Yoga Teacher Training 2014-2015

Title: Finding your Center

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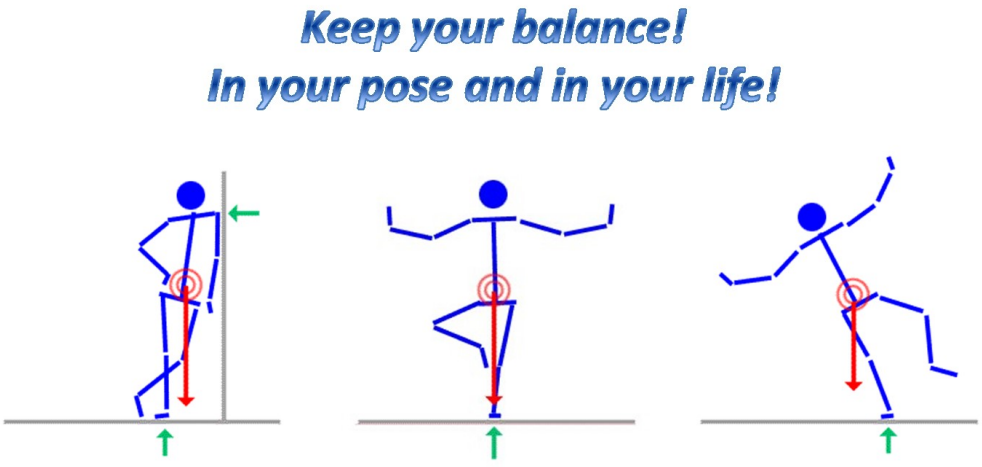
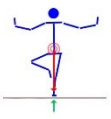


[1] Image: animationwear.blogspot.com

Table of Contents



Acknowledgments

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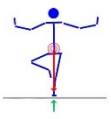
Abbreviations

Throughout this thesis CG is used as an abbreviation for the center of gravity.



1. Introduction: Definitions of key aspects

The word “yoga” means yoking together, reuniting body, mind and spirit. With this thesis I would like to create a body - mind connection by finding a way of achieving awareness. If we are aware of our postures as well as our emotions, we can modify those. Thus, with this awareness we are able to live a life without pain both on a physical as well as on an emotional level. The word awareness is thrown around a lot when it comes to spiritual practice, but not always do we know what it really means or how to achieve it. By focusing on particular things like the center of gravity during our yoga practice, we practice being aware and over time we create awareness in other aspects of our lives.

In order to be aware of our center of gravity, we ultimately need to know more about what and where it is. In the first section of this thesis, we will calculate the center of gravity for multiple yoga-poses using the segmental method. In the second section, we will look at how finding your center can also be used emotionally. And finally in the conclusion section, we will summarize what we have learned.

Before moving on, some key aspects need to be defined more clearly:

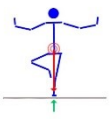
Definition of center of gravity (or center of mass):

> *“In physics, the center of mass of a distribution of mass in space is the unique point where the weighted relative position of the distributed mass sums to zero. The distribution of mass is balanced around the center of mass and the average of the weighted position coordinates of the distributed mass defines its coordinates. Calculations in mechanics are often simplified when formulated with respect to the center of mass.”* [2]
>
> *Center of gravity is “a point, near or within a body, through which its weight can be assumed to act when considering forces on the body and its motion under gravity. This coincides with the center of mass in a uniform gravitational field.”* [3]

Definition of segmental method (used to calculate the center of gravity):

> *“The segmentation method is based on a simple principle that states that the sum of the moments of the individual body segments defined relative to an arbitrary axis must equal the moment of the sum (i.e., the moment of the total body mass) relative to the same axis.”* [4]

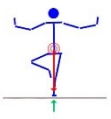
If you are supposed to pick up a person with only one hand, you should do that close to the point where all the mass is concentrated (the center of gravity). This is especially important in dancing and gymnastics, because this makes the dancers and gymnasts more efficient and it saves their strength. It is easier to find the center of gravity in objects that are less complex than the human body. Take for example a piece of board or a broom where the center of gravity is the point in which you can hold it up without falling down or rotating. In order to calculate the center of gravity in our body, we have to divide the body into different parts, determine the center of gravity of these single parts and then with some assumptions about their relative mass put them together to an overall point. This method is called segmental method. In Table 1 the different body segments, their center of gravity locations and relative



masses are shown.[5] This table was derived by Dempster in 1955 who studied and collected data from cadavers to determine center of rotation at each joint, segment lengths, masses and volumes. This information will be used for the segmental center of gravity calculation in the main chapter.

Segment	Center of Gravity Location % of length		Relative Mass %
Head	59.8%	from vertex	6.94
Trunk	44.9%	from suprasternal	43.46
Upper Arms	57.7%	from shoulder	5.42
Forearms	45.7%	from elbow	3.24
Hands	79.0%	from wrist	1.22
Thighs	41.0%	from hip	28.32
Shanks	44.6%	from knee	8.66
Feet	44.2%	from heel	2.74

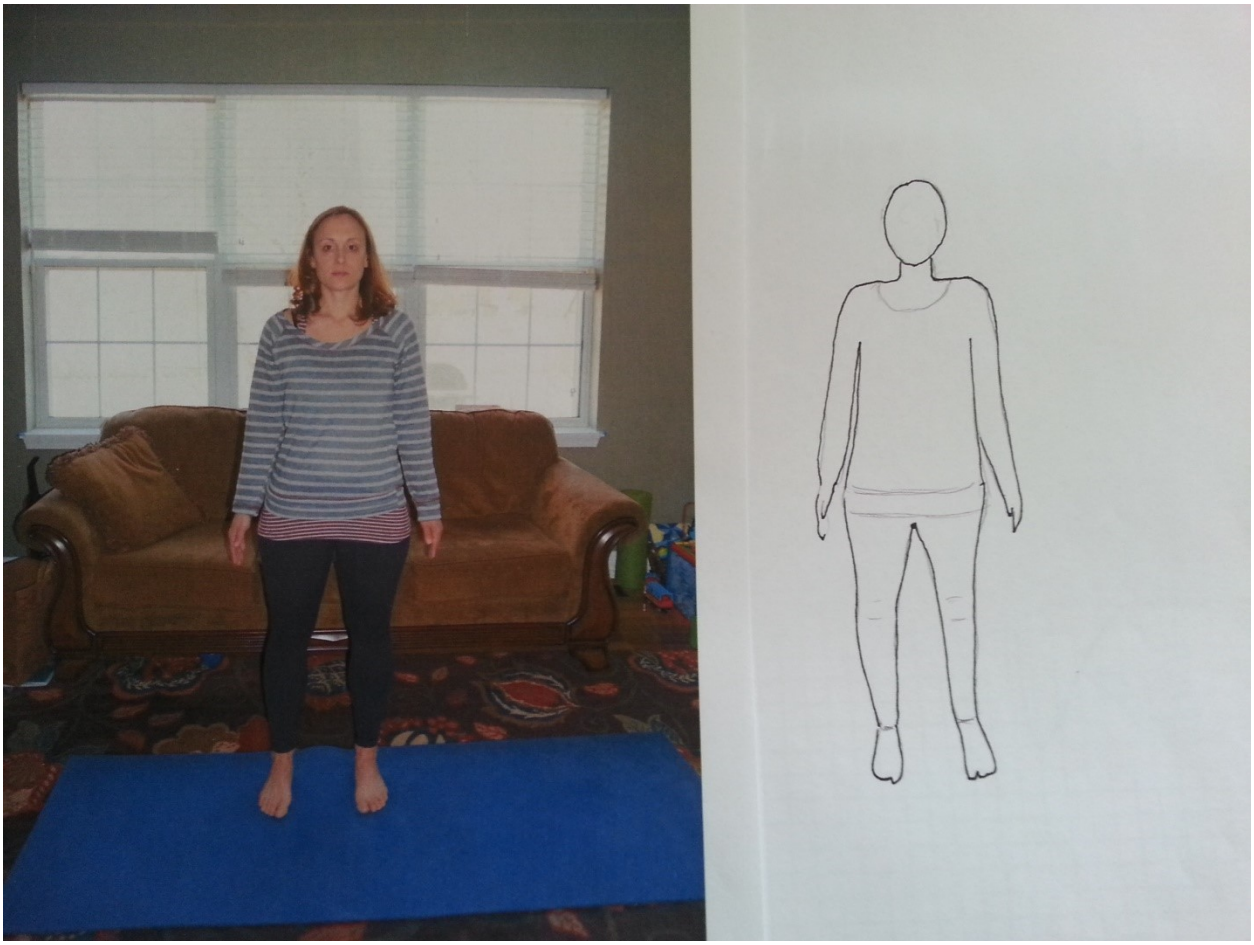
Table 1: Center of gravity location and its relative mass of different body segments



2. Finding your Center – physically

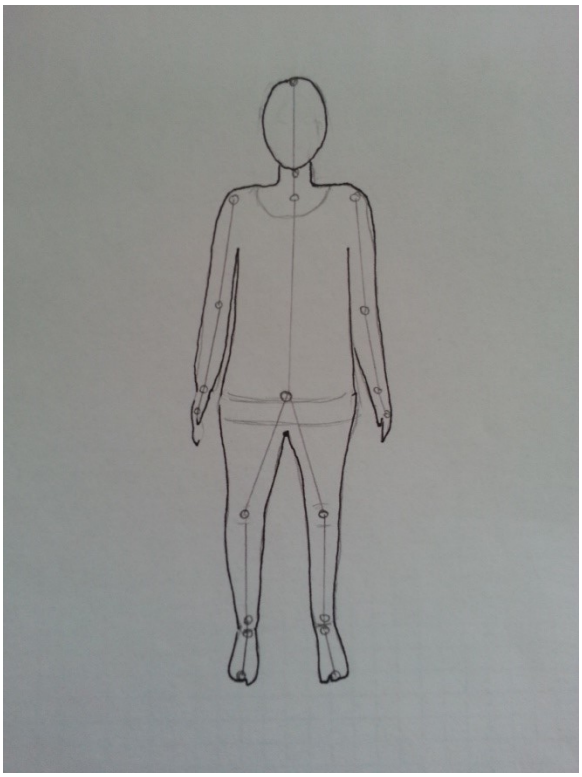
2.1. Explanation of segmental method calculation using Tadasana

Before starting to calculate the center of gravity a photograph has to be taken of the pose and person of interest. The center of gravity will be different for everyone, especially for men compared to women. The center of gravity for women is usually lower than for men. If I have to make a guess where the center of gravity in Tadasana is located, I will say it is somewhere between navel and the hips. After the picture has been taken, an outline of the body is created on white paper, so it is easier to work with (Picture 1).



Picture 1: Outline of the body in Tadasana

In Picture 2 you can see the marked endpoints of all the different body segments: head, trunk, upper arms, forearms, hands, thighs, shanks and feet.



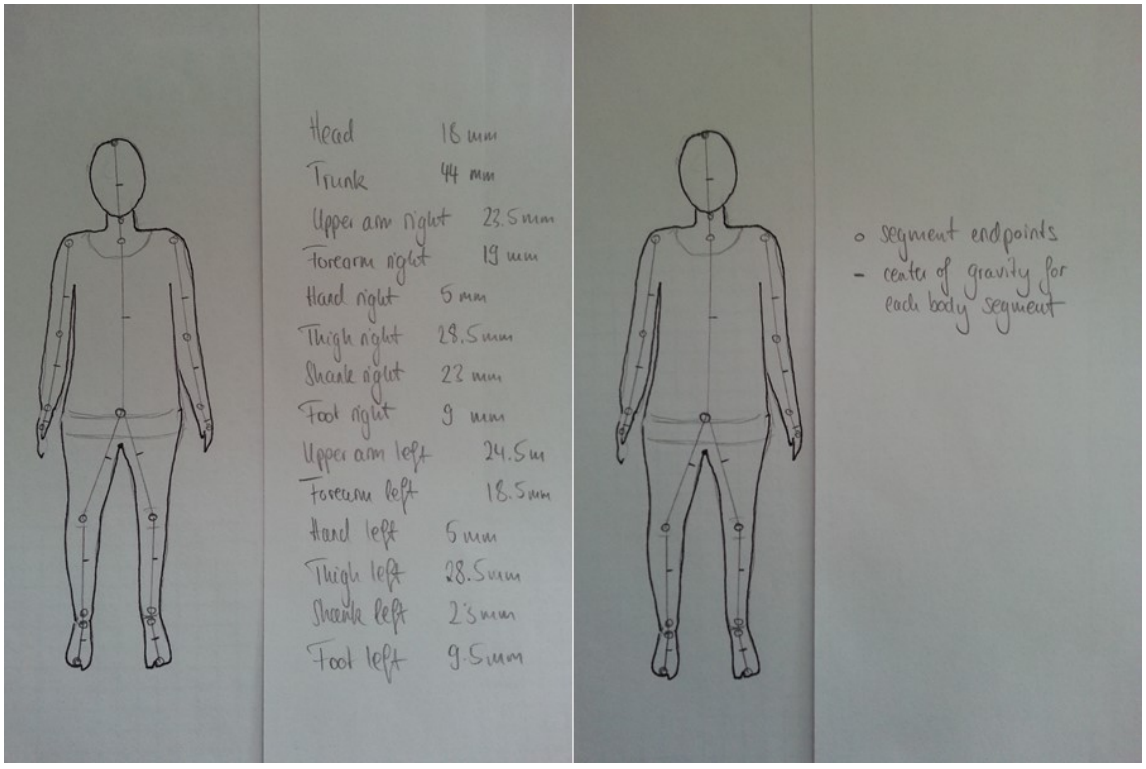
Picture 2: Endpoints of the different body segments (o)

After determining those endpoints the length of each segment has to be measured with a ruler (millimeters are used, but inches could be used as well). With the help of Dempster's studies [5] the center of gravity location can be calculated as shown in Table 2 and afterwards marked in the drawing (see Picture 3). The next step is to create an X- and Y- axis in the drawing (Picture 4) and measure the X- and Y- coordinates for each single center of gravity point (Picture 5 shows the X- and Y- coordinates for the center of gravity for the head).

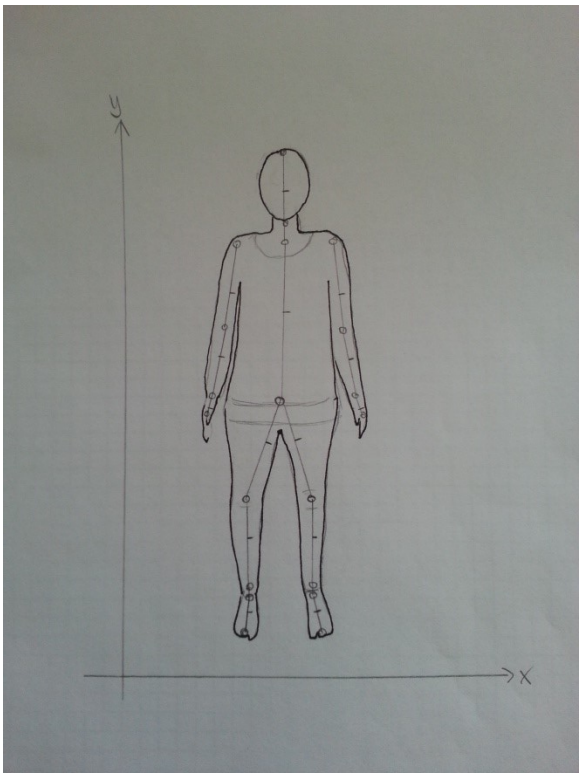
Finally Table 3 summarizes all X- and Y- coordinates, calculates the horizontal and vertical moment of each body part and concludes the final coordinates of the overall center of gravity in this particular pose. Finally, the overall center of gravity with X- coordinates of 44.0mm and Y- coordinates of 82.4mm is drawn into the body silhouette, shown in Picture 6.

Segment	Length	Center of Gravity Location		Centre of Gravity Location
	L (mm)		% of length	L x % of length (mm)
Head	18	59.8%	from Vertex	10.76
Trunk	44	44.9%	from suprasternal	19.76
Upper Arm right	23.5	57.7%	from shoulder	13.56
Forearm right	19	45.7%	from elbow	8.68
Hand right	5	79.0%	from wrist	3.95
Thigh right	28.5	41.0%	from hip	11.69
Shank right	23	44.6%	from knee	10.26
Foot right	9	44.2%	from heel	3.98
Upper Arm left	24.5	57.7%	from shoulder	14.14
Forearm left	18.5	45.7%	from elbow	8.45
Hand left	5	79.0%	from wrist	3.95
Thigh left	28.5	41.0%	from hip	11.69
Shank left	23	44.6%	from knee	10.26
Foot left	9.5	44.2%	from heel	4.20

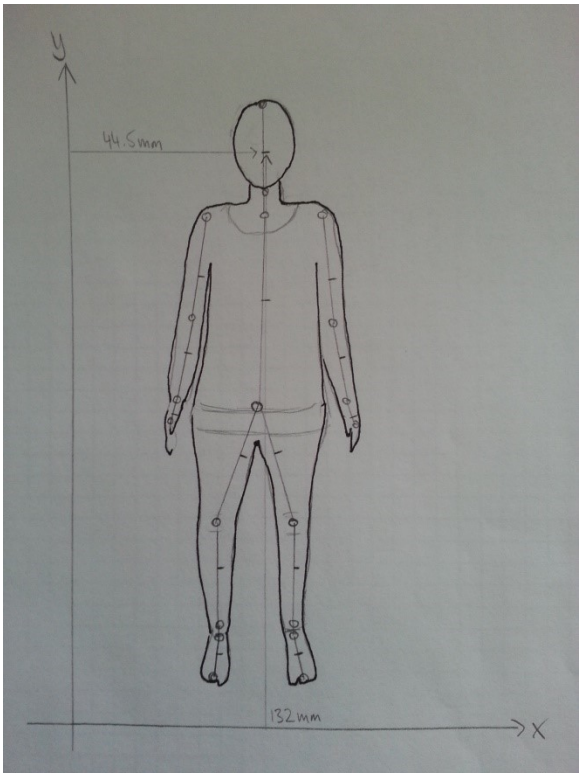
Table 2: CG location for each segment based on the measured segment length (Tadasana)



Picture 3: Measured segment length and location of the CG for each body segment (-)



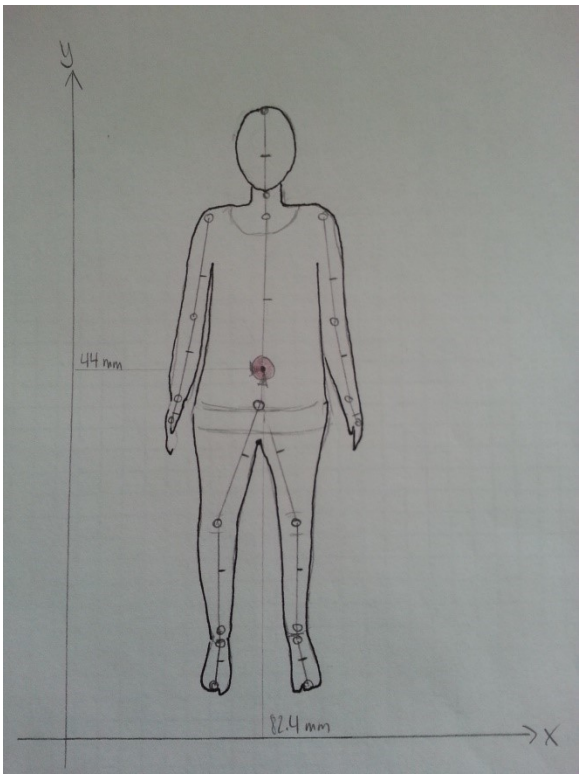
Picture 4: X- and Y-axis added



Picture 5: X- and Y-coordinates of the CG for the head

Segment	Relative Mass m_i (%)	Horizontal CG Distance x_i (mm)	Horizontal Moment $m_i \times x_i$	Vertical CG Distance y_i (mm)	Vertical Moment $m_i \times y_i$
Head	6.94	44.5	308.83	132	916.08
Trunk	43.46	44.5	1933.97	98.5	4280.81
Upper Arm right	2.71	29.5	79.95	104	281.84
Forearm right	1.62	26	42.12	86	139.32
Hand right	0.61	23	14.03	72	43.92
Thigh right	14.16	39	552.24	62	877.92
Shank right	4.33	34	147.22	36	155.88
Foot right	1.37	33.5	45.90	16.5	22.61
Upper Arm left	2.71	60	162.60	103	279.13
Forearm left	1.62	63	102.06	85	137.70
Hand left	0.61	66	40.26	71	43.31
Thigh left	14.16	47.5	672.60	62.5	885.00
Shank left	4.33	51	220.83	36	155.88
Foot left	1.37	53	72.61	16.5	22.61
	Total sum	$\sum m_i x_i =$	4395.21	$\sum m_i y_i =$	8242.00
	Overal CG location	$X=(\sum m_i x_i)/100=$	**44.0**	$Y=(\sum m_i y_i)/100=$	**82.4**

Table 3: X- and Y-coordinates for each CG, horizontal and vertical moment and the coordinates of the overall CG (Tadasana)



Picture 6: Overall CG with coordinates: X=44mm and Y=82.4mm (Tadasana)

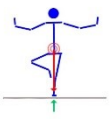
2.2. Trikonasana

In order to determine the center of gravity in Trikonasana the same approach as described in section 2.1 will be applied:

- Take a picture and outline the body on white paper
- Make a guess of where you think the center of gravity might be
- Mark all body segment endpoints in your drawing
- Measure the segment lengths and calculate the center of gravity for each body part (Table 4)
- Mark each center of gravity in the drawing
- Create an X- and Y- axis in your drawing
- Measure X- and Y- coordinates for each center of gravity
- Calculate the horizontal and vertical moment of each body part and derive the overall center of gravity coordinates (Table 5)
- Mark the final center of gravity in your drawing and compare it to the estimated location (Picture 7)

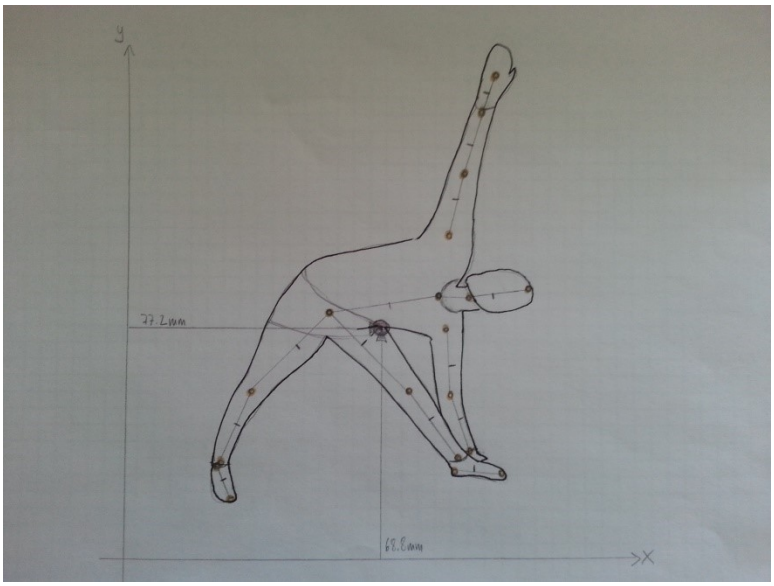
Segment	Length	Center of Gravity Location		Centre of Gravity Location
	L (mm)		% of length	L x % of length (mm)
Head	18	59.8%	from Vertex	10.76
Trunk	34	44.9%	from suprasternal	15.27
Upper Arm right	19	57.7%	from shoulder	10.96
Forearm right	18	45.7%	from elbow	8.23
Hand right	8	79.0%	from wrist	6.32
Thigh right	34	41.0%	from hip	13.94
Shank right	25	44.6%	from knee	11.15
Foot right	13	44.2%	from heel	5.75
Upper Arm left	19	57.7%	from shoulder	10.96
Forearm left	18	45.7%	from elbow	8.23
Hand left	8	79.0%	from wrist	6.32
Thigh left	34	41.0%	from hip	13.94
Shank left	25	44.6%	from knee	11.15
Foot left	13	44.2%	from heel	5.75

Table 4: CG location for each segment based on the measured segment length (Trikonasana)

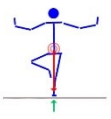


Segment	Relative Mass	Horizontal CG Distance	Horizontal Moment	Vertical CG Distance	Vertical Moment
	m_i (%)	x_i (mm)	m_i x x_i	y_i (mm)	m_i x y_i
Head	6.94	112	777.28	79	548.26
Trunk	43.46	80	3476.80	76	3302.96
Upper Arm right	2.71	100.5	272.36	108	292.68
Forearm right	1.62	105	170.10	125.5	203.31
Hand right	0.61	110	67.10	140	85.40
Thigh right	14.16	51	722.16	63.5	899.16
Shank right	4.33	33.5	145.06	39.5	171.04
Foot right	1.37	29	39.73	23	31.51
Upper Arm left	2.71	98	265.58	57	154.47
Forearm left	1.62	101	163.62	41	66.42
Hand left	0.61	105	64.05	30	18.30
Thigh left	14.16	71.5	1012.44	63.5	899.16
Shank left	4.33	92	398.36	40.5	175.37
Foot left	1.37	105.5	144.54	25	34.25
	Total sum	$\sum m_i x_i =$	7719.17	$\sum m_i y_i =$	6882.28
	Overal CG location	$X=(\sum m_i x_i)/100=$	**77.2**	$Y=(\sum m_i y_i)/100=$	**68.8**

Table 5: X- and Y-coordinates for each CG, horizontal and vertical moment and the coordinates of the overall CG (Trikonasana)



Picture 7: Overall CG with coordinates: X=77.2mm and Y=68.8mm (Trikonasana)



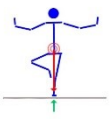
2.3. Virabhadrasana 1

Same approach for the CG calculation of Virabhadrasana 1:

- Take a picture and outline the body on white paper
- Make a guess of where you think the center of gravity might be
- Mark all body segment endpoints in your drawing
- Measure the segment lengths and calculate the center of gravity for each body part (Table 6)
- Mark each center of gravity in the drawing
- Create an X- and Y- axis in your drawing
- Measure X- and Y- coordinates for each center of gravity
- Calculate the horizontal and vertical moment of each body part and derive the overall center of gravity coordinates (Table 7)
- Mark the final center of gravity in your drawing and compare it to the estimated location (Picture 8)

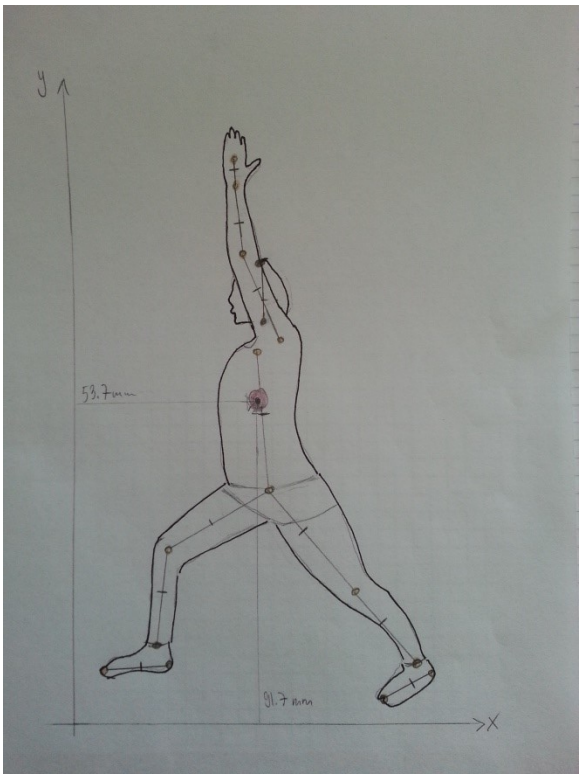
Segment	Length	Center of Gravity Location		Centre of Gravity Location
	L (mm)		% of length	L x % of length (mm)
Head	17	59.8%	from Vertex	10.17
Trunk	40	44.9%	from suprasternal	17.96
Upper Arm right	27	57.7%	from shoulder	15.58
Forearm right	18.5	45.7%	from elbow	8.45
Hand right	7.5	79.0%	from wrist	5.93
Thigh right	33.5	41.0%	from hip	13.74
Shank right	26	44.6%	from knee	11.60
Foot right	18	44.2%	from heel	7.96
Upper Arm left	27	57.7%	from shoulder	15.58
Forearm left	18.5	45.7%	from elbow	8.45
Hand left	7.5	79.0%	from wrist	5.93
Thigh left	37	41.0%	from hip	15.17
Shank left	25	44.6%	from knee	11.15
Foot left	15	44.2%	from heel	6.63

Table 6: CG location for each segment based on the measured segment length (Virabhadrasana 1)

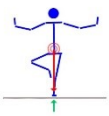


Segment	Relative Mass	Horizontal CG Distance	Horizontal Moment	Vertical CG Distance	Vertical Moment
	m_i (%)	x_i (mm)	m_i x x_i	y_i (mm)	m_i x y_i
Head	6.94	54	374.76	120	832.80
Trunk	43.46	54.5	2368.57	86.5	3759.29
Upper Arm right	2.71	53	143.63	123	333.33
Forearm right	1.62	48	77.76	141.5	229.23
Hand right	0.61	47	28.67	156	95.16
Thigh right	14.16	39	552.24	55	778.80
Shank right	4.33	25	108.25	36.5	158.05
Foot right	1.37	19	26.03	15.5	21.24
Upper Arm left	2.71	53	143.63	123	333.33
Forearm left	1.62	48	77.76	141.5	229.23
Hand left	0.61	47	28.67	156	95.16
Thigh left	14.16	66	934.56	153	2166.48
Shank left	4.33	87	376.71	28	121.24
Foot left	1.37	95	130.15	11	15.07
	Total sum	$\sum m_i x_i =$	5371.39	$\sum m_i y_i =$	9168.40
	Overal CG location	**$X=(\sum m_i x_i)/100=$**	**53.7**	**$Y=(\sum m_i y_i)/100=$**	**91.7**

Table 7: X- and Y-coordinates for each CG, horizontal and vertical moment and the coordinates of the overall CG (Virabhadrasana 1)



Picture 8: Overall CG with coordinates: X=53.7mm and Y=91.7mm (Virabhadrasana 1)



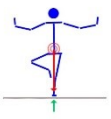
2.4. Virabhadrasana 2

Same approach for the CG calculation of Virabhadrasana 2:

- Take a picture and outline the body on white paper
- Make a guess of where you think the center of gravity might be
- Mark all body segment endpoints in your drawing
- Measure the segment lengths and calculate the center of gravity for each body part (Table 8)
- Mark each center of gravity in the drawing
- Create an X- and Y- axis in your drawing
- Measure X- and Y- coordinates for each center of gravity
- Calculate the horizontal and vertical moment of each body part and derive the overall center of gravity coordinates (Table 9)
- Mark the final center of gravity in your drawing and compare it to the estimated location (Picture 9)

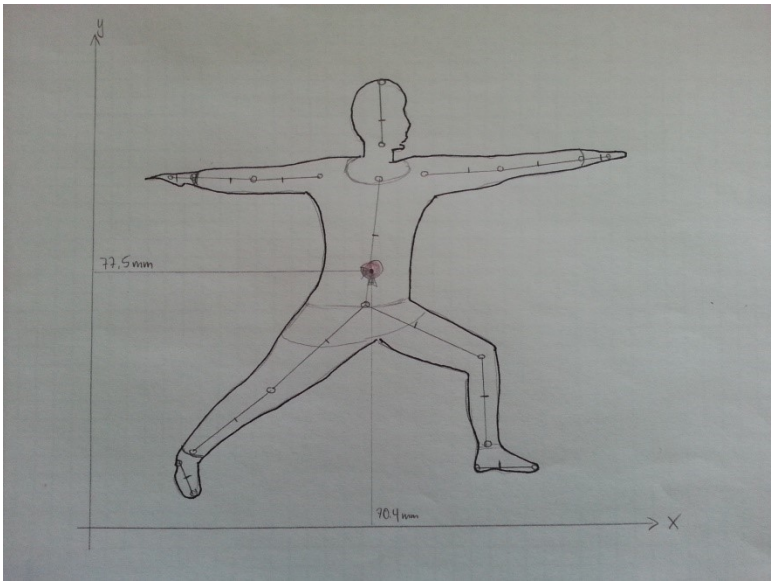
Segment	Length	Center of Gravity Location		Centre of Gravity Location
	L (mm)		% of length	L x % of length (mm)
Head	17	59.8%	from Vertex	10.17
Trunk	35.5	44.9%	from suprasternal	15.94
Upper Arm right	19	57.7%	from shoulder	10.96
Forearm right	16	45.7%	from elbow	7.31
Hand right	6.5	79.0%	from wrist	5.14
Thigh right	35	41.0%	from hip	14.35
Shank right	27	44.6%	from knee	12.04
Foot right	10	44.2%	from heel	4.42
Upper Arm left	21	57.7%	from shoulder	12.12
Forearm left	22	45.7%	from elbow	10.05
Hand left	7.5	79.0%	from wrist	5.93
Thigh left	35.5	41.0%	from hip	14.56
Shank left	25	44.6%	from knee	11.15
Foot left	15.5	44.2%	from heel	6.85

Table 8: CG location for each segment based on the measured segment length (Virabhadrasana 2)



Segment	Relative Mass	Horizontal CG Distance	Horizontal Moment	Vertical CG Distance	Vertical Moment
	m_i (%)	x_i (mm)	m_i x x_i	y_i (mm)	m_i x y_i
Head	6.94	80	555.20	113	784.22
Trunk	43.46	78	3389.88	80	3476.80
Upper Arm right	2.71	52	140.92	96.5	261.52
Forearm right	1.62	37.5	60.75	96	155.52
Hand right	0.61	22.5	13.73	96.5	58.87
Thigh right	14.16	65	920.40	51	722.16
Shank right	4.33	39	168.87	29.5	127.74
Foot right	1.37	26	35.62	13.5	18.50
Upper Arm left	2.71	105	284.55	98	265.58
Forearm left	1.62	125	202.50	99.5	161.19
Hand left	0.61	142.5	86.93	101.5	61.92
Thigh left	14.16	89.5	1267.32	54.5	771.72
Shank left	4.33	109	471.97	35	151.55
Foot left	1.37	112.5	154.13	15.5	21.24
	Total sum	$\sum m_i x_i =$	7752.76	$\sum m_i y_i =$	7038.50
	Overal CG location	**$X=(\sum m_i x_i)/100=$**	**77.5**	**$Y=(\sum m_i y_i)/100=$**	**70.4**

Table 9: X- and Y-coordinates for each CG, horizontal and vertical moment and the coordinates of the overall CG (Virabhadrasana 2)



Picture 9: Overall CG with coordinates: X=77.5mm and Y=70.4mm (Virabhadrasana 2)

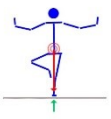
2.5. Virabhadrasana 3

Same approach for the CG calculation of Virabhadrasana 3:

- Take a picture and outline the body on white paper
- Make a guess of where you think the center of gravity might be
- Mark all body segment endpoints in your drawing
- Measure the segment lengths and calculate the center of gravity for each body part (Table 10)
- Mark each center of gravity in the drawing
- Create an X- and Y- axis in your drawing
- Measure X- and Y- coordinates for each center of gravity
- Calculate the horizontal and vertical moment of each body part and derive the overall center of gravity coordinates (Table 11)
- Mark the final center of gravity in your drawing and compare it to the estimated location (Picture 10)

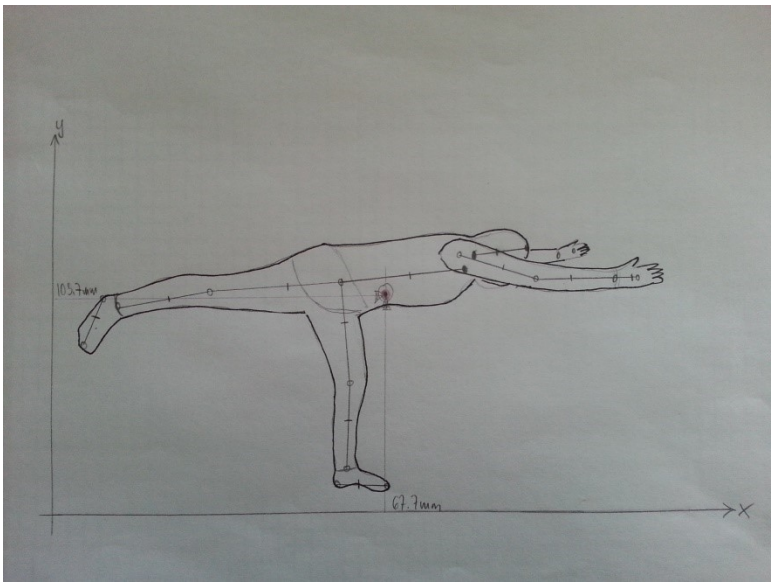
Segment	Length	Center of Gravity Location		Centre of Gravity Location
	L (mm)		% of length	L x % of length (mm)
Head	16.5	59.8%	from Vertex	9.87
Trunk	40	44.9%	from suprasternal	17.96
Upper Arm right	25	57.7%	from shoulder	14.43
Forearm right	24	45.7%	from elbow	10.97
Hand right	7	79.0%	from wrist	5.53
Thigh right	41	41.0%	from hip	16.81
Shank right	28	44.6%	from knee	12.49
Foot right	15.5	44.2%	from heel	6.85
Upper Arm left	25	57.7%	from shoulder	14.43
Forearm left	24	45.7%	from elbow	10.97
Hand left	7	79.0%	from wrist	5.53
Thigh left	31.5	41.0%	from hip	12.92
Shank left	26	44.6%	from knee	11.60
Foot left	15	44.2%	from heel	6.63

Table 10: CG location for each segment based on the measured segment length (Virabhadrasana 3)



Segment	Relative Mass	Horizontal CG Distance	Horizontal Moment	Vertical CG Distance	Vertical Moment
	m_i (%)	x_i (mm)	m_i x x_i	y_i (mm)	m_i x y_i
Head	6.94	139.5	968.13	80	555.20
Trunk	43.46	112	4867.52	73	3172.58
Upper Arm right	2.71	141	382.11	75	203.25
Forearm right	1.62	162	262.44	71.5	115.83
Hand right	0.61	181	110.41	72	43.92
Thigh right	14.16	73	1033.68	70	991.20
Shank right	4.33	36	155.88	66	285.78
Foot right	1.37	13	17.81	61	83.57
Upper Arm left	2.71	141	382.11	75	203.25
Forearm left	1.62	162	262.44	71.5	115.83
Hand left	0.61	181	110.41	72	43.92
Thigh left	14.16	91	1288.56	58	821.28
Shank left	4.33	92	398.36	28	121.24
Foot left	1.37	95	130.15	8.5	11.65
	Total sum	$\sum m_i x_i =$	10370.01	$\sum m_i y_i =$	6768.50
	Overal CG location	**$X=(\sum m_i x_i)/100=$**	**103.7**	**$Y=(\sum m_i y_i)/100=$**	**67.7**

Table 11: X- and Y-coordinates for each CG, horizontal and vertical moment and the coordinates of the overall CG (Virabhadrasana 3)



Picture 10: Overall CG with coordinates: X=103.7mm and Y=67.7mm (Virabhadrasana 3)

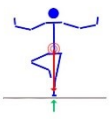
2.6. Parsvakonasana

Same approach for the CG calculation of Parsvakonasana:

- Take a picture and outline the body on white paper
- Make a guess of where you think the center of gravity might be
- Mark all body segment endpoints in your drawing
- Measure the segment lengths and calculate the center of gravity for each body part (Table 12)
- Mark each center of gravity in the drawing
- Create an X- and Y- axis in your drawing
- Measure X- and Y- coordinates for each center of gravity
- Calculate the horizontal and vertical moment of each body part and derive the overall center of gravity coordinates (Table 13)
- Mark the final center of gravity in your drawing and compare it to the estimated location (Picture 11)

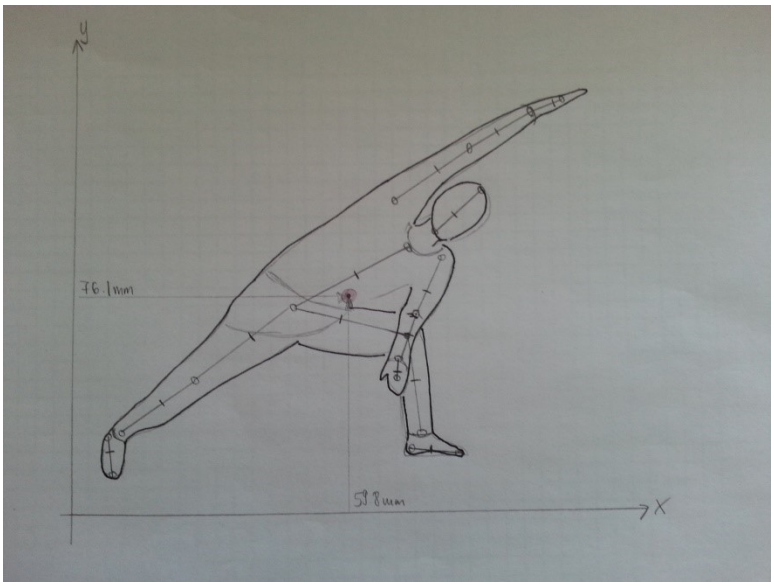
Segment	Length	Center of Gravity Location		Centre of Gravity Location
	L (mm)		% of length	L x % of length (mm)
Head	18	59.8%	from Vertex	10.76
Trunk	36.5	44.9%	from suprasternal	16.39
Upper Arm right	26	57.7%	from shoulder	15.00
Forearm right	21	45.7%	from elbow	9.60
Hand right	9	79.0%	from wrist	7.11
Thigh right	33.5	41.0%	from hip	13.74
Shank right	24	44.6%	from knee	10.70
Foot right	11	44.2%	from heel	4.86
Upper Arm left	17.5	57.7%	from shoulder	10.10
Forearm left	12.5	45.7%	from elbow	5.71
Hand left	6	79.0%	from wrist	4.74
Thigh left	33	41.0%	from hip	13.53
Shank left	27	44.6%	from knee	12.04
Foot left	15	44.2%	from heel	6.63

Table 12: CG location for each segment based on the measured segment length (Parsvakonasana)

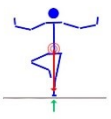


Segment	Relative Mass	Horizontal CG Distance	Horizontal Moment	Vertical CG Distance	Vertical Moment
	m_i (%)	x_i (mm)	m_i x x_i	y_i (mm)	m_i x y_i
Head	6.94	107	742.58	83	576.02
Trunk	43.46	79	3433.34	66	2868.36
Upper Arm right	2.71	102	276.42	95	257.45
Forearm right	1.62	119	192.78	105.5	170.91
Hand right	0.61	134.5	82.05	113	68.93
Thigh right	14.16	49	693.84	48.5	686.76
Shank right	4.33	25	108.25	30	129.90
Foot right	1.37	10.5	14.39	17	23.29
Upper Arm left	2.71	98.5	266.94	60.5	163.96
Forearm left	1.62	93.5	151.47	48.5	78.57
Hand left	0.61	90	54.90	38.5	23.49
Thigh left	14.16	74	1047.84	53	750.48
Shank left	4.33	95	411.35	36	155.88
Foot left	1.37	99.5	136.32	16.5	22.61
	Total sum	$\sum m_i x_i =$	7612.45	$\sum m_i y_i =$	5976.60
	Overal CG location	**$X=(\sum m_i x_i)/100=$**	**76.1**	**$Y=(\sum m_i y_i)/100=$**	**59.8**

Table 13: X- and Y-coordinates for each CG, horizontal and vertical moment and the coordinates of the overall CG (Parsvakonasana)



Picture 11: Overall CG with coordinates: X=76.1mm and Y=59.8mm (Parsvakonasana)



2.7. Benefits of being aware of your center of gravity

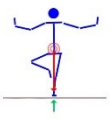
Using this approach as explained above the center of gravity can be found for any pose. Of course these calculations are not really quick and you can't use them in the moment when you are doing your yoga practice. But there is another way of thinking about it and creating awareness: as a rule of thumb when you are standing straight up the center of gravity is 2 inches below your navel.[6] If you shift your body into different positions, your center of gravity will shift as well. When this shift happens and you put awareness into the center of gravity you automatically improve your alignment in order to be more efficient. Robert Rickover who is working with the so called Alexander technique, a technique that enables the elimination of unused muscle tension in your body, gives a very simple experiment on his website that illustrates the power of being in touch with your center of gravity. In this experiment you give, with advance warning, your partner a little push forward or sideways in his or her shoulder area (enough to slightly and temporarily disrupt his or her equilibrium). Then you notice how far they move and how easily they recover their upright position. Now, you show them where their center of gravity is located and ask them to simply be conscious of it. Afterwards you give the same little push and see what happens. Most people are far more stable when their attention is placed on their center of gravity.[6] Consequently, by being aware of the center of gravity we move more efficient and we can get rid of unneeded tension in our bodies. It is not in the scope of this thesis to get into detail of this Alexander technique (even though it is very fascinating), but I wanted to give a little history about this technique:

> *"F.M. Alexander (1869-1955) was an Australian actor who began to experience chronic laryngitis whenever he performed. When his doctors could not help him, Alexander discovered a solution on his own. He had not been aware that excess tension in his neck and body were causing his problems, and began to find new ways to speak and move with greater ease.*
> *His health improved to such an extent that his friends and several of the doctors he had consulted earlier persuaded him to teach others what he had learned. Over a career span of more than fifty years, he refined his method of instruction. After teaching for over 35 years, he began to train teachers of what has now become known as the Alexander Technique."* [7]

Next, there is a quote of F. M. Alexander showing his understanding that we can use the center of gravity in our favor:

> *"…the primary principle involved in attaining a correct standing position is the placing of the feet in that position which will ensure their greatest effect as base, pivot, and fulcrum, and thereby throw the limbs and trunk into that pose in which they may be correctly influenced and* ***aided*** *by the force of gravity."* [8]

Overall, in my opinion the Alexander technique is just another form of yoga, especially the asana practices where alignment is in focus. With correct alignment or with awareness of the center of gravity, poses get easier and less muscular actions are required and thus, allowing us to release tension and pain in our body.



3. Finding your Center – emotionally

3.1. How does asana practice influence our emotions?

Yoga offers so many other techniques to increase awareness beyond physical poses. Patanjali, the most notable authority on yoga teaches us about the 8 limbs of yoga: Yama (ethical and moral discipline in social life), Niyamas (ethical and moral discipline in our own mind), Asana (physical practice), Pranayama (breathing techniques), Pratyahara (withdrawing the senses, going inwards), Dharana (concentration), Dhyana (meditation), Samadhi (enlightenment). These are seen as tools to purify the mind and body and ultimately leading you to self-realization. [9] Each of those limbs has a lot of depth to it and you would be able to write a whole thesis on each of them. The point to bring across is that those limbs each offer different tools including working with the Koshas (layers, sheaths or coverings of our personality), the Chakras, as well as Prana Vayus to create awareness and get to know yourself better and ultimately find your "true" self.

When you practice asana and leave out all the other limbs, you might not be conscious about it, but you still influence your subtle emotional body. E.g. with certain poses or groups of poses, you are able to influence your mood: forward bends are more calming, back bends are more uplifting. Furthermore, with continuous practice your posture improves, your chest is more lifted and your head is upright and that might make you feel more confident going through your day. The practice of yoga works from the outer world to the inner world and finding your center is an important part of this. In her book "Bringing Yoga to Life" Donna Farhi writes in a whole chapter about finding your center and how helpful it can be in daily challenges: [10]

> *"When we focus the mind and bring it back to center, we find a place of spaciousness. It is here we have enough room to let the mystery we call life live itself through us. By bringing our attention back to the transparent nature of consciousness, we can experience bad things without feeling so much need to contract, to hold on, or to run away. Turning toward this mystery, however, can feel like jumping from the frying pan into the fire. The very largeness of life can overwhelm us. For this reason, when we hit a roadblock in the path, Patanjali advises us to stay with one method, one practice, and one focus because this one-pointedness will lead us inexorably to our center and the spaciousness of this mystery. It is through trusting the ineffable nature of our center that we can find the deepest possible security."* [11]

This quote summarizes the interest in finding your center. There will be days where your center is more likely to be found through physical asana practice, but there will also be days where you just need to sit quietly and listen to your body, reconnect with your feelings and emotions, reconnect with yourself. Through practice we will find inner stillness faster and even in the midst of activity.

4. Conclusion

Life is full of dualities like male - female, day - night, sun - moon, positive - negative, good - bad etc. One major polarity in our life is happiness versus sadness and especially when we are sad, we tend to start asking questions about ourselves and our viewpoints in response to our unhappiness. Often we don't realize that those questions and that being stuck in that feeling of sadness are not helping us move toward happiness. Moreover, being happy in a particular moment is usually caused by an outside source, meaning for example we received a promotion in our job, bought ourselves a new outfit, finished a race or did a challenging yoga pose. I am not saying these aren't legitimate reasons to be happy, but the point I would like to make is, that more often than not, our emotions, if good or bad, are caused by the outside world. Yoga practice allows us to look more careful at our situation and it allows us to be aware of our center. The center, that is neither one nor the other, that is neither overly ecstatic nor totally sad, that is neither being buoyant nor being pulled down by gravity. The center, that allows us to keep our balance: in our pose, but also in our life.

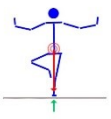
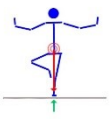


Table of Pictures

Table of Tables



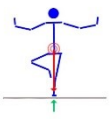
Blank tables

Segment	Length L (mm)	Center of Gravity Location % of length		Centre of Gravity Location L x % of length (mm)
Head		59.8%	from Vertex	
Trunk		44.9%	from suprasternal	
Upper Arm right		57.7%	from shoulder	
Forearm right		45.7%	from elbow	
Hand right		79.0%	from wrist	
Thigh right		41.0%	from hip	
Shank right		44.6%	from knee	
Foot right		44.2%	from heel	
Upper Arm left		57.7%	from shoulder	
Forearm left		45.7%	from elbow	
Hand left		79.0%	from wrist	
Thigh left		41.0%	from hip	
Shank left		44.6%	from knee	
Foot left		44.2%	from heel	

Segment	Relative Mass m_i (%)	Horizontal CG Distance x_i (mm)	Horizontal Moment $m_i \times x_i$	Vertical CG Distance y_i (mm)	Vertical Moment $m_i \times y_i$
Head	6.94				
Trunk	43.46				
Upper Arm right	2.71				
Forearm right	1.62				
Hand right	0.61				
Thigh right	14.16				
Shank right	4.33				
Foot right	1.37				
Upper Arm left	2.71				
Forearm left	1.62				
Hand left	0.61				
Thigh left	14.16				
Shank left	4.33				
Foot left	1.37				
	Total sum	$\sum m_i x_i =$		$\sum m_i y_i =$	
	Overal CG location	**$X=(\sum m_i x_i)/100=$**		**$Y=(\sum m_i y_i)/100=$**	

= yellow needs to be measured in drawing

= green needs to be calculated



Resources

[1] http://animationwear.blogspot.com/2010/11/figure-drawing-basic-pose-and.html
[2] http://en.wikipedia.org/wiki/Center_of_mass
[3] http://www.yourdictionary.com/center-of-gravity
[4] http://www.asu.edu/courses/kin335/documents/CM%20Lab.pdf
[5] http://www.slideshare.net/craigjohnharris/centre-of-gravity-segmental-method
[6] http://www.upwithgravity.net/up-with-gravitysm-lesson-1-locating-your-center-of-gravity/
[7] http://www.alexandertechnique.com/fma.htm
[8] http://www.upwithgravity.net/alexander-technique-and-up-with-gravity/
[9] Prairie Yoga Teacher Training Manual, 2014, pg. 256-258
[10] Bringing Yoga to Life, Donna Farhi, 2003, pg. 134-141
[11] Bringing Yoga to Life, Donna Farhi, 2003, pg. 135