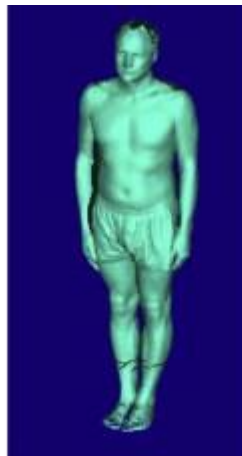
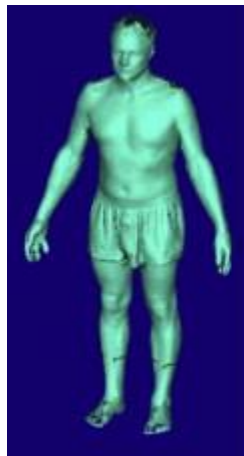
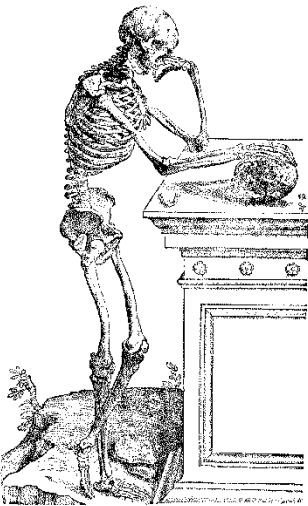


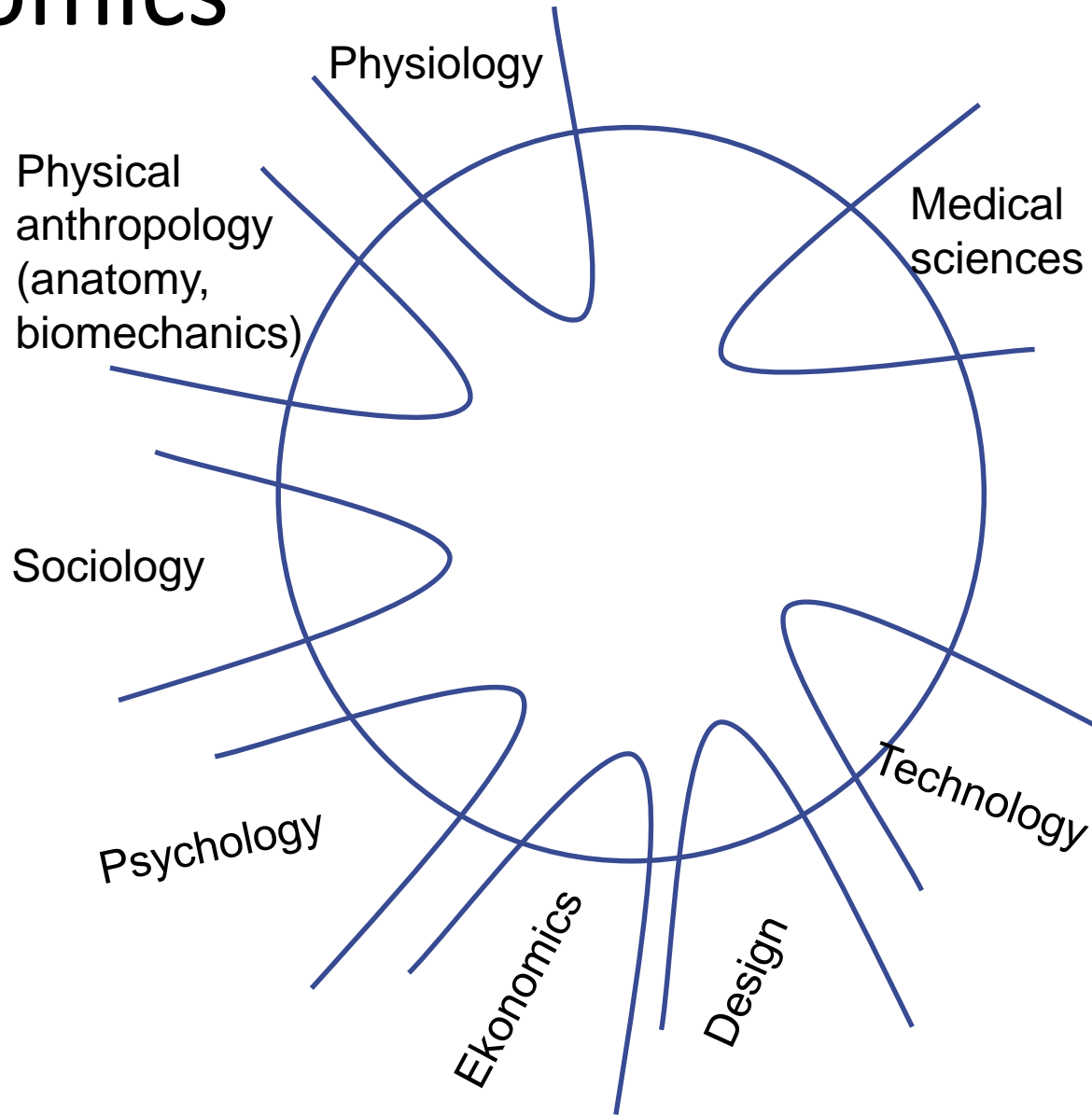
Ergonomics and human factors

Bi9100 Ergonomics and Applied Anthropology



Ergonomics

- Ergos – (greek) work
- Nomos – (greek) law
- The relationship between man and work environment
- Multidisciplinary specialization



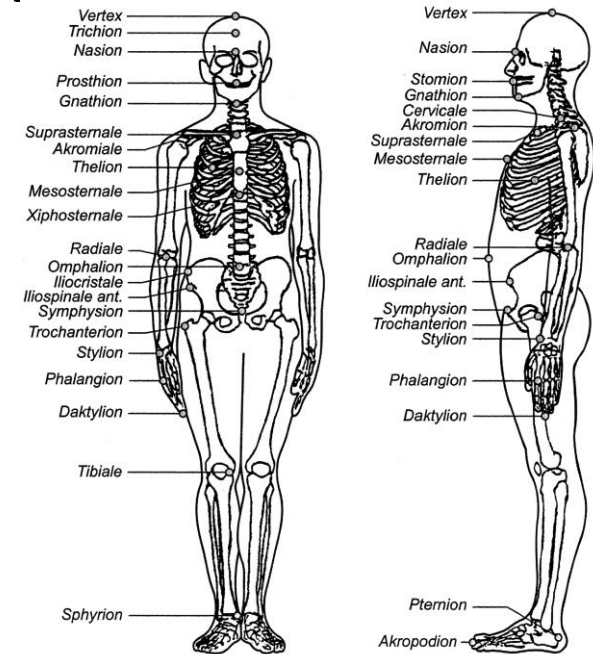
Basic concepts

Criteria and parameters under evaluation

- Floor surface
 - Work area
 - Work position
 - (Repetitive) work motion
 - Static and dynamic work ratio
 - Physical demands
 - Load manipulation
 - Visual conditions
 - Background color schemes
 - Visual input
 - Acoustic conditions
 - Mikroklimatic conditions
 - Psychosocial conditions
- Notes on history:
First use/definiton: W. Jastrzebowski, resp. H. Murrell (1949)
 - Historical/archeological evidence of adjusting instruments to match the human body and its capacity
 - Systematic study of interaction is a recent concept

Performance and capacity

- Somatic dimensions and motions/mobility
- Muscle strength; physical work
- Sensory capacity
- Psychological features/capacity
- Adaptation to work conditions



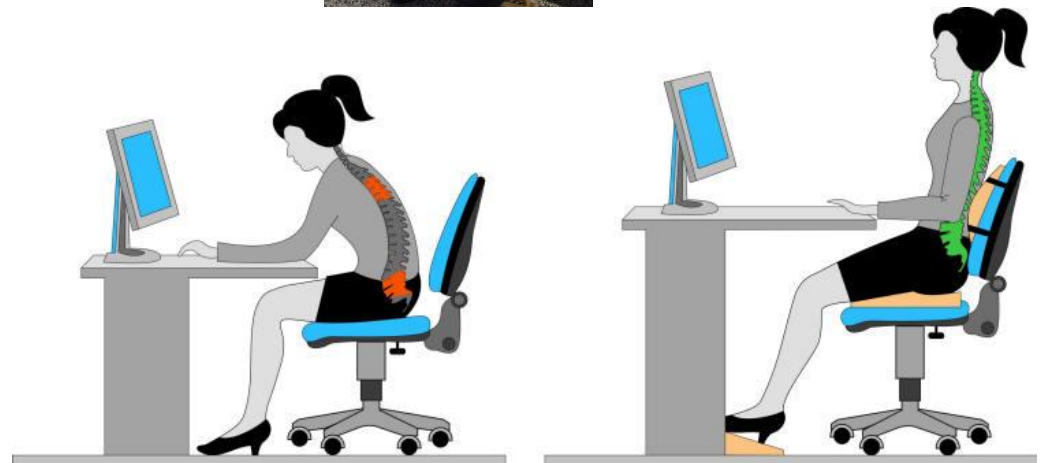
Stress

- Acute stress
- (anticipative stress)
- Chronic stress


- Chronic fatigue syndrome
- Burnout syndrome

- Stress prevention

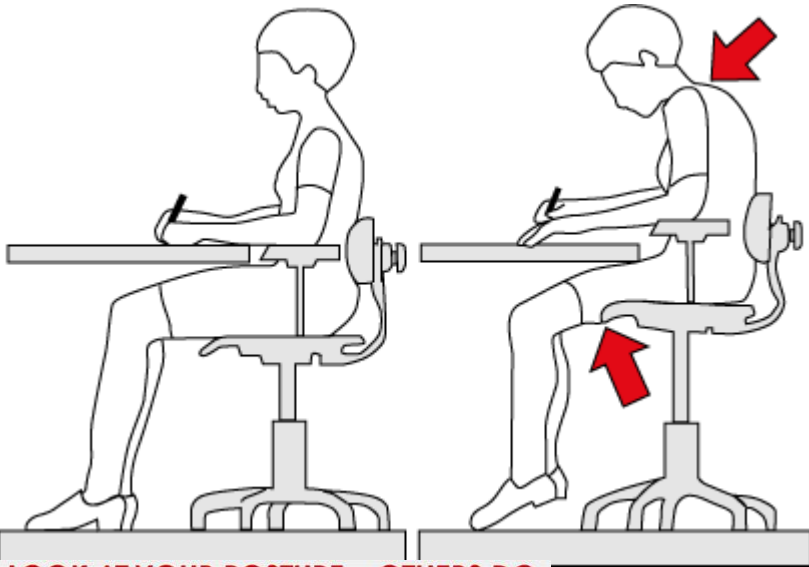
- Stand-up work
- Sitting-position work



Anthropo-technical system

- The human body – the living part of the system
- The technical element – „lifeless“ part
- The main goal – work/workplace efficiency (improvements in function, safety, design – adjusting/adapting the technical element to human physical and psychological capacity)
- An optimal design reflects/respects biological variability
- Fit the man to the job  fit the job to the man

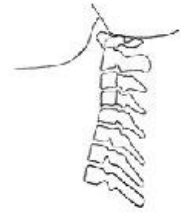
„Traditional“ ergonomics



Healthy Curve

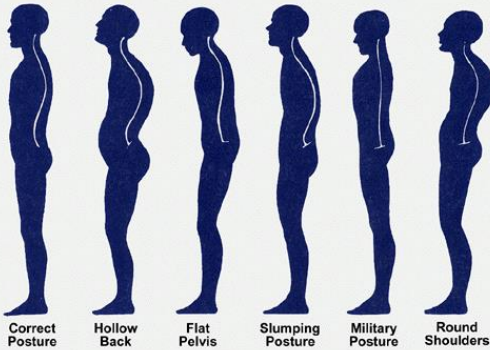


Pathological Curve

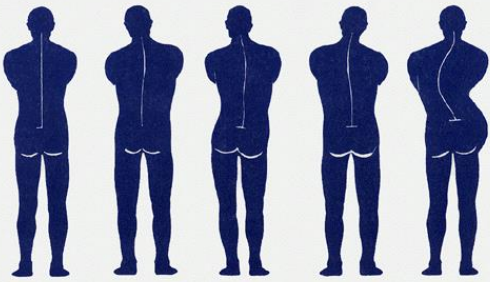


Pathological Curve

LOOK AT YOUR POSTURE... OTHERS DO



Correct Posture Hollow Back Flat Pelvis Slumping Posture Military Posture Round Shoulders



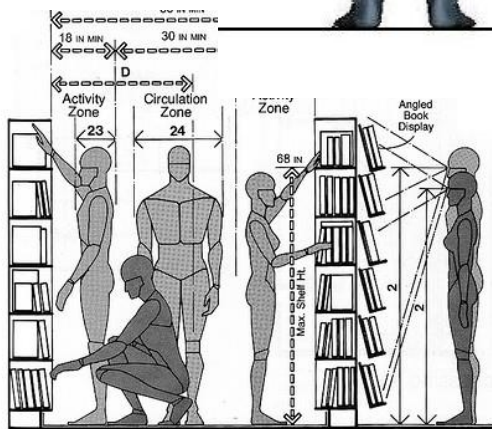
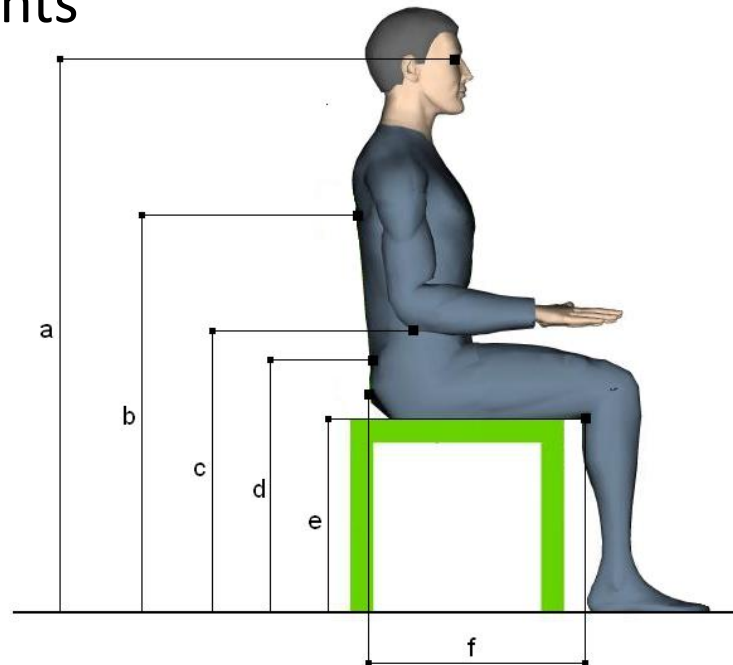
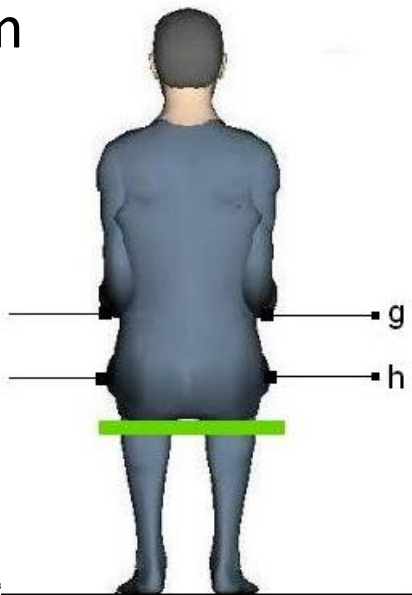
Correct High Shoulder High Hip Head Tilt Severe Scoliosis



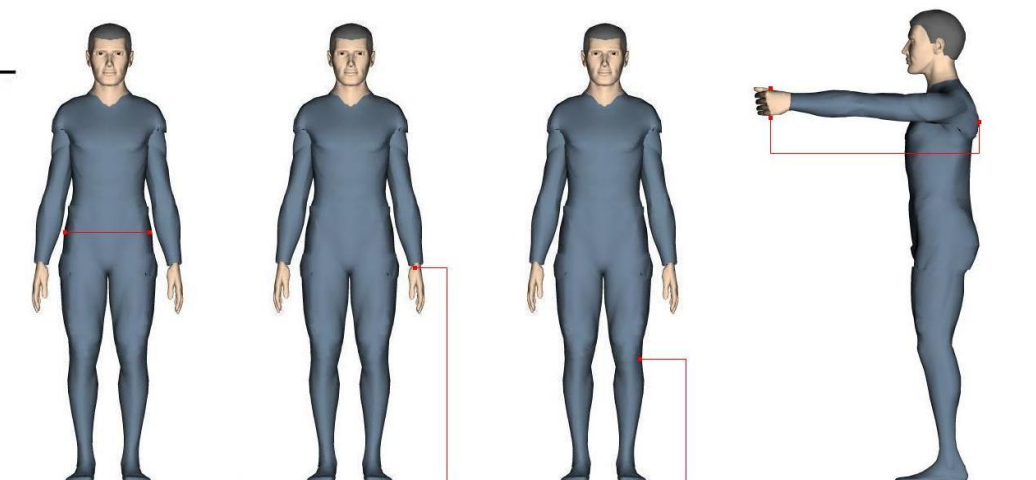
Traditional methods of physical anthropology in ergonomics

- Anthropometry
- Dynamometry
- Kinanthropology
- Biomechanics

- Basic („structural“) measurements
- Functional measurements
- Design „conversion“
- The human body is a dynamic system



BOOK STORE / DISPLAY AREA

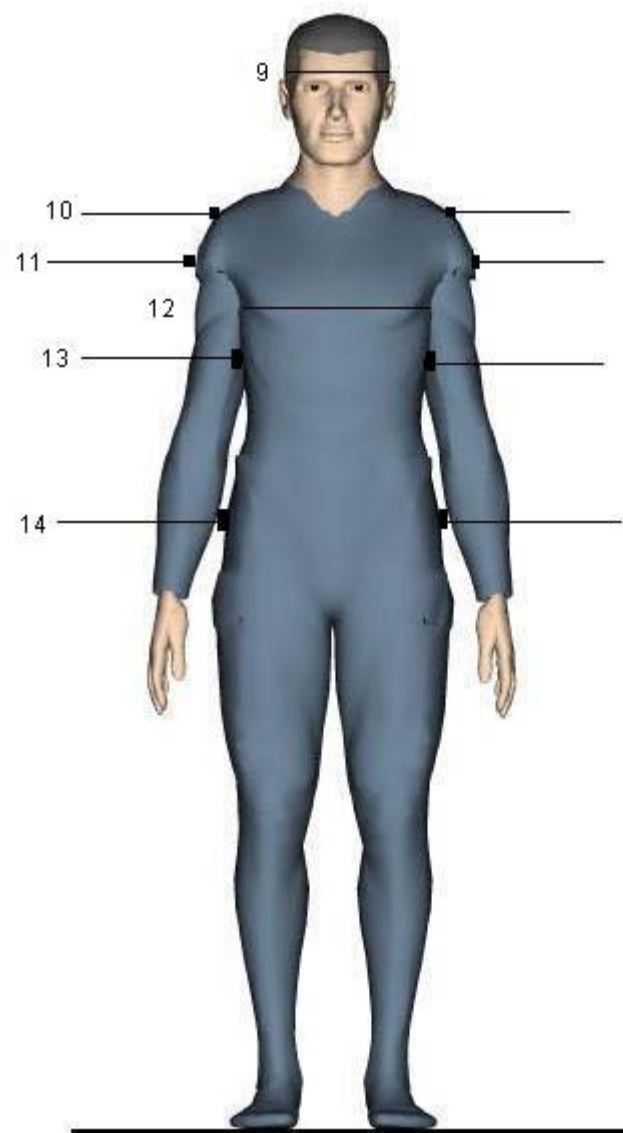
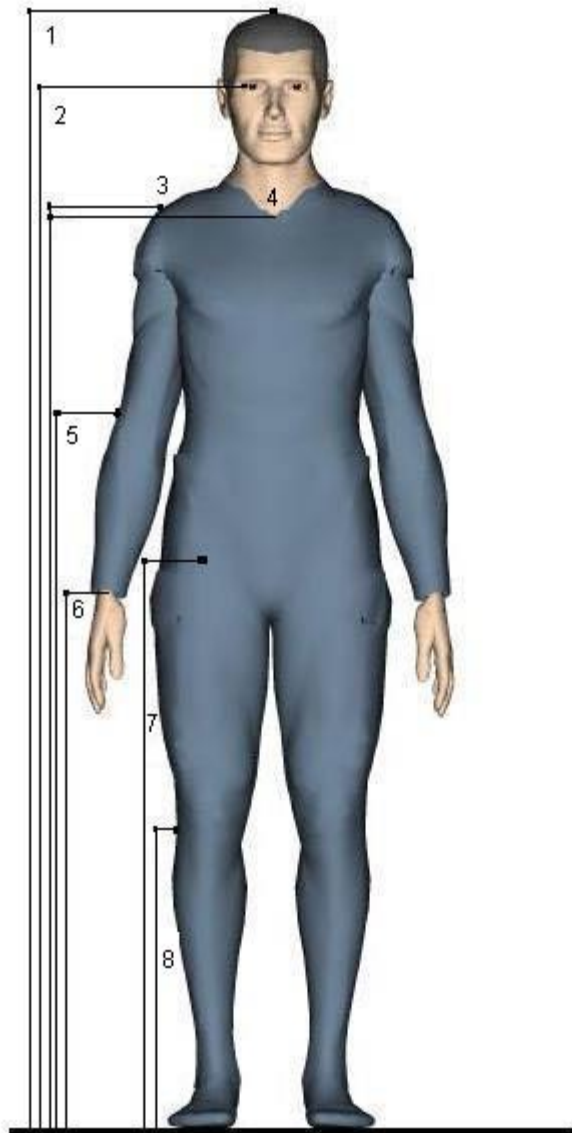


bikristální šířka pánve

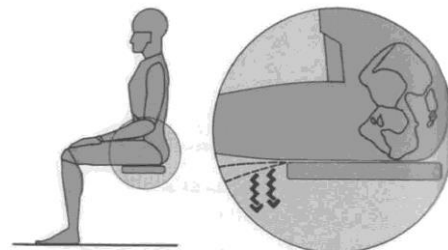
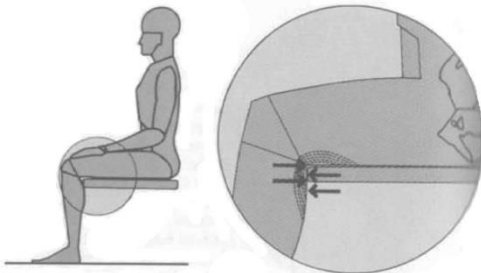
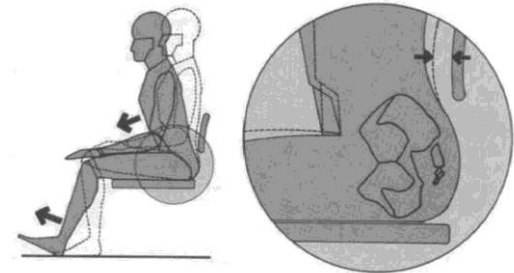
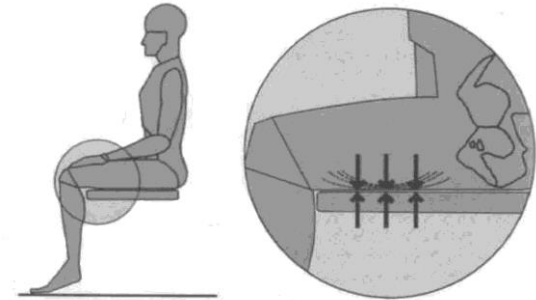
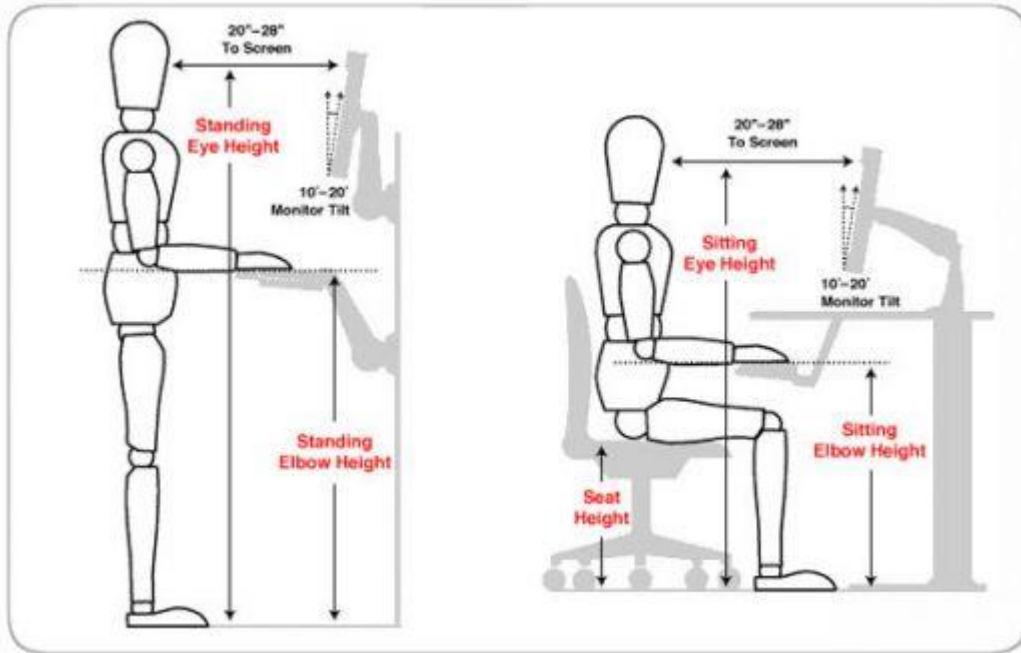
výška bodu styllon

výška tibiale

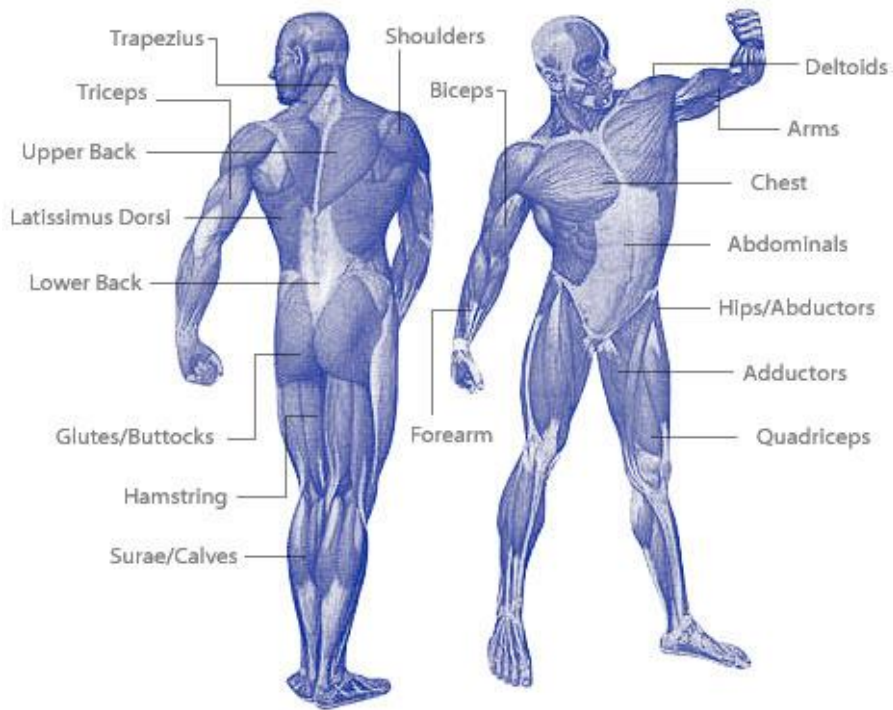
dosad dopředu k úchopu

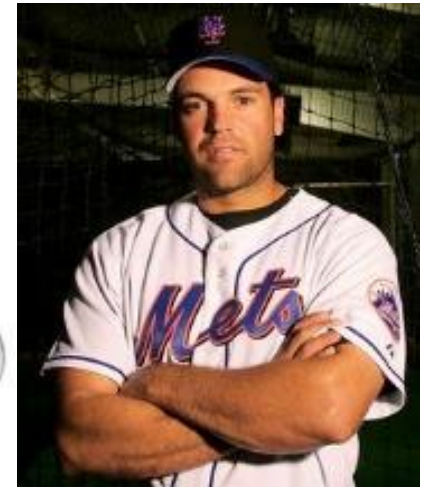


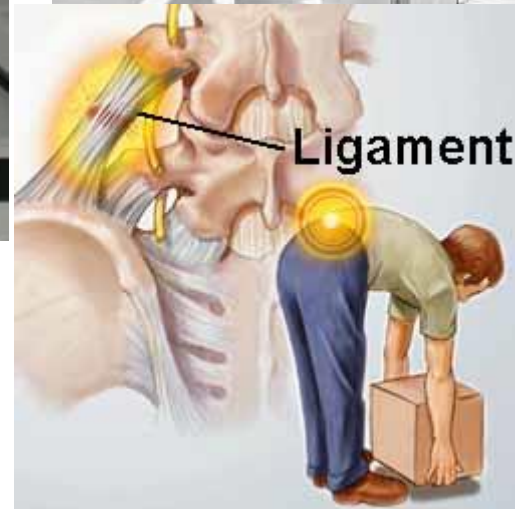
- Importance of establishing the appropriate target population
- Individual solutions – or wide-scale fitting solutions
- Use of 3D advanced techniques (to model real/extreme situations)

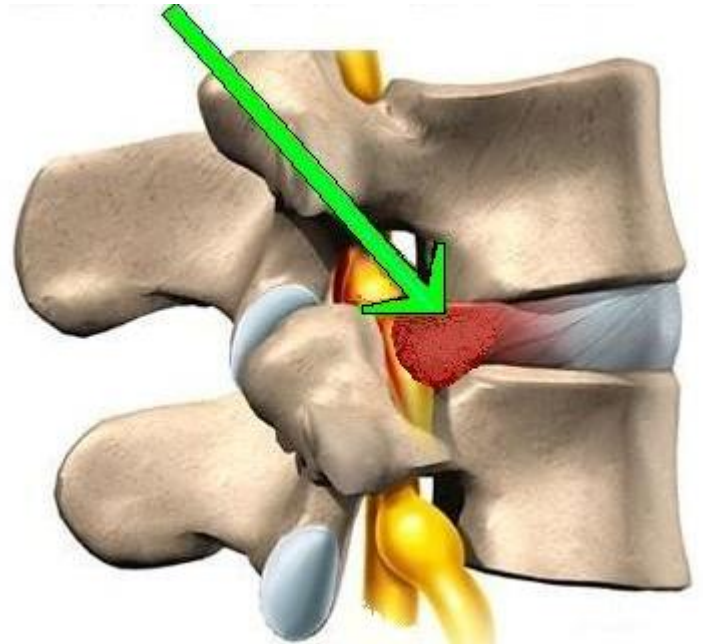


- Public/military sector (internal sources of data)
- NASA





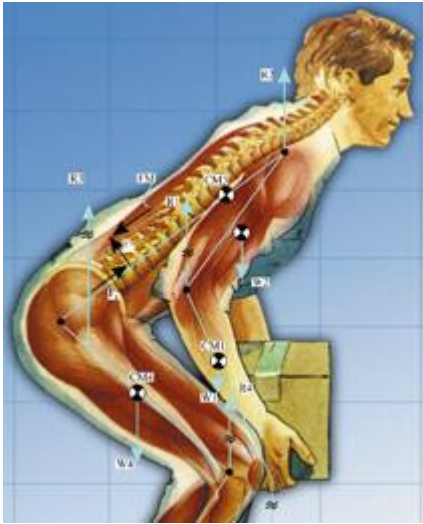




TIRE FLIP

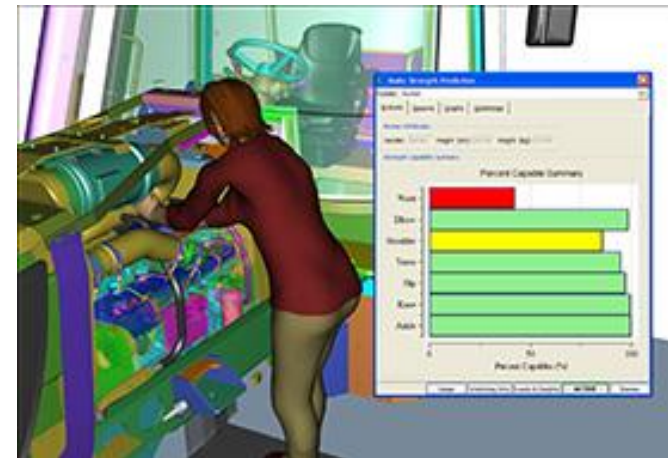




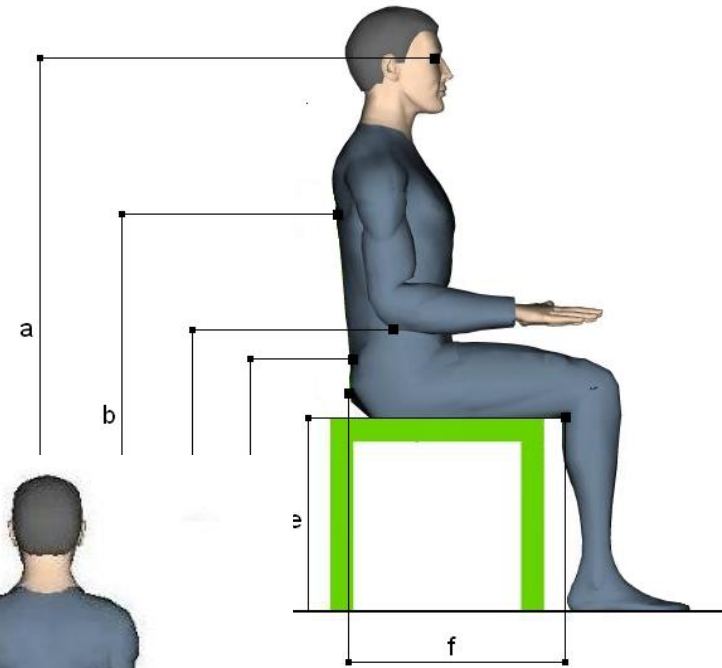


„New“ approaches in ergonomics/HF

- Simulations and modelling (advanced PC supported methods – virtual model of the human body)
- HCI – human computer interaction (IT – hardware, software, interfacing fit to the user requirements); signal reception from the surroundings; responses (neurophysiological level)
- Cognitive ergonomics
- Recovery from work



3D simulatiom (SW Siemens Tecnomatix Jack)



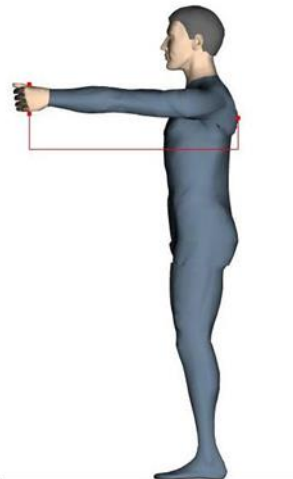
bikristální šířka pánve



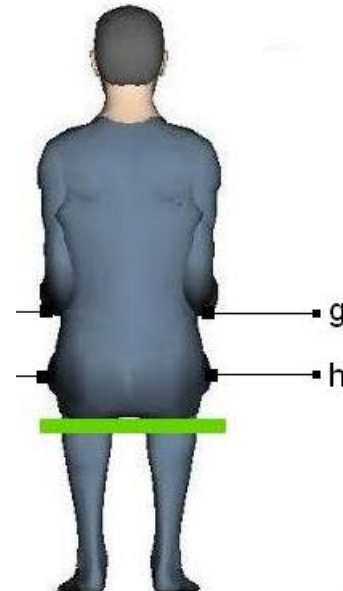
výška bodu styloid



výška tibiale



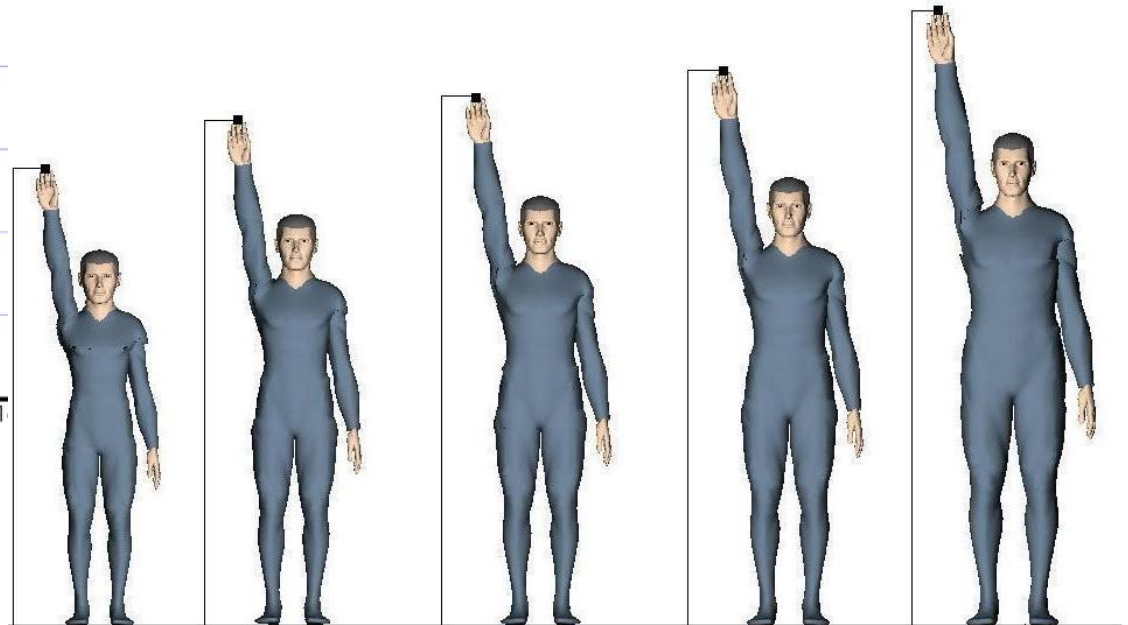
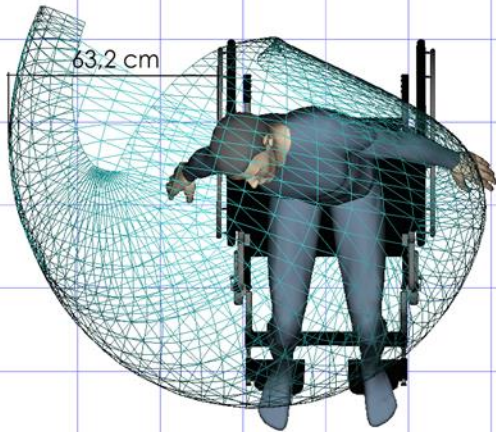
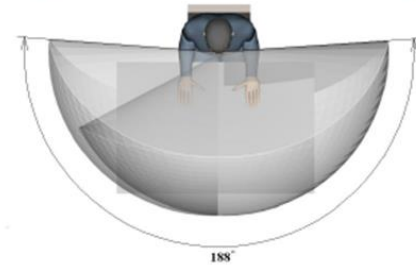
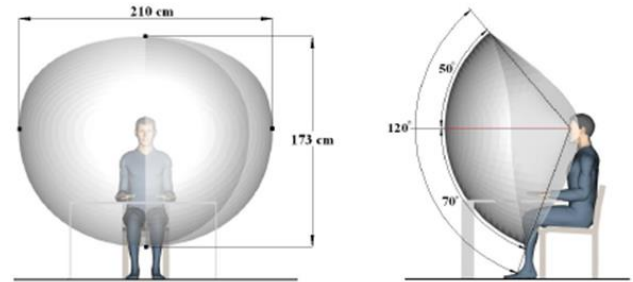
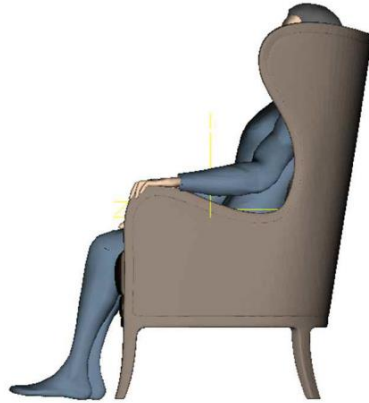
dosad dopředu k uchopu



g

h

3D simulations



Cognitive testing

MONTREALSKÝ KOGNITIVNÍ TEST (Nasreddinův test)

JMÉNO :
Vzdělání :
Pohlaví :

Datum narození :
DATUM :

Prostorová orientace / zručnost		Okopírujte krychli		Namalujte ciferník a označte 11 hodin 10 minut (3 body)		BODY	
				<input type="checkbox"/> kontura <input type="checkbox"/> číslice <input type="checkbox"/> ručičky			___/5
Pojmenování zvířete							
						___/3	
Paměť							
Přečtete řadu slov. Testovaný je musí opakovat. Zopakujte je ještě jednou. Po 5 minutách požádejte o opakování slov.			TVĚŘ	SAMET	KOSTEL	KOPRETINA ČERVENÁ	žádný bod
		1.pokus					
		2.pokus					
Pozornost							
Přečtete řadu čísel (1 za vteřinu). Testovaný je má zopakovat, jak šla za sebou.		[] 2 1 8 5 4		[] 7 4 2		___/2	
Testovaný je má zopakovat pozpátku.							
Čtení řady písmen. Testovaný musí klepnout prstem pokaždé, když uslyší A. Při 2 a více chybách nedostane žádný bod.							
[] FBACMNAAJKLBAFAKDEAAAJAMOF AAB							___/1
Množina odečtů 7 od 100							
[] 93 [] 86 [] 79 [] 72 [] 65							___/3
4-5 správných odečtů = 3 body / 2-3 správné = 2 body / 1 správný = 1 bod / 0 správný = 0 bod							
Řeč							
Opakujte po mně: Pouze vím, že je to Jan, kdo má dnes pomáhat. []							___/2
Když jsou v místnosti psi, kočka se vždy schová pod gauč. []							
Vybavování slov: Řekněte co nejvíce slov, která začínají písmenem K, během 1 minuty. [] (N > 11 slov)							
Abstrakce							
Podobnost mezi např. banán-pomeranč = ovoce. [] vlak - bicykl [] hodinky - pravítka							___/2
Pozdější vybavení slov							
Vybavení slov BEZ NÁPOVĚDY		TVĚŘ	SAMET	KOSTEL	KOPRETINA	ČERVENÁ	Body se udělí pouze BEZ NÁPOVĚDY
		[]	[]	[]	[]	[]	
Nepovinné		Jedna nápověda					
		Více nápověd					
Orientace							
[] datum [] měsíc [] rok [] den [] místo [] město							___/6
© Z.Nasreddine MD		NORMA ≥ 26 / 30		CELKEM		___/30	
www.mocatest.org				Přidej 1 bod všem, kteří nemají 12 leté školní vzdělání!			



Manipulation tests



Recovery from work

- High work-load – associations with several stress-related disorders: anxiety, depression, chronic fatigue, burnout, high blood pressure, cardiovascular diseases...
- Ability to recover (in terms of turning off from work) is an important preventive factor
- Work stress is closely associated with changes in various physiological indicators – elevated blood pressure, heart rate etc.
- Work stress increase with low level of decision-making, responsibility and control over outcomes paired with high demands

Specifics of practical applications/method of physical anthropology

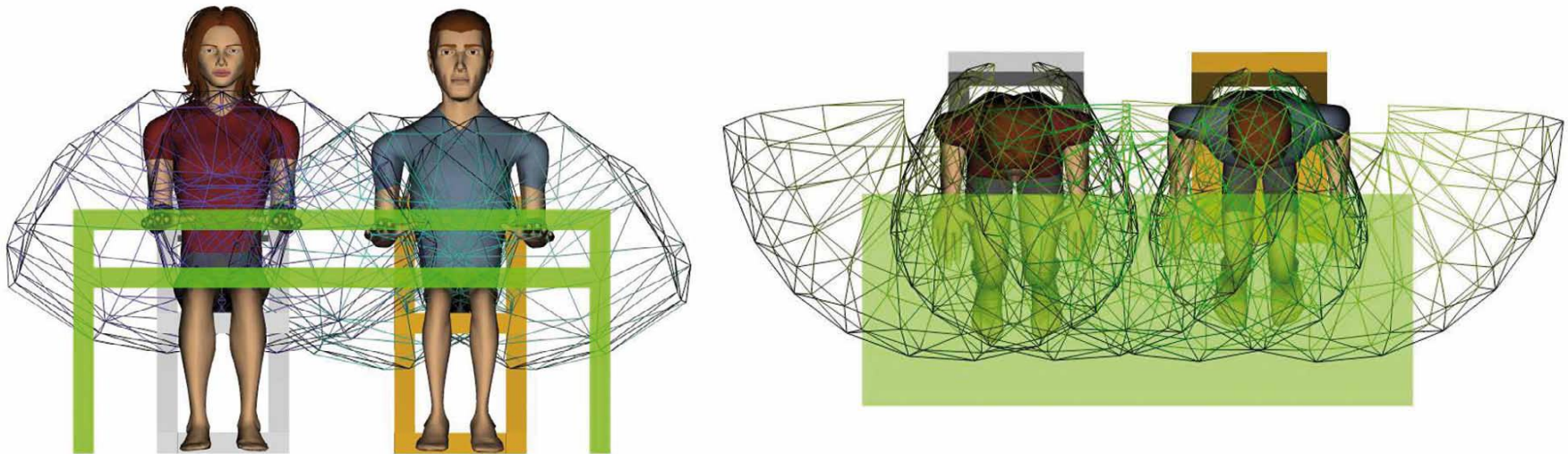
- Work load regulation – efficiency, work proces management and regime
- Workplace conditions adaptation – optimalization and individualization
- Workplace conditions adaptation – minimizing health and injury risks
- Analysis of planned or implemented work proces
- Specific ethic aspect

Anthropometry of a Czech Children Sample and its Use in Ergonomics – Preliminary Report

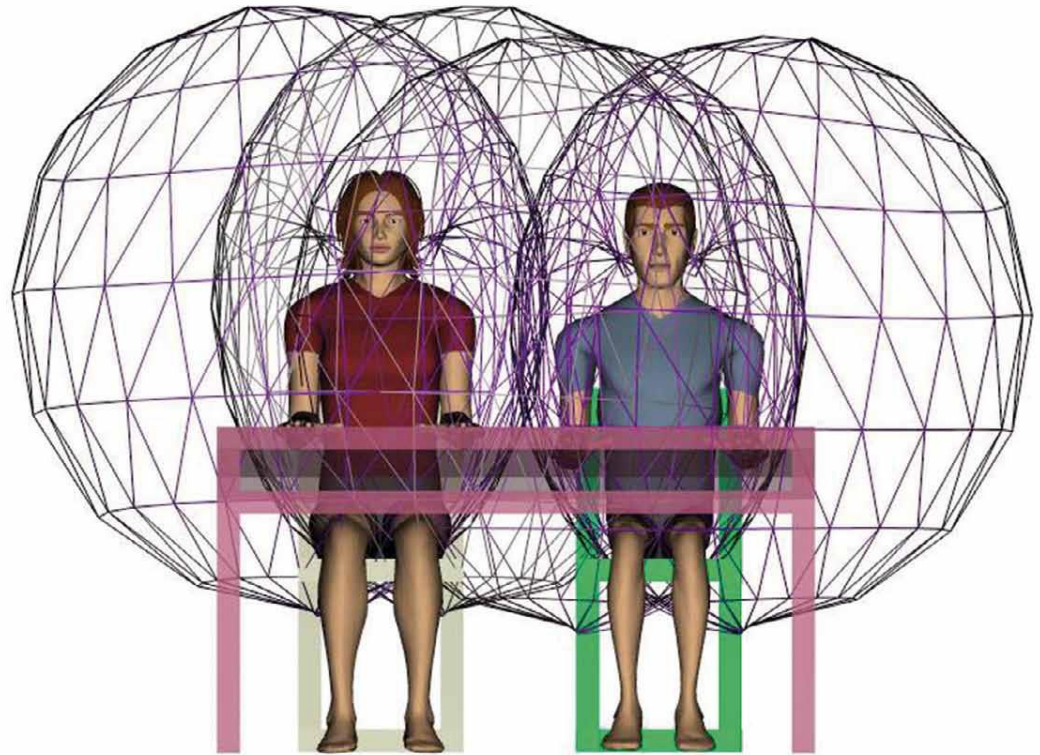
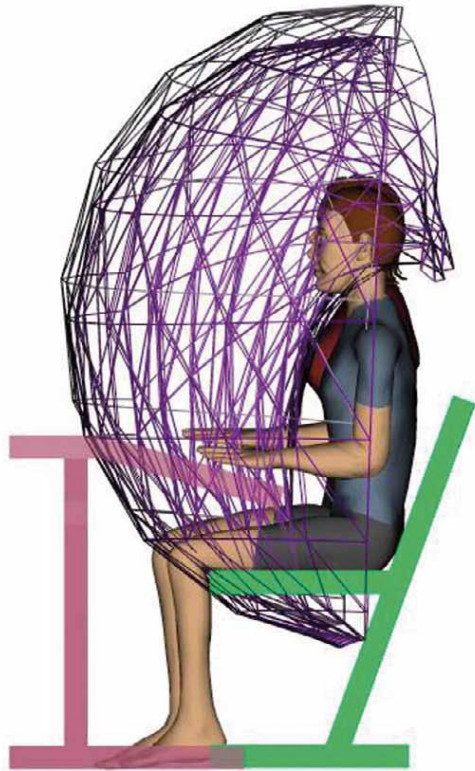
Martin Čuta, Martin Zach

Department of Anthropology, Faculty of Science at Masaryk University, Vlnářská 5, Brno CZ-603 00, Czech Republic

Department of Furniture Design and Habitat, Faculty of Forestry and Wood Technology, Mendel University in Brno



Simulation I – boy and girl (early school age), horizontal school desk (relevant size standard) with overlapping reach distances (comfort position)



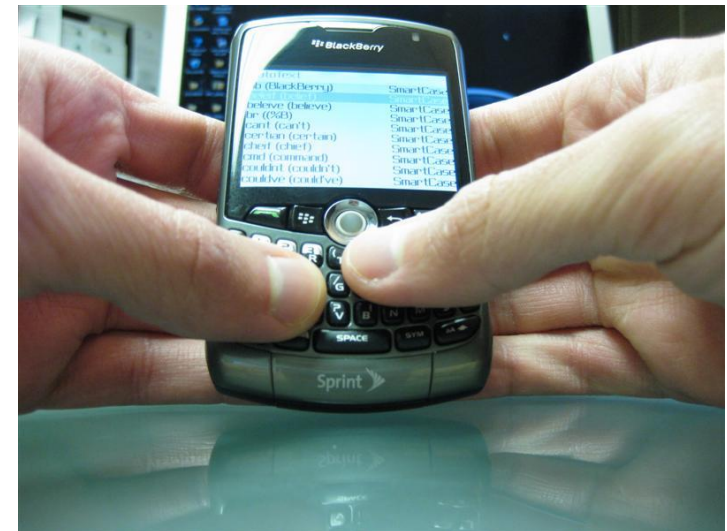
Simulation II – boy and girl (middle school age), reclining school desk (relevant size standard) with overlapping reach distances (maximum reach position)

Mobile technology use study



In males, hand width
correlated with phone width

Positive correlation between
first finger apex surface and
the keyboard



Mobile technology use study



Women more style-conscious

Males more focused on technical parameters when selecting a phone



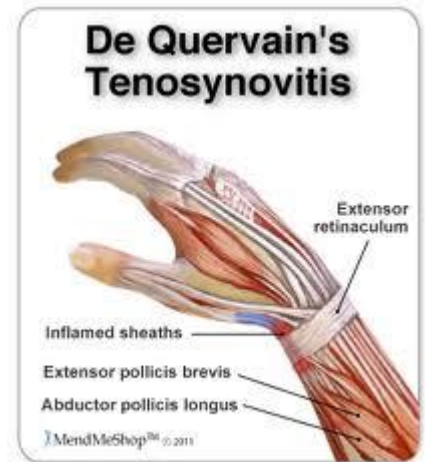
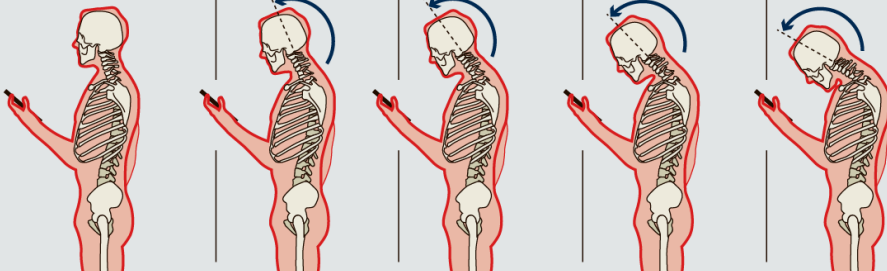
Repetitive stress injury – mobile technology

- Texting thumb
- Text neck

How texting could damage your spine

Forces on the neck increase the more we tilt our heads, causing spine curvature

Force on neck	10-12lb	27lb	40lb	49lb	60lb
Neck tilt	0 degrees	15 degrees	30 degrees	45 degrees	60 degrees



Forward Head Posture (FHP)

or "Text Neck" Syndrome is a condition which develops when the head is not properly aligned with the neck causing a curvature of the spine.

Correct your Head Position

Neck Sofa with the patented inner "Support Structure" allows you to re-train how you use specific wireless devices. Supporting your head allows for weight and added pressure to be minimized. Thereby providing proper posture alignment. Better posture of course means better overall health.

