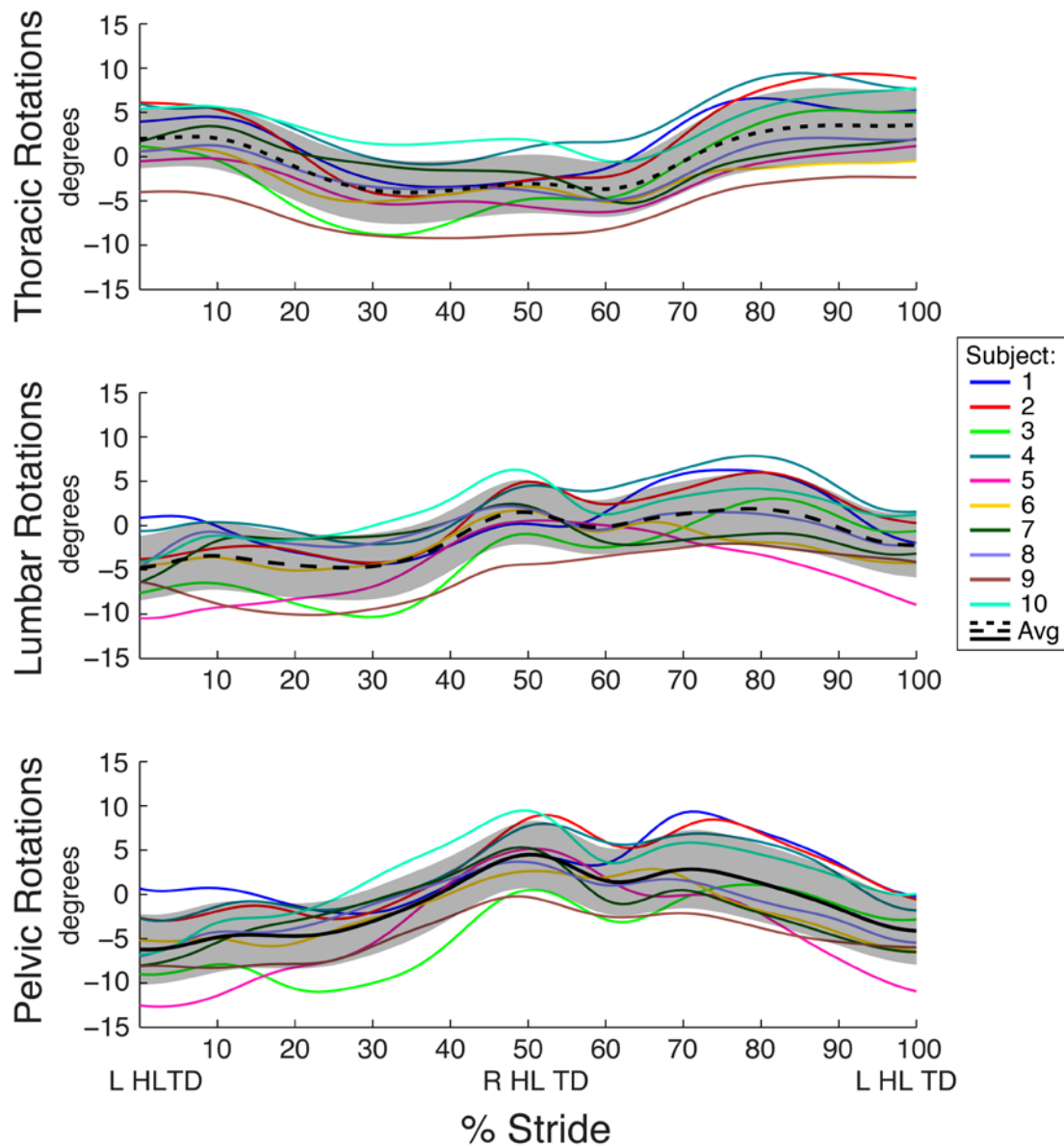
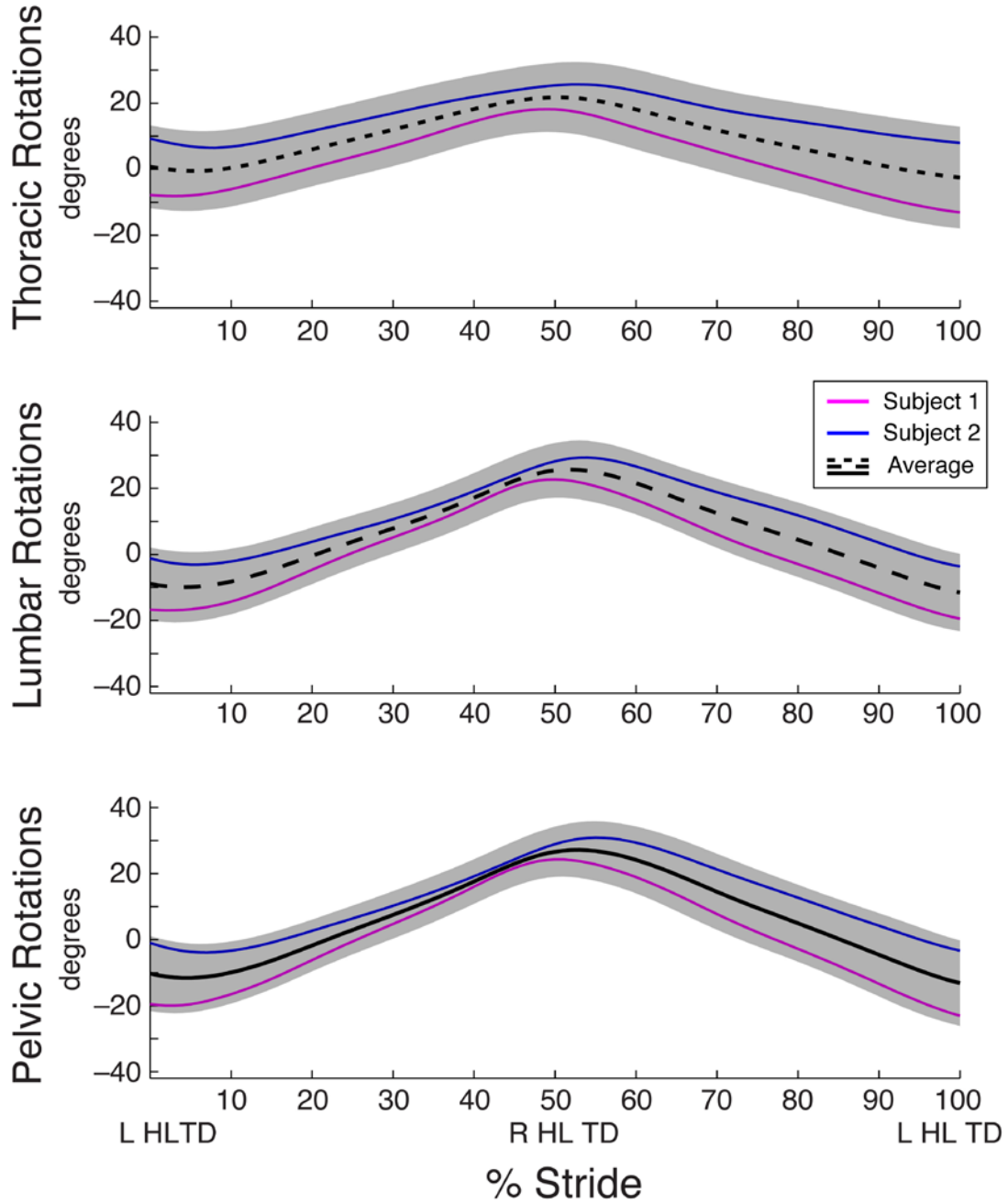




Supplementary Figure 1 | Mean angular motion of all segments for individual human subjects. Rotations are relative to a global coordinate system. Colored lines represent individual subject means, and the thick black line represents the mean for all human strides. Shaded area represents $\pm$ one standard deviation. Note that much of the variation between subjects relates not to shape of the curve, but to differences in y-axis offsets. This is largely due to slight variations in standing posture when taking the single image that defined the neutral position (0°).



Supplementary Figure 2 | Mean angular motion of all segments for individual chimpanzee subjects. Rotations are relative to a global coordinate system. Colored lines represent individual chimpanzee subject means, and the thick black line represents the mean for all chimpanzee strides. Shaded area represents $\pm$ one standard deviation.

Supplementary Tables

Supplementary Table 1 | Kinematic variables for human subjects

	Human Subject 1		Human Subject 2		Human Subject 3		Human Subject 4		Human Subject 5	
	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.
Sex	Female		Female		Female		Female		Female	
Mass (kg)	53.2		60.2		52.5		48.1		65.0	
Age (years)	26.5		26.3		25.4		28.0		23.8	
Lower limb length (m)	0.83	0.00	0.88	0.00	0.88	0.01	0.82	0.00	0.84	0.01
Speed ($m s^{-1}$)	1.28	0.04	1.42	0.06	1.26	0.04	1.33	0.07	1.37	0.05
Dimensionless velocity	0.45	0.02	0.48	0.02	0.43	0.01	0.47	0.02	0.48	0.02
Number of strides	5		5		5		5		5	
Axial Range of Motion (°)										
Pelvis	11.9	2.7	13.3	4.0	12.2	1.9	11.9	2.3	18.6	1.6
Lumbar	11.2	2.4	11.6	3.6	13.4	1.3	10.4	2.1	12.3	2.5
Thorax	10.6	2.2	14.4	3.1	13.6	2.3	10.5	1.3	8.4	1.8
Thorax relative to pelvis	13.1	1.8	21.5	3.5	14.0	2.7	17.0	1.6	24.7	2.2
Lumbar relative to pelvis	5.2	2.2	5.2	0.5	4.6	0.5	6.6	0.7	6.6	0.9
Thorax relative to lumbar	12.0	2.5	18.0	2.8	11.3	3.1	10.5	0.7	17.5	2.2
	Human Subject 6		Human Subject 7		Human Subject 8		Human Subject 9		Human Subject 10	
	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.	mean	st. dev.
Sex	Male		Male		Male		Male		Male	
Mass (kg)	66.8		61.5		66.0		68.7		73.1	
Age (years)	29.2		27.1		21.4		28.7		21.7	
Lower limb length (m)	0.93	0.00	0.87	0.00	0.90	0.00	0.88	0.00	0.96	0.00
Speed ($m s^{-1}$)	1.47	0.04	1.34	0.04	1.33	0.01	1.39	0.01	1.44	0.08
Dimensionless velocity	0.49	0.01	0.46	0.01	0.45	0.00	0.47	0.00	0.47	0.03
Number of strides	5		5		5		5		5	
Axial Range of Motion (°)										
Pelvis	9.9	0.6	13.6	2.4	10.9	1.7	8.3	1.7	16.4	2.2
Lumbar	7.4	1.3	9.0	2.4	7.4	2.0	8.2	1.2	10.5	2.2
Thorax	6.9	0.8	9.0	0.5	7.5	0.7	7.1	1.9	8.4	1.4
Thorax relative to pelvis	14.2	0.9	17.5	1.7	16.0	1.2	13.5	1.1	20.0	2.5
Lumbar relative to pelvis	5.0	1.3	7.2	0.5	6.5	0.9	7.4	0.7	6.8	0.8
Thorax relative to lumbar	10.8	1.8	12.3	2.0	11.3	1.2	9.3	1.5	14.0	2.4
	Females		Males		P-value					
	mean	st. dev.	mean	st. dev.						
Mass (kg)	55.8	6.1	67.2	3.9	0.02					
Age (years)	26.0	1.4	25.6	3.5	0.84					
Lower limb length (m)	0.85	0.02	0.91	0.03	<0.001					
Speed ($m s^{-1}$)	1.33	0.08	1.39	0.07	<0.01					
Dimensionless velocity	0.46	0.03	0.47	0.02	0.30					
Number of strides	25		25							
Axial Range of Motion (°)										
Pelvis	13.6	3.6	11.8	3.4	0.07					
Lumbar	11.8	2.5	8.5	2.1	<0.001					
Thorax	11.5	3.0	7.8	1.4	<0.001					
Thorax relative to pelvis	18.0	5.0	16.2	2.8	0.26					
Lumbar relative to pelvis	5.7	1.3	6.6	1.2	0.01					
Thorax relative to lumbar	13.8	3.9	11.5	2.3	0.05					

P-values are results of Wilcoxon rank-sum tests with a sample size of 25 for each males and females.

Supplementary Table 2 | Kinematic variables for chimpanzee subjects

	Chimpanzee Subject 1		Chimpanzee Subject 2	
	mean	st. dev.	mean	st. dev.
Mass (kg)	35.7	0.7	34.2	0.7
Age (years)	7.0		7.1	
Lower limb length (m)	0.44	0.01	0.42	0.01
Speed ($m\ s^{-1}$)	0.94	0.09	1.00	0.09
Dimensionless velocity	0.45	0.04	0.49	0.04
Number of strides	7		7	
Axial Range of Motion (°)				
Pelvis	49.0	10.8	36.6	5.5
Lumbar	43.5	11.9	35.5	5.1
Thorax	32.5	11.4	21.2	3.4
Thorax relative to pelvis	19.9	4.0	18.2	5.3
Lumbar relative to pelvis	7.4	2.8	5.6	4.8
Thorax relative to lumbar	15.6	3.0	15.6	2.4

Mass includes standard deviations since each chimpanzee includes data from two recording sessions within a period of four months.

Supplementary Table 3 | Marker positions for trunk segments

	Humans	Chimpanzees
Thorax markers	First thoracic vertebra Last thoracic vertebra Anterolateral aspect of second (females) or fourth (males) rib	
Lumbar markers	First lumbar vertebra Two markers on either side of third lumbar vertebra	
Pelvic markers	Left anterior superior iliac spine Left and right posterior superior iliac spines <i>Left iliac blade</i>	<i>Left ischial tuberosity</i> <i>Sacrum</i> <i>Coccyx</i>

The pelvic markers in *italics* represent those markers that were species specific.