


MONASH University  
Information Technology  
IMS5302  
Human factors and usability



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**Interface Design Issues  
Lecture 8**

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**Overview**

- Quality, need to reduce
  - Response time
- Interaction styles
  - Direct manipulation
  - Interaction devices
- Function versus look
  - Field layout –gizmos/ widgets
  - Fill-in forms
  - Menu design

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**Response time**

- What is acceptable? What is tolerated?
- User expectations
- 2 second rule (Nielsen, 1999) – local systems versus network systems
- Anything longer than 15 seconds is generally detrimental

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**Good design results in..**

Users achieve rapid task performance, low error rates, and high satisfaction if the following criteria are met:

- Users have adequate knowledge of the objects and actions necessary for the problem-solving task
- Solution can be carried out without delays
- Distractions are eliminated
- User anxiety is low
- Feedback about progress is given
- Errors can be avoided or handled easily

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**WYSIWYG - We now take for granted**

- ‘What you see is what you get’, principles:
  - Users see a full page of text
  - Document printed as it appears on the screen
  - Cursor action is visible
  - Cursor motion is natural
  - Labelled icons make frequent actions rapid
  - Immediate display of results of action
  - Rapid response and display
  - Easily reversible actions

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**Direct manipulation**

- What is it?
- Insight and understanding user’s model of reality important in designing direct manipulation functionality.
- Used in a wide range of devices/systems. PDA, electronic diaries, on line banking.
- Used in industrial robotics, for example robotic arms the building cars.
- Virtual reality, flight simulators  
(S&P ch 6 provide good examples)

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### Issues with direct manipulation

- Consumes valuable screen space
- Users must learn/understand visual representations such as icons
- Can be misleading, users draw incorrect conclusions about what is possible.
- Need to make sure that visual feedback is rapid particularly where there is rapid keyboard interactions.
- Selecting right objects and actions for direct manipulation may be difficult. (S&P ch 6)

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### Control manipulation – THE MOUSE

- Cooper and Reimann (2003) describe two mouse actions: **clicking** and **clicking and dragging**.
- Most important (and frequently ignored) part of a drag operation is how the user gets out of it.
- Think of the different mechanisms used to alert us as to the success or otherwise of a click and drag operation.
- What are some of the other design considerations for click and drag operations?

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### Other operations

- Charged cursor tools
- Object manipulation – repositioning, resizing and reshaping.
- How do you know that an object can be repositioned, resized reshaped?
- How does the user know what to 'grab' to activate this command?

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### Input device considerations

- Kiosks – must be clear, easy to master
- Small screen displays have limited display 'real estate' serious consideration for designers.
- How is device carried or used? Does it require two hands?
- Effectiveness for the task
- Time to learn
- Cost and reliability
- Size and weight

(good discussion in chapter 9 S&P)

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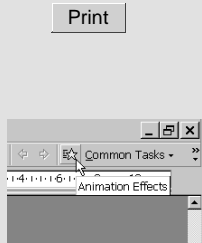
### Field layout: Gizmos and widgets (interface components)

- Assist in data entry
- Reduce human data entry (therefore reduce error)
- Need to select the most appropriate gizmo/widget for the user, the application and the screen design

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### Imperative gizmos

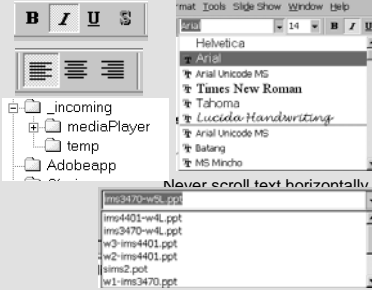
- Based on verbs
- Immediate action
- User expects to see change in state of button
- Addition of ToolTips



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### Selection gizmos


- latch button
- flip flop (toggle)
- listbox
- combo box
- tree gizmo
- radio buttons
- check boxes



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### Entry gizmos

- Enable the user to enter new information into the program rather than selecting information from an existing list
- Bounded entry restricts entry to a set of values



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### Form fillin

- Some tasks too cumbersome with menus.
- Where data entry of text or numbers is required keyboard typing becomes more attractive.
- If many fields of data necessary appropriate interaction style is 'form fillin'.
- Very frequent style used in Web based systems.

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### Fill-in forms

<p><b>Advantages</b></p> <ul style="list-style-type: none"> <li>• Simplifies or reduces data entry</li> <li>• Self explanatory</li> <li>• Requires modest training</li> <li>• Little cognitive load</li> <li>• Gives convenient assistance</li> <li>• Efficient use of screen space</li> <li>• Permits use of form management tools</li> </ul>	<p><b>Disadvantages</b></p> <ul style="list-style-type: none"> <li>• Assumes typing skills (and ability)</li> <li>• Error prone due to incorrect data entry</li> <li>• Inflexible and restrictive</li> <li>• Requires understanding users and their workflow</li> </ul>
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### Fillin form guidelines

- Should be some indication of data type to be entered into field or message indicating if for example characters entered instead of numbers.
- Corrections should be obvious.
- Often an electronic form is designed to look like paper version
- Ensure the required numeric format is clear (currency, data, telephone)

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### Fillin form guidelines

- Meaningful title:
- Comprehensible instructions:
- Logical grouping and sequencing of fields
- Visually appealing layout of the form
- Use familiar field labels, consistent terminology and abbreviations
- Visible space and boundaries for data entry fields
- Use colour to group items
- Convenient cursor and Tab movement

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### Fillin form guidelines

- Cursor should move from one data item to next.
- Should be some indication of data type to be entered into field or message indicating if for example characters entered instead of numbers.
- Corrections should be obvious.
- Often designed so forms look like paper version.
- Error correction and prevention messages should be simple
- Optional fields clearly marked
- Completion signal

### Other interface design considerations -- Colour

Colour can improve task performance and increase interface attractiveness. Colour can:

- Soothe or strike the eye
- Add accents to an interesting display
- Facilitate subtle discriminations in complex displays
- Emphasise logical organisation of information
- Draw attention to warnings
- Evoke strong emotional reactions of joy, excitement, fear, or anger. (Shneiderman 398)

### Shneiderman recommends (398-400):

- Use colour conservatively
- Limited number of colours
- Recognise power of colour as a coding technique
- Recognise the power of colour to speed or slow tasks
- Ensure colour coding supports task
- Consider needs of colour deficient users

- Use colour to helping formatting
- Be alert to problems with colour pairings
- Use colour changes to indicate status changes
- Use colour in graphic displays for greater information density
- Consider why word processors are black on white.

### Metaphors

- Metaphors describe overall concept within which objects and actions are organised (then converted to icons).
- Help users think about screen objects as they would about real world objects.
- When designing the visual representation of current process need to stay close to real world objects.
- Metaphors are not always good representations of real world objects, in designing this has to be considered.

### Icons

- Used to reduce complexity of systems
- Make systems easier to learn
- Difficult to design because designers must always ensure the underlying concept does convey a distinct meaning.

### Designing menus

- Must remember that even with short response times frequent menu users can become annoyed if they are required to make several menu selections to complete simple tasks.
- Three possible approaches can be used to improve this: to allow typeahead, assign names to menus, create menu macros.

(S&P ch 7)

- Research indicates that error rates can be cut and user think time reduced where a meaningful organisation of menus is used.
- Key to menu structure design is to consider task related objects and actions.
- Categories should be comprehensible and distinctive so users are confident in making selections.

### Menu types

- Single menu: two or more items, maybe permanently available or pop up.
- Binary menus: yes/ no, true /false e.g. printer icon.
- Multiple menu items
- Pull down and pop up menus

### Menus with Typeahead: BLT approach

- This allows user to not have to wait to see menus before choosing items.
- User can type string of letters or numbers when presented with main menu. Many applications allow for this. Advantaged users can move from novice menu users to knowledgeable command users easily. No new commands to learn.

### Menu names or bookmarks

- Numbered menu items assigned, menu names to each menu frame.
- Users can follow menus or if no name of function can type it in and go there directly.
- Saves users having to work through several levels of menus.
- Strategy useful if there is only a small number of destinations each user needs to remember.

### Menu macros, custom toolbars and style sheets

- Allows users to record as macros regularly used paths, place them on toolbars or create as an icon.
- Mechanism allows tailoring of system and can provide simplified access mechanisms for users with special needs.

### Menu layout

- Titles: need to be carefully chosen, particularly descriptive or memorable, title can make a big difference in responses.
- For single menu simple descriptive title that identifies situation is all that is necessary.
- With linear sequence of menus title should accurately represent stages in sequence.
- Consistent placement of titles and other features, menu screens important, inconsistent placement increases users' time to select items.

### Menus and navigation

- Designers must display menus so that they are natural to use.
- Useful to organise commands in a hierarchical way. Problem is deciding which items to include at different levels and which items to group.

### Alternatives

- Empirical evidence suggests 4 alternatives:
  - Alphabetical
  - Categorical – relies on selection of suitable Categories can be difficult
  - Conventional – neither categorical nor alphabetical
  - Frequency – based on use (Preece 265-66)

### Phrasing of menu items

- Guidelines:
  - Use familiar and consistent terminology –must be familiar to user community
  - Ensure individual items are distinct from one another
  - Use consistent and concise phrasing
  - Bring keyword to the left - first word user likely to recognise should be on the left.

(S&P ch 7)

### Graphic layout and design

- "Consistent formats help users to locate necessary information, focus users attention on relevant material, and reduce users' anxiety by offering predictability." (Shneiderman 260)
- Guidelines:
  - Titles centred or left justified?
  - Item placement – typically left justified with item number or letter preceding item description.
  - Instructions – should be identical in each menu
  - Error messages – should be consistent

### Schneiderman: 8 golden rules of interface design (74)

- Strive for consistency
- Enable frequent users to use shortcuts
- Offer informative feedback
- Design dialogues to yield closure
- Offer error prevention and simple error handling
- Permit easy reversal of actions
- Support internal locus of control
- Reduce short-term memory load

### Guidelines

- Don't create cluttered displays overusing techniques
- Novice users require simple logical well organised, well labelled displays.
- Expect users need extensive field label more subtle highlighting etc

### Functionality

- A major task for developers is to determine functionality of a system.
- Usually done by studying users' task domain.
- Outcome is list of task actions and objects-abstracted into set of interface actions and objects, in turn these represented with low level interface syntax.

### Creeping featurism

- Common problem is to provide excessive number of objects / actions which can overwhelm users.
- Excessive objects / actions take more code to maintain, cause more bugs, slowdown execution times, require more help screens, error messages etc.
- For users excess functionality slows learning.

### Function versus look

- Good screen design is the key to successful interface design
- Start with:
  - Knowledge of users' tasks
  - Meaningful grouping of items
  - Consistent sequencing of groups
  - Justification (text, images, numbers, dots)

### Readings

- Schneiderman & Plaisant Chapter 11, 12
- Galletta, D., Henry, R., McCoy, S and Polak, P (2004) *Web Site Delays: How Tolerant are Users?* Journal of the Association for Information Systems, Vol5, No 1, pp1-8  
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