villages, perimeter walls were symbolic, rather than absolute, indicators for property limits, which is why they rarely exceeded human height. Most of these walls were built from stone, earth or later on, also brick.

#### Earth, Soil, Mud, Clay

Although not too durable, earthen walls were easy to build and therefore popular. Made from soil, the most basic ones were reinforced with rice straw and topped with strips of it. [Airang, 2013:1] (Fig. 105)



Fig. 107: wapyeondam (wall made from soil and tile fragments)



Fig. 106: perimeter wall combining earth and stones

#### Earth and tiles or stone

Earthen walls also came in combination with stones or tiles. (Fig. 106) More elaborate kinds of these were the *wapyeondam* ("wisdom walls") and *kkochdam* ("flower walls"). (Fig. 107) The former were characterized by a pattern resulting from fragments of tile being stuck into the sides, and topped with roof tiles. [Lee, 2015:12] A *kkochdam*, also topped with roof tiles, featured ornate patterns or Chinese characters. This type was most often used to separate the inner from the outer quarters of a *banga*. [Lee, 2015:12]

The Japanese likewise built earthen walls, with *tsuiji* being a formal style, made from mixture of pounded clay and mud, put between wooden frames [Neighbour-Parent (9), 2018:1] (Fig. 108) These were topped by a gabled roof made from tiles or boards. *Neribei*, a variety of these, are comparable to Korean *wapyeondam*. These mud walls were reinforced by broken tiles instead of a framework and had their upper end protected by boards. Some had the tiles plastered on, rather than inserted. [Neighbour-Parent (10), 2018:1]



Fig. 108: Japanese neribei made from clay and reinforced by tiles





Fig. 109: stacked stones forming a perimeter wall

### Stones

Another popular natural material for border-indicating structures was stone. Used in their original state, the stones were stacked with gaps deliberately left open, rather than being fitted precisely. This enabled wind and water to pass through the stone wall (*doldam*), decreasing pressure on it and thereby keeping it stable. (Fig. 109)

*The Japanese* built similar walls, which they referred to as *ishigaki*. Walls that were made from stone slabs, rather than stones, were called *ishibei*. [Peter: 2017:12]

### Perimeter fences

Many *minga* properties did not use walls, but only light fences to indicate their borders. [Ariang, 2013:1]

*The Japanese* refer to fencing material which is cut and dried as *shinigaki* ("dead material"). Examples are e.g. embedded bamboo posts or stakes, reeds as well as strips of bark. [Neighbour-Parent (6), 2018:1]



Fig. 110: twig fence (ssariul) surrounding a minga



Fig. 111: walls of city hanoks as perimeter boundaries in Bukchon, Seoul

### Twigs

*Ssariul* are light fences made from loosely bound branches or stems of bush clover. [Ariang, 2013:1] These bundles are then stuck into the soil, arranged next to each other in a line. [Jackson et al, 2012:86] (Fig. 110)

*Similar fences* made from branches are found in Japan, with *takehogaki* being those assembled from bamboo reeds and held in place by bamboo stalks. [Neighbour-Parent (7), 2018:1]

### Buildings

Due to limited space, and their layout, urban *hanok* plots are restricted by buildings, rather than fences. [Jun, 2012:232] (Fig. 111) The house itself, most often in U or L-form, together with neighbouring buildings, sometimes also a front wall, enclose a courtyard and thereby serve as barriers. Also functioning as perimeter barrier, in both the city and countryside, was the *daemunchae* or "gate building", which was placed directly next to the public space.



## HABITATION

When looking at *hanok*, it becomes clear that the upper classes had a somewhat different relationship with their houses than the lower classes. While the wealthy were able to enjoy their living environment, which they designed with leisure in mind, the dwellings of the poor rather had a practical background. For the majority of the time, *minga* were places to work and sleep, occupied by people whose lifestyle allowed for little past-time. Being reflections of these different lifestyles, *banga* could be labelled as homes, whereas *minga* are best described as shelters.

### *Behaviour: Patterns and influences*

Housing is understood as an interplay of the built environment, as well as the lifestyle and activities of occupants. Dwellings and dwelling patterns are thereby interdependent, which is why changes to either one directly impact the other.

### Environment

In his 1968 namesake theory, *Barker* states that behaviour is shaped by behavioural settings, which are defined by people, time and geography. [Hematalikeikha et al., 2014:3-4] These cultural phenomena thereby influence setting-patterns, which display aggregation when congruent and separation when incongruent. [Hematalikeikha et al., 2014:12] Likewise, *Rapoport* and *Lefebvre* concluded that space is a product of social circumstance, with its organization reflecting the culture and customs of a certain group. [Hematalikeikha et al., 2014:2] *Pourdehimi* understands culture as any ability or habit a person derives from its social surroundings, with the end product being the lifestyle. Based on this, he makes culture responsible for shaping the built environment. [Hematalikeikha et al., 2014:4-6]

### Individualism vs. conformism

According to *Gauvain*, all cultures are influenced by an interplay of societal control and individual freedom, with neither one prevailing. To him, searching for identification within a community, while simultaneously trying to retain a certain degree of individualism, is an ever present theme. In Korea, where individualism takes a backseat due to being a Confucian and thereby collective-focused society, this has different implications compared to other regions. Prevailing social norms however, always leave their mark on living arrangements, even if to a varying degree. Not only is the location of a dwelling influenced, but so are its external and internal structure, which in turn impacts the use of space. The needs of the occupants are thereby reflected in the house structure itself, while decorations serve as display of status. [Gauvain, 1982:28-29] *Shin* describes vernacular buildings as the embodiment of the lifestyle of their time and its distinct “[...] social, cul-

tural, political and economic environment”. Reminiscent of *Gauvain*, he further states that these elements change simultaneously to society, leaving “[...] original contexts [...] difficult to maintain unless the building itself evolves.” [Shin, 2012:167] Korean culture, with its distinct character, has always influenced the form and layout of the peninsula’s homes, making them a “[...] vital cultural heritage to [...] Korea”, as Lee puts it. [Lee, 1991:75]

### Floor-based vs. chair-based living

Floor-based living, which comes with the custom of removing one’s outer footwear, is not unique to Korea, but also found in other Eastern societies like those of Japan and Thailand. Believed to be rooted in Buddhism and its call for simple living, this lifestyle requires only few and small pieces of furniture, which enables a more flexible utilization of space compared to its chair-based counterpart. [Kim, 2009:71-72] In Korea this custom is synonymous with the use of heated *ondol* and unheated *maru* floors, which are sat on with legs crossed, and one or both bent inward, a rather unique style.

*The Japanese* culture, floor-based since ancient times, also sees no need for spaces separated by function. Differing from Korea however, people in Japan never rest on their knees when sitting. [Jung, 2014:72]

*Unlike Koreans* and the Japanese, the Chinese do not sit on the floor, but use of chairs and other furniture. [Jung, 2014:135-136] This may be one reason why Chinese homes have separate rooms for different functions, while Korean and Japanese ones don’t. [Jung, 2014:72]

### Removing one’s shoes

The custom of taking off one’s shoes signifies the penetration of boundaries in numerous cultures. [Rieh, 2003:70-71] Wishing to draw a line between inside and outside, as well as private and public, along with climate and customary considerations, may explain this ritual. [The Japan Forum,1997:1] Removing one’s shoes at the entry is an archetypical practice in Korea. [Kim, 2001:52] Activities followed by this practice, were associated with the interior happenings of a household. [Yoon, 2001:3] The shoes were taken off before stepping on the *toetmaru*, so that its wooden surface remained clean. Placed on the stone surface beneath it, the eaves of the roof ensured their staying dry. (Fig. 112)

*In Japan*, not removing ones shoes upon entering someone’s home is considered uncouth, since this would mean bringing dirt into the home. [Klassen, 2011:1] This old tradition can be traced back to the *Meiji* period (1868-1912), with the main contributing factors for its development most likely being the floor-based lifestyle and the subsequent use of *tatami* floors. [The Japan Forum,1997:1] After removing their outer footwear in the *genkan* (vestibule) [Buckley, 2009:170], the Japanese change into slippers. (Fig. 113) These are worn throughout the house, except in



Fig. 112: shoes left on the stone step in front of the toetmaru

*tatami*-floor areas, since this is thought to be bad for the mats. [Sugiyama-Lebra, 1992:117] This custom was also practiced in the Japanese settlement in *Seoul* during the occupation. What may have been delightful in the mild climate of some Japanese areas, proved rather uncomfortable in the very cold Korean capital. [Savage-Landor, 1895:129-130]

In the Orient it is also customary for guests to remove their shoes upon entering a dwelling, as Wight explains. One reason is to keep away dirt from the rugs or couches, which are used for sitting, and thus from clothing. Furthermore, keeping the footwear on would cause discomfort in the traditional seating positions. [Wight, 1953:29]

### Chores and activities

In households of *Joseon* and prior times, roles were assigned based on gender. [Park et al, 1995:132] This Confucian idea, one example of the analects promoting patriarchy, saw the husband being referred to as *baggatsaram* or "outside person", while the wife was called *ansaram* ("inside person"). [Choi, 2007:67] Like in many other cultures, this meant that Korean women were responsible for tasks connected with the domestic sphere, while men were assigned the tasks outside of those boundaries.

Likewise, the culture of the Plains Indians in North America makes women responsible for matters inside the dwelling, while men are mostly concerned with external issues. This translates into the majority of housework be-



Fig. 113: front of the genkan of a Japanese Samurai residence

ing taken up by women. [Lehner (2), forthcoming:16-20] *The same* goes for the Mongolian society, where females are entrusted with internal tasks and males with those of the outside realm. [Lehner, forthcoming:16-18]

### Meals: Preparation, serving and consumption

In Korea, preparing and serving food fell upon the females. [Jung, 2014:69] Men had the privilege to take in their meals first, which were served to them by their wives or servants. Women ate only after the men had finished and did so in a different room. Due to floor-sitting habits, dining tables were close to the ground. [Savage-Landor, 1895:144] Although each person would generally have a small one to themselves, there were instances when people of the same gender would share a larger one. [Choi, 2007:84]

A similar set-up, with small individual tables, could be observed in Japan. [Savage-Landor, 1895:145]

Among the Plains Indians of North America, the male household head is also the first to receive his food, which is served by younger males. [Lehner, forthcoming:18]

*The same* is true for Mongolian households, although before the master starts eating, he proceeds to serve guests starting with the most honourable. [Lehner, forthcoming:22-24]

### Food: Growing and preservation

Farm-related tasks generally fell into the male sphere. They were responsible for tilling the (mostly) rice-fields and, after harvesting the crop, for threshing it in the courtyard of their home. Besides this large-scale cultivation, food was also grown in and around the house, especially among lower classes. The roofs of thatched houses, for example, were commonly utilized as soil for planting pumpkins or gourds, as well as for drying crops like red peppers, an important staple of Korean cuisine. [Jung, 2014:62] (Fig. 114) Koreans being largely self-sufficient have since ancient times been not only growing food, but also putting great efforts into storing and preserving it.





Fig. 114: gourds grown on the roof of a thatched house

This was necessary to survive the often long and harsh winters on the peninsula. Due to this, it is not surprising that each traditional house had its own area for earthen jars (*onggi*), the aforementioned *jangdokdae*. (Fig. 115) These *onggi* contained staples like *kimchi* and *gochujang* (red chilli paste). The preparatory work for this was most often done in the courtyard.

### Tending to livestock

The livestock of the upper classes, which was placed in buildings away from the living area, was catered to by servants. Among the lower classes, caring for the animals, who sometimes lived under the same roof, was most often a shared responsibility.

### Pastime and entertainment

*Savage-Landor* believed upper-class Korean men to be spending the majority of their time on eating and sleeping. [Savage-Landor, 1895:147] Also important in these circles was entertainment, with music played on uniquely Korean instruments such as the *gayagum* and *geomoon-go*. These were specifically made to be played while sitting on the floor, a result and reflection of the ground-based lifestyle. [Yoon, 2001:7] While board games such as chess, backgammon and checkers were also a popular pastime, playing cards was forbidden as it was considered vulgar. [Savage-Landor, 1895:89]

### Sleeping

Traditionally, in tune with their floor-based lifestyle, Koreans slept on the ground of *ondol-bang*. Padded clothes were worn as a shield from the *ondol* heat which, although a great advantage during cold winters, could be quite intense. Upper classes additionally owned small and thin mattresses covered in silk, which were spread out at night and rolled up during the day. Rather than using soft pillows, people would rest their heads on a wooden block. [Savage-Landor, 1895:140]



Fig. 115: jangdokdae (jar bay) with onggi

### Visitors

*Joseon Yangban* would visit each other in order to exchange knowledge or enjoy entertainment. This simultaneously strengthened the bonds of within the same clan and helped to establish relations with others. Since guests were generally those of the household head, he was responsible for receiving and entertaining them. Visitors would enter the compound through the main gate (*soseuldaemun*), which led them into the main yard (*ma-dang*). As space intervals lay bare views to adjacent indoor or outdoor spaces, nature was a constant companion. [Lee, 1991:68-69] Moving straight ahead, they walked up onto the foundation, from where they stepped on the *toetmaru* (wooden veranda). By crossing this wooden walkway, they gained access to the main floor (*daechong*) of the *sarangchae*. During this process, changing notions of inside and outside give way to increased privacy. [Kim, 2008:6] In this sequence, the courtyard functions as semi-public main route from the public sphere to the privacy of the interior spaces.

Lower class Koreans of *Joseon* did not visit other homes, unless they had urgent business to take care of. This included neighbourly help, which was an essential part of village life. As mentioned before, gaining access to a *minga* plot was easier compared to *banga*. With its low perimeter boundaries, outsiders could be seen upon approach. After stepping through the opening in the fence, helpers or visitors reached the courtyard, where they usually remained. This outdoor space thereby brought people together, whether it was for work or enjoying a communal meal. Only in the case of bad weather, would outsiders be asked under the eaves of the house. [Jung, 2014:177-178]

The *Japanese* view the entering process as climbing up from stage to stage, which they refer to as *agaru* ("go up") [Sarvimaki, 2003:99] Here, a visitor calls out a formal greeting from the outside to announce his presence. Then, the owner slides open an exterior door, allowing the guest to step on to the *tataki* (a concrete floor at the



ground level). The host then offers her greetings while standing in the small room adjacent to the *tataki*. Being invited inside means removing ones shoes and gaining access to the *shikidai*, a wooden step leading into a room for guests. In the *Shoin*-style residences, guests were seated in the *tokonoma*, a recessed space built inside the wall behind the seat of honour. [Higashino, 2003:25-28]

*When entering* a house, in suburban America, the front door seems to be reserved for guests, while the family mostly uses a side or rear entrance. The entranceway is commonly lit at night, which can be interpreted as a signal for hospitality. [Gauvain, 1982:33-34]

*Bedouin tribe* customs demand that visitors approach a tent from the front and, without exception, from the eastern (male) side. This is to prevent unwanted exposure of the women to foreign men. [Gauvain, 1982:41]

*Javanese culture* in Indonesia does not require to ask for permission before entering someone else's home. [Gauvain, 1982:41]

### **Space utilization: Influences and responses** **Sequencing: Time and space**

Lifestyle habits are more often than not directly linked to the socio-cultural system people are a part of. Furthermore, practical considerations have to be taken into account. Based on this, dwelling patterns adhere to certain spatial and temporal sequences for various activities or groups of people. [Hematalikeikha et al., 2014:10] To understand the different formations resulting from this, it is important to analyze the factors of influence.

#### **Era**

A quite significant role can be ascribed to the era a dwelling is developed in, with all its implications. *Hematalikeikha* and his colleagues noted that, "the prevalent views on time and space in different cultures influence the way human activities are carried out. [...]" [Hematalikeikha et al., 2014:1] They further cite a 1987 *Gruetter* as pointing out, that "[...] understanding an architectural space requires movement, and this in turn requires time." [Hematalikeikha et al., 2014:2] In 1970, *Haegerstrand* coined the phrase "time geography", where human activity is limited by three categories. Capability constraints deal with the availability of physical resources, while authority constraints are concerned with laws and principles influencing the access to space and time. Coupling constraints, the final factor, illustrate the time and space interdependency of certain activities. [Hematalikeikha et al., 2014:2-3] As mentioned before, the most influential era concerning *hanoks* was the *Joseon* period from 1392 to 1897, the prevalent beliefs of which were not only reflected in society itself, but also in the way people dwelled.

#### **Season**

Koreans use the spaces in their homes differently, de-

pending on seasons and the accompanying climatic influences. While *maru* areas are mainly suited for use in summer, *ondol* spaces can be used all year round. When heated during colder months, the latter provide warmth while their surface also has a cooling effect, when left unheated. Seasons and weather also influence the extent of *hanok* spaces, which can be expanded or limited by utilizing shutters. [Yoon, 2001:3]

Adapting one's dwelling to the seasons is practiced in many cultures all around the world, especially those with pronounced changes in conditions.

*The Qashqai* nomads of Iran have a rather unique approach to seasonal changes. Instead of adapting their dwellings to the current weather conditions, like Koreans, they migrate between summer and winter quarters. [Hematalikeikha et al., 2014:7]

#### **Time of day**

Lifestyle patterns are responsible for the way spaces are utilized in the course of the day. An understand of these is especially important when multipurpose rooms are concerned. [Hematalikeikha et al., 2014:11] Distinct activities occur at certain times and differ in length, which is why right timing is vital for an undisturbed flow. In *hanok*, the accommodation of different requirements, made by morning, afternoon and night-time, is ensured by spatial adaptability.

*Like the* occupants of *hanok*, the Iranian *Qashqai* also have regular intervals and sequences for activities taking place in their tents. [Hematalikeikha et al., 2014:10]

#### **Economization**

One of the main reasons for practicing the aforementioned time-sequencing is the economization of spaces, which is of great concern in lower class homes, more so than in those of the wealthy. Since most routines within a household come with different spatial requirements, temporal sequencing them brings changes to the structure of a house. If done right, certain spaces become obsolete, which increases functionality and ultimately saves costs. Although the upper-classes made use of multipurpose spaces just like the poor, the reasons for doing so differed. *Banga*, unlike *minga*, were sprawling residences with a plethora of space and economical utilization thereby of no concern, which is why *banga* spaces could be separated as social customs required. These rules were also adhered to in *minga*, but to a much lesser extent. Climate was another huge factor in economization. Separating heated spaces from unheated ones not only increased thermal efficiency, but also helped in saving heating material and time.

#### **Flexibility of features and elements**

Both, the flexibility and adaptability of physical features, have a great influence on activities and their sequencing

within a dwelling, and vice versa. The interplay between fixed (e.g. walls, ceilings), semi-fixed (furniture) and variable elements (residents, behaviour) is a result of the cultural habitus. Adaptations made to a setting thereby represent the requirements of a certain time. [Hematalikeikha et al., 2014:11-12] Since, as previously depicted, a majority of the spaces found in Korean traditional residences are used for multiple purposes, the ability to conduct changes is a key factor in putting them to best use. *Nomadic dwellings* like the tents of the *Qashqai* in Iran, are by necessity very flexible and therefore easily adapt to their surroundings. [Hematalikeikha et al., 2014:11-12]

### Distancing: Connection and disconnection

With the "organization of interactions [being] the first step in environmental organization", as *Hematalikeikha* puts it, the quality and quantity of communication between spaces is determined by the activities conducted in them. [Hematalikeikha et al., 2014:11] The assignment of spaces to these activities is dependent on a wide range of factors.

### External stimuli

External stimuli, in the form of auditory, olfactory, visual and tactile influences, often represent disturbances in dwellings. Due to this, it often becomes a necessity to keep their producers at a certain distance. This also rings true for *hanok*.

### Cooking

Cooking and food preparation are often accompanied by pungent smells and disruptive sounds. This is why *hanok* kitchens, especially those of *banga*, were separated from main living quarters.

### Livestock

Bad smells and sounds emitted by livestock were just as unwelcome, especially to the upper classes. This is why in *banga*, animals were kept in separate buildings, as far away as possible from the living quarters. Servants had less of choice, often having to share their building with the livestock. This, like a lot of other aspects concerning *hanok* was a question of status. Although the poor also often had separate buildings for the livestock, in some types of *minga*, primarily in the North, it was kept inside the main house. Despite the aforementioned drawbacks, this was done deliberately in order to utilize the warmth produced by the animals. Furthermore, occupants did not have to leave the dwelling in order to tend to them. *Keeping their* livestock at a distance, in order to avoid disturbances such as sounds and odours, is also important to the *Qashqai* of Iran. Here, animals are provided with their own tent which, similar to *banga*, is placed in a certain direction from the main dwelling. [Hematalikeikha et al., 2014:11]

*Like some minga*, traditional houses in the Austrian Alps house livestock and humans under the same roof, albeit on different levels. Cows and the like stay on the ground level, producing warmth, which benefits the humans living above. In the plains on the other hand, barns and stables are attached to the rear end of the main house, but spatially separated from it and entered from the outside.

### Waste

Spatial sequencing is also applied to areas designated to waste, so that sewage does not become an inconvenience. [Hematalikeikha et al., 2014:11] In Korean homes, of both upper and lower classes, this generally translated to separate toilet huts or buildings, which were kept in secondary locations. In some cases, those of *banga* were even placed outside of the compound.

*Toilet huts* were also the standard in traditional Austrian houses. These were usually placed in unremarkable spots near secondary facilities such as stables and storage units.

### Privacy and social dignity

Another important reason for spatial distancing in *hanok* was the safeguarding of privacy and social dignity. The number of generations sharing one compound, most often two or three, had a great impact on the dwelling structure. Most senior family members had their own area, whether a building or just a room. [Choi, 2007:81] In the case of individual structures, privacy was ensured through distancing and placement of physical elements, the latter also being used for subdividing inner spaces.

*In Chinese Siheyuan*, which typically faced the road, privacy increased with depth, which is why the residential spaces were located in the back. [Sun, 2013:160]

*The Taiwanese* guaranteed privacy through refining their rooms by inserting a wall, with openings for sunlight and ventilation kept to a minimum. [Chiou, 1996:697-698]

*Reminiscent of* the Korean approach, is the one taken by the polygamist *Nyansongo* of Kenya. Not only are the individual dwellings of the wives separated by at least one field, their interior is divided too. The wife spends her time in the family area, while the husband entertains guests in the public one. Separate entrances ensure that outsiders are kept away from the wife. [Gauvain, 1982:43-44]

### Housework

In Korean *hanok*, the majority of the housework is conducted in secondary spaces. This is not only done to eliminate any disturbances, but also to keep up social dignity. *Although striving* for spatial condensation, the *Qashqai* in Iran make use of separate tents for living and household activities such as cooking or carpet-weaving. This ensures a visual, acoustic and olfactory distance, which not only preserves privacy but also the dignity of a household. [Hematalikeikha et al., 2014:10-11]

### Hospitality

As *previously* mentioned, community and thereby hospitality play a key role in Korean culture, with visitors being welcomed and entertained in elaborate ways. When staying overnight, guests of *Yangban* were given a room in special annexes or offered the master's quarters, if status called for it.

*The social status of the Quashqai* is protected by prioritizing the hosting of guests over day-to-day activities. Furthermore, overnight guests are accommodated in their own spaces, away from the occupants. [Hematalikeikha et al., 2014:10-11]



## DESIGN PRINCIPLES AND APPLICATION

Vernacular buildings can be likened to the human organism, where several factors have to be in sync in order to make it work. If the cooperation is lacking, diseases appear and make for a disrupted life. As prevention is always better than reaction, it is important to plan a home according to the lifestyle and needs of its occupants, which traditional houses all over the world are well known for. They are often based in invisible, but palpable relations and are focused on community, rather than the individual, which is often case for modern buildings. This way of living, as well as building materials, thereby greatly influence people's wellbeing.

### *Approaches*

Varying lifestyles have brought forth different building customs and design aesthetics in the vernacular dwellings found throughout the peninsula. They are the results of two prevalent approaches, identified by *Fazeli* as environment-based and belief-based, respectively. [Fazeli et al, 2010:97-98]

#### *Environment-oriented*

The environment-based approach regards the topography and climate of a region as main influences on house shapes and geometries. With this in mind, the vegetation on a building site is utilized to improve human comfort. Furthermore, materials and building structures (shapes and geometries), respective of the climatic influences, were chosen to create a micro-climate. [Fazeli et al, 2010:97-98] Understanding their importance, the Korean people have always considered natural phenomena in their traditional building practices and knew how to utilize them to achieve physical and emotional comfort. This was implemented by applying principles and rules based on the inter-relation between environment and the prevalent belief system. [Fazeli et al, 2010:97] Considering this, it is evident, that the physical environment has a great impact on the culture it hosts. [Nguyen, 2014:42]

#### *Culture-oriented*

Although, as explained above, the physical environment puts certain constraints on a culture, it is also greatly determined by the prevailing social conditions. [Nguyen, 2014:42]

### *Religions and philosophies*

Religions and philosophies have had a great influence on which principles were applied to Korean vernacular architecture and in what way. In order to understand how this came to be, it helps to look into their history on the peninsula.

#### *Animism*

As the ancient Chinese believed all things to have spirits, they viewed all natural phenomena as deities. Good health was thought as resulting from growth, enabled by the sun and sky, which is why those were especially worshipped. Special attention was also given to the spirits of ancestors, honouring them with regular rituals. The ruler too was held in high regards, as he was believed to possess the ability to pray to the gods on behalf of citizens. [Sarvimaki, 2000:105]

#### *Shamanism*

The original form of worship practiced by Koreans was Shamanism, with shamans often called upon to correct geomantic shortcomings, which were thought to be the sources of all kinds of misfortunes. [Sarvimaki, 2000:141]

#### *Buddhism*

Geomancy (*Pungsu*) and Buddhism were adopted in Korea around the same time, which manifests itself in the fact that most *Joseon* geomancers were Buddhist monks. [Sarvimaki, 2000:138] Not only did they apply their knowledge to temples and royal buildings, but also offered advice to the general folk. [Yoon, 2007:9-10]

#### *Confucianism*

Besides Buddhism, Confucianism was also adopted alongside geomancy. This is the reason for overlaps in certain areas and why scholars did not forego it. [Sarvimaki, 2000:138]

#### *Taoism*

*Hanok* are also influenced by Taoism, foremost its Five Elements Theory and the dualistic properties of *Yin* and *Yang*.

### *Connection with nature*

According to *Kim*, Korean vernacular architecture is one of mutual relation, not only between spaces inside the house, but also in regards to nature. This connection, achieved by making no distinction between the inside and outside, is the key to create a harmonious environment. [Kim, 2008:7-8] In *hanok* this meant welcoming in everything beneficial and keeping the harmful out. [Ariang, 2013:1]

The Japanese philosophy of *Shizen*, or "naturalness", likewise rejects artificial pretence in favour of unforced natural authenticity.

#### *Cosmology*

Geomancy is based on the Chinese theories of balanced dualism and the Five Elements, both of which formed a basis of analysis in Buddhism and Hinduism.

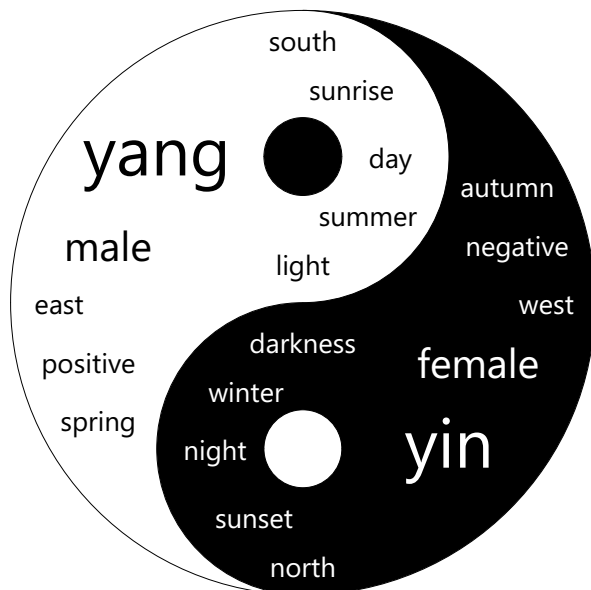


Fig. 116: Yin and Yang with associations

### Balanced dualism: Yin and Yang

The cultures of the East believe in the dualistic distinction of the universe, where the balance of two opposing forces results in harmony, which is essential to prevent harm. [Magnant, 2015:1] Known as *Yin* and *Yang*, these principles appear in various natural phenomena. [Kim, 2008:6] (Fig. 116) The positive force *Yang*, associated with even numbers, is ascribed to the male realm. Connected to spring and summer, as well as the directions of East to South-East, it represents sunrise and consequently, light. *Yin*, the negative force, represents odd numbers and is ascribed to the female sphere. Associated with the North and North-West, as well as being connected to autumn and winter, it represents the sunset and with it, darkness. These dualistic forces appear in many features of *hanok*, where they are meant to create balance. An example is traditional roof tiles, which are shaped either convex (positive) or concave (negative). [Magnant, 2015:1] Another is the separation of quarters into individual ones for men and women. [Kim, 2008:6] Dualism is also present in *hanok* doors and windows, with the shadows of their latticework representing the interaction of light (*Yang*) and darkness (*Yin*). [Yim, 2012:1] Even the number of elements used in dwellings was based on this two-fold principle. *Yang*, ascribed to even numbers, is associated with the resting places of the dead, while the negative *Yi*, is connected to residences for the living. This is why elements in the latter only came in odd numbers, an example being the number of buildings.

### Round sky and square earth: Cheonwonjibang

*Cheonwonjibang*, literally "round sky and square earth", refers to the ancient Korean belief of the sky being round and the earth square. This can be witnessed in the shapes used, with columns being a prime example. Those used

## II. HANOK | DESIGN PRINCIPLES AND APPLICATION

for important building were round, since these were associated with heaven, whereas ordinary homes, seen as part of the earth, had square ones. Life was believed to be comprised of a small universe, the human body, within a midsized one, one's home. Due to sky, earth and humans being the main components of life, the number "three" was given auspicious properties, which is why motifs usually appear thrice. [Magnant, 2015:1] *This principle was adopted from the Chinese, who refer to it as Tian Yuan Di Fang.*

### Cardinal directions

As mentioned before, traditional Korean houses were, if possible, positioned in a way to open up to the South and closed off to the North.

*When their residences and directions were concerned, the Chinese followed the forces of the Universe rather than topography.* [Rapoport, 1969:29]

*This can also be reflected in Japanese houses, which adopted many Chinese principles, even if they made little sense. Taut encountered this when wondering about the placement of certain rooms of traditional homes. Everyone he spoke to agreed that, neither the entrance to a home, nor its kitchen or toilet were to be placed on the North-East to South-West axis.* [Taut, 1997:26] This may explain why the *Hogaku* system determines orientation without taking topography into account. [Rapoport, 1969:28-29]

*Also following certain cardinal directions are Indian houses. Their entrance doors are always located in the East, even if that means facing up the slope on a steep hillside.* [Rapoport, 1969:28-29]

### Five elements: Oheang

The Five Elements Theory (*Oheang*), known as *Wu Xing* in Chinese, is rooted in Taosim and describes natural processes occurring between different elements. In this closed natural cycle, where the elements keep each other in check, water nourishes wood, wood feeds fire, fire turns wood into earth, earth becomes metal and metal enhances water, a harmonious balance is maintained. All of these materials are found in *hanok*, where they strive to establish a connection between the humans that live in it, the earth they are built on and the sky that surrounds them. [Sarvimaki, 2000:107]

As mentioned before, each element is associated with a colour, one of five directions, the four cardinal ones and the centre, as well as one of five Confucian virtues. Blue, or green, represents the East, wood and benevolence, while red connects the South, fire and propriety. Yellow stands for the centre, earth and loyalty, with white representing the West, metal and righteousness, which leaves black for the North, water and humility. [Lee, 2013:1-147] Each of the five elements is also related to an animal and a season. The black turtle (sometimes tortoise) marks the

North and stands for winter, while the blue (or green) dragon signifies the East and spring. The South is identified through the red (or scarlet) phoenix and associated with summer, while the West is represented by the white tiger and connected to autumn. This leaves the centre to the yellow snake and the 6th lunar month. [Sarvimaki, 2000:107]

### Perception

Nature, its sights, sounds and smells, can be experienced in various ways, which is reflected in the approaches taken by different cultures around the world.

### Sights

In Korea, nature is traditionally appreciated the most in its raw form. Gardens were left in their original state, in order to emphasize existing plants and water features. These surroundings were enjoyed from pavilions, specifically built for this purpose. Taking advantage of nature's beauty was also facilitated by the size and placement of windows. Upon opening, they not only framed the views, but also offered a seamless transition from indoors to outdoors and thus brought nature into the dwelling.

Compared to European gardens, the lack of human intervention left Korean ones looking rather sparse. [Jackson et al, 2012:11-13; 87]

The Japanese value the outdoors in a much more formalized way than Koreans, which makes their use of *shizen* seem quite contradictory. [Sarvimaki, 2000:142] This is due to the term referring to nature in a rather unaffected and spontaneous state. [Sarvimaki, 2000:124] The notion of *furyu*, although encompassing the "unforeseen" and "accidental", is in this case achieved through artificial creation. [Sarvimaki, 2000:143]

Although essential in their building design, the Chinese did not apply axial symmetry to their gardens. Rather, their composition was organic and informal, thus offering a nice environment for relaxation and contemplation. Set up as miniature forms of bigger landscapes, the gardens only had plants that would grow there naturally. This aesthetic is also reflected in the use of the term *ziran* for nature, which implies spontaneity. [Sarvimaki, 2000:123-124]

### Sounds

Besides views, sounds were also an important aspect in connecting a *hanok* with its natural surroundings. This was made possible by the aforementioned windows, in both open and closed state. In case of the latter, the connection was enabled by *hanji* (Korean paper). Used instead of glass, and unlike it, the paper allowed natural sounds to penetrate into the interior. By listening to, for example birdsong, the blowing of the wind and rain splashing to the ground, occupants could immerse themselves in nature. [Choi, 2007:61]

### Ecological aspects

Unlike today's modern buildings, which have the newest technological developments to their disposal, traditional builders did not have this luxury. This however led to a great understanding of nature and its phenomena, which triggered building practices closely connected to the surroundings. In Korean vernacular architecture, this harmony with natural surroundings was primarily achieved by making use of geomancy, also known as *Pungsu*. While most features of a vernacular dwellings were respectful to the environment, rather than a disturbance, there was room for improvement in some aspects.

Likewise, China's three main housing types, courtyard houses, cave dwellings and storied wooden structures, all focus on sustainability by utilizing natural resources. [Sun, 2013:145]

### Building layout and structure

*Hanoks* are built to avoid, depending on the four seasons, the heat or cold on the Korean peninsula, which is influenced by the continental and oceanic climate. [Shon, 2014:21-32] As mentioned before, *ondol*-style rooms are generally closed and have low ceilings to ensure efficiency in heat usage. [Jung, 2014:145] Found mostly in the South, the basic type uses a separate furnace for every room. Being disconnected leaves it exposed to cold air, making it rather uneconomical and lacking comfort. The *ondol* in the northern part of the peninsula on the other hand, excels in efficiency by using one furnace with no exposure to cold air, to provide warmth to all rooms. [Jung, 2014:140-141]

### Materials

Important in making *hanok* one with its surroundings was the implementation of natural materials, which were used for every single piece. This becomes visible when, with the change of seasons, the colours of the houses adapt to and blend in with the environment. [Arirang, 2013:1] Having evolved during a time when synthetically manufactured materials were yet to be seen or in their beginning stages, *hanok* naturally made best use of what their environment had to provide. Walls were made from local materials such as yellow soil, found in the fields, as well as sand, stones and mortar. Rocks, split into thin slabs, served to evenly distribute the heat of the *ondol* system. Columns were made from lumber that was cut in the mountains. Plots were fenced in by a mix of fieldstones and mud. Koreans have, by using locally sourced materials, all along used nature for their benefit, while living in harmony with it. [Kim et al, 2018:1] There were however not only positive aspects to using natural materials. With wood serving as burning material for the *ondol* heating system, a connection to deforestation cannot be denied. For *Kon*, this was one of the main reasons for the lack of trees on the peninsula. [Jung, 2014:117; 152-153]



*Chinese dwellings* were also built in harmony with nature, which was achieved with not only the right setting, but also by using surrounding materials. [Wang, 2014:3] Likewise, *Japanese* vernacular dwellings are products of nature, making use of wood, earth and different kinds of grasses.

### **Rainwater conservation**

Koreans not only knew how to make use of nature by sourcing their building material from it, they also had a very specific method in to collect water. Grass or straw bundles would be tied with ropes to one side of a tree-trunk, with tips pointing into earthen jars that were placed underneath. Rainwater would then flow down the trunk, be cleaned by passing the grass and then collected in the container. [Cetay, 2017:1] Also in use were gutters, which were utilized in order to control the drainage of rainwater. Placed along the edges of the eaves, they prevented it from damaging the timber structure below. Those in the city, where eaves had to be shortened due to space limitations, were usually made from stone. [Park et al, 2015:137] In the countryside on the other hand, rain curtains usually dug their own dents in the ground, which with time turned into channels, that lead away the water naturally.

*The Vietnamese* also collect rainwater, but in different ways. A water tank, placed in a corner of the yard or in the middle of the main house, is supplied with water streaming from the roof. Some houses also have ponds that collect surface water, which are not only used for farming fish, but also provide water for domestic use. Furthermore, this system regulates the microclimate by facilitating rainwater runoff. [Nguyen, 2014:44]

### **Health benefits**

#### **Physical aspects**

The connection of *hanok* with nature brings numerous benefits to their occupants health. Their open structure and papered openings enables a continuous supply with fresh air and oxygen, while the *ondol* system produces heat energy that circulates around the house, which is believed to be superior to other kinds. [Jung, 2014:139] Another huge part in the way *hanok* aid health can ascribed to the materials used. The most common ones such as yellow clay, wood and stone are widely recognized for their beneficial properties, with some people even claiming preventative abilities regarding asthma and even cancer. [Shin, 2012:169] Loess, used for walls and floors, is especially worth mentioning. Not only are its micro-organisms good for human health, its composition also facilitates air circulation. This keeps the air indoors very fresh and pleasantly moist, making humidifiers or air purifiers obsolete. [Yoon, 2013:1]

## **II. HANOK | DESIGN PRINCIPLES AND APPLICATION**

### **Mental aspects**

Traditional Korean houses were not only beneficial to physical, but also to mental health. Their arrangement led to a formation of protected and calming spaces, both on the inside and outside. A prime example for this are the courtyards, which were generally only filled with the sound of nature. *Hanok* spoke to all senses, whether with the sounds of rainwater or birdsong, the smell of wood and grass, the neutral colours of the surrounding scenery or the feeling of cool breezes and different surfaces. All of this combined was very soothing for the human soul. Upper class Koreans especially had a high regard for nature and, due to their status, were able to enjoy its “wonder” in spaces specifically dedicated to this purpose. A somewhat negative effect on mental health can be ascribed to *minga*. Since they spent most of their time working in order to survive, lower classes did have designated spaces for leisure activities. Rather, their dwellings often meant hardships, since they meant a lot of work.

### **Geomancy: Pungsu**

As explained before, geomancy is applied in order to create a built environment that in harmony with nature. Having greatly influenced how people view and treat their natural surroundings, it has, throughout history, had a great effect on vernacular dwellings. [Yoon, 2006:309] [Kim, 2008:4]

### **Etymology**

The term “geomancy” translates from the Latin *geomantia* which stands for “divination by earth”. [Bennett, 2012:1] In Korea, this philosophy is known as *Pungsu*, short for *Pungsu-jiri seol*, which translates to “wind-water-earth-principles theory”. [Yoon, 2007:10-11] The better known Chinese equivalent, *Feng Shui*, similarly translates to “wind-water”.

*The Indian version, Vastu Shastra*, is known as the “science of dwelling”. *Vastu*, understood as “place where people dwell”, stems from the Sanskrit word *vas* for “to reside” or *vasu*, which describes the composition of the structure itself. [Fazeli et al, 2010:97]

### **Aim**

A unique ancient method, geomancy assists in evaluating a landscape and the cosmological directions in search for the most auspicious sites to place e.g. cities, village and dwellings. [Yoon, 2001:1] *Yoon* considers it not solely a superstition, religion or science, but a combination of all three. [Yoon, 2007:7] Comparable to alchemy in the Western world, it aims to understand the environment and find ways to manage it. [Yoon, 2012:1] It furthermore seeks to utilize nature’s benefits without harming it. Although geomancy, from a design point of view, is not free of contradictions, it has proven itself to have legitimate properties. [Sarvimaki, 2000:143]

*Pungsu* was influenced by the Chinese *Feng Shui*, which viewed the universe as being influenced by dual cosmic forces and five elements. [Yoon, 2001:2-3]

The Taiwanese also used *Feng Shui* to choose sites, which can balance and harmonize a building with its surroundings. [Chiou, 1996:689-690]

Like its Korean equivalent, the Indian *Vastu Shastra* aims "[...] to guide people to create spaces which harmonize with nature and with the universal forces.", as *Fazeli* explains. [Fazeli et al, 2010:97-100] This ancient teaching seeks to make the best use of a building's environment and climate, by focusing on sun rays as well as the magnetic poles and geopathic zones of the earth. During the construction process, rules regulate the methods, placement and rituals applied at each stage. Based on culture and belief, the main characteristics are the concentric zones, an elongated complex and certain facade patterns and forms. [Fazeli et al, 2010:100]

*Hogaku* ("corners and directions"), the Japanese equivalent to *Pungsu*, is used to find the right orientation for houses (*Kaso*) and land (*Chiso*), consequently deciding their physical appearance. Although *Hogaku* was almost identical with *Feng Shui*, it developed its own principles, which led to differences in application. [Kalland, 1996:17] With Japanese master carpenters traditionally implementing metaphysics, this philosophy has been vital in understanding the built environment on the islands. [Sarvimaki, 2000:143] Although influenced by other geomantic traditions, it also developed its own principles based on local characteristics, which explains the occasional uniqueness in Japanese architecture. Applying these rules however, did not mean the disregard of practical requirements. [Sarvimaki, 2000:155]

*Vietnamese geomancy* was influenced by, but deviates from its Chinese counterpart, a circumstance that can be associated with the differing climates and topography. [Sarvimaki, 2000:137]

### Site selection

As stated before, *Pungsu* (Korean geomancy) is a unique ancient method which seeks to harmonize built structures with their natural environment. Its main goal lies in understanding the environment and finding ways to manage it, by taking both beliefs and surroundings into account. [Yoon, 2012:1] This is why Koreans swore by applying its principles when searching for the best site for their buildings. Finding the most auspicious site was believed to bring wealth, good luck, and virtue to a settlement or a house, and consequently, its occupants. In search of an ideal site, geomancy considers three important factors, those being the surrounding landforms, watercourses and cardinal directions. This translates to an ideal site being surrounded by horseshoe-shaped hills to its back and sides, while the southward front is open to face a river. In *Pungsu*, this principle is known as

*Baesanimsu* ("mountain in the back, river in the front"). [Yoon, 2007:7] The most auspicious site itself is referred to as *hyeol* ("cave"), a term that goes back to the Chinese character used for earthen cave dwellings. [Yoon, 2007:8] (Fig. 117)

Centre: *hyeol* ("hole", most auspicious place)

Inside the *hyeol*: *Naesugu* ("inner water mouth")

Outside the *hyeol*: *Oesugu* ("outer water mouth")

Central valley: *Myeongdangsu* ("little river")

Furthest North: very high *Josan* or *Jongsan* ("servant mountain")

North: high *Jusan* ("main mountain", "black turtle")

East: *Jwacheonyong* (left "blue/azure dragon"), *Naejwacheongnyong* (inner left "blue/azure dragon")

South: low *Ansan* ("table mountain")

Furthest South: very high *Josan* ("servant mountain")

West: *Ubaekho* (right "white tiger"), *Naeubaekho* (inner right "white tiger")

### Landforms

In selecting the location, geomancers put a great emphasis on the conditions of sky and earth. Looking to control the winds and in search for great energy flow, they favoured protected basins, formed by the earth, over valleys and tops of mountains. Features of the land were used to read the conditions below, in order to achieve an ideal energy flow to benefit human life. [Kim, 2008:3] Traditional Korean villages were, if possible, set up at a foothill with sloping hills in the back and open space to the front. Even the alleyways, which connected the single compounds, followed features of the ground. Winding, rather than straight, they produced an irregular arrangement of houses, making built structures subordinates of nature. [Kim, 2008:4] Mountains are classified into five shapes, four of those corresponding to elements. An earth mountain is associated with steep slopes and a broad flat top, like those found in the Loess plateau of China, where geomancy originates from. Fire mountains are those with a pointed peak, since they resemble a flame. Gentle, rolling hills are reminiscent of waves, which is why they are called water mountains. A projecting formation, standing tall like a tree, is known as wood mountain, while metal mountains come in a dome-like shape, which can be likened to a bell. [Yoon, 2007:8]

### Watercourses

Koreans believe that, in order for a site to be auspicious, it has to be located on dry land. It is however essential for the dwellers' survival, that a water source such as a river is in close proximity. [Yoon, 2007:8] If the landscape of a settlement resembled a ship, people would steer clear from digging wells. They were likened to leaks, which would metaphorically sink the ship and thereby cause imbalance and harm. [Yoon, 2006:309]

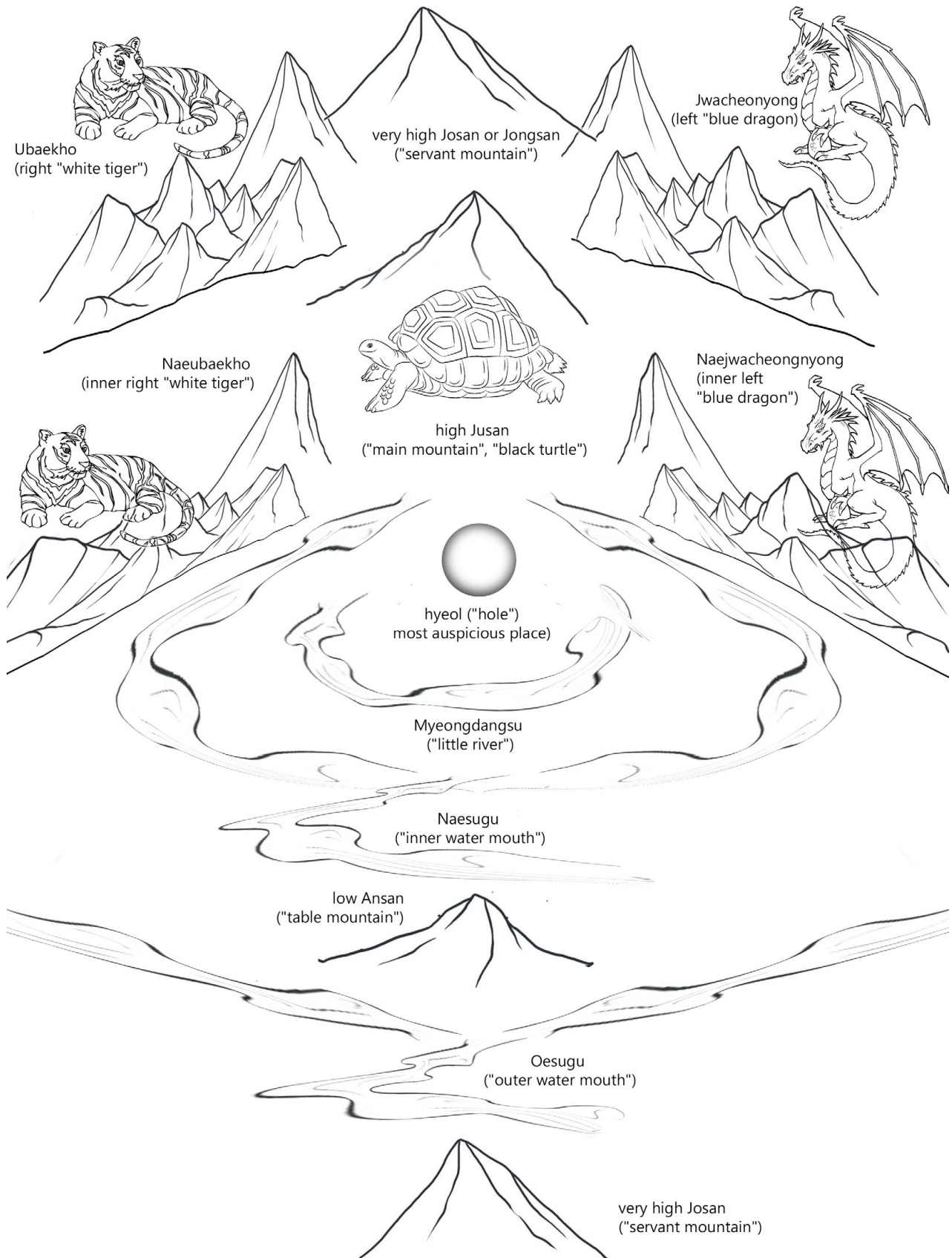


Fig. 117: topographical features of an auspicious site



### Cardinal directions and axes

*Pungsu* was not only vital in the placement of a house, but also determined its layout by finding the ideal orientation to take advantage of sunlight and ventilation. Furthermore, it helped deciding on the right location for the entrance, as well as finding the right size for structural elements. [Yoon, 2001:2-3] [Savage-Landor, 1895:139] A traditional dwelling is closed off to the North, with a courtyard opening to the South and facing the East. [Jun, 2012:233] South, south-eastern or south-western directions are favoured, in order to manage sunlight, which is directly associated with life. [Kim, 2008:4] Due to the dwelling opening to the South, the main gate is also located in this direction.

*Kaso* (Japanese house physiognomy) called for a hill or a mountain to be located in the North-East and South-West, in order to provide protection from demons, who were believed to come from there. This is also the main reason for shrines and temples situated in these directions. [Sarvimaki, 2000:148]

The Vietnamese consider the North-West and West unlucky directions, which is why houses should face East (regarded as most auspicious), North-East or South-East. Similarities to China become apparent, which had governed Vietnam from about 2000 BC to 1000 AD. [Sarvimaki, 2000:137] The opening towards the South furthermore enables ventilation by cool wind, while simultaneously protecting the house from eastern and western solar penetration. [Savage-Landor, 1895:139]

In Taiwan, structures are arranged to enclose a courtyard, with proper placement being likened to humans sitting in an ergonomically comfortable chair. [Chiou, 1996:689]

### Aesthetic

#### Minimalism/ Simplicity

*Hanok* are known for their minimalist aesthetic, a characteristic that is often connected to the moral compass of Confucianism, which calls for a restrained lifestyle, rather than an lavish one. [Yun, 2011:29]

The Japanese also apply the principle of simplicity, which they refer to as *kanso*. This is expressed by eliminating clutter and presenting the living environment in its plain, natural form. By doing this, the spaces themselves create atmosphere and make excessive decoration unnecessary.

#### Emptiness/ Void/ Vacancy

A straightforward way to achieve simplicity are vacant spaces, found in both structure and composition. Corresponding with the call for humility and modesty, the practice of keeping spaces uncluttered and sparsely decorated not only balances out the lack of symmetry found in these Korean homes, but also helps to directly connect the occupants with the structure. [Kim et al, 2018:1] In terms of outdoor spaces, this translated to empty yards, with little to no vegetation. If something was planted,

Persimmon trees were often chosen, since they do not grow too big and can be utilized for food. [Kim et al, 2018:1] (Fig. 118) Inside a traditional Korean house, emptiness translates into sparsely furnished spaces. (Fig. 119) This is supported by the floor-based lifestyle, which requires only small pieces. These can, depending on need, either be easily stowed or carried away.

*Voids* are also a feature of Japanese architecture, where the practice of leaving spaces vacant is referred to as *ku-kan*, literally "empty space". (Fig. 120)

The concept of emptiness is also found in Indonesian building traditions, where it is applied in various ways throughout different regions.



Fig. 118: courtyard characterized by emptiness



Fig. 119: uncluttered hanok interior



Fig. 120: vacancy inside a traditional Japanese house



Fig. 121: asymmetrical arrangement of buildings of a banga

### Symmetry and asymmetry

The aesthetic of *hanok* does not come from fabricated symmetry, but rather natural asymmetry, in both its exterior and interior arrangement. In *banga*, asymmetry translates to the individual buildings being dispersed based on cardinal directions. [Sarvimaki, 2003:88] (Fig. 121) This principle is furthermore reflected in the uneven distribution of spaces and openings, both of which are arranged by function, rather than mirrored on an axis. [Sarvimaki, 2000:143] (Fig. 122) There is however a certain degree of symmetry in the wooden framework. While the set-up of the individual members may look coincidental, it is based on calculations. [Kim et al, 2018:1]

Also rooted in asymmetry are Japanese interiors, a philosophy known as *Fukinsei*. With nature seen as being balanced despite its irregularities, this dynamic aesthetic is also attempted for the home. It symbolically mirrors so-



Fig. 123: axial-symmetrical arrangement of a Chinese Siheyuan



Fig. 122: asymmetrical arrangement of openings

ciety and its natural interaction between humans. [Sarvimaki, 2000:155-156] There are however also examples for symmetry in Japanese architecture, one being *Shinden-zukuri* mansions, where it is a main characteristic. Here, the *shinden* (main building) is positioned on a central North to South axis, with two secondary structures arranged to its left and right. Both sides are connected to the main part by *sukiwatadono* and *watadono*, two kinds of corridors, thereby forming a southern courtyard. [Neighbour-Parent (1), 2018:1]

Unlike *hanok*, Chinese courtyard houses are extremely symmetrical, which stems from differing cosmological views. [Sarvimaki, 2000:143] (Fig. 123)

Also unlike Korean compounds, Taiwanese ones have their main building placed on a central line. It functions as axis for the secondary structures (*hulong*). These are, either parallel or transverse, attached to the main part, and thus create a balanced bilateral symmetry. [Chiou, 1996:690-691; 703-704]

### Shapes

#### Facade

In *hanok* design, a great importance was placed on the forms and patterns of the facade. A noticeable feature is horizontality, emphasized by the single level and elevation of a building. [Yoon, 2001:3] This appearance is a result from a division in three areas. (Fig. 124) While



Fig. 124: horizontality in the facade of a banga





Fig. 125: materials declining in weight from top to bottom

an elevated platform, made from rocks, serves as a base, a wooden frame or stone structure forms the wall zone in the middle, leaving the third and top part to the roof. Another feature, especially noticeable in *minga*, is the application of materials, from the heaviest on the bottom to the lightest on top. (Fig. 125) Also found in many other cultures, this ensured that the structure could be built in an economic way, while still being safe. This is mainly visible in the roofing materials used, with lower classes applying relatively light materials such as thatch and wooden shingles, while the standard for upper-class homes were heavy tiles.

### Roof

Translating to *jibung*, the roof of a traditional *hanok* was most often constructed to run parallel to the mountain lines in its background. (Fig. 126) The curved roof lines thus acted as continuation of those. [Yoon, 2001:3] Its



Fig. 126: banga roof as continuation of the mountain lines in the back



Fig. 127: upturned tips and underlying woodwork of hanok eaves

eaves and curves resemble the folding wings of a crane, a symbol Koreans believe to bring peace, longevity and purity. [Sarvimaki, 2003:84-85] In order to prevent the rather far protruding eaves from appearing too heavy, more rafters and smaller diameters are used. Additionally, the tips of the structure are lifted and curved to paint an even lighter picture, with the latter also clearing the view onto the intricately crafted woodwork that beneath. [Jeon et al, 2011:1] (Fig. 127)

### Timber-work

*Hanok*, especially *banga*, were constructed with timbers from Korean pines, a majority of which don't grow straight. [Kim, 1998:24-26] Despite this, they were used in their natural and winding state, since straightening the raw material would have made it too thin to use. (Fig. 128) While due to this, *hanok* may appear rather unrefined, great craftsmanship was involved in building them. [Sarvimaki, 2003:83] In addition to being functional, the frame of a *hanok*, when combined with decorative elements, also serves as ornament. [Kim, 1998:27] Since round columns were reserved for highly important buildings such as temples and palaces, only squared-shaped ones were used for residences. This however did not stop some aristocrats from implementing such features into their *banga*. [Sarvimaki, 2003:93]

Unlike their Korean equivalents, the Japanese incorporated timbers as straight as possible into their *Shoin* residences, but nevertheless strived for naturalism. (Fig. 129)





Fig. 128: winding timbers used for the framework of a minga

Their linear appearance, further emphasized by the highly refined Japanese carpentry and reflected the island nations minimalist design approach. [Sarvimaki, 2003:83] *The Chinese* also shaped their timbers into form, instead of using them in their natural state. Specifically chosen cedars were turned into circular rafters and roof planks, while oaks or *nanmu* were used for brackets, rafters, pillars and around windows and doors. [Zhao, 2001:42] Also unlike their Korean counterparts, Chinese upper class homes had round columns as standard. (Fig. 130)



Fig. 130: round columns of a Chinese upper-class residence



Fig. 129: straight timbers used for a Japanese residence

## Colours

### Five colours: *Obangsaek*

Koreans traditionally make use of the five cardinal colours (*obangsaek*), which are associated with the five directions and five elements found in Taoism. The colours not only appear in architecture, but also in traditional clothing and Korean cuisine. The spectrum of these five traditional colours includes blue, red, yellow, white and black. While green sometimes replaces blue, according to *Hwang*, Koreans grant blue a greater significance, since nature often manifests itself in this colour and its hues. [Kim (2), 2016:1] This discrepancy can, as *Chung* explains, be ascribed to difference in colour being regarded as symbolic rather than sensory. [Sarvimaki, 2000:112] According to the Five Elements Theory (*Oheang*), each of these colours is associated with a direction, the four cardinal ones plus the centre, an element and one of the five Confucian virtues. A more detailed explanation of this will be given later on.

### Natural palette

The restrained approach noticeable all over a *hanok* continues in its colour scheme. Houses of all classes use natural materials in their original state, with their subdued tones reflecting the natural environment. (Fig. 131) This leads to shades of brown, differing in intensity, being the most prominent colours, especially regarding woodwork. Equally pronounced is the presence of white, which comes from the calcareous soil used for plastering and walls, as well as paper, which functions as coating for different elements. Grey, and bluish variants thereof, was present in the form of stones, used for foundations, and



Fig. 131: banga clad in natural colours



Fig. 132: minga adapting its colours to the environment

roof-tiles. *Chung* connects this consciousness regarding colours to the aim in keeping the flow between a house and its surroundings as undisturbed as possible. [Sarvimaki, 2000:112] This becomes especially apparent in *minga*, whose colours change through weathering. (Fig. 132) Unlike the buildings themselves, furniture, especially that used by upper-classes, was rather colourful. Regarding the women's quarters of *banga*, this translated into brightly and warm-coloured and furnishings, an expression of femininity.

### Dancheong

While dwellings were characterized by the use of natural colours, a contrary approach was applied to very important buildings. Their woodwork was not only painted in bright colours, but these were applied in elaborate patterns, a type of decoration referred to as *dancheong*.

### Light, darkness and shadows

#### Perception

The perception of light and darkness differs in the East and West. [Kim (1), 2016:2] Westerners, who generally have higher regard for light, always look for ways to overcome darkness. Cultures of the East on the other hand, embrace it as something natural and thereby unavoidable. According to *Tanizaki*, they don't mind immersing themselves in the dark and even find beauty in it. This is why, in contrast to the West, excessive illumination is deemed unnecessary. In accordance to this, *Confucius* is quoted as saying that it is better to light a candle, than curse the darkness. *Kim* notes that the interplay of light and darkness within built space, as well as the resulting shadows, may be one of the main reasons why Westerners perceive the East as a mysterious place. This is because the change in visual appearance conveys a palpable sense of intrigue. [Kim (1), 2016:4-5] [Joh, 1999: 63]

### Management and manifestation

In Korea and other Asian countries, light and darkness were controlled with simple, but effective methods. Windows were fitted with latticework and translucent *hanji*



Fig. 133: light penetrating the translucent paper applied over latticework

(Korean paper), which allowed for indirect natural light to cast soft shadows on the interior. (Fig. 133) Koreans traditionally did not make use of glass, among other reasons, due to its reflective properties making sunlight management difficult. Unlike its reflective Western counterpart, the Korean paper itself was delicate in structure and thereby receptive of light. [Kim (1), 2016:2]

### Symbolism

Shadows, especially those cast by the latticework of openings, added another sphere to *hanok* spaces. With Korean architecture having been strongly affected by Confucianism, their geometrical patterns are believed to go back to the *I Ching* or "Book of Changes". Upon closer inspection, the grid resembles the trigrams of divination, which visually symbolize the representation of the universe. [Kim (1), 2016:8] Darkness and light are another example representing a dualistic universe, with *Yin* connected to the former and *Yang* to the latter.

### Spatial differentiation

Unlike light, which Koreans manipulated according to necessity and desire, they generally did not strive to control darkness to such an extent. Rather, the absence of light was seen as a symbol for change, be it regarding time or sphere. This translated to bright communal spaces, illuminated to differing degrees and rather dark private spaces. The brightness of the shared (*maru*-) spaces was, during the day, achieved by opening up entire wall areas. (Fig. 134) Most private rooms, generally equipped with *ondol* flooring, only had small and non-translucent openings and thus remained rather dark. (Fig. 135) Although an interplay of light or darkness was also present in *minga*, it was more pronounced in *banga*. This was due to its roots lying in symbolism and aesthetic, rather than in practicality, which was the main concern of lower class dwellers. Considering this, it is not surprising, that the interiors of commoners' homes are generally darker than those of the wealthy. This also correlates to the whole of a *minga* generally being private, while *banga* also incorporated semi-public spaces.





Fig. 134: light flooding a maru space

### Ornamentation and decorations

Unlike the lower classes, those of higher status made use of decorations and ornamentations in their *hanok*. [Jung, 2014:122] Although not used to excess, paintings, calligraphy and pottery gave them the finishing touch. [Kim et al, 2018:1] For special occasions, such as ancestral ceremonies, items of great value would be brought out and displayed in the main hall. [Savage-Landor, 1895:141]

*Like the Koreans*, the Japanese generally keep their homes uncluttered and free from unnecessary elements. They do however make use of understated decorations, displaying selected and valuable items in such forms as pottery, flower arrangements and calligraphy scrolls.

*The Tuareg of the Sahara* display weaving and leatherwork as decoration in their tents. [Gauvain, 1982:39]

*American homes*, especially communal spaces, are often decorated with photographs, which display the bonds among families. [Gauvain, 1982:37]

*The Philippine Tarong* people also place pictures of important people in their dwelling. [Gauvain, 1982:37-38]



Fig. 135: dark ondol-bang



Fig. 136: paper scroll displayed on the main gate of a banga

### Entrances

Korean doors, especially entrances, are often used to display paper scrolls with writings on them. These are related to the house and its occupants, aiming for protection and good fortune. (Fig. 136)

*Similar to this*, the *Tinglit* Indians of north-western America also use objects as symbols. Instead of hanging scrolls, they place totem poles with figures of animals, humans and mythological creatures near their entranceways. These represent events associated with the occupants or the community as a whole. [Gauvain, 1982:34]

*Unlike Korea*, the decorations on suburban North American front doors have an aesthetic purpose, rather than symbolic meaning. [Gauvain, 1982:33-34]

*The entranceways to yurts in Central Asia*, originally doors made of felt and equipped with intricate designs, were seen as a status symbol, which displayed the wealth of their owners. [Gauvain, 1982:34]

*In parts of Norway*, houses have large wooden front doors with carvings on their frames and potted plants flanking the steps leading up to them. All of these are symbols for the welcoming nature of the homeowners. [Gauvain, 1982:34]

*Austrian homes* have mats with inviting quotes placed in front of main entrance for welcoming guests. Hung on an adjacent wall, plates display the last name of the inhabitants and inform outsiders of the dwelling's affiliation.

### Artwork

The walls of important *hanok* rooms were equipped with native paintings, similar to Japanese *kakemonos*. Also put on display was artisan pottery-ware, reminiscent of the Japanese *Satsuma* style, an originally Korean technique, but forgotten with time. [Savage-Landor, 1895:141]

*The sliding panels* used to partition Japanese *Samurai* mansions into rooms had decorated paper on both sides, with the art indicating the prestige of a household. [Sarvimaki, 2003:88]

*Taiwanese houses* have intricate details worked into their platforms and body, as well as elements of the roof. [Chiou, 1996:689; 712]



### Symbolism and reflection of status

Many features of traditional Korean residences point to the status of their owner. This can not only be seen within the dwelling itself, but also in the broader context of a settlement.

#### Positioning

*Hanok* were placed in consideration of hierarchy, resulting in upper classes residing on the highest and most revered points within a settlement. Status receded with elevation, which is why the lowest classes saw themselves relegated to the plains. [Jung, 2014:114-115] As explained before, spatial hierarchy was also observed within the compounds and buildings themselves.

#### Dwelling size

While *banga* were often huge complexes, especially when owned by members of the ruling family, *minga* only incorporated the most necessary spaces. This was mainly due to the financial situation of their respective owners. Unlike Korean homes, the size of Philippine dwellings is based on the number of occupants and thereby does not give away the owners status. [Gauvain, 1982:31]

#### Spaces

As mentioned before, certain spaces were only found in upper-class homes. These were generally the ones not necessary for everyday life, but bonus rooms incorporated as a sign of prestige. Examples are several *ondol-bang*, as well as a separate ancestral shrine.



Fig. 137: smoke outlets of the ondol system

The Japanese even had spaces that were reserved for the upper classes only, one of those being the *zashiki* (formal *tatami*-space). This however, was only the case in the 12th century, with commoners also including it in their *minka* by the *Edo* period. It was only used for special occasions and important guests, while everyday guests continued to be received in the *hiroma* (living area). [Higashino, 2003:29-47]

#### Features

##### Smoke outlets

As mentioned before, a main sign for higher status was elevation, which the upper classes also translated to their dwellings themselves. Some *sarangchae* had outlets in the lower section of their facade (Fig. 137), the level where the flues of the *ondol* heating system were located. Along with the chimney, these allowed the white smoke to escape, which would then spread over the surface of the courtyard and make the building appear to be floating on a cloud. This symbolically indicates the superiority of the master who resided there. [Sarvimaki, 2003:98]

##### Latticework

Most often, *banga* and *minga* had latticework with similar patterns applied to their windows and doors. In *banga* very high status however, they could get quite intricate and complex. As this required great craftsmanship and much time, these patterns were very expensive, which explains their limited use. (Fig. 138)



Fig. 138: general pattern for latticework of banga and minga openings



Fig. 139: banga with a tiled roof

### Roofs

Social hierarchy was also reflected in the roofing materials, some of which could only be applied to certain shapes and structures. The tiles placed on *banga* roofs were heavier and followed the curvature of the mountains in their back, both of which required a rather complicated and more expensive frame. [Savage-Landor, 1895:114] (Fig. 139) *Minga* and secondary structures were roofed with materials such as thatch or wooden shingles. Although less durable, these were lighter and thus required a less sturdy support, compared to the more prestigious tile-roofs. They had, by nature, less intricate or no patterns, another sign for the lower status. (Fig. 140)

Comparable in using different shapes and materials for signifying the importance of a certain building are the traditional roofs found all over Indonesia. Here, the number of roofs, their symmetry and overall complexity increases with hierarchy. Due to this, it is not surprising that the same building may have different roof shapes, all based on the importance of the areas they cover. [Lehner, forthcoming:2-3]

In Taiwan too, roofs alluded to hierarchy, with multiple roofs signifying a higher status than a single roof. [Chiou, 1996:689; 7112]

### Gates

The location, direction and physical appearance of gates was determined by cultural norms such as social status and power. [An et al, 2017:120] Elevated roofs, as high as the building, were reserved for the main gates of *Yangban* residences. Low gates, levelled with the fences or walls attached to them, were used for the separation of *banga* inner quarters or, if they had one, for residences of the lower classes. [Sarvimaki, 2003:91]

Gates of Japanese mansions were also influenced by status and area of placement. Cusp-gabled roofs, for example, were reserved for the upper classes. [Sarvimaki, 2003:88]

Russian gates gave away their owner wealth and status through their decorations. While those of the upper classes were richly ornamented, the gates of the poorer folk were very simple. [Ivanova, 2011:1]



Fig. 140: minga with a thatched roof

### Materials

A noticeable distinction between upper and lower classes was, that the houses of the better off were not only functional, but also of great artistic value. These greater means were shown by incorporating more exclusive materials and decorations. Regarding *minga*, materials were generally chosen for practical and economic reasons, as previously explained in the case of roofs.

In the Philippines too, a home owner's wealth is indicated by construction materials and their quality. [Gauvain, 1982:31]

The tents of Berbers indicate to their owners identity by way of decorations, with those of the better off being more elaborate. [Gauvain, 1982:31]

Bedouin tents in Saudi Arabia display hierarchy through large strips of woven cloth on the outside. Their length proportionally increases with the status of the owner. [Gauvain, 1982:33]

### Interior

The interiors of *banga* are dominated by paper. Not only is it plastered on walls, as well as floors and ceilings of *ondol* rooms, it is also applied on doors and windows. [Sarvimaki, 2003:84] While paper is also present in *minga*, earth is more prominent.

### Floors

As mentioned before, spaces in Joseon hanok could be laid out with three types of floors. *Ondol* were the clay-floors heated from underneath, while *maru* were made from wooden boards. The third kind were dirt floors referred to as *heulkbadaek*. [Choi, 2007:47]

#### Heated floors: Ondol

*Ondol* floors were constructed by placing stone slabs over underfloor flues, through which hot air was sent to warm them up. Heated up by a cooking stove, the hot air cooled down on its way, before exiting through an exterior chimney vent. [Lee, 1991:66] The slabs of *ondol* were covered by clay and finished with thick, yellowish oil paper. [Savage-Landor, 1895:139] Its glossy structure, achieved by a mixture of bean-oil and a yellow



gardenia-seed paste, ensured a low-maintenance and soft surface. [Kim, 2009:73-74] It furthermore reflected and softened sunshine or moonlight, when it entered through the paper-clad windows. [Rieh, 2003:69] *Ondol bang*, small in size and with low ceilings, were used for sleeping, working and warming up during winter. [Lee, 1991:67] They were however also used in summer, then left unheated and with their doors hung open to enable airflow. [Sarvimaki, 2003:83-84; 87]

### Unheated floors: Maru

As mentioned before, *maru* refers to elevated wooden floors, which were traditionally made durable by being finished with a mixture of red clay and a glue-like substance. With time and through use, the wood would change colour and turn dark brown. [Kim, 2009:74] A *maru* floor was usually found in the main hall which, one or more sides, had no walls standing between the pillars that supported the roof, hence being open. This enabled an extension of the floor to and along the front of the *ondol* room, where it formed a type of veranda. [Lee, 1991:66-67] While *maru* spaces were usually open to the roof, they were sometimes equipped with a partial wood-clad ceiling (*umulbanja*). The elevated position, as well as the deep eaves covering *maru* floors, enhanced the horizontal lines of the facade. [Sarvimaki, 2003:84-85] Although mainly used for *daecheong*, *maru* were also applied to other areas, such as transitory porches, and came in various compositions. A *jangmaru* ("long" floor), which features long parallel floorboards, was generally used for storage spaces or in attics. [Jackson et al, 2012:72-75] The set-up of the uniquely Korean *umulmaru* alternates between shorter and longer boards, thereby creating a chequered structure. This technique not only prevents warping, the shorter pieces also facilitate installation. Besides being used for narrow porches, the boards in main halls and storage units could also be laid out in this pattern. [Choi, 2007:47] [NHC, 2017:86]

### Dirt floors: Heulkbadaek

Subordinate spaces, such as kitchens, barns and storage units, had dirt floors. These *heulkbadaek* were composed of hardened soil, which was compressed even more through use. [Choi, 2007:47]

Like in Korea, dirt floors could also be found in traditional Japanese kitchens. [Sarvimaki, 2003:86]

### Ceilings

*Hanok* ceilings come in two forms. They are either open to the roof, and thus high, or suspended and flat. In case of the latter, they are much lower.

### Open to the roof

When the former is the case, all structural elements are exposed, with the spaces in between filled with white

plaster. [Cho, 2013:146-147] Similar to a human ribcage, this type comes in two variations, depending on the roof shape. [Jung, 2014:134] The standard in *banga* are *yeondeung*, where the bottom of a simple pitched roof is exposed. (Fig. 141) *Minga* ceilings were, as a result of their usually thatched roofing, conical in shape and sloped to the edges, a type known as *satgat*. [Choi, 2007:58] (Fig. 142) These types of ceilings, where the structure was visible, were generally installed in unheated *maru* spaces, since there was no need for heat preservation.



Fig. 141: exposed structure (yeondeung) of a pitched, tiled banga roof



Fig. 142: exposed structure (satgat) of a conical, thatched minga roof



Fig. 143: flat, suspended ceiling (jongibanja) in an ondol room



### *Suspended and flat*

Heated *ondol* rooms, on the other hand, needed to be compact, which is why suspended ceilings were installed. (Fig. 143) Referred to as *banja*, these flat ceilings are achieved by applying boards to a wooden frame, which are then plastered and covered with *hanji* (paper) to conserve heat. [Jung, 2014:145] These flat ceilings came in different variations. [Choi, 2007:58] *Jongibanja* were the paper-finished ones usually used for *ondol* rooms, while *pyeongbanja*, mostly used in kitchens, were finished with wooden boards or clay. The third, and most prestigious, kind were the coffered *umulbanja* (also *soranbanja*). Usually applied to cover only parts of the roof structure, they were constructed with square wood panels attached to a paper-coated frame. [Choi, 2007:58]

Unlike those of Korean mansions, the ceilings of Japanese *shoin* rooms are generally finished with wood. [Sarvimaki, 2003:86-87]

### Walls

*Hanok* walls are generally made from plaster which, depending on the source material, comes in different earthen shades. These clay walls are either left in their natural state, most often the case in *minga*, or coated with *hanji* (paper), more common in *banga*. If case of the latter, the surface is almost white. (Fig. 144)

Also plastered and white, although painted, was the single room of houses in *Juxlahuaca*, Mexico. [Gauvain, 1982:38] *Japanese walls* are also traditionally plastered, which is done over a bamboo net place between columns. [Sarvimaki, 2003:86] (Fig. 145)

### *Furnishings*

#### General

Due to the fact that most rooms in vernacular homes were used for several purposes, and thereby required flexibility, furniture needed to be transportable and easy to stow away. To facilitate this, the few pieces that came to use were rather small and low in size. (Fig. 146) This was possible since Koreans led a floor-sitting lifestyle, which called for low and compact, rather than big and heavy pieces. [Kim, 2009:72-74] Since, due to the aforementioned emphasis on simplicity and minimalism, only the most necessary furnishings were used, which were rather plain in their appearance, they were often overlooked at first glance. [Savage-Landor, 1895:139] Furniture used in the *sarangchae* (men's quarters), the majority of which was movable, was placed according to size. Bigger pieces were put close to walls, decreasing in size towards the centre. [Yoon, 2001:5]

*Living a floor-based* like the Koreans, the Japanese also made use of multipurpose rooms and thus owned little furniture. [Sarvimaki, 2003:84-85] (Fig. 147)

*Izba*, the very basic log cabins of Russian peasants, likewise came with only few furnishings. [Pipes, 1995:143-144]



Fig. 144: paper-coated walls inside a banga



Fig. 145: plastered interior walls of a traditional Japanese house



Fig. 146: small-scale furnishings



Fig. 147: interior of a Japanese house with few furnishings

### Space dividers

While, as mentioned, most spaces in traditional Korean houses were used for multiple purposes and were thus rather open in their set-up, some occasions called for spatial separation. Instead of fixed walls, which would have interrupted the space, adjustable dividers, in various forms and sizes, functioned as partitions. These panels not only came in various sizes, but also had different opening mechanisms.

### Shutters

Due to their positioning and appearance, most space dividers were fixed in their place and thus functioned as doors and windows rather than furnishings. This is also reflected in their Korean names. A more detailed introduction to the diverse typologies of these shutters will be given later on. [Kim, 2009:71-72]

### Folding screens: Byeongpung

While all other types of partitions had a designated place, *byeongpung* or "folding screens" were portable and thus used differently. (Fig. 148) Originally used for practical purposes such as blocking drafts, these structures later served as displays for paintings and embroidery. Smaller



Fig. 148: byeongpung (folding screen)



Fig. 149: Chinese folding screen (ping feng)

screens were used to shield the head from drafts when sleeping on the floor. Introduced to Korea from China in the seventh century A.D., where they have been in use for close to 2,000 years, most of the original *Byeongpung* remaining are from after the 15th century. These folding screens always consist of an even number of panels, generally four to twelve. [Lee, 2012:96]

The Chinese refer to similar folding screens as *ping-feng*, *ping* meaning "screen" or "blocking" and *feng* translating to "breeze" or "wind". (Fig. 149) Believed to have originated during the *Han* dynasty (206 BC to 220 AD), they became widespread during *Tang* (618-907AD). *Ping-feng* are believed to have developed as protective measure while sleeping, which was done in multipurpose spaces that changed their function depending on the time of day. [Yoon, 2001:6]

*Byoubu* or "wind wall", as they are referred to in Japan, were imported from Korea in the late stages of the 7th century A.D.. [Lee, 2012:96] (Fig. 150) These too are made from multiple joined panels and come in various sizes, with standard ones being six-fold and about 1.5m high and 3.5m wide. [Neighbour-Parent (4), 2018:1] Folding screens were also introduced to Europe, when imported from China in the 17th and 18th centuries.

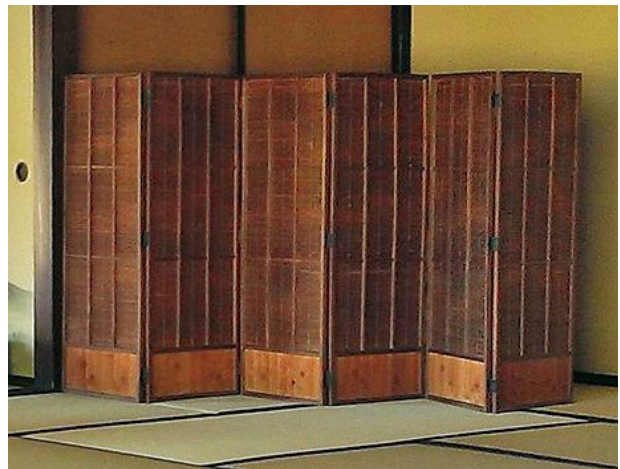


Fig. 150: Japanese folding screen (byoubu)





Fig. 151: dotjari (rush mat)

### Mats: Dotjari

*Dotjari*, mats made from bulrush, were traditionally used in various situations, both indoors and outdoors. (Fig. 151) Handy and light-weight, they could be rolled up or laid out as the occasion required and thereby allotted a new meaning to a spot. After the sun had set and work for the day had finished, occupants of *minga* would lay out *dotjari* directly on earth of the courtyard and enjoy each others' company. These mats thereby turned a place of work into a place of rest. People would also use them to sleep on, in order to keep cool during warm summer nights. To achieve this, they were unfolded in breezy spots on *maru* or *ondol* floors. When placed on a heated floor, people slept with their heads near the upper part (*witmok*) and their feet near the lower, and warmer, part of the room (*araetmok*). [Choi, 2007:83] During the day, these were rolled up and stored away, while different ones were laid out and offered as seats for guests when, for example, playing cards. [Koehler, 2017: 27] Although similar in appearance, the types used inside were much more delicate and softer than those used outside. Weaved in a floral pattern, their beige and brown undertone merged seamlessly with both, the yellowish surface of *ondol* and the wood of *maru*. [Lee, 2012:78] While still in use, today's mats are generally made from bamboo or some sort of synthetic material. [Koehler, 2017: 27]

Comparable mats are the straw-based *tatami* ("to fold") of Japan, which are responsible for floor arrangement and thus dominate the interior. (Fig. 152) Portable car-



Fig. 152: tatami mats making up the floor of a Japanese space

pet-like objects at first, they started to cover the whole floor of *Shoin*-style rooms by the 15th century. Initially, only used to a limited extent in upper-class homes, and unseen in those of commoners, this started to change in the 18th century. [Sarvimaki, 2003:85]

### Bamboo pillow: Jukbuin

When sleeping on *dotjari*, people would sometimes make use of a *jukbuin*. This pillow was made by plaiting strips of bamboo into a cylindrical shape with holes. [Koehler, 2017: 27] (Fig. 153)

Generally known as "bamboo wives", variations of *jukbuin* are found in many other Asian countries.



Fig. 153: pillow made from plaited bamboo strips (jukbuin)





Fig. 154: typical chest used for storage

### Closets, chests and drawers

In *hanok*, chests were most often only found in the *an-bang* and *sarangbang*, both used as bedrooms. They were used to store clothes, as were pegs located in recessed parts of a wall. (Fig. 154) The chests were covered with Korean paper (*hanji*), studded with brass nails and since they were also used for travelling, equipped with two handles and a lock. Additional drawers could be found in the reception room, where they were placed in a corner in order not to be in the way. [Savage-Landor, 1895:140-141] The most notable closet in Japanese homes was the *getabako*. This is where outer footwear was put after removing it in order to enter the living space. [Spacey, 2015:1] It usually stood in an area directly attached to the *genkan* or sometimes on the porch. [The Japan Forum, 1997:1] *Getabako* refers to *geta* (Japanese wooden clogs with cloth-thongs) and *hako*, which translates to "box". [Ito, 2003:231]



Fig. 155: small, portable floor-table (sang)



Fig. 156: traditional Japanese low table (chabudai)

### Tables

Traditional portable tables, low in height, are known as *sang* or "floor table". (Fig. 155) Although most come with four legs, there are varieties with only three. They get their names from either the designs they are adorned with, their region of origin or their material. [Lee, 2012:96-97] These tables are often found in reception rooms, where flowers are placed on them. [Savage-Landor, 1895:140-141] The *seoan*, a table-like bookstand found in the *sa-rangchae*, was used to indicate where a guest should sit. [Yoon, 2001:5]

Since the Japanese also live on the floor, their tables (*chabudai*) are also quite low. (Fig. 156) In the colder months, they used the *kotatsu* kind, which was heated from the bottom. People would cover it with a blanket and put their feet underneath it in order to warm up.

Different to Koreans, the Chinese use tables of various heights. This is due to their lifestyle being a mix of floor- and chair sitting, whereas Koreans primarily use the floor. [Yoon, 2001:7]

### Lighting/ Illumination

As mentioned before, Easterners don't regard light as superior to darkness, which is why light emitters did not play a huge role before the invention of electricity. [Kim (1), 2016:4-5] The few objects that provided light in these regions were used very sparsely. Besides candles, held by wooden or brass candlesticks, Koreans used oil cup-lamps similar to those in Europe, to provide themselves with light. [Savage-Landor, 1895:149-150] Regarding this, it has to be considered that using such objects came with a cost, which is why they were more prevalent in upper-class homes.

### Heating sources

Koreans utilized hearths to supply their unique *ondol* floors with heat. (Fig. 157) In *minga*, these were generally located in the kitchen, while in *banga* additional ones were placed in spaces next to sleeping areas. Close proximity was necessary in order to fully use the potential of this underfloor heating. Regardless of area, the system required the hearths to always be positioned on a lower level than the spaces that they provided heat for. (Fig. 158)

Unlike Korean homes, Chinese ones were not equipped with heated floors. To warm up, people sat or slept on *kang* instead. (Fig. 159) These brick structures, with funnels inside, were heated by an attached stove, which was simultaneously used for cooking.

An earthen stove, similar to *kang*, was also the central element in a Russian *izba*. This *pechka* was likewise used for sleeping and cooking. [Pipes, 1995:143-144] (Fig. 160) Japanese houses did not have underfloor heating either, rather, as previously mentioned, their occupants stayed warm with the help of heated tables.



Fig. 157: hearth for heating the ondol floors



Fig. 159: kang (heated bed) in China



Fig. 160: pechka (heated bed) inside a Russian house

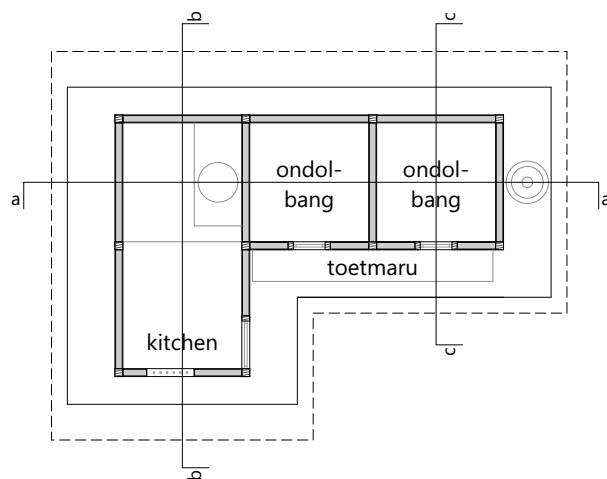
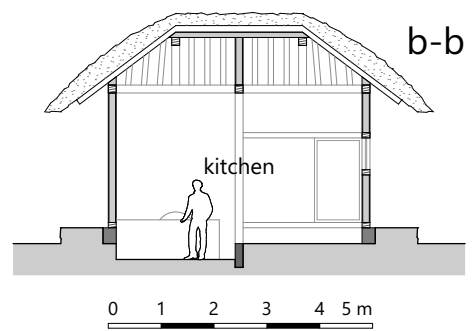
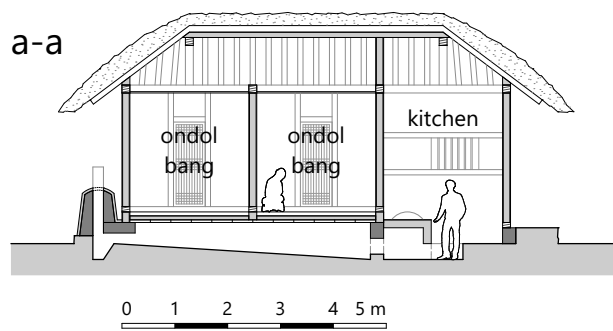
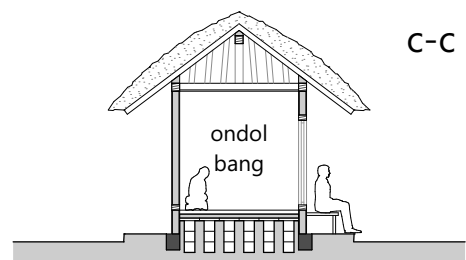


Fig. 158: positioning of the ondol fireplace in relation to ondol-bang



### Human scale Background

*Hanok* are designed to offer the ideal environment for the movement of its occupants. This is not surprising, since *Sarvimaki* identifies the human physique and activities such as sitting, sleeping and working as main influences on the dimensions of vernacular dwellings. She believes the basic measurements to have their origins in bodily proportions, pointing to one foot (around 30 cm) as the length of the average male foot. [Sarvimaki, 2000:165] With the lifestyle inside a *hanok* being floor-based, it comes as no surprise that its dimensions correspond to that. This is not only reflected in the proportions of rooms, which do not feel claustrophobic even when rather small, but also in the way spaces are connected to facilitate effortless movement. Being adapted to the human proportions, *hanok* feel homely and safe.

Chinese vernacular houses likewise create a balance between their inhabitants and nature, which results in spaces that convey a sense of security. [Wang, 2014:3]

### Changes throughout history

From today's perspective, these dimensions seems very compact, but they were perfectly adequate for the people of *Joseon*. The differences in perception lie in the fact, that the average height of Koreans have increased with time. A 2010 height study conducted for the Korean Ministry of Knowledge and Economy found that, while a significant change was recorded starting from the early 20th century,

the onset of modernization, the average height had largely remained the same from the early 15th until the late 19th century, the *Joseon* period. The average height of Korean adults during the *Joseon* dynasty (1392-1910) was estimated to have been 161.1 cm for men and 148.9 cm for women, resulting in an average height of about 1.55 metres for both sexes. (Fig. 161) This is significantly shorter than today's generation, with men measuring in at 174cm and women at 160.5cm in 2010. [Shim, 2012:1] The same is true for Japan, where skeletal remains show a combined average height of 158 cm in *Edo* times (1603-1867) and 159 cm during the medieval period (1200-1600), the time span of Korean *Joseon*. [Clark, 2007:59-61] In 1936, *Taut* found Japanese adults as being between 160 and 165 cm tall, while the average European measured in at 172 to 175 cm. Like in Korea, not only was people's height important to find the right dimensions of Japanese houses, body proportions were too. [Taut, 1997: 38]

### Calculation and Implementation

Traditionally, Koreans measured a person's height in *cheok*, with one *cheok* equalling to about 30.3 centimetres. By way of expression, giants were nine *cheok* (~270 cm) in height, while "normal" people were, at their shortest, 5 *cheok* or about 150cm tall. *Joseon* residential buildings were based on the minimum of five *cheok*, which not only determined the size and height of spaces, but also the dimensions of features.

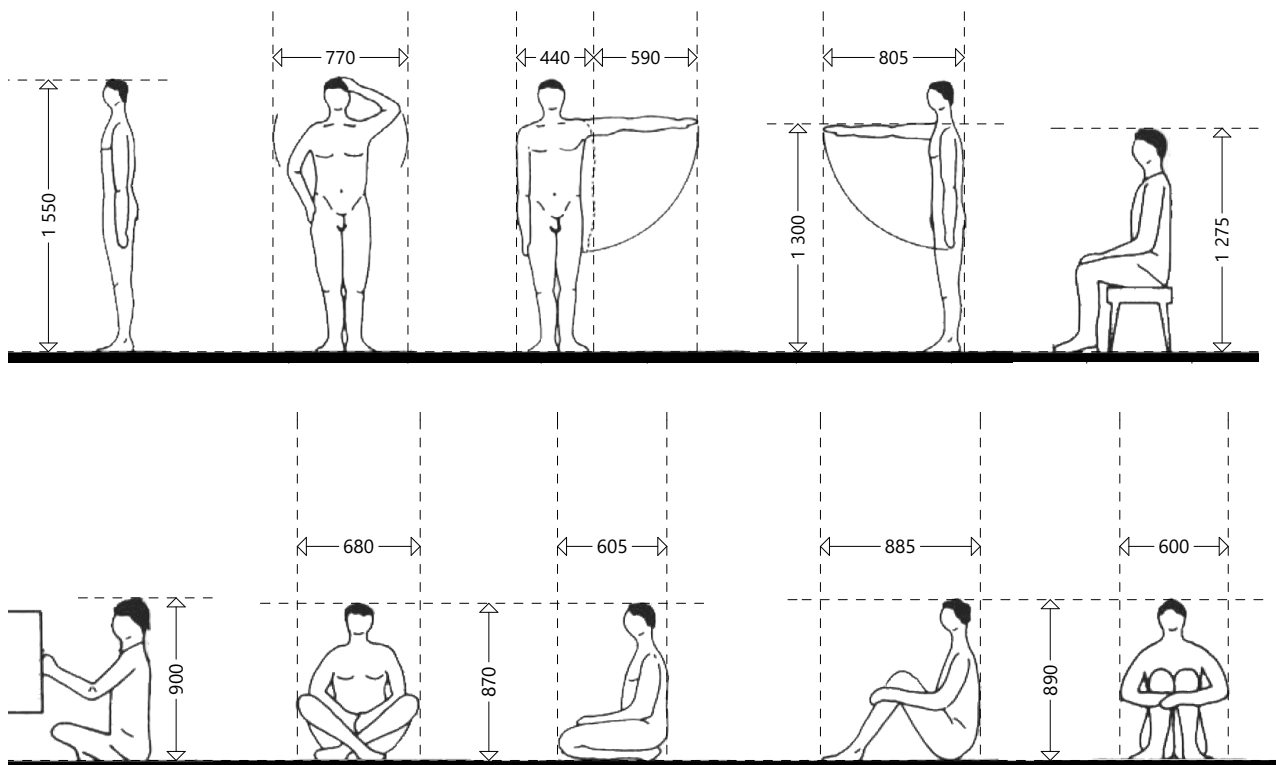


Fig. 161: spatial requirements based on average height during the Joseon period



### Ceilings

The adaptation to human size and proportions was also reflected in ceiling height, which was lower in enclosed spaces than in semi-open ones. This was due to the former being used in a floor-based manner, while the latter was additionally used in standing position. [Choi, 2007:58]

#### Open to the roof

As mentioned before, due to varied demands, *hanok* spaces came with different ceiling height. *Maru* spaces are generally open to the roof, with rafters exposed, which makes for better ventilation and provides storage space. Although this applies to most *banga* and *minga*, some kinds of the latter come with an open floorplan, where the majority of the interior space is open to the roof. An example for this is the *Kkachigumeong-jib*, where this is done for practical reasons. Regarding measurements, this amounts to about ten *cheok* or three metres from the floor to the bottom of the top beam, which is double the height of a *Joseon* Korean. [Hong, 2016:1]

In Japan, the ceilings in rooms of significance, like the grand reception halls of upper-class *shinden* (sleeping buildings), were also raised. Unlike those of Korean *maru* spaces however, these were levelled and rather elaborate in structure and decoration. [Itoh, 2004:1-2; 4]

#### Suspended and flat

Unlike wooden-floored halls, enclosed *ondol-bang* (heated floor rooms) called for lower ceilings and a levelled finish. This was necessary in order to ensure optimal heat preservation. In numbers, this resulted in a floor to ceiling distance of 7.5 *cheok* (~2,30 m) or one and a half humans. [Hong, 2016:1]

The ceilings in regular Japanese rooms, most equipped with *tatami*, tend to be lower and simpler in design than in reception spaces. They are however higher than those of Korean *ondol-bang*. [Itoh, 2004:1-2; 4]

#### Floor area

Human height also had an influence on the grid *hanoks* were based on. Consisting of bays, which describes volume enclosed by four columns, the measurements of the grid varied. On average however, the distance from column to column was approximately at about 7.5 *cheok* (2.3m) to 8 *cheok* (2.4m). The same applies to the ceiling height of enclosed rooms, a bay thus being square in shape. Based on these measurements, the floor area of a bay amounts to about 5.5 square metres.

#### Elevation

As mentioned prior, in order for the *ondol* system to function properly, its fireplace needed to be positioned lower than then rooms meant to be heated. (Fig. 162) The hearth that produced the heat for the *ondol* was simultaneously used for cooking and thus generally found in



Fig. 162: lower positioning of the ondol hearth

the kitchen. This explains why this space was placed lower compared to the rest of the house. The difference usually amounted to the height of a sitting person, translating to 2.5 *cheok* or about 75 cm. [Hong, 2016:1]

#### Openings

Also influenced by the five *cheok* minimum were the thresholds of openings between enclosed rooms and halls. Wide as a shoulder, their top was low enough to be reached by an arm's length when sitting down.

#### Building and measurement units

Korean and Japanese architecture was greatly influenced by China, which explains the similarity of their measurement systems. [Sarvimaki, 2000:165]

#### Base unit

##### Kan

*Hanok* were usually measured in *kan*, a unit used for length, area and volume, whose origins lie in China. [Cho, 2013:147] A *kan* did not have fixed dimensions, but was distinguished by the social standing of the household and varied by period and region. It was measured by the actual distance between two columns which, although not always the same, was usually six to nine feet (about 1.8 to 2.7 metres) in length. While the distance between columns determined the length of a *kan*, the area enclosed by four resulted in a square-*kan*. Multiplying a square-*kan* by column height resulted in the volume known as

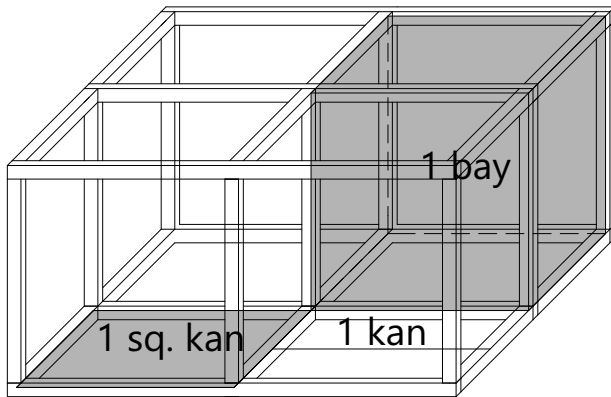


Fig. 163: principles of the kan measurement

bay. [Lee, 1991:66] (Fig. 163) The allowed amount and size of these units was based on social status, with checks having been conducted in order to assure the adherence to the restrictions. [Sarvimaki, 2003:91-93] Koreans not only used the *kan* for measurement, but also to describe *hanok* themselves. Rather than referring to their breadth and depth, standard in the West, they speak of either *dori-kan* (purlin-direction) or *bo-kan* (transverse beam direction). [Cho, 2013:147]

The base unit for the Chinese modular building system is known as *jian*. As equivalent of the *kan*, it likewise

describes the span between two lateral pillars. [Knapp, 2004:30] It originated at around 1600 BC, at the end of Chinese prehistory and the start of the *Shan* dynasty, when important buildings had wooden posts placed at regular intervals. [Sarvimaki, 2000:19]

In Japan, the same type of unit is referred to as *ken* or *ma*. Like those of *kan*, the dimensions of *ken* also varied by column distance. [Sarvimaki, 2003:91-93]

### Length

#### Korean foot: *Cheok* (also *ja*)

Another important unit besides the *kan* was the *cheok* (also *ja*) or "Korean foot". Measuring in at about 30.3cm, it was primarily used to adapt the traditional houses to the human scale.

The *ja* is based on the "Chinese foot" (*chi*) which, in its original form, was measured on a human hand and represented the distance between the tips of the thumb and the forefinger. This unit first appeared in China during the *Shang* dynasty (1766 to 1122 BC) and was then exported to other East Asian countries. Although its length varies by region, the standard lies, like in Korea, at about a third of a metre.

In Japan, the equivalent to the *ja* is known as *shaku*. Here too it measures in at about 30,3 centimetres.

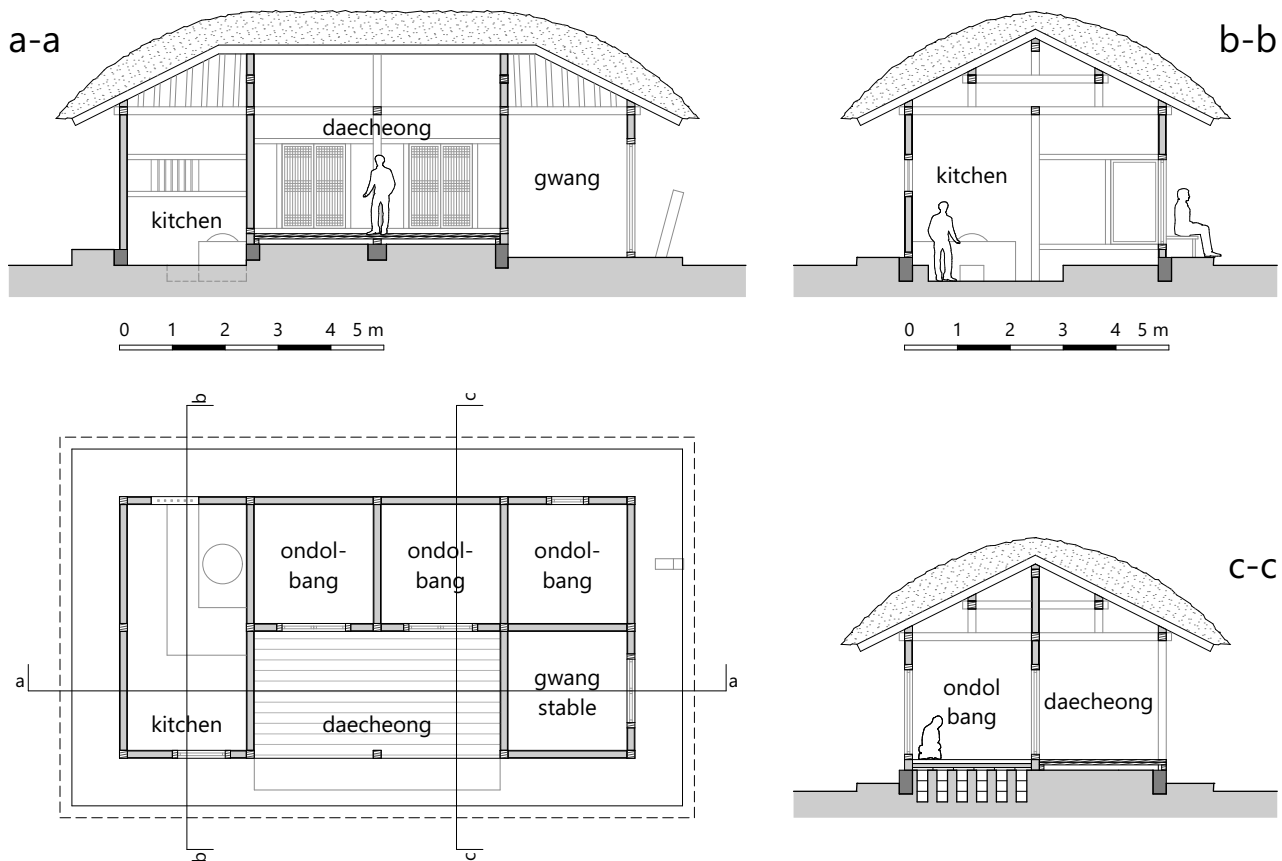


Fig. 164: overview of the general spatial dimensions of a minga

### Floor area and volume

Not only have the Korean length units their origins in China and are an expression of the social order, the modular method used for the grid is too. [Sarvimaki, 2003:91]

#### Bay: Square kan

As mentioned before the size of a *hanok* is determined by its number of bays (also square *kan*). [Jun, 2012:231-238] A square *kan* describes the space enclosed by four columns, usually measuring in at about 36 to 81 square feet or 3,30-7,50 square metres. [Lee, 1991:66] These compartments form the basis for the modular system, with their number deciding upon the size of the house. [Lee, 1991:66] (Fig. 164) (Fig. 165) (Fig. 166) When determining size, all other components are based on the columns, whose footprint usually comes in at around 20 x 20 cm. [NHC, 2017:20-21]

In China, the volume defined by the walls and floors of a square bay is known as *jian*. Most dwellings are made up of three to five *jian*, which shows regional variations of height, width and depth. Generally, one *jian* was from three to five metres wide. While in the North, its height was usually similar, it could be double or triple that in the southern areas. [Knapp: 1989, 26-28]

The method of measurement for length, space and area used in Japan is referred to as *shakkanho* or “*shaku-ken* system”. Also significant for the floor area is the *tsubo*, which is based on a square *ken* and describes the area of two *tatami* mats. Available in four main sizes, these mats represent the basis for dimensioning a Japanese house and are thus responsible for floor arrangement, as well as room size. [Higashino, 2015:5]

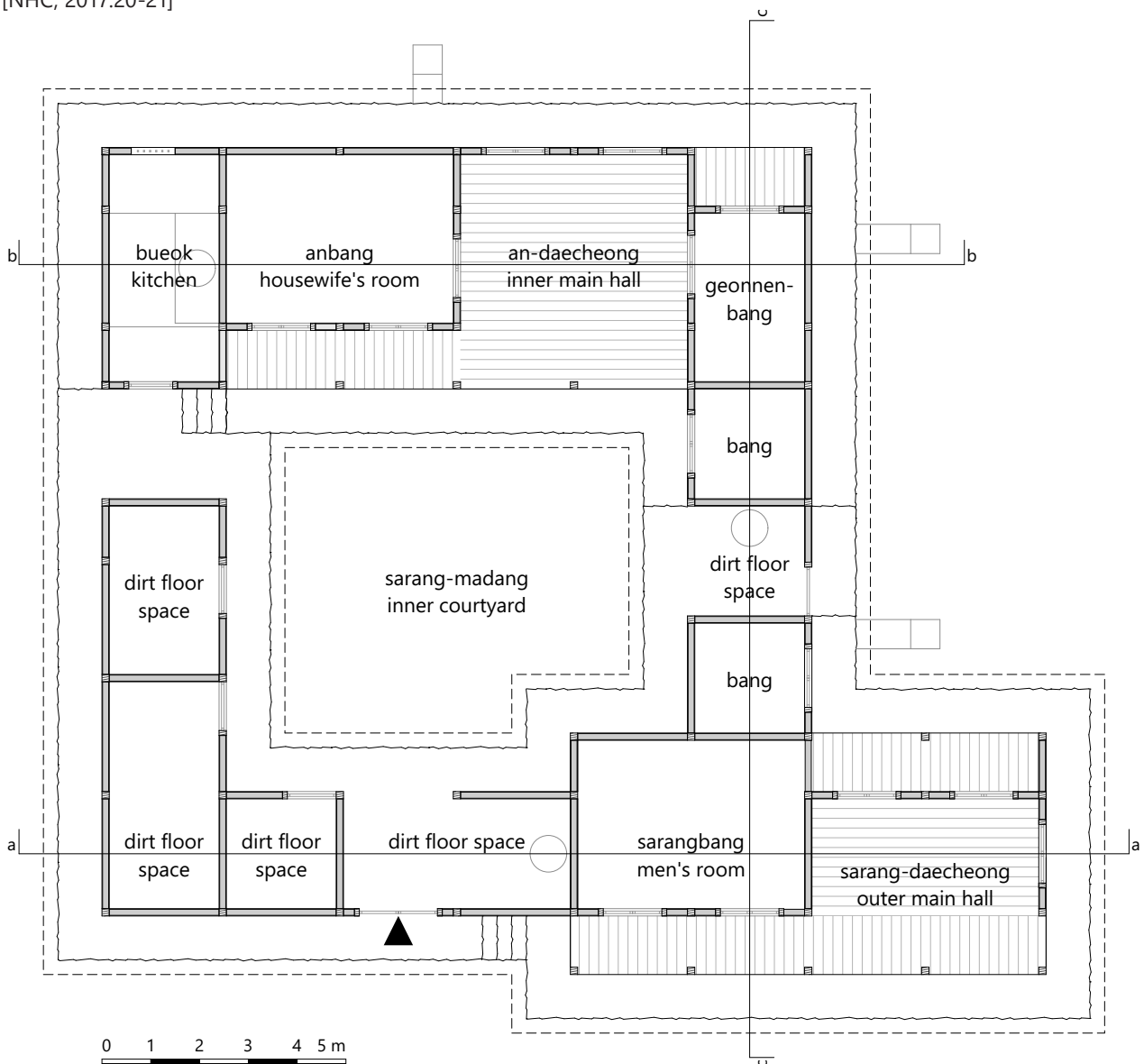


Fig. 165: floorplan depicting the general spatial dimensions of a banga



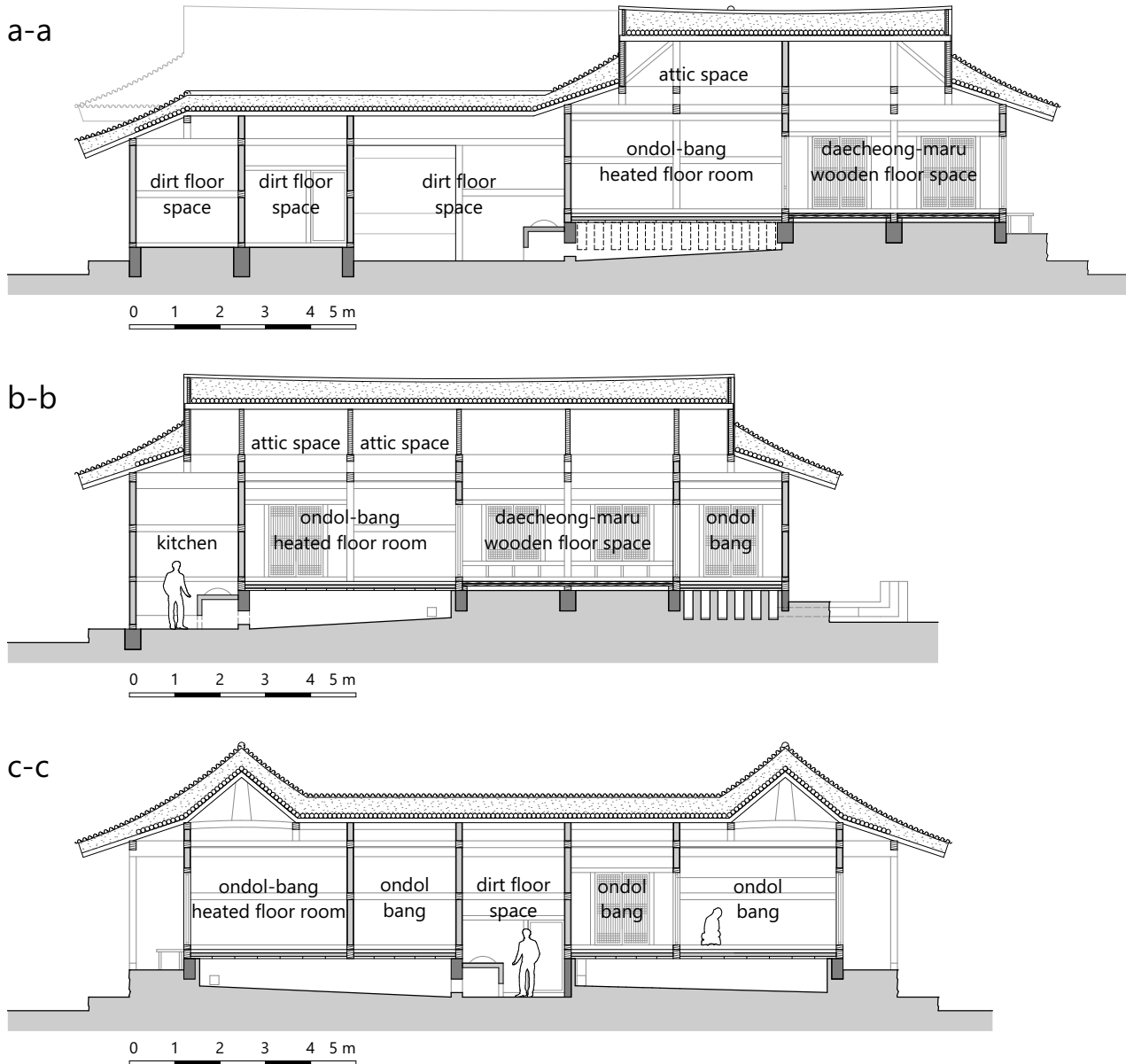


Fig. 166: sections depicting the general spatial dimensions of a banga

### Grid: Sizing and expansion

#### Building: Chae

A *chae* or "building" is formed when several *kan* are arranged on a grid. The front of a *chae* always extends in odd numbers such as three and five. This is based in the theory of a dualistic universe, an influential principle in traditional Korean architecture, where human residences are ascribed to *Yang*, which correlates to odd numbers. Most *hanoks*, especially *banga* compounds, consist of more than one of these *chae*. [Jun, 2012:231-238]

Like its Korean counterpart, a Chinese building was created by the conglomeration of several square *jian* (bays). [Knapp, 2004:30] While the main building, due to being constructed first, was dimensioned freely, the length of the secondary buildings, and with it the number of bays, was determined by the depth of the courtyard. Not only

were the bays, and thus rooms, of these smaller compared to those of the primary building, but the ceilings were also lower. [Chiou, 1996:703-704] In the past, regulations only allowed using dimensions according to one's class, which contributed to the standardization and modulation of Chinese houses. [Knapp, 2004:30]

The Japanese also made use of a proportional system. Known as *kiwari*, it regulates the size of all elements that a building is composed of. [Higashino, 2015:1-5] This modular system, developed from antiquity, was used as base for aristocrats' mansions and Buddhist temples. Its standard structure (width by depth of one bay) represents the boundary lines of the main space, *moya*. Although limited in beam direction (*hari yuki*) by the depth of one bay, an infinite number of bays could be added in the opposite direction, *keta yuki*. [Higashino, 2015:1-5]



## STRUCTURAL COMPOSITION

A *hanok* structure incorporates three main sections. While the base part is formed by a visible foundation, often resembling a stylobate, the body consists of a wooden frame or earthen walls, topped by the roof. [Kim et al, 2018:1] The latter two parts are another representation of balanced dualism in Korean residential architecture. [Kim, 2008:7]

Like *hanok*, Chinese *Siheyuan* consist of a foundation, a wooden framework and a roof, all built from readily available materials. [Knapp, 2004:30]

### Base section: Foundation

#### Artificial hills

While all living spaces of *hanok* are elevated from the ground to a certain degree, significant *chae* (buildings), such as the one containing the ancestral shrine, would not only be elevated by their foundation, but raised even higher by being placed on an (artificial) hill or an additional platform.

This double elevation can be likened to the holy shrines of the *Maya* or *Aztecs*, with the ones situated highest being the most revered.

#### Platform, base: Gidan

In the countryside, the elevation of both *banga* and *minga* is achieved with *gidan* or “platforms”, which are most often built from piled up stones and soil, sometimes from bricks or roof tiles. Lower class *hanoks* most commonly use an earthen platform called *tochuk-gidan*, made by packing and building up mud, which is mixed with gravel or wooden sticks. (Fig. 167) *Jayeonseok-gidan* are earthen stylobates framed by stacked field-stones, which are similar in size. Used for both lower- and upper-class homes, the former most often consist of only one layer, while the latter are formed by several and are thus higher. (Fig. 168) (Fig. 169) [NHC, 2017:129-130] Urban *hanoks* and important *banga* structures, such as the *sadangchae*, had theirs built from solid stone, processed into rectangular pieces of certain dimensions (*jangdaeseok-gidan*). [Savage-Landor, 1895:150] (Fig. 170) Very important buildings came



Fig. 167: tochuk-gidan (earthen platform) of a lower-class dwelling



Fig. 168: banga platform made from natural stone (*jayeonseok-gidan*) with even more elaborate, stone-finished stylobates. [Shon, 2014:21-32] While in *minga*, the elevation serves practical purposes, *banga* also attach symbolic meaning to it. In terms of practicality, the height difference not only proved helpful in preventing rainwater from entering the dwelling, but also kept humidity and cold air at bay, which could have crept up from the ground below.



Fig. 169: *jayeonseok-gidan* (field-stone platform) as *minga* foundation

[Cho, 2013:145] Another benefit were the insect-repellent properties of the stones and soil, which were sourced in close vicinity, ideally from streambeds. *Gidan* were furthermore tasked with evenly distributing the building's weight from the columns to the cornerstones and on to the soil, which prevented them from sinking or slanting. Besides the aforementioned functional properties, plat-



Fig. 170: platform made from soil and solid stone (*jangdaeseok gidan*)





Fig. 171: living area placed higher than storage spaces

forms found in upper-class mansions also reflected hierarchy, with their elevation directly related to the status of a building. This is why main structures were raised higher than secondary ones. (Fig. 171) Most often made from granite, these bases were 90 to 120 cm high and took up about a third of the height of the house. [Kim et al, 2018:1] Those of *minga*, on the other hand, were of only about 20 centimetres. Stone built houses (*Jeju-jib*) were, like their timber-framed counterparts, also built on platforms, albeit not high ones. (Fig. 172) The logs of *Ulleung* island homes, on the other hand, were placed directly on the ground, protected only by a layer of mud. (Fig. 173) *Chinese houses* were often built directly on compacted, levelled earth. At times, they could also be slightly raised on a podium of tamped earth or solid stone, a dry and secure base. [Knapp, 2004:30]



Fig. 173: logs placed on a layer of mud, rather than a foundation



Fig. 172: platform of a Jeju island stone-house

### Cornerstones: Juchutdol

*Hanok* pillars rest on *juchutdol* (cornerstones), which redistribute the load of the structure on to the ground. (Fig. 174) These rocks also block moisture from below, keeping the wooden pillars from getting wet and rotting. *Juchutdol* are either hewed, in order to give them a polished appearance, or left in their natural state. In case of the latter, a labour-intensive process called *geuraengijil* has to be used, in order to adjust the pillars to the uneven stone surface. While either kind may be found in *banga*, most *minga* only use stones in their original form.

Until the *Edo* period, while constructing a Japanese *minka*, wooden posts were put directly into holes in the ground (*hottate-bashira*). From the *Edo* period (1603-1868) onward, posts were protected from rotting by being put on stone bases. [Higashino, 2003:29-47]



Fig. 174: cornerstone (juchutdol) carrying a wooden pillar of a minga

### Middle section: Framework and walls

#### Load-bearing

The load-bearing structure of *hanok* either consist of a timber frame, used for both *banga* and *minga*, or from stones or logs, seen in some special lower-class dwellings.

#### Timberwork: Chimok

Although the timber-frame itself was introduced from China, Koreans have made it their own and developed their very assembling methods, which resulted in the typical aesthetic found in *hanok*. [Barrera et al, 2013:204] A *banga*'s frame consists of a wooden post-and-lintel structure, placed atop foundation stones. [Cho, 2013:145] (Fig. 175) The length and height necessary for all timber elements is determined by the size of the roof structure, as well as the protrusion of the eaves.

The walls of higher quality Chinese dwellings did not support the roof directly, but were merely curtain walls between a wooden framework. This modular and flexible wood structure, similar to the steel framing of 20th century, was suitable for all climates. Since timber was expensive, these wooden frames were mostly found in upper class homes. The northern Chinese used the *tailiang* system, which required thick columns and beam, while in the South, slender pillars and traverse-tie beams were used, a method known as *chuandou*. [Knapp, 2004:35-37]

#### Materials and characteristics

Korean pines, serving as raw material for timbers on the peninsula grew, as mentioned before, rather crooked. This resulted in limited possibilities of processing, which is why the elements used in *hanok* were winding, rather than straight. After all woodworking had finished, the timbers would be oil-washed in order to protect them from rotting and insects, a process referred to as *magam*. This was taken even further in important buildings, where wood would be painted in the five Korean colours. [NHC, 2017: 176]

#### Columns

While the "crooked" columns of residences were rather limited in diameter and quadrangular in profile, those installed in highly important buildings had a round and more massive footprint. In Korea, columns were always placed on bases made from stone, with no levelling layer in between. [Cho, 2013:145-146] Rather, a method called *deombeong jucho* was used to adapt them to the base, in order to stabilize them and prevent slipping due to horizontal motions caused by strong winds or earth tremors. This technique saw both contact surfaces prepared in a way, that they would lock together. [Kim, 1998:26] Sturdiness was also the reason for applying other technical features such as *guiseoseum*, which refers to columns gradually increasing in height, from the smallest found in



Fig. 175: timberframe-constructed banga

the central part of the house, to the tallest at the corners of the building. *Ansollim* describes the upper part of the column slightly inclining towards its centre. Another characteristic, rarely seen in residential architecture, is *bae-heulim*. It refers to the largest diameter of column, found at the bottom, being a third of its height, which prevents torsion. [Cho, 2013:145-146] [Kim, 1998:26-27]

#### Beams

Transverse crossbeams connect the whole building and thus carry the roof load, which is why these elements are made from strongest and hardest woods are used. Standing atop these are short pillars, which support the roof and carry its load to the ground. [Cho, 2013:146-147]

#### Joinery methods

Assembling a *hanok* timber frame is approached in a holistic way, rather than done with a standardized process. Instead of modern metal fasteners, century-old joinery techniques, which require great knowledge and skill, are used. [Shin, 2012:168] The most widely used joints in Korean houses are *dovetail joints*, a series of trapezoidal pins interlocked with similarly shaped tails. [KTO, 2015:1] These joints are applied in two ways, with *leum* joining two wooden elements side by side, and *matchum* describing two pieces of wood joined perpendicularly or diagonally. [KTO, 2015:1:1] *leum*, found on only one side, describes a rigid longitudinal joint, which connects post and post or beam and beam. More common for *hanok* is the *matchum*, a connecting joint that can be applied in with various angles and is on both sides of a wooden member. This hinge joint attaches e.g. a post and a beam, or a post and purlin to each other. [Kim et al, 2011:353] Based on which components are combined at the head of a column, *mindori* and *sorosujang* are differentiated. The most basic kind, known as *mindori*, combines the column (*gidung*) with a beam (*bo*) and a purlin (*dori*). A more formal composition method, the *sorosujang*, starts off as *mindori* and then adds a bracket set composed of a connecting beam (*changbang*), a capital (*judu*), and a *soro* (small bearing block). [NHK, 2017:21]





Fig. 176: logs forming the load-bearing walls of a minga

### Log structures

Although rare, there were some examples of *minga* that were log structures. (Fig. 176) The outer walls of *Udegi-jib* on *Ulleung* island were made from logs, stacked up parallel to the ground. [Kim, 2015:1] [Ciccone, 2005:1]

### Stone houses

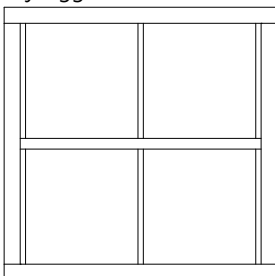
Just as rare were stone-built structures, which were primarily found on *Jeju* island. The walls of these houses, known as *dol-jib*, were built by combining untreated, volcanic stones with mud. (Fig. 177)

### Non-load-bearing Mud and wood

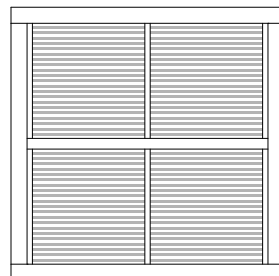
#### Lathwork: Oeyeokgi

In order to obtain closed walls, lattices are raised as sub-structure for mud-plastering. (Fig. 178) The first step of *oeyeokgi*, as this process is called, requires vertical laths (*junggut*) of about 5cm to be tucked into the holes of two cross beams in regular intervals. [NHC, 2017:90] Thinner elements (*oe*), made from bamboo or split canes, are then used to refine the matting. [Savage-Landor, 1895:150] This starts on the inner side of the dwelling, where horizontal ones (*nuloe*) are tied on top of the *junggut* with straw ropes. For the last step, vertical strips (*seoloe*) are woven onto the horizontal ones from the other side, thus filling in the space between the *junggut*. [NHC, 2017:174] Walls in Japanese traditional houses were built from a net of bamboo placed in between square pillars and beams, which was then plastered. [Sarvimaki, 2003:86]

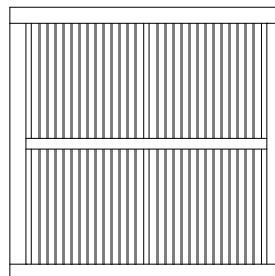
1: junggut



2: nuloe



3: seoloe



4: oeyeokgi

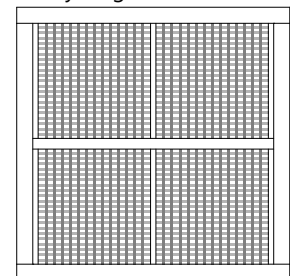


Fig. 178: lathwork (oeyeokgi) as base for the plastering of a non-loadbearing wall



Fig. 177: load-bearing stone and mud walls of a Jeju island home

### Plastering: Sujang

Seen as a very characteristic feature, *hanok* walls are plastered in such way that the timber structure remains visible. (Fig. 179) Three layers of mud are attached on both, the inside and outside. For the under-most coat on the inner side, known as *chobyeok-bareugi*, mud, sand and finely chopped straw, which prevents cracking, are mixed with water and then applied to the lathwork. The same is then done on the outer side (*matbyeok-bareugi*), but with less straw added to the mix, in order to enhance adherence to the inner layer. These first layers are then topped with a second one (*jaebyeok-bareugi*), whose mix uses finer sand and smaller pieces of straw. As the last step, the walls are finished with setting plaster (*jeongbeol-bareugi*), which comes in three types. Using only lime, known for its strong adhesive properties, leads to a greyish surface. [Jackson, 2012:91] A mixture of red clay and sand, on the other hand, allows for colour adjustment, as does adding lime to it. [NHC, 2017: 91; 74-75] (Shon, 2014:21-32) [Savage-Landor, 1895:150]

### Dry-panelling

In the 19th century, wood-panelled dry walls were often used instead of mud walls. [Cho, 2013:146]

### Mud and stone

While, like *banga*, *minga* often used soil and wood for building non-load-bearing walls, other techniques were also used. Thatched roofed houses, for example, often achieved their sturdiness by putting soil and dry stones in





Fig. 179: plaster applied to the lathwork of a non-loadbearing wall

between their wooden frame, the latter replacing wooden laths. Crosswise bamboo sticks would then be applied on top and plastered with a wet mixture of soil and straw. If available, loess was used, which gave the facade a distinct red-brown colour, comparable to clay. [Arirang, 2013:1] Walls in Vietnam are, similar to this, sometimes made from rammed mud or thick brick walls, both of which have insulating properties. [Nguyen, 2014:44]

### Brick

It should be mentioned that bricks were also used for building *hanok* walls. However, this only applies to urban *hanok*, which were a result of the industrial age and built at a later stage. [Park et al., 2015:12]

### Interior walls

Interior walls, used for dividing spaces, are either of the same depth as the frame they are placed between, or even thicker. This ensures great insulation even during cold winters. [Sarvimaki, 2003:86] These *simbyeok*, literally “core walls”, are usually finished with plaster, paper, or fabric. [Choi, 2007:47] (Fig. 180) Openings are put in these walls for entrance, lighting and ventilation purposes. Instead of panes, these doors and windows use latticed frames, clad in paper. Another kind of walls found inside are *banghwajang*, fire-resisting walls made from brick and stone. Placed in between *ondol* hearths and wooden structures, they are tasked with preventing the latter from catching fire. [Sarvimaki, 2003:86]

Comparable to the Korean kind are the interior walls found in Japanese houses of all classes. These came with plastered areas and papered doors, both interspersed by wooden frameworks. [Sarvimaki, 2003:86] (Fig. 181)



Fig. 180: plastered wall with openings between two banga spaces

### Top section: Roof Shapes

Depending on the roofing material, *hanok* generally come with one of three roof shapes. Besides the gabled *matbae-jibung* and the hipped *ujingak-jibung*, the hipped and gabled *paljak-jibung* comes to use. Some houses also have *nunsseop-jibung*, which are narrow roofs attached to a side, while pavilions are most often covered by a *mo-im-jibung* or “pyramid roof”.

Different roof shapes are also common in Japan. Farm-houses (*noka*) can be distinguished by having roofs with either a single ridge, multiple ridges or structurally independent, but connected roofs. While the latter are typical for the *Bunto*-style, a single ridge is found on *sugoya*, *magariya* and *Kabuto-zukuri* roofs. Multi-ridge roofs are typical for *Yamatomune*-, *Honmune*-, *Gassho*-style homes, as well as *Kudo-zukuri* structures and many more, come with multi-ridge roofs. [Higashino, 2003:29-47] Taiwanese roofs come in six types, with even more variations of those. They are rather simple in their form, and generally have slopes of about 0.35. [Chiou, 1996:712]

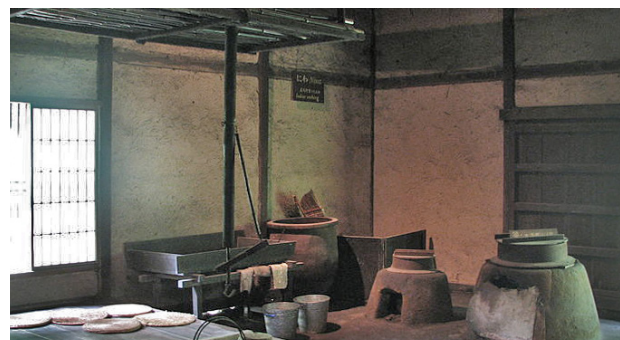


Fig. 181: plastered walls of a Japanese minka

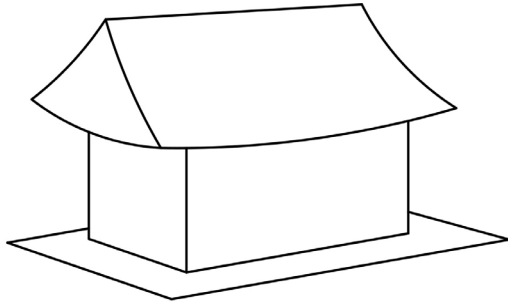


Fig. 182: gabled roof (matbae jibung)

**Gabled roof: Matbae jibung**

Covering a rectangular shape floor plan, gable sides of the *matbae-jibung* (gabled roof) are triangular with no eaves going beyond them. (Fig. 182) (Fig. 183) On its longer sides, there is an overhang. These roofs are found on *banga*, where they carry tiles.

The northern house of Vietnamese properties also has a high, gabled roof. [Nguyen, 2014:44-45]

Most indigenous Indonesian houses have gabled roofs. Those of North Sumatra rise high, have pointed gables and a sagging ridge. [Lehner, forthcoming:2-3] (Fig. 184) Taiwanese vernacular residences either have a gabled roof, whose beams are covered by the end walls, or one with protruding beams. [Chiou, 1996:712]

**Hipped and gabled roof: Paljak-jibung**

The *paljak-jibung* (hipped and gabled roof) although based on a gabled roof, comes with eaves that go beyond the gable sides and only the triangular top of the wall left

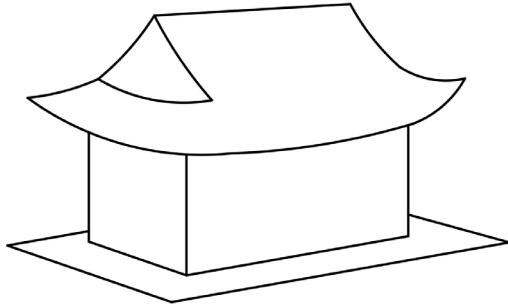


Fig. 185: hipped and gabled roof (paljak jibung)



Fig. 187: hipped and gabled kabuto-zukuri roof in Japan



Fig. 183: matbae jibung covering a upper-class house



Fig. 184: gabled roof on a house of the Bata Tobak on North Sumatra

free. Like the gabled roof, his kind is typically used for the tile-roofing of *banga*. (Fig. 185)(Fig. 186)

Japanese *kabuto* ("helmet")-style houses may also come with a hipped and gabled roof. (Fig. 187)



Fig. 186: banga with a paljak jibung

**Hipped roof: Ujingak-jibung**

Constructed in a way that four sloping sides meet at the ridge, the *ujingak-jibung* (hipped roof) additionally comes with an overhang, that offers protection on all sides. (Fig. 188) (Fig. 189) This construction was the standard for thatched houses (*choga-jib*).

Hipped roofs also top the houses in central Vietnam, where they are low and thus optimal for resisting typhoons. [Nguyen, 2014:44-45]

The roofs of Japanese *Kabuto*-style roofs in Japan came, besides in a hipped and gabled variety, also in only hipped form. (Fig. 190)



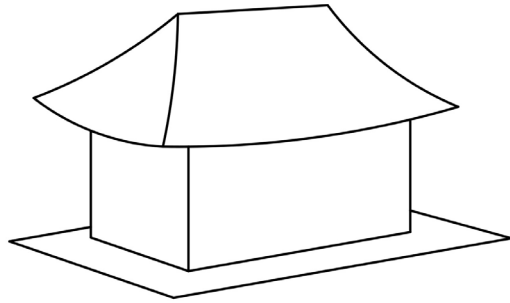


Fig. 188: hipped roof (ujingak jibung)

**Pyramid roof: Moim-jibung**

The pyramid-shaped *moim-jibung* has at least four, sometimes up to eight, identical, triangular slopes meeting at the tip and eaves that go beyond the walls. This type is mostly used for pavilions or pagodas. (Fig. 191) (Fig. 192) *Pyramid roofs* can also be seen on Javanese buildings, where an elongated ridge leads up to and peaks in a high roof tip. [Lehner, forthcoming:3]

*Taiwanese auxiliary* buildings also come with rectangular or polygonal pyramid roofs (*zan-jian*). [Chiou, 1996:712]

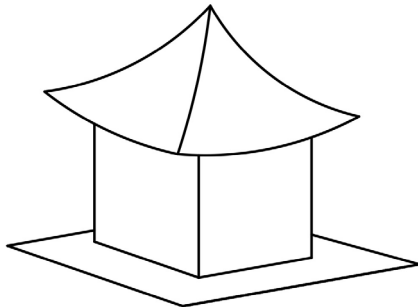


Fig. 191: pyramid roof (moim jibung)

**“Eyebrow”-roof: Nunsseop-jibung**

The *nunsseop-jibung*, is a narrow, mono-pitched roof which is attached gable-side to a gabled roof. (Fig. 193) Resembling the curve of the eyebrow, it is installed in order to protect the walls and parapets. A rather uncommon technique, it is sometimes found on *hanok* annexes.



Fig. 193: additional, narrow roof (nunsseop-jibung)



Fig. 189: thatched ujingak jibung of a minga



Fig. 190: hipped roof of a Japanese kabuto-style house



Fig. 192: pavilion with moim jibung

*Roofs with similar curvature* are also constructed in Taiwan, where they placed over porches. [Chiou, 1996:712]

**Roofing materials**

The materials used for covering the roofs of *hanok* varied greatly. The main factors were the status and subsequent wealth of the owner, climatic influences and local availability. *Giwa* (tiles) were mostly reserved for the roofs of *banga* (upper class residences), comparable to their Japanese equivalents, the *Shoin*-style residences. Side buildings of less significance were usually covered by straw, bark or shingle. [Sarvimaki, 2003:86] *Minga* (middle and lower class *hanoks*) usually had thatched or shingled roofs, in some regions slated.





Fig. 194: roof-tiles (giwa)

### Roof-tiles: Giwa

Togiwa (clay tiles), cement tiles and metal tiles

*Giwa* or “roof-tiles”, which are mainly used for upper class *hanoks*, are made from different materials and come in various shapes. (Fig. 194) (Fig. 195) *Togiwa* are tiles made by kneading and baking clay, while mixing cement and sand results in the cement *giwa*. Also available are metal *giwa*, which are cut and formed with metal plates. Depending on their glazing, these tiles are called e.g. *cheonggiwa* and *ozigiwa*. Form-wise, original *giwa* are known as *bongiwa*. The roofing is installed by combining two basic types, the *amgiwa* (flat tile) and *sugiwa* (round tile). Convex in shape, the *amgiwa* are placed at the bottom on top of a thin layer of clay. The joints of two of these bottom tiles are then covered with a concave shaped *sugiwa*. These contrasting shapes are another representation of dualism found in *hanok*, with *amgiwa* being connected to the female *Yin* and *sugiwa* to the male *Yang*. [Cho, 2013:146] The special tiles placed at the ends of the ridges are called *bugo*. [NHC, 2017:79]

Roof tiles, in various shapes, are used in countries all around the world. The convex and concave shapes used for *hanok* are comparable to the under and over tiling typical for European roofs. In Austria, this technique is referred to as monk-and-nun roofing. Further examples are the stone and bronze tiles found among the ruins of Rome and the marble tiles used for Greek temples.

The Japanese refer to similar, fired clay tiles as *kawara*. These were introduced to the island nation in the 6th century (*Kudara* period) from Korea's *Baekche* kingdom.



Fig. 198: thatched houses (choga-jib)



Fig. 195: giwa-jib (tile-roofed house)

### Stone slabs

Cheong-seok: Bluestone slate

In coal-producing areas rich in argillite, roofs were covered with flat, layered stone slabs, that came in different shapes and sizes. People used bluestone slate (*cheong-seok*), known for its long endurance, as well as a smooth surface, which dampens the noise of raindrops. (Fig. 196) The slabs were installed similar to roof-tiles, with pieces of slate put on the bottom and then gradually covered with additional ones. Houses with this type of roofing are referred to as *cheong-jib*. (Fig. 197) Nowadays these kinds of roofs can be seen in some areas of *Gyeonggi-do* and *Gangwon-do*.



Fig. 196: stone slabs from bluestone slate (cheong-seok)



Fig. 197: house with slate roofing (cheong-jib)

### Thatch: Choga

Thatched houses, known as *Choga-jib* get their names from being covered by *choga* or “straw”. (Fig. 198) The thatch, applied in several layers and thereby reaching significant thickness, results in a hipped roof with rounded ridges. In order to secure the material from being blown away by winds, it is secured by ropes. On *Jeju* island this is done with ones form hemp, which are applied in a criss-crossed pattern, reminiscent of turtle shells in their shape and structure. Due to the roofs not being too steep, their surfaces are commonly utilized to grow pumpkins or gourds and for drying crops like red peppers. [Jung, 2014:62]





Fig. 199: thatch made from rice straw (byeot)

As mentioned before, the Japanese too made use of thatch when covering their roofs. These came in a variety of styles and thickness, which had an influence on the thickness of the straw layers.

Thatch is also found on Vietnamese houses in the central lowland, where it is applied on a layer of dry rammed mud with bamboo framing. The mud not only serves as heat insulation, but also protects the space below in case of the thatch catching fire. As in Korea, wind is a considerable factor, but differs in strength, which is why roof shapes vary by region. [Nguyen, 2014:44-45]

#### Rice straw: Byeot

A *choga-jibung* (thatched roof) is usually made from *byeot* (rice straw). (Fig. 199) Due to being hollow, the straws enable air circulation, which lessens sunlight potency in summer and helps with heat insulation during the winter months. As the rice straws' surface is relatively smooth, rain hardly soaks through the roof. Not only are these roofs warm and soft, they can also be redone without special effort for a new and clean appearance. [Jung, 2014:62]

#### Reed, grass: Eoksae

Less common than rice straw but also in use is Chinese reed (*eoksae*), different kinds of which are found in Korea. (Fig. 200) Due to its abundance there, pampas grass (*eoksaemi cham-eoksae*) is the preferred material on Jeju



Fig. 201: Jeju-jib thatched with pampas grass



Fig. 200: thatch made from pampas grass

island. (Fig. 201) Its strong stalks not only offer good waterproofing abilities, but when twisted into ropes, make for a flexible and highly durable tying material. Provided that, before being applied, the reed is dried on a dew for about a week, in a place with good ventilation, once covered, such roofs last for about ten years.

Likewise thatched with reed are some types of houses in Japan [Jung, 2014:62], where the method is known as *kay-abuki yane*. Although *kaya* literally translates to "thatching with miscanthus", the term is used for many kinds of grasses, reeds and straw. [Neighbour-Parent (12), 2018:1]

#### Wood and bark shingles

##### Red pine shingles: Neowa

In mountainous areas, where tiles and rice straw were hard to come by, people utilized wooden shingles for their roofs. (Fig. 202) Those were made of the thick bark of about 200 year old red pine (*neowa*) trees, which were abundant in those regions. With the decline of red pine trees however, *Neowa-jib* (shingle-roofed houses) disappeared gradually, with only three known to be left today. (Fig. 203) Not really fixed in size, *neowa* shingles were usually about 20-30 cm wide, 40-59 cm long and 4-5 cm thick. To complete a roof, about 105-140 of these shingles were needed. To protect them from being blown off by strong winds, they were pressed down with the help of heavy stones or logs. *Neowa-jib* had all rooms, including the kitchen and a cow shed, placed under one square roof. Gaps between the shingles were thereby crucial for air circulation and, since these dwellings lacked a chimney, for the release of emerging smoke. Due to their waterproofing effect when encountering moisture, *neowa* shingles last about 5 years, but are replaced individually, as soon as they start rotting.



Fig. 202: red pine shingles (neowa)





Fig. 203: red pine-shingled house (neowa-jib)

### Oak-bark: Gulpi

*Gulpi* or "oak bark" is used for the namesake *Gulpi-jib*, mostly found in mountainous villages surrounded by woods. (Fig. 203) (Fig. 204) Oak trees, about twenty years old, are peeled of their bark, which is then put into water and subsequently left to dry. In order to flatten these pieces of around 1.3 metres in width, a heavy stone is placed on top. While shrinking in dry surroundings, the bark obtains many holes, which disappear with time when applied. This is due to the material soaking in rainwater, which causes it to expand. Stones are laid on top of the shingles in order to weigh them down and hold them in place in case of storms.

In Japan, bark-shingle-roofed houses are known as *hi-wadabuki*, with cypress bark (*hinoki*) being the most commonly used material. [Jung, 2014:62] The bark shingles, usually 45 to 60 centimetres long, 4 to 15cm wide and 9 to 12cm thick, are applied with overlaps of one to two centimetres and are secured with nails made of bamboo. [Neighbour-Parent (12), 2018:1]



Fig. 204: oak-bark shingles (gulpi)



Fig. 205: oak-bark-shingled house (gulpi-jib)



Fig. 206: curved, tiled roof with upturned eaves

### Structural set-up

#### Tiled roof: *Giwa-jibung*

#### Substructure and roofing

Tiles are generally placed on a gabled, hipped or hipped and gabled substructure. Characteristic for this type of Korean roof are distinctively upturned eaves (Fig. 206), as well as a concave curvature of the ridge [Cho, 2013:145], which was meant to represent the continuation of the mountain ridges in the background to blend in with the surroundings. [Savage-Landor, 1895:114] Due to their weight, tiles require a strong substructure, which is why timber is used for the rafter-based roof trusses of *Giwa-jib*. (Fig. 207) Based on their field of use, the elements are categorized into horizontal (length- and cross-wise), vertical and sloping pieces, as well as the elements connecting those. Purlins or longitudinal beams are generally known as *dori*, while crossbeams or girders are called *bo*. Rafters are referred to as *seokkare* and pillars are called *gidung*. [Jeon et al, 2011:1] Cantilevered and extended, *seokkare* bear and distribute the load of the roofing on to the beams and columns beneath. [Shon, 2014:21-32] The roofing itself consists of wooden panels and wood blocks, with clay and soil put on top. Not only does this layer of mud carry the tiles, it also keeps the house well insulated. [Cho, 2013:146] The purlin structure (*ryangga*),



Fig. 207: truss of a tiled roof



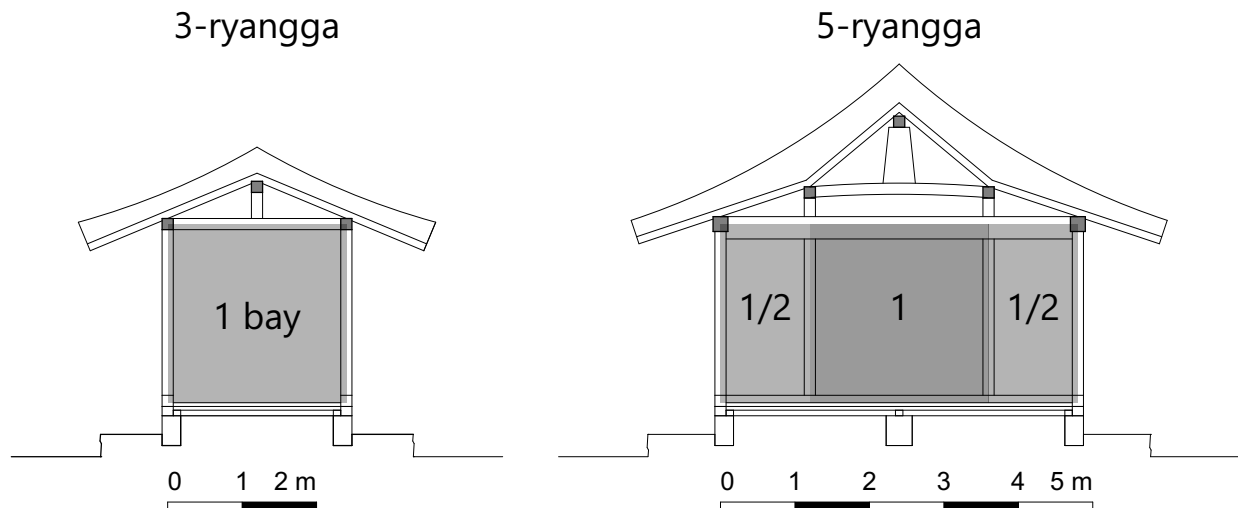


Fig. 208: purlin structure based on house width

which carries the rafters, is determined by the width of the house and the desired height of its spaces. (Fig. 208) Three purlins are generally used to cover one bay, while five purlins carry the roofing over two or three bays. Based on this, the structure is referred to as either 3-ryangga or 5-ryangga. [NHC, 2017:21] The number of purlins also affects the *seokkarae* (rafters), which come as one piece in the 3-ryangga, while split in two when five members are used. Regarding the latter, the upper and shorter ones are referred to as *danyeon*, while on the lower end, longer ones called *jangyeon* are installed. The ends of these latter ones simultaneously form the eaves. [NHC, 2017:174] *Bo* (girders), installed at a right angle to the purlins, are horizontal crossbeams, which distribute the roof load onto the columns. While the outer purlins (*jusimdori*) are stabilized by the main crossbeam (*daedeulbo*), the middle purlins (*jungdori*), which only come in the 5-piece set-up, are supported by a collar beam (*jongbo*). The *jongdori* (ridge-purlin) is held up by the *daegong*, also known as “king” or “queen post”, which is a piece of wood placed on top of either the crossbeam or the collar beam. [Jeon et al, 2011:1] In order to improve the distribution of the roof pressure on to the columns, a bracket set known as *gongpo* is installed below the outer purlins. (Fig. 209)



Fig. 209: bracket set (gongpo)

### Eaves

Known as *cheoma* in Korea, upturned eaves of roofs not only provide shade and shelter from rain, they also protect the facade. (Fig. 210) (Fig. 211) With their gentle slope and distinctively upturned ends, they enable a look onto their often elaborate substructure. To make the best use of the overhang and keep its disadvantages to a minimum, the length of the *cheoma* is customized according to the demands of the various regions. [Jeon et al, 2011:1] Not only do the climatic differences from North to South, and with it winds and rainfall, play a role, the differing solar altitude is also a huge factor. [Kim et al, 2018:1] Also influenced by the sun's position, like the eaves of *hanok*, are those of Taiwanese compounds. Those found on the buildings in the front are higher than the eaves of the rear ones, with the pitch of the roof varying between 30 and 40 degrees. [Chiou, 1996:691-694] Quite similar to the *cheoma* of tiled roofs are the *hisashi* (eaves) of Japanese *irimoya-zukuri* houses of the Nara period. [Jung, 2014:63] The curled up eaves of Korean tiled roofs also resemble those found on Chinese roofs, which comes as no surprise, since they have been adopted from there. [Savage-Landor, 1895:136] (Fig. 212)



Fig. 210: protruding eaves of a giwa-jibung



Fig. 211: bottom view of tiled eaves



Fig. 212: roof with curled-up eaves on a Chinese temple

### Thatched roof: *Choga-jibung* Appearance

As mentioned before, thatched roofs are concave-shaped with more or less defined ridges, thereby often resembling an elongated, flat dome. These structures, with their gradual curve and low eaves, have their ends tied down with straw ropes and vines of gourds and the like were planted on top for additional reinforcement. [Jung, 2014:132] (Fig. 213)



Fig. 213: concave-shaped, thatched roof tied down by ropes



Fig. 214: truss of a thatched roof

### Substructure and roofing

The substructure of a thatched house generally consists of purlin-based, simple timberwork. (Fig. 214) Mats from straw or reed, tied onto bamboo sticks, are secured on top of the rafters and serve as a base for the thatch. Mud is then applied on the bottom side of the roof, in between the rafters. The thatching itself is done with lanes of woven straw or reed, which are rolled up in bales passed on to the roof, where they are rolled out again. The first layer is knotted to the bamboo mats with ropes, while the subsequent ones are tied to each other. Sometimes, the material used for the upper ridge is weaved in a way that it resembles the Korean letter *yongmareum*, giving it a distinct appearance. (Fig. 215) *Choga-jib* were usually re-thatched in intervals of three to four years, which is was not too expensive since the material was readily available on the fields or in close proximity. Since traditionally, all villagers would help out, this took only about an afternoon and also came with the benefit of strengthening community ties. [Airang, 2013:1] (Fig. 216)



Fig. 215: ridge-specific style of thatching





Fig. 216: re-thatching a choga-jibung



Fig. 217: eaves of a thatched roof

### Eaves

Although serving the same purposes as to those of *Gi-wa-jib*, the eaves of thatched roofs were significantly different in their appearance. Rather than being upturned at the ends, they faced down in order to protect the layers of thatch. (Fig. 217)

### Openings

#### Purpose

Openings were installed whenever a connection to the outside, or between spaces, was desired. These could either span the whole length and height of a wall, like in the case of *numaru*, or take up just a small portion of it, typical for *ondol-bang*. Covering those were elements, functioning as shutters or dividers, depending on where they were installed. Not only did these, when opened, establish a connection to nature, but their translucent paper-cover also enabled light and air penetration, even

when they remained closed. [Shon, 2014:21-32] When *han-nok* are concerned, making a distinction between doors and windows is not easily done. This is due to openings in some places being used for not only lightning and ventilation, tasks generally ascribed to windows, but also for entering, the main task of doors. An opening was generally referred to as *chang* ("window"), when it was rather small or placed above a sill, and consisted of a frame with papered latticework. [Choi, 2007:47] All other kinds, which were the majority, were seen as doors (*mun*). The Korean names of these elements can help in shedding light on this, since most of them include either of the two terms. Besides their positioning and size, doors and windows are also differentiated by size, appearance and opening mechanism.

A distinction can also be difficult to make when Japanese openings are concerned. From antiquity to the middle ages, *minka* had very few openings, allowing for only limited interaction of outer and inner spaces. This started to change beginning in the *Kinsei* period (1568- 1600) when, influenced by the upper-class *Shoin* style, the structures started to open up. [Higashino, 2003:29-47]

### Size

While *banga* came with both, spaces that called for big openings, as well as those requiring smaller ones, the majority of *minga* only incorporated the latter. (Fig. 218) Representing the former are *maru* spaces, especially the pavilion-like *numaru* found in some upper-class homes, which has window spanning the whole wall on up to three sides, that could be opened or closed as required. (Fig. 219) The *daecheong* of both *minga* and *banga* was semi-open by nature. (Fig. 220) Unlike *maru* spaces, most *ondol-bang* came with openings that were only as big as necessary, in order to keep the heat inside as long as



Fig. 218: small openings of a minga



possible. Windows allowing for fresh air and light, as well as doors providing entry, were therefore rather small. As mentioned before, the size of the openings was generally adapted to human scale, which was based on the average height of people of the time of construction. While the size and appearance of *banga* openings, like many other



Fig. 219: numaru with expansive openings



Fig. 221: typical rectangular opening on top of a meoleum



Fig. 222: openings framing the scenery

features, were rooted in aesthetics and the connection of its occupants with nature, most of those found in *minga* were based on practicality and economy. In case of the latter, this meant that windows and doors were adapted to climate and structural necessities, which resulted in rather limited openings, especially in cold regions.



Fig. 220: semi-open daecheong of a minga

### Positioning

The placement of openings, be it doors or windows, strongly correlates with the lifestyle of the respective countries, be it floor-based, like in Korea, or chair-based. [Yoon, 2001:7] Not only was the size of the openings adapted to human scale, their position was also chosen with this in mind. Openings installed in *maru* spaces were placed close to the floor, on top of a “sleeper” (*meoleum*), which could be used as armrest when sitting down and looking out onto the scenery. (Fig. 221) Openings, especially those of *banga*, were arranged so that they acted as frames for the scenery they opened up to. (Fig. 222) [Sarvimaki, 2000:124] Another factor of influence was the climate, which is why windows were often placed directly under the roof, where they were well protected by the eaves. [Savage-Landor, 1895:136] The thresholds, especially in rural houses, were quite high, in order to keep vermin at bay.

*In China*, the chair-based lifestyle led to window sills being positioned lower than in Korean residences. [Sarvimaki, 2003:84-85] [Yoon, 2001:7] Also unlike their Korean counterparts, the openings connecting Chinese interior spaces did not allow for much flexibility in expansion, which was due to sizing and positioning. [Yoon, 2001:7]

### Panels: Shutters and dividers

#### Composition

Windows and doors of *hanok* are generally rectangular in shape, [Savage-Landor, 1895:136] Although quite rare, some *Joseon banga* also come with round and half-moon-shaped ones. [Choi, 2007:49] The most widely used type of covers consisted of a wooden framework, which was plastered with, most often translucent, paper on its inner side, rather than being equipped with glass panes. Installed between the inside and outside (shutters), as well





Fig. 223: characteristic, paper-covered shutter with latticework

as between spaces (dividers), these *Jangjimun* ("coated paper") doors not only provided separation and privacy, but also prevented drafts and kept the cold out. (Fig. 223)

### Latticework: *Changho*

Latticework found in between the frames of *hanok* doors and windows is referred to as *changho*. Made from thin strips of wood, this *ttisal* latticework is only covered by translucent paper and therefore instantly visible. [Kim et al, 2018:1] Serving as both decoration and base for the paper, it generally comes in geometrical patterns, although floral designs are also used. The former are of Confucian origin, with its call for simplicity, while the latter are based in Buddhism. Like many other *hanok* features, latticework was influenced by social status, which explains why the kind found in upper-class houses is more intricate. The latticework of kitchen and barn windows, which were used to bring in light and fresh air, generally came in a criss-crossed pattern. When hit by the sun, the latticework cast beautiful shadows on the interior, with this alternation between darkness and light being another portrayal of dualism. [Yim, 2012:1] The latticed area placed above some openings is known as *gochang*. (Fig. 224) The Japanese equivalent to *gochang* are *ramma*. These however come with much less complex latticework. [Sarvimaki, 2003:88]

### Window paper: *Changhoji*

When *hanji* ("Korean paper") is used for windows or doors, it is referred to as *changhoji* ("window paper"). [Brown, 2006:134] This mulberry paper's ability to regulate humidity made it the ideal material to protect interior spaces from various natural influences. Although *changhoji* is quite thin, it has great sound-proofing and insulation properties, keeping out both the cold and heat. Furthermore, the use of *chanhoji* helped with blocking sunlight without the necessity for curtains, while simultaneously keeping a house properly lit. [Finnanger, 2016:1] In China too, paper was applied to windows before glass was used. The windows of the northern region's courtyard houses were made up of small wooden partitions and had oil-treated paper from rice pulp attached on the outside. This technique not only withstood winds, but also kept snow from accumulating around the partitions. Every year, with winter around the corner, thick liquid from boiled glutinous rice was used to apply several layers of paper onto the window frames and edges, only to be removed again in the spring. [Sun, 2013:146-14] Japanese *shoji* screens are likewise covered with tissue paper, which is dipped in oil prior to installation to help keep out the cold better. This is necessary since these doors, or windows, seldom fit tight and are therefore prone to draughts of air. [Savage-Landor, 1895:138] Rather than applied to the inside, like on Korean shutters, the Japanese plaster the paper on the outer side of the wooden frame. [Sarvimaki, 2003:83] Unlike the Koreans, Russians did not make use of paper, but covered their windows with fish or ox bladders, before glass came to use.



Fig. 224: openings with gochang on top

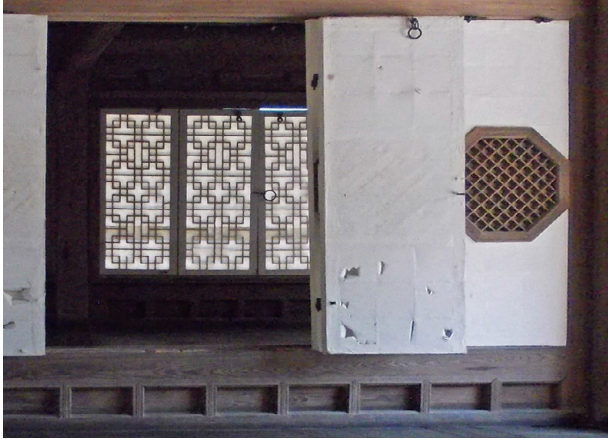


Fig. 225: opaque bulbalgimun with transparent mid-section

### Types by set-up

Shutters and dividers can be differentiated by their appearance, which includes their frame and cover.

#### Translucent doors: Jangjimun

Doors equipped with cross-shaped latticework and covered with translucent *changhoji* (window paper), are known as *jangjimun*. [Kim et al, 2018:1] Their frames were either slid to the side on grooves or hinged. In the summer time, they were generally kept open, or removed completely, in order to enable ventilation. [Savage-Landor, 1895:139] According to *Sarvimaki*, the openings of *banga*, especially those of the *anchae*, often came with two layers of sliding or pivoted elements, which added mystery to the separation from other areas. Sometimes a third set of frames, equipped with a net, was installed, in order to keep insects out. [Sarvimaki, 2003:86] [Jung, 2014:149]



Fig. 227: pocket-frame doors (dodeummun)



Fig. 226: opaque Japanese sliding shutters (fusuma)

The Japanese *shoji* were likewise equipped with translucent paper. [Sarvimaki, 2003:83] These were used for verandas of *Sukiya-zukuri* and *Shoin-zukuri* houses. Installing them on the outer side created a walkway between the interior and the exterior.

#### Non-translucent doors: Maengjangjimun

Although the majority, not all openings were equipped with translucent paper. Some doors had thick, thus not transparent, paper applied to them. These are referred to as *maengjangjimun*. One kind are the multi-piece *bulbalgimun*. While the outer pieces are, due to several layers of paper applied to them, opaque, and thus provide privacy, the middle part is latticed and plastered with translucent paper. These doors are used to connect the main hall with individual rooms. [Choi, 2007:49] (Fig. 225)

A similar type are the Japanese *fusuma*, which are papered elements with a lattice-free frame. Unlike *shoji*, these are opaque and painted, rather than translucent and plain. (Fig. 226)

#### Pocket-frame doors: Dodeummun

If openings had several layers, the additional parts could be stored away in built-in pocket-frames. These doors were known as *dodeummun*. [Choi, 2007:49:49] (Fig. 227) The Japanese wooden screens *amado* ("rain door") could, like the *dodeummun*, be slid into cases built into the outer walls. [Sarvimaki, 2003:88]

#### Mats: Bal

*Bal* are reed mats, which functioned as blinds when hung to cover openings. They were placed before openings in order to ensure a certain level of privacy, while still enabling ventilation. [Rieh, 2003:70:70] (Fig. 228)

*Sudare*, mats made from bamboo, are similar types found in Japan. (Fig. 229)

### Types by opening mechanism

As mentioned before, *hanok* doors and windows can also be differentiated by their opening mechanism. Besides





Fig. 228: bal (blinds made from reed)

standard swing doors held on the side, there were also those hinged from top, sliding ones and foldable types. Smaller openings would usually swing open to the outside, built in a way to be held in place by gravity. Bigger ones would also be swung to the side, or hung from the ceiling. In case of the latter, overhead hooks would keep them in place when opened. Very high elements were folded before doing so. [Sarvimaki, 2003:83-84] These pieces not only allowed great flexibility in combining and dividing spaces as required, they also ensured easy transition between rooms or the inside and outside. [Yoon, 2001:7]

#### Panels hinged on the side: Deosmun

*Deosmun* ("shutter") are side-swung panels. (Fig. 230) In Taiwan, a door swinging both ways is used as main entrance, while a one-way or two-way door connects the public central space with adjoining private rooms. [Chiou, 1996:699-700]



Fig. 230: paper panels swung to the side (deosmun)



Fig. 229: Japanese bamboo blinds (sudare)

#### Panels hinged up top: Bunhappmun

*Bunhappmun* are panelled doors, hinged on and swung to the ceiling, where they are held by horseshoe-shaped hooks called *dolsoe* ("lock"). [Kim, 2009:71-72] [Sarvimaki, 2003:88] (Fig. 231) Depending on their degree of opening, these doors, windows or walls, were either passages or partitions. Their construction not only enabled light and ventilation, differing in potency when open or closed, but also views to the outdoors. *Dukkeopdajimun* are double doors, which combine two hinged doors with two sliding parts. [Sarvimaki, 2003:83-84] [Choi, 2007:49:49] Also pivoted are the *shitomido* of Japan. (Fig. 232) These wooden shutters with criss cross lattice, attached on either side of a window, were first used in *Heian* era *Shinden-zukuri* houses, later also in *Shoin* style homes. Originally one piece, they were, due to being heavy and unmanageable, divided with time. *Shitomido* are suspended by metal hinges (*shitomizuri*), which are bent into hooks at their ends. [Neighbour-Parent (5), 2018:1]



Fig. 231: paper panels hooked to the ceiling (bunhappmun)





Fig. 232: pivoted shitomido in Japan



Fig. 233: sliding doors separating the interior



Fig. 234: Japanese shoji screens with paper on the outside

### Sliding panels

Sliding mechanisms were used as second layer of outdoor shutters or as interior partitioning. These usually had translucent paper applied to both sides of their latticed framework. (Fig. 233)

Unlike Korean screens, most of which were hinged or swung open, the Japanese primarily used sliding mechanisms for theirs. This applies to, for example, the translucent *shoji* (Fig. 234) and the opaque *fusuma*.

### Building materials

As mentioned before, *hanok* only made use of natural materials such as wood, stone, clay and paper. Iron was only used for hinges and locks, but not for assembling the structure itself. [Park et al, 2015:10] [Shon, 2014:21-32] [Barrera et al, 2013:204] Upper-class homes had their frame made from timber, thereby using a lot of wood, while clay was used for the walls and as base material for the roofing. Their platforms were made from quarry stone or solid granite. [Cho, 2013:145] Materials used for *minga* changed with local availability due to altitude. Dwellings situated on lower ground were mostly a combination of clay and wood, sometimes also clay and stones. In higher situated places, load-bearing walls could also be made of rock or logs. Wood was however only used when necessary, since its use as firewood for *ondol* had led to a shortage. Unlike the bases of *banga*, the foundation of lower-class houses were made from soil, with the edges often secured with stones. [Jung, 2014:116]

Given the topography and climatic influences, wood was the ideal material for Japanese houses. Brick and stone, common in the West, were unfit, since they are not flexible enough to withstand the regular earthquakes on the islands. Furthermore, the milder climate calls for thinner walls and big openings, which are not as insulating as the clay-built ones found in Korea. [Jung, 2014:83-85]

Although in Russia wood was the most common building material, in the South, wattle and daub constructions, as well as stone, were also used. [Ivanova, 2011:1]

### Soil/ clay

#### Obtainment

Since it was easy to come by, and thus cheap, soil was a popular building material.

#### Utilization

Soil of different kinds was used throughout the *hanok* construction. Not only were the bases made from it, soil was also used for walls and flooring. It was furthermore important for roofs, not only as base material for tiles, but a layer of clay was also applied above the wooden truss, where it served as insulation. (Fig. 235) (Fig. 236)

The Chinese have also made use of up to 50cm thick mud walls. This was primarily done in very cold regions, in order to facilitate insulation. [Sun, 2013:147] (Fig. 237)





Fig. 235: soil used for a minga foundation



Fig. 236: soil used as plaster for banga walls



Fig. 237: houses with mud walls in China

### Characteristics

While its great insulating properties help preserve heat in winter, soil does not conduct heat in summer, which keeps temperatures at a comfortable level. Due to its composition, clay absorbs moisture in the summer, emitting it in winter, thus providing the dwelling with a nice room ambience. [Shon, 2014:21-32] Since the soil or clay was sourced locally, the colour varies throughout the peninsula, depending on the type used.

### Wood Obtainment

Unlike in Japan, where cedar and cypress were plentiful, the Korean topography made it difficult to come by high quality wood. Only the likes of pine, fir and larch grow in these conditions, which are however mostly thin and crooked. [Jung, 2014:69] *Ondol*, which requires great amounts of wood, has led to the deforestation of the peninsula's mountains. Increased wood prices and reduced availability, have thus made it difficult for commoners to build their structures with good timber. [Jung, 2014:69] Obtaining the right trees for timbers was the responsibility of the carpenters who built the structure. To identify the most suitable trees, a vast knowledge about the various species and their environment was of great importance. [Kim, 1998:24] Also vital were the age of a tree, its time of harvest and the trimming direction, based on natural growth. [Shin, 2012:168] In the past, the expert carpenters responsible for constructing important buildings such as royal palaces, would go as far as acquiring whole mountains, years in advance, and examine the characteristics of the trees from various areas to obtain the right wood. [Kim, 1998:27] After securing and felling, the trees were dried and cut, in order to bring out the full potential of the wood. [Kim, 1998:27]

### Characteristics

Being organic by nature, due to stemming from a living organism, wood "[...] performs best under conditions similar to its original environment." [Kim, 1998:24] A difficult and complex material to handle, wood is prone to warping and must be able to breathe in order to prevent rotting from moisture. In order to make wood work to their advantage, carpenters are required to fully understand its properties. [Kim, 1998: 26] The timbers used in the traditional building process were not standardized, but used in their natural state. [Shin, 2012:168] (Fig. 238) This was due to Korean pines, the main source, growing rather crooked and straightening them out forcibly would have made them too thin to use for columns. Although the wooden members could look rather unrefined to outsiders, they give Korean architecture its very distinct and recognizable aesthetic. Defined by being curved and unpolished, rather than straight and neat, it transmits a distinct dynamic. [Kim, 1998:22; 24] Appearance aside, their



winding state provided structural benefits. Beams distributing the vertical load, for example, were installed with their curve facing upwards, which lessened the danger of bending under pressure and consequently, breaking. [Kim, 1998:25-26] (Fig. 239)

### Utilization

The area that a tree grows in has a great influence on where in a building its wood is used best. Wood from trees grown on the southern slope of a mountain is most suitable for the southern face of a house, while the rear, or shaded side, of the building is best fitted with wood from northern slopes. Parts which have to bear significant structural loads, such as pillars and beams, are best made from wood obtained from along the timberline, where trees have been exposed to harsh winds. Wood from trees grown in humid valleys with mild temperatures is pliable and workable, sought after characteristics for walls and decorative applications. [Kim, 1998:22; 23-24]



Fig. 238: crooked timbers used for a minga



Fig. 239: beam installed curving upward

### Stone Obtainment

Stones were sourced locally, either found in the fields or, if possible, taken from riverbeds.



Fig. 240: stones framing the soil foundation of a minga



Fig. 241: basalt (volcanic rock) typical for Jeju island homes

### Utilization

In *banga*, stone was primarily used for the platform, then in form of granite blocks, or as stone slabs for the *ondol* heating system. *Minga* too utilized stone for their foundations, but rather as individual pieces and only as frame for the soil. (Fig. 240) Stones were also used to secure roof shingles and for building perimeter walls. The unique homes of *Jeju-do* are an example for the whole house being built from stone, with volcanic rock, which the island consists of, being the material of choice. (Fig. 241)

### Paper

Paper is believed to be an invention of the East, although Westerners have adopted it and changed its structure to suit their needs. While eastern paper absorbs light, its Western counterpart turns it away. [Kim (1), 2016:5]

### Origins and etymology

*Hanji* refers to Korean paper, to which it also literally translates. The origins of papermaking in Korea can be traced back to the 6th century A.D., with the oldest known prints date back to 751AD.

*Papermaking* made its way to Japan via Korea at around 600 A.D. The Japanese paper is known as *washi*, a term deriving from *wa* meaning "Japanese" and *shi* translating to "paper". Although having no association with the grain, it is sometimes also referred to as "rice paper".

The roots of Chinese papermaking go back to the Silk Road, precisely the *Xinjiang* area, with the oldest papers stemming from the 2nd century A.D.. Chinese paper is also known as *xuanzhi* or "paper from *Xuanzhou*", where this type originated from during the *Tang* dynasty (618-907 A.D.).

*India* was introduced to Chinese papermaking when it was brought in via Tibet around 650 A.D., where after it was soon widely used.

### Source materials

Early Korean papermaking made use of different kinds of fibres, among them, for example, mulberry, rice straw, hemp and bamboo. Generally however, *hanji* is produced from twenty to thirty year old mulberry trees, but can also be made from those as young as one year.

Chinese *xuan* is usually made from the bark of elm, sometimes also made from mulberry, like its Korean counterpart. Rice and bamboo are also used.

Japanese *washi* is made from bast-fibres of low growing shrubs such as *gampi* ("paper tree"), *mitsuma*, *yu* and like its Korean pendant, from paper mulberry (*kozo* in Japanese). [Verschuer et al, 2016:210] While *gampi* can only be grown in a mild climate and has thus become rare and expensive, *kozo* is still very common.

### Production method/ process

The three steps of processing *hanji* are the sourcing of



Fig. 242: light shining through translucent paper

the raw material, breaking it down and finishing it. Beginning with the frost period, dry *dak* is cut into pieces and then steamed in an iron pod. Taken out and wrapped in straw sacks, the material is lit in order to loosen the bark, which is then peeled by hand and left to dry. It is steamed again while immersed in soda, where-after the liquid is squeezed out from the bark. After being squashed and wrapped up, the bark is rinsed again. It is then added to a mixture of water and lye, in which it is boiled for three hours until only the fibres remain. After washing, they are spread on a flat stone and separated by being crushed with a pestle, while the sticky liquid from *dak*-root is mixed in. Sifting this mixture through a bamboo screen, with back and forth motions, results in the typical cross-pattern of the sheets. The still wet *hanji* is then spread on a wooden panel and pounded with a pestle, a process known as *dochim*. This not only increases the paper's density, but also makes it smoother and creates a lint-free texture with a shiny surface. The length of this process and the hard work involved are the main reasons for *hanji* only being produced in small quantities. [Finanger, 2016:1]

The first step in producing Japanese *washi* is, as for *hanji*, sourcing the material. *Kozu* and *mitsumata* are cut in winter, with their trunks then bound to half their length and parted from their bark over hot steam. The bark is then washed, before being boiled with alkalis to fasten up the separation of the bast fibres and other components. This is followed by yet another wash, after which the fibres are crushed by pounding, a process called *kokai*. They then undergo another thorough wash (*kamidashi*).



### *Characteristics and functional properties*

Although its wide fibres make *hanji* airy and light, it is, due to its base material *dak*, also strong. Its ability to adapt to air and balance out moisture make *hanji* very durable. When *dak* is stored in water for one year prior to use, paper made from it can even withstand decomposition. *Hanji* is soft in texture and offers great flexibility, which makes it applicable to many areas. [Finnanger, 2016:1] The paper's composition allows natural phenomena such as sun- and moonlight, as well as sounds and smells to enter the dwelling. [Rieh, 2003:69] (Fig. 242)

Chinese *xuan* paper is known for its soft and fine texture. The extensive extraction process during the production of Japanese *washi* produces very resilient types of paper. While the one obtained from *gampi* is known for its resistance, paper made from *kozo* makes it very tough. *Mitsuma* ensures exceptional smoothness through fine fibrillation.

### *Fields of use*

Craftsmen have used *hanji* when building houses since early times. When pasted on the clay floors and walls of *ondol-bang*, the oil paper was termed *jangpan*. With great abilities to regulate humidity levels by absorbing and emitting moisture, it was the ideal material to protect the surfaces. [Finnanger, 2016:1] [Yi, 2015:7] As *changhoji*, the paper was an important part in finishing doors and windows. [Sarvimaki, 2003:84] [Brown, 2006:134] (Fig. 243) Besides serving as finishing material, the paper was also used in crafting furniture. [Finnanger, 2016:1]



Fig. 243: hanji used for flooring (jangpan) and shutters (changhoji)



## CONSTRUCTION PROCESS

### Customs and rites

#### Ceremonies

##### Ground breaking ceremony

Shamanism is considered an important part of the construction process, which is why several ceremonies are held during its course. [Baker, 2008:18-29] Before the start of construction, a ground-breaking ceremony called *gae-to-je* takes place, which aims to inform the earth and its spirits of the project, while also asking for safe and sound proceedings. Furthermore, this ritual serves to ask symbolic permission from neighbours and enables all participants to get to know each other. Performed at the centre of where the building will stand, the rite includes offering food to ancestors and everyone present, as well as laying the foundation stone. [NHC, 2017:44] Another ceremony, *motang-gosa*, is held when timberwork gets underway. It calls on the spirits to ensure a sturdy building. Additional services are held when erecting the columns (*ipju-sik*) and when finishing the framework (*sangryang-sik*). Finally, the naming and moving-in ceremonies announce that construction has been completed. [NHC, 2017:44f-45]

### Participants

#### Craftsmen

In Korea, the term “architect” was unheard of prior to the modern era, which started after the Japanese occupation ended in 1945. *Cho* even suggests that it did not exist in the Korean language until the early 1960’s. [Kim, 1998: 24] [Cho, 2013:144] Until then, the tasks generally associated with the profession were carried out by master craftsmen, who were most often Buddhist monks. These can be compared to the professionals that worked in medieval Europe. [Kim et al, 2011:353] Known for their considerable knowledge of materials, measurements, angles, carpentry and stonemasonry, these *dopyunsu* (chief carpenters) were capable of building sound structures without the help of engineers. (Fig. 244) While in *Joseon* times (1392-1910) small residences were built by simple craftsmen (*daemok*), Neo-Confucian scholars carried out the tasks of the architect and were thus responsible for designing substantial historical buildings. When oversee-



Fig. 244: dopyunsu (master carpenter) overseeing house construction

ing the erection of the timber frame, the *dopyunsu* relied on their experience rather than making use of drawings. [Shin, 2012:168] *Hanoks* were thus often designed and redesigned directly on site and during the building process. As every craftsman used a somewhat different technique, their distinct style had a great influence on the appearance of a *hanok*. [Jeon, 2016:42] With carpenters and stonemasons not part of the literate class, great masters shared their knowledge with apprentices verbally and through visual demonstration. Due to this, there are hardly any written accounts of their work available. [Park et al, 2015:10]

*Japanese homes* were also built by carpenters, who can be divided into four categories, based on their field of work. The *ie-daiku* (also *yagata-daiku*) are responsible for building teahouses and residential buildings. *Tategushi* finish the interiors, as well as crafting doors and windows, while the *sashimi-noshi* having a background in furniture making. [Butler, 2004:40]



Fig. 245: thatching a choga-jib



Fig. 246: applying roof-tiles to a giwa-jib



Fig. 247: wall construction in Joseon times

The Chinese classical language was likewise missing the term “architect”, but did include the word for “craftsman-builder”.

### ***Building approach***

#### **Top down**

Buildings in the West are erected from the bottom up, with no protection against the elements. Rain and the like therefore often cause delays. [Yi, 2015:7]

#### **Bottom up**

Korean houses on the other hand, are built from top to bottom, so work can continue even during bad weather. The roof structure sits on crossbeams, held up by wooden columns, which stand on foundation blocks laid on top of compressed soil. After the shell is constructed, finishing of the inner-room floors starts. [Yi, 2015:7]

### **Stages**

A Korean house continuously “grows” by *kans* being added to the structure. [Lee, 1991:66] This is based on five primary steps, with the first one being the preparation of the stone or mud bases and the foundations for the heated floor. Next comes the load-bearing structure, made from either a timber frame, stone walls or logs, which is then topped by the roof. (Fig. 245) (Fig. 246)

After this, the non load-bearing walls are erected between the timber frame walls, which then leaves the finishing touches. (Fig. 247) Next to fitting the doors and windows, this means papering the heated floors, walls and ceilings. [Park et al, 2015:10] [Kim et al, 2011:353]

Chinese and Taiwanese house construction also proceeds in bays, referred to as *jian*, with a key brick marking the start. First to be built is the *zheng-shen* (main building), which is then followed by a secondary building (*hu-long*) to each side, thereby creating a courtyard. [Chiou, 1996:691-694]

## CLIMATE CONTROL AND SUSTAINABILITY

*Kil-Ryong Park* stated that traditional Korean houses are well adapted to, and respective of, their natural surroundings. [Jung, 2014:167] This explains why *Kon* believed that they developed differently than their Japanese counterparts, which were subjected to other climatic influences. [Jung, 2014:112-113]

### Lifecycle

While the majority of modern houses neglect nature's cycle and, due to the materials used, become trash after their life ends, *hanoks* are a product nature and thus given back to it. [Shon, 2014:21-32] (Fig. 248) Soil and earth, which come from the ground, are used, as are rocks and stones. Sourced from nearby fields and valleys, these are brought back after use. Wood, retrieved from the trees on the hills, is reclaimed by nature when it rots. Straw, which comes as by-product of the rice harvest, is used as natural fertilizer for the fields, after being used as thatch. [Arirang, 2013:1] These eco-friendly materials not only raise energy efficiency, but sourcing them in close proximity to the building site also reduces carbon emission. [Shon, 2014:21-32]

### Heating

#### Heat preservation

#### Spatial structure

Homes in the North, where winters can get really harsh, are kept compact to ensure heating efficiency. This is why rooms are of a minimum size and arranged in rows, with low ceilings and clay walls further aiding in keeping the dwelling warm. Cold winds are prevented from entering and cooling the house off by keeping openings as small as possible. [Jung, 2014:168] In order for the *ondol* system to work, the heated-floor rooms have to be elevated above the heating source. This is why the kitchen, where the hearth is most often located, is placed on a lower level. Furthermore, the heating source needs to be placed in close proximity to the *ondol-bang*, in order to limit heat loss. Also helping with warming up *hanok* in winter are their deep eaves. While they block the high standing summer sun, they don't interfere with its low position in winter. The sunrays can thereby enter and warm up the dwelling. Furthermore, the eaves are arranged in a way that the hearth-heated air is collected underneath them when rising, which also aids thermal storage. [Jeon et al, 2011:1]

*The people* of China have sought similar ways to handle the severe cold of some regions. They built south-facing, low-rise dwellings with quadrangular courtyards, whose arrangement allowed for sufficient solar access and warmth, while thick mud walls and two-layered windows provided the necessary insulation. Grouping together several of those courtyard dwellings further enabled the control of solar gain. [Sun, 2013:147]



Fig. 248: hanok structure reclaimed by nature

### Underfloor heating: Ondol (also gudeul)

Koreans have, for a long time, made use of an underfloor heating system in order to stay warm. Known as *ondol*, this method is rather unique, not only in Asia, but all around the world. *Savage-Landor* writes that the *ondol* system seems to be the "[...] only thoroughly barbaric custom which the Korean [sic] natives have retained." [Savage-Landor, 1895:139] While the heat of the floors, which could get quite hot, was generally enjoyed, it did come with disadvantages. Room temperatures in *ondol bang* of small *minga* (lower class dwellings) would sometimes get so high, that people in rural areas preferred sleeping outside the house. [Savage-Landor, 1895:139-140]

### Introduction

#### Etymology

Koreans refer to their underfloor heating system as either *ondol* or *gudeul*. The word *ondol* comes from *on* for "warm" and *dol* meaning "stone", while *gudeul*, the original expression, translates to "baked stone". Both terms refer to its functioning method.

#### Origins and development

The development of this system, can be linked to the Korean custom of floor-sitting, with *hanok* occupants sitting, eating and sleeping on this fire heated stone floor on cold days. [Jung, 2014:135-136] *Kon* assumed, that a method utilizing air for heating could have first been introduced to the northern part of the peninsula by lower classes from Manchuria. He believed, that their nomadic roots and simple constructions could have played a role in this, as a "[...] primitive floor-heating apparatus [was] found in the *minka* of Korean slash-and-burn farmers who simply made fires underneath their floors." According to him, the system spread then spread to the middle and finally the upper classes, which is why it can be found in all types of *hanok*. [Jung, 2014:138-139] *Jeon* on the other hand argues that, against popular belief, *ondol* was not ubiquitous throughout history, but that its development was only completed by the middle of the twelfth





Fig. 249: spot-heating in a Japanese house

century and then used by the upper classes and ailing elderly only, spreading across regions and social classes later on. [Jeon, 2016:17] At the end of the 19th century, this method caught the eye of foreign architects, with some even declaring it superior to those of their neighbours. [Jung, 2014:139] Today, *ondol* is a basic feature in all Korean homes, both houses and apartments, thereby much more prevalent than in Europe. Unlike traditional *ondol* however, modern ones no longer use hot air but run on electricity. It can be assumed that the modern water-based underfloor heating found in the West, has roots in *ondol*. [Kim, 2010:349-361]

The underfloor heating found in Manchuria was only applied to certain areas of a room. [Jung, 2014:138]

According to Kon, *ondol* is comparable to methods used in Russia, Europe, Japan and China, the old culture areas. The Korean system is unique however, in that it covers the entire floor. [Jung, 2014:154]

Similar to the Korean *ondol* is the hypocaust of Ancient Rome, which also made use of airflow for heating purposes. [Jung, 2014:137]

Prior to the Romans, the Germanic people of Northern Europe used a brazier (*ro*), placed in the middle of the room, for warming up. It was later moved into the walls and turned into wall heating system. [Jung, 2014:137]



Fig. 250: agungi (fireplace) generating heat for the ondol system

The method of heating a dwelling with a brazier was introduced to Japan from Korea. Unlike the Koreans, who developed it into the *ondol* (full underfloor heating), the Japanese seemed to be content with spot-heating. (Fig. 249) They kept warm by squatting in front of a lonely brass brazier, usually found in the middle of the dirt-floored kitchen or, at times, centred in a *tatami* room. This fact earned the houses a rather questionable fame for being notoriously cold. [Jung, 2014:138-140] [Sarvimaki, 2003:86] Although, tables heated from underneath (*ko-tatsu*) can be found in many Japanese *minka*, not all are heated this way, a circumstance that can be explained by how the method spread. Unlike the Korean *ondol*, which is commonly believed to have spread from the lower to upper classes, the Japanese *kotatsu* was first introduced to upper class homes and only later incorporated into the *minka* of the middle and lower classes. [Jung, 2014:139]

While the Northern Chinese used spot-heating to keep warm, the dwellings of the central part often lacked heating altogether, which meant that people were never quite warm during harsh winters. Spot-heating was done in the form of *kang*. [Jung, 2014:140] In use for more than 2,500 years, it consists of a bed-like structure from brick, a stove and a chimney. The stove, fired with bio-materials, is connected to the bed through channels, through which it sends heated air. This warms up the structure, which emits residual heat to the space, warming it in the process. An adjacent chimney disposes of the cooled off smoke. The *kang* is generally found in the bedroom. [Sun, 2013:148]

The Russian *pechka*, a brick stove comparable to the Chinese *kang*, was developed from a primitive heating method. Like in China, it is customary to sleep on top of it, especially among the lower classes. [Jung, 2014:137-138] Considered the heart of the traditional rural house, this large structure took up almost a quarter of a peasant home's living area and weighed up to two tons. [Bivens, 2017:1]



Fig. 251: object for generating wind to stir up the fire



Fig. 252: oven placed on lower level than the floor of the ondol-bang

### Mechanics

The *ondol* system consists of four main parts. These are a fireplace, underfloor flues, stone slabs and a chimney. It is installed in such a way that several rooms can be heated simultaneously. [Kim, 2009:74] The stove that generates the heat for this heating system, known as *agungi* (Fig. 250) (Fig. 251), is most often located in the kitchen, has a flat cooking counter (*buttumak*) placed above it. [Kim et al, 2018:1] Vents in the back of the *agungi* are connected to masonry flues (*gorae*), which distribute heated air. In order for this set-up to work, the oven has to be placed lower than the adjacent rooms (Fig. 252), which is why the kitchens are generally situated lower than the rest of the *hanok*. [Kim, 2009:74] As soon as the *agungi* is lit, hot air is sent along masonry *gorae*, with wide stone slabs (*gudeuljang*) placed above conducting the heat, from

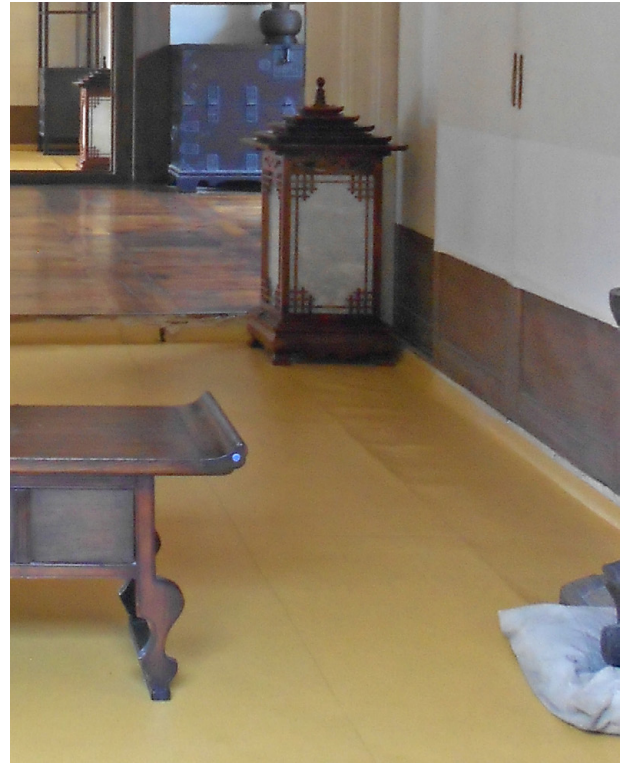


Fig. 254: oil-paper finished floor of an ondol-bang

where it then radiates and warms up the room. (Fig. 253) The *gudeuljang* do not represent the finished floor, but are covered in clay, which is then clad in thick yellowish oil paper. (Fig. 254) While the air runs through the flues, it cools down and, as smoke, disappears outside through the chimney (*gulttuk*), which is generally placed to the rear of the house. Chimneys are either simple, like the ones found in *minga*, or more elaborate when *banga* are concerned. [Lee, 1991:66-67] Some flues may not be connected to a chimney, but release the smoke through side-ways openings in the foundation. [Jung, 2014:135-136] The Japanese equivalent of the *buttumak* is known as *kamado*, a term of Korean origin, with a cooking range being referred to as *kama* in the North. This connection stems from the fact that the cooking range was introduced to Japan from the peninsula. [Kim, 2017:1]

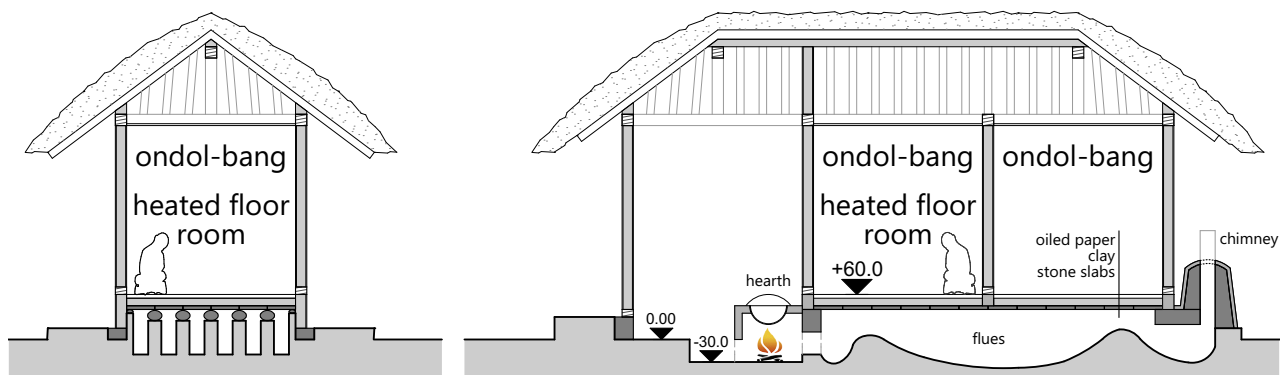


Fig. 253: set-up of the ondol heating system



### Spatial characteristics

The layout of Korean houses changed with the incorporation of *ondol* and its physical requirements. In order for the system to function properly, e.g. the kitchen had to be placed in a certain area. [Jeon, 2016:17] Utilizing the *ondol* system to its full capacity requires the sizes of the rooms, where it is installed, to be kept to a minimum. The same goes for the ceilings, whose height should be kept as low as possible. Furthermore, only small windows are installed, with screens offering even more insulation. [Jung, 2014:80] Although the system is generally the same, the one in the North differs from the southern one, which is the result of differing topographies and climate. Since the southern regions are quite warm and have little firewood, *ondol* floors are only used temporarily and for certain rooms. In the North however, where winters can get very cold and firewood is plentiful, all *ondol* rooms are heated simultaneously. [Jung, 2014:137-138]

### Cooling

#### Spatial structure

The arrangement of *hanok* by cardinal directions provides for very effective ventilation. The hot air from the front in the South, cools off by meeting the cooler air which streams in from the North. [Kim et al, 2018:1] Openings mostly faced the courtyard, whose layout created a micro-climate of its own and thus provided protection from the weather, be it the heat or the cold. (Fig. 255) A courtyard was able to minimize the effects of the often great temperature changes that could occur during the day. [Lee, 1991:69] *Hanoks* also provide cooling in the form of covered outdoor spaces such as balconies and verandas. [Jung, 2014:168] Furthermore, *maru* spaces are either semi-open by nature, or come with big openings and are elevated from the ground. All of this provides for ventilation through breezes and thereby cooling. [Kim, 2009:74] (Fig. 256) Additional cooling is provided by *ondol* floors, which are left unheated on hot summer days.

*Traditional Vietnamese* dwellings likewise respond to the prevailing climate by incorporating verandas, sizeable



Fig. 255: openings facing the courtyard



Fig. 256: elevated, semi-open maru spaces

doors and windows, which enable natural ventilation.

*Staying cool* during the hot Japanese summers is also best achieved by making use of the wind. This is made possible by the structure of traditional homes, which can be opened to a large by fully removing some doors. [Jung, 2014:80; 168] (Fig. 257)

*Chinese Siheyuan* were kept cool through whitened walls and shaded verandas. Their North to South alignment brings shade by the East and the West, while skylights bring in daylight. [Sun, 2013:160-162] The sizeable main courtyard allows for ample solar penetration, with openings in the walls big enough to enable airflow, while keeping out harsh winter winds. (Fig. 258) Most of the courtyard is laid out with limestone, whose surface, through tiny water drops from humidity, indicates rain. During the hot summer months, potted flowers and trees, as well as verandas and overhanging eaves, provide shade and create a pleasant environment for people to gather. Brick walls, up to 40cm thick and single-glazed, sealed window frames, made of rice paper, keep house temperatures at a comfortable level. [Sun, 2013:152-154]

### Structural and non-structural features

#### Openings

Traditionally, *hanok* windows and doors are covered with paper and are not closed with glass, thus allowing in fresh air even when closed.

*Natural ventilation* is also extremely important in the humid climate of Vietnam, which is why doors and windows are arranged to facilitate air circulation. [Nguyen, 2014:44]





Fig. 257: wide open Japanese dwelling

### Eaves

The far protrusion of the *cheoma* (eaves) beyond the exterior walls serve several purposes, one of their most important being to control the penetration of sun rays. (Fig. 259) Through their width, sunrays could be controlled based on the sun's angle. While in the winter, the rays could enter the house and provide warmth, the higher standing summer sun was blocked out to keep the home cool. [Jeon et al, 2011:1]

### Materials

*Hanok* are built from materials that breathe, with their walls being no exception. Like mentioned before, a mix of clay and straw is generally used, which provides the dwelling with a cooling effect.



Fig. 259: protruding hanok eaves providing shade



Fig. 258: courtyard of a Chinese Siheyuan

Like *hanok*, Vietnamese houses also come with insulated walls, which keep the heat outside. [Nguyen, 2014:44]

### Shading mats

There were several methods used to provide shade for a traditional dwelling and its inhabitants. As mentioned before, one of those were mats. Most often made of parallel placed split bamboo strings, tied together by silk strands, they came in various sizes and were hung at the ends of eaves or in front of openings. Besides providing shade, they stopped flies, whilst enabling airflow at the same time. They furthermore provided a sense of privacy by allowing a visual connection to the outside, but blocking people from looking inside. These bamboo mats however, were only used by the rich, as they were expensive due to being difficult to obtain. Lower classes therefore used rough mats made of rushes instead. [Savage-Landor, 1895:138]

### Rainwater management: Roofing and gutters

People have found an effective way to protect the *hanok's* timber framework from being destroyed by water. Rounded, flat dripping tiles are placed along the edge of the roof, between the circular end tiles, to direct rainwater away from the structure. [Park et al., 2015:137] (Fig. 260)



Fig. 260: tiles at the edge of the eaves



Fig. 261: natural gutters formed by rainwater dripping from the eaves

When *minga* are concerned, rainwater digs its own natural gutters by running in a curtain from the edges of the roof. The water then makes its way onto lower grounds. (Fig. 261) Due to being a product of the industrial age and its limited space, the eaves of city *hanoks* had to be shortened. This led to the instalment of gutters below the eaves to catch rainwater. [Park et al., 2015:12]

*Japanese Kudo-zukuri* houses have two wings, which come with projecting thatched roofs that extend over open space on each side. The eaves of these meet above a gutter (*toi*), where rainwater is collected. [Itoh, 2004:4] [Higashino, 2003:29-47]

### ***Natural disaster prevention***

#### **Earthquakes**

Although not as prone to earthquakes as Japan, *hanok* timber-frames have a sufficient bending performance and are able to withstand such an occurrence. [Kim et al, 2011:354-355] *Kim* explains, that the construction methods used for *hanoks*, ensure that they would not collapse, even if a post was missing. The stiffness, achieved through hinged, post- and beam joints, is sufficient to make these buildings earthquake-resistant. [Kim et al, 2011:353; 355] This is achieved through *ieum* and *machoom* joints, which have been explained prior.

*Similar techniques* to those of *hanok* are also used for buildings in Japan, a country very prone to earthquakes. *Likewise able* to withstand an earthquake are Chinese wooden structures, which are built on the *tailiang* and *chuandou* systems. [Knapp, 2004:34-37]

#### **Fires**

To prevent fires from destroying the mostly wooden construction, fire-resisting walls called *banghwajang*, literally "fire prevention guards", made of brick and stone, were placed between the wooden members and the heating source of the *ondol*. [Sarvimaki, 2003:86]

### III. CONCLUSION





### Transmission

#### *Giving vs. receiving*

The prevalent assumption regarding Asian architecture seems to be, especially in the West, that it found its way from Japan to other countries such as Korea. Although true from a later-stage point-of-view, this paper has shown that the majority of time saw Korea as transmitter of cultural and architectural phenomena, oftentimes having their origins in China and, to a lesser degree, India. This thesis aimed to give an overview of Korean residential architecture, which is overlooked too often, being foregone for mostly Japanese and Chinese building traditions. By examining characteristic features of the traditional Korean house, both tangible and intangible, this paper strived to illustrate that comparable features are, in more or less apparent ways, also found beyond the peninsula's borders. In order to do so, not only were cultural considerations taken into account, but also climate and topography. With this thesis I hope to have shown that Koreans have every reason to preserve their built heritage, which has unfortunately for a long time been neglected in favour for newer, more modern alternatives, although this notion seems to be changing in the recent past. In order to be able to do so, some aspects need to be addressed.

### Time

#### *Modern age vs. tradition*

Changing times and their demands are surely one of the main reasons for the disappearance of traditional architecture. Vernacular builds are often deemed outdated and seen as unable to provide inhabitants with modern-day amenities, an oftentimes unfounded prejudice. It seems that in order to become relevant again, traditional architecture needs to take advantage of the benefits it is able to provide, while simultaneously adapting to the new needs placed upon homes brought on by a changing social and domestic culture. A chance for this is the rekindled interest for everything ecological living, be it food or housing. As a product of nature, with its materials and the philosophies applied to it, *hanoks* are the best candidates to fill a spot that has been neglected for a long time, not only in Korea. Whereas most modern buildings seem to exploit nature and shield itself from it, the opposite is the case for *hanok*. Old values packed into a new envelope come to mind.

### Lifestyle

#### *Poor vs. wealthy*

An influence in the comeback of *hanok*, that should not be neglected is its reputation. Originally used by both the upper and lower classes, it has throughout history with few exceptions, become associated with the poor, who couldn't afford modern builds and therefore had to stick with the old. In recent times however, this notion

seems to be changing again, as preserving or building a *hanok* in its original way, has become a costly endeavour, due to factors such as difficulties in finding craftsmen still proficient in the techniques necessary. This problem is not exclusive to Korea, but can be witnessed all over the world. For this very reason and the fact that a majority of original *hanok* have been destroyed, which makes them very rare, these homes have become somewhat of a prestigious object, that only the wealthy can afford.

### Method

#### *Mechanics vs. technology*

Vernacular Korean dwellings are often seen as less advanced compared to their contemporary counterparts. What seems to be forgotten however is, that in order to fully function, the latter need resource-heavy technology. *Hanok* on the other hand, have since the beginning made best use of what was to their disposal, in form of materials and mechanics. One of the first aspects that comes to mind is cooling. Whereas modern buildings make use of energy-consuming air conditioning, *hanoks* achieve comfortable temperatures solely by adapting to natural phenomena. Heating is another field where the vernacular homes were pioneers for today's methods, the *ondol* being an especially striking example. Whereas the original version managed without electricity, this has changed today.

### Society

#### *Collective vs. individual*

As shown throughout the paper, Confucianism has for a long time had a major influence on Korean society and culture. With its high regard for collectivism, Koreans have been seeing individualism as nothing to strive for, which is why with the onset of modern apartment buildings, they have followed the collective in wishing to live in such. The opening to the West has also brought about changes in this respect, albeit slow ones.

### Family

#### *Nuclear vs. extended*

Collective thinking has resulted in *hanoks* being adapted for housing several generations or extended families. The changes of modern times have however led to children moving out and establishing their own households and nuclear families. Traditional dwellings and their set-up have not been ideal in serving this new lifestyle. A reflection on old values, foremost filial piety, has seen older children moving back in with their parents in order to care for them.

### Vernacular

#### *Preservation vs. alteration*

With *hanoks* being vernacular or traditional buildings, a look into what these terms actually mean or imply, should

not be foregone. The term *vernacular* stems from the Latin *vernaculus*, which stands for “domestic”, “native” or “indigenous”. *Bernard Rudofsky*, in “architecture without architects”, was the first to use it in an architectural context. [Rudofsky, 1964:preface] Its connotation brings about the question of what makes a building vernacular. Is it the special time or circumstance it is developed in or rather its appearance, regardless of the former two? Is the “vernacular style” allowed to undergo a process of change or is it static? Is something still considered vernacular, even if it includes changes and is put into a new context? How do we distinguish the real from the fake? Is there even such a distinction to be made? Who decides what is vernacular, the collective or experts? If it is the latter, what makes someone more proficient than others? How does preservation play into this? Should people strive for static conservation or adaptation to modern times? If changes are made, what distinguishes the vernacular from the modern? All these questions can be applied to architecture in general, not only the Korean one. This paper, rather than answering these questions, provided it is even possible, is an invitation to readers to ponder upon this topic by keeping *hanok* in mind.



## APPENDIX



## GLOSSARY

## A-Z

## a

**agungi:** fireplace

**anbang:** inner room in the women's quarters

**anchae:** "inner yard", women's quarters

**andaecheong:** representative room inside the women's quarters, used especially in summer to receive guests

**anhaengnangchae:** additional servants quarters in the anchaе (inner area)

**anmadang:** yard in the women's quarters

**ansarangchae:** additional men's quarters in the inner living area

**araechae:** "lower house", a building in the outer area

## b

**bakkarat- sarangchae:** further *sarangchae* in the outer area

**bang:** room, chamber, enclosed space

**bangmun:** room door

**bangseok:** sitting cushion

**bondang:** main building

**bongwan:** clan

**bueok (also jeongji):** kitchen

**bug:** north

**bunhapmun:** a type of door (*bunhap*= "put together"), consist of 4 parts, can be folded upward on hot summer days, usually between *daecheong* and a adjacent room

**busokchae:** attached annex

**buttomak:** flat cooking counter placed above the fireplace

**byeolchae:** annex, separate building, comprised of the eastern outbuilding *dong-byeoldang* and the western outbuilding *seo-byeoldang*

**byeoldang:** annex, separate building

**byeonso:** toilet

## c

**changmun:** window

**chae:** building used as a salon

**cheok:** measurement unit, ca. 30,3cm

**cheonwonjibang:** ancient Korean belief of the sky being round and the earth square

**cheukgan (also dwitgan or byeonso):** toilet house

**chimbang:** sleeping quarters of the owner

**chodangchae:** straw house, outside of the main living space

**choga-jib:** house with thatched roof

**choga:** "thatch"

**chongbop:** Joseon dynasty moral system governing family relations, men- oriented

**choseok:** foundation block or stone

## d

**daecheong (also daecheongmaru):** main room with

wooden floor, used mainly in summer to receive guests

**daemun:** entrance gate of the house

**daemyo:** temple of honour, keeping place of ancestral tablets, place where ancestral worship rituals are performed

**damjang:** "fence", border between interior and exterior spaces.

**dang:** house, little less representative than *jeon*

**ddijangneolmun:** type of door, carpentry object of thin and narrow wood

**deulmun:** type of door, can be folded from the floor upward, kept mostly open during summer

**dong:** east

**dongban:** Joseon era civil servants/ government officials, part of the scholar gentry

**dongjae:** eastern or western house

**dopyunsu:** chief carpenter in during the traditional building process

## e

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## f

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## g

**gamsil:** place where ancestral tablets are kept

**gaok:** "house", word borrowed from Chinese

**geonneonbang:** "room on the opposite side", either opposite of the women's room or the men's room with the *daecheong* (for receiving guests) in between

**giwa:** roof tile

**giwa-jib:** tile-roofed house

**gobangchae:** storage house

**gongnu (also darak):** storage space

**gorae:** heat duct, smoke from the heated stones passes through here

**gotaek:** historical dwelling

**gotgan (also gwang):** storage area for supplies

**gotganchae:** storage house

**gudeuljang (also gudeul):** flat and wide stone slabs placed above the *gorae* (heat duct), with a layer of red mud clay on top (to prevent smoke from seeping out)

**guteul-jib:** square shaped log house, built from thick logs with clay- covered gaps

**gulpi:** oak-bark

**gulpi- jib:** oak-bark-roofed house

**gulttuk:** chimney

**gwang:** storage area

**gwangchae:** storage building

**gwallisa:** administrative house or guardhouse

**gyolan:** railing with latticework between two posts

## h

**haengnangchae:** servants quarters with storage area



**haengnang-madang:** yard in front of the servants' quarters

**heon:** representative pavilion, administration house

**heotganchae:** storage house with servants quarters

**heulkbadak:** dirt floor

**hoji-jib:** house for part-time servants

**hwarang:** knights, sons of Silla aristocracy

**hyanggyo:** Confucian academy or village school

**hyeopmun:** side gate leading to women's or men's quarters

## i

**iksa:** side wing

**ilgakmun:** free standing entrance gate in between two columns, two-wing covered

**imsacheong:** room for ancestral worship ceremony preparations

## j

**jaesa:** memorial house for the ancestors

**jageunsarangchae:** men's quarters, smaller manor house for the son

**jangdaeseok:** treads/ steps of stone

**jangdok (also onggi):** earthen jars, storage containers for fermented foods

**jangdokdae:** outdoor podium for storing earthenware (onggi) with spices

**jecheong:** room for the ancestral worship ritual

**jeon:** representative palace- or monastery building

**jeongja:** open pavilion (summer house) with great views

**jeongji (also bueok):** kitchen

**jeonjugan:** transitional room, living room between kitchen and bedrooms, without walls, with hearth, space for meals and housework

**jeonsacheong:** room for ancestor ceremony preparations

**jeontoe-jib:** house with wraparound veranda, made of wood and clay, with underfloor heating

**jereup-jib:** hemp-thatched house

**jib:** "house"

**jongdori:** a type of roof ridge purlin

**jongtaek:** main house

**juiljae:** library

**junggansseoulju:** small supporting pillar in the middle of a room door

**jungmun:** middle gate, entrance door to the living area

**jungmunchae:** middle house with an entrance gate inside the living quarters

**jusa:** kitchen for food preparation for the ancestral ceremony

## k

**kan:** measurement unit, distance between two columns, between 1,8m and 2,4 m (depending on building type), also used as square measurement (e.g. 2,4m x 2,4m = 5,76 sqm)

**keunsarangchae:** large men's quarters, manor house for the head of the family

**kkachigumeong-jib:** "magpie- hole house", hearth or kitchen in the same house as the cowshed, birds would enter through the opening for smoke, good type for heat storage and protection from the cold, people and animals under one roof

**kkotdam:** "flower walls", plot enclosing structures with ornate patterns

## l

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## m

**madang:** courtyard

**maguganchae:** pet barn

**maksae:** top tile of the roof ridge

**maru:** wooden floor or room with wooden floor

**marudaegong:** support post resting on the main or middle beam and carrying the ridge purlin

**meoritbang (also uitbang):** "upper room", next to the women's room (if existing)

**mobang:** rooms directly next to the hearth, where the warmest floor spaces next to the main fireplace are available

**momchae:** main building with women's and/or men's quarters

**munganchae:** entrance gate house

**munganbang:** room inside the entrance gate house

## n

**naerimmaru:** ridge of a gabled roof, with animal figurines on top to scare off dark spirits in palaces and monasteries

**naewon:** ornamental garden in the inner quarters

**nam:** south

**neolmun:** type of door, made of thin and horizontally stacked wood planks

**neowa:** "red pine tree"

**neowa-jib:** house roofed with red pine tree shingles

**numaru:** elevated room with wooden floor, open room adjacent to and in front of the men's quarters, similar to daechong, used for receiving guests during warm days of summer

**naewoebop:** Joseon dynasty law, prohibited free contact between men and women

**nunsseopjibung:** "eyelash- roof", roof of a *hanok* annex, attached below the main roof,

## o

**oeyanggan:** stable, cowshed

**onggi (also jangdok):** earthen jars for storing fermented foods

## p

**paljak-jibung:** roof form based on an octagonal floor plan, only used for important buildings

**pyeong:** measurement unit, used until today, 1 pyeong = 3,3 sqm

## q

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## r

**ruh:** open pavilion on a pond

## s

**sadang:** shrine, memorial house of ancestors

**salimchae:** house where family lives, general dwelling

**sarang:** salon, hall

**sarangbang:** men's room

**sarangchae:** men's quarters (detached), building used as salon

**sarangmadang:** courtyard in the men's quarters

**sarangmun:** gate that leads to the men's quarters

**seo:** west

**seojae:** eastern or western house

**seoban:** Joseon era military officers, part of the scholar gentry

**seokgarae:** wooden rafters

**seowon:** Confucian academy or school

**sinmun:** "spirit gate", entrance to the ancestral area

**sireong:** wardrobe of poles to hang clothing

**soseuldaemun:** representative entrance gate leading to an aristocrats dwelling, towers over the other buildings

**soseuldaemunchae:** representative entrance gate or entrance gate house

## t

**toetmaru:** veranda with wooden flooring, along the side of a room

**tumak-jib:** timber log house made of clay and reed, bear loading outer walls made of logs, outer walls surrounded by non- load bearing reed walls (truss construction)

## u

**uitbang (also meoritbang):** "upper room", next to the women's room (if there is one)

**ujingakjibung:** hip roof

## v

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## w

**wapyeondamjang:** "tile fragment walls", plot enclosing structures with broken- tile patterns

## x

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## y

**yangban:** scholar gentry, consisting of civil servants/ government officials and military officers

**yeondang:** pond

**yeonmot:** pond

**yeonji:** pond

**yongmaru:** crest, roof ridge

**youlhwadang:** same function as men's quarters

## z

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## Categories

### Houses

**jib:** "house"

**choga-jib:** house with thatched roof

**giwa-jib:** general term for a tiled roof

**guiteul-jib:** square shaped log house, built from thick logs with clay-

**gulpi-jib:** oak- bark roofed house

**hoji-jib:** house for part-time servants

**jeontoe-jib:** house with wraparound veranda, made of wood and clay, with underfloor heating

**jereup-jib:** hemp-thatched house

**kkachigumeong-jib:** "magpie-hole house", hearth or kitchen in the same house as the cowshed, birds would enter through the opening for smoke, good type for heat storage and protection from the cold, people and animals under one roof (just like in old European homes)

**neowa-jib:** house roofed with red pine tree shingles

**tumak-jib:** timber log house made of clay and reed, bear loading outer walls made of logs, outer walls surrounded by non- load bearing reed walls (truss construction)

**ttwari-jib:** ring-shaped clay house

**udegi-jib:** walled house, specific to Ulleung island

**yangtong-jib:** two-layered house

### Roofs

**jibung:** roof

**matbae-jibung:** gabled roof

**moim-jibung:** pyramid roof, only used for important buildings

**nunsseop-jibung:** "eyebrow-roof", roof of a *hanok* annex, attached below the main roof

**paljak-jibung:** hipped and gabled roof

**ujingak-jibung:** hipped roof

### Gates and doors

**mun:** "door", "gate"

**bangmun:** door to a room

**bunhapmun:** panels or doors hinged up top, *bunhap:* "put together", can be folded upward on hot summer days, usually put between *daecheong* and a adjacent room

**daemun:** entrance gate

**deosmun:** panels or doors hinged on the side, used between rooms and in outside walls

**hyeopmun:** side gate leading to another building

**jangjimun:** door covered with translucent paper

**jungmun:** middle gate leading to the inner quarters

**maengjangjimun:** non-translucent, paper-covered door  
**sarangmun:** gate that leads to the men's quarters  
**sinmun:** "spirit gate", entrance to the ancestral area  
**soseuldaemun:** representative entrance gate leading to  
an aristocrats dwelling, towers over the other buildings  
**soseuldaemunchae:** entrance gate house



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