Human Computer Systems

Lecture week 3

Recognition v. Recall

- Easier to RECOGNISE than to RECALL
  - e.g. Menus versus command line
- Contrast
  - knowledge in the **world**
  - knowledge in the **head (mind)**
  - we combine knowledge from both

Mnemonic Aids

- What months have what days?
- What are the colours of the rainbow?
- Sailing - (cdmvt?) – compass, deviation, magnetic, variation, true….
- Graphical user interfaces reduce mental load
  - knowledge in the head is a different type of knowledge e.g. How to find.....
  - Memory exercise. Visualisation – 10 items

Knowledge & Mental Models

- We want to be able to predict learning times, likely errors, ease of performing tasks ..
- Enable users to acquire suitable mental models
  - e.g. Count the number of windows on the outside of your house/flat - how did you do that?

Knowledge Organisation

- Semantic Networks
  - nodes with typed links
- Frame-based
  - characteristic scenarios
  - can we use frames that already exist?
  - many schema-based systems too inflexible
  - in unusual situations we can adapt & predict
- Mental Models - more dynamic

Mental Models

- “The model people have of themselves, others, the environment, and things with which they interact. People form mental models through experience, training and instruction.” Donald Norman

Mental Models

- Structural model
  - how-it-works
- Functional model
  - how-to-use-it
- In HCI
  - how to design systems to take advantage of mental models to help grow a model
  - how to elicit mental models

Mental Models

- Skill- based level
  - normal way of interacting, automatic
- Rule-based level
  - apply learned routine
- Knowledge-based level
  - conscious, analytical process

User Attitude & Anxiety

- Anxiety can :
  - reduce STM
  - inhibit performance
  - increase anxiety...
- Closure
  - when task is complete STM can be flushed..

Responses Mechanism

- Given goal and plan to achieve it some response will be required
- responses continually tested for completion of goal
- Distinction between :
  - well learned skills (automatic)
  - skills being acquired (break into sub-goals)
- Response feedback control loop
  - senses determine level of success of response - failure could result in change of plan eg learning to change gear in car

Ecological Approach

- Information is picked up from the environment
  - main use in HCI - **affordance**
  - an object's visual representation indicates how to interact with it
- In Germany the Gestalt school of psychology produces 'laws' of perceptual organisation
  - main use in HCI - design of symbols, screen layout

Attention & Memory Constraints

- Focussing attention
  - senses are bombarded with sensations
- Attending to one event
  - focussed attention
- Attending to multiple events
  - divided attention e.g. Writing memo, need someone to help phrase memo, phone rings, knock at door, email arrives, trip over dog ...

Interface Structure

- No unnecessary data
  - not too much information
  - not too little information
- Group together
- Spatial layout
- Use of colour
- Multitasking & interruptions
- Can you return to a task & continue?

COLOUR THEORY IN BUSINESS/WEB MARKETING & DESIGN

- Meanings/emotions of different colours US/UK:
- **Red:** excitement, strength, passion, speed, boldness, determination, desire, courage
- **Yellow:** warmth, sunshine, happiness, comfort, energy
- **Blue:** trust, reliability, belonging, loyalty, professionalism (This is one of the most popular colors, especially for businesses.)
- **Orange:** playfulness, warmth, vibrant, enthusiasm, creativity
- **Green:** nature, fresh, cool, growth, abundance, harmony

COLOUR THEORY IN BUSINESS/WEB MARKETING & DESIGN

- **Pink:** soft, sweet, security
- **Purple:** royal, spirituality, dignity, nobility, luxury, elegance
- **White:** pure, clean, youthful, innocence, simplicity
- **Black:** sophistication, formality, seductive, mystery
- **Gold:** prestige, expensive, elite
- **Silver:** prestige, cold, scientific

COLOUR Guidelines

- Use harmonious colours.
- Not use more than 7 colours on a webpage.
- There should be a large contrast between text and background.
- But not too much, black on white is tiring in the long run.
- Dark on light is better than light on dark.

COLOUR Guidelines

- Avoid text and background that only differ in blue.
  - This is because the human eye is more sensitive to green and red than to blue.
- Avoid bright, saturated colours.
  - This can create a sense of vibration and eye fatigue

Automatic Processing

- Sensory-motor tasks
  - with training can become automatic
- Likewise with cognitive processes
  - reduces load on short term memory
- Implications for HCI
  - automatic processes are difficult to unlearn
  - controlled processes allow flexibility

Memory Constraints

- Is everyday memory needed?
  - It is not infallible
- For HCI
  - how to remember how to interact with a computer
  - recall -
  - depends on familiarity and imagery

System Design

- Minimise distraction during tasks & memorisation
- avoid overloading short term memory both in terms of quantity of info and the time span of retention
- Chunking - appropriate structuring of info facilitates memorisation
- combination of image & text can assist memorisation

System Design

- Consistency in terms of style, level of content and spacial location helps memorisation
- appropriate system response time will avoid disruption of short term memory processes
- memorisation can be improved with the presentation of pertinent contextual information

System Design

- structuring of information can help to facilitate links with other memories and so improve recall
- use of compound cues (image, text , sound)
- Be consistent in design
- PRIMARY DESIGN AIM:
  reduce amount to be learned to a minimum