A Study on the 19th-Century Depiction of Parallel Projection in Donggwoldo

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Abstract

Donggwoldo, or "Painting of Eastern Palaces," is a late Joseon documentary painting of Changdeokgung Palace, its rear garden Huwon, and Changgyeonggung Palace. It falls under the category of 19th century map paintings. In Donggwoldo, a contemplative mode of depiction based on parallel projection is used to create a multi-perspective spatial structure; however, the focus is less on achieving a unified mode of depiction and more on adhering to the tradition of Joseon paintings that used artistic techniques selectively to fulfill specific purposes. In contrast to their actual layout, the buildings of the palaces followed a strict order of arrangement and positioning based on the traditional principles of architectural composition. While various sections of the palace are accurately partitioned and clearly reflect hierarchy, they are also individually magnified or scaled down to restructure the buildings into near-ideal forms of palatial architecture. This conceptual interference makes Donggwoldo transcend its practical function of documentation, and suggests that the aim was less on creating an accurate depiction of the actual palaces, but rather on effectively reflecting the architectural ideology behind their creation.

Keywords: Donggwoldo; Painting of Eastern Palaces; Visual Representation; Parallelism; Reverse Perspective

1. Introduction
1.1 Objectives and Significance

An architectural painting is not a mere visual representation, but one that manifests the socio-cultural mechanisms of the era in which it was made. Modes of architectural depiction undergo continuous change and development, and the question of "how to depict a subject" is key to understanding the architectural philosophy of an era. (Lee and Jung, 2000; Jo, 2004) In traditional East Asian art, it was more important that a subject be represented with ideological correctness, rather than depicted with visual accuracy, which had never been the first priority.1

State-led projects to compile national maps or geographic records peaked under the kings Yeongjo and Jeongjo in the 18th century. Beginning in the 19th century, state-compiled maps or geographic records spread to the public through copies hand-scribed by individuals, and palaces and cities were frequently drawn onto large-scale folding screens or folding sheets. The best known of such paintings include Donggwoldo, Gyeonggi-gamyeong-do (Painting of the Gyeonggi Provincial Government) and Pyeongyang-do (Painting of Pyeongyang City). (Han et al., 1999).

The premise of this study is that a painting's mode of graphic representation reflects the era's intellectual paradigm formed by its socio-cultural background; thereby, this study seeks to analyze the 19th century documentary painting Donggwoldo in order to understand the late Joseon depiction of architectural forms using parallel projection and architectural ideology.

1.2 Methodology

Chapter 2 examines the nature and graphic projection modes of jiehwa, which primarily depicts buildings or cityscapes, and defines oblique parallel projection in relation to other projection modes. Chapter 3 contemplates the significance of Donggwoldo by examining its characteristics as a painting and comparing them to those of contemporary paintings. Chapter 4 employs an iconographical analysis of Donggwoldo to examine how factual and ideological elements interact within a documentary painting.

2. Graphic Projection Mode of Late-Joseon Jiehwa Documentary Paintings

Architectural paintings using distinct modes of graphic representation were either palace paintings or walled-city paintings, whose main purpose was to record the layout of buildings or a city. They also included documentary paintings of royal ceremonies that had to be expressed in detail, and thus the architectural forms were included to serve as part of the background. Regardless of the subject, most jiehwa were painted using one of three modes of graphic projection: (1) orthographic with omnidirectional

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façades, (2) cavalier with upright façades, and (3) oblique parallel. The first, orthographic projection with omnidirectional façades, refers to a straight-down view of the buildings, as in traditional map paintings, but with the façades visible by tilting them in whichever direction they happen to be standing against. As in Inpyeongdaegun-bang-jeondo (Fig. 1., Complete Map of the Residence of Grand Prince Inpyeong), this projection mode enables a relatively balanced depiction of the subject, but the direction in which a façade reclines depends on its relationship with the surrounding constructions and pathways. (Song, 2002)

The second, cavalier projection with upright façade refers to the schematic arrangement of architectural forms from a bird's-eye perspective with the façades rendered flat and upright. This projection mode was mostly used in detailed documentary paintings of ceremonies. The surrounding walls of the architecture create rectangular frames within which the ceremony can be depicted in detail, and the façade of the main building is rendered flat to emphasize its hierarchical significance. (Lee, 2008) An example is Jinyeon-bancha-do (Fig. 2., Painting of the Seating Arrangement at a Royal Banquet), in which the entire ceremony is seen from a bird's-eye view; closer examination reveals that different parts of the image are in fact depicted from their own different perspectives. Also, the tent poles, the stone porch, the courtyard and other components are exaggerated vertically in order to make room to better depict the ceremony.

The third, oblique parallel projection, renders the architectural forms as parallelograms expressing their dimensions along the line of sight. The façades of the architectural forms are again rendered flat and upright, but the sides are set at an oblique angle. As seen in Myeongjonggungjung-sungbul-do (Fig. 3., Painting of a Buddhist Ritual Held at the Royal Court under King Myeongjong), oblique parallel projections result in a bird's-eye view unfolding in a panorama, in a manner similar to landscape paintings, and it is thus appropriate for creating balanced representations of relatively wide spaces. These different projection modes were all used in creating jiehwa until the late 19th century. There were also many instances of different modes used for different scenes within a single album or folding screen, of which the most representative is the Suwonneung-haeng-dobyegung (Paintings of King Jeongjo on His Way to His Father's Tomb in Suwon). Unfettered by the need to achieve unity in form, late Joseon documentary paintings generally used multiple projection modes rather than a single mode for a single scene, adopting the most efficient graphic representation mode that best fit the subject and purpose of the painting.

3. Overview of Donggwoldo as Painting

Donggwoldo (Fig. 5.) is a sixteen-panel painting of the two Eastern Palaces of Joseon—Changdeokgung, including its rear garden Huwon, and Changgyeonggung—drawn on silk. It is presumed to have been produced by a royal court painter from Dohwaseo (Office of Paintings) starting sometime between 1824 and 1827 and completed before 1830. (Ahn et al., 2005) It exemplifies the height of 19th century documentary paintings in its execution, well expresses the tradition of cartographic paintings, and is valuable as an historical source. This section discusses the characteristics and the significance of Donggwoldo as a painting.

3.1 Oblique Parallel Projection with Effects of Scattered-point Perspective

Donggwoldo uses parallelogrammatic composition with scattered-point perspective, which is a graphic representation mode used in Eastern landscape paintings. As seen in Inwangsan-do (Fig. 4., Painting of Mt. Inwang), this mode of composition is appropriate for depicting the subject in detail with uniform perspective. In parallel projection, there is no vanishing point; rather the
subjects are rendered so that their sides are parallel, on
the premise that there is no central axis on which the
line of sight converges, and that the image is seen with
moving eye. In paintings based on oblique parallel
projection, there is not only one central subject but
usually several of varying sizes that are positioned at
intervals throughout the painting.

The traditional scattered-point perspective is what
enables the flexibility of composition found in Eastern
landscape paintings. One example is
Donggyeong-sansu (Fig. 6., Winter
landscape), in which
objects in both the
foreground and
background are
depicted as relatively
equal in size, thus
giving each object its own presence. The scattered-
point perspective creates multiple perspectives within
one image, designed so that a viewer can move in
front of the image and observe it at a fairly close range
without distorting the perspective. Because the viewer's
eyes are not fixed upon a single point, the artist can
express a variety of subjects on a single surface, giving
each one its own separate domain, and also freely
control the vertical and horizontal lengths, supplement
the real with the ideal, and diversify the expression of
density or scarcity if it seems necessary. (Jin, 1995) In
Donggwoldo, the palaces are viewed from an oblique
overhead angle, and multiple perspectives are created
by each part of the overall composition. This effect is
more conspicuous when examining Donggwoldo up
close rather than from afar, as is the use of scattered-
point perspective, which results in different parts of the
painting having their own perspectives.

3.2 Application of the Reverse Perspective
In reverse perspective, objects are depicted from
a bird's-eye view in which the further away they
are, the larger they are drawn. The vanishing points
are placed in front of the painting, as opposed to a
linear perspective, which places the vanishing points
somewhere behind it. The realistic effects of reverse
perspective is that, because our eyes intuitively register
the focal point of an image with the greatest precision,
if the areas that are farthest from that point are the most
magnified, this effectively counterbalances the lack
of attention for that area, allowing us to view all areas
with equal attentiveness. Reverse perspective allows
faraway objects to be magnified and thus expressed in
greater detail. The magnified human figures appear as
if they are right next to us, and our eyes are directed
to the place the human figures are facing toward,
effectively making the viewer pay attention to the
details of that area.³

As seen in Seowonajib-do (Fig. 7., Gathering of Xiyuan),
the adoption of reverse perspective is conspicuous
in the depiction of tables, raised wooden floors,
and fences. In the visual representation of architectural
forms, the application of reverse perspective makes
it appropriate—as open-air spaces framed by walls grow
in size the further they are from the viewer—to depict in
detail the human figures within
those spaces. Such a perspective can reveal a greater
number of surfaces of the subjects in comparison to the
Western linear perspective, and because the edges and
corners of the subjects are emphasized, the contours of the roofs and areas framed within post-and-lintel structures are also systematically revealed.

The use of reverse perspective in Donggwoldo emphasizes the flat depiction of the façades of south-facing buildings and distinguishes the main royal buildings within the rectangular courtyards from its surroundings. The trapezoidal depiction of buildings due to the reverse perspective is also applied to the barren sites of old buildings, as evidenced by the rows of remaining cornerstones and stone porches that spread wider towards the background. Donggwoldo was painted onto a folding sheet, which makes the focus created by reverse perspective more conspicuous: when the sheet is unfolded, the two eastern palaces can be observed in their entirety; when folded, the limited view of a single scene allows one to appreciate the details and execution. Most of the sixteen scenes emphasize through reverse perspective a courtyard framed by cloistered corridors or walls, and at the top of the courtyard is a royal building that is the focus of that scene.

3.3 Expression of the Landscape

Donggwoldo, and Kyunggi-gamyong-do just to name a few. Depicting architecture within its surrounding landscape allows one to express the geographical characteristics of the area and express the overall composition as naturally as possible.

In Donggwoldo, the buildings and nature show a marked difference as components of the palaces. Even though the actual palaces sit on hilly terrain, it is hard to understand the topography in detail from the painting. One could perhaps postulate from the stonework and stairs next to the walls that the terrain is elevated, but the landscape is rendered in such an extremely ideological manner that it serves as a poor reference to the two palaces’ in fact pragmatic use of the natural landscape. The trees within the palace grounds flow in a linear fashion, serving as a main component that marks the separation between the two palaces; in contrast to how in reality nature dominates architecture, the strong artificial force of the palace arrangement dominates the painting. In particular, the landscape is affected by the law of linear perspective and grows smaller in scale towards the back, while reverse perspective is applied to the buildings, making them grow larger in size towards the back; thereby, the artificial and natural components are shown to be governed by conflicting powers. Each building is expressed as having three dimensions, due to the mode of parallel projection, while the trees are rendered in the style of the Southern School of Chinese painting, making them appear rather flat and simultaneously larger than the buildings, thus lacking a sense of realism.

3.4 Use of the Five Directional Colors

Donggwoldo uses an ideological palette characteristic of palace paintings, rather than one that matches the actual colors of the subject. The true-view landscape paintings that were prevalent at the time tried to capture the true colors of the subject, but this trend is not visible in Donggwoldo. The buildings were rendered in a simpler color scheme, with the dancheong (Traditional multi-colored paintwork) decorations uniformly green, the pillars and gates reddish brown, the brick walls peach, the insignia blue, and the roof tiles that were in fact blue were rendered green. In particular, because the blue tiles were only used for the roofs of buildings that were of superior rank, it can be inferred that the blue tiles were made green because green is defined traditionally as an intermediate color between the center and east. (Lee and Jung, 2000) As such, the color scheme of Donggwoldo can be said to reflect the perception and ideology of an overall classification system and to make full use of all five directional colors that are valued in East Asian cultures. In addition, the main royal buildings and the connecting cloistered corridors and open-air wooden porches are yellow because, in the concept of the five directional colors, yellow signifies the center and thus expresses the hierarchical significance of those structures. There are other instances of jiehwa that use color to express an ideal such as Ganghwahu-jeondo (Fig.9., Complete Map of Ganghwado Island) and Myeongjongjo-gungjun-sungbul-do. (Fig.3.)

4. Visual Representation and Philosophy of Architecture in Donggwoldo

Visual representations of architectural forms reflect the principles, norms and philosophy behind their architectural composition, and likewise depictions of palaces such as Donggwoldo provide considerable insight into their underlying philosophy of architecture. The two Eastern Palaces (Donggwol) of the Joseon Dynasty—Changdeokgung and Changgyeonggung—are considered to have been constructed on a perfect human scale in a unique spatial arrangement that departs from the structured layout of traditional palace
design to fit the natural lay of the land. (Han, 2007)

This section discusses how the two three-dimensional structures are transformed by common perception and ideology into a planar image in accordance with the depiction mode of oblique parallel projection.

4.1 System of Objective Perspective from a Contemplative Distance

Documentary paintings of architecture based on the modes of cavalier projection with upright façades, or orthographic projection with omnidirectional façades, involve a personalized reading by the painter who directly experiences the depicted subject according to the hierarchy, frontality, and accessibility of its major areas. In contrast, the perspective system of oblique parallel projection, in which objectivity is separated from subjectivity, is basically suitable for rational description of what is already known. That is, the perspective is not that of a human being whose line of sight converges at one point, but rather that of a transcendent entity who can apprehend all segments of a panoramic view with equal attention. Parallel projection is suitable for depicting an expanse of alternating large architectural structures and open spaces, and only when the painting presents a comprehensive view of the subject and is viewed in close proximity can an intimate connection be formed between subject and viewer that leads to the latter’s better awareness of the spatial flow of the former.

While oblique parallel projection has the advantage of providing a relatively balanced perspective of the whole palace, it does not provide direct information associated with the process of entering the palatial grounds, the internal flow of space, and hierarchy among the component areas.

4.2 Composing a Space of Multiple Points of View

In Donggwoldo, the scattered-point perspective of paintings is combined with a reverse perspective, enabling an overall visual balance among the areas in such a way that each has its own viewpoint. The lines of the roof ridges were extended to accentuate the specific composition of space of multiple viewpoints. This revealed that Donggwoldo can be divided into four sections, each with its own reverse vanishing point: (1) Changdeokgung, (2) the Donggung (the crown prince’s quarters) in Changdeokgung and the adjacent southern section of Changgyeonggung, (3) Changgyeonggung, and (4) the rear garden Huwon.

The reverse perspective, however, is less conspicuous in section 4. The lines that extend from the roof ridges of the two palaces converge at different vanishing points outside of the lower left frame of the painting.

In Fig.11., color-coded lines are used to distinguish four different areas and the lines of the roof ridges for the royal buildings located in each, in order to show that parallel projection was not applied uniformly.

4.3 Spatial Layout and Arrangement

Examination of the historic map of Joseongjeokdobo reveals that royal buildings in Changdeokgung are arranged longitudinally with three different axes along narrow flatland located between hilly terrains, and the throne hall (Myeongjeonggeon) in Changgyeonggung faces east and extends vertically.
The two Eastern Palaces, including Huwon, are laid out vertically to the north and south in reality, while the overall spatial structure in Donggwoldo is significantly expanded to the east and west. The result is quite a few intended distortions in the layout of buildings in Donggwoldo. To tell the difference between the actual and pictorial building arrangements, Joseongojeokdobo was projected onto a view plane through parallel projection, and the map of parallel projection and Donggwoldo were overlapped at the fiducial point of Injeongmun (The gate leading to Injeongjeon). In Fig.13., the architectural forms in altered Joseongojeokdobo are marked in red, and the changes in location for the main royal buildings are indicated with arrows.

As a result, it can be concluded that the relationship between Changgyeonggung and Changdeokgung and a sense of depth in the section of the latter's rear garden are the most exaggerated. Centered on the fiducial point of Injeongmun, the three sections in Changgyeonggung—the throne hall (Myeongjeongjeon), the inner gate of the throne hall (Myeongjeongmun), and the main gate (Honghwamun)—are depicted in the upper right corner, significantly different from their actual locations; also, the northern part of the Gyeongbokjeon site (the queen dowager's quarters that were destroyed by fire) is truncated, as if the middle section were cut out, and Hwangdan Altar appears immediately. For the same reason, the locations of Juhapru Pavilion and Yeongyeongdang Hall are drawn further down than they are located in actuality.

4.4 Division and Hierarchy of Areas

In Donggwoldo, the walls surrounding the areas of Changdeokgung, Hwon, and Changgyeonggung are connected continuously to indicate that the two palaces are actually used as one, but the flow of trees is clearly drawn along the boundaries to divide the entire space into its respective areas. (Fig.5.) A point of note is that both Nakseonjae Mansion estate and the southern section of Changgyeonggung appear in the painting as if belonging to Changdeokgung according to the flow of trees. While Gunggwolji (Records of Palaces) includes the Nakseonjae estate in Changgyeonggung by designating Geonyangmun Gate as the east gate of Changdeokgung, the records regarding the reign of King Seongjong in the Annals of the Joseon Dynasty designate Geonyangmun as the inner gate and Seoninmun as the outer gate of Changdeokgung. (Woo, 1991) Therefore, if the current Seoninmun stands in its original location, it can be inferred that the sections of Sugangjae Mansion, Jinsudang Hall, and Geumwi-gun military quarters, currently classified as belonging to the area of Changgyeonggung, originally were considered within the area of Changdeokgung in the 19th century.
4.5 Unrestrained Reduction and Expansion of Space

While Donggwoldo is a visual representation of architecture using parallel projection to enable the objective expression of the subject from a contemplative point of view, it also has a strong characteristic of a perceptual map in which ideal forms were constructed by reducing and expanding actual spaces. The greatest amount of spatial reduction can be seen in the Gyeongbokjeon section located north of Sujeongjeon in Changdeokgung and of Jagyeongjeon in Changgyeonggung. The two queen dowager's quarters are drawn on the same latitude, but in reality Jagyeongjeon is located further to the south, so it can be said that the longitudinal reduction is more significant in Changgyeonggung. The area to the upper right of Jagyeongjeon is scaled down in accordance with the length of the rear garden reduced, causing the royal buildings in this area to be arranged on the same horizontal axis as Sujeongjeon. Moreover, in actuality, Tongmyeongjeon (the queen's quarters of Changgyeonggung) and Huijeongdang Hall lie on approximately the same northern latitude while facing different directions, but Tongmyeongjeon is located on the same line as Daejojeon in the painting. This result derives in large part from raising the position of Changgyeonggung and aligning the starting point of the rear garden with Changdeokgung. There are also areas that appear larger than in reality; notable examples are the crown prince's quarters Donggung, Sugangjae Mansion, Jinsudang Hall, and Geumwi-gun military quarters in Changdeokgung. The expansion of these areas results from depicting the throne hall and the cabinet hall of Changgyeonggung at higher positions while leaving the southern boundary of the palace unchanged. That is why the enlarged external spaces around the royal halls are depicted sparsely with a decreased visual focus.

In Donggwoldo, there are quite a few areas in which width and length adjustments are made to detailed depictions. While the number of bays of actual buildings is represented as is, the width of the bay of each building is depicted differently as the layout of the buildings is expressed differently from how they are arranged in actuality. In addition, while the building edges may be covered by the roof due to the foreshortening of the first bay in the direction of oblique receding lines of parallel projection, they are intentionally elongated to enable the viewer to count the exact number of bays. In this regard, Donggwoldo features detailed descriptions to conform to the purpose of a documentary painting while embracing drastic reduction and expansion for the sake of composition.

4.6 Expression of Structural Exactness as an Ideal

The palaces in Donggwoldo are depicted close to an ideal palatial form through simplification of axis and positioning of buildings, intentional reconstruction of component areas in accordance with the hierarchy of palace architecture, and spatial reduction and expansion in a longitudinal direction based on parallel projection. All of the buildings depicted in Donggwoldo face one of the four cardinal directions—north, east, south, and west—regardless of their actual geographical conditions. This is a technique employed not only to increase the pictorial completeness but also to illustrate Changdeokgung as being structured in an orderly manner to the north and south, based on vertical hierarchy, although its short longitudinal axis was a major obstacle to achieving such a structured layout. In particular, the three main royal buildings of Changdeokgung are depicted close to the traditional palace design by exaggerating the spatial depth of the north-south direction and unifying the orientation of the buildings. (Fig.16.)

As for the main external spaces that occupy an integral part within the hierarchy of palace architecture, unstructured spaces are intentionally depicted as structured. A typical example is the area containing cloister corridors in front of Injeongmun Gate. Despite the initial unstructured quality of their construction, owing to the narrowness of the site, and their facing the same direction as Donhwamun Gate, this area is depicted in a structured shape. This example illustrates a strong tendency throughout the history of Joseon
painting to regard structured arrangement along a linear axis as ideal despite the restrictions associated with the layout of the land and site conditions, and thus it may be inferred that the depiction of unstructured spaces as structured in many documentary paintings constitutes conceptual expression of such an ideal. Throughout Donggwoldo, it can be inferred that the painter intended to express a conceptual ideal by transforming actual subjects rather than depicting them objectively.

5. Conclusion

Donggwoldo is based on a contemplative system of perspectives that adopts the objective depiction mode of oblique parallel projection. This mode prevents the artist from expressing intuitive thoughts or sensations, and instead forms a balanced composition that offers a contemplative view of the subject in its entirety. On closer examination, however, one can see that the basic form of oblique parallel projection is preserved overall, but not uniformly applied to every detail. Instead, the palaces are reproduced from a transcient perspective into an image considered ideal to the people of the time; also, while Donggwoldo is foremost a documentary painting, it displays similarities to Joseon landscape paintings, both in concept and in form.

The concept of "space as an experience," an important aspect of landscape paintings that renders space using multiple perspectives, is reflected in the dual composition of Donggwoldo: the distant view emphasizes the harmonious coexistence of the palace buildings within the natural landscape, while the close-range view documents the architectural design of each royal building and the overall spatial structure of the palaces. Therefore, from afar, it appears to be based on an atmospheric perspective, but closer examination reveals that the rectangular open-air structures or buildings are subject to a contrasting, reverse perspective. Despite the oblique overhead view, certain buildings are also partially altered to reveal more detail from a lower vantage point. This is reflective of the painting tradition that is less intent on maintaining a unified expression mode and instead freely uses specific styles for different purposes.

Architecturally, the palaces are assigned a strict order to the arrangements and positioning of the buildings, even though in reality they are divided along different axes according to the natural lay of the land and were organically positioned through various stages of extension and reconstruction. Also, the separation of areas is accurately marked according to hierarchy, but when necessary, an area is freely expanded or contracted, effectively restructuring the entire layout. The positioning of the main royal buildings, and the relationship between each courtyard framed within cloistered corridors and the building within it, are rearranged to reflect an architectural ideal. This effectively explains how the courtyard is utilized and perceived as an open-air structure attached to the building. This signifies that Donggwoldo was made to reflect the Eastern approach to architecture, offering an effective explanation of the architectural space, instead of a scientific one through exact replication, and to express less the real conditions and more an architectural ideal.

Notes

1. Beginning in the 16th century, Western culture came into China and introduced partial changes to this aesthetic tradition. Numerous Joseon paintings from the late 18th century and later reflect the influences of Western art in their use of the laws of perspective, projection, and shading. (Lee, 2008)
2. Jiehwa is the detailed, orthogonal, three-dimensional depiction of architectural forms with the aid of a ruler.
3. Lin (1995) presumed that the reverse perspective first emerged to supplement the style of depicting rectangular objects as parallelograms from a bird's-eye view that was prevalent during the late Eastern Han period and the subsequent Six Dynasties period in China.
4. The five directional colors represent each of the five cardinal directions: blue for east, spring, and wood; red for south, summer, and fire; white for west, autumn, and metal; black for north, winter, and water; and yellow for the center, earth.
5. In Gyeongbokgung, the main palace of the Joseon Dynasty, the palace grounds were largely square in shape and followed the traditional design of three gates and three courts, with the throne hall, cabinet hall, and living quarters aligned longitudinally. In contrast, Changdeokgung and Changgyeonggung, secondary palaces of the Joseon Dynasty, were given a modified design, as the two Eastern Palaces were built on narrow hilly terrain and underwent various stages of extension and reconstruction. Over the course of construction, the palaces developed along different axes: Changdeokgung's throne hall (Injeongjeon Hall) and cabinet hall (Sejongjeon Hall) ended up in a latitudinal arrangement, and Changgyeonggung's throne hall (Myeongjeongjeon Hall) was placed at a right angle to its cabinet hall (Munjongjeon Hall) due to their different orientations of buildings.
6. The building orientation of Yeonkyeongdang is tilted fifteen degrees towards the west from due south, (Park, 2010) but Yeonkyeongdang was depicted facing true south in Donggwoldo.

References