Comparative review of exterior spaces in the Korean *hanok* and the Italian *palazzo*: spatial aspects of the *madang* and the *corte*

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### ABSTRACT

For as long as the principles of Korean space have been investigated, the *madang* has been considered as a central issue. However, scholars tend to define this space as a *courtyard* in the Western sense. Believing that this leads to a misinterpretation that the *madang* is equivalent to the Western courtyard, a comparative analysis has been conducted in this study for highlighting their peculiarities and differences. The Korean *madang* has been compared with the Italian version of the courtyard, the *corte*, which is considered to be the prototype of the Western notion of this type of space. An investigation has been conducted on residential examples (*hanok* and *palazzo*) from the 15th to 19th centuries and has been summarized through diagrams. This study highlights two fundamental differences between the *corte* and the *madang*. First, while the *corte* is comparable to a regular solid, the *madang* can be considered as an expandable fluid. Secondly, the *corte* and the *madang* have different relationships with the environment surrounding the *palazzo* and the *hanok*; the *corte* is strongly separated from it, whereas the *madang* is closely linked to it and is almost a part of the natural context in which the building is located.

### 1. Introduction

#### 1.1. Study background and objectives

Ever since Korean historians began investigating the principles of Korean space (Ahn 1978; Chung 1974), the *madang* has always been considered as a central issue. This space emerged as a matrix of the Korean architecture itself, as an element that, from ancient times, exerted a constant influence on the conception of buildings: “... amid the changes in discourse through the decades, we can nevertheless identify a powerful diagram that remained unchanged in spite of the rise and fall of numerous buildings. It is that of a *madang* or courtyard” (Jung 2013, 143).

However, this last quote introduces a problem that has been underestimated to date. When Korean scholars started sharing their research with the rest of the world, they almost always adopted the term “courtyard” in its Western sense to define the *madang*. Since then, the use of the word *courtyard* as a synonym for *madang* has been widespread, both in scientific and non-specialist literature, websites, and design vocabulary.\(^1\) The use of this incorrect terminology keeps generating a certain ambiguity. From the perspective of a person coming from Western culture, a *madang* and a courtyard have little in common. In addition, interpreting the *madang* on the basis of the criteria for a courtyard leads to an underestimation of its originality as a unique space.

This study was inspired by the abovementioned considerations as well as the observation that, despite some scholars being aware of the basic differences between a *madang* and a courtyard (Jung 2013; Lee 2017), relatively little research has been done to investigate such differences in depth. Most studies from the East (Dae 1975; Kim and Cho 1990; Rhee, Kim, and Kim 2004; Sagong and Kim 2002; Ahn 2008) as well as from the West (Abass, Ismail, and Solla 2016; Beltramo, Cantatore, and Folin 2016; Perogalli 1975; Zucchi 1989) proceeded in parallel without mutual correspondence. The few comparative analyses that were conducted mainly focused on Eastern cases (Kim 2006) or interior space (Kim and Lee 2001; Tufekcioglu 2017).

Therefore, the authors believe that a scientific, comparative analysis of the *madang* and the Western courtyard could fill this historiographic gap and provide materials for a better understanding of their peculiarities and the differences between the two spaces.

#### 1.2. Research methods and scope

A comparative analysis can be approached from several perspectives: functional, sociological, geographical, or cultural. This study focuses primarily on the physical aspects of these spaces, namely, on the issues concerning the relationship between masses and voids, interiors and exteriors, boundaries, levels, and

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\(^1\)A simple search of the words *madang* and *courtyard* on the Google search engine provides a huge number of webpages, studies, etc., which confirm this fact (see for example: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=madang+courtyard&btnG=).
areas, and have been investigated in terms of the interpretation and graphic processing of the floor plans, sections, and elevations.

An exploration of this kind was attempted for the first time by the Japanese architect Yoshinobu Ashihara in his "Exterior Design in Architecture" (Ashihara 1970). Ashihara’s book compared Eastern and Western exterior spaces using a Gestalt approach inspired by the plan of Rome by Giambattista Nolli (Figure 1). The method of Ashihara, considered fruitful for the goals of this work, has been adopted in the analysis and its categories, and its instruments have been adapted according to the peculiarities of the spaces investigated.

As mentioned above, the Korean madang is the first term of this comparison. To avoid misunderstandings, we clarify that this study does not consider the madang as a representative of all Asian spaces of this kind. The Eastern architectural context is, in fact, extremely varied, and cases such as the Japanese or Chinese architectural contexts deserve separate discussions. In contrast, the Western context is more homogeneous and the type of courtyard, the second term of comparison in this study, can be easily represented using a local example. The selected example, namely, the Italian corte, is meaningful because several studies agree on its pivotal role in the genesis, definition, and development of the Western courtyard prototype. The chronological period in this research study ranges from the 15th to the late 19th century and corresponds to the Korean Joseon dynasty and the Italian preindustrial era. During this period, the madang and the corte were defined, consolidated, and reached their greatest complexities. The comparison in this study has been circumscribed to the architectural typology. Although we can observe the existence of the madang and corte in several building types (e.g., temples or monasteries), this study considers only their residential versions, namely, the madang of the hanok, the traditional Korean house (in its upper-class variant) and the courtyard of the palazzo ("palace"), the Italian residence of wealthy families. In these types, the exterior spaces show significant articulation in terms of form and mutual interaction.

2. Madang and corte in residential buildings: a historical outline

2.1. Hanok and madang

The surviving examples of the hanok and related historical documentation mainly belong to the late Joseon period (17th–19th century). As can be seen in the Yeongyeongdang residence (Figures 2 and 3), the hanok of the upper class was composed of several one-story high blocks hosting the primary activities of the house. The blocks were organized around the madang, the outdoor area, with which they formed separate quarters arranged by gender and class separation. The main quarters were the sarangchae (A, men’s area) with its sarang madang (A1) and the anchae (B, women’s area) with its anchae madang (B1). Additional quarters would include the haengnangchae (C, servants’ area) with its haengnang madang (C1). The madang of the different quarters were separated by walls with gates. Similar walls enclosed the perimeter of the house. The main gate provided direct access to the sarangchae through the haengnangchae. The main facades of the buildings opened onto the frontal part of the madang. Each block of the complex was characterized by a timber structure, and different floor materials defined the functional spaces of the different buildings.

During the 19th century, the layout of the hanok tended to be simpler than before, with less separation between the quarters and fewer functional areas. In the 20th century, the subdivision into multiple madang was replaced by a single outdoor area, and the hanok reduced in size and became an urban single-family house.

2.2. Palazzo and corte

The palazzo ("palace") is the Italian counterpart of the upper-class hanok, namely, a large residence for wealthy families. Its typological development can be reconstructed from the large number of available historical sources. These types of residences increased at the end of the 14th century, when families of the merchant class, whose assets had grown, began to buy several neighboring urban houses to merge them into single, bigger, residential buildings. From the 15th century, Renaissance architects selected the palazzo as one of their primary design themes and turned it into a modern edition of the ancient Roman house. Palazzo Medici in Florence is considered the original prototype of this design, and in the 16th century, its characteristics were perfected and disseminated by Palazzo Farnese in Rome (Figures 4, 5, and 6).

The palazzo could have two to four levels. All the spaces were arranged around the corte (already existing in the above mentioned merchants’ houses but later regularized). Arcades provided circulation among the rooms on the first floor.

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2Cf. Pai and Woo (2014, 416) fol. At the center of Ashihara’s method were (a) the formal/perceptual relationship between figure and background, and (b) the psychological effects of boundaries on the sense of outwardness or inwardness of spaces.
3Blaser (1985) and bibliography: Edwards et al. (2006).
4Choi et al. (1999, 36); Choi (1989); Yi (2016, 10) fol. See these references for all the following notes.
5Yim (2011).
6Chastel (1980); De Benedetti (1988, 103) fol.; Chierici (1964); Murray (1963); Perogalli (1975); Zucchi (1989). See these references for all the following notes.
and loggias or corridors with windows on the upper floors. Vertical circulation was allowed by a staircase opening to the arcades. In general, the first floor hosted service or accessory spaces (workshops, stables, etc.). The main rooms (public halls and private areas, such as the bedrooms of the household) were located on the second floor (also called the piano nobile – “noble floor”). Finally, the last floor, or the attic, consisted of the servants’ quarters. Depending on its size, the palazzo could be provided with additional service courtyards or gardens protected by tall walls (in this case, the corte was also called corte principale, i.e., “main courtyard”).

The palazzo remained the most important urban residence type for the Italian upper class until the 19th century. Later, it was gradually turned from a single-family residence into a multi-family complex, serving as a model for modern apartment buildings.

3. Comparative analysis

3.1. Criteria and parameters

A comparative analysis was conducted on several cases selected within the geographical, chronological,
and typological scope\(^7\) of this study. The results of the survey have been visualized through diagrams obtained from two buildings selected as samples: Son Byeongjun house in Gyeongnam (1876) (Figures 7 and 8) and Palazzo Farnese in Rome (from 1517, Figures 4, 5, and 6).\(^8\)

\(^7\)In particular, approximately 50 examples each of the palazzo and the hanok from different regions have been analyzed in this study, focusing on the cases in which reliable drawings were available. The starting sources for the analysis, later expanded through their bibliography, are mentioned in Section 2.

\(^8\)Although these buildings belong to different periods, they are suitable to be selected as representatives of their type. Palazzo Farnese (see Chastel 1980; Murray 1963, 158–164), as mentioned in Section 2, shows features that are influential and have been repeated in the following centuries. Son Byeongjun house, considered here in its original version (see Choi 1989 and http://www.heritage.go.kr/heri/cul/culSelectDetail.do?dKutKey=31,01850000,38), built three centuries later, is a mature achievement of the consistent development of this type of building structure through the centuries.
The analysis has been divided into the following sections:

a) Mass–void relationship (reverse space), b) Boundaries (method of enclosing the space), c) Interior–exterior hierarchy (separation between the outdoor and indoor areas).

The findings of this investigation are discussed in Section 4.

3.2. Comparison

3.2.1. Mass–void relationship (reverse space)

This step of the analysis borrows, applies, and adapts Ashihara’s method of “reversing” the space to observe the reciprocal interaction between the masses and voids.\textsuperscript{9} In this study, the term mass represents a volume that is delimited by vertical elements (e.g., walls, columns, etc.) and is covered by a roof. On the other hand, the term void indicates an open space without a roof. The diagrams shown in Figure 9 illustrate the results of the graphical “reversion” of masses and voids in the layouts of the palazzo and the hanok.

In the case of the palazzo (Figure 9(a)), the outcome is straightforward. After reversing the masses and voids, the void (corte) maintains a sharp and defined shape, comparable to that of the surrounding mass. The masses and voids of the palazzo are reciprocal positive–negative spaces.

However, in the case of the hanok (Figure 9(b)), we cannot merely identify the masses (black areas) and voids (white areas). Between them is a “grey” element, namely, the kidan, which is a high stone base surrounding the

\textsuperscript{9}Ashihara observed that Western exterior spaces, if “reversed,” (Figure 1) generate forms having the same sharpness as the interior spaces (namely, the areas occupied by the buildings). However, the same is not true for the examples of Eastern building structures, since the urban voids and buildings do not show the same relationship.
main buildings (Figure 3). The *kidan* is an open antechamber where people remove their shoes before entering the living spaces. It is covered by the broad eaves of the roof but is not delimited by any vertical element.

Strictly speaking, it cannot be considered as a part of the mass. It cannot also be seen as a generic area under the roof, given its important function and considerable extension. Therefore, in this study, the term...
3.2.2. **Boundaries (method of enclosing the space)**

The second part of the analysis refers to Ashihara’s considerations on the “Enclosing Space” (Ashihara 1970, 78) and examines the “boundaries” of the corte and the madang.

As can be seen in Figure 10(a), the corte is delimited by four uniform facades of the same height, composed of arcades on the first floor and walls with windows on the upper levels. Despite being “perforated”, the arcades generate a visual continuity with the compact wall above. Thus, the vertical boundaries of the corte are perceived as four coplanar sides. The top horizontal boundary (Figure 10(b)) does not exist physically since the corte does not have a roof. However, the cornice provides a strong visual limit, which restricts the facades according to carefully studied proportions (the actual roofs, not visible from the courtyard, are not involved in the general composition).

The lower horizontal boundary of the corte is demarcated by the outdoor paved floor, which is coplanar with the rooms on the first floor and the public street outside (Figure 10(b)).

The vertical boundaries of the madang show much more variation than those of the corte. As shown in the diagram in Figure 10(c), they consist of facades of different heights and extensions as well as low and continuous walls. In turn, the facades are characterized by different degrees of “visual permeability” provided by pillars, walls, removable panels, and the considerable mass of the roofs. Unlike the coplanar delimitations of the corte, the vertical boundaries of the madang are composed of various layers arranged at different depths. The upper boundary is undefined and “blurred” since the various heights of the facades, roofs, and walls do not allow us to identify a precise visual limit as in the case of the cornice of the corte. The lower boundary is more homogeneous, although it can sometimes be conditioned by topography. However, unlike in the corte, there is no continuity between the outdoor and indoor spaces in the madang, with the latter being higher than the former (Figure 10(d)).

3.2.3. **Exterior–interior space hierarchy (separation between the outdoor and indoor areas)**

The analysis described in this section is inspired by Ashihara’s intuitions on the “Hierarchy of Exterior
Space (Ashihara 1970, 82). It is aimed at classifying the spaces in the hanok and palazzo based on their degree of “inwardness” and “outwardness” in order to study the intensity of separation between the outdoor and indoor areas. Before starting the examination, it is necessary to illustrate some definitions adopted in this study and visualize them via diagrams, as shown in Figure 11. First, we consider an exterior space to be any “space without a roof” (the yellow areas in the diagrams). Consequently, the building spaces are
“spaces with a roof.” Second, we identify different types of partitions between the exterior space and the building spaces. In particular, we call (a) a partition characterized by high visual and physical “permeability” (e.g., pillars) as a frame, (b) a partition characterized by zero permeability (e.g., the actual walls) as a wall, and (c) a partition characterized by low permeability but which is removable (e.g., hanging panels, existing only in the hanok) as a layer. All building spaces have been named according to the degree of permeability of their partitions. Therefore, an interior is a roofed space enclosed by walls and a semi-interior is a roofed space enclosed by “permeable” partitions. A special case is the semi-exterior, a roofed space that
is not delimited by any partition and which exists only in the *hanok*.

From the analysis, we observe that in the *palazzo* (Figure 11(a)), the separation between the outdoor and indoor areas is relatively strong. Only on the first floor, we move from the *exterior space* of the *corte* to the *interior spaces* of the rooms through the *semi-interior* space of the arcade. However, on the upper levels, the outdoor and indoor spaces are firmly separated by walls.

*Figure 11.* Diagrams showing the interior-exterior space hierarchy (separation between the outdoor and indoor areas).
The structure of the hanok is more articulated, showing many more gradations of “inwardness” and “outwardness”, and therefore, a less sharp separation between the outdoor and indoor areas (Figure 11(b)). Proceeding from the exterior space of the madang toward the buildings, we first encounter the kidan, the space already examined in Section 3.2.1. Its unique condition of being a roofed space without vertical boundaries leads us to call it a semi-exterior space. Beyond the kidan, there are either rooms enclosed by walls, namely interior spaces, or the toenmaru, a roofed space delimited by a frame of pillars, i.e., according to our definition, a semi-interior space. Beyond the toenmaru is the maru (or taechong), the common hall of the residence. This space is closed on its main side by removable panels (layer), and its transformability makes it an interior or a semi-interior space alternately. The actual sequence of these spaces may vary depending on which side of the house is considered.

4. Discussion of the findings of the analysis
4.1. Corte and madang: solid versus fluid
The Italian corte is a clearly defined space with a regular layout (Figure 9(a); Section 3.2.1), delimited by sharp boundaries (Figure 10(a and b); Section 3.2.2).
Its separation from the interior spaces is clear-cut (Figure 11(a); Section 3.2.3). On the other hand, the Korean *madang* is more complex. Its layout is free and its space is “interlocked” by the masses (Figure 9(b); Section 3.2.1) and the interior spaces (Figure 11(b); Section 3.2.3).\(^\text{10}\) Its boundaries are diverse, multi-layered, or “blurred” (Figure 10(c and d); Section 3.2.2).

The fundamental difference between these two spaces becomes clearly evident when we consider them as three-dimensional entities. The *corte* is conceptually a *solid*. As a perfect negative, it corresponds to the actual solids of the building mass and is characterized by a neat shape and balanced dimensions and proportions (Palazzo Farnese’s *corte* is a perfect cube). On the other hand, the *madang* cannot be considered as a *solid*. Given the indefiniteness of its volume, which is hardly contained by its boundaries, it can be considered to be a *fluid* that is free to expand in any direction.\(^\text{11}\) It partially penetrates the masses and the interior spaces, extends toward the sky, and even tends to surpass the limits of the house, overcoming the low walls that separate it from the public spaces. Unlike the *corte*, the *madang* is not a perfect negative of the building masses. Instead, it is independent of their form and dimensions.

\(^{10}\text{Cf. Jung (2013), 130 fol., 144.}\)

\(^{11}\text{See the considerations of the *madang* as an improper void in Lee (2017, 234-37).}\)
4.2. Relationship with the environment: separation versus interaction

Another issue that has been highlighted from the analysis is the difference in the relationship of the *madang* and the *corte* with the respective environments surrounding the *hanok* and the *palazzo*.

As discussed in the previous section, the *corte* is a regular solid. Therefore, its shape and proportions are not different from those of the surrounding rooms, to the point that it does not seem incorrect to define it as a *room without a ceiling* (Figure 13). The continuity of the sections strengthens the idea that the *corte* and the rooms belong to the same category (they lie on the same level, Figure 10(B)), and the use of similar materials confirms this inference (both the *corte* and the rooms are paved (Figure 12)).

From its characteristic of being a *room without a ceiling*, the *corte* firmly belongs to the *palazzo* space and is clearly separated from the (urban) environment surrounding the building. Once again, the materials highlight this separation: solid paving for the *corte* and soil for the public spaces (Figure 12).

On the other hand, the relationship of the *madang* with the (natural) environment surrounding the *hanok* is undoubtedly stronger. As mentioned in the previous section, *madang* is a *fluid* that is free to expand and is hardly contained by its boundaries. In particular, only a mild limitation is provided by the perimeter walls. The physical and visual continuity between a *madang* and the context is thus remarkable and is confirmed by materials (natural soil and greenery, Figure 12) and respect for natural orography. It looks as if the wall has generated the *madang* by cutting out and circumscribing a portion of the natural context. On the basis of this interpretation, the *madang* can be seen as a sort of *domesticated territory*, interacting with the natural environment, but which is slightly different in physical features and, of course, function.13

5. Conclusions

The comparative analysis conducted in the previous sections has confirmed the initial assumptions of the research. The *madang* and the *corte* (the latter representative of all Western spaces of this kind), although often referred to as *courtyard*, are fundamentally different spaces. The differences highlighted in this study are as follows: Firstly, while the *corte* can be compared to a regular *solid*, reciprocally linked to the *palazzo’s* actual solids (masses), the *madang* is instead a *fluid*, free to expand beyond its boundaries and independent of the masses of the *hanok*. From these properties, the second fundamental difference that is manifested is their relationship with the surrounding environment. The *corte*, which is comparable to a *room without a ceiling* in terms of its shape and proportions, firmly belongs to the *palazzo* space and is clearly separated from the surrounding (urban) environment. However, the *madang* maintains a strong physical and visual interaction with the (natural) environment significantly and thus can be considered as a *domesticated* portion of it.

These differences reflect two opposing cultural backgrounds. The *corte* is the product of a design approach in which exterior and interior spaces are conceived *simultaneously* through reciprocal feedback between the masses and voids. In the designing process, these spaces interact and negotiate to modify each other to achieve a balanced result.14 On the other hand, the *madang* comes from a culture in which the definition of exterior and interior spaces proceeds *independently* and with reciprocal respect.15

The contributions of this study are proposed here to provide a reference frame and a starting point for further analysis.

Firstly, it would be meaningful to extend the investigation by including more regionally and socially diverse cases. Moreover, although the example of the Italian courtyard can be considered a good representative of the Western case, other Western contexts can be analyzed to obtain a complete picture of the situation. The analysis can be extended to different Asian contexts (e.g., Japanese or Chinese) on the basis of the same comparative criteria.

Finally, a future potential research target could consist of expanding the scale of the comparative analysis from the dimensions of the buildings to that of cities in order to investigate whether the architectural and urban exterior spaces share similar principles. Such an investigation could provide clues for an improved understanding of the cultural differences in the formation of regional environments.

Disclosure statement

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12 Room without a ceiling intentionally recalls the expression “architecture without a roof” used by Ashihara for Italian urban exterior spaces (Ashihara 1970, 14).
13 Ashihara provides a similar interpretation for the traditional Japanese garden (however with fundamental differences resulting due to the local culture). Ashihara (1970, 25).
14 From the Renaissance, treatise writers (Alberti 1452; Serlio 1537; Palladio 1570) stated that building courtyards are not just voids resulting from the design of the mass, but spaces with their own character, composition and proportions, hierarchically equal to the rest of the rooms (Cf. Lee 2017, 235; Jung 2013, 91).
15 According to the most shared theory on how a traditional Korean complex was designed, the *madang* would have been conceived before defining the buildings of the complex. The latter would have been arranged later according to principles of ventilation and *feng shui*. (Cf. Pai and Woo 2014, 426; Jung 2013, 131 fol., Lee 2017, 235). This independency is confirmed by the *hanok* section (Figure 10(d)) where buildings are raised (i.e., separated) from the *madang*. 
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