Ergonomic considerations in seated work

How do we think we sit?
How do we actually sit?
How should we sit?

Bernardino Ramazzini (1777)

“First, constant sitting, secondly the incessant movement of the hand and always in the same direction…”

“Incessant driving of the pen over paper causes intense fatigue of the hand and the whole arm because of the continuous and almost tonic strain on the muscles and tendons, which in course of time results in failure of power in the right hand”.

Over 1,000 postures people can sustain

Often reflect national, cultural and gender differences.
Seated work activities

If all you have is a hammer, ... you think everything is a nail.

When our posture is not supported, most comfortable ≠ what's best

Comfortable ≠ best postures

Healthy ligament
Damaged ligament (below)

Symptoms are complicated and unpredictable

Tunnels

Screw up one thing, screw up everything!
Seated work activities

How do we support the back?

Humanics

What are good postures?

Neutral postures
- Balance muscle loads
- Reduce physical demands
- Relieve physical stress

www.humanics-es.com/movement-ergonomics.htm

How do we support the back?

Keegan x-rayed one man 13 times


Pelvic tilt

Standing Sitting erect Sitting relaxed


Intradiscal pressures


What are good postures?

Neutral postures
- Balance muscle loads
- Reduce physical demands
- Relieve physical stress

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Seated work activities

- **Lumbar fit**

- **The seat pan**

- **Zazen sitting**

- **"Rotatory" movements**

- **The "gender gap"**

- **"Fit": user and seat pivot point**

References:
Seated work activities

- **Seat height and depth**
- **Seat compression**
- **Postural constraints**
- **Fit?**
- **Fit?**
- **Lines of sight**
Seated work activities

Standing and sitting viewing angles

And then, the training

- Critical information is missing
- Content is wrong
- "Blame the victim" (for bad design)

Training effects

- Practice effect
- Order effect
- Direction of adjustment effect

The practice effect ...

- Practice as a group, using their own chair (stay away from a work surface).
- Demonstrate all chairs they need to adjust.
- Find a way to fully adjust in one minute.

The order effect

- Seat height.
- Seat pan depth.
- Backrest height and angle.
- Backrest tension - unlocked.
- Armrest width and height.

Direction of adjustment

- Seat height: Down, then up then down
- Back height: Down, then up, then down
- Seat tension: Low, then high, then down
Seated work activities

**Seat adjustments...**
- Active vs. passive controls
- Adjustments → obvious, easy, intuitive → from seated position
- Adjustment controls interact

**More on adjustments...**
- Keep adjustment steps consistent
- Can employees with CTDs adjust?
- Left-handed users

**Best time to train...**
- ASAP
- When the new furniture arrives
- When moving / starting a job

**Seat design trends**
- Dynamic backrests for a dynamic back.
- Rethink forward seats.
- Keep moving!
- Foot support, finger height, line of sight.
- Neck supports.
- One size does not fit all.

**Download handouts**

www.humanics-es.com/seating.htm

**Thank you!**

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About Rani Lueder

Rani Lueder, MSIE, CPE is President of Humanics ErgoSystems, Inc. an ergonomics consulting firm in Encino, California that she established in 1982. She has consulted, performed research and served as an expert witness in occupational ergonomics, posture and the design and evaluation of products and places for adults, children and people with disabilities for more than two and a half decades. She has consulted for corporations, governments and universities in seven countries and has provided expert testimony on a range of cases related to product design, occupational health and accommodating people with disabilities.

She has performed large-scale evaluations for organizations and served on retainer for numerous organizations. She continues to serve on retainer to the Japanese Scientific University, the University of Waseda. She also served on retainer for several years with the Japan Institute of Human Posture (Tokyo), The University of Waseda and ErgoSeating in Japan. She was a member of the ANSI committee revising the American National Standard for workstation design.

She teaches human factors and ergonomics in industrial design at the Art Center College of Design in Pasadena on a regular basis. Her service-related activities include participating in various ergonomics standards committees and chairing a Human Factors and Ergonomics Society Task Force on their online human factors and ergonomics content and services.


Rani has an MSIE in Ergonomics/Industrial Engineering from Virginia Tech, and is a member of the Human Factors and Ergonomics Society (US). The Board of Certification in Professional Ergonomics certifies her (#258).

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