Errors & Error Assistance

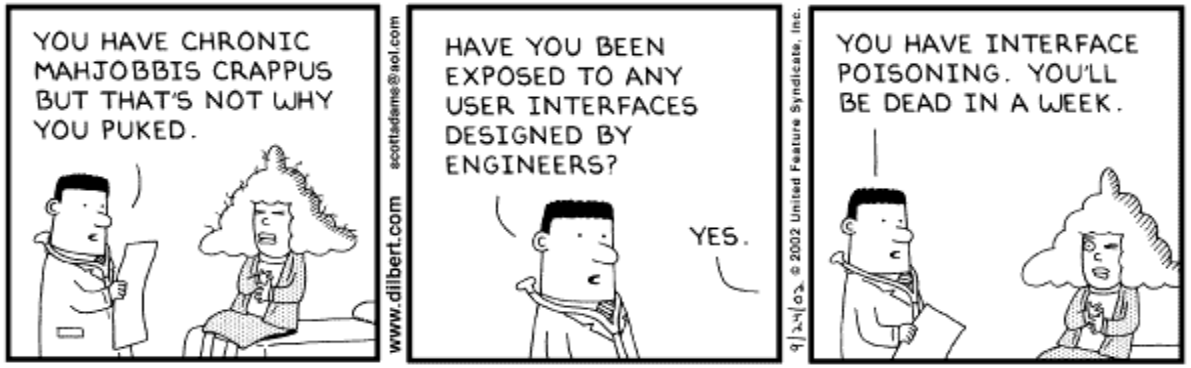
Discussion Section

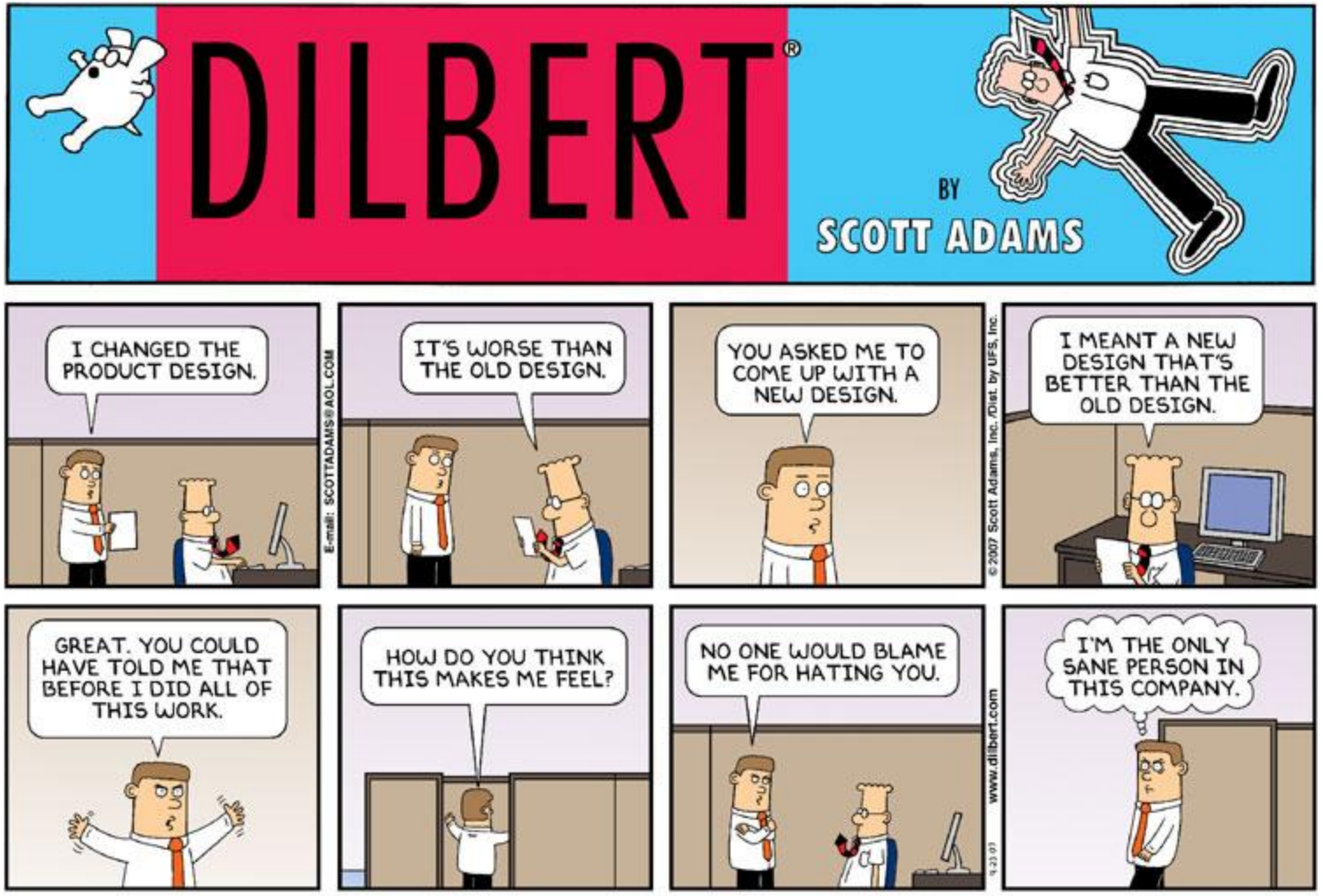
Wed 8:30-9:30 & Thu 1:30-2:30

Introductory HCI: User Interface Design, Prototyping, and Evaluation
CSE 440 — Autumn 2007

Role of discussion section

- Answer questions about class material
- Cover class topics in more detail
- Cover techniques useful in group projects





Overview

- Errors Happen
- Types of Error
- Strategies
  - Prevention
  - Recovery
  - Correction
- Examples
- Reference

Common physical world errors?

Common software interface errors?

Motivation

- Consider the use of an online banking system
- Compare this to interacting with human teller

Who is more graceful at coping with errors?

What are the error coping mechanisms?

Deal with errors in a positive and helpful manner

- People will make errors!
- Errors we make:
  - Mistakes
  - Slips
  - False Understanding

Types of Errors

1. Mistakes
   - conscious deliberations that lead to an error
   - mismatch in conceptual model
2. Slips
   - unconscious behavior that is misdirected
   - shows up frequently in skilled behavior
   - often arises from similarities of actions
3. False Understanding
   - Generalizing from a single incident

Types of Slips

1. Capture error
2. Description error
3. Loss of activation
4. Mode errors

Capture error

- frequently done activity takes charge instead of one intended
- occurs when common and rarer actions have same initial sequence
  - change clothes for dinner and find oneself in bed (William James, 1890)
  - confirm saving of a file when you don't want to replace it (the "ok" button syndrome)
  - drive to work on a Saturday morning

Description error

- intended action has much in common with others that are possible
- usually occurs when right and wrong objects physically near each other
  - pour juice into bowl instead of glass
  - go jogging, come home, throw sweaty shirt in toilet instead of laundry basket
  - move file to trash instead of to folder

Loss of activation

- forgetting what the goal is while undergoing the sequence of actions
  - start going to room and forget why you are going there
  - navigating menus/dialogs and can’t remember what you are looking for

Mode Errors

- people do actions in one mode thinking they are in another
  - refer to file that's in a different directory
  - look for commands / menu options that are not relevant
  - pen vs mouse on tablet pc

Designing for Slips

- general rules
  - prevent slips before they occur
  - detect and correct slips when they do occur
  - user correction through feedback and undo
- capture errors
  - instead of confirmation, make actions undoable
  - e.g. Mac trash can be opened and “deleted” file taken back out
- description errors
  - in icon-based interfaces, make sure icons are not too similar
  - check for reasonable input
- loss of activation
  - if system knows goal, make it explicit
  - if not, allow person to see path taken
- mode errors
  - have as few modes as possible (preferably none)
  - make modes highly visible

Answer this

UNIX: list files with *ls*

DOS: list files with *dir*

Error: type *ls* instead of *dir on windows*

What kind of error is this?

(capture, description, loss of activation, mode?)

- *A: mode*

What can we do about errors?

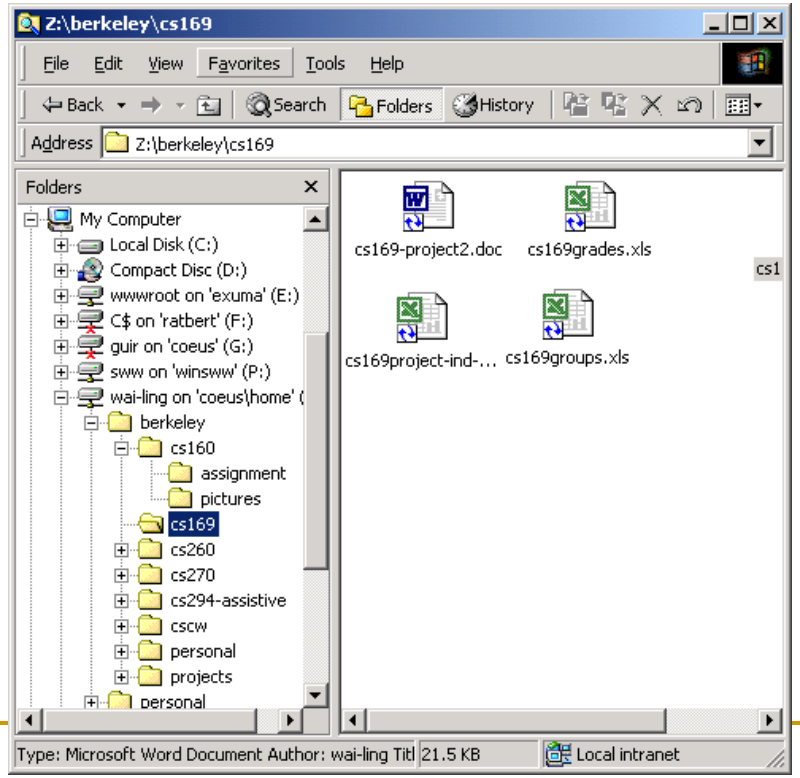
- Prevent them!
- Detect them!
- Fix them!
- Make corrections inexpensive for the user (undo/redo)

Strategies: Do Nothing

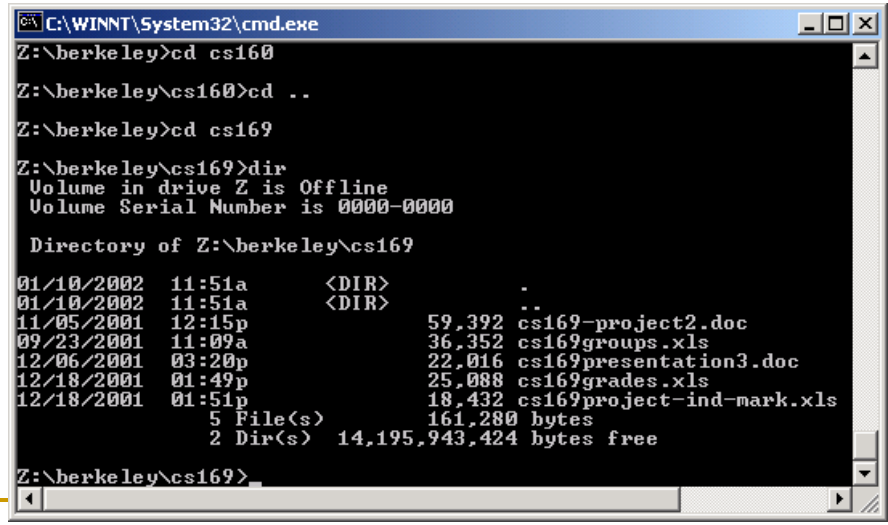
- Do nothing
  - Good
    - does not chastise the participant for an error
  - Bad
    - does not provide clues for recovery
    - can be dangerous if user does not notice error
  - E.g.
    - enter letter into a numeric field (key clicks ignored)
    - put a file icon on top of another file icon (returns it to original position)

Strategies: Prevention

- Good Representation: How can it reduce errors?



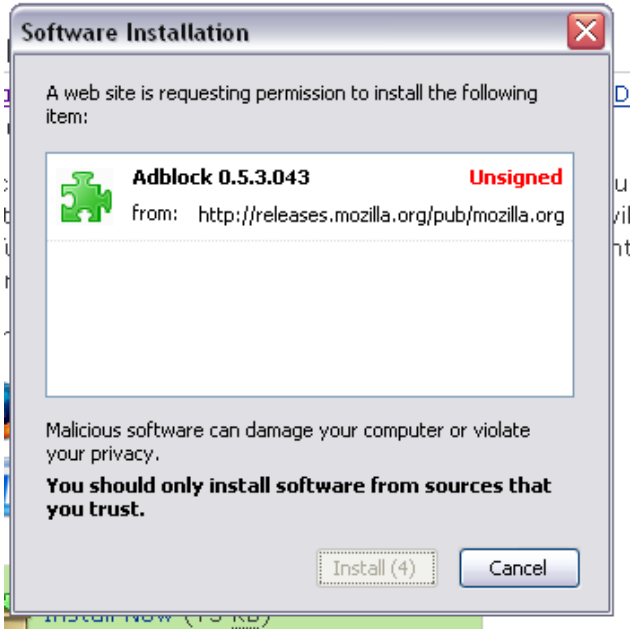
GUI File System



Command Line File System

Strategies: Prevention

- Interlock
  - Prevent users from continuing
  - Can't move forward in a wizard if no file is selected
- Warn
  - warn people that an unusual situation is occurring
  - when overused, becomes an irritant



Strategies: Recovery

- Self Correction (by computer)
  - Guess the closest legal action and do it.
  - Pros: When done well can be seamless and helpful
  - Cons: Can guess the wrong thing and be obtrusive

Automatic typo correction in Word

Strategies: Recovery

- Mediated Self Correction
  - Guess a few close legal actions, and let the user choose
  - Pros: Gives the user more control
  - Cons
    - May not guess the correct options
    - may add to user cognitive load
  - E.g.
    - Abort, Retry, Ignore
    - Compiler bringing up line of code

Strategies: Recovery

- Computer Learns
  - Ask user what they want the system to do in this situation next time

Strategies: Error Messages

- Good Error messages
  - Do not use humor
    - sometimes it's not funny!
  - Don't use unnecessarily severe language
    - "Symbol table full - Fatal heap error; please go buy a ram upgrade from your local Apple dealer"
    - "And the lord said, 'lo, there shall only be case or default labels inside a switch statement"

      -Apple C compiler

Strategies: Error Messages

- Good Error messages
  - Use context to help the user recover
  - Identify the error that triggered the breakdown
    - “Huh?” – Apple C compiler
  - Do not put the blame on the user
    - “Do you want to save your file?” vs.
    - “User forgot to save file”
  - Are in the user’s language (literally, but also their vocabulary)

Strategies: Error Messages

Eg: From Wai-Ling's Research Project

Discussion

- We've discussed errors as tools to help the user "find the right path". What about help systems? Have any shame or fame favorites?
- Many users learn by "trial and error"
  - How does error handling affect this learning style?

Reference

- Designing for Error
  - Clayton Lewis and Donald A. Norman
- Ben Bederson / Saul Greenberg
- http://www.cs.umd.edu/class/fall2002/cmsc434-0201/notesab.pdf