A Comparative Study of Paintings of the Eucharist in the Second Half of the 15th Century

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Abstract. There are two main themes in the historical representation of the subject of the Eucharist. One is the representation of the sacredness of the Eucharist and the sublimity of the figure of Jesus, and the other is the representation of the scandal and greed of Judas. In the second half of the 15th century the artists, mainly Castagno, Ghirlandaio and Perugino, returned to the medieval and earlier monogrammatic composition of the Eucharist. These artists attempted to fuse two different sacramental subjects, but their paintings have a very stilted and confusing effect. This confusion of subject matter was perfectly resolved by Leonardo da Vinci and had a profound influence on later generations. This paper will focus on a documentary analysis of the differences between the paintings of other painters of the period on the subject of the Eucharist and Leonardo da Vinci's *Last Supper*. The author will demonstrate the advancement and transcendence of Leonardo da Vinci's painting for its time by examining the scientific method he used in the *Last Supper*.

Keywords: Leonardo da Vinci, *Last Supper*, Science, Renaissance.

1 Introduction

In the second half of the 15th century the artists like Castagno, Ghirlandaio and Perugino, returned to the medieval and earlier monogrammatic composition of the Eucharist. They attempted to fuse two different Eucharistic subjects, but the result was a very stilted and confusing. This confusion of subject matter was perfectly resolved by Leonardo da Vinci and had a profound influence on later generations.

The most well-known *Last Supper* is painted by Leonardo da Vinci. Along with the restoration of Leonardo da Vinci's *Last Supper*, research on the *Last Supper* and the subject of the Eucharist has continued to emerge. Martin Kemp's The Science of Art: Optical Themes in Western Art from Brunelleschi to Seurat traces the historical relationship between optics and painting in an all-encompassing way for the first time, which is of immense help to the author's analysis of the optics in the *Last Supper* [1]. In his 2005 book Leonardo, Professor Martin Kemp describes Leonardo's scientific and anatomical explorations [2]. In his 2006 book *Leonardo Da Vinci: The Marvellous Works of Nature and Man*, he mentions that the 'science of art' Leonardo learned in his

early training laid the foundation for his masterpieces such as the *Last Supper* [3]. A book of a similarly overview nature is Leonardo Da Vinci, published by Professor Carlo Pedretti in 2006 [4]. These overview books all emphasise the importance of the *Last Supper*, but do not compare it with the *Last Supper* painted by other painters. Peter Burke's Eyewitnessing: The Uses of Images as Historical Evidence interprets the subject of the Eucharist from an iconographic and stylistic perspective [5]. In his 2011 article Reflections on Leonardo's *Last Supper*, Joseph Polzer analyses the *Last Supper* painted by painters in the second half of the 15th century, but he doesn't say much about the use of science in Leonardo da Vinci's Last Supper [6]. Most Chinese scholars' studies of Leonardo da Vinci and the *Last Supper* have been confined to a simple appreciation of the images and artistic analysis. But in the early years there were two systematic books on the development of science and technology during the Renaissance in China, one by Liu Jinghua and Zhang Gongyao in 2008: A History of the European Renaissance - Science and Technology Volume; the other by Professor Zheng Huiyong in 2006: Medieval Renaissance----The Union of Science and Technology [7,8]. Both of these books descend into content on perspective and proportionality. In recent years there has been less cutting-edge research in China on Leonardo da Vinci and the subject of the Eucharist. Here the author will compare communion paintings from the second half of the 15th century with Leonardo da Vinci's *Last Supper* to illustrate the innovation of da Vinci's *Last Supper* and the scientific basis behind it.

The author will use iconographic research methods to analyse the differences between *Last Supper* painted by different painters, starting with the basic image and analysing the composition and image content composition of Leonardo da Vinci's *Last Supper*. Another research method is stylistic analysis. The author will discuss the classification of individual styles versus the overall style of the period. The comparative method will also be used to compare the differences in composition, characterisation and subject matter between Leonardo's *Last Supper* and works on the subject of the Eucharist painted by other painters. Lastly, the author will take bibliographical research to explore the biblical account of the liturgical part of the Eucharist as evidence for a picture comparison.

The comparison of Leonardo da Vinci with the *Last Supper* painted by his contemporaries gives people a better understanding of Leonardo's transcendence in the field of art. He transcended his time and the shackles of science and art form [9]. The author will delve into the optical techniques, perspective and pictorial composition that he used in *Last Supper*. Also, basing on the story of communion in the Bible, the contrast shows us how different painters have visualised history. This visualisation process involves the painter's understanding of the art of his time.

2   Themes of the Last Eucharist

The First Four Gospels of the New Testament all contain accounts of the *Last Supper*, but because the Gospel of John is the most dramatic, it has been favoured by painters. Leonardo's painting of the *Last Supper* is based on the Gospel of John [5]. There are two overriding themes in this story, one in which Jesus Christ gives the disciples the liturgy

of the distribution of bread and wine, and the other in which Judas betrays Jesus and Jesus announces it on the spot. The former theme highlights Jesus Christ, while the latter focuses on the contradictory nature of the relationship between Judas and Jesus [10].

The author ties together the storyline. Judas betrayed Jesus for profit, which Jesus already knew about in advance. As all sat together for the Passover, Jesus announced that one of the 12 disciples had betrayed him and said that whoever he passed the bread to be the one who had betrayed him. At this point all the disciples are terrified and speculate as to who is the betrayer. John leans into the arms of Jesus and Judas' hand and Jesus' hand are on the table. In this storyline, the key objects of the painting that could symbolise the communion theme would be: Jesus handing out the bread, with Jesus' hand on the table, Judas' money bag, Judas receiving the bread, with Judas' hand on the table and John leaning on Jesus.

Paintings of Judas in conflict with Jesus often portray Judas as greedy and evil by vilifying and highlighting him. Paintings that focus on the sacredness and sublimity of the Eucharist often underplay Judas and highlight the calmness and fearlessness of Jesus Christ in the face of death.

3   The Confusion of Communion Subjects in the Second Half of the 15th Century

In the second half of the 15th century, the exposure of Judas' greed and ugliness became the focus of the images of this period. In order to enhance the ambivalence and conflict, the new trend was to depict Judas in opposition to everyone in a single line. While highlighting Judas, the painters also sought to retain a sense of the sacred and the sublime in the picture.

The Last Supper by Andrea del Castagno highlights Judas on a very regular rectangular white tablecloth, creating a sharp contrast in colour [11]. The communion on the table is also eliminated. Judas and John are positioned opposite each other in space, forming a diagonal line. So, the focus of the people's attention at the first moment people see the image is on Judas and John. In contrast, half of Jesus' body is blocked by Judas, diminishing the presence of Jesus. With the exception of John, everyone is in the same plane, which seems somewhat stagnant [12].

This mode and manner of composition were very popular in this period. Ghirlandaio's interpretation of the subject of the Eucharist also has many similarities with Castagno. The difference, however, is that Ghirlandaio pays more attention to the symmetry of the picture. In his Last Supper, painted in 1480, the picture is divided from the centre by the vaulted ceiling, and the expressions of the disciples on the left and right are kept centrally symmetrical with their bodies and the angles of their faces turned in the same direction [13]. Jesus is at the very centre of the picture. The author suggests that Ghirlandaio seems to have realised at this period that he had deviated from the form of the Eucharist as originally represented by Giotto and attempted to redeem the sacredness of the picture through a sense of symmetry and the introspective expressions of the disciples. But the restraint and introspection of the disciples is at odds with the

dramatic highlighting of Judas' greed and ugliness, which is where the author's confusion in the picture comes in.

The same problem is present in Perugino's picture. The author finds Perugino shaping the space in such a way that Judas is not on the same plane as everyone else except John. The other disciples have benign and serene facial expressions, which runs counter to the artist's intention of highlighting Judas' greed and ugliness [14]. Also, the picture is centred on John and Judas, not Jesus. Jesus is not highlighted in the picture and is not distinguished from the other disciples. Judas' whitish blouse, his back turned, and his head deliberately twisted to resemble the viewer's, are what make him the central figure in the picture. However, the artist's depiction of Judas does not give the viewer the impression of ugliness or evil, but rather makes the picture feel calm and serene.

At this time, the painters seem to have realised that a complete departure from the sacredness of the Eucharist would be problematic, and so attempted to fuse the two themes. A lined-up composition is the simplest way to highlight the contradictory conflict between Judas and Jesus, but such an approach would draw attention entirely to Judas and lose the sense of ritual and sacredness of the Eucharist itself. To balance this conflict, the artist has used the symmetry of the distribution of the disciples to reflect a sense of order, and the restraint of their expressions to reflect the sacredness and solemnity, but the effect is not so good as to weaken both the drama of the exaggeration and the sacredness of the Eucharist [15].

4   A Perfect Blend of Two Themes

The confusing fusion of themes and the oscillation between them in the second half of the 15th century is perfectly resolved by Leonardo da Vinci's brush. The greatest breakthrough in the composition is the elimination of Judas in opposition to everyone else in the monogram, the setting of John in the arms of Jesus, and the alteration of the original composition in which all the planes were symmetrical towards the centre at the same level [16]. In Leonardo da Vinci's *Last Supper*, the thirteen people lined up in a row form five geometric forms of staggered heights and gatherings, enhancing the ebb and flow of the scene. From the left to the right of the picture, each of the three men, with the exception of Jesus, forms a geometric figure, with the heads of Bartholomew, James the son of Alphaeus, and Andrew arranged in sequence, all looking towards Jesus. The three men, Judas, Peter, and John, fit closely together, their bodies forming A triangle. John is leaning on Peter's shoulder. Jesus is in the most neutral position. To the right of Jesus Thomas, James the Greater and Philip form another assemblage, echoing the direction in which Jesus turns his head. To the far right are Matthew, Jude Thaddeus and Simon, whose bodies are tilted in a central symmetry with the three disciples on the far left. This composition allows the visual centre of the viewer to converge entirely on Jesus.

In highlighting the dramatic nature of Judas and the story, Leonardo da Vinci uses the exaggerated expressions and physical stretching of the disciples to show the moment of surprise, panic, mutual speculation and self-incrimination after Jesus announces that he has been betrayed [17]. Philip puts his hands to his chest and points to

himself, as if to demonstrate his loyalty to Jesus. John, Jesus' favourite disciple, had a very calm expression on his face, as if he had grasped the meaning of Jesus' words. The expressions and gestures of the figures reflect the glory of humanity in Renaissance painting [18]. Leonardo da Vinci's treatment of Judas, on the other hand, makes use of spatial divisions and differences in light. Judas's body is leaning forward, with his entire upper body resting on the table, and he is not in the same plane as everyone else in the painting except for the disciples on the far sides. In terms of light, the faces of all the others are in a lighted position, with the light coming from the left side of the picture, while Judas, due to the angle of rotation of his body, has only the right half of his arm illuminated. In addition, Leonardo da Vinci has specifically pressed the uglier face of the vice-president of the abbey, who was of bad character at the time, onto Judas' body, with darker skin and a somewhat uglier appearance than the others. This is also more reflective of the realistic human and religious connections of the period.

In terms of highlighting the liturgy of the Eucharist and the sacredness and sublimity of Jesus, Da Vinci uses the three windows deliberately painted behind him to place Jesus in a position of complete independence from the others, placing him in a completely separate visual centre. The painting is set in a rectangular room, and the vanishing point is located behind Jesus's head. John's tilted body to the left leaves room for the prominence of the figure of Jesus, whose body takes on the geometry of a square triangle, the most stable geometric form to represent Jesus' unparalleled peace and tranquillity, even as he anticipates his own death. The slightly tilted head to the right and the spread hands of Jesus give a sense of inclusion, calmness and holiness. The window behind him isolates Jesus from all the bickering of the disciples around him, allowing the image to return to a calm interior in the midst of dramatic dynamics.

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5   Techniques in the *Last Supper*

Behind the gap between what people see with the naked eye in Leonardo's paintings of the communion theme and those painted by painters before him is a pile of painting techniques and science. Leonardo da Vinci was able to blend the two communion themes perfectly, not just by simply painting, but as a result of his study of painting, starting with perspective, optics and geometry [19]. The ability to present vivid characters with just the right movements and expressions in the picture is also inseparable from Leonardo's study of anatomy [20]. Yin MaoKe has mentioned that an important

reason why modern science was able to emerge in Europe was that Europeans were able to relate the mechanics to the geometric structures behind natural phenomena [21].

In the *Last Supper*, Leonardo da Vinci mainly uses linear perspective and aerial perspective. Linear perspective is the use of geometric lines to construct space. Da Vinci's interpretation of linear perspective is that between several objects of the same size. The further away they are, the smaller they appear, and conversely, the closer they are, the larger they appear, and that the proportion of reduction is equal to the proportion of distance [22]. By means of such linear proportions, people can shape the exact proportions of space. In the Last Supper, Jesus is at the centre of perspective, the point where the projection points and parallel lines converge. Leonardo draws the circle with Jesus at the centre and then draws the octagon to arrange the other figures in the picture with the food and cutlery on the table [23]. In his further studies, Leonardo discovered aerial perspective, which he applied extensively in his paintings. Leonardo's basic understanding of air perspective is that since there is a universal reflection of any object, people cannot see the original colour of the object with our eyes. So when people want to see three-dimensional space on a two-dimensional plane, they need to take into account the changes in colour caused by the reflection and refraction of light in the air [24]. Leonardo discovered through observation that air is blue. The closer an object is to the human eye, the less blue is reflected into the air and the closer the object is to its own colour, and conversely the further the object is from the human eye, the more air there is between the eye and the object, the closer the object is to blue [25]. The landscape behind Jesus in *Last Supper* uses aerial perspective. In the space behind Jesus there are darker coloured blue mountains, light blue air and clouds of varying brightness. Leonardo further enhances the depth of the space through the blue air, drawing the image into the boundless beauty.

From an optical point of view, Leonardo da Vinci considered the activity of studying the characteristics of light and shadow, reflection and reproduction of natural scenes as the study of the "Science of Visible Light", so perspective and optics are in fact inseparable [26]. Leonardo da Vinci once mentioned that a painter operating a work needs to consider ten items: light, dark shadows, colour, volume, form, position, distance, proximity, movement and stillness. A sculptor, on the other hand, only has to consider volume, form, position, movement and stillness [27]. This is why, according to him, painting has a higher status than sculpture because painting needs to grasp the variations of light and colour. In the Last Supper the light is very clearly coming in from the left side of the picture. This light has exactly the same effect as that which occurs at sunset in the monastery, thus implying that the Last Supper is a representation of the last moments of Jesus. All the food and ritual objects on the table become more three-dimensional as the light and shade change. He also depicted the reflections and refractions of light [28]. For example, the glass of wine in front of Christ reflects the light from the window behind him, while the edges of the glass refract the light, causing them to appear distorted. Leonardo considers not only the light within the picture, but also the changes in light between the picture and its location [29]. He sees the painting from the viewer's point of view, making the two-dimensional plane truly intertwine with the three-dimensional space, using the science to interpret nature [30].

6   Conclusion

The Renaissance was a period of embryonic development of natural science and mathematics in Italy, during which the development of science continued to intervene and influence the development of painting. From the 15th century onwards, the form and subject matter of the subject of the Eucharist changed. In the second half of the 15th century painters departed from Giotto's representation of the sacred liturgy of the Eucharist and Jesus Christ, using a lined-up composition that pits Judas against all men, but in order to preserve the sacredness of the Eucharist led to a rigid and confusing picture. This problem was solved perfectly when Leonardo da Vinci painted the *Last Supper*. He used perspective to precisely place space in relation to the figures, and his intimate knowledge of anatomy and the human body to construct dramatic, dynamic body structures and facial expressions. He uses optics to blend the image with the dining room in the church of Santa Maria delle Grazie, giving the image a halo of sacred light. He also used changes in light and shade to create a 'three-dimensional space' within the picture.

Renaissance art sought to realistically depict the features of light and shadow and spatial relationships in the world of objects; science used language, theorems and formulae to illustrate the inner structure of this world of objects. Leonardo sought to reconstruct the world realistically through art and science, so that he could come infinitely closer to what he considered to be the perfect nature and the great Lord. Under da Vinci's brush, the simplicity of religion merges with the complexity of content, and the diversity of subjects is perfectly unified.

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