

## Exploration and Expression of Space in Italian Renaissance Painting

Ran BI

School of Journalism & Communication, Nanjing Xiaozhuang University, Nanjing, Jiangsu 211171, China  
rbmail0623@163.com

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**Abstract:** The Renaissance (Italian: Rinascimento) is a vigorous movement launched in Europe in the 14th-17th century. This 300-year revolutionary movement originated in Italy. During the Renaissance, many immortal characters appeared, and many well-known works of art were produced. As the origin of the Renaissance, Italy's achievements in literature, science and politics play an important role in the future development of the world. During the Renaissance, many paintings were handed down, especially in the early Renaissance of the 14th century, the works of painting giants Giotto and Masaccio showed their unique views on painting space and language.

### 1. Introduction

The painting art of some European countries has long taken "perspective" as the main artistic technique. Before the Renaissance, the civilized countries represented by Greece and Rome expressed perspective incisively and vividly in their paintings. During the Renaissance, perspective has become the main painting space perspective in Europe. There are some differences between the Greek understanding of painting space and today's understanding of painting space. Perspective advocates the separation of space. Other objects in the painting are "placed" in a separate space, rather than taking space as the background of the painting subject. After the beginning of the Renaissance, Florence, Italy, gradually changed from the original Gothic painting style to perspective. At this time, Giotto, the pioneer of the Renaissance, believed that perspective could make the emotion expressed by painting art smoother and more vivid than Gothic painting. It was this view that became the turning point of the Renaissance movement in the 15th century. Subsequently, Renaissance paintings with perspective as the mainstream painting space perspective began to emerge. This study further explores and discovers the space of Renaissance painting art.

### 2. Painting Space in the Early Renaissance

#### 2.1 Perspective to Reproduce the Renaissance

As the birthplace of the Renaissance, Gothic has long been the mainstream painting style in Italy. At this time, painting artists represented by Renaissance pioneer Giotto began to re-study the mainstream perspective painting techniques of Greece and Rome. Compared with Gothic painting, perspective can better show human's respect for nature. Therefore, a large number of painting artists represented by Italian Florence artists began to gradually abandon the Gothic style. Artists began to explore the relationship between perspective and mathematical geometry system and apply it to practical paintings.

In the 13th century, when the Renaissance was not widely popularized, Giotto had unique views on perspective. Giotto's unique views on perspective played an important role in enlightening the Renaissance painting artists' skilled application and innovation of perspective, and Giotto's feat was highly praised by Dante, Boccaccio and other Renaissance pioneers.

#### 2.2 Expression of Perspective in Renaissance Paintings

Compared with the paintings created by Gothic painting, the paintings created from the perspective of perspective can not only present a more vivid scene, but also make the painting

theme closer to people's life. As the first artist to study perspective in the Renaissance, Giotto used perspective to create many paintings based on biblical stories. <sup>[1]</sup> Europeans have a high degree of awe of the Bible, and the biblical theme paintings created by perspective can make people walk closer into the story behind the Bible. On the one hand, it improves people's admiration for the Bible. On the other hand, it makes people more recognize that the works created by perspective have stronger penetration and spatial structure effect compared with Gothic painting style.

The perspective used by Giotto in his painting is not a copy of the original perspective of Greece and Rome, but a certain innovation on the original basis. During the Renaissance, Giotto advocated that although the paintings were created in plane space, the visual effect expressed was three-dimensional, and the three-dimensional visual effect could make the paintings more vivid. For a time, the biblical theme paintings created by Giotto's perspective were popular in Florence, which also established Giotto's position as a pioneer of the Renaissance. Figure 1 shows the biblical theme painting Christ into Jerusalem created by Giotto's perspective.

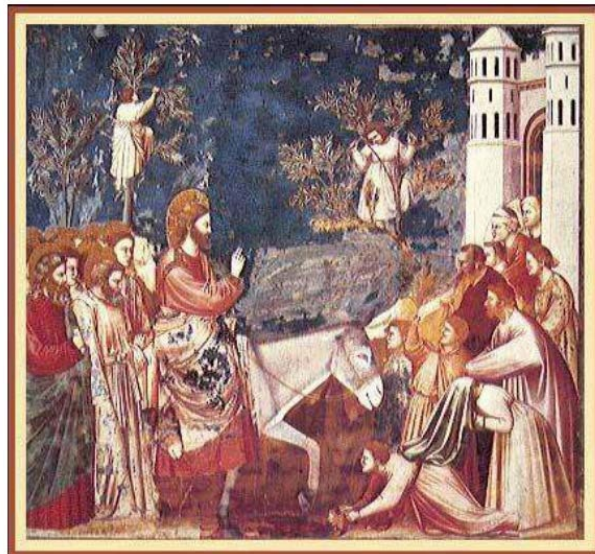


Fig.1 Christ into Jerusalem

### 3. Further Establishment of Painting Space Techniques in the Renaissance

From the Renaissance to the middle and late 14th century, it has entered the second stage. Inspired by Giotto, a large number of artists began to carry out further research and innovation on the application of perspective in paintings. <sup>[2]</sup> At this stage, the research on the spatial structure of painting works is not limited to the level of "painting art creation", but advanced to a new stage of integration with a series of sciences such as mathematics, physics and literature. Francesca and Leonardo da Vinci are famous representatives of this period.

#### 3.1 Francesca

Francesca is a representative figure in the early stage of the second stage of the Renaissance. Unlike Giotto, Francesca not only made extraordinary achievements in painting art, but also made extraordinary achievements in mathematics, literature, sculpture and so on. On the basis of Giotto, Francesca made further innovations in perspective, and wrote these views in his book *On Perspective Painting*. Francesca's research on perspective, based on the original perspective painting techniques, combined with mathematical geometry theory, physical optics theory and vertebral body vision theory, integrates a better perspective painting technique.

A careful observation of Francesca's paintings shows that a variety of scientific theories are integrated at the same time. As a mathematician, Francesca's painting theory is mainly based on mathematical theory. Like Giotto, Francesca also created many paintings with biblical themes. In the process of creation, Francesca was fully aware of the importance of showing three-dimensional visual effects on the flat canvas. Francesca's paintings showed his profound research on the spatial

structure, thus showing a more three-dimensional and vivid visual effect. Francesca's achievements brought the spatial structure of painting in the Renaissance to a new level. Figure 2 shows Francesca's representative work *Resurrection*.

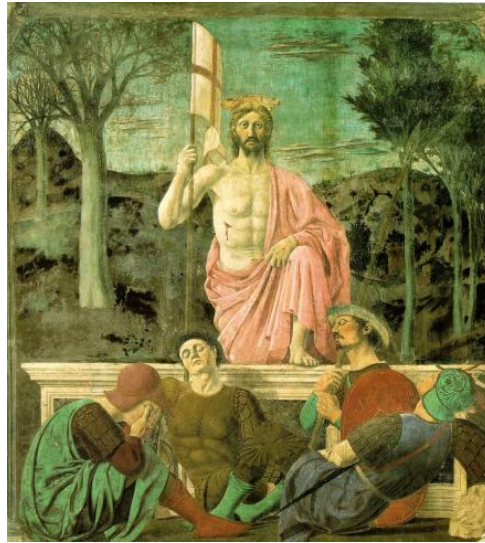


Fig.2 Resurrection

### 3.2 Leonardo Da Vinci

Leonardo da Vinci is a well-known genius and one of the three giants of the Renaissance. Leonardo da Vinci made further innovation and improvement on the basis of his predecessors, and the Renaissance at this stage has officially entered the 15th century. Leonardo da Vinci believed that perspective is the primary condition for painting creation, which shows that the Renaissance painting represented by Leonardo da Vinci has completely separated from the original Gothic style of Italy. With his talent, Leonardo da Vinci made achievements in many scientific fields. Leonardo da Vinci regarded painting techniques as a huge scientific system and wrote them in his book *Perspective*.

As a mathematician and physicist, Leonardo da Vinci adhered to a modest and cautious attitude towards everything. It is precisely because of this rare attitude that Leonardo da Vinci can achieve extraordinary achievements in the field of painting art. Leonardo da Vinci also made an in-depth study of vertebral visual theory, and as an all-round talent, Leonardo da Vinci always closely linked painting technology with other scientific structures.

Leonardo da Vinci's research on perspective painting techniques made great progress compared with his predecessors. Before Leonardo da Vinci, many artists made innovations in perspective painting techniques to varying degrees, and successfully enhanced the spatial visual effect of paintings, but they never divorced from the essence of Greek linear perspective techniques. Leonardo da Vinci believed that although the linear perspective technique can give the picture a certain spatial visual effect, it can't effectively create a real reproduction space. In order to achieve a better three-dimensional visual effect, Leonardo da Vinci created the air perspective painting technique based on the linear perspective technique. The biggest feature of the air perspective technique is to make full use of the properties that there are still some non-parallel interfaces outside any section.

After creating the air perspective technique, Leonardo da Vinci made an innovation on this basis, that is, the gradual perspective technique. As a physicist, Leonardo da Vinci believed that there are colors in space, and the colors in the air are not invariable, but will change with the continuous change of visual field distance. This concept has become a major breakthrough in the spatial structure of painting in the middle and late Renaissance, and is still an advanced technique in the field of painting art.

The gradual perspective technique believes that as the distance between the line of sight and the object becomes farther and farther, the color and light dark relationship of the object will also

change, which is the essence of the gradual painting technique. The works processed by the gradual painting technique can not only have a stronger three-dimensional space effect, but also improve the delicacy and connotation, which is fully displayed in Leonardo da Vinci's masterpiece *Mona Lisa*. Figure 3 shows Leonardo da Vinci's painting *Mona Lisa*.



Fig.3 Mona Lisa

#### 4. Conclusion

Many versatile talents emerged in the Renaissance. They were scientists, artists and writers. The innovation of painting spatial structure reached the peak. Giotto found that Greek perspective painting techniques can achieve more ideal spatial visual effects than Gothic painting techniques, and achieved ideal results. Subsequently, Italian artists carried out further innovation and research on perspective painting techniques on this basis. When the Renaissance developed to the second stage, the painting space techniques were not limited to the field of art, but formed a huge system with many sciences. Da Vinci created the theory of “spatial perspective” and “gradual perspective” with his rich knowledge and unique views on painting space techniques, making the painting spatial structure reach the peak in the Renaissance, and leaving many unparalleled works. It can be seen that the Renaissance movement originated in Italy played an essential role in promoting the improvement of painting spatial effect.

#### References

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