Why we Can See the Image on the Shroud

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Abstract

Every image that a person can see is based on information. For example, a person can be recognized in a photograph because the information that defines the person's appearance has been encoded into the colors, shades, and positions of the pixels that form the image on the photograph. The same is true for the Shroud. We can see the image on the Shroud because the information that defines the appearance of a crucified man has been encoded into the location of the discoloration on the fibers that make the image on the Shroud. When light carries this information to our eyes, our brains recognize this information as an image of a crucified man.

1. Introduction

The hypothesis of an extremely rapid intense burst of radiation from the body has been proposed (Ref. 1) to explain the mysteries of the Shroud related to the image, the carbon dating, and the blood on the Shroud. This presentation provides a deeper understanding of information and the part that it plays in why we can see the image of a crucified man on the Shroud. For further information on why we can see the image, go to Ref. 2, 3, and 4 on the research page of www.shroudresearch.net.

Scientists have long described reality in terms of mass, space, and time. But they gradually came to realize that another important concept to understand reality is energy, which is a relationship between mass, space, and time. Scientists are now coming to the realization that there is another important concept to understand reality – the concept of information. It is sometimes said that we live in the information age because of the importance of information in the use of computers, science, the media, and biological systems. Why are you the way that you are? It is because of the information in your DNA. Your body is made of tissue and organs, which are made of proteins, which are made of organic molecules, which are made of atoms. But it is all controlled by the information in your DNA. For proteins to operate correctly, they must have the correct three-dimensional structure. To have the correct structure, when proteins are initially constructed, they must be made with the correct sequence of amino acid molecules so that they can fold into the correct three-dimensional structure. The sequence of amino acid molecules in any protein is determined by the information in your DNA. This information is in the form of a code in the DNA molecule based on the sequence of four molecules (adenine, thiamine, guanine and cytosine) which form the letters of a very long instruction manual to direct the construction of proteins. This is just one example of the importance of information.

Another example is CAD/CAM. CAD is an acronym for computer aided design (Figure 1). CAM is an acronym for computer aided machining (Figure 2). Together they represent a system in which an item is designed and the parts for it are manufactured. Manufacturing of the parts for the item require three things: 1) equipment that makes up the process or mechanism to

produce the parts, 2) energy to allow the equipment to function, and 3) information to control the equipment.

What is the information that is required in this process of CAD/CAM? It is the information that defines the parts – their size, shape, dimensions, and materials. This information must be sent to the equipment to make the parts with the right characteristics. In computer aided design (CAD), engineers use a computer (Figure 1) to design the parts that are needed to manufacture the item. In this process, they put into the computer all the information that is required to fully define the characteristics of all the parts that are required. With a push of a key on the keyboard, this information is sent to the manufacturing process to control the equipment that makes the parts. Without this information, a useful part could not be made. Energy is also needed for the equipment to function. In the example in Figure 2, the cutting equipment must be provided with electricity to operate.

Figure 1. Information is Input in Computer Aided Design

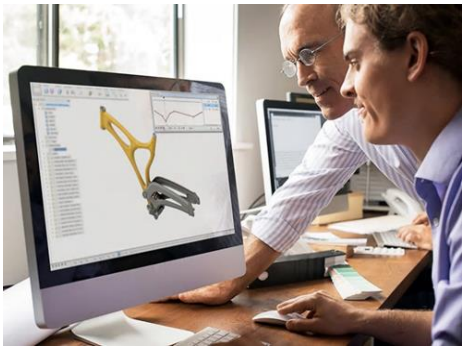


Figure 2. Information is Used in Computer Aided Machining

2. Why can we see the Image?

The quantity and quality of information may be difficult to measure, but it's presence can be easily recognized by an individual. When a person reads a sentence and it conveys a meaningful concept to the person, he knows that the sentence contains information. Consider the following sequence for loss of information from the sentence "She saw a black cat."

1. She saw a black cat.
2. Hes wsa a calbk tac.
3. Bcs ask l ahate awc.
4. bc saSk la h.ate awc
5. ▒▒ ▒▒▒▒ ▒▒ ▒▒▒▒▒ ▒▒▒

Line 1 in this sentence contains readily apparent information because it means something to a person reading it. In line 2, information is lost from this sentence when the letters in each word are randomized, i.e. mixed up. But information is still present because with enough trials of rearranging the letters, the original meaning can be recovered. Each trial would consist of a random reassortment of the letters in each word until a person can recognize the sentence as meaning something. When the letters are mixed up between the words as well, as in line 3, more information is lost, and more random trials rearranging the letters would be required to get back to the original sentence. In line 4, additional information is lost when the correct punctuation (spacing between words, first letter capitalized, and a period at the end) is randomized. But this sentence still contains information in that it contains the correct letters, and each letter contains information that defines its appearance. The information that defines a letter's appearance is

contained in the X and Y coordinates of each pixel or dot that makes the image of the letter. When this information is removed, as in line 5, the X and Y coordinates of each pixel/dot that made the letter is randomized. Thus, there is information not only in the sequence of the letters and the punctuation, but also in the location or pattern of the pixels that define the appearance of the letters.

The same can be said for any image that you see in a newspaper, a magazine, a photograph, on television, or on a computer monitor. The image is formed by the location and size of the pixels. The location and size of the pixels were formed by a process that was controlled by the information that defines the image. In this way, the information that defines the image was encoded into the pattern of the pixels and thus into the image. For example, a person in a photograph can be recognized because the information that defines the person's appearance has been encoded into the location of the pixels/dots on the photograph.

In fact, every image we see is based on information, even the image we see around us when we open our eyes. As an example, how is it that one person can see another person? A simplistic answer might be that when you open your eyes and if there is enough light then you can see the other person, but a more detailed explanation is helpful to understand why we can see the image. The smallest packet of energy that makes up light is called a photon. Photons can carry, transfer, or communicate information in three ways. A photon's energy communicates color, its intensity (number of photons) communicates shade (light vs dark), and the position and angle that it enters the lens of a person's eye communicates the position of the color and shade of the point being seen. Thus, person A can see person B because the color, shade, and position of every point on person B is communicated to the eyes of person A by photons that reflect off person B, some of which enter the eyes of person A.

The same can be said for the Shroud of Turin, except that the pixels are discolored fibers instead of dots. We recognize the image on the Shroud as a crucified man because the information that defines the appearance of a crucified man was used to specify the location and length of the discoloration on the fibers in the image. As a result, this process encoded this information into the image.

There are three requirements to form any image: 1) there must be a process or mechanism to produce shades and/or colors in a medium, 2) there must be energy to drive the process or mechanism, and 3) there must be information to control the process or mechanism so that the shades and/or colors are correctly located to produce the image. The information required to control the process must be that which defines the image. This information must be delivered to the location of the process in order to control it. This can be applied to the Shroud. To form the image on the Shroud, there must have been: 1) a mechanism to discolor the fibers, 2) energy to drive the discoloration mechanism, and 3) information to control the discoloration mechanism. The information required to control the discoloration mechanism must be that which defines the appearance of a crucified man. This information must have been deposited on the cloth for that is where the mechanism was discoloring the fibers. If this information were not deposited on the cloth, then no image could have been formed by the discolored fibers. The fibers could still have been discolored, but only a meaningless blur would have been formed on the cloth.

In Figure 3, the pixels are dots of color. The location of these dots is controlled by the information that is input into the discoloration process. This process effectively encodes the information into the pattern of colored dots that create the image. The information that is required to accomplish this is that which defines her appearance, including colors, shades (light vs dark), and positions of each color and shade. This information is transferred from her body and clothing to the camera by reflected photons. We can see her image in this picture because the information that defines her appearance (colors, shades, positions) has been encoded into the pattern of pixels that form the image. When we look at the picture, reflected photons communicate this information to our eyes. The photons deposit this information on the rods and cones at the back of our eyes, where this information is translated into electrical signals that travel up our optics nerves to our brains. Our brains have learned to recognize this information in the electrical signals as the person in the picture.

The same applies to the image on the Shroud. We can see the image of the crucified man because the information that defines the appearance of a crucified man controlled the mechanism that discolored the fibers. Because of this process, this information was effectively encoded into the pattern of the discolored fibers in the image. Thus, we can see the image of a crucified man on the Shroud (Figure 4) because the information that defines the appearance of the crucified man has been encoded into the pattern of the discolored fibers on the Shroud.

Figure 5 shows the 3 to 1 Herringbone weave of the Shroud and shows certain fibers that have been discolored. It is these discolored fibers that make the image of the crucified man. Yet as you get close to the fabric, as in Figure 5, you cannot see the image. In a painting or a photograph, you can see the details of the image better as you get closer to it but with the Shroud, you must be several feet back from the cloth to see the image. It should be noted that the discolored fibers are only on the surface of the thread.

In a photograph of a person, the information required to form the image is that which defines the appearance of the person, i.e. colors, shades, and positions, so this information could only come from the person. This information would be communicated from the person to the camera by reflected photons, which are a form of radiation. The same can be said for the Shroud. The information must be that which defines the

Figure 3. Information is Encoded into the Image on a Photograph

Figure 4. Information is Encoded into the Image on the Shroud

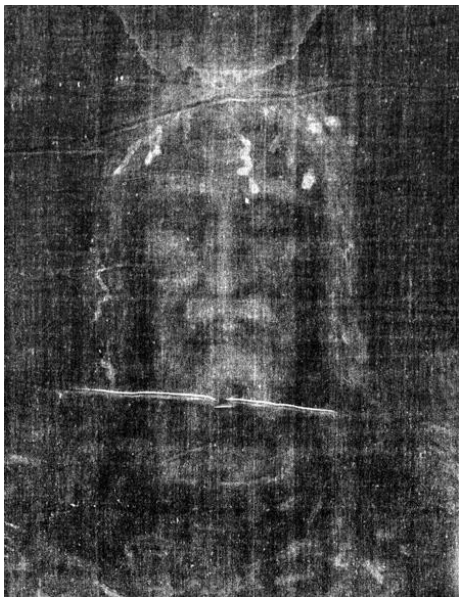
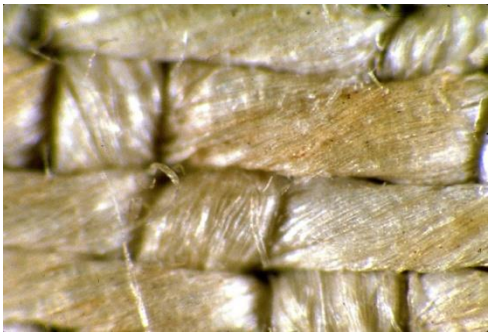


Figure 5. The Information is Encoded into the Location of the Discoloration on the Fibers.



appearance of a man that died by crucifixion exactly as Jesus was crucified. This information had to come from the body since it was only inherent to the body. It was not located in the limestone or the air in the tomb. And it had to be deposited on the Shroud to control the mechanism that discolored the fibers.

The first seven decades of research on the Shroud included many very qualified individuals:

	Research
• Dr. Yves Delage, Prof. of Comparative Anatomy, Paris	1900-1902
• Dr. Paul Vignon, Professor of Biology, Paris	1900-1943
• Dr. Pierre Barbet, Prof. of Anatomy, Paris	1932-1961
• Dr. Robert Bucklin, M.D, Forensic Examiner, LA	1941-1993
• Dr. Frederick Zugibe, Chief Medical Examiner, NY	1953-2002
• Dr. Alan D. Adler, Prof. of Chemistry, Conn. State U.	1978-2000
• Dr. John Heller, Prof. of Medical Physics, Yale	1978-1995
• Dr. John Jackson, Prof. of Physics, Air Force Aca.	1978-
• Dr. Baima-Bollone, Chief of Forensic Medicine, Turin	1978-

Their research focused primarily on the nature of the blood on the Shroud. They concluded that the blood must have come from the body of a crucified man that was wrapped in the Shroud. The important point is that there was a crucified man that was wrapped in the Shroud.

The amazing discovery of 3D information in the image on the Shroud led to the establishment of the Shroud of Turin Research Project (STURP). In 1978, the Vatican allowed STURP to come to Turin, Italy, to perform none-destructive experiments on the Shroud of Turin in the Cathedral of St. John the Baptist in Turin, Italy, for five days, 24 hours a day. STURP's main goal was to determine how the image was formed. They concluded that there was no evidence of pigment forming the image on the Shroud. They also found no carrier, no brush strokes, no clumping of fibers or threads, no capillarity (soaking up of a liquid), no stiffening of the cloth, and no cracking of the image along fold lines. Because there is no indication of capillarity, the image could not be due to an artist using an acid or any organic or inorganic chemical in liquid form. This evidence indicates that the image is not the product of an artist.

Under UV light, the scorches on the Shroud from the fire in 1532 fluoresced but the body image did not, indicating that the image is not a scorch from a hot object. The full size front and back images with good resolution, the extreme superficiality of the discoloration, the presence of 3D information in the image, the history of the development of photography, and the lack of residual material on the Shroud from a photographic process indicates the image was not formed by photography. The absence of body decay products on the Shroud indicates that the image was not caused by body decay products interacting with ointments placed onto the body. This evidence indicates there is no workable option for the image being an intentional forgery or the result of crucifixion. The only remaining option is that the image was formed by a body that was wrapped in the Shroud. This agrees with the evidence that the blood on the Shroud came from a body that was wrapped in the Shroud.

The information that was required to control the discoloration mechanism had to be deposited on the cloth when this mechanism was operating. This information had to define the appearance of a man that had been crucified exactly as Jesus was crucified. This information was only inherent to the body that was wrapped in the Shroud. It did not exist in the limestone walls, ceiling, and floor of the tomb, or in the air in the tomb. Thus, this information had to be carried, transported, or communicated from the body to the cloth, where it had to be deposited. There are six ways that information can be transported from one location to another. This includes:

1. Radiation, including charged particles such as protons or electrons, and what is called electromagnetic radiation such as infrared, visible, and ultraviolet light.
2. Waves in a medium such as sound waves in air or water waves in the ocean.
3. Direct contact such as fingers on a keyboard.
4. Flow of charged particles through physical connections such as the flow of electrons through wires or the system of nerve cells in the body.
5. Diffusion of molecules such as the smell of a skunk or the taste of an orange.
6. Waves in a field such as an electrostatic or gravitational field.

The cloth was not in contact with the body at every point of the image, such as next to the tip of the nose, so that direct contact can be ruled out. It is safe to assume that there were not wires connecting every point of the body with every point on the image, so electron flow through wires can be ruled out. The image on the Shroud has good resolution, so the information had to be delivered to the cloth as focused information. Diffusion of molecules and waves in a medium or field would not deliver focused information to the cloth, so they can be ruled out. The only remaining option is radiation. Radiation, both charged particles and photons of electromagnetic radiation, is ideally suited to transport the information required to define an image. The energy of the radiation can communicate the colors in the image, the intensity (number of particles) of the radiation can communicate the shades (light vs dark), and the direction of the radiation can communicate the location of each color and shade. (Ref. 2 and 3)

When the radiation hit the cloth, it was absorbed by the cloth, thus depositing the information onto the cloth that was required to control the discoloration mechanism. This process effectively encoded the information into the pattern of discolored fibers on the cloth. Since the image is that of a crucified man, the information that was encoded into the pattern of discolored fibers was that which defines the appearance of a crucified man.

In conclusion, the image can be seen on the Shroud because the information that defines the appearance of a crucified man has been encoded into the pattern of discolored fibers that make the image. Photons of light reflect off the image in all directions, some of which enter our eyes. These reflected photons carry the information regarding the shade of the discoloration at each point on the image. The location and angle that the photon enters the lens of our eyes determines which rod or cone that it hits at the back of our eyes, which determines where we perceive the point to be on the image. The rods and cones translate this information into electrical signals which travel up our optic nerves to our brains. Our brains have learned to recognize this information as an image of a crucified man.

References

1. Robert A. Rucker, "Holistic Solution to the Mysteries of the Shroud of Turin", Rev. 0, December 18, 2019 *
2. Robert A. Rucker, "Information Content on the Shroud of Turin", Rev. 0, Oct. 11, 2016 *
3. Robert A. Rucker, "Role of Radiation in Image Formation on the Shroud of Turin", Rev. 0, October 11, 2016 *
4. Robert A. Rucker, "Image Formation on the Shroud of Turin", Rev. 1, June 20, 2019 *

* - Papers by Robert A. Rucker can be downloaded from the research page of www.shroudresearch.net. Send comments and questions to robertarucker@yahoo.com.

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