

SISTER LUCY **TRUTH**

FACIAL MATH MEASUREMENTS

Mathematical Measurements Confirm Expert Opinions: Pre-1967 Sister Lucy is a Different Individual than “Sister Lucy,” 1967–2005

EXPLANATION OF THIS REPORT

Sister Lucy Truth sought to confirm some of the visual findings offered by experts including Dr. Garcia, the board-certified plastic surgeon, Lois Gibson, the expert forensic artist, and facial recognition specialists. These visual findings included the claims that (a) Lucy I’s philtrum (base of nose to top of upper lip) was longer than Lucy II’s philtrum, (b) Lucy II had a wider nose, (c) Lucy II’s eyebrows are farther away from her eyes than Lucy I, and (d) Lucy I’s left eyebrow is arched relative to her right brow, a feature not observed in Lucy II. **All of these findings were confirmed by careful mathematical measurements.**

Ratios comparing anatomical landmarks on an individual’s face should remain constant despite an individual appearing in different sizes in certain photographs. For example, dental professionals, such as prosthodontists, use old photographs of a patient to help establish the size of a patient’s missing tooth. Old photographs allow for the dentist to establish a mathematical ratio between a tooth and other anatomical landmarks on the patient’s face as depicted in the photograph. These ratios are then applied to the live patient’s face to deduce the size of a missing tooth.

Specifically, the patient’s true interpupillary distance (horizontal distance between the midpoint of each pupil) can be compared with the interpupillary distance measured on a full face photograph; a ratio can be calculated and then used to determine the size of a replacement tooth from the relative size of the patient’s own tooth depicted on the photograph. As an example, if an old photograph of a patient shows an interpupillary distance of 10mm and tooth width of 1mm, then a ratio of 10:1 is derived. A ratio of 10:1 can be simply stated as 10. From there, the doctor would measure the live patient’s interpupillary distance, and, if that distance measured at 50mm, then the doctor could apply the 10:1 ratio and conclude that the needed missing tooth should be 5mm in width.

With the help of a prosthodontist, Sister Lucy Truth applied these measurement principles to a collection of full face photographs of the known Lucy I and the impostor Lucy II. The data below shows various ratios documented using different anatomical features of the face. As mentioned, **the data strongly supports the conclusion that Lucy I and Lucy II are different individuals given the different philtrum lengths, nose widths, eye brow distances and significant differences between the various ratios.**

OVERVIEW

- Eight known photographs examined of forward-facing Lucy I with a relatively expressionless pose.
- Five photographs examined of forward-facing Lucy II with a relatively expressionless pose.
- All numbers presented are ratios. All underlying measurements were made in millimeters.
- All measurements display a ratio calculated by dividing two different anatomical landmarks—ratios should be similar across photographs despite size of image.
- **These facial measurements demonstrate that the pre-1967 Lucy is not the same woman who was presented in 1967 and thereafter because they have different**
 - (a) **philtrum lengths**
 - (b) **nose widths, and**
 - (c) **eyebrow/eye distances.**
- These anatomical landmarks were selected with the aging process in mind as explained below.
- The charts depict **just how unusual Lucy II's measurements are** as compared to Lucy I.
 - A **yellow** ratio is more than 1 standard deviation outside of the expected (mean average) ratio in the authentic Lucy—68% of the ratios *should* fall within 1 standard deviation.
 - An **orange** ratio is more than 2 standard deviations outside of the expected ratio in the authentic Lucy—95% of the ratios *should* fall within 2 standard deviation.
 - A **red** ratio is more than 3 standard deviations outside of the expected ratio in the authentic Lucy—99.7% of the ratios *should* fall within 3 standard deviations.
 - A **dark red** ratio is more than 4 standard deviations outside of the expected ratio in the authentic Lucy—approximately 100% of the ratios *should* fall within 4 standard deviations.

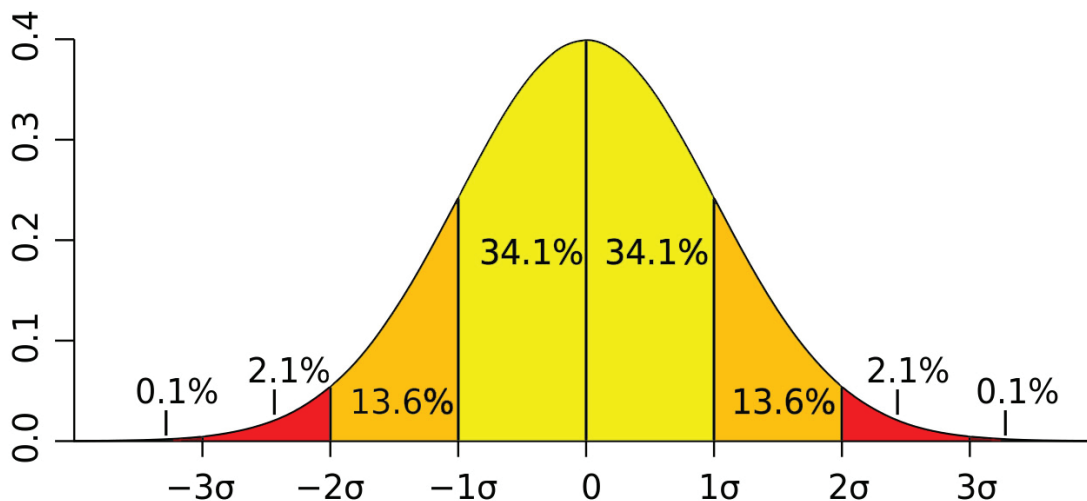


FIGURE 1. Standard deviation diagram.
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- The figures to the right of the various “>1 standard deviations” measurement key provide the numerical thresholds for each respective standard deviation parameter based upon the data analyzed.

KEY FINDING 1

Philtrum: Lucy I's Philtrum is Longer Than Lucy II's Philtrum and Therefore Inconsistent with Aging Process

Philtrum is base of nose to edge of top lip. Philtrum length gets *longer* with age, not shorter.

Philtrum lengths differ substantially between Lucy I and Lucy II given that the eye width/philtrum length ratio is significantly different. A *smaller* eye/philtrum ratio in Lucy I compared to the *larger* eye/philtrum ratio in Lucy II proves that **Lucy II has a shorter philtrum than Lucy I—an inconsistent finding which is also totally at odds with the known aging process.**

Known Lucia (Pre-1967)	Inner Eye/Philtrum Length	Interpupillary/Philtrum Length	Outer Eye/Philtrum Length
B1	1.875	3.625	5.5
B2	2.129032258	3.935483871	5.935483871
B6	1.866666667	3.6	5.066666667
B10	1.857142857	3.857142857	4.571428571
B11b	2.2	3.92	5.7
B12	1.555555556	3.444444444	4.888888889
B14	1.714285714	3.571428571	5.142857143
B15	2	4	5.870967742
Mean	1.899710381	3.744187468	5.33453661
Sum Squares	0.309159721	0.300390527	1.699268687
Variance	0.044165674	0.042912932	0.24275267
Standard Deviation	0.21015631	0.207154368	0.49269937
Unknown Lucia (Post-1967)	Inner Eye/Philtrum Length	Interpupillary/Philtrum Length	Outer Eye/Philtrum Length
C1	2.7	4.8	7.4
C2	2.631578947	4.947368421	7.157894737
C3	2.428571429	4.571428571	6.571428571
C4	2.416666667	5.166666667	5.833333333
D14	3.142857143	6	8.571428571
Mean	2.663934837	5.097092732	7.106817043
<u>Above Mean</u>			
>1 Standard Deviation	2.109866691	3.951341836	5.827235981
>2 Standard Deviation	2.320023001	4.158496205	6.319935351
>3 Standard Deviation	2.53017931	4.365650573	6.812634722
>4 Standard Deviation	2.74033562	4.572804942	7.305334092
<u>Below Mean</u>			
>1 Standard Deviation	1.689554072	3.5370331	4.84183724
>2 Standard Deviation	1.479397762	3.329878731	4.34913787
>3 Standard Deviation	1.269241453	3.122724363	3.856438499
>4 Standard Deviation	1.059085143	2.915569994	3.363739129

TABLE 1. Philtrum Ratios.

LUCY I



Photo B10.

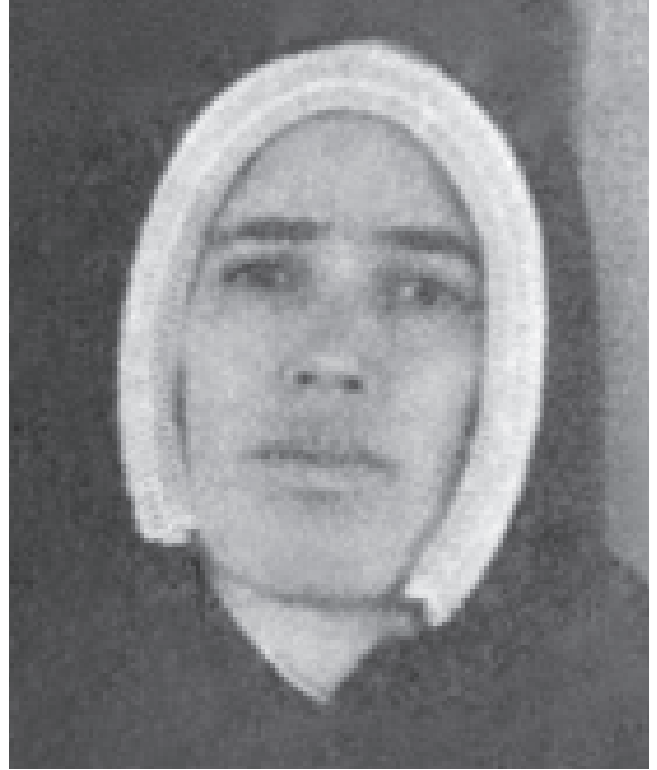


Photo B6.

LUCY II



Photo C1.



Photo C4.

KEY FINDING 2

Nose: Lucy I's Nose is Narrower Than Lucy II's Nose

Nose width does not change with aging.

Nose interalar width was examined by comparing the ratios of the nose to mouth and eye to nose. Nose/mouth ratios are substantially different: Lucy I's mean ratio of .628 indicates a narrower nose as compared to Lucy II's ratio of .745.

Ratio of Nose to Mouth	
Known Lucia (Pre-1967)	Outer Nose/Mouth Width
B1	0.666666667
B2	0.596491228
B6	0.625
B10	0.736842105
B11b	0.651162791
B12	0.615384615
B14	0.583333333
B15	0.551724138
Mean	0.62832561
Sum Squares	0.022851451
Variance	0.003264493
Standard Deviation	0.057135741
Unknown Lucia (Post-1967)	Outer Nose/Mouth Width
C1	0.75
C2	0.697674419
C3	0.75
C4	0.79245283
D14	0.736842105
Mean	0.745393871
<u>Above Mean</u>	
>1 Standard Deviation	0.685461351
>2 Standard Deviation	0.742597092
>3 Standard Deviation	0.799732834
>4 Standard Deviation	0.856868575
<u>Below Mean</u>	
>1 Standard Deviation	0.571189868
>2 Standard Deviation	0.514054127
>3 Standard Deviation	0.456918386
>4 Standard Deviation	0.399782644

TABLE 2. Nose to Mouth Ratios.

Eye to nose width ratios are also substantially different.

Known Lucia (Pre-1967)	<i>Inner Eye/Nose Width</i>	<i>Interpupillary/Nose Width</i>	<i>Outer Eye/Nose Width</i>
B1	0.9375	1.8125	2.75
B2	0.970588235	1.794117647	2.705882353
B6	0.933333333	1.8	2.533333333
B10	0.928571429	1.928571429	2.285714286
B11b	0.982142857	1.75	2.544642857
B12	0.875	1.9375	2.75
B14	0.857142857	1.785714286	2.571428571
B15	0.96875	1.9375	2.84375
Mean	0.931628589	1.84323792	2.623093925
Sum Squares	0.014249192	0.042281904	0.218459195
Variance	0.002035599	0.006040272	0.031208456
Standard Deviation	0.045117611	0.077719187	0.176659153
Unknown Lucia (Post-1967)	<i>Inner Eye/Nose Width</i>	<i>Interpupillary/Nose Width</i>	<i>Outer Eye/Nose Width</i>
C1	0.818181818	1.454545455	2.242424242
C2	0.833333333	1.566666667	2.666666667
C3	0.80952381	1.523809524	2.19047619
C4	0.353658537	0.756097561	1.666666667
D14	0.785714286	1.5	2.142857143
Mean	0.720082357	1.360223841	2.101818182
<u>Above Mean</u>			
>1 Standard Deviation	0.9767462	1.920957107	2.799753078
>2 Standard Deviation	1.021863811	1.998676294	2.976412231
>3 Standard Deviation	1.066981422	2.076395481	3.153071384
>4 Standard Deviation	1.112099032	2.154114668	3.329730537
<u>Below Mean</u>			
>1 Standard Deviation	0.886510978	1.765518733	2.446434772
>2 Standard Deviation	0.841393367	1.687799546	2.269775619
>3 Standard Deviation	0.796275756	1.61008036	2.093116466
>4 Standard Deviation	0.751158145	1.532361173	1.916457313

TABLE 3. Eye to Nose Width Ratios.



Photo B6 close up.



Photo C1 close up.

KEY FINDING 3

Eyebrows: Distance Between Brow and Eye Differ

Eyebrows droop with age or, at most, stay in relatively the same position. The ratios below measure the distance from

- (1) the bottom of the eyebrow to the middle of the pupil, and
- (2) the bottom of the eyebrow to the top of the eyelash.

Lucy I's eyebrows are *closer* to her eyes compared to the older Lucy II, findings at odds with the aging process. Stated differently, **the older Lucy II's eyebrows *should* be closer to her eye than Lucy I, but in fact, Lucy II's eyebrows are a greater distance away.**

Ratios comparing the bottom of the eyebrow to (1) the pupil and (2) the eyelash yield substantially smaller ratios in Lucy II, which indicate much greater distances compared to the real Lucy I. It is *extremely unlikely* that an *older* Lucy II would have a greater distance between the bottom of her brow to her pupil or eyelash.

Note: The arched position of Lucy I's left eyebrow actually makes it yield a more similar ratio to Lucy II's left brow (e.g., farther away from the eye). Consequently, this arch causes more yellows and even a green of the left eyebrow/eye ratios comparisons between Lucy I and Lucy II. This *asymmetrical* arching of Lucy I's left eyebrow is visible in many photographs but absent in Lucy II.

Known Lucia (Pre-1967)	<i>Interpupillary/ Right Pupil</i>	<i>Interpupillary/ Right Eyelash</i>	<i>Interpupillary/ Left Pupil</i>	<i>Interpupillary/ Left Eyelash</i>
B1	5.8	9.666666667	4.833333333	5.8
B2	6.421052632	11.09090909	6.1	10.16666667
B6	6	10.8	4.909090909	6
B10	6.75	9	5.4	6.75
B11b	5.850746269	10.88888889	5.444444444	9.333333333
B12	5.636363636	8.857142857	5.166666667	7.75
B14	6.25	8.333333333	5	7.142857143
B15	5.636363636	11.27272727	5.166666667	9.538461538
Mean	6.043065772	9.988708514	5.252525253	7.810164835
Sum Squares	1.114187519	9.434032169	1.148976635	19.75048089
Variance	0.159169646	1.347718881	0.164139519	2.82149727
Standard Deviation	0.398960707	1.160912952	0.405141357	1.679731309
Unknown Lucia (Post-1967)	<i>Interpupillary/ Right Pupil</i>	<i>Interpupillary/ Right Eyelash</i>	<i>Interpupillary/ Left Pupil</i>	<i>Interpupillary/ Left Eyelash</i>
C1	4.8	6.4	4.8	6.4
C2	4.272727273	5.875	4.272727273	5.875
C3	4	5.333333333	4	5.333333333
C4	4.769230769	5.636363636	4.769230769	5.636363636
D14	4.666666667	6	4.666666667	6
Mean	4.501724942	5.84893934	4.501724942	5.84893934
Above Mean				
>1 Standard Deviation	6.442026478	11.14962147	5.65766661	9.489896144
>2 Standard Deviation	6.840987185	12.31053442	6.062807967	11.16962745
>3 Standard Deviation	7.239947892	13.47144737	6.467949324	12.84935876
>4 Standard Deviation	7.638908599	14.63236032	6.873090681	14.52909007
Below Mean				
>1 Standard Deviation	5.644105065	8.827795562	4.847383895	6.130433526
>2 Standard Deviation	5.245144358	7.66688261	4.442242538	4.450702218
>3 Standard Deviation	4.846183651	6.505969659	4.037101181	2.770970909
>4 Standard Deviation	4.447222944	5.345056707	3.631959824	1.0912396

TABLE 4. Eyebrow to Eye Ratios.

The distance between the bottom of the eyebrow to the eye is **shorter** in Lucy I compared to Lucy II, which is contrary to the aging process.

LUCY I

(note the arched left eyebrow)



Photo B2 close up.



Photo B6 close up.

LUCY II



Photo C2 close up.



Photo C1 close up.