

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



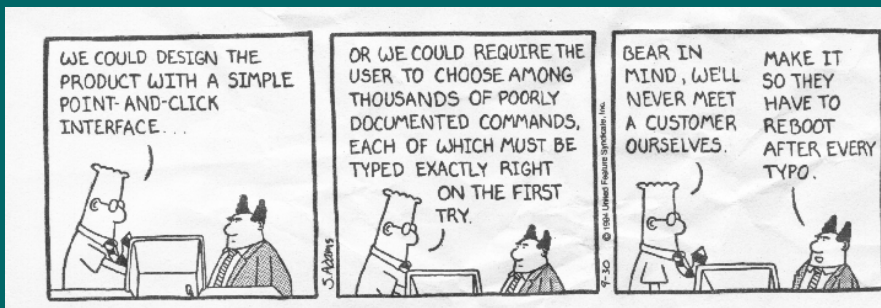
Agenda

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



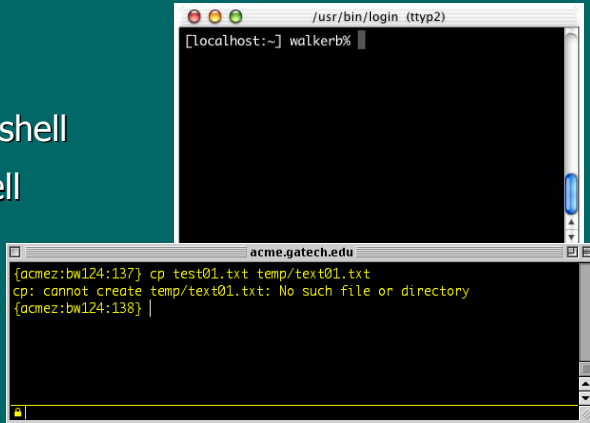
Dialog Design

- How does a user interact with the interface?



Command Languages

- Earliest UI interaction paradigms
- Examples
 - MS-DOS shell
 - UNIX shell
 - dBase
 - GPSS



```
/usr/bin/login (ttyp2)
[localhost:~] walkerb%

acme.gatech.edu
{acmez:bw124:137} cp test01.txt temp/text01.txt
cp: cannot create temp/text01.txt: No such file or directory
{acmez:bw124:138} |
```



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
 - ?



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?

% delete file
or
% file delete

- 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 abbrevs. 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



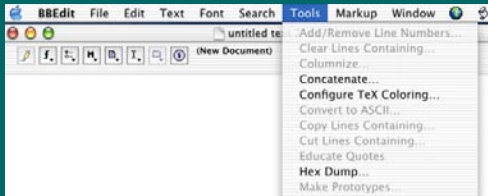
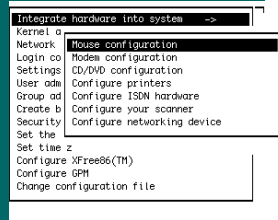
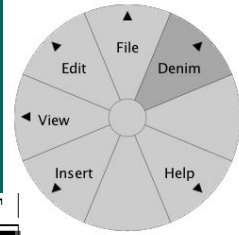
Window Cons

- 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

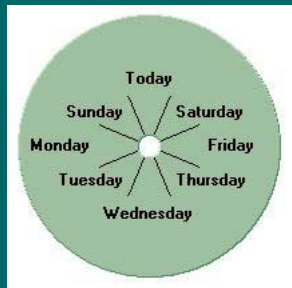


Menus

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



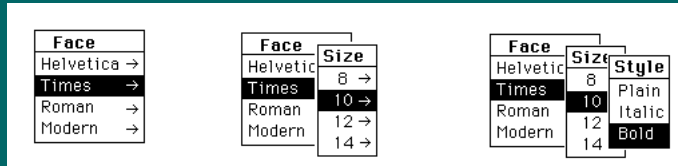
Pie Menus



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?



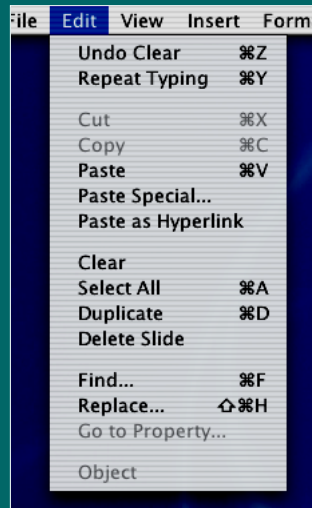
Presentation Sequence

- 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 dialog
- 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?



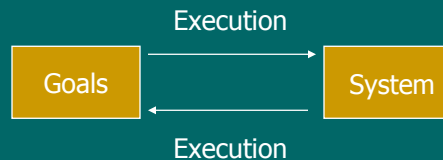
More Psychological View

- What is directness? (not always done well)
- Related to two things:
 - Distance
 - Engagement



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 user 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

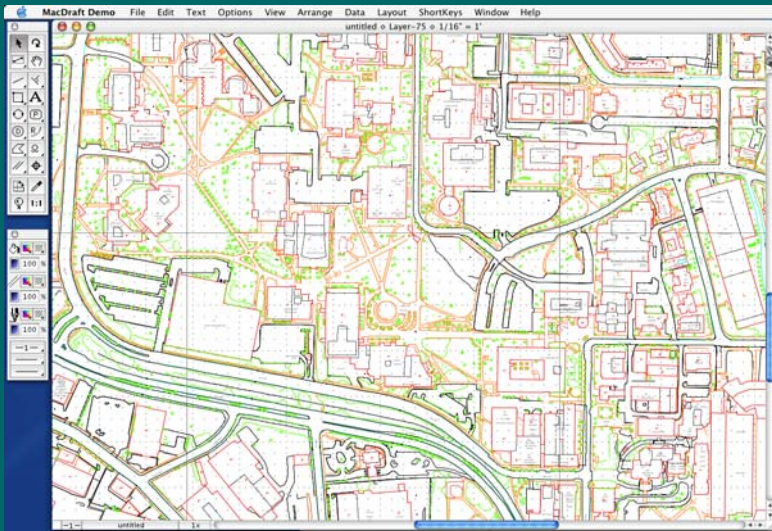


Ultimately...

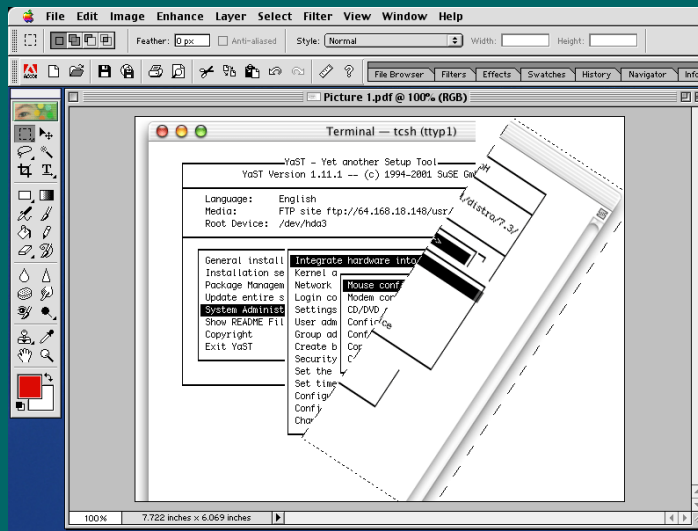
- In end, must characterize direct manipulation by feeling of directness and illusion of manipulating objects at hand



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

