Dialog Design - Direct Manipulation
Ch. 5.1-5.3

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Dialog Styles

1. Direct Manipulation
2. WIMP - Window, Icon, Menu, Pointers
3. Command and natural languages
4. Gesture, pen
Agenda

• Review of dialogue design issues
• Direct Manipulation
  ▪ Advantages, disadvantages
  ▪ Design guidelines
  ▪ Another characterization of DM
Review - General Issues in Choosing Dialogue Style

- Who is in control - user or computer
- Initial training required
- Learning time to become proficient
- Speed of use
- Generality/flexibility/power
- Special skills - typing
- Gulf of evaluation / gulf of execution
- Screen space required
- Computational resources required
DM

- What is direct manipulation?
- That is, how can we characterize DM?
  - How do we know it when we see it?
DM Characteristics

• Continuous visibility of the objects and actions of interest
• Rapid, reversible, incremental actions whose effect is immediately noticeable
• Replacement of command language syntax by direct manipulation of object of interest (physical actions, buttons, etc.)

Shneiderman ‘82
DM Examples

• Examples
  ▪ WYSIWYG text and graphics editors
  ▪ VISICALC - 1st electronic spreadsheet
  ▪ CAD
  ▪ Desktop metaphor
  ▪ Video games
  ▪ 3D immersive Virtual Reality systems
DM Essence

• Representation of reality that can be manipulated

• The user is able to apply intellect directly to the task

• The tool itself seems to disappear
Some DM Advantages

• Easier to learn & remember, particularly for novices
• Direct WYSIWYG
• Flexible, easily reversible actions helps reduce anxiety in users
• User in control
DM Advantages

• Provides context & instant visual feedback so user can tell if objectives are being achieved
• Easier to remember how to use if are infrequent user
• Exploits human use of visual spatial cues
• Limits types of errors that can be made
• Reduces need for error messages
Some DM Disadvantages

- Screen space intensive (info not all that dense)
- Need to learn meaning of components of visual representation
- Visual representation may be misleading
- Mouse ops may be slower than typing
- Subtle aspects may not be self-explanatory
DM Disadvantages

• Not good at
  ▪ Repetition
  ▪ History keeping (harder)
  ▪ Certain tasks (Change all italics to bold)
  ▪ Abstract elements (variables)
  ▪ Macros harder
Any Way to Combine DM and CL?

- Show commands that DM is using
- Show DM effects of commands
A More Psychological View of DM

• What is directness? (not always done well)

• Related to two things:
  ▪ Distance
  ▪ Engagement

Hutchins, Hollan, Norman ‘86
Distance

- Two gaps or “gulfs” between user’s goals and system image
- Directness partly depends on the distance between these two gulfs
  - Gulf of execution
  - Gulf of evaluation
Gulfs

• Gulf of execution
  ▪ Distance between user’s goals and means of achieving them in system
    – Does the system allow the user to do what they want?

• Gulf of evaluation
  ▪ Amount of effort person must expend to interpret system state and judge if intention was achieved
    – Can use perceive if progressing favorably?
Directness and Distance

• Two types
  ▪ Semantic - Relation between what user want to express and what is available in interface
    – Can I say what I want (concisely)?
  ▪ Articulatory - Relation between meanings of expressions and their physical form(s)
    – Is the way to perform an action expected and clear (appropriate)?
Engagement

• Feeling that you are directly manipulating the objects of interest
• Promoted by
  ▪ Unobtrusive interface
  ▪ Minimizing gulfs of execution and evaluation
  ▪ Appropriately responsive system
Ultimately...

- In end, must characterize direct manipulation by feeling of directness and illusion of manipulating objects at hand