

# TILMAN EHRENSTEIN

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## DIAGNOSTIC IMAGING

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In December 1895 a famous scientific report *Über eine neue Art von Strahlung / Concerning a New Kind of Radiation* presented a picture with a skeleton of a right hand. It was the first ever published radiograph of the human body. The skeleton is complete, all bones are of normal shape and in their natural position, bony outlines are clearly defined, the structure of the bone is regular and of normal density, no obvious injuries or deformities are visible. A metal object, apparently a ring, is placed around the fourth finger.



X-ray of a Right Hand with Ring

information and historical x-ray provided by Dr. Hennig at the Roentgen Museum, Remscheid

One may assume from the delicate and tender appearance of the hand, that it belongs to a female. Since epiphyseal plates are closed and growth is completed, while there are no signs of osseous degeneration, it is most likely the hand of a young woman. The lack of bony alterations may indicate that she did not have to perform hard physical work. She also didn't suffer from a major physical complaint concerning her hand, so no diseased alterations are seen. Most likely the picture was not taken for a medical purpose at all, otherwise the ring would certainly have been removed.

To whom does this hand belong? She was not a patient and as radiology was a rare and brand new technique at the time, she most probably was related to the scientists who discovered the effect of the radiation only in the preceding weeks. The ring on her finger might be the clue. As a single ring it may have symbolic meaning -- the ring of a married woman -- and the fact that the ring is on her right hand instead of her left locates her somewhere in Europe, either in France, Germany or Italy.

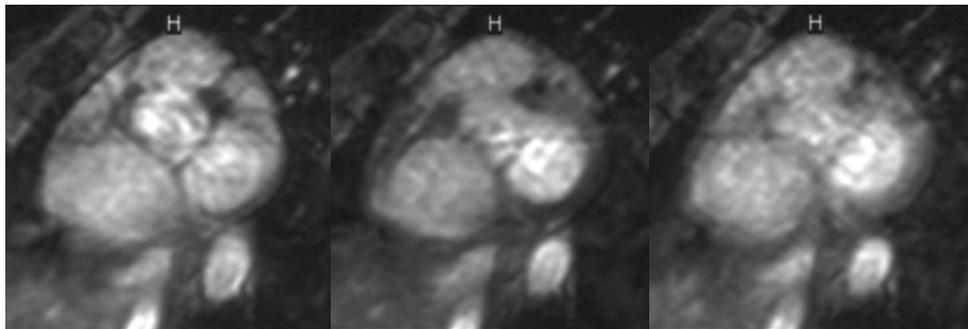
In fact, it is the hand of Anna Berta Roentgen, the young wife of Wilhelm Conrad Roentgen who had taken this picture on the 22 of December 1895, six weeks after he had discovered the existence of a new radiation called X-ray in his Würzburg laboratory.

The process of thoughts and assumptions that leads from a single picture consisting of a range of lines, shadows and grey scales to the characterization of a personality is not unlike the process a doctor performs in order to assess a patient's health from looking at a comparable picture. The doctor utilizes a method that allows a visualization of the invisible.

The image therefore is always a selection that serves a certain purpose. Through the process of reduction and selection, things become assessable, which at first do not warrant attention.

A doctor is faced with the task of discerning something that is hidden in the image. From a collection of outlines, shadows and contrasts, the doctor is expected to draw a conclusion concerning the patient's health. Of interest, therefore, is not the bare image of a body, but an image of its function, since disease can be interpreted as a reduction in functionality.

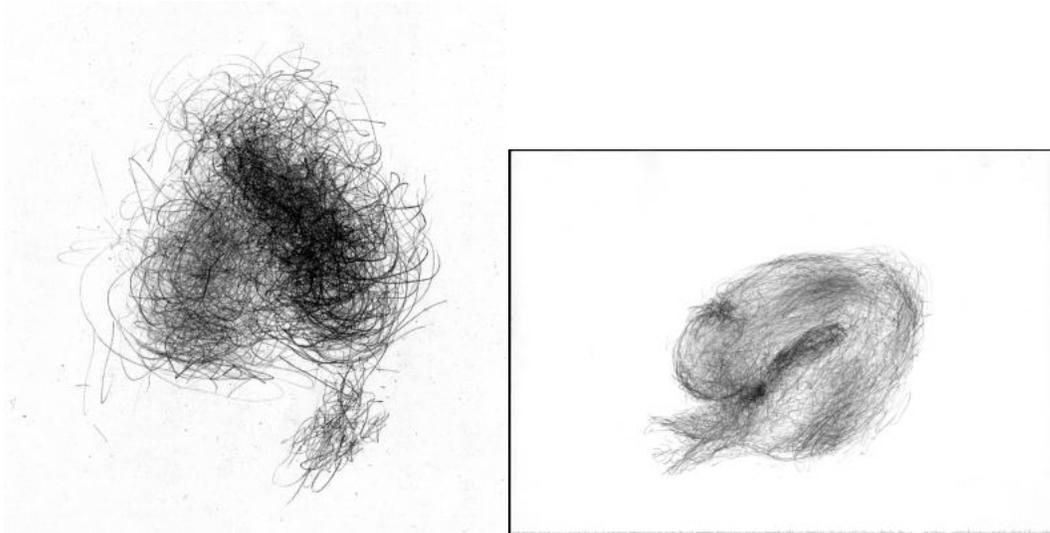
In practice, most radiological techniques like conventional X-ray and computer tomography (a method of radiology displaying details in a selected plane in the body) produce static images. Not only is the image itself created by a process of selection but timing adds another dimension as movement is stilled by being taken out of a continuous process. Functionality is hidden behind a collection of single snapshots. In an attempt to compensate for this problem, one can add up a number of images taken of a repetitive action, one at a time, from different stages of subsequent cycles, each time moving a little further along the time line and putting them together on film. Thus, the illusion of continuous movement is created. An example is the visualization of a moving human heart through Magnetic Resonance Imaging, an invention of this century (MRI, a non-invasive diagnostic technique employing a scanner to obtain computerized images of internal body tissue). A number of images taken at different stages of approximately sixty subsequent heartbeats are linked together. The result is an ideal heartbeat extracted out of a number of repetitive actions.



*Magnetic Resonance Imaging (MRI)*

*Images of a beating human heart taken at different stages of subsequent heart cycles.*

Although this technique is an approach towards direct visualization of movement and function, one has to bear in mind that the result is just another selection, a nonetheless useful one, as it gives a general idea of what a heartbeat looks like. In its idealized form it not only produces an image but also provides a notion of the character of very specific movements. While using this technically very advanced method to produce a film of an idealized heartbeat which provides insight into the living body, with a notion of its functionality and a recognition of its very distinct and characteristic motions, it is very fascinating to see how the product of this effort can be further condensed into a single graphite drawing. It is impressive to see how this is achieved by applying a very skillful, yet simple method and by further selecting the available information to create an image that contains an even more general idea of what a heartbeat is about. The artist, positioned in front of the aforementioned MRI video loop of a beating heart, holds a mass of graphite pencils over a piece of drawing paper. Allowing the pencils to rest on the paper, the artist mirrors the pulsing action of the heart, alternately guiding and relaxing the pencils, tracking the movement pattern of one muscle after another until the complete heart becomes visible on the page.



*Drawings of a beating human heart by Morgan O'Hara accomplished with the technical assistance of Dr. Matthias Gutberlet in the Virchow Klinikum, La Charité, Berlin, Germany. Graphite on Bristol paper II x 14 inches / 28 x 35,5 centimeters.*

Diagnostic meaning, be it arrived at through a medical film or a drawing is always challenged by the task of visualizing something that cannot be captured as an image in itself. Though the information about this hidden something, an expression of disease or a clue to the character or general idea -- in this case, of a human heartbeat -- is contained in the image, it is often buried underneath layers of competing and distracting information.

The art of medical imaging, therefore, seeks to unwrap this hidden something by a process of reduction, selection and imagination. An abstract image of the human body, be it only a collection of lines, shadows and greyscales as seen through X-rays or by a density of graphite energy traces in a drawing by Morgan O'Hara, enables one to recognize something which may reveal more than that which first meets the eye.

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