

Dürer's Melancholia I: The Relationship between Geometry and the Masterpiece

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Abstract: The main purpose of this article is to discuss the relationship between Melancholia I and geometry during the Renaissance. Compared with the clear distinction between science and art today, there was no very clear boundary between science and art in the Renaissance, which made the research object of this paper have research value. The scope of investigation of this article is the work of Dürer as well as other Renaissance artworks. Dürer is a pioneer of the Renaissance, he is not only a representative figure of the Northern Renaissance, but also absorbed the knowledge of the Italian Renaissance, so the article chooses his famous prints for research. The main methodology is interpreting two main objects (the melancholy angle and the light from behind) in Dürer's Melancholia I which helps to understand the idea expressed by him, and analyzing the geometric principles used by Dürer in printmaking. The main idea of Melancholia I is to express the grief that human beings cannot exhibit ideal beauty. The meaning of the melancholy angle and the beam of light is why the author makes such a prediction. The girl represents the artist, thus expressing his ideas. Speaking of the relationships, geometry provides the theory and helps with the painting. It can be seen from the layout. Dürer's statement is important evidence because they reveal Dürer's use of geometric theory in Melancholia I.

Keywords: Renaissance, Albrecht Dürer, Melancholia I

1. Introduction

After nearly a thousand years of the Middle Ages, the Renaissance followed to it changed greatly. Undoubtedly, these changes are reflected in the artworks of two different ages. Art works during the Renaissance particularly pay attention to how to narrate the story. Artists focus on how the figure in the artworks relate to each other, for instance, the people they are looking at and the gesture they are posing. While in medieval arts, the figure had fewer eye contact, and more mechanical movements and showed more independence rather than strong interaction. The Renaissance arts preferred a sense of being true to nature. Artists employed several techniques to achieve this goal [1, 2]. Firstly, they applied perspective methods such as linear and aerial to their paintings, effectively telling the difference between nearer and farther objects, as well as the correct relative scale of figures and objects. Secondly, the artworks became three-dimensional using catching light and shade like the shadow caused by folds. Compared to former two-dimensional artworks, there formed a more life-like style. The materials for painting also differ. Middle Ages paintings were keen on valuable materials such as gold leaf (gold ground paintings) and other metal materials. The use of those

precious was essential in showing the honor of the characters in the painting and the noble status of the master. However, during the Renaissance, artists abandoned the use of precious material, instead, they tried to draw treasures with layered glazes of semi-translucent paint, which enabled them to better seize the light. What is more, Renaissance artworks revived the ancient Greek tradition, there was a desire for perfect body proportion at the time. An ideal figure was thought to be youthful with an athletic physique. That is not to say an excessively muscular body was appropriate because it broke the balance. As people can see, a good deal of medieval art pieces did not require a perfect proportion or a real human body proportion, the size of the body was more about status back then.

Although the modeling experienced a dramatic change, traditional religious images and themes have survived. Religious elements such as alters, lambs, crosses, and many other items often appear in paintings. In the meantime, science developed quickly. Seven liberal arts gave sufficient theoretical support to all aspects of living, not to speak of the arts. Anatomy contributes to accurately scaling the human body and seeing the human body as a microcosm also help people understand the outside world. Arithmetic helps in various ways. All of the architectures would not exist without arithmetic. Achievements in geometry study found the golden ratio, polyhedron, and so on, all of which help make the picture beautiful, and presented a feeling of effortless and gracefulness [3].

Dürer was a pioneer of the Renaissance in northern Europe. Coming from a goldsmith family undoubtedly had a great influence on his excellent carving skill [4, 5]. His most important study tours were two trips to Italy, during which Dürer met painters Giovanni Bellini and Raphael, studied Leonardo da Vinci's works and artistic theory, and learned about the Renaissance. What makes his works special is that he was not Italian and he wear different hats. As well as being an artist, he was well versed in geometrical science. *Melancholia I* was his master's work. It is unable to deny that Dürer utilized several geometrical principles in this work, which make it suitable for studying the relationship between geometry and artworks.

The scope of investigation of this article is the work of Dürer as well as other Renaissance artworks. Dürer is a pioneer of the Renaissance, he is not only a representative figure of the Northern Renaissance, but also absorbed the knowledge of the Italian Renaissance, so the article chooses his famous prints for research. The main methodology is interpreting two main objects (the melancholy angle and the light from behind) in Dürer's *Melancholia I* which helps to understand the idea expressed by him, and analyzing the geometric principles used by Dürer in printmaking. The main idea of *Melancholia I* is to express the grief that human beings cannot exhibit ideal beauty. The meaning of the melancholy angle and the beam of light is why the author makes such a prediction. The girl represents the artist, thus expressing his ideas. Speaking of the relationships, geometry provides the theory and helps with the painting. It can be seen from the layout. Dürer's statement is important evidence because they reveal Dürer's use of geometric theory in *Melancholia I*.

2. The background of *Melancholia I* and Geometry in the Renaissance

During the Renaissance, that is, the beginning of 1400-1600, geometry made great progress. In Europe, The German mathematician Müller wrote the "Triangle Complete Book", the general solutions of cubic and quartic equations are also thoroughly solved [6]. During that period, many geniuses emerged, bringing science (geometry) to a peak, and integrating it into all aspects of life. Not only in the construction of numerous architectures, but also in artistic creation. Albrecht Dürer is the genius of geniuses. He took the lead in applying geometric principles to his artistic works and wrote the "Four Books of Measurement", which influenced more young German artists.

Melancholia I is a print created by Albrecht Dürer in 1514. The way of creating this 24×18.5 cm artwork is engraving. It is one of his most famous and special prints. Unlike his series of prints on religious subjects, Melancholia I does not depict a scene from the bible, nor does it convey teaching, but expresses a relatively personal feeling of Dürer. This image is dominated by the figure of a brooding angle and numerous other objects such as the melancholy angle. However, as one of Dürer's most famous works, he did not leave the world any written explanations about his intended meaning in Melancholia I which makes understanding the meaning behind all these elements extremely important. Meanwhile, Dürer's application of the knowledge of scientific theory is also worth studying. He pioneered the use of the principle of perspective to create art which makes it possible to explore the relationship between Melancholia I and geometry. Overall, geometry rose during the Renaissance and greatly affected the economic activity of production as well as the expression of art [7, 8].

3. Understanding the Key Objects

3.1. Angel as a Two-folded Representation

The predominant object on the right side of the print is an angle. Angles are the messengers of God in the Bible. They had witnessed the creation of the world, which means they had witnessed the power and the wisdom of God. However, in Dürer's print, the angle presents a meditation gesture, which gives expression to how beautifully and ingeniously God has designed the world.

Another unique point that makes this print different is the expression on the angle's face. It is generally accepted that angles have the quality of solemnity and they do not show negative emotions. In Renaissance artworks and even earlier medieval artworks, angles often appeared as dignified and expressionless figures, while in Melancholia I, the angle expressed a mood of concern. It is like the emotions of a human being rather than a spiritual angle.

She held a compass in one hand, her chin in the other, her brow furrowed in a thoughtful posture that echoed the theme- 'Melancholia'. By referring to Panofsky in Dürer's Melancholy One, the author predicts that she embodies the fully developed artist. The reason for her melancholia is that she can see ideal forms in her imagination but knows that she will be unable to fully realize them in the physical world [9]. Dürer expressed human's limitation of knowledge by embodying angelic finitude. Yet she is still thinking of a better way to present the 'ideal' in her mind which reflects Dürer's own words "Since we may not achieve the very best, shall we therefore not even bother to learn?" [10]. During the Renaissance, art is regarded as a collection of beautiful parts of nature, and it is artists' work to select them. In the past ages, artists only focus on the meaning they showed in their works but ignore whether it conforms to the law of nature (the law of geometry) or perhaps they did not find the universal(common) rule. Durer is the prophet of his time who started to use science to represent art in his works, which could be deeper and more precise to capture and present the beauty of God's creatures.

3.2. The Meaning of a Beam of Light

Another main object is the light that comes from the lighthouse. The rays of light scattered from a point and filled the sky, lighting up the sea and the village, and providing a light source for the scene. Compare with the melancholy atmosphere, the brilliant rays are so warm and brilliant that an opposite feeling is poured into this print. First, Dürer concluded that God has incorporated some elements of the beautiful into all creation, and the artist must seek out and extract these elements, then reintegrate them whose beauty has been observed in and drawn from nature [10]. By comprehending his value, it is possible to indicate that Dürer firmly believes all creations carry God's will, and yet human has difficulties in absorbing God's wisdom though the human is

surrounded by the world he creates. The light that fills the picture vividly expresses this Second, the print is created in 1514, just before the Reformation, and a different view of religion is already in the breeding.

The light has a small chance of giving expression to Dürer's thinking on previous theology. Referring to the bible: The Gospel of John 1:18 No man hath seen God at any time, so the light is a symbol which does not represent God but one of his attributes. The author tends to believe that the light is a symbol of the wisdom of God, and is the light of truth. In the print, the light source is relatively far, almost at the end of the scene, and all the other objects are surrounded by it, which can be understood as God's general revelation. At the same time, the melancholy angle, the smaller angle beside her, the dog, and even the orientation of the windows of the houses in the distant village face back to the light, so that rules out the possible meaning that the light of truth gained by man's prying into God's creation. Third, Dürer explained the relationship between the light of truth, God, and science mainly by the layout of the print. God through general revelation put part of the truth in man's mind, helping humans study science and at last, know God himself better.

In conclusion, the theme of Melancholia I is to express Dürer's sorrow of human incapability to present the ideal beauty which God has already placed for man in the world.

4. The Relationship Between Melancholia I and Geometry: Foreshortened Figure

Dürer spent his lifetime studying science, especially geometry. He applied massive geometry theory to Melancholia I, in another word, geometry is a tool used to create the print more accurately, a way to better present God's creation, while artistic work is a trial or an experiment to show beauty. In his own words "It would be useful for the artist to grasp in his mind which are the correct measurements, and which are not so that his work will be able to show this" [9]. Dürer himself wrote the *Four Books of Measurement*, which analyzed and studied linear geometry, two-dimensional geometry, and the application of geometry in architecture and perspective methods, and in the last volume, he used his invented geometric machinery to help study perspective methods. His writings also include *Four Books on Human Proportions*, all of which have had a profound impact on young painters in the north and later generations. The projection principle and perspective principle that will be discussed below (two main and important geometric principles used in Melancholia I) are all analyzed in detail by Dürer himself in the *Four Books of Measurement* written by him. Therefore, the following discussion has his own words as solid evidence.

4.1. Projection Theory

Dürer carefully set two light sources, one in the rear, and one from the right. Observing the shadow of the lady, the sphere, and the measuring tools on the ground, It can be found that on the page of *The Four Books of Measure* a common point is that the dark sides are on the left and the bright sides are on the right. The other light source is the lighthouse, the lightened top of the polyhedron is a good example. The draft below demonstrated Dürer's calculation. The demonstration he applied in Figure 1 has shown how light and the extensive features of the object of eyesight are manifest through the science of projection.

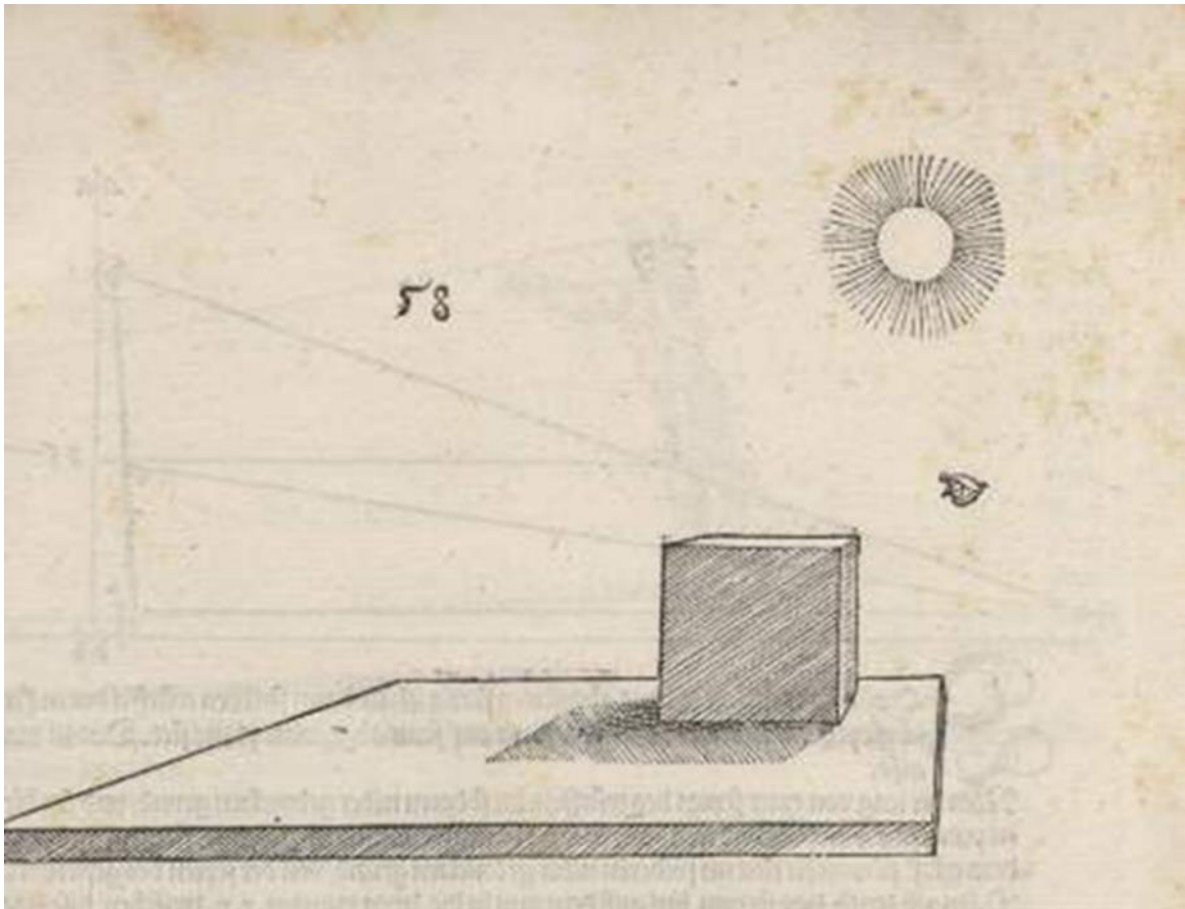


Figure 1: The projection theory illustrated by Dürer in *Four Books of Measure*, Accessed from <https://digital.slub-dresden.de/werkansicht/dlf/17139/1>.

He placed a cube on a horizontal surface and a sun on the upright corner then stimulated the true shape of the shadow on the ground. Compared to medieval paintings, such as *The Crucifixion* by Jan Provost, employing this theory made the reflection in the scene more true to nature.

4.2. Foreshortened Figure

Similar evidence came from his fluoroscopy. Dürer was the first who introduced perspective into Germany. During this time, artists argued if they see a scene outside through a window, they can project what they see in the window as a collection of visual points they get when they fix their eyes on a single focal point. The windows became their canvases. The scene is naturally affected by the position of the artist's eyes and the position of the canvas. Dürer utilized this new way of drawing into his work. *Melancholia I* used parallel perspective. He first conceived and order the whole picture well and grandly in all its parts, and next ensure that every part in and for itself is thoroughly and skillfully made. He even actually invented mechanical tools that aid in perspective drawing, as shown here. His attempt of making measuring more accurate may come from the belief "For truly: art is rooted in nature, if you can draw it out then it will be yours. If you come to possess it, it will free you from many faults in your work. And through geometry, you may ground much of your work on proof" [10].

5. Discussions

The main idea of Melancholia I is to indicate the grief of humans incapable of showing ideal beauty. The meanings of the melancholy angle and the light that came from the back are the reason why the author made a such prediction. The girl is the embodiment of the artist and thus shows his thoughts. As for the relationship, geometry provides theory and assistance to this print. One can tell it from the layout. Dürer's statements are crucial evidence. They reveal Dürer's utilization of geometrical theories in Melancholia I. The above research found that, the reason this print was named Melancholia I is that during the Middle Ages, people's science and technology, and artistic expression were not as superb as in the Renaissance. Therefore, one has no depression, knowing and fully accepting the fact that human beings cannot fully represent the goodness of God's creation. But in the Renaissance, all kinds of human skills reached a whole new level. People have seen the shocking beauty brought by superb artistic skills and rich natural knowledge, and they think that such beauty is still far from ideal beauty. Therefore, artists like Dürer felt sad and sighed. He incorporates his melancholy into this print and named it Melancholia I.

6. Conclusions

By analyzing the details in Melancholia I, this article has explored the relationship between Melancholia I and geometry. Under the Renaissance broad environment, geometry is a tool in the pursuit of beauty and the artwork is an experiment to show beauty, the driving force behind it is the desire of knowing God and to get closer to him. Geometry helps people to find the ideal beauty which was set at the beginning of the world. The Northern Renaissance tradition, represented by Albrecht Dürer, is significantly distinguished from the Italian Renaissance tradition in its understanding of human nature and religious spirituality. The study of Albrecht Dürer can be used to guide the further understanding of the Reformation and the humanistic and scientific spirit that lurked in the Middle Ages. The Northern Renaissance represented by Albrecht Dürer was not still religious, but was deeply imbued with the values of scientific inquiry. It is this very spirit that scholars of the Northern Renaissance should not ignore.

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