HOAXY Body Shapes and Fashion Formula

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Abstract

The keynote speech introduces the use of 3D scans as tools in “HOAXY” styling (as used by the Fashion Formula book). This approach comes from understanding how body shape relates to silhouette shape in a garment. This classification is based on the 3 principal girths: the bust, the waist, and the hip. Designers use letters to refer to these typical shapes. The “pencil” or “tubular” shape is an H, the “pyramid” shape is an A, the classical “hourglass” is an X shape, , and so on. Body shapes are both an illusion and a reality: Illusion as appearance and reality as a volume to be dressed in live conditions. The classification will also be presented in different postures.We applied the HOAX concept to the traditional appearance of someone walking: For men, a Y shape was added while an S (“spoon”) shape was required for women. However, this classification does not take heights into account.We developed the same goal to classify into HOAXY shapes, using parameters based on the 2D shape, taking height into account.
We used the Rand criteria (1) statistical tool to evaluate the two classifications of the same population.
As dressing people is not a static concept, we extended the study to predict changes in body volume between standing and sitting posture, including trouser posture evaluation. To predict the shape in the sitting posture, we used the standing-position HOAXY classification. Results for women and men will be detailed separately. H women mostly remain in H shape in sitting posture. However, some H women sit in an S posture where hips become wider. The benefits of being able to predict certain critical measurements are discussed as usable for different industries such as furniture or car seats and are clear for the apparel industry.

Keywords: Anthropometry, Scanner, Body shape, HOAX statistics, postures

1. Introduction

The keynote speech introduces the use of 3D scans as tools in “HOAXY” styling (as enhanced by the Fashion Formula book). This approach comes from understanding how body shape relates to silhouette shape in a garment. The silhouette first is an illusion created by the contour of the garment. The global shape may be presented on the same body.(3).

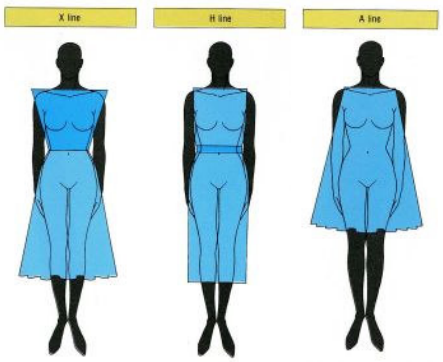


Figure 1 – illusion X, H, A on same body (3)

Understanding the shape further relates to the body as a styling whole (4). However, the consumer being the final goal of the purpose, some authors give different perception approaches on the body shape. Body proportions were widely admitted in the 50’s as 2D front and side classification (12, 2). By the way the classification was just alphabetic or numbers.

The plus size sector itself had a classification approach also base on the main girths. Also referring to an illusion, the shapes are called barrel, pear, box, or rectangular-8.

While new size surveys are preceded, using the 3D scan volume of people, it was an opportunity to test some classification of body shapes.

The HOAX reference concept appeared with the Duffy book (5).. This classification is based on the 3 principal girths: the bust, the waist, and the hip. Designers use letters to refer to these typical shapes. The “pencil” or “tubular” shape is an H, the “pyramid” shape is an A, the classical “hourglass” is an X shape, , and so on.

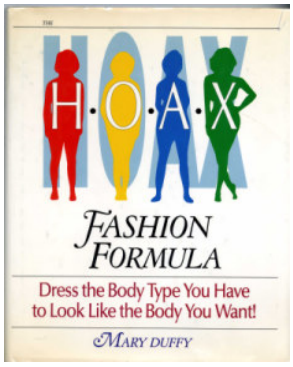


Figure 2 the book from Duffy

2. Method

Body shapes are both an illusion and a reality: Illusion as appearance and reality as a volume to be dressed in live conditions.
We applied the HOAX concept to the traditional appearance of someone walking: For men, a Y shape was added while an S (“spoon”) shape was required for women. Suggestion for the limits between the measurements are well described by some authors (8, 13,14,15) and we applied a similar algorithm.

2.1 Technology (see ref 20)

We got 3D volumes scanned. An amount of 180 measurements for each scan was organized in an Oracle database.
We used the SPAD software as the data mining tool.(22)

2.2 Results on girths

We proceeded an Principle composant analysis on the selected measurements The measurements were normalized according to the 7th cervical height, in order to be closer to the concept of silhouette than metric size. :

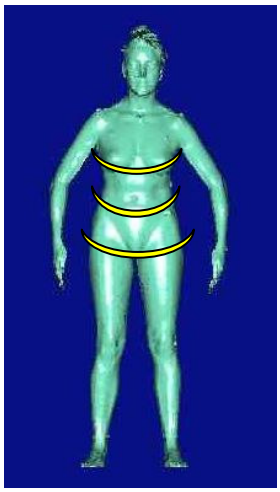


Figure 3 Classification on girths

- Bust girth normalized : R007
- Waist girth normalized R009
- Hip girh normalized : R010
- Ration bust/waist girths: R0016
- Ratio bust/hip girths : R0019
- Ratio hip/waist girths : R0018

The Spad software helped to find 9 classes for the 484 women identified that have been gatherd according to AHOXY as

A	H	O	X	Y
112	120	44	154	54

classification with girth.

Some examples

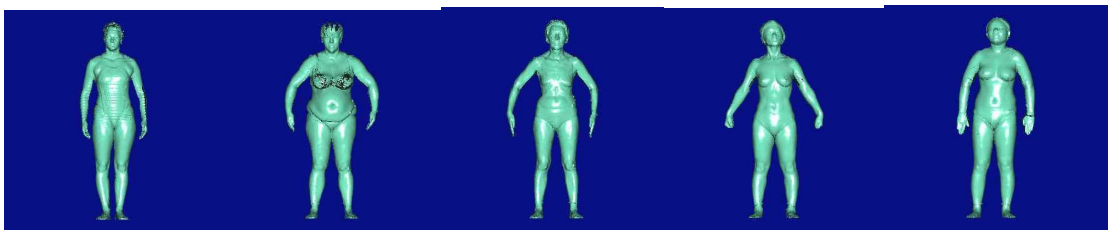
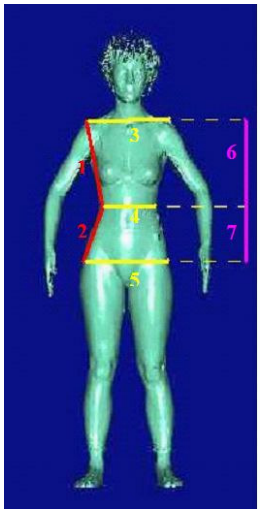


Figure 4 kind H *kind O* *kind A* *kind X* *kind Y*

To explain the kind of A if the figure looks like an X, the bust girth is due to a small breast compared to the hip girth. So this woman has been classified as an A.
Similarly the kind of Y looks like an H, due to a big bust girth.

2.3 Classification according to width

The classification using girths do no take heights into account.
We developed the same goal to classify into HOAXY shapes, using parameters based on the 2D shape, taking height and widths into account



- Slope shoulder to waist (1) : R002
- Slope waist to hipe (2) : R006
- ratio shoulder width (3) / hip width (5) : R021
- height shoulder to waist (6) normaized: R003
- ratio wist width (4) to height wist to hip. (7) : R001

Figure 5 Front 2D shape detection

2.4 results on widths

We treated exactly the same population (484 women) through an PCA and a classification by SPAD referring also 9 classes.

The attribution to classes HOAXY, was made a posteriori, using the result given by SPAD.
We got 2 classes assigned to X, 3 classes looking like an A, 2 classes like an H, one like an O and one like a Y?

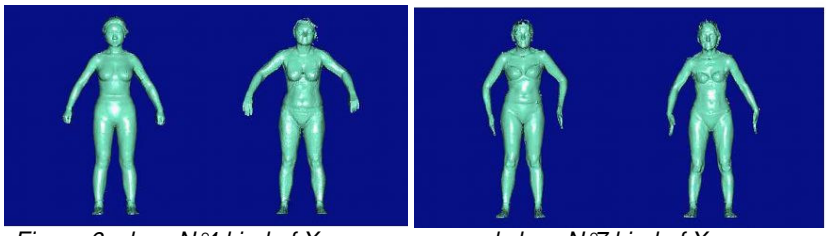


Figure 6: class N°4 kind of X and class N°7 kind of X

The scans represented on figure 6 are the 2 parangon for each class.

A	H	O	X	Y
73	153	25	159	74

Classification using the widths

3. Compare the two classifications of the same population.

Class width \ Class Girth	A	H	O	X	Y	
A	43	11	9	13	0	76
H	9	53	14	36	17	129
O	5	1	15	0	0	21
X	48	22	1	81	4	156
Y	7	33	5	24	33	102
	112	120	44	154	54	484

Figure 7 comparaison chart.

We used the Rand criteria (1, 22) statistical tool to evaluate the two classifications of the same population.
The Rand criteria is a number between 0 and 1 that gives the correspondence between the 2 partitions (classifications). The closer the number is to 1, means that the 2 partitions are equivalent, and when the number is close to 0 it means that the 2 partitions are different.
We used the contingencies chart above to compute the criteria.
Rand criteria was 68.16%. This means that we can consider these 2 classifications are globally different.
In this figure 7, the different classes are represented according to the 2 classification.
There are 54 persons assigned to Y with circumferences, while they are 102 in width classification. If we consider class A with circumferences quite 50% become an X with the width classification, and 25% of the X with circumferences is an H with the widths.

This study show that as a matter of morphology, the classification may depend on the criteria used, girth or width as well as the subjective definition of a groupe (HOAXY, pear box or barrel etc…
However, these classifications do not take the distribution of each class into account.
It seems obvious that X class may represent more little body volume than the O class.

4. HOAXY in changing posture.

As dressing people is not a static concept, we extended the study to predict changes in body volume between standing and sitting posture.
To predict the shape in the sitting posture, we used the standing-position HOAXY procedure in width.

Results for women and men will be detailed separately. H women mostly remain in H shape in sitting posture. However, some H women sit in an S posture where hips become wider.

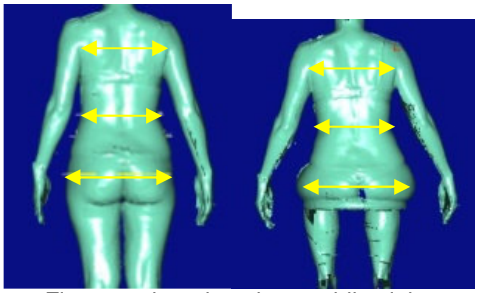


Figure 8 changing shape while sitting

As an approach we studied our global population, men and women.(see 21)

Sitting posture

Standing posture assis / debout	H	O	A	X	Y	S	**TOTAL**
H	68	0	13	51	9	74	**215**
O	0	0	0	0	0	0	**0**
A	2	0	1	1	1	0	**5**
X	1	0	0	63	1	25	**90**
Y	21	0	0	11	5	8	**45**
S	1	0	1	10	0	15	**27**
TOTAL	**93**	**0**	**15**	**136**	**16**	**122**	**382**

Sitting posture

Standing posture

People in H posture standing, changes by 2/3 either in X or in S while sitting.
One third of X people standing sit in S (wider hip) while the X category change from 90 people standing to 136 in sitting.

To clarify this changing, we separated men and women.

4.1 Women sitting

WOMEN

assis / debout	H	O	A	X	Y	S	TOTAL
H	24	0	12	28	0	49	**113**
O	0	0	0	0	0	0	**0**
A	0	0	1	0	0	0	**1**
X	0	0	0	61	1	19	**81**
Y	3	0	0	0	0	0	**3**
S	1	0	1	10	0	15	**27**
TOTAL	**28**	**0**	**14**	**99**	**1**	**83**	**225**

Standing posture

Sitting posture

Consider that half of women are H posture standing (113/225)
Only a quarter of H standing remain in H while sitting. One quarter become X and half of them sit in S.
The 12 H women that sit in A shape are corpulent women.
The 61 X women that stay in X while sitting are thin women with few soft volume able to change the shape.
Changes in X or S from standing to sitting are due to the hip width also influenced by the sitting surface.

4.2 Men sitting

The men chart show similar information in the changes.

MEN

assis / debout	H	O	A	X	Y	S	TOTAL
H	44	0	1	23	9	25	**102**
O	0	0	0	0	0	0	**0**
A	2	0	0	1	1	0	**4**
X	1	0	0	2	0	6	**9**
Y	18	0	0	11	5	8	**42**
S	0	0	0	0	0	0	**0**
TOTAL	**65**	**0**	**1**	**37**	**15**	**39**	**157**

Standing posture

Sitting posture

In standing posture our population of men is either in H or Y (102 / 42)

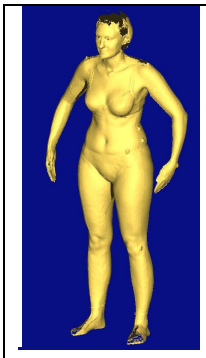
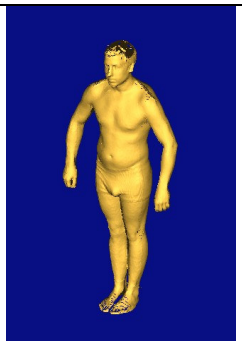
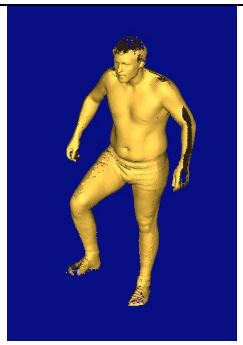
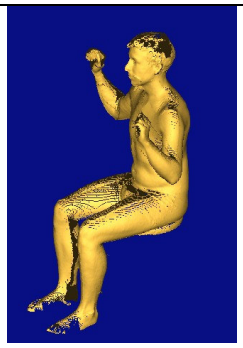
Half of H men stay in H while sitting. The other half sit either in X or in S, mostly due to the hip width enhancement.
Half of Y men sit in H (18) also due to the change of the hip conformation.

4.3 Changes while sitting

This study tackles the body changes while sitting. This may be a base for estimation of the prediction of the to give to the bottom body garments '(skirts, pants)
The amounts of the changes in the hip area are linked to the global morphologies (thin X quite do not change). Predictions may be establish also according to the garment style

5. Pant posture evaluation

To finalize the study we scanned 62 people in the 4 following postures (39 men, 23 women)

			
standard	Standing ISO 7250	panting	Sitting ISO 7250

We used a stair to standardize the one foot up for the panting posture.
We considered this posture as a step to the sitting posture. We studied the changes of the hip area compared to the standing posture.

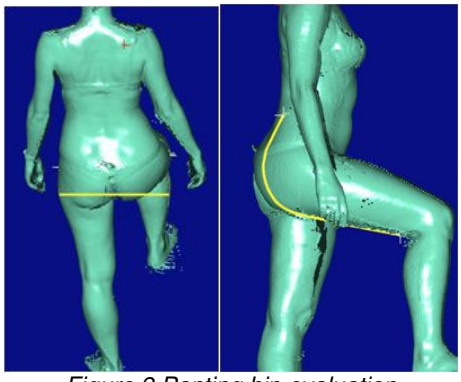
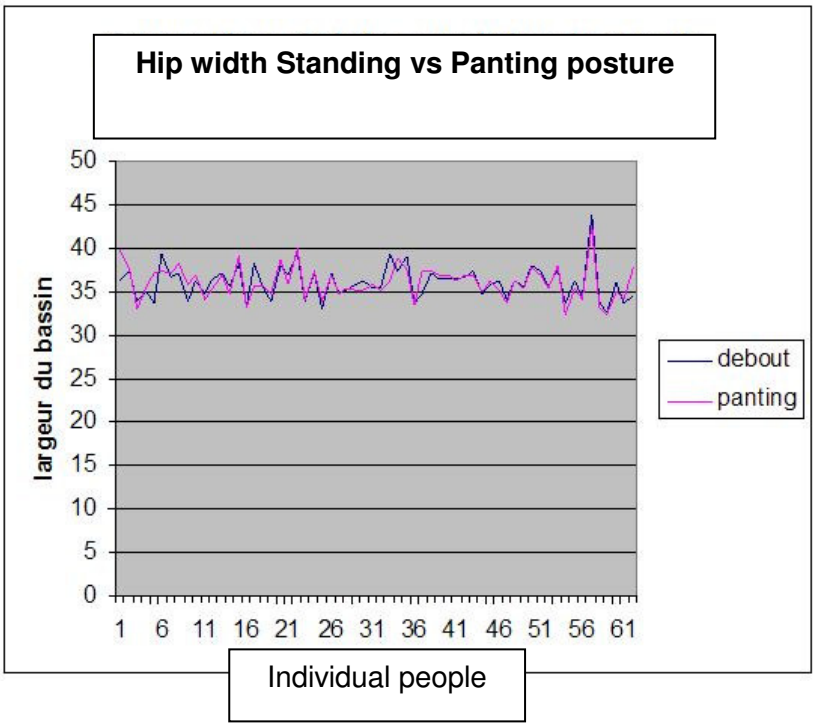


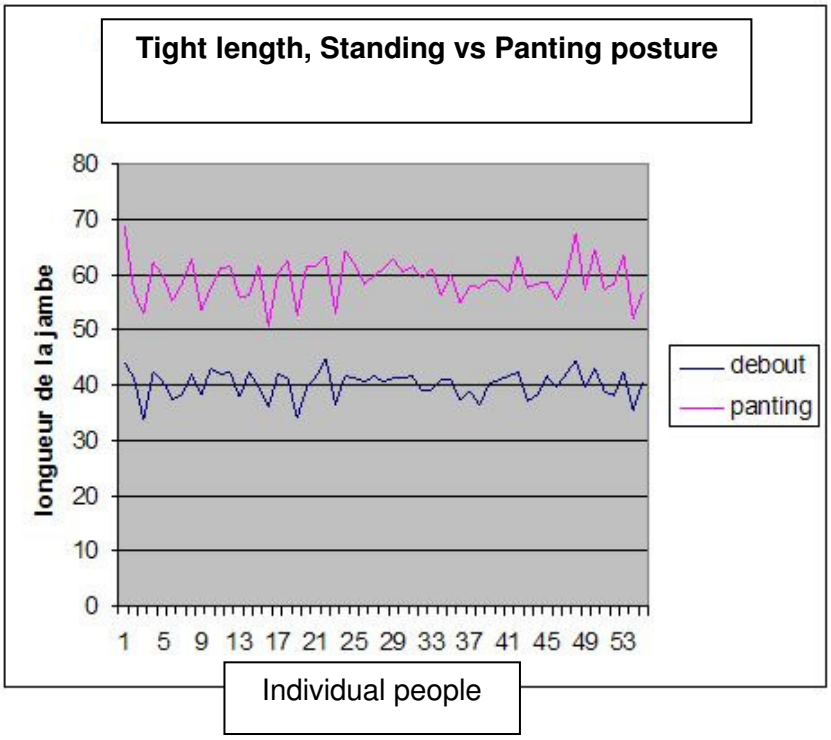
Figure 9 Panting hip evaluation

5.1 Width of the hip

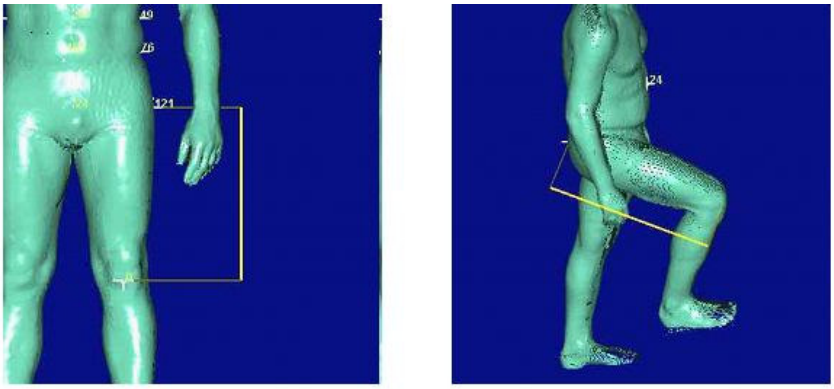


This super imposed curves show no change a the hip width for the Panting posture.

We evaluated the tight length.



There is a difference that is quite constant for all individual.



As shown of the same man the length of the tight in the panting posture includes a part of the buttock that is not considered in the standing posture.
The pant posture do not involve volume changes as a matter of HOAXYS classification.

5.2 Pant evaluation

Figure 10 lenght of the tight and pant fitting.

We considered the bottom length of the leg that is well known as a sensation in try-on sessions while putting a foot on a chair. This length must be taken into account to avoid the classical loose back waist line.

6. Conclusions

This approach of the shape appearance has shown that both illusion and reality may be fused to give some silhouettes inside a population. It showed also that following the same goal of appearance (HOAXYS) depending on the tools used (measurements) some people may move from one category to another. This must be taken into account for the pattern construction dedicated to style effects.

The HOAXYS classification adopted for our study through width, gave a true iformation for the posture changing, mainly fot the sitting posture that includes the sit surface effect. The garment should be prepared for these changes. It is also obvious that any sitting surface such as car, plane or train seats could take advantage in considering these changes.

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