Evidence that the Shroud Was not Completely Flat During Image Formation

Dr. Mario Latendresse

latendre@iro.umontreal.ca

The Turin Shroud Was Not Flattened Before the Images Formed and no Major Image Distortions Necessarily Occur from a Real Body

Dr. Mario Latendresse

latendre@iro.umontreal.ca

The complete paper is available online

The paper – and these slides – are available at

www.sindonology.org

as well as access to all materials, including an online tool to do length measurements on the Shroud.

There are many details that cannot be presented in these slides: the paper should be consulted.

The two questions addressed by this paper

A Was the top half of the Shroud forcefully flattened before the images formed? That is, after the blood stains formed, was the top half of the Shroud flattened before the images formed?

B If the top half of the Shroud draped the body when the images formed, should we necessarily see major image distortions when the Shroud is shown flat?

We argue that the answer is no, to both questions.

Why are these questions important?

Several researchers – pro and con-authenticity – claim that the Shroud had to be forcefully flattened to avoid image distortions.

It is believed that if the top half of the Shroud draped a body while the images formed, major image distortions would result once the Shroud is shown flat.

For the con-authenticity, the belief of a forceful flattening points toward a man made fabrication. And the belief in the necessary obvious image distortions points toward the use of a bas-relief.

We show that these beliefs are unfounded.

The possible answers to the two questions

1. A: yes; the Shroud was forcefully flattened. B becomes irrelevant. Problem: how do we explain how it was flattened? By whom? Or by what mechanism? It looks like the Shroud is a man made fabrication.
2. A: no, B: yes. The Shroud was not forcefully flattened, and there is necessarily major image distortions from a real body. In that case the Shroud is not authentic.
3. A: no, B: no. The Shroud could be authentic. There is no need to have “someone” or a special mechanism flattening the Shroud.

The Simplest scenario for authenticity

The simplest scenario for authenticity is to have both questions answered negatively: there is no need for an explanation on how it was forcefully flattened.

Is it possible that no major image distortions would occur if the images formed while the top half of the Shroud draped a real body?

Yes it is! (Xouxa 2005)

This is yet another counter-intuitive aspect of the Shroud image.

What is an image distortion?

An image appears distorted if it undergoes an asymmetric modification – i.e. a widening or shortening.

If an image is symmetrically modified, we have a rescale, which is more difficult to perceive.

On the Shroud, we might have asymmetrical as well as symmetrical modification.

Our major assumptions

1. The Shroud was covering a full human body form (henceforth simply “body”) that was lying down essentially perpendicular to the force of gravity when the blood stains and images formed.
2. The images formed by a mechanism that reproduces each point by a vertical projection, from the body to the Shroud.
3. The distance between the surface of the body and the Shroud is inversely proportional to the luminance of the image. More precisely, we will assume that beyond two centimeters the projection has lost more than 80% of its efficacity.

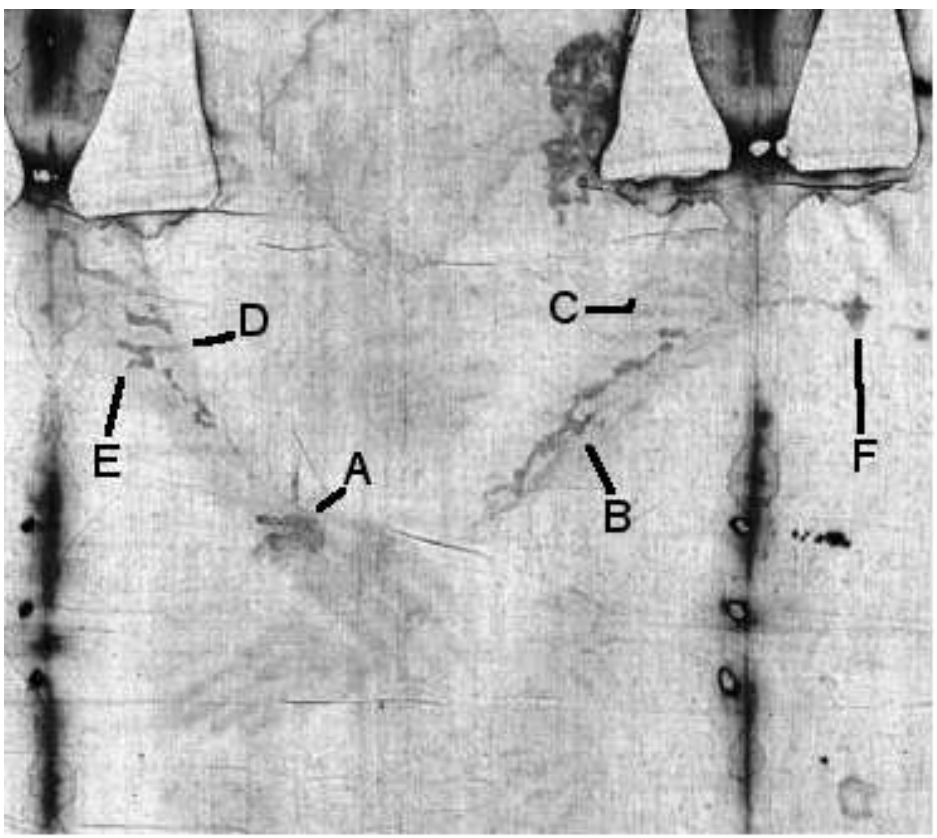
The first question

Was the top half of the Shroud forcefully flattened before the images formed? That is, after the blood stains formed, was the top half of the Shroud flattened before the images formed?

Our demonstration of that result is based on the following observations:

The blood stains from the face, in particular the ε-shape one, and the blood stains on the arms do not show any major (> 1 cm) longitudinal repositioning when compared to the image.

The blood stains on the arms



Some blood stains are right to the edges of the arms (e.g. C and D). It is hard to imagine that repositionings of the Shroud occured over the arms.

The ε-shape blood stain

If the ε-shape blood stain had been lower by a few centimeters, it would have been over the eye – a very odd location.

First Conclusion

Once the blood stains formed, the Shroud cannot have been made straight, or flattened, before the images formed.

Otherwise, the blood stains would have moved up or down relative to the images – we do not see that on the Shroud.

The second question

If the top half of the Shroud draped the body when the images formed, should we necessarily expect major image distortions when the Shroud is shown flat?

1. Based on digital images of body cross-sections. (The Human Visible project). Difficulty: modeling the sheet. This is not presented on these slides. Please, see the paper for the results.
2. Based on a real human body covered with a real linen sheet. Difficulty: computerised the measurements. We present this approach.

Length measurements on digital images

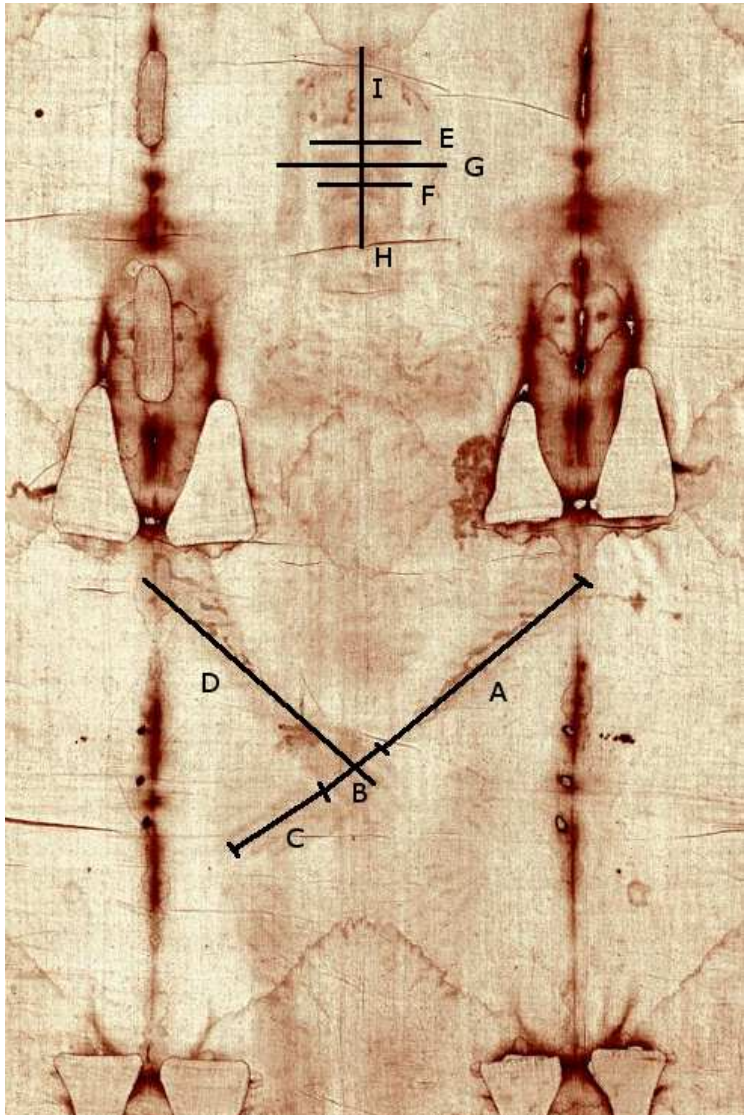
We use a simple technique to report length measurements that can be **reproduced**: the lengths are calculated using the number of pixels between two **reported** end-points.

An end-point is a (x, y) coordinates directly taken from the digital photograph. The upper-left corner is $(0, 0)$.

The photograph is calibrated: 1px $= x$ mm.

The length between (x_1, y_1) and (x_2, y_2) is $x\sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ mm. Most graphic software gives the $\sqrt{\ldots}$ value (e.g. Gimp).

Length measurements on digital images



The calibration of that photograph is 1 px$=$1.901 mm.

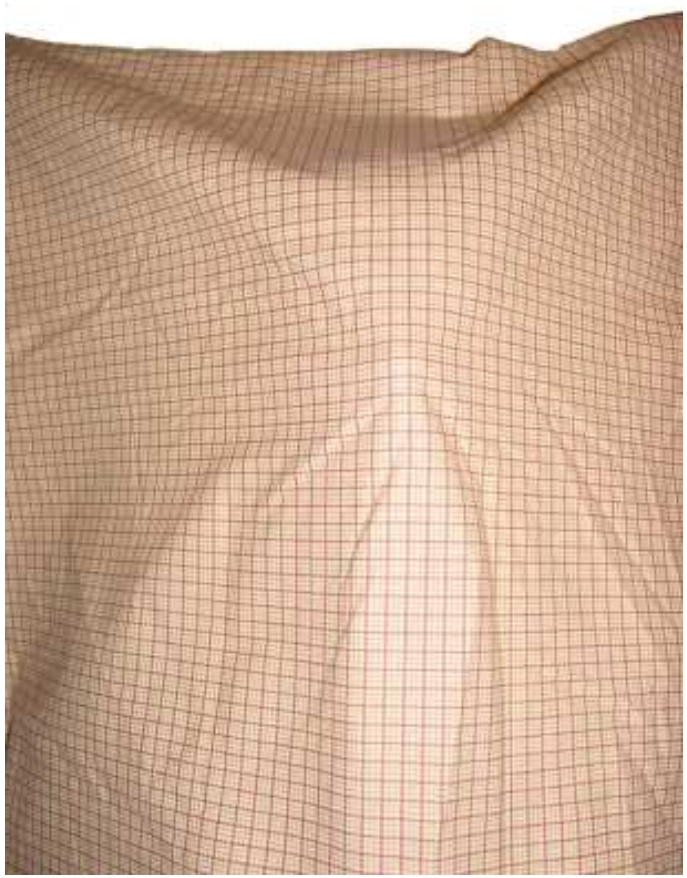
Length measurements on Enrie's photograph

Label	Description	End-points coordinates	Nb of pixels	Length in cm
A	Right forearm	$(455, 1603)(323, 1713)$	172	32.6
B	Left hand width	$(282, 1743)(322, 1713)$	47	8.9
C	Right fi ngers	$(283, 1743)(224, 1781)$	70	13.3
D	Left forearm and hand	$(164, 1600)(316, 1735)$	203	38.9
E	Width of face, eyes	$(275, 1310)(346, 1310)$	71	13.5
F	Width of face, tip nose	$(280, 1338)(340, 1338)$	61	11.6
G	Width of face-hair	$(253, 1325)(363, 1325)$	111	21.1
H	Head height	$(308, 1379)(308, 1248)$	132	25.1
I	Top head to center eyes	$(311, 1248)(309, 1309)$	62	11.7

Our face model

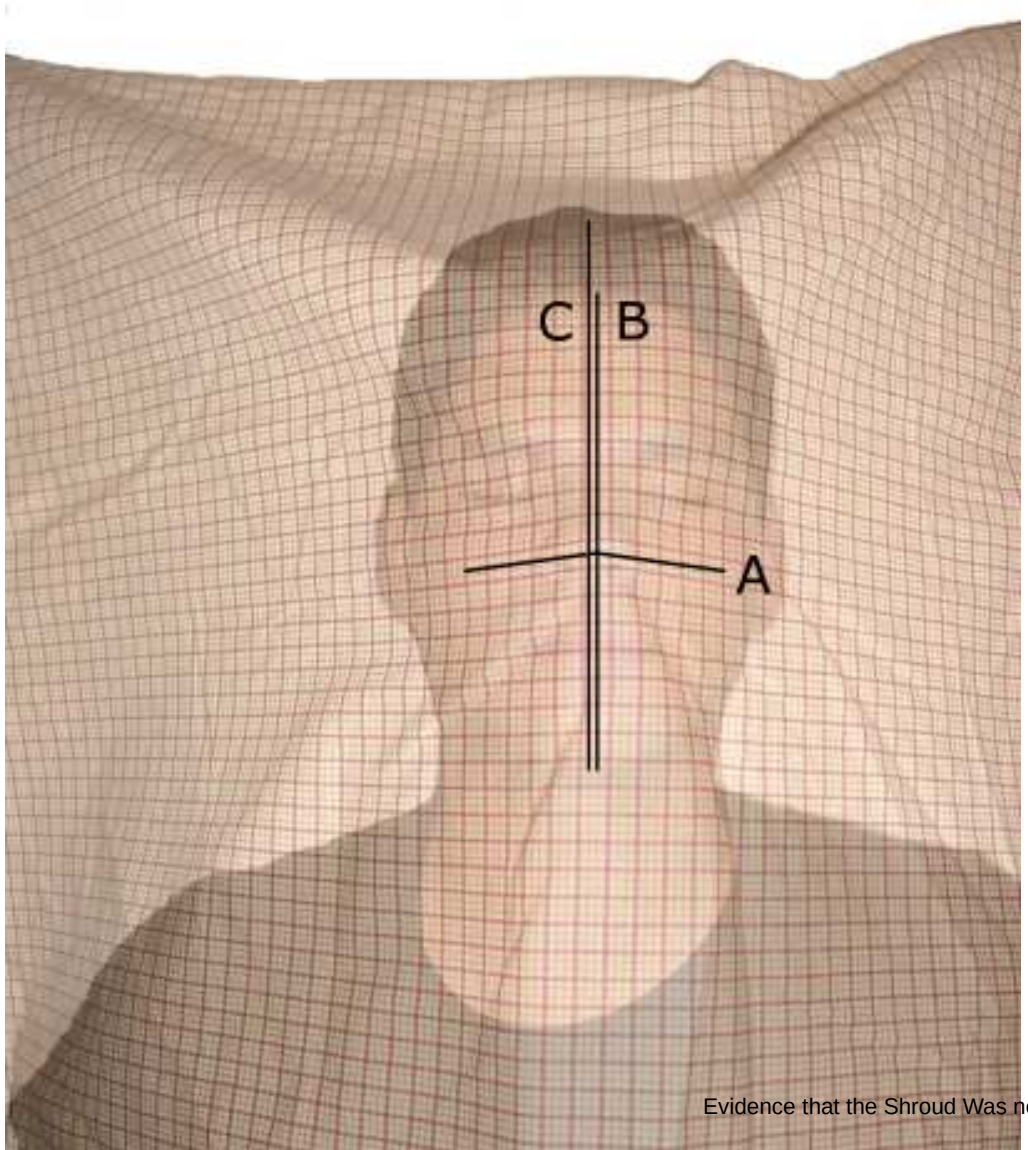
The camera is fixed. First we take a picture of the model, then we cover the body with a linen sheet for a second photograph...

Our face model covered by a linen sheet

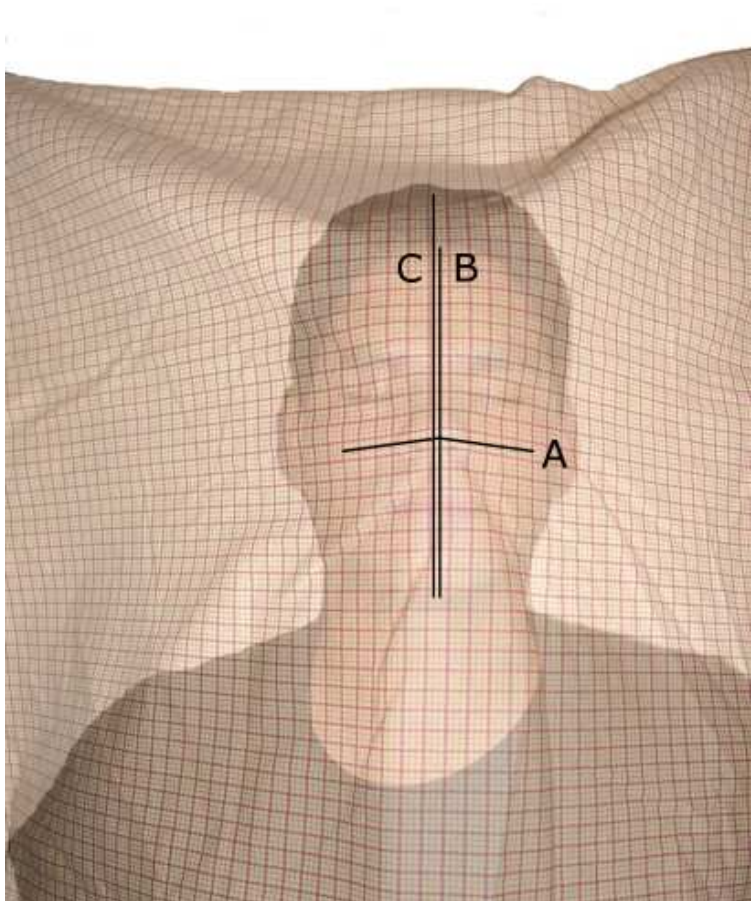


The camera is fixed, the model did not move. We can then make this photograph digitally transparent over the previous one...

The sheet is digitally transparent



Measurements of image distortions in the head area

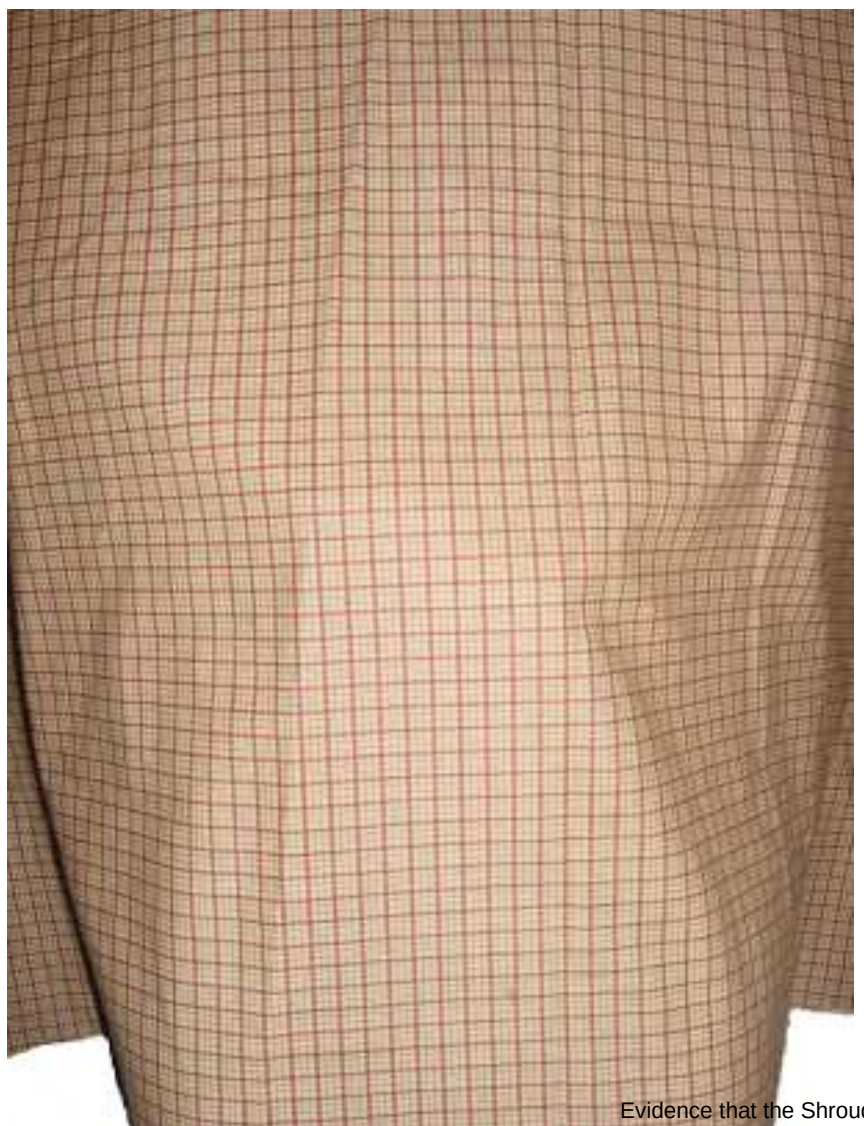


One lengthwise grid division is 1.034 cm, and one widthwise grid division is 1.111 cm. 1 px $=$ 0.225 mm. The Length is the “real expected” length. The Grid Length is the “distorted” length.

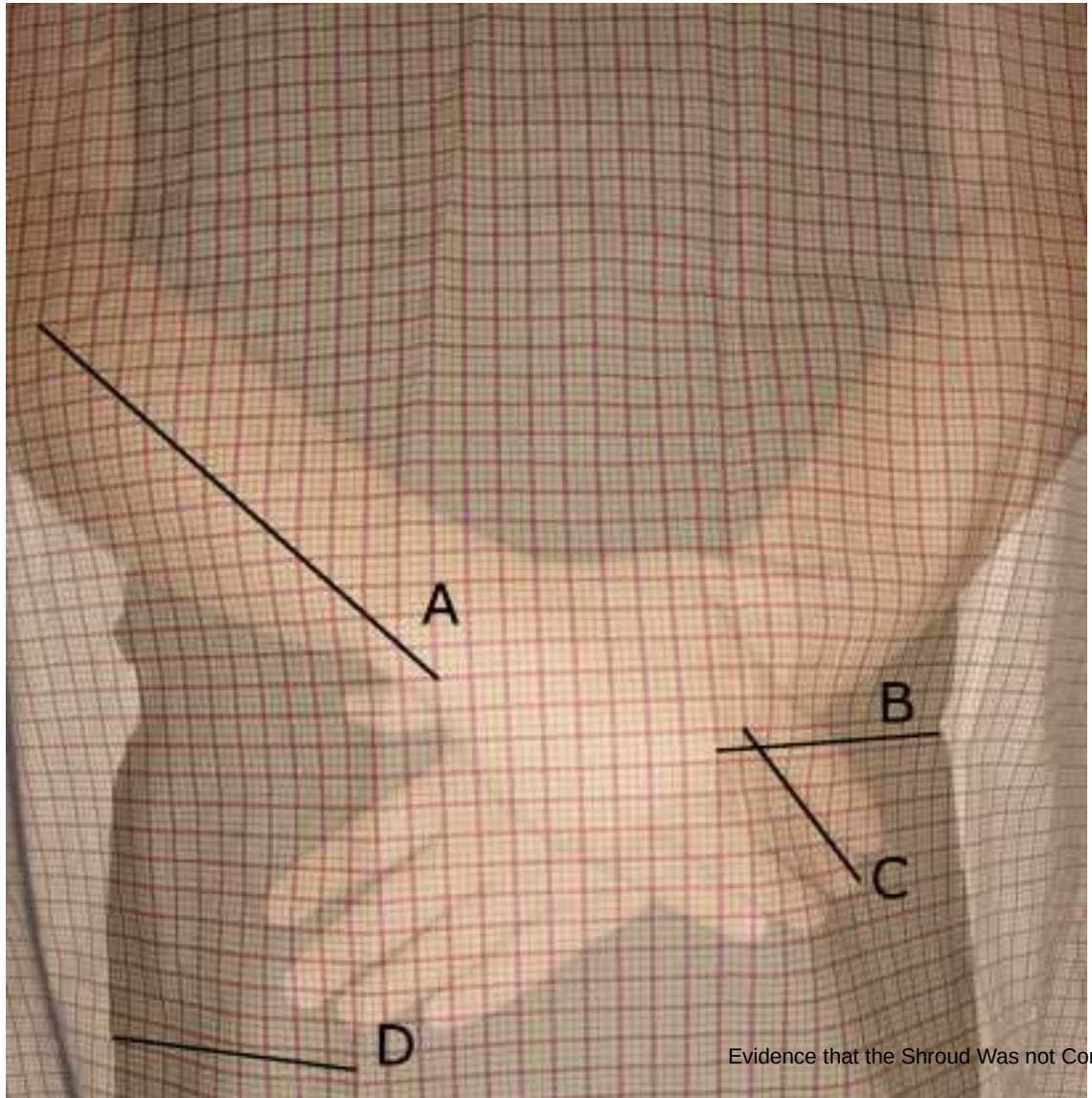
Label	**Px (x)**	**Length**	**Grid Length**	
		cm	**cm**	% increase
A	393	8.8	12.2	28%
B	718	16.2	19.4	16%
C	833	18.7	25.8	27%

Our model (the arms area)

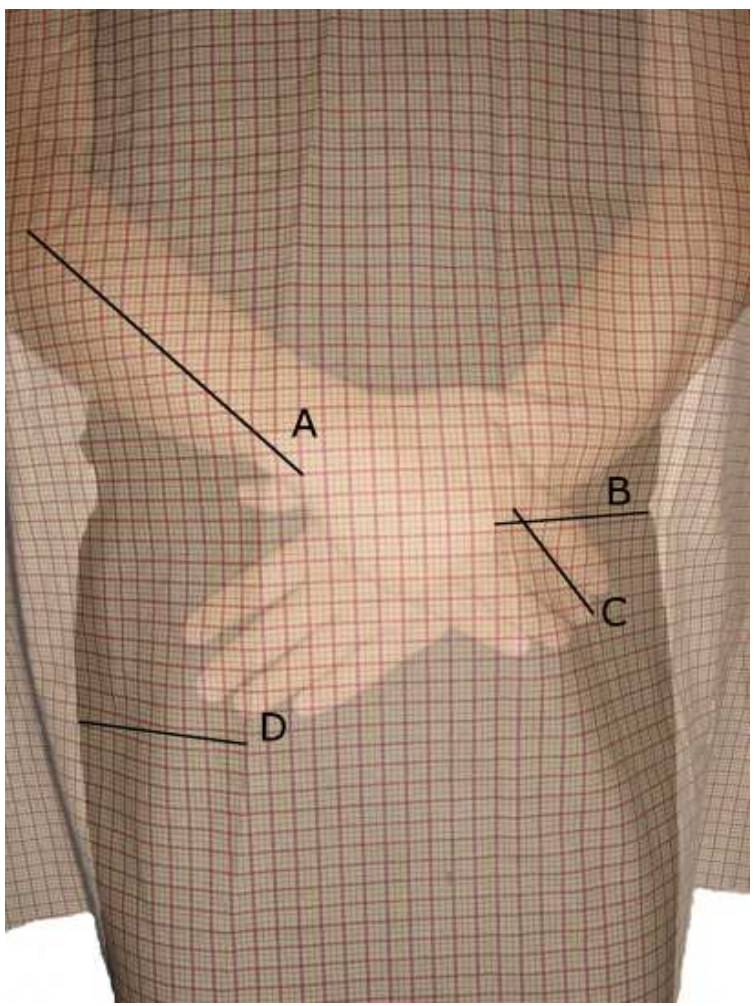
Our model covered with a sheet (the arms area)



The sheet is made digitally transparent



Measurements of image distortions near the arms



Calibration: 1px$=0.228$mm. A grid division is 1.034cm long by 1.111cm wide; a diagonal is 1.518cm. The Length is the “real expected” length. The Grid Length is the “distorted” length.

Label	Px (x)	Length cm	Grid Length cm	% Increase
A	756	17.2	19.7	13%
B	313	7.1	12.2	
C	270	6.1	8.9	
D	346	7.9	12.2	

Second Conclusion

There is not necessarily any major image distortions even if the Shroud draped a real body and the images were formed by a “vertical” projection.

Some small image distortions should occur, that are difficult to perceive without measurements.

Other researchers (Ercoline et al, 1982; Jackson 1989) have shown that there are small image distortions consistent with the Shroud draping a body when the images formed.

Related works

The results presented in this paper partially contradicts the results of Lavoie et al. on the formation of blood stains in the face area.

But it is consistent with the work of Jackson, Ercoline et al. on small image distortions found on the Shroud: the draping should produce small image distortions.

Ercoline et al, “Examination of the Turin Shroud for Image Distortions”, 1982.

Lavoie et al., A three parts series in Shroud Spectrum International, 1983, 1986.

The full paper is online

Again, the full paper and the slides are available at

www.sindonology.org

Summary

It has been shown that, once the blood stains formed by contact, the Shroud was not globally repositioned before the images formed.

It has been shown that no major image distortions necessarily occur if the top half of the Shroud was drapping the body, as the blood stain indicates, when the images formed.

This disproved, for example, that a bas-relief had to be used to avoid image distortions.

Future work

Do several 3D scans of a real body with and without a sheet in several positions.

The deformation of the images could be reproduced by computer simulation.

Access a high resolution digital scans of the Shroud to study all possible point of contacts of the Shroud with the body. (Access to the restoration scans of 2002?)