

## Human Computer Interaction Lecture 8

Human learning  
Learning computer systems  
Categories of users

### The learning curve

- learning is always more or less difficult
- does not proceed uniformly
  - blocks
- is individual
- based on our experience, prior knowledge

### Top-down v bottom-up

- pure rote learning of new material is very difficult/slow
  - many repetitions/mnemonics required
- meaningless material very hard to learn
- we need to order, categorise, make sense of things
- learning is fastest when we
  - transfer prior knowledge
  - make connections, make things meaningful

### Learning & knowledge

- declarative knowledge
  - things we know
    - facts
    - kings, countries, etc
- procedural knowledge
  - things we know how to do
    - tie shoe-laces
    - drive a car
- episodic knowledge
  - events, memories

### Learning styles

- problem-solving
- active thinking
- learning by doing
  - trial & error; responding to unexpected events
- learning by analogy
- learning a skill
  - declarative knowledge
  - becomes procedural

### Issues in learning computer systems

- learner's focus is the task
  - not the system
- at best, system is transparent
- often, system is obstructive
- learning the system is perceived as a *waste of time*
- importance of forming a *mental model*

## Mental models

- our internal representation of the real world
  - gives us our understanding
- an *abstraction*
- may be accurate, or not
- an accurate model aids learning
- an inaccurate model may inhibit learning

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## Some examples

- your house
- plumbing system

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## Software systems & mental models

- we need a model of how system works
  - what it does
- our model
  - informs use/behaviour/learning
  - allows hypothesis/experiment
- users' models often partial, inaccurate

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## Mental model of the system

- allows us to predict events
- to know what is possible
  - to know what we can do with the system
- to plan tasks
  - goal and plan knowledge

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## Word processing system

- do we have a model?
- paper and type-writer
- successful model?
  - relevant prior knowledge
- unhelpful prior knowledge?

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## Analogy and mental models

- transfer prior knowledge to current system/understanding
- 'correct' prior knowledge speeds learning greatly
- 'wrong' prior knowledge can inhibit learning

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## Some common models

- file handling system
  - filing cabinet
- spreadsheet?
- paint package?

## Presenting a model to the user

- model should be explicit
- analogy should be clear
- navigation should be clear
- designer's goal:
  - enable the user to develop a model
  - which is clear and complete
  - accurately represents the software

## Summary of learning issues

- learning styles
- analogies and mental models
  - importance of transferring past experience (+ve transfer)
  - potential problems in transferring past experience (-ve transfer)
- learning is **active** not passive
- assimilation of new input
  - relies on pre-existing knowledge
  - synthesis

## Categories of user - any system

- Traditionally hci designers recognise 3 categories of user
- novice
  - new to all IT systems
  - new to this system
- intermittent user
- expert user

## Novice

- characteristics
  - processing is slow and complex
  - slow responses
  - need support in forming mental model
- system requirements
  - limited functionality
  - extensive help
  - detailed menus

## Intermittent user

- characteristics
  - maintain semantic knowledge
  - forget syntactic knowledge
- system requirements
  - need meta -knowledge
    - knowledge about how to get knowledge
- on-line support

## Expert user

- characteristics
  - highly task-focussed
  - works fast
- system requirements
  - extensive functionality
  - speed of operation
  - short-cuts

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## Problems with the novice..expert model

- variations in cognitive ability ignored
- knowledge about a system may be
  - knowledge about the task (task domain knowledge)
  - knowledge about the computer system
  - knowledge about the system as a tool for the task
- novice..expert scale exists in each
- levels of user expertise complex to analyse
- learning needs are individual

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## User modelling

- many levels of expertise can be defined
- user may be novice here, but expert there
- adaptable systems

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## Applications of user modelling

- design intelligently adapting interfaces
- tailor information presentation to the user
- adapt interface as novice becomes expert
  - 'training wheels'
  - agents & wizards

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