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### Vermeer's Verisimilitude

Realistic representation can be difficult to portray, especially if very few people have tried to do it before. Representation started moving away from celestial icons and started moving towards objects on the global plane. The way artists see and represent the world around them changed dramatically with the spread of knowledge during the Renaissance. Not only has our portrayal of what we see changed, but our knowledge of how we see has changed as well. The influence of the camera obscura and linear perspective, specifically in Johannes Vermeer's works, became monumentally revolutionary during the seventeenth century.

A camera obscura directly means a dark room. It is when all light is rejected from the room or box except for a small space that allows light in. When this little space is open it allows the light that reflects off of the objects on the other side of the wall into the space. This light bounces onto the wall of the room, creating an illusion that the image that one can see through the hole is upside down on the wall parallel. It is a simple device that uses a pinhole or a lens and an image from one side of the device projects onto a screen of which that image can be traced and seen in detailed full color. Not to be confused with the camera lucida, a tool that consists of a prism that reflects the image onto the paper. In Ref. 1, you can see how the view of the mountains projects itself onto the wall opposite. The image can then be traced and colored in according to this projection. The image projected is actually upside down and flipped, but the artist can still use the projection and just flip the artwork around after the use of the camera is completed.<sup>1</sup>

Jonathan Crary, in *Techniques of the Observer*, further explained how the camera obscura was often used in the seventeenth and eighteenth centuries to explain human vision.<sup>2</sup> But many art historians believe that Johannes Vermeer used a camera obscura as a tool to help him create his paintings. They find it difficult to believe that he didn't use some sort of advanced technology as a tool for his art. Even with his great technical skills, the possibility that he traced

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<sup>1</sup> Ref. 1

<sup>2</sup> Crary, Jonathan. *Techniques of the Observer*. Page 27

large parts of the outlines on his paintings managed to cause controversy. Philip Steadman, used his book *Vermeer's Camera* to explain that using the camera obscura is often considered cheating and underhandedly surpassing the skill of observation.<sup>3</sup> However, using the camera as tool to help assist in representing the world in a more accurate way should not be considered cheating. It was part of a historical movement that revealed a whole new phenomena of optical studies in art. It created a new way to see and analyze what we see. A visual representation of progress mathematically and scientifically in art.

Using a camera obscura as a tool in painting can only allow the viewer to see the scene, in the same way as the artist. It can also allow for the artist to adjust the composition; it can allow them to adjust and position the subject matter in accordance with their surroundings. Artists were starting to be able to have a newfound ease of access to the space they were trying to translate visually. It opened up a whole range of new artistic choices to be made, a whole new way of viewing and how to perceive the space around them. Vermeer's use of the camera obscura did not hinder his abilities to view light, shade, and color. His use actually does the complete opposite, it it helps him increase the quality of his view in space. As well as help him use optical illusions and imagery that allows the viewer to become a part of his painting.

In Vermeer's painting *The Concert*,<sup>4</sup> there are multiple signs that Vermeer used a camera obscura in his studio to assist in making art. For starters, many of his paintings seem to be in the same room and painted from nearly identical positions in space. Despite the floor tiles and back wall being the only visible part of the rooms architecture, there are multiple signifiers that indicate that a camera obscura was used.<sup>5</sup> *The Concert* has an indication of a light source, most likely a window, coming in from the left side of the room. There are two dull and loosely detailed paintings on the back wall and some dark and white tiles against the ground, they are much more out-of-focus than they would be if the viewer was looking directly at them. Closer to the viewer in the midground are three people (from left to right), a girl sitting at a harpsichord, a man seated, and woman standing and singing. In the foreground, there is a viola de gamba that has a slight softened focus.<sup>6</sup> There is also a table with the identical drape that appears in *The*

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<sup>3</sup> Steadman, Philip. *Vermeer's Camera*. Page 10

<sup>4</sup> Ref. 6

<sup>5</sup> Steadman, Philip. *Vermeer's Camera*. Page 122

<sup>6</sup> Steadman, Philip. *Vermeer's Camera*. Page 124

*Music Lesson*,<sup>7</sup> and another stringed bass. There are small hints of halos around the brightest parts of the painting, which occur when using a camera obscura. The light is condensed into a small pinhole, so when the light comes back into the room it spreads back out and the brightest points tend to be highlighted even more than they are in reality. Many artists tried to compensate for the shift in depth by showing all parts of the painting in full-detail. Using the camera obscura, emphasizes the monocular cues that the eye is drawn to. The relative size and interposition of the objects, not only to one another, but to the painting as a whole, is exactly how one would see the scene if they were viewing the scene in real time. However, there are actually a few idiosyncrasies in Vermeer's work that really help to prove his use of a camera obscura:

his painted treatment which [seems] to mimic the distortions produced by lenses. Thus Vermeer seems to render some passages 'out of focus', and elsewhere seems to reproduce other effects which would be seen through the camera but not with the naked eye. The evidence presented here is different. It relies on an analysis of the perspective geometry of the paintings.<sup>8</sup>

In *The Concert*, the girl seated to the left at the harpsichord is in the sharpest detail, and the detail fades out of focus moving away from the center of the piece, the places where the light hits the most have the sharpest highlights on them. Using the camera obscura as his method for translating what he directly sees onto the page or canvas through paint creates a focal point and a blurring of the edges. These distortions in space occur most often in the background of the painting.<sup>9</sup> Recreations of Vermeer's subjects and compositions using the camera obscura were used in *Tim's Vermeer*. Which is a film, that proves that these idiosyncrasies come specifically from the use of the camera obscura alone. Vermeer's use of the camera allowed for more accuracy and uniformity in his work, but also came at a price. There are very few faults in his use of line, shape, and color. The subject matter is all crisp and the lines formed by the tiles and the chairs coincide with one another. But the use of a camera obscura can still distort the edges of the scene, which would not be seen with the naked eye. Yet, it still manages to make the work unique and create a realistic representation of the world.

Steadman's theory is that Vermeer had a camera obscura with a lens that reflected onto

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<sup>7</sup> Ref. 5

<sup>8</sup> Steadman, Philip. *Vermeer's Camera*. Page 2

<sup>9</sup> *Tim's Vermeer*

the painting.<sup>10</sup> This viewpoint and arrangement provided an easy access that allowed him where he could project the room in front of him onto the other side of the room on his painting. There are a few different theories and techniques to create a camera obscura. The image can come from behind him where the point of view originates. This allows for him to project whatever is outside of the room from behind him to the room he is standing in and projected onto the wall he is facing opposite from the lens. All of Vermeer's paintings are relatively proportionally accurate to the positioning of where the camera obscura has been determined to be.<sup>11</sup> After the lens projected the picture on the wall then he would be able to trace the image and perhaps even paint from the projected image itself. Due to the form and shape of the camera obscura, the projected image is almost always the same size as the painting is. Or it is at least similar, the dimensions of the oval-like shape can be shrunk into a rectangular shape.

There are multiple other theories as to what Vermeer used to achieve such striking imagery. One point is that the camera obscura projects a geometrically accurate photograph from a monocular viewpoint. However Vermeer also could have used conventional math methods to accurately measure perspective.<sup>12</sup> Or he could have traced the images that were reflected in mirrors. Furthermore, the use of the camera obscura is the most naturally viable explanation that helps distinguish his artwork from the rest of the art of the time period. Especially due to the way he captured light in his paintings, down to each haloed highlight. Even his spectacular use of line and shape help prove he had to have used more than just his naked eye. It is unlikely that he used any of these other methods simply due to the fact that none of them have a strong backing argument.

In order to make an camera obscura there must be a pinhole to a keyhole sized hole in a wall or window shutter. The room has to be pitch black, in order for the hole in the wall to properly capture an outside landscape. Or to be seen differently in clearer vision, the hole itself has to be bigger to properly project the scene onto the wall. However if the sun is directly being captured the hole is candy smaller. This is actually seen as an everyday occurrence down on the

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<sup>10</sup> Steadman, Philip. *Vermeer's Camera*. Page 1

<sup>11</sup> *Tim's Vermeer*

<sup>12</sup> Steadman, Philip. *Vermeer's Camera*. Page 28



ground or between please when you see the sun ground through the leaves. Or when you see the sun's rays coming through a hole in the ceiling of an attic.<sup>13</sup>

This can then relate back to Aristotle's use of shadow and light to view a solar eclipse in the 17th century. Aristotle watched the Sun watch turn into a crescent shape and then disappear during a solar eclipse. He tracked his views of the Sun and this was a basic sense of what a camera obscura was before it had the name camera obscura. This use introduced the concept that people could watch solar eclipses happen on the ground without going blind. In astronomy, apertures start being studied by multiple philosophers and astronomers. This was the first practical application of the camera obscura it easily allow viewing solar eclipses. Aristotle's not in fact the first person to observe the sky through this technique and many other astronomers used this to measure and observe the sky before telescopes and lenses became commonplace. Tycho Brahe used the camera obscura to make solar observations and measurements of the Moon as well. Brahe worked with Johannes Kepler as well. Kepler wrote multiple pieces about optics and lenses in astronomy and especially in surveillance of the night sky. But Vermeer was using the camera obscura in the mid-1600s from 1632 to 1675.

The first possibilities of the use of the camera obscura as a device for art were seen in Leonardo da Vinci's notebooks.<sup>14</sup> DaVinci noted, through Richters translation, on the fact that one could move through the lens onto the wall. Then the observer would get in the way of the image and he also realized that the image was not only upside down but also reversed from left to right. He then proposed that the observer doesn't sit in between the lens and the screen but instead the image can reflects onto the screen in front of the artist.<sup>15</sup> Instead of having the lens hit the screen against the wall, where the artist will get in the way in between the lens and the screen, he proposed that the lens hits a screen in the middle of the room, which does not get in the way, and can then be seen behind the screen facing the lens instead of facing the wall. Doing so started to reinforce the viewers perception of reality. This can be seen in Athanasius Kircher in 'Ars Magna Lucis et Umbrae', 1646.<sup>16</sup>

From there on the camera obscura developed only further and further. The concept of a lens itself like a glass was introduced the camera could then become portable and not only

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<sup>13</sup> Mitchell, William J. *The Reconfigured Eye*. Page 118

<sup>14</sup> Richter, I. A. Ed. *Selections from the Notebooks of Leonardo da Vinci*. Page 115

<sup>15</sup> Ref. 2

<sup>16</sup> Ref. 2

portable but it also quickly became the digital camera that we have today. The camera obscura was still a camera, it directly documented the world around the artist. Unfortunately, the camera obscura is often considered to have been invented by Giovanni Battista della Porta.<sup>17</sup> Even in scientific books like James Southalls, *Mirrors, Prisms, Lenses*, the credit of the invention itself is still given to della Porta. Della Portas book *Magia naturalis (Natural Magic)* became popular in the 16th century, across multiple languages, and he describes the specifics of his invention, the camera obscura. However he did not create the camera obscura and the claims he made in his book make it appear like he had a bigger say in the camera obscura than he actually did. He did not directly claim that he invented the camera obscura.<sup>18</sup> However his implications that he was the first to describe cameras with lenses quote for mirrors camera<sup>19</sup>. In his piece he seemed to describe the concept of a pinhole camera in a very similar way as da Vinci's notebook from 1490, through Richter's translation:

This is shown when the images of illuminated objects penetrate into a very dark chamber by some small round hole. Then you will receive these images on a white paper placed within this dark room rather near to the hole; and you will see all the objects on the paper in their proper forms and colours, but much smaller; and they will be upside down by reason of that very intersection. These images, being transmitted from a place illuminated by the sun, will seem as if actually painted on this paper, which must be extremely thin and looked at from behind. And let the little perforation be made in a very thin plate of iron.<sup>20</sup>

As compared to della Porta's description in *Magia naturalis* (1558):

If you cannot draw a picture of a man or any things else, draw it by this means; If you can but onely make the colours. This is an Art worth learning. Let the Sun beat upon the window, and there about the hole, let there be Pictures of men, that it may light upon them, but not open the hole. Put a piece of white paper against the hole, and you shall so long sit the men by the light, bringing them neer, or setting them further [i.e. adjusting the focus], until the Sun cast a perfect representation upon the Table [i.e. the drawing board] against it; one that is skill'd in painting, must lay on colours where they are in the Table, and shall describe the manner of the countenance; so the Image being removed, the

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<sup>17</sup> Southall, James. *Mirrors, Prisms, Lenses*. Page 561

<sup>18</sup> Porta, Giovanni Battista della. *Magia Naturalis (Natural Magic)*. Page 143

<sup>19</sup> Steadman, Philip. *Vermeer's Camera*. Page 9

<sup>20</sup> Richter. *Selections from the Notebooks of Leonardo da Vinci*. Page 115-116

Picture will remain on the Table, and in the superficies it will be seen as an Image in a Glass [i.e. reversed left-to-right].<sup>21</sup>

Both of them share the same descriptive qualities to bring attention to the technical aspect of the process of making a camera obscura. However, da Vinci's description came 70 years before della Porta's.

Vermeer's painting *The Milkmaid*<sup>22</sup> is a good way to show how intense colors will show up even more intense than they are in real life. Both da Vinci and della Porta both make note of how the colors of the subject will show up in the right value and placement. Vermeer takes advantage of this and uses the intense colors of the lush fabric to his advantage. In this painting, there is a woman in a white bonnet in a yellow dress with orange stitching and green sleeves that trail into blue, then there is an orange-red skirt below her bright blue apron that matches a similarly bright blue fabric on the table amidst various bread loaves and slices. On the green tablecloth, there is also an orange-red dish with milk being poured into it from another red clay vessel, which is then next to a blue textured pot. Against the back wall, there are a few baskets hanging next to a window with a soft light coming in through the panes. The lines created by these panes help not only guide the viewer's eyes towards the milkmaid, but they also help create a sense of depth. This use of linear perspective helps support the argument that Vermeer used a combination of methods to assist him in making his art. Vermeer's work is so enrapturing, it is hard to look away from the simple calmness of the event at play. The scene's Vermeer captures are all so mundane, but the way he captures them makes them have an odd sort of ephemeral beauty. Each highlight on the shine of each vessel glow with an extra strength. Even the shine of the bucket on the wall, despite being in the shade, has a strong highlight. This effect comes from the use of the camera obscura.

This painting is so silent and still. Not only is it still in a sense where the physical painting isn't moving, but it is still in a sense that the scene is so still that the stillness was able to merge itself into the paint and become part of the painting. It creates a bond between times, closing the gap between then and now. It brings the viewer not only closer in space to the scene playing out, but also in time. The scene is immediate and it brings the viewer into the scene, giving the viewer autonomy of themselves as both part of the painting and as an onlooker. It is a

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<sup>21</sup> Steadman, Philip. *Vermeer's Camera*. Page 10

<sup>22</sup> Ref. 3

moment in time captured over many moments in time that all become one new moment in time that represents the first moment in time.<sup>23</sup> Certain types of images come to seem natural and more faithful to reality than others for this very reason. Vermeer manages to do this in all of his pieces. When three-dimensional space is projected onto a flat surface, the natural conventions of this translation are pre-established, simply through abstracting the simplification of the object depicted. The choice to reproduce both features are all based on convention as well. It is necessary to learn the conventional language of painting in order to see a picture. Just as it is impossible to understand what is said without knowing the language. Our visual perception of the world at large accumulates to the point where we are able to distinguish the painted image from the photograph. The portrayal of the object is linked through this recognition until it becomes instantaneous and we no longer see a picture.<sup>24</sup>

European artists have used this perception of the artist as a camera obscura to record precise outlines for tangible things, like film photography can do nowadays, in the exception of which photographic truth is in question. However a camera obscura requires human touch in order to be documented. A camera obscura on an empty wall will do nothing to create art, unless there is an artist present to trace the outline and fill in the forms. Unlike a more current version of a camera that a physical imprint of light falls onto another surface, like film. It is not an automatic transition from light to canvas. It includes manual labor to accurately locate different positions in space and it includes decision making and thoughts of how to portray them accurately within a painting. This requires attention to detail and precision in measuring the amount of light on each plane as well the position of each plane in space. Both of which require a certain key that uses corresponding marks on the surface to represent these changes.<sup>25</sup>

Another aspect of Vermeer's work that helped change the way artists painted, was the use of linear perspective. Linear perspective helped create rational space in art. Rational space was a concept that was not really explored until the Renaissance. The viewer became necessary for the painting because the paintings were no longer iconic images that could stand alone. Linear perspective made the viewer feel important, celestial beings became more life-like and more

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<sup>23</sup> Berger, John, and Michael Dobb. *Ways of Seeing*. Page 31

<sup>24</sup> Mitchell, William J. *The Reconfigured Eye*. Page 7

<sup>25</sup> Mitchell, William J. *The Reconfigured Eye*. Page 117

tangible. They were even sometimes smaller than the humans in the paintings, they were one with the gods.

Using linear perspective gave individual artists names, they were no longer just craftsmen. They had their own techniques, their own styles that gave each artist a unique appearance to their artwork. Each artist had a name that was associated to their artwork. However, the invention of the concept of perspective has been fought over for centuries. “Brunelleschi is traditionally accorded the honor of being its practical inventor or discoverer, while Alberti is almost universally acknowledged as its first theoretical interpreter.”<sup>26</sup> Alberti used a “veil of threads” to visually explain this monocular cue.<sup>27</sup> There is a vanishing centric point where all the threads met. It also creates a space that allows the viewer to become part of the painting, the interaction of the viewer with the painting, is what makes it important. The notion that the viewer is important started to become more romanticized. The fact that the viewer was important to the painting, gave viewers a sense of belonging and unity with the artwork. Moving away from depicting celestial beings as larger than life beings helped make it appear like the subject matter was in real life on the earthly plane.

Leon Battista Alberti set out a specific algorithm in a procedural process, a mathematical single-point perspective overview on how to achieve such depth. He did so in his treatise on painting in 1436, a monumental step that was using tools like drafting instruments in art, which was how he explained that he was able to do this. He demonstrated consistent perspective tracing the Florentine Baptist Church with the aid of a peephole.<sup>28</sup> He continued talking about perspective in later treatises and separated further in each one he continued the same procedure but continue developing it further and developing similar variance of the initial procedure. It was like a guaranteed or your money back type of deal where if the process was followed step by step it will guarantee that results will show perspective introduced a more accurate way to depict the world around the artist.<sup>29</sup>

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<sup>26</sup> Martin, Jay. *Scopic Regimes of Modernity*. Page 5

<sup>27</sup> Martin, Jay. *Scopic Regimes of Modernity*. Page 6

<sup>28</sup> Ref. 7

<sup>29</sup> Mitchell, William J. *The Reconfigured Eye*. Page 117-118

Vermeer's oil painting *Lady at the Virginal with a Gentleman, 'The Music Lesson,'*<sup>30</sup> shows a very mechanical perspective. There is a clear use of depth. In this painting there is a wood slatted ceiling that transitions into wood lined frosted glass windows. The windows are covered with a decorative design, each window decreases in size towards the back wall in the painting. The light from the windows falls gently onto a pattern of navy and white tiles that recedes in size to the back wall. Against the back wall there is an ornate virginal, which is similar to an early keyboard, and a large painting next to a mirror propped up atop the virginal, reflecting the seated lady and the artist's easels legs. A woman in a dark navy blue dress sits on a red stool facing the wall with her hands on the keys and her head turned slightly towards the man that instructs her. Between them and the viewer is what appears to be a stringed bass, then a blue chair with gold or brass tacks. In the foreground there is a portion of a table with an extremely detailed red, blue, and gold cloth draped across it and a stark white vessel resting on a golden tray.

Each detail in this painting helps to emphasize the use of mechanical linear perspective. Each physical and implied line recedes back in space to a fixed point. There is also a clear change in size from foreground to background. Many artists try to compensate for the lessening of detail towards the background, however Vermeer leaves the slightly blurred details alone and represents the shapes as accurately as his eye sees them. The closer to the foreground the object is the more detailed it is rendered. If each of the items in this painting were represented differently, then the accuracy of each objects size in proportion to one another would be distorted inappropriately. All of the lines that are parallel to each other in the real world are represented to be moving back in space not only in the right angle, but also in the right size. So the wall on the left appears to be smaller towards the back and larger in the front giving the viewer the illusion that the room in the painting has depth to it. During the time period it was uncommon to portray a scene as the eye sees it, rather they painted what they thought they saw. Other artists used their preconceived notions of what the correct proportion of each object is, which is why a lot of the art from before the Renaissance had very little depth.

Vermeer was an instrumental leader in art and in particular the renaissance era. His use of technical concepts like the camera obscura and the use of linear perspective were huge advancements in art-making for the time period. He continued his use of both of these techniques

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<sup>30</sup> Ref. 5

together to create his artwork. Most of his pieces have a clear use of linear perspective, most often seen in the windows and the adjacent furnishings of the rooms. Most of his paintings depict figures in full proportional accuracy. This verisimilitude in Vermeer's work, proves his worth as a revolutionary leader of visual culture.

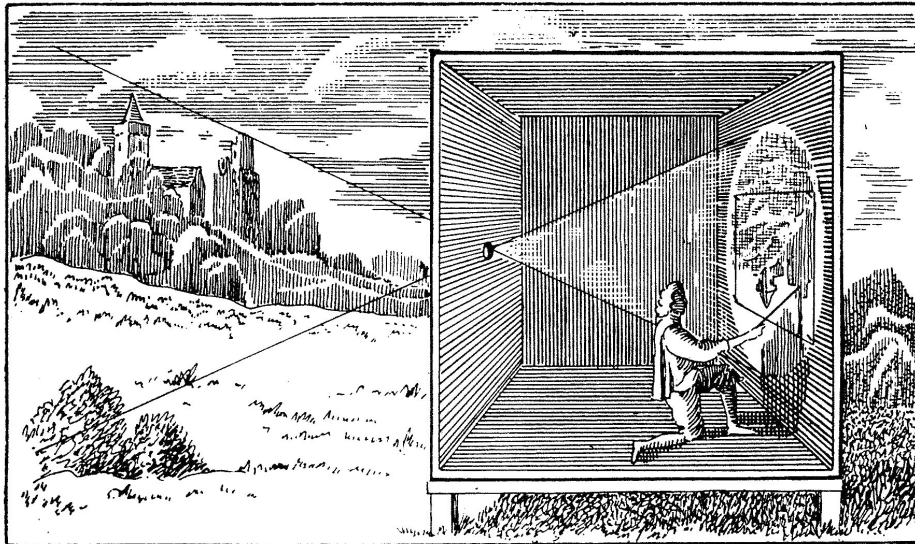
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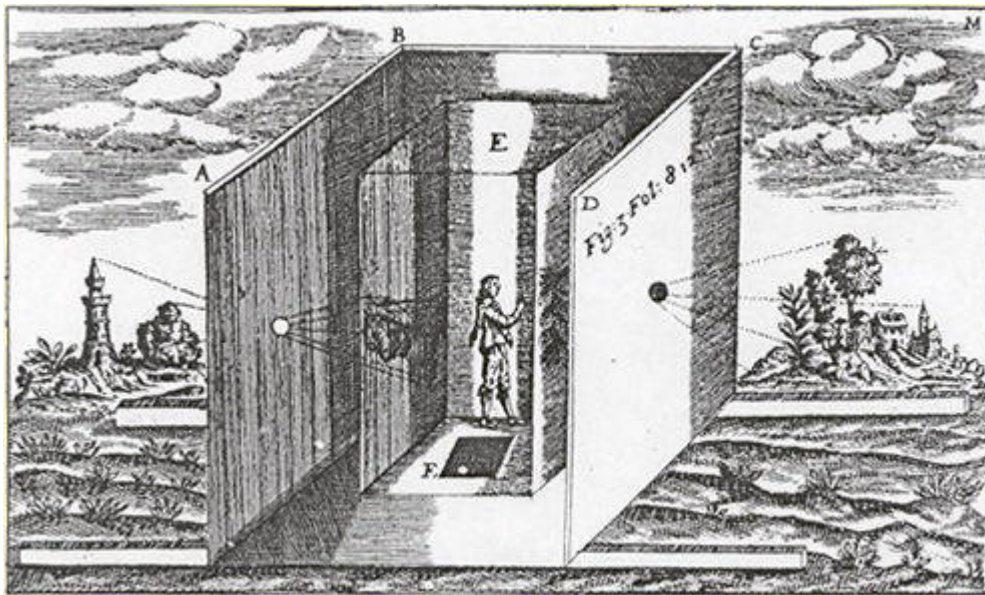


## Appendix of Images

Ref. 1



Ref. 2



Athanasius Kircher in 'Ars Magna Lucis et Umbrae', 1646

Ref. 3





*The Milkmaid*, Johannes Vermeer

Ref. 4





*The Astronomer*, Johannes Vermeer

Ref. 5





*Lady at the Virginal with a Gentleman, 'The Music Lesson,' Johannes Vermeer*



Ref. 6



*The Concert, Vermeer*

Ref. 7



Alberti's window