

# Evaluation of three types of school furniture according to prEN 1729

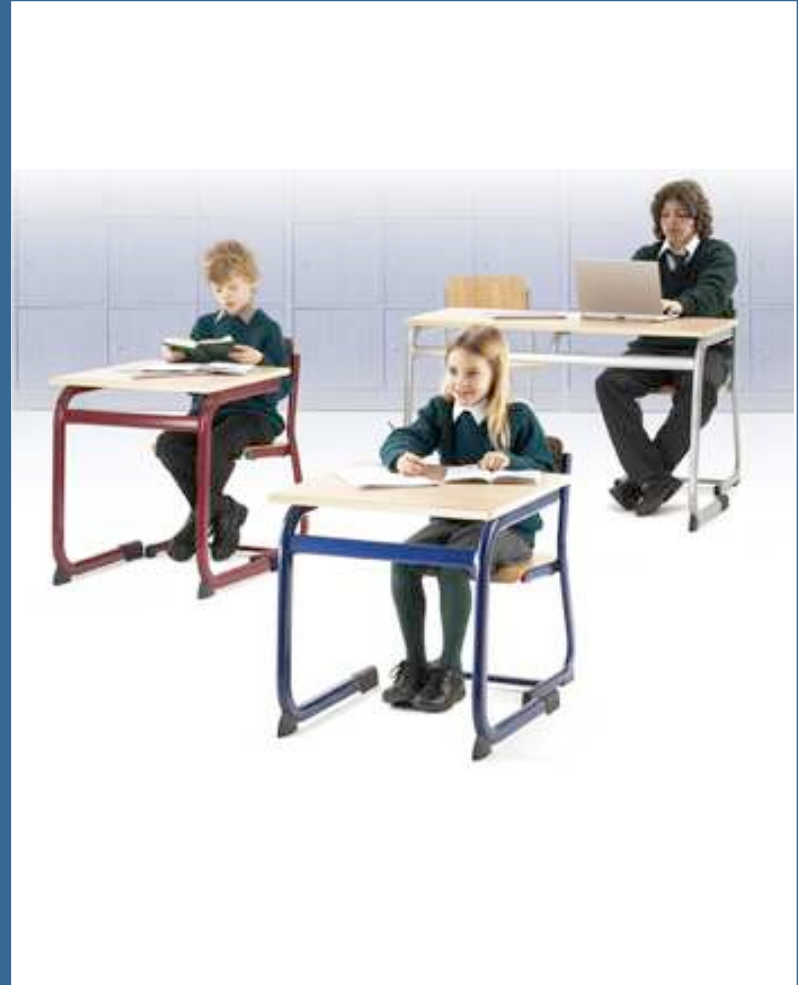
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# Introduction

- sitting a lot of time
- different tasks
- different body lengths



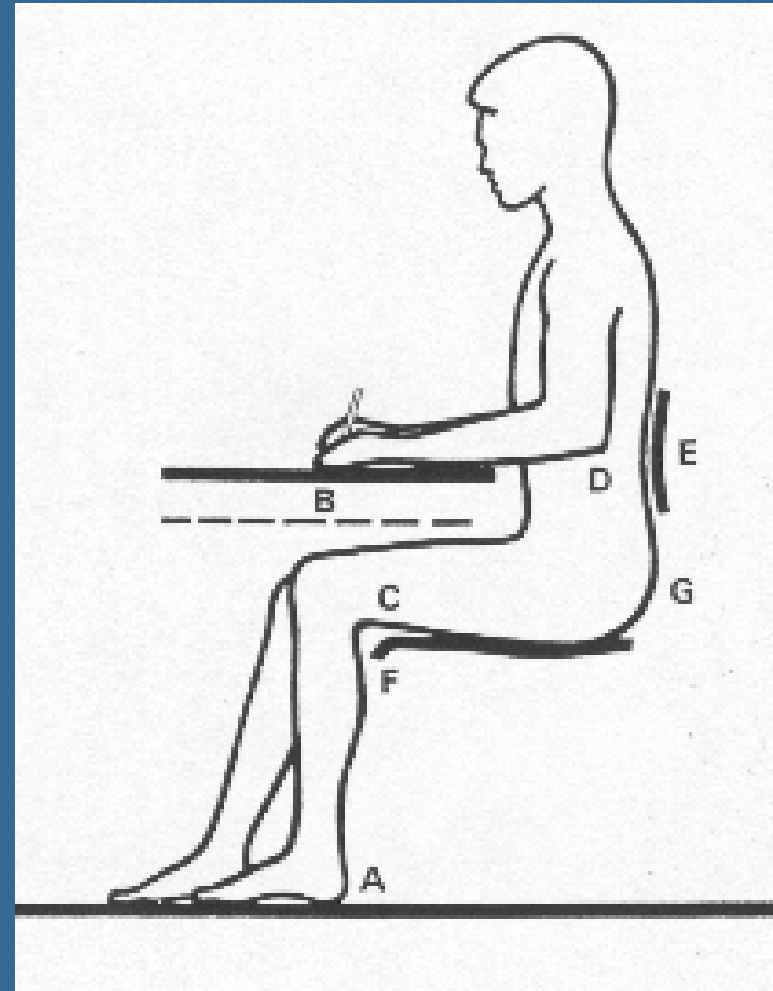
# Mismatch furniture

- one size fits all ?
- younger pupils
  - too high and too deep
- older students
  - best fit for the smallest students



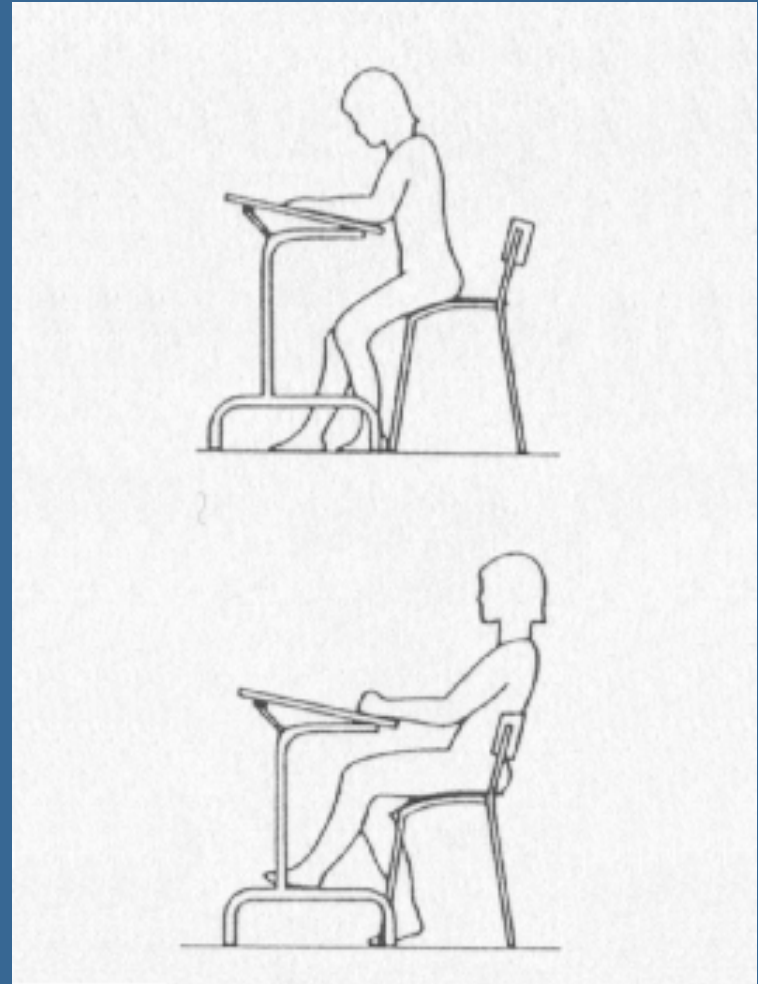
# Upright seating

- ISO 5970
- 7 sizemarks for 90-190cm
- reference posture
  - feet flat on floor
  - seat at popliteal height
  - table at elbow height
  - back rest provides support



# Open hip angle seating

- higher chair and desk
- forward tilt of seat pan
- tiltable desk of 0-20°
- functional seating



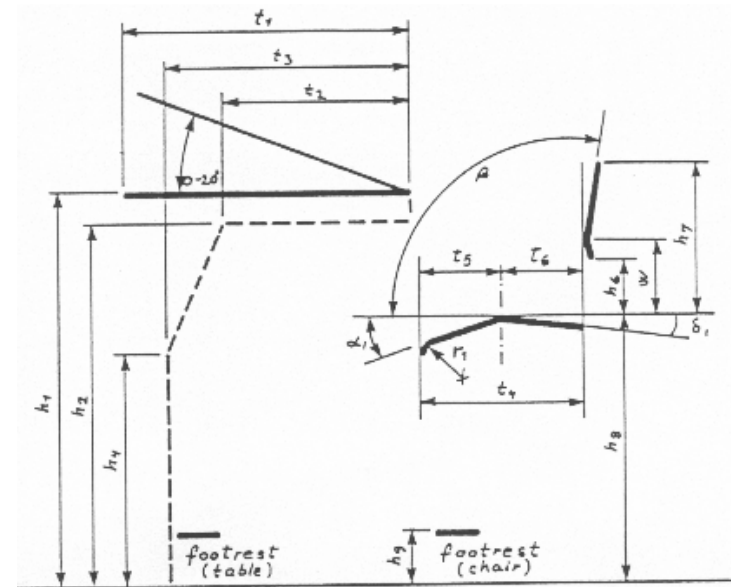
# Class room situation

- subjective preference for open hip angle furniture
- preference tiltable table top
- correct place of the lumbar support



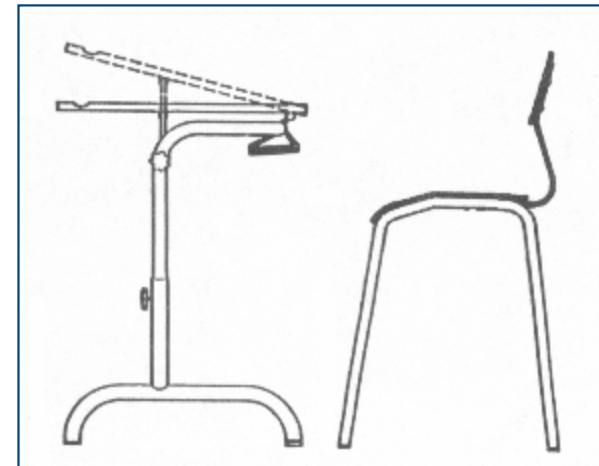
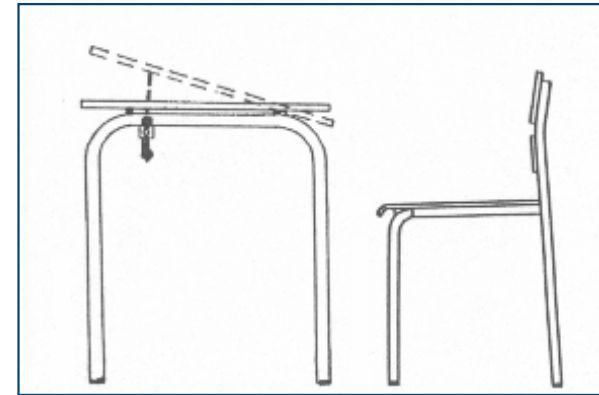
# Standard draft prEN 1729

- 8 sizemarks
- based on popliteal height
- all seating concepts are allowed



# Hypothesis

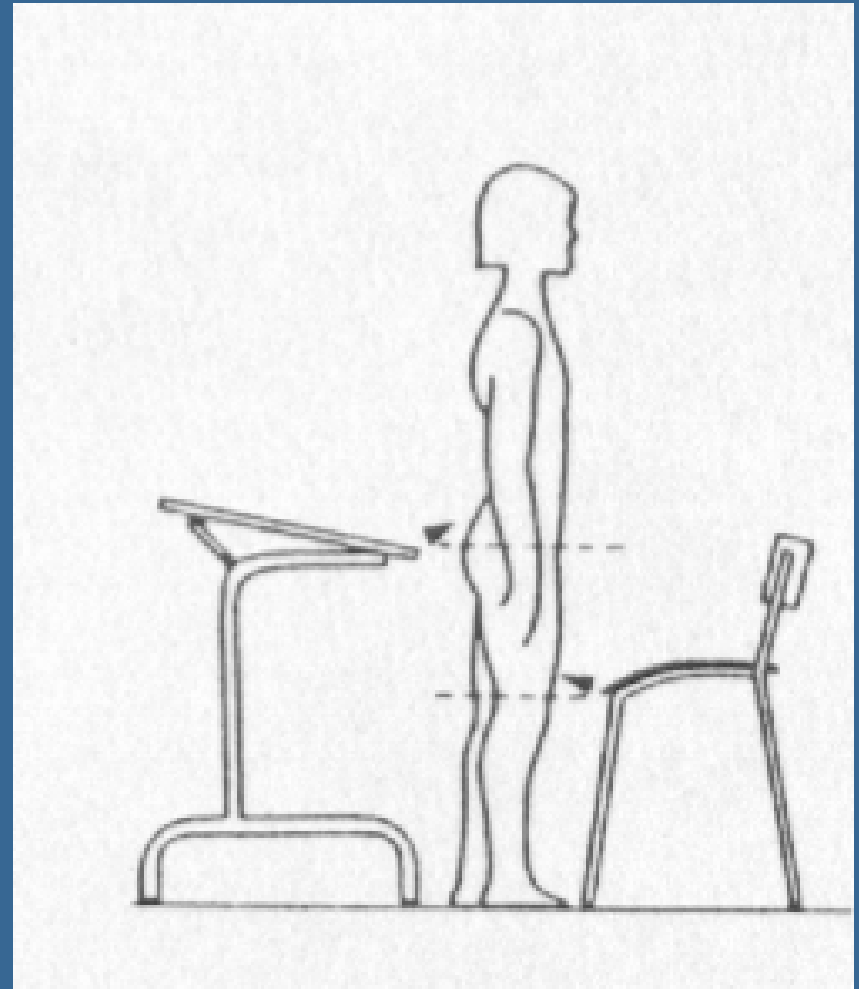
- existing furniture
  - upright seating concept
    - backward activities
    - middle sitting position
  - open hip angle concept
    - forward activities
- => sitting posture





# Methodology

- participants: 16 to 18 years
- furniture: existing
  - upright seating
  - open hip angle
- tasks: writing
  - copying writing
  - copying watching
  - watching



# Methodology

- head tilt
- neck flexion
- trunk angle
- hip angle



# Results existing

- writing
  - flexion head, neck and trunk  $\uparrow$
  - hip angle = upright seating
- copying and watching
  - hip angle  $\downarrow$
  - neck, trunk = open hip angle



# Results upright seating

- watching screen
  - backward trunk lean ↑
  - neck flexion ↓
- combination task and writing
  - hip angle ↓
  - head, neck and trunk =  
(compared to open hip angle furniture)



# Results open hip angle

- writing and combination
  - hip angle  $\uparrow$
- watching screen
  - hip angle =  
(compared to upright seating)



# Tilttable table

- head and trunk flexion ↓
- EMG ↓
- subjective preference
- independent of table height



# Back support

- intradiscal pressure ↓
- back unloading
- more students used lumbar support in upright seating concept
- passive activities



# Relative neck flexion

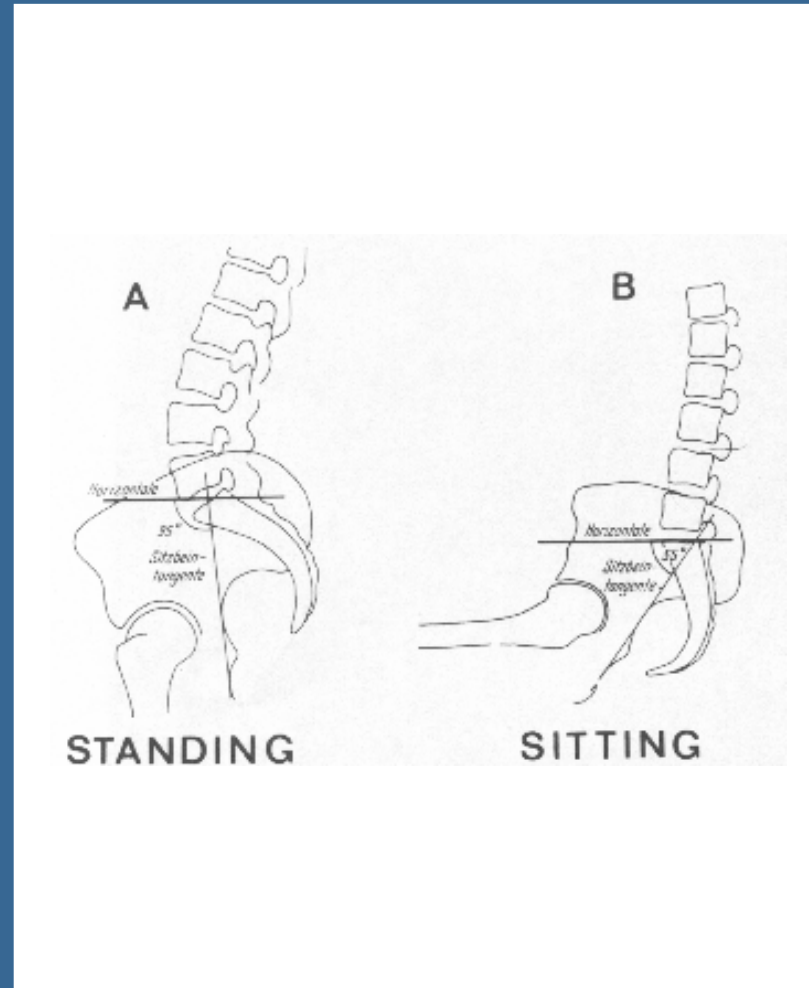
- less neck flexion during watching or not?
- absolute angle or relative to the resting posture...





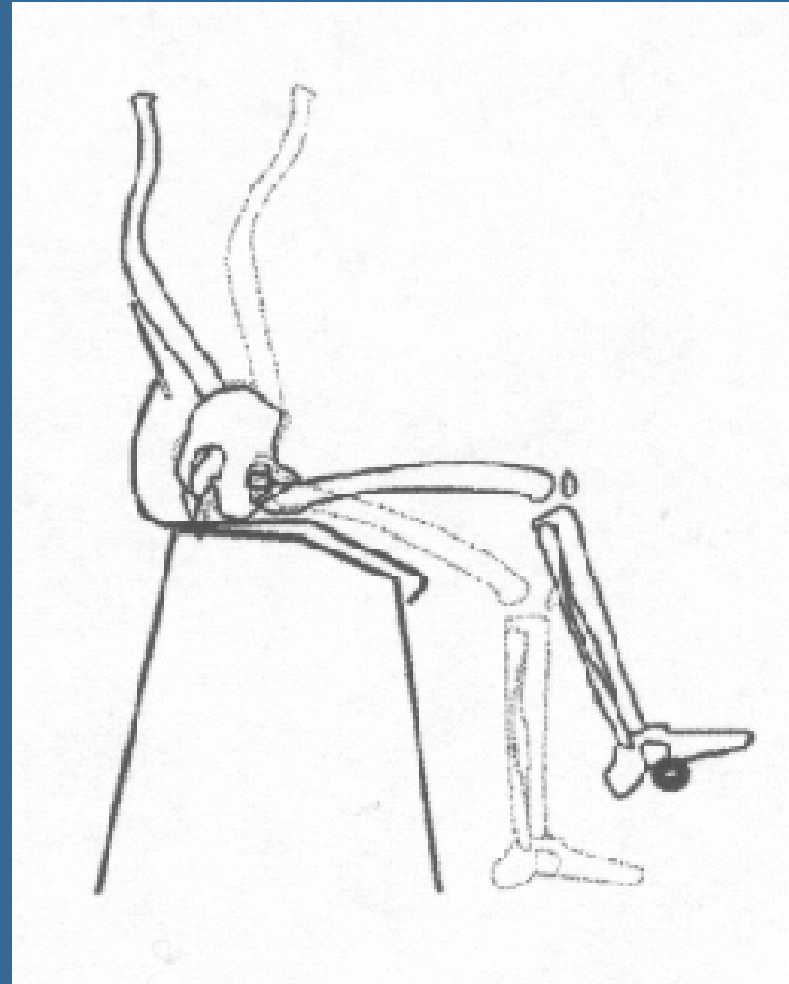
# Open hip angle

- backward pelvis tilt ↓
- lumbar lordosis ↑
- ~ sitting height
- during forward activities
- subjective preference



# Conclusion

- active: open hip angle
- passive: back support
- 57% forward activities
- open hip angle passively =



# The end...

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