Ergonomics?!?

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Ergonomics is the science of work; of the people who do it and the ways it is done; the tools and equipment they use; the places they work in, and the psychological aspects of the working situation.

Stephen Pheasant

Why Ergonomics?

- Service need
  - Preparing patients to return to work / sport / hobbies
  - Understanding the demands of work during pre-op assessments / splint design
  - Prevention of re-injury
  - Prevention of symptom flare / aggravation

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  - Prevention of symptom flare / aggravation
  - Health and Safety legislation

Today's demands

- Fit notes
- AHP advice note
- Raising the question of work and employment
  - Are we truly holistic?
- Work as a treatment outcome
  - Liaison with HR, H&S, OH, managers
- Equality Act

Principles of Ergonomics Person

- Physical
  - Biomechanical loading
    - internal loads
    - physiological responses
  - Internal tolerances
  - Mechanical strain
  - Fatigue
- Psychological
  - Coping skills
  - Independence
  - Fatigue
- General
  - Medication

Principles of Ergonomics
Job

- Working postures, sitting, crouching, standing etc
- Physical demands – lifting, pushing, pulling, how much and how often
- Pace of the work
- Working alone / group
- Cognitive / processing skills
- Responsibility and management

Aims of Task Analysis

- Understand the individual components of work
- Understand the order and sequence of work
- Evaluate in isolation or interactively the separate functions of a job
- Evaluate the information or decision-making requirements of the work.

Posture

Force

Repetition

Biomechanical Analysis of Work : Posture

- End of range postures
- Constrained postures
- Compressive forces

Work Height

- Major factor in determining posture
  - stooping to reach down to the work
  - elevate the arms to give clearance of the work surface
- Work surface height and work height are not necessarily the same thing
- If tools are being used the work height will be higher than the surface.

Biomechanical Analysis of Work : Force

- Fatigue
- Reduced circulation
- Recovery time in a work cycle
- Mechanical stresses

Biomechanical Analysis of Work : Repetition

- Rate of repetition / speed
- Intensity
- Pace of work

Summary of assessment

Assessment of posture and movement including;

- strength
- range
- endurance
- speed
- accuracy of motion

Anthropometry

The measurement of static and dynamic body dimensions:

- Height
- Length
- Reach
- Circumference
- Volume

Individual differences

- Hand size / proportions
- Strength / Stamina
- Skin
- Tolerance to
  - Activity
  - Pain
- Motivation
- Health / well-being
- IQ
- Psychological resilience

Reach Envelope

- Zone of convenient reach or maximam working area
  - The area encompassed by sweeping your arms in front of the body.
  - It is a 3-Dimensional area.
- Normal working area
  - The immediate area in front of the body which can be reached without shoulder flexion

Placement of equipment

- Importance
  - important items should be accessible
- Frequency of use
  - the most often used should be the most accessible
- Function
  - items with similar functions should be grouped together
- Sequence
  - place items in the order they are used

Assessing an office environment
Seating

Seating influences

- Head / neck posture
- Shoulder posture
- Hand / wrist / elbow posture
- Height in relation to work
- Comfort
- Endurance

Key points of sitting

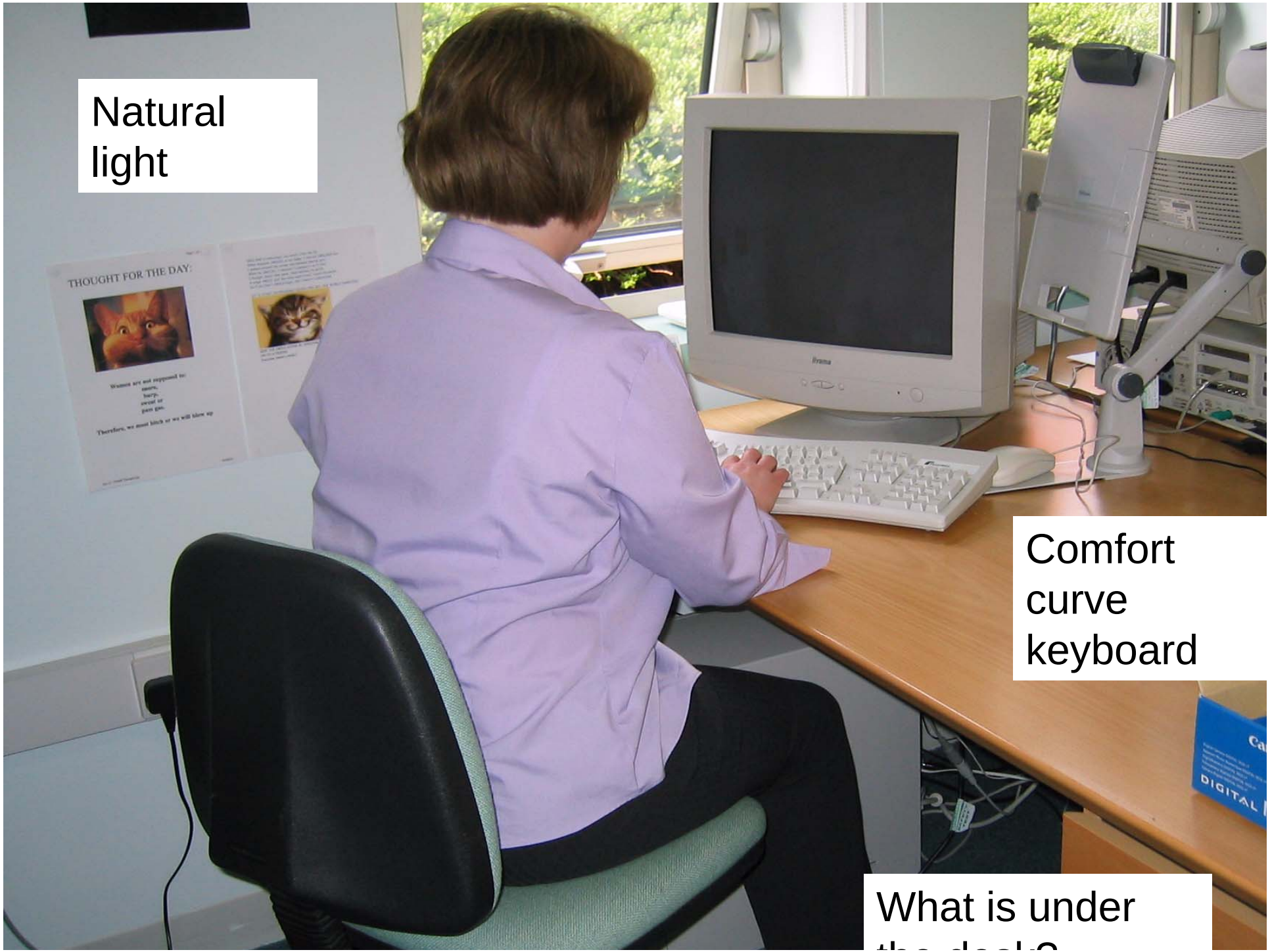
1. Seat pan appropriate for leg length
2. Size and shape of bottom is accommodated
3. Buttocks in appropriate place on seat pan
4. Spinal curve similar to shape of backrest
5. Backrest encourages placement of scapula
6. Rake angle of backrest adjustable
7. Do you need armrests?

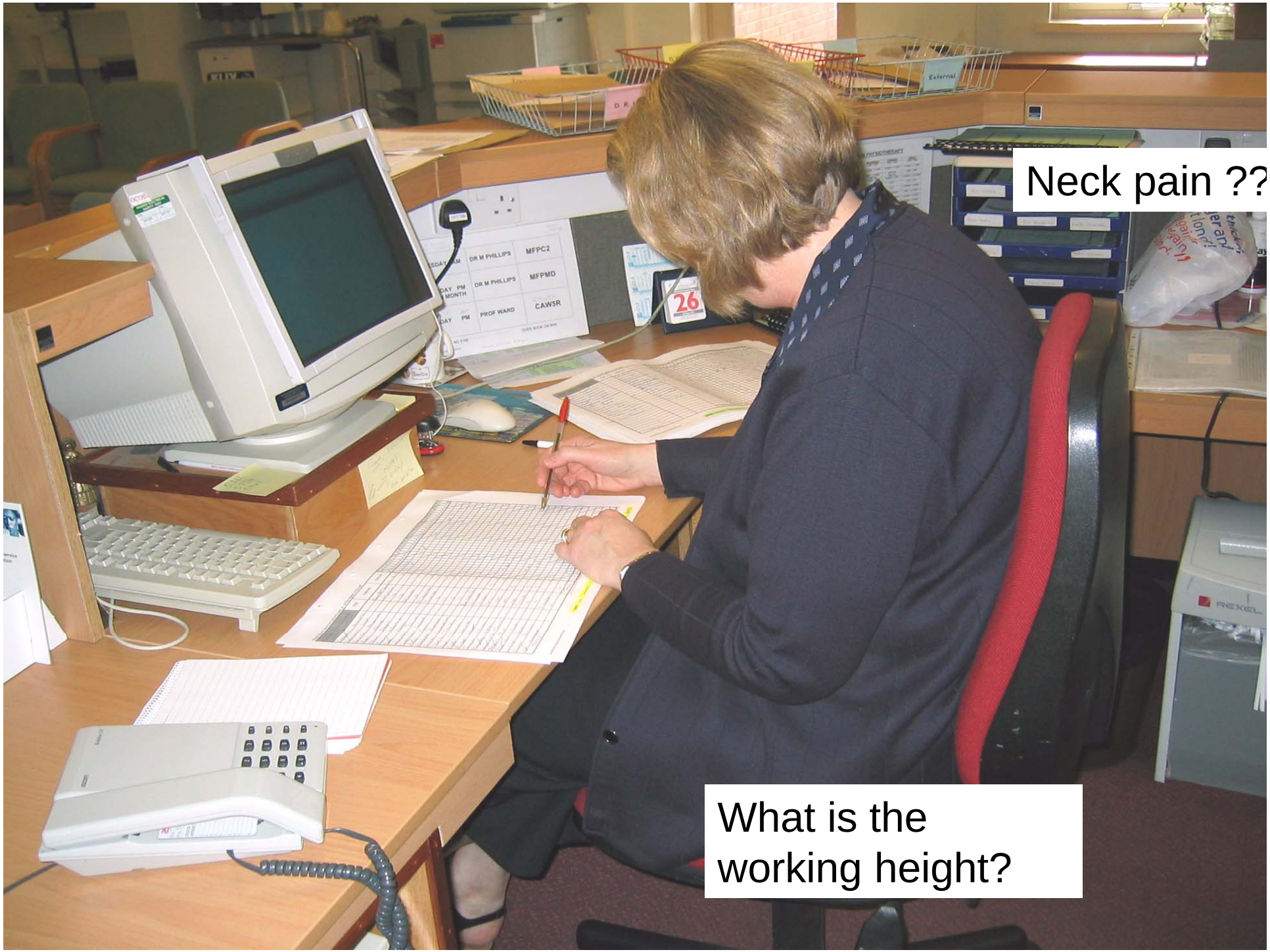
Different types of seating

Don’t make assumptions

- active sitting
- core stability

- ✓ fire proof
- ✓ infection control
- ✓ mobile base


Natural light
THOUGHT FOR THE DAY:
Comfort curve keyboard
What is under


Neck pain ??
What is the working height?

Assessing an office environment Keyboard

- Shape and slope of a keyboard influences
  - Forearm posture
  - Wrist posture
  - Finger posture
  - Typing force
  - Fatigue
- Generation of static and dynamic forces
  - Shoulders
  - wrist

Keyboards

- The key mechanism can be designed to respond to different forces and displacement characteristics.
- The forces used with each keystroke can be 2.5 to 3.9 times above the required force.
- Peaks forces decrease as typing speed increases.
- The force exerted decreases significantly when the distance the key travels is increased.

Spot the difference

What is the function of these armrests?

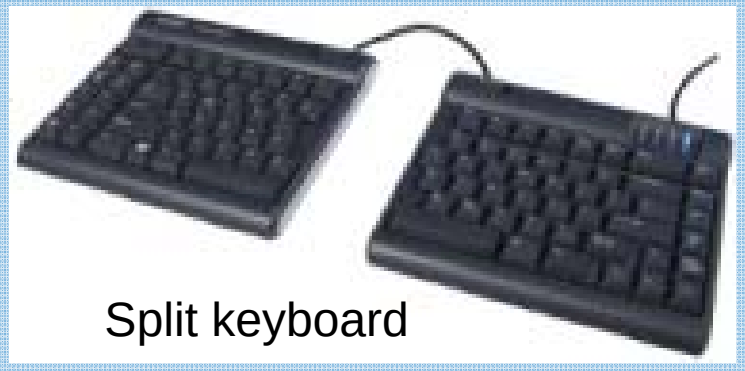
Keep it simple!

What angle do you need the keys to be? Consider your options

Comfort curve

Gold touch split keyboard

Maltron keyboard



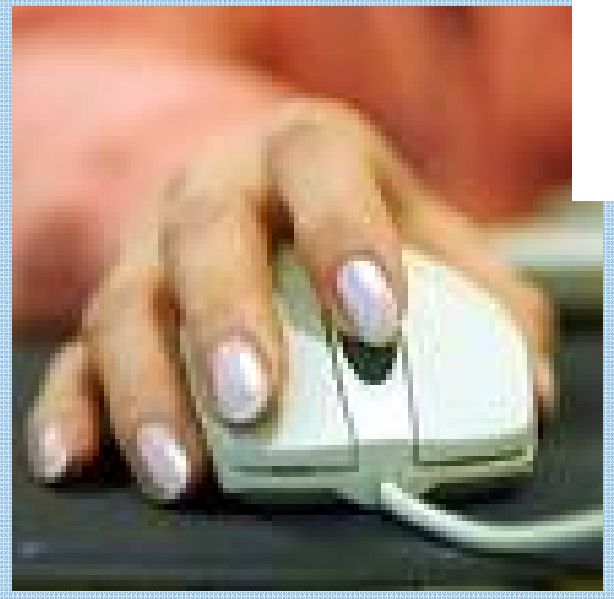
Split keyboard

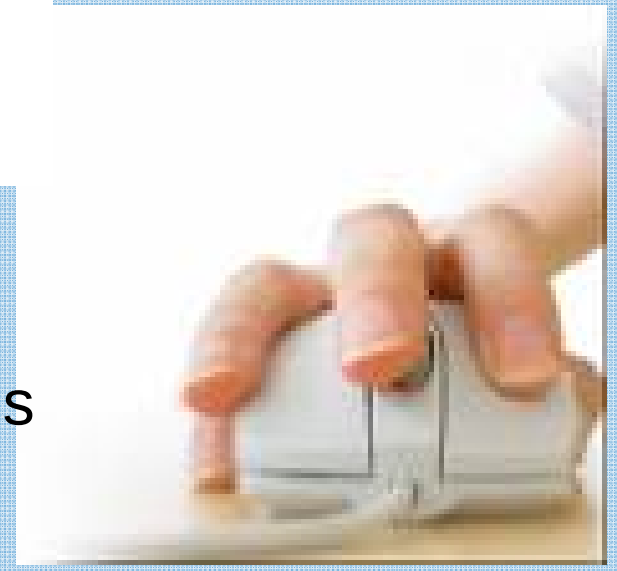
Don’t forget the front to back slope

Assessing an office environment Mouses

- Mouse design
  - Material
  - Size
  - Shape
  - Placement of scroll feature
- Anthropometrics
  - Finger length
  - Palm length and breadth

How do you hold a mouse?





What buttons are used?

How often

How long

What structures are being compressed

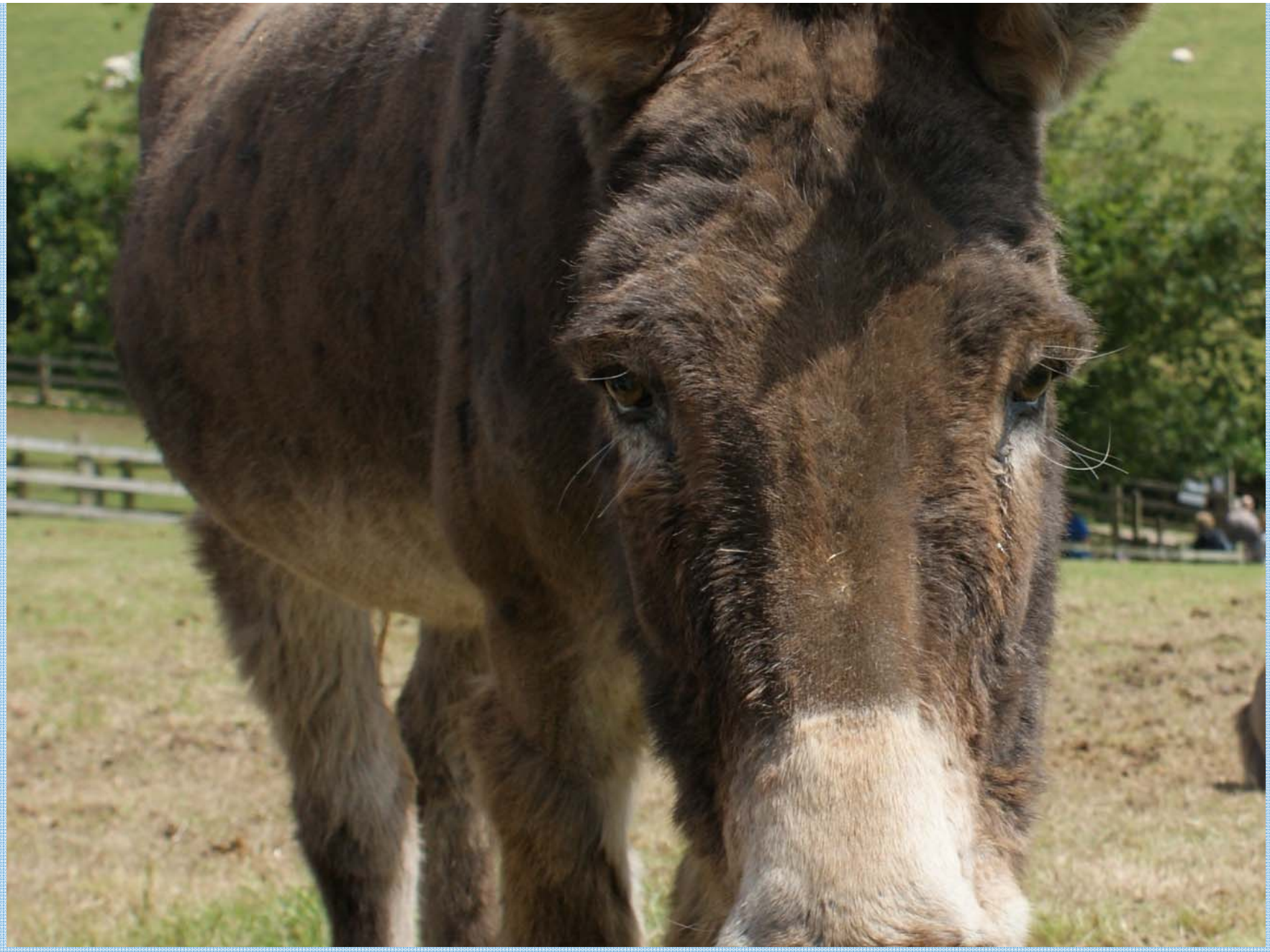
Each mouse has advantages and disadvantages

Joystick mouse

Logitech Mouses

Evoluent mouse /
vertical mouse

Quill mouse



Is it time for lunch yet??