



Leonardo da Vinci Self Portrait

The quest for “perfect painting” which...

Leonardo da Vinci to Stereoscopy

Following the master's steps will take us, via depth of field and, to the 3D frame, which the human brain wishes to see and thinks it is real.

Was there a problem?

Yes, there was! Especially, for the genius who was born in 1452.

He could visualise objects in three dimensions in his brain. He was a talented artist. He was very smart. He was not accepted to college since he was born out of wedlock. At the studio, where he was an apprentice, high-quality paintings and sculptures were being produced. He was obsessed with “perfection”. As a matter of fact, he was interested in mechanics... His situation itself was a big problem...

The first step was to use the right material. He didn't like the dye he was using, he improved them. He did not like the metals being used, he improved them as well. Now, it was time to do things in a right way; and he started working on anatomy. He observed humans and animals. Not being content with his observations, he incised corpses to see what was inside. While he was observing the living things, the concept of “motion” attracted his attention. This helped increase his interest in mechanics.

As he worried less about the quality of his works, he started to worry more regarding the perceptions of those who were to see his works. How did human beings perceive things? What was troubling to anyone working on visual arts became his “target”. He started to analyse... A human being, having two eyes, had a finite angle when looking at a painting, but had “infinite angle”, that is, a three-dimensional view, looking at a sculpture. There were questions to be answered before he reached “perfect painting”... Is it possible to transfer the richness in sculpture to painting? Is it possible to perceive a painting as real? How much one can deceive human brain?

He thought!..

The far-away objects were not the same size as the ones closer. When one concentrates on an object, others closer and farther are out of focus, when the center of attention changes, so does the area in focus. The colors of the far-away objects are paler than those of ones closer. What the left eye sees is different from what the right eye sees. This difference is not only a function of distance, but it is also a function of what one focuses on. While one eye sees the real target, the other eye looks somewhere else. As the viewing angle and the elevation of the viewer change, so does the way she perceives the environment. The viewing angle of the audience looking at the stage is also something to be picky about, since, if every variable is used correctly, the person who looks at a painting can think herself as if she is looking at “the truth”. The weirdest thing is that, by manipulating the reality, it is possible to enhance impression ... Very complicated! In order to solve this complication, it is required to find multiple answers.

Perspective

The first step is that as the objects are further away, they look smaller... Perspective was used by pundits before Leonardo da Vinci and he became very skilled at it. So much so that he knew it was not enough to follow the rules of perspective to paint a picture...

He started to work by renewing and improving upon the previous knowledge. He manipulated the perspective parameters by taking into account the wall on which the painting was going to be hung and the potential viewing angle of its spectators. By doing so, the spectator was going to be able to locate herself in the composition of the painting. After that, he established the link between the composition and the light under which the painting was going to be exhibited.



the Ventricles of the Brain

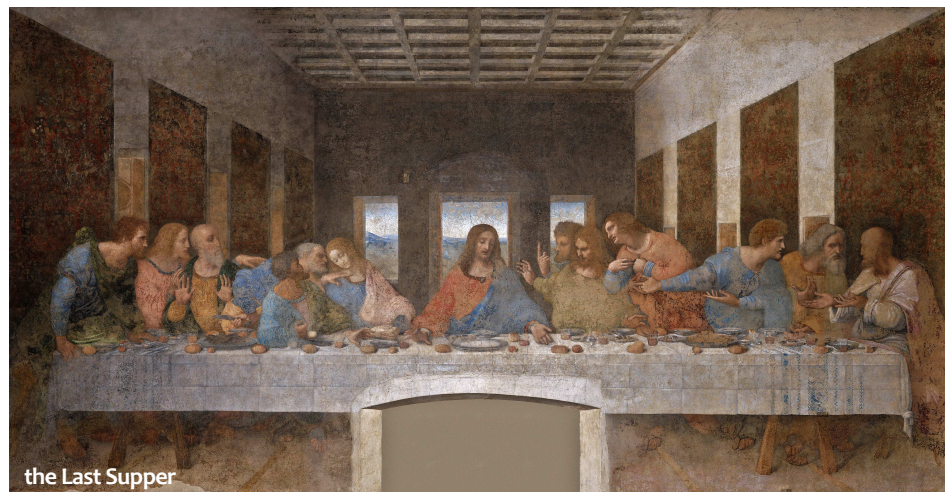
Depth of field

Objects located far away have paler colors and Da Vinci, his contemporary artists, sculptors, architects and carpenters were using the fact to their advantage. Red and yellow were perceived as if they were closer than blue and green but more information was needed in order to use this fact to conceal its “fakeness”. Leonardo da Vinci established a relationship between the deformation of colors and that of objects. He painted the areas, where he wanted his spectators to concentrate on, in focus. Not only those, but all areas which were on the same plane as the center of attention. He modified the color temperature and light parameters of the sharpness of close and far-away regions in proportion to distance – and as much as he wanted to manipulate.

Physiology of vision

He indeed was able to paint the picture which he always wanted to, but after working hard on the positions of the artist, the painting and the spectators, and the conditions of their environment. He also analysed human face. The distance between the two eyes enabled the 3D vision. The regions, which humans could not perceive in 3D, were too far away to see sharply. To test this, he conducted experiments. The results of his experiments were confusing, since human brain was “making up what it could not see”.

“Vision” was a learnt concept; which meant that “the eyes” were only tools and it was the brain which did the job. Human beings were creating the vision in their brains and recording them, relating what they see to similar things they saw before, even attribute a meaning to meaningless images. It was possible to deceive someone by technical manipulation and controlling the deformation of objects and colors. This is good news for an artist, but not for someone designing weapons and machines for warfare. He worked on to find the “right way”. He discovered that it was possible to modify the



the Last Supper

capacity to perceive the environment by changing the distance between the eyes. As a result, he summarised the process of vision in three steps: perceiving the raw light coming through the eyes, combining the visual material and converting it to image and assigning a meaning to this image and recording it.

3-dimensional frame

Since the cavemen, the target is “the spectator” in every visual work. The methods of Leonardo indicate that “there are many variables to think about at each step and the ultimate target is the end-user”. The requirements for a single 3-dimensional photo are the knowledge of manipulation of the photographer, the devices he uses, the lenses, the quality of the recording, transfer technique, the method of presentation, its dimensions, the position of the spectator, the device she uses to watch it and the will to “perceive” and talent of the spectator. Leonardo da Vinci always invented something and at every step of the production process, he thought about the “result”. Even though he was the first to think of 3-dimensional imaging, he was not successful in his experiments with stereoscopic 3D paintings and he never saw a 3-dimensional photograph or movie.