

## HCI Lecture 7

### Users (1)

## Topic for today

- People
  - discussion of people as computer users
  - strengths, weaknesses, capacities

## Know the user

- things to be known
  - general issues – common to all
  - issues specific to the application

## Know the user - general

- humans - capacities & constraints
  - physical
    - capacities/constraints
  - cognitive
    - mental/psychological capacity

## General strengths & weaknesses

- we are good at
  - problem-solving
  - creative thought
  - adaptation
- we are bad at
  - repetition
  - consistency
  - endurance

## Physical constraints

- ergonomics
  - work-station design
  - seating
- environment
  - lighting, ventilation
- device design
  - mouse, keyboard design

## Implications for health & safety

- eye strain, headache
- muscular strain, backache
- rsi, tenosynovitis
- ?radiation
- risk assessment
- workflow/job rotation

## Cognitive capacity

- perception & attention
- knowledge & memory
- learning

## Computer interaction

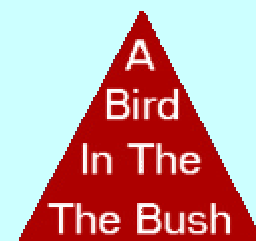
- predominantly sight
  - primary source of information
- touch
  - mouse, keyboard
- hearing

## Perception – receiving input

- receive information through senses
  - sight
  - hearing
  - touch
- process information to acquire
  - knowledge
  - understanding

## Attention & selection

- we are bombarded by input
- but attend to different inputs only selectively
- or we would not be able to cope
- perception is *active* not just receptive

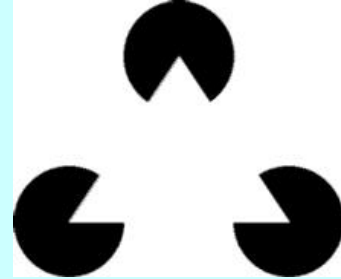


## Perception

- we receive input
- we need to assimilate it
- to construct our understanding
- based on experience
- brain interprets and makes sense of input in the light of previous knowledge and experience

..

...



..

...

## Interpreting input

- brain makes assumptions/interpretations
- fills in missing detail
- ignores irrelevant/senseless detail
- ambiguity causes us to 'see' different things

..

...



..

...

## Sight

- colour perception & discrimination
- colour resonances
  - eg red/green
- focus, resolution & clarity
  - refresh rates

..

...

## Implications for screen design?

- design for monochrome
- clear, logical, avoid ambiguity
- be conservative with colour
  - colour should support the task
  - avoid problematic colour combinations
  - red/green, red/blue, yellow/white
- attention-getting mechanisms?

..

...

## Sense of touch

- haptic perception
  - response to pressure
    - awareness of weight/pressure
  - kinesthesia
    - awareness of body
      - location in space
      - position
- importance of feedback

..

...

## Knowledge & memory

- remembering
- learning
- knowing
- how we store new information

..

...

## The human machine

- the human as an information processor (Card, Moran & Newell)
  - receives information (sensory stimulus)
  - processes it
  - acts on or stores it
- input, process, output model

..

...

## Memory

- theorists posit
  - short-term memory
  - working memory
  - long-term memory
- computer analogy
  - registers, RAM, backing storage

..

...

## Short-term memory

- limited capacity
  - 7 plus/minus 2
- recall v recognition
  - recognition is easy
  - recall is difficult
- fast access
  - processing not storage
- importance of *chunking*

..

...

## Working memory

- an area where current processing takes place
- in conjunction with inputs from short-term memory
- new information, plus old knowledge
  - we understand/interpret new information in the light of what we already know
- problem-solving

..

...

## Short-term & working memory

- volatile
- information is easily lost before transfer/commitment to long-term memory
  - disruption/interruption
  - visual distraction
- anxiety impedes information processing
- familiarity aids information processing/chunking

.. ...

## Long-term memory

- very large - ?infinite
- associative - time needed to retrieve
- again, much current research
- neural networks
- applications in AI

.. ...

## Kinds of knowledge/memory

- semantic
  - facts, rules, knowledge - 'I know'
- episodic
  - events - 'I remember'
- kinaesthetic
  - 'feeling' a spelling, swimming, riding a bicycle

.. ...

## Implications for interface design?

- reduce memory load
  - show menus, command sets
  - maintain consistency
    - of screen components
    - of menu structures
    - of commands

.. ...

## Human capacities – summary

- physical constraints
- cognitive abilities
- perception and attention
- memory

.. ...

## Know the user – specific to application

- user populations
  - age, gender
  - nationality
    - language
    - iconography
  - culture
    - meanings of colours
    - interface agents/'personalities'

.. ...

## User error

- to err is human
- people will make mistakes
- interface designers should
  - design for error
  - regard it as normal interaction
- making mistakes is normal not aberrant behaviour

..

...