Dialog Styles:  
Command Languages, WIMP, & 
Direct Manipulation

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Dialog Styles

• 1. Command languages
• 2. WIMP - Window, Icon, Menu, Pointer
• 3. Direct manipulation
• 4. Gesture, pen
• 5. Speech/Natural language
Agenda

- Command languages
  - Advantages, disadvantages
  - Design guidelines
- WIMP
  - Advantages, disadvantages
  - Design guidelines
- Direct manipulation
  - Definition
  - Advantages & disadvantages
  - Another characterization

Dialog Design

- How does a user interact with the interface?
Command Languages

- Earliest UI interaction paradigms

- Examples
  - MS-DOS shell
  - UNIX shell
  - dBase
  - GPSS

Issues

- CL are easily maligned...
Unix Shell CL Potential Disadvantages

- Learning takes a long time
- Hard to remember command names
- Some command names don’t make sense, so have to memorize
- No in-progress feedback - how much longer?
- System state is invisible, and have to know which commands to use to get which information
- Hard to make sense of outputs, such as with `ls` - no headings, no code interpretations
- No “look”
- No warning if bad things are going to happen
- No universal Undo; to reverse a command, have to know the inverse command (create directory, delete directory)
- Have to use `man` command to find desired command
- How to get help?
- Because commands are short, typos can lead to incorrect command
- Inconsistent flag meanings
- Inconsistent parameter orders
- Have to type a lot - touch typing needed

CL Attributes

- Work primarily by recall, not recognition
- Heavy memory load
- Little or nothing is visible so...
- Poor choice for novices
- But all is not bad...
CL Attributes

- Advantages for experts
  - ?

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CL Advantages

- Advantages for experts
  - Speed, conciseness
    - %ls (hard to beat)
  - Can express actions beyond a limited set
    - Flags, piping one command to another
  - Repetition, extensibility
    - Scripting, macros
  - Easier implementation, less overhead
  - Power
    - Abstraction, wild cards
CL Dangers

- With added power, comes added responsibility and danger
  - UNIX
    - `% rm -r *`
    - Deletes every file that you have, and you can’t get them back

CL Reflection

- Command languages are often maligned (for good reason)
- But increased functionality can win out over bad UI (e.g., UNIX)
  - Try to get both
  - Avoid excess functionality (comes at cost)
CL Design Goals

- Consistency
- Good naming and abbreviations
- Doing your homework in design can help alleviate some of the negatives

Consistency

- Provide a consistent syntax
  - In general: Have options and arguments expressed the same way everywhere
  
  - UNIX fails here because commands were developed by lots of different people at different organizations
  - No guidelines provided
Order

- English: SVO  subject verb object
  "you" assumed on computer

- CL: S assumed (you)
  - Is VO or OV better?

- V dO iO vs. V iO dO
  - % print file calvin
  - % lpr -Pcalvin file Which is better?

Syntax

- Pick a consistent syntax strategy
  - Simple command list
    - e.g, vi, minimize keystrokes
  - Commands plus arguments
    - realistic, can provide keyword parameters
    - % cp from=foo to=bar
  - Commands plus options plus arguments
    - what you usually see
Terminology

- Keep terminology consistent
  - Same concept expressed with same options
  - Useful to provide symmetric (congruent) pairings
    - forward/backward
    - next/prev
    - control/meta

Example

- vi text editor
  - w - forward word
  - b - backward word

- Wouldn’t ‘f’ be better for forward?
  - ‘f’ already used

- How about ‘fw’ and ‘bw’?
  - Extra keystrokes
Ordering

• Keep ordering consistent
  – VO seems to be the most natural
  – Typically need to pick where options go

• Example
  – % ln -s file1 file2 (I can never remember)
  – Think of % cp file1 file2

Names and Abbreviations

• Specificity versus Generality
  – General words
    • More familiar, easier to accept
  – Specific (typically better)
    • More descriptive, meaningful, distinctive
  – (Nonsense does surprisingly well in small set)
Abbreviations

- Abbrevs. allow for faster actions
  - Expert performance begins to be dominated by motor times such as # of keystrokes
  - Not good idea for novices
  - (Allow but don’t require)

Picking Good Abbreviations

- Strategies
  - Simple truncation (works best, but conflicts)
  - Vowel drop plus truncation (avoid conflicts)
  - First and last letters
  - First letters of words in a phrase
  - Standard abbrev from other contexts
    - qty, rm, bldg
  - Phonics
    - xqt
Abbreviation Guidelines

- Use single primary rule (with single fallback for conflicts)
- Use fallback as little as possible
- Mark use of fallback in documentation
- Let user know primary and secondary rules
- Truncation is good but generates conflicts
- Fixed length is better than variable length
- Don’t use abbrs. in system output

Abbreviations Matter...
Dialog Design

- 1. Command language
- 2. WIMP
- 3. Direct manipulation
- 4. Pen, gesture
- 5. Speech, audio

WIMP

- Focus: Windows, Menus, Buttons, Forms

- Predominant interface paradigm now (with some direct manipulation added)

- Advantages:
  - ?
Window Pros

- Facilitate multi-tasking, which many people do
- Maps well onto overlapping sheets of paper on our desks, so is a familiar concept
- Makes computer usage easier for many people

Window Cons

- Can make concentrating on a single task hard (that incoming mail....)
- An extension of the cluttered desk :)
- May be unnecessary for dedicated-use environments that run a single application
Menus

- Many different types
  - pop-up
  - pull-down
  - radio buttons
  - pie buttons
  - hierarchies

Pie Menus

From Sim City
Pop-up Hierarchical

Menu Pros

- Key advantages:
  - 1 keystroke or mouse operation vs. many
  - No memorization of commands
  - Limited input set
Menu Cons

- Less direct user control - have to find correct menu / menu item
- Not so readily extensible
- Slower than keyboarding for experienced users, at least without accelerators

Menu Items

- Organization strategies
  - Create groups of logically similar items
  - Cover all possibilities
  - Ensure that items are non-overlapping
  - Keep wording concise, understandable
Presentation Sequence

• How does Mac, IE, etc, do it?

• Use natural if available
  – Time
    • e.g. Breakfast, Lunch, Dinner
  – Numeric ordering
    • e.g. Point sizes for font

Presentation Sequence

• Choices
  – Alphabetical
  – Group related items
  – Frequently used first
  – Most important first
Presentation Sequence

• User studies
  – Novices: alpha > functional > random
  – Experts: categorization

• How would you do it in general?

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Presentation Sequence

• One possible methodology (first->last)
  – Natural order (if exists)
  – Frequency of use
  – Order of use
  – Categorical
  – Alphabetical

• Don’t change dynamically!
A Good Menu Example

- Logical grouping
- Visual separation of groups
- Disabled items “grayed out”
- Shortcuts shown
- ... indicates leads to dialogue
- Go forth and find some bad examples!

Bad Example

- Travel web page links:
  - Flight page
  - 3 Best Itineraries
  - Flights & Prices
  - Timetables
  - Fares

- Which do you choose for reservations?
Dialog Design

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Definition

- What is direct manipulation?
Direct Manipulation

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

Shneiderman '82

Direct Manipulation

- Examples
  - WYSIWYG editors and word processors
  - VISICALC - 1st electronic spreadsheet
  - CAD
  - Desktop metaphor
  - Video games
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

Direct Manipulation

- Advantages
- Disadvantages
DM Advantages

- Easier to learn & remember, particularly for novices
- Direct WYSIWYG
- Flexible, easily reversible actions helps reduce anxiety in users

DM Advantages

- Provides context & instant visual feedback so user can tell if objectives are being achieved
- Exploits human use of visual spatial cues
- Limits types of errors that can be made
DM Problems

- 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
- Not self-explanatory (no prompts)

DM Problems

- Not good at
  - Repetition
    - History keeping (harder)
    - Certain tasks (Change all italics to bold)
    - Abstract elements (variables)
    - Macros harder
What is DM?

- UNIX?
- Word?
- Emacs?
- PowerPoint?

More Psychological View

- 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

Example: CAD
Example: Photoshop

Reminder

- P2 due Friday
- Show designs, discuss their strengths and weaknesses w.r.t. requirements
- Questions?
Upcoming

- Dialog
  - Speech & natural language
  - Pen & Gesture

- Predictive Models