Overview and Heuristic Evaluation

SWE 632
Spring 2018

GEORGE MASON UNIVERSITY

In class exercise

- As you come in and take a seat
- Write down at least 3 characteristics that makes something **usable**

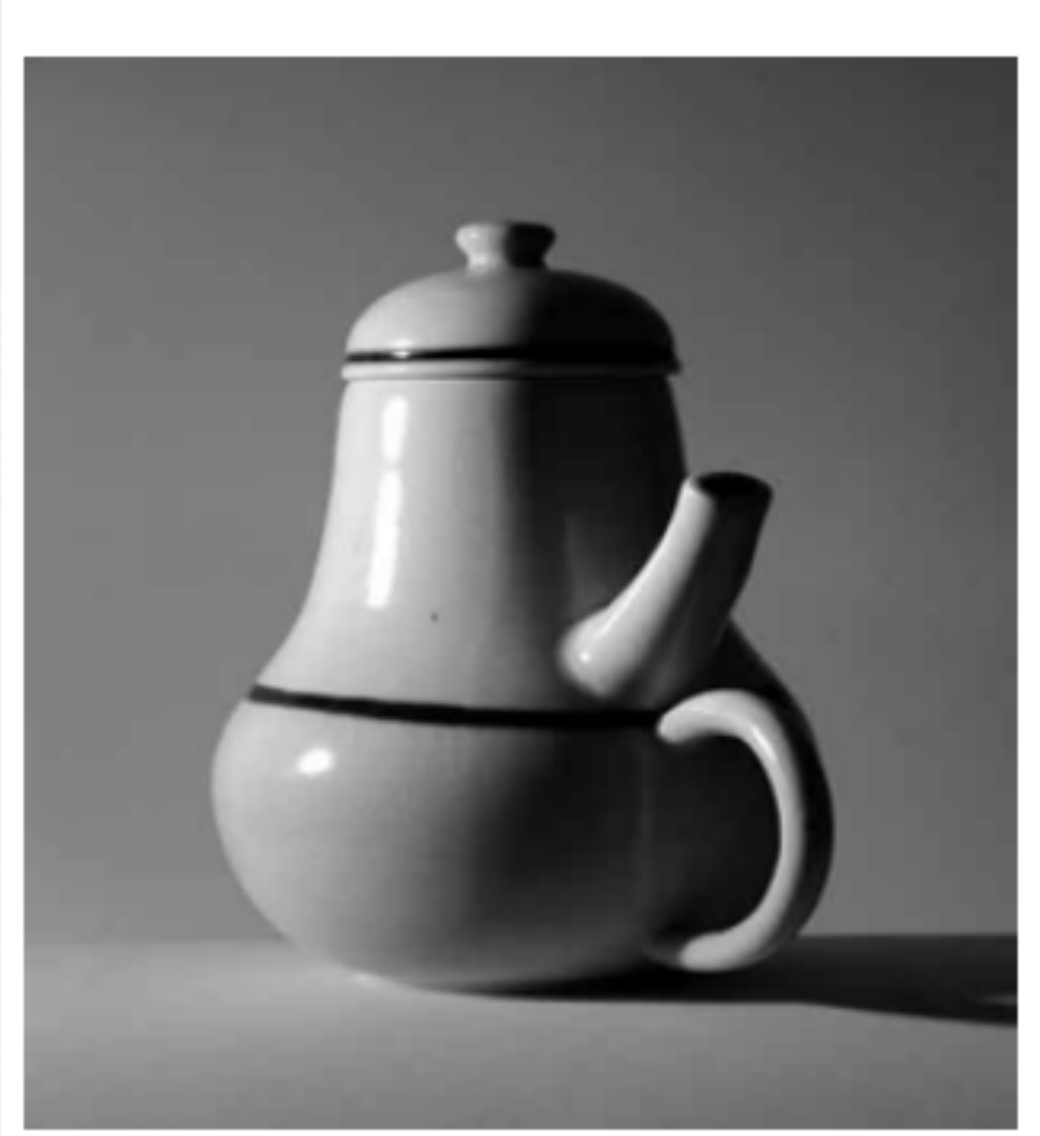
Characteristics of usability

Characteristics of usability

- ease of use
- productivity
- efficiency
- effectiveness
- learnability
- retainability
- user satisfaction

Usable or unusable?

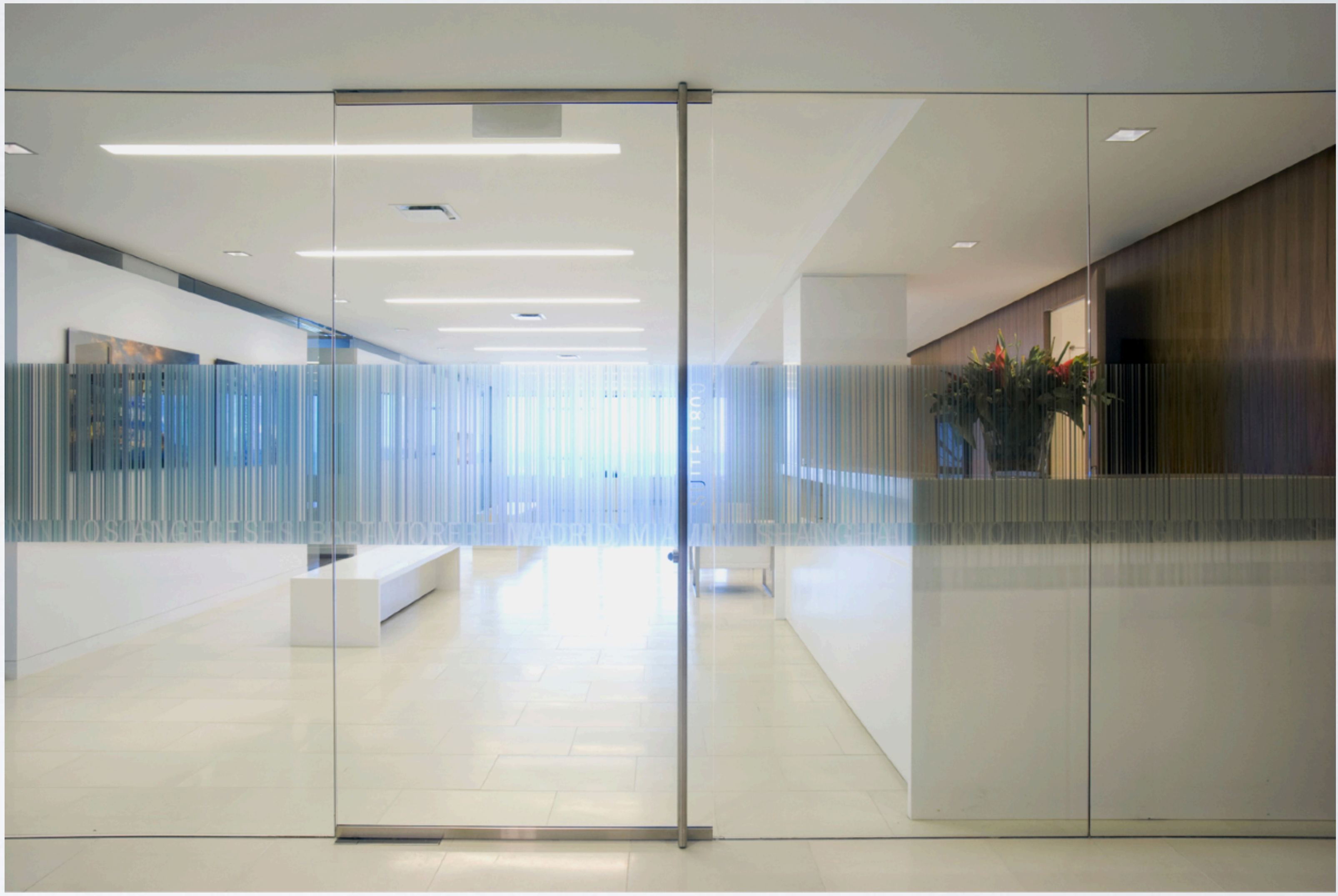
A teapot



From Don Norman, Emotional Design

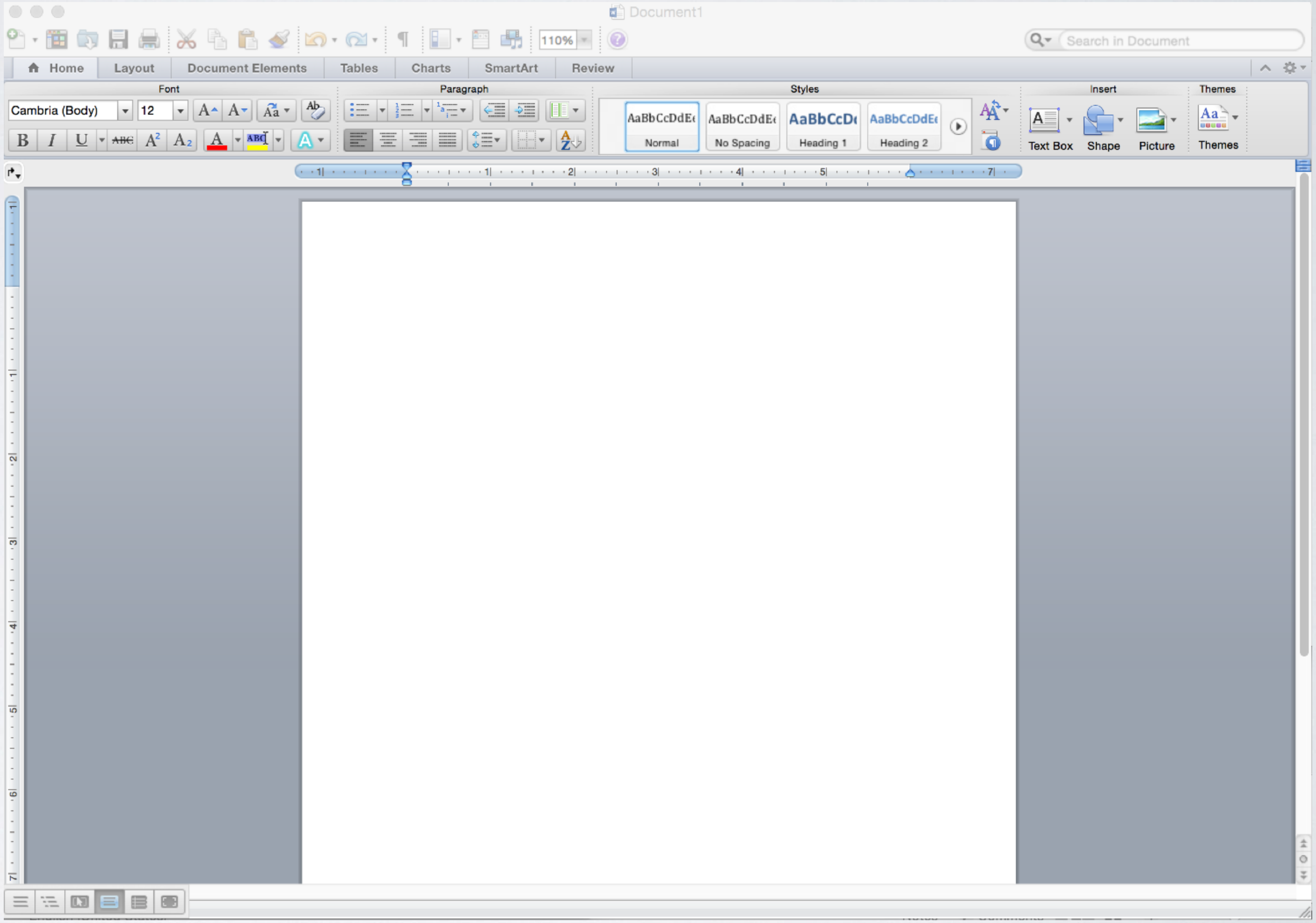
Usable or unusable?

A door



Usable or unusable?

A word processor



Usability

- A property of the relationship between
  - humans with goal-driven tasks
  - an artifact
- The speed and success with which the goals can be accomplished (task **performance**)

Needfinding

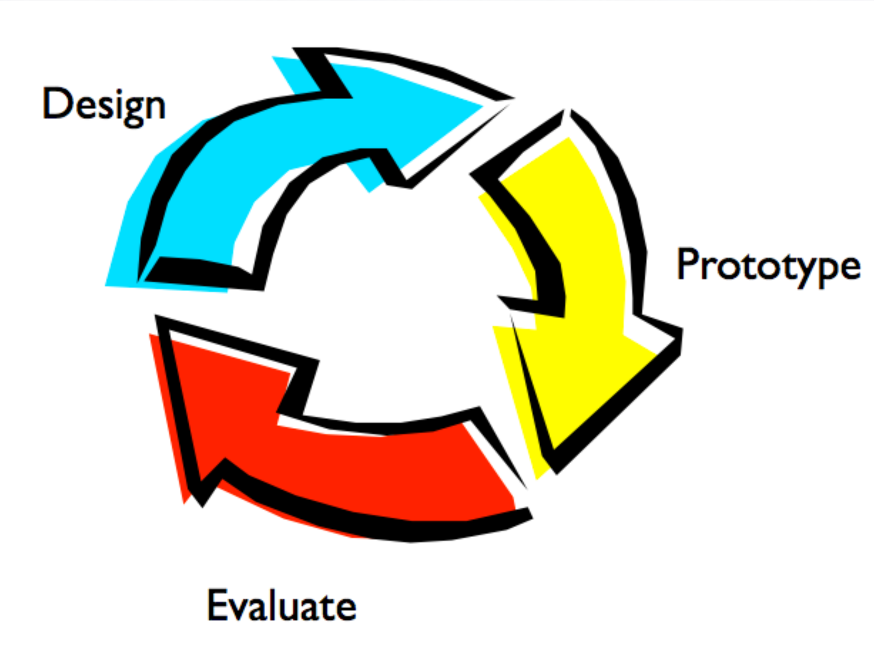
- Given an existing artifact and humans doing a set of tasks, determine **goals** and identify **usability issues** that decrease task performance

User-centered design

- Given humans with goals and tasks, design an **artifact** that helps to accomplish these tasks

Iterative User-centered design

- Given humans with goals and tasks, **re**design an **existing** artifact that helps to accomplish these tasks **faster** and **more successfully**

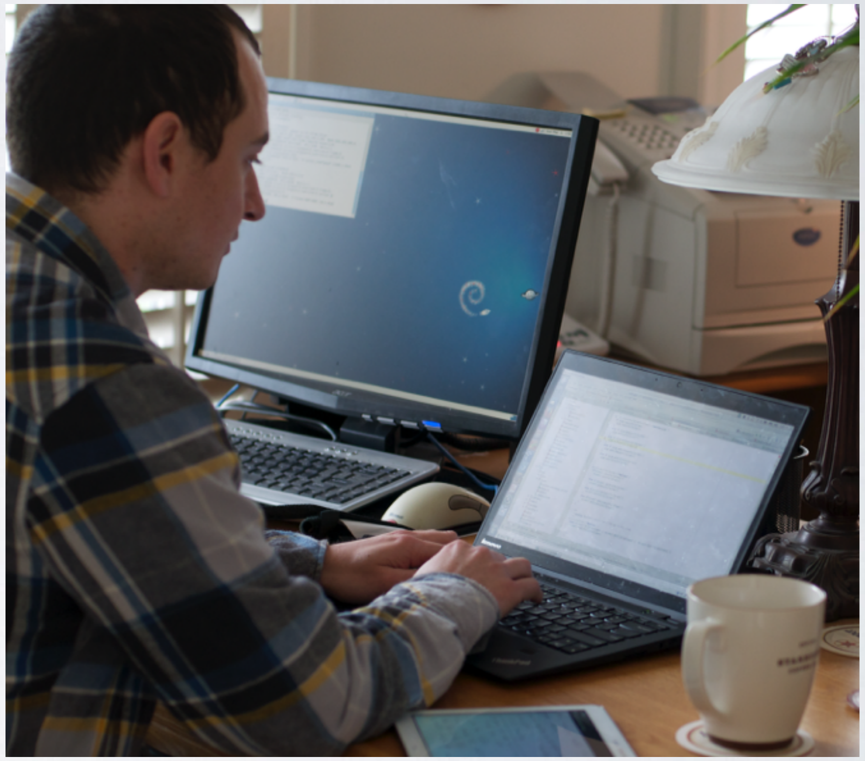


Usability evaluation

- Given humans with goals and tasks and a new artifact, identify usability issues that decrease task performance

Empirical: Usability evaluation **study**

- Given humans with goals and tasks and an artifact, **observe humans to** identify usability issues that decrease task performance



- (ground truth)

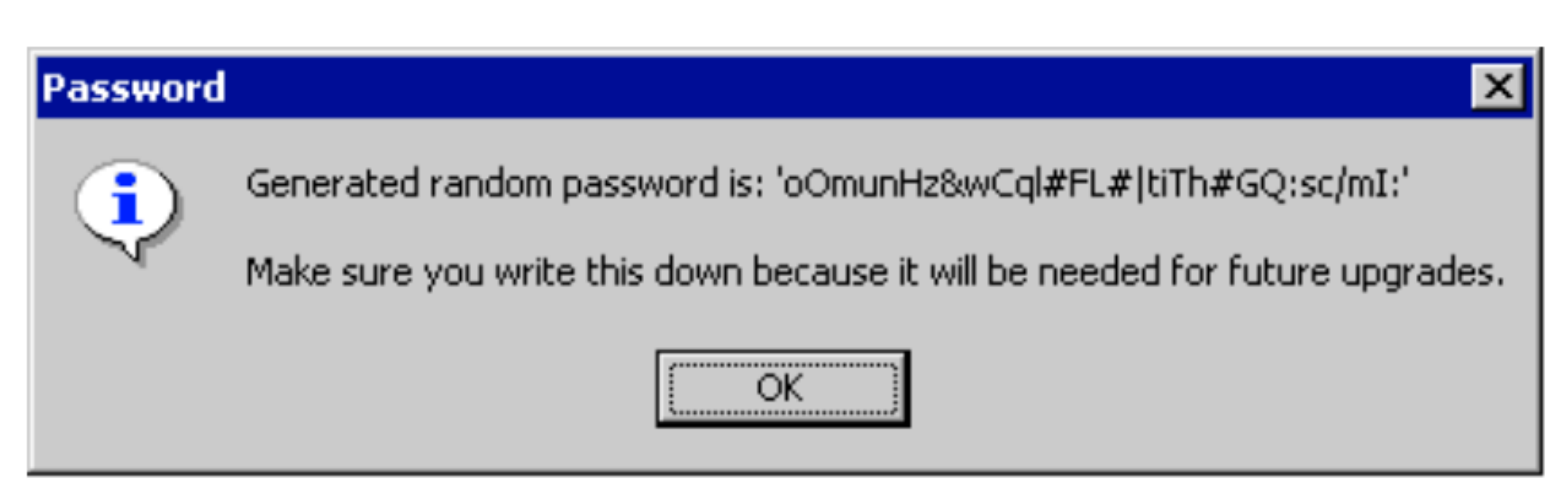
Analytical: Usability principles

- Given humans with goals and tasks and an artifact, **assess for conformance to UI principles to** identify usability issues that decrease task performance
- (lightweight approximation of ground truth)

Why study usability?

“The results show that in today's applications, an average of **48% of the code** is devoted to the user interface portion.
The average time spent on the user interface portion is 45% during the design phase, 50% during the implementation phase, and 37% during the maintenance phase.”
– Myers & Rosson, CHI’92

Why study usability?



Generated random password is: 'oOmunHz&wCql#FL#|tiTh#GQ:sc/mI:'

Make sure you write this down because it will be needed for future upgrades.

Adapted from Maneesh Agrawala & Bjoern Hartmann

Life-Threatening Errors

- 1995 American Airlines jet **crashed** into canyon wall, killing all aboard
- On approach to Rozo airport in Colombia
- Pilot skipped some of the approach procedures
- Pilot typed in "R" and system **completed** full name of airport to Romeo
- Guidance system executed turn at low altitude to head for Romeo airport
- 9 seconds later plane struck canyon wall
- Is the pilot to blame?
- http://en.wikipedia.org/wiki/American_Airlines_Flight_965

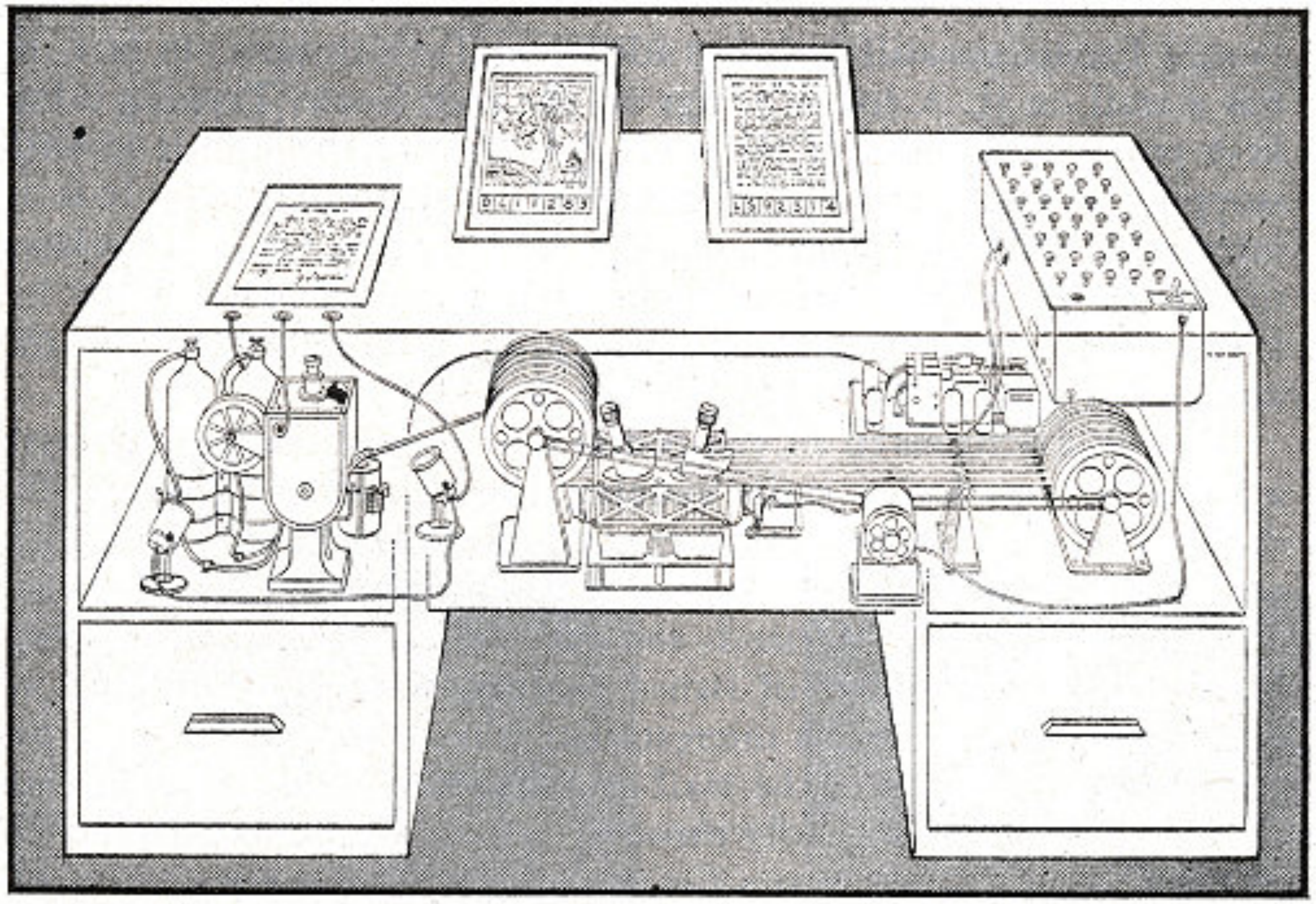
What usability is not

- Not "dummy proofing"
- Not being "user-friendly"
- Not just "usability testing"
- Not just making software pretty

As we may think

- Vannevar Bush, The Atlantic, July 1945

- Described the Memex and predicted hypertext, personal computers, the Internet, the WWW, speech recognition, online encyclopedias



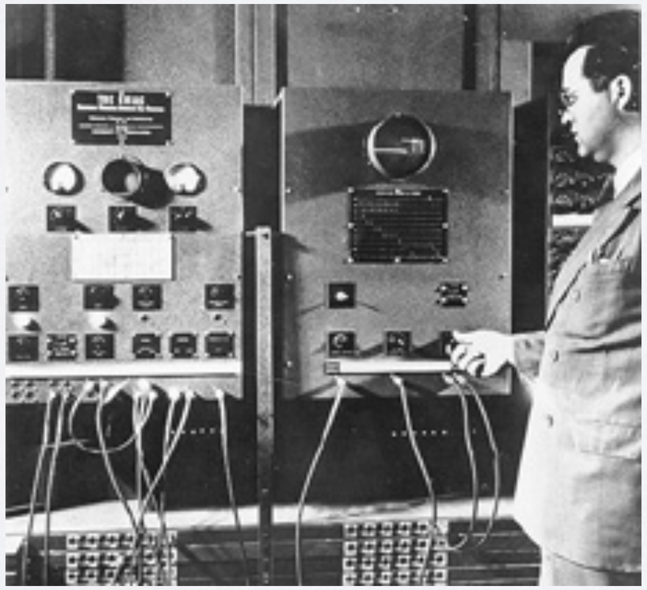
MEMEX in the form of a desk would instantly bring files and material on any subject to the operator's fingertips. Slanting translucent viewing screens magnify supermicrofilm filed by code numbers. At left is a mechanism which automatically photographs longhand notes, pictures and letters, then files them in the desk for future reference.

The user is NOT like me

- Understanding user needs, tasks, goals

Human-Computer Interaction

“a discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them.” ACM SIGCHI Curriculum Development Group Report, 1992



This course

- Comprehensive introduction to usability and human-computer interaction (HCI)

- Basic cognition, user-centered design, usability evaluations, principles for UI design

Resources

- Course website - Syllabus, Schedule
- Piazza - Announcements, Assignments, Discussion, Questions
- Blackboard - grades

HWs (a.k.a. “project”)

- Build a (really simple) web app
- Use usability concepts and methods to identify usability issues
- Iteratively improve your app to address usability issues

HW0

- Due next Tues before class
- Form a group of 1, 2, or 3
- Pick an app to build
- Describe what you propose to build in ~1 paragraph

Policy on code reuse

- Can borrow code from online sources as much or as little as you’d like.
- **You must document** instances of code that you reuse.

Late HW assignments

- HWs will often involve peer evaluations
- Can submit up to 24 hours late, lose 10%
- **HW submissions more than 24 hours late will receive a 0**

Tech talks

- 15 minute overview of a front-end web technology
- Groups of 2 (collaborate w/ Skype, Hangouts, …)
- Use piazza to find a partner, reserve topics
- Only 1 group can cover a technology
- Signup by start of class next Thurs

SWE Subject Pool

- To gain experience in user studies, you will participate in 6 hours of user studies

- User study sessions primarily in the evenings or on weekends

- Will have mechanism for signing up for studies - details on Piazza

In class activities

- Work together in small groups to gain experience trying out methods and concepts with examples

Exams

- Midterm exam and comprehensive final
- Includes both in class lectures and material from assigned readings
- Mix of multiple choice, short response, short essay

Grades

- SWE Subject Pool participation: 10%
- Tech talk: 5%
- HWs and project presentation: 40%
- Mid-term exam: 20%
- Final exam: 25%

Heuristic evaluation

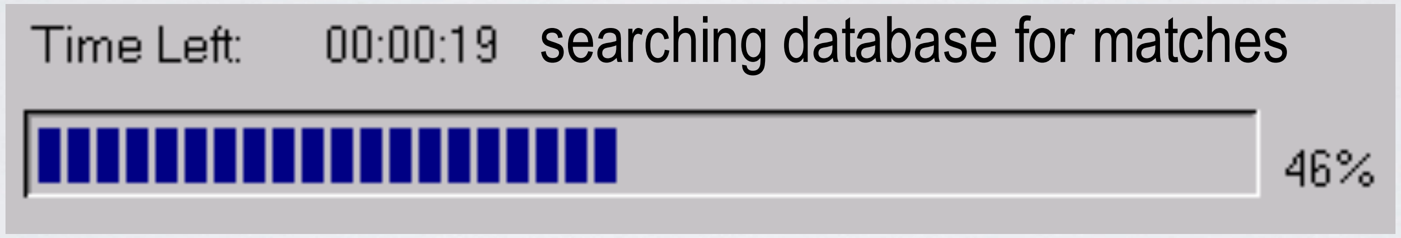
- "**Discount** usability engineering methods"… Jakob Nielsen
- Involves a small team of evaluators to evaluate an interface based on recognized usability principles
- Heuristics–"rules of thumb"

Adapted from slides by Bonnie John and Jennifer Mankoff

Heuristics

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition vs. recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation

H1: Visibility of System Status

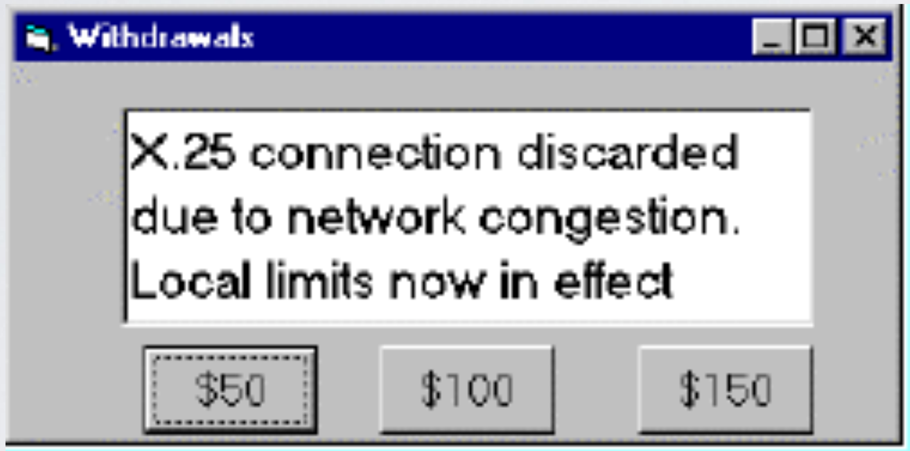


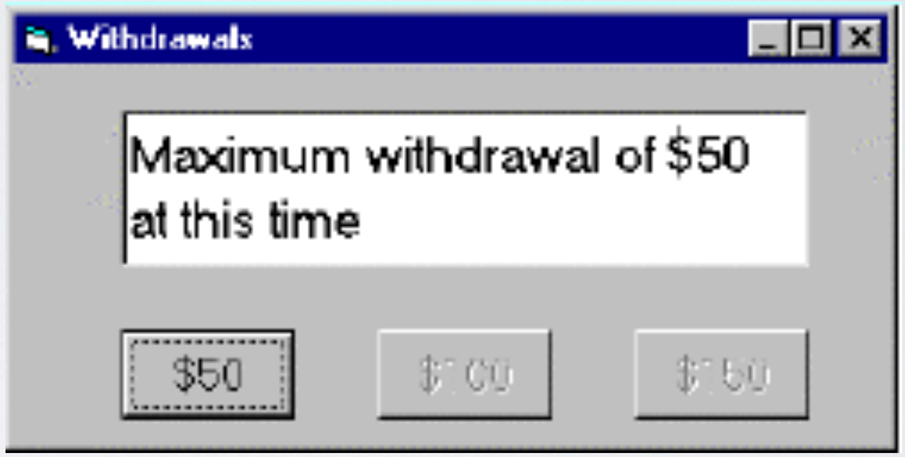
Time Left: 00:00:19 searching database for matches

46%

- What input has been received--Does the interface above say what the search input was?
- What processing it is currently doing--Does it say what it is currently doing?
- What the results of processing are--Does it give the results of processing?
- Feedback allows user to monitor progress towards solution of their task, allows the closure of tasks and reduces user anxiety (Lavery et al)

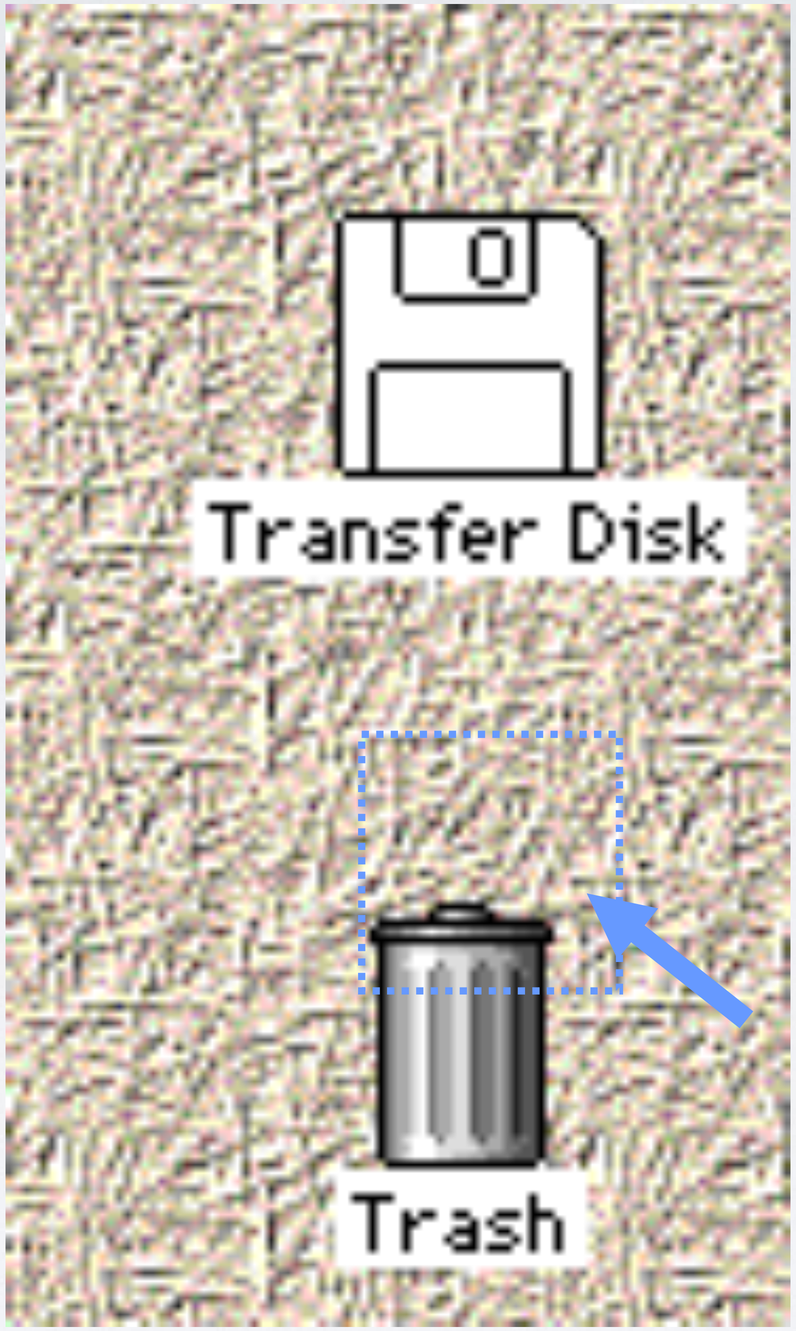
H2: Match between system and the real world


X.25 connection discarded due to network congestion. Local limits now in effect

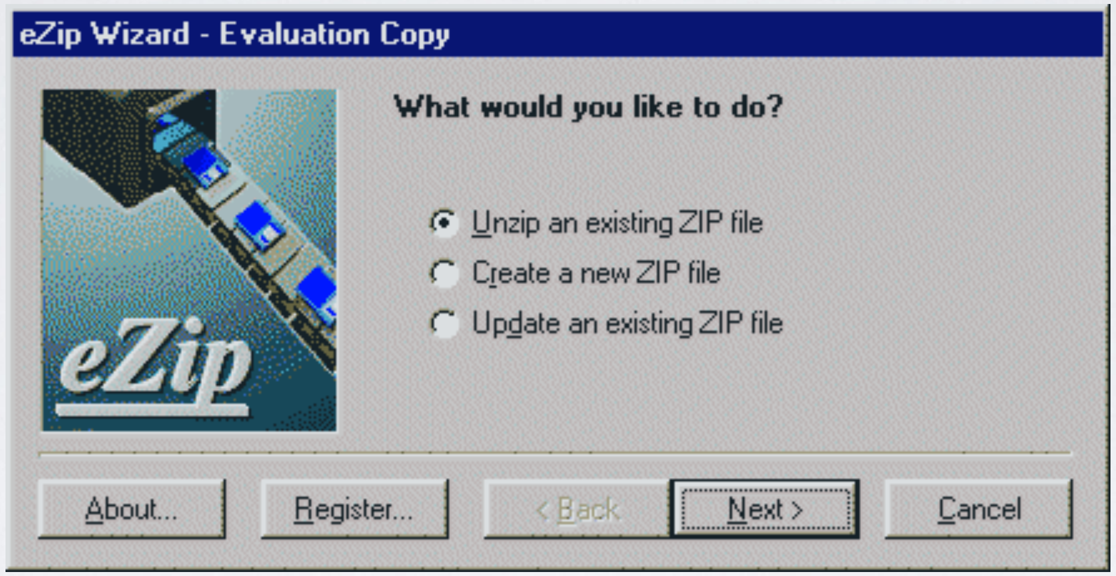

Maximum withdrawal of $50 at this time

- Speak the users' language
- Follow real world conventions

Mail
Read
Show


Transfer Disk
Trash

H3: User Control and Freedom



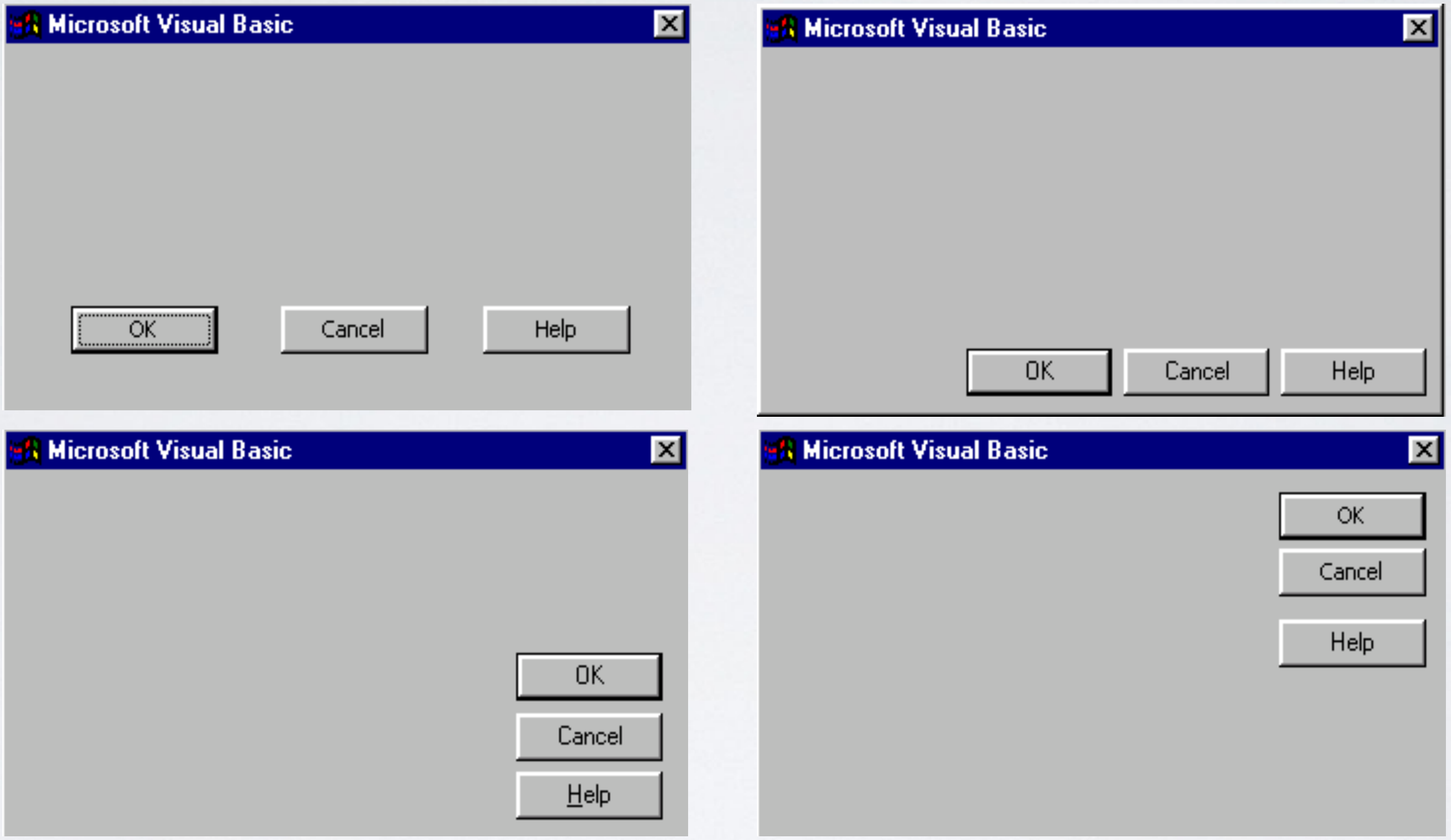
eZip Wizard - Evaluation Copy

What would you like to do?

- ● Unzip an existing ZIP file
- ○ Create a new ZIP file
- ○ Update an existing ZIP file

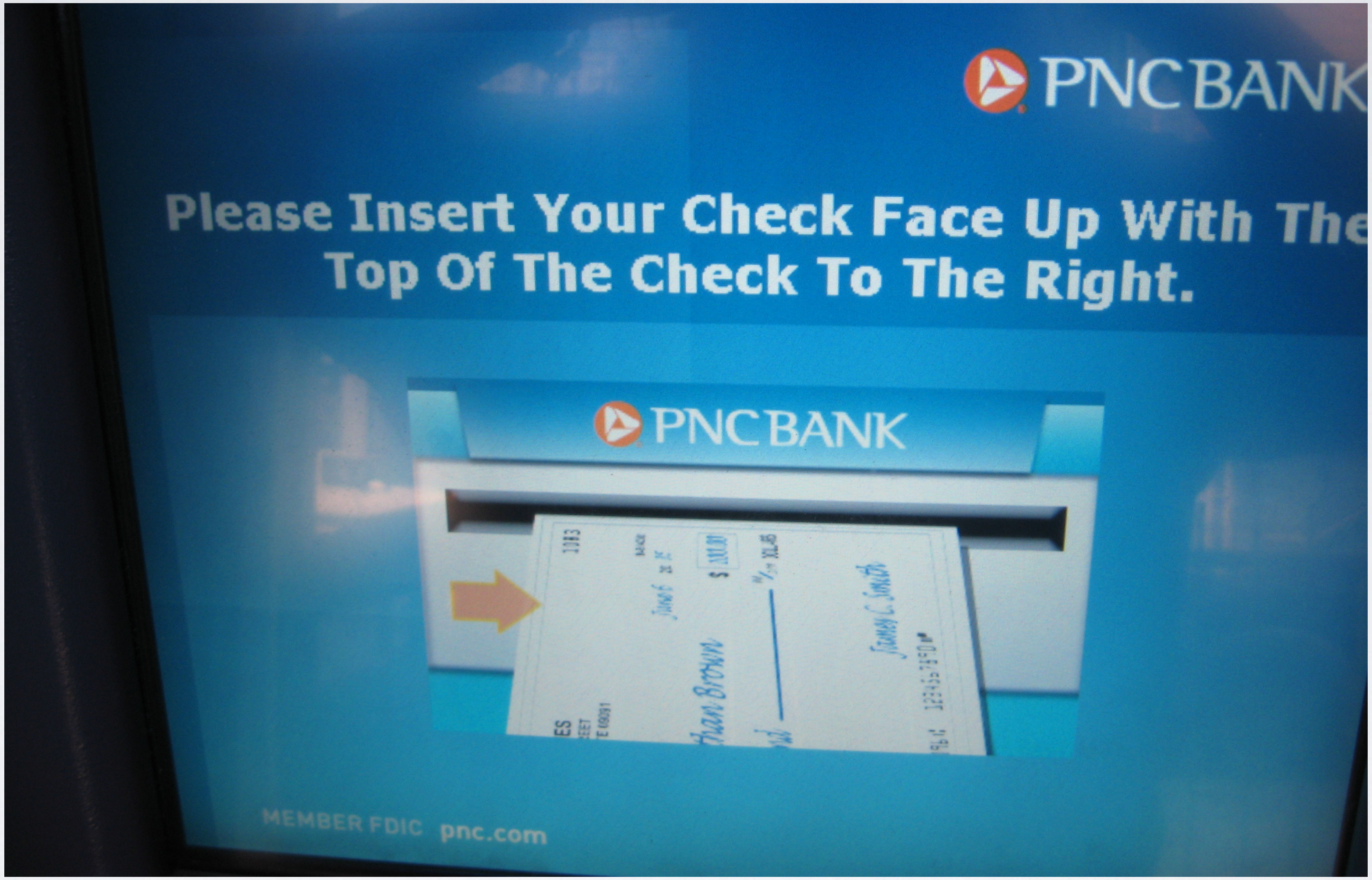
- "Exits" for mistaken choices, undo, redo
- Don't force down fixed paths

H4: Consistency and Standards



- Same words, situations, actions, should mean the same thing in **similar** situations; same things look the same, be located in the same place.

- Different things should be different

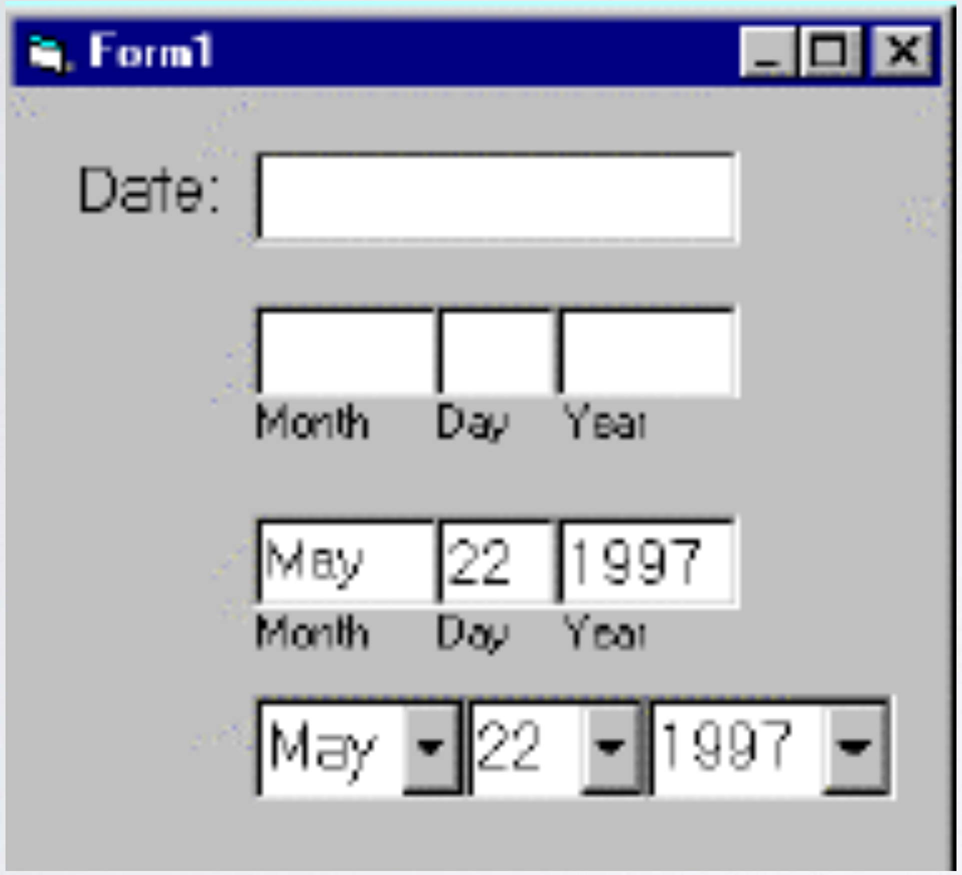


PNC BANK

Please Insert Your Check Face Up With The Top Of The Check To The Right.

MEMBER FDIC pnc.com

H5: Error prevention

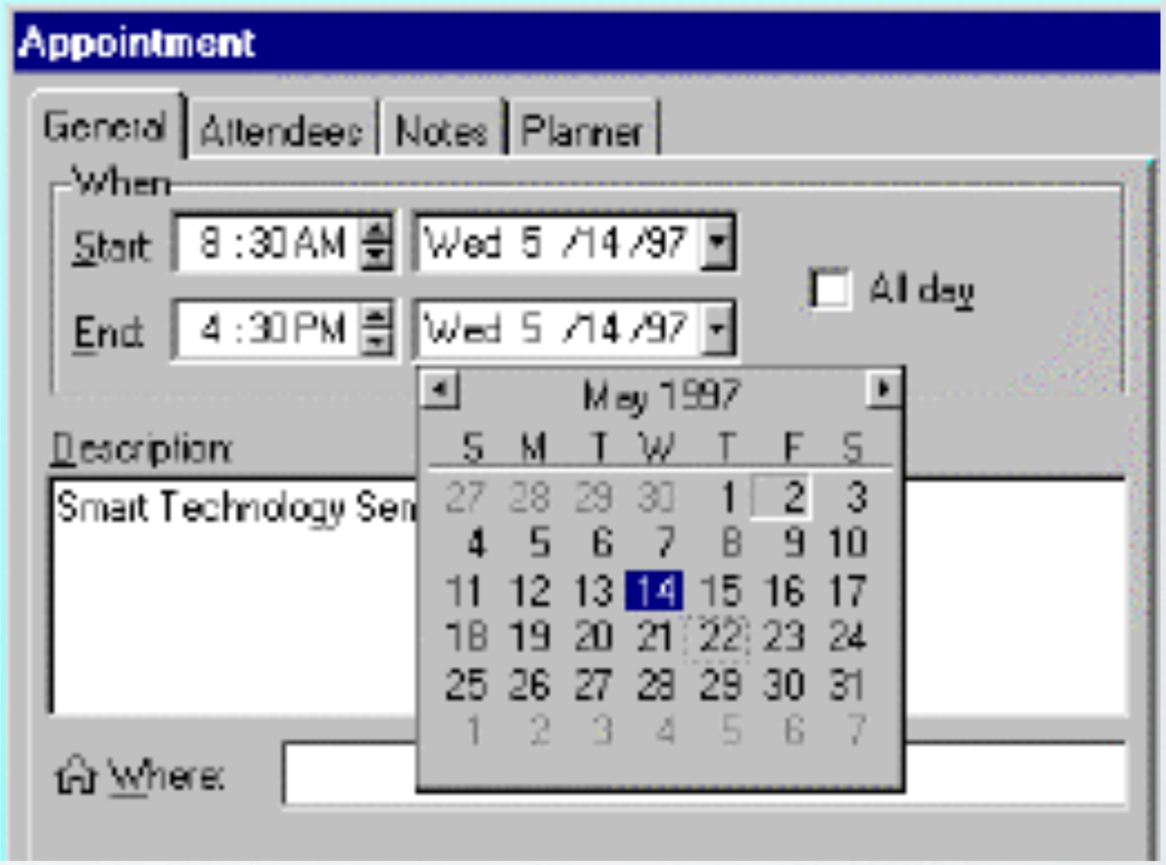


Date:

Month Day Year

May 22 1997
Month Day Year

May 22 1997



Start 8 :30 AM Wed 5 /14 /97

End 4 :30 PM Wed 5 /14 /97

□ All day

May 1997

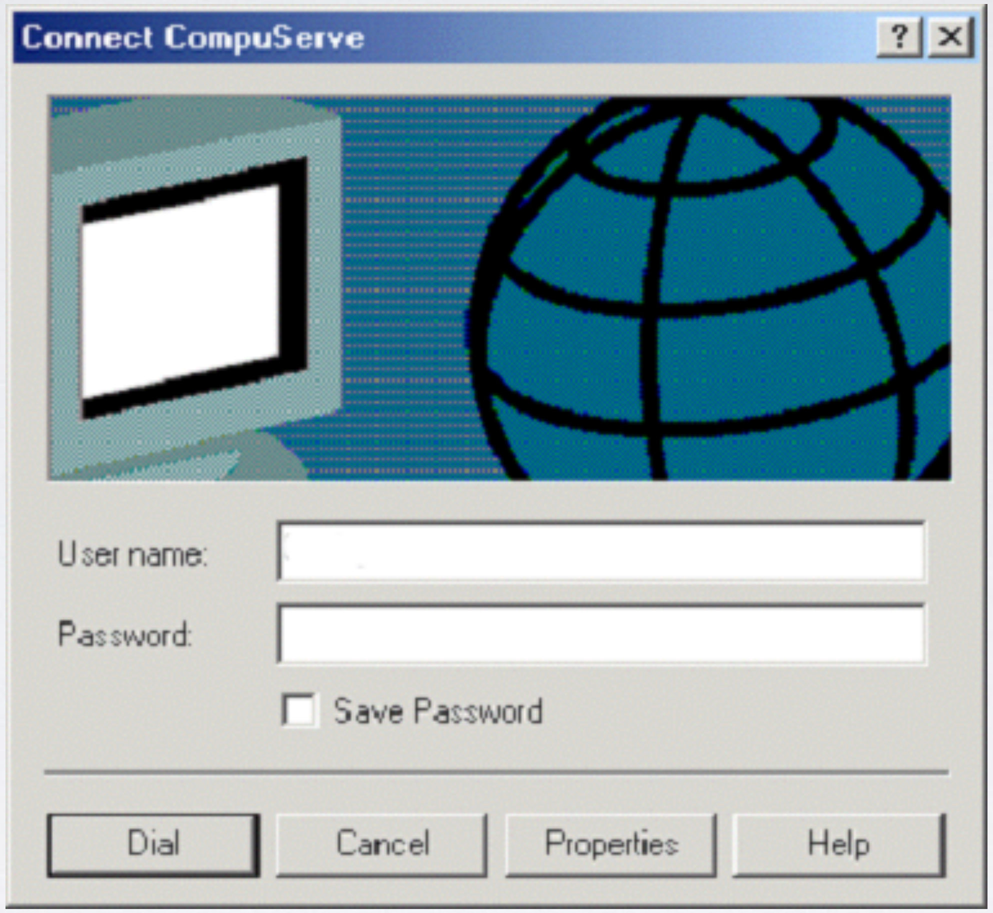
S	M	T	W	T	F	S
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

Description:
Smart Technology Ser

Where:

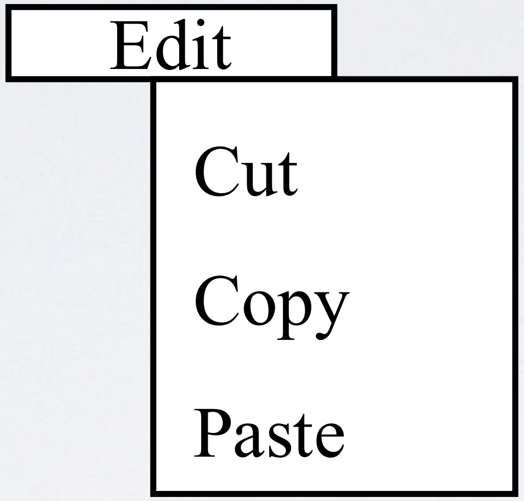
- Careful design which prevents a problem from occurring in the first place

H6: Recognition rather than recall



- Make objects, actions and options visible or easily retrievable

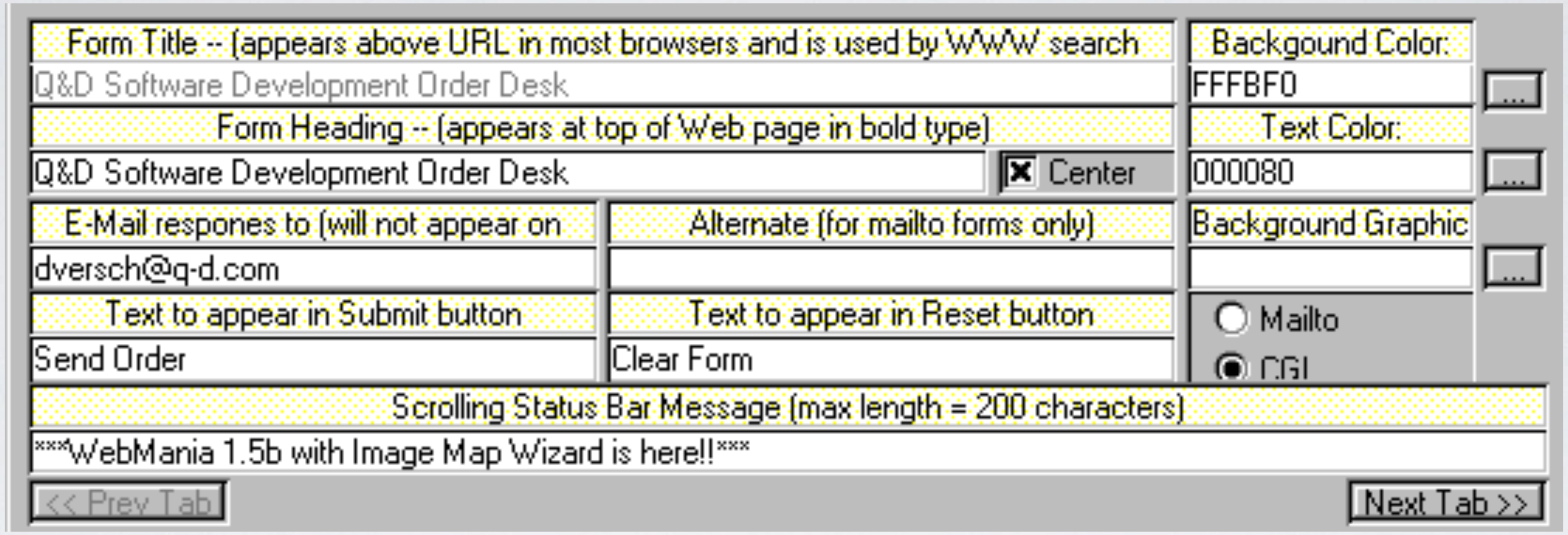
H7: Flexibility and Efficiency of Use



- Accelerators for experts (e.g., gestures, kb shortcuts)

- Allow users to tailor frequent actions (e.g., macros)

H8: Aesthetic and Minimalist design



Form Title -- (appears above URL in most browsers and is used by WWW search

Q&D Software Development Order Desk

Backgound Color:

FFFBF0

Form Heading -- (appears at top of Web page in bold type)

Q&D Software Development Order Desk

☒ Center

Text Color:

000080

E-Mail respones to (will not appear on

dversch@q-d.com

Alternate (for mailto forms only)

Background Graphic

Text to appear in Submit button

Send Order

Text to appear in Reset button

Clear Form

○ Mailto

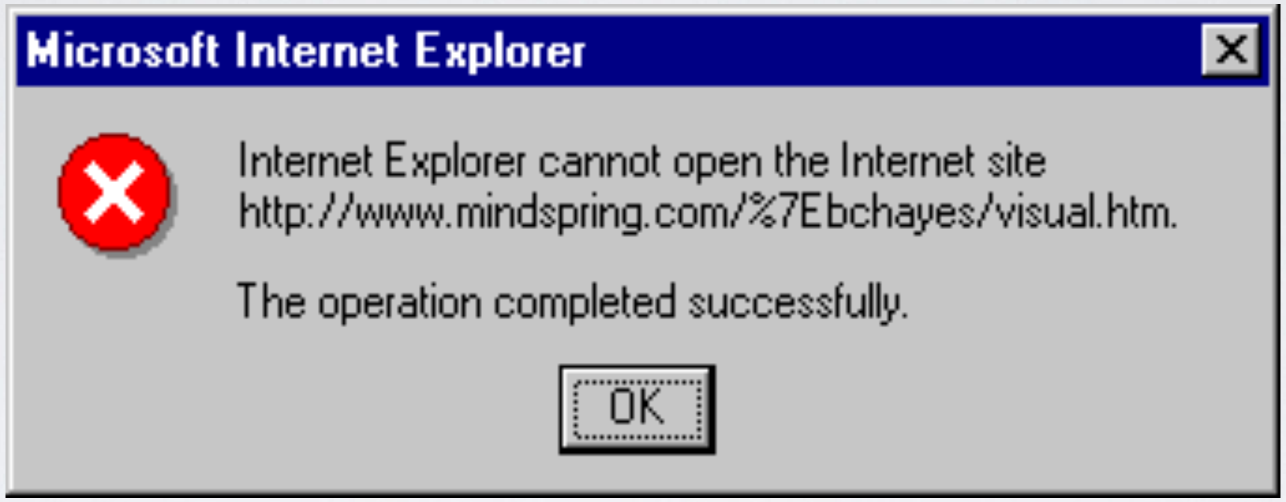
● CGI

Scrolling Status Bar Message (max length = 200 characters)

WebMania 1.5b with Image Map Wizard is here!!

- Interfaces should not contain irrelevant or rarely needed information

H9: Help users recognize, diagnose, and recover from errors



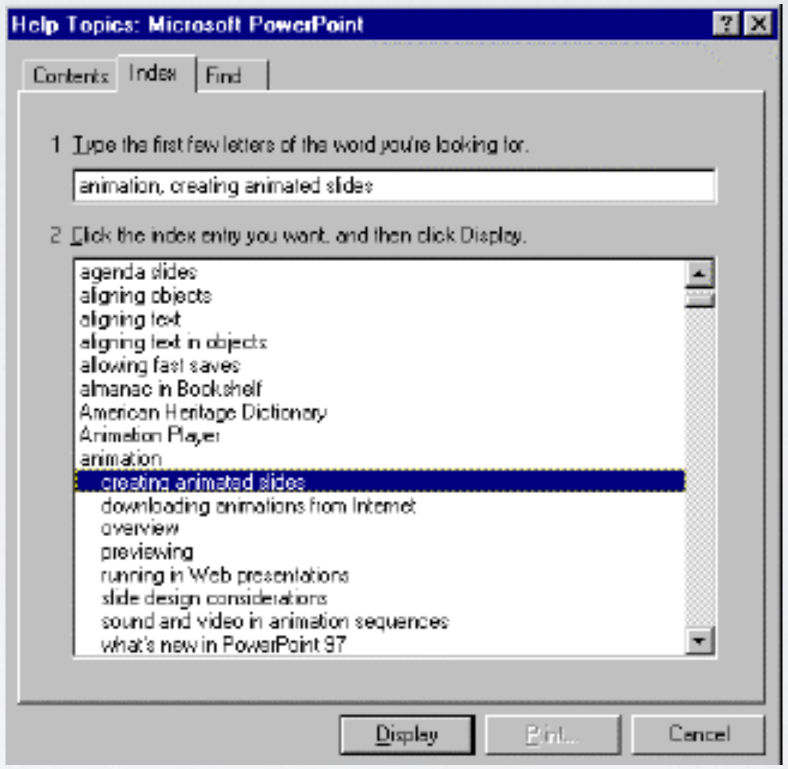
Microsoft Internet Explorer

Internet Explorer cannot open the Internet site http://www.mindspring.com/%7Ebchayes/visual.htm.

The operation completed successfully.

- Error messages in language user will understand
- Precisely indicate the problem
- Constructively suggest a solution

H10: Help and documentation



1 Type the first few letters of the word you're looking for.

animation, creating animated slides

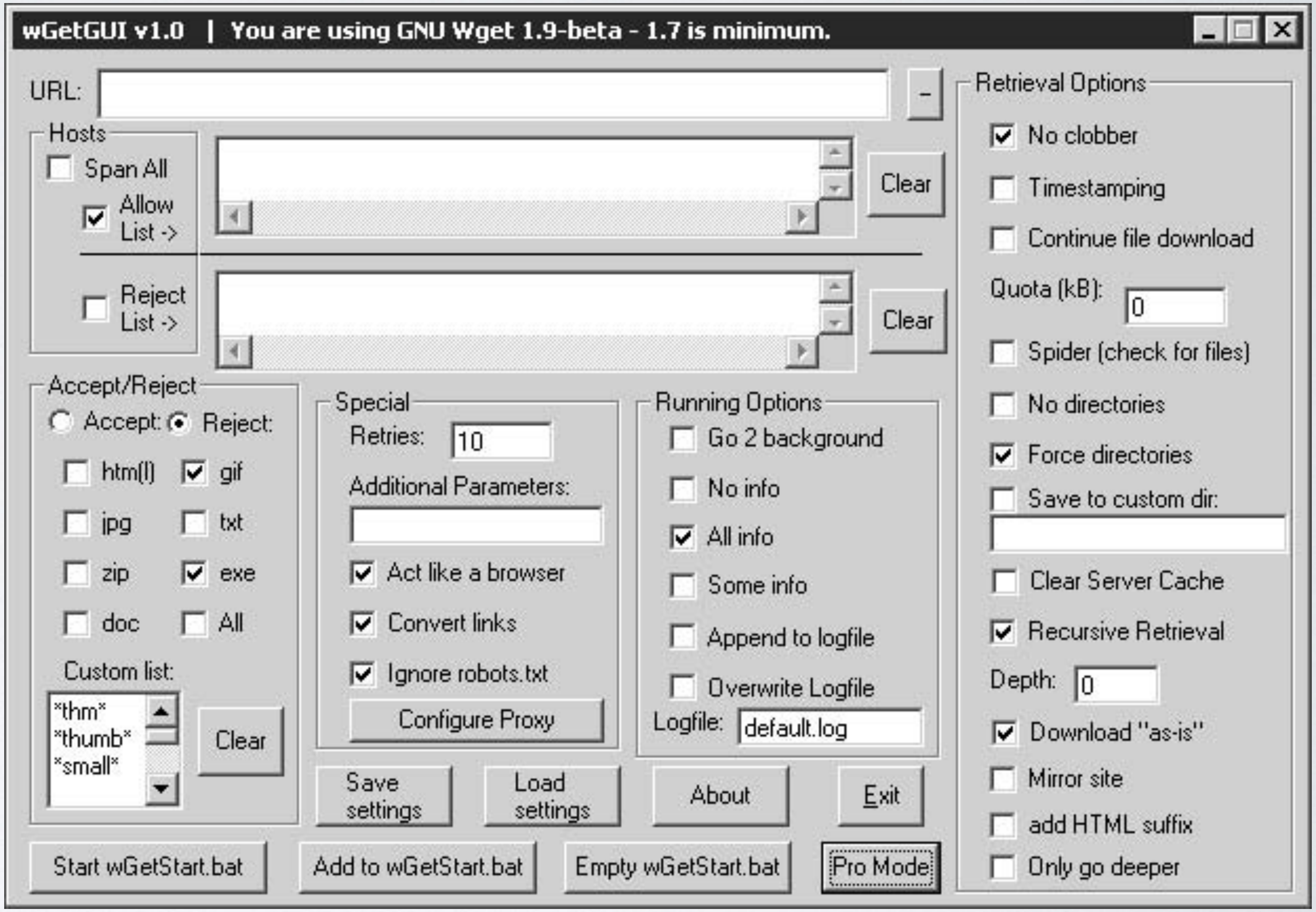
2 Click the index entry you want, and then click Display.

agenda slides
aligning objects
aligning text
aligning text in objects
allowing fast saves
almanac in Bookshelf
American Heritage Dictionary
Animation Player
animation
  creating animated slides
  downloading animations from Internet
  overview
  previewing
  running in Web presentations
  slide design considerations
  sound and video in animation sequences
  what's new in PowerPoint 97

- Easy to search
- Focused on the user's task
- List concrete steps to carry out
- Always available

Example

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition vs. recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation



wGetGUI v1.0 | You are using GNU Wget 1.9-beta - 1.7 is minimum.

URL:

Hosts
□ Span All
☑ Allow List ->
□ Reject List ->

Accept/Reject
○ Accept: ● Reject:
□ htm(l) ☑ gif
□ jpg □ txt
□ zip ☑ exe
□ doc □ All

Custom list:
thm
thumb
small

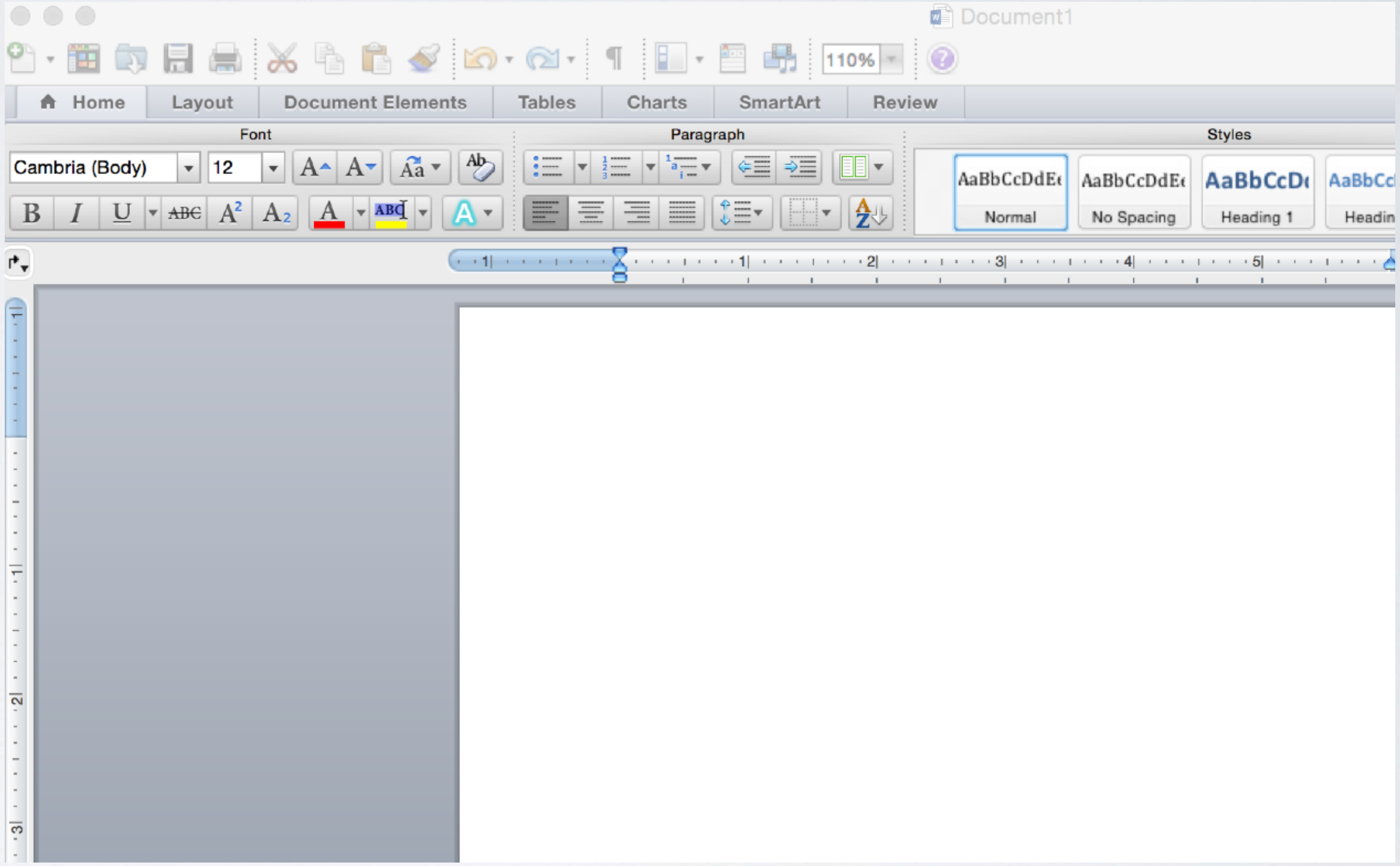
Special
Retries: 10
Additional Parameters:
☑ Act like a browser
☑ Convert links
☑ Ignore robots.txt

Running Options
□ Go 2 background
□ No info
☑ All info
□ Some info
□ Append to logfile
□ Overwrite Logfile
Logfile: default.log

Retrieval Options
☑ No clobber
□ Timestamping
□ Continue file download
Quota (kB): 0
□ Spider (check for files)
□ No directories
☑ Force directories
□ Save to custom dir:
□ Clear Server Cache
☑ Recursive Retrieval
Depth: 0
☑ Download "as-is"
□ Mirror site
□ add HTML suffix
□ Only go deeper

Example

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition vs. recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation



Using heuristic evaluation

- Can be used informally to identify issues in a website
- Can be used as a more formal usability inspection method
- Evaluators each first separately identify issues
- Issues then combined from each evaluator

Heuristic evaluation in groups

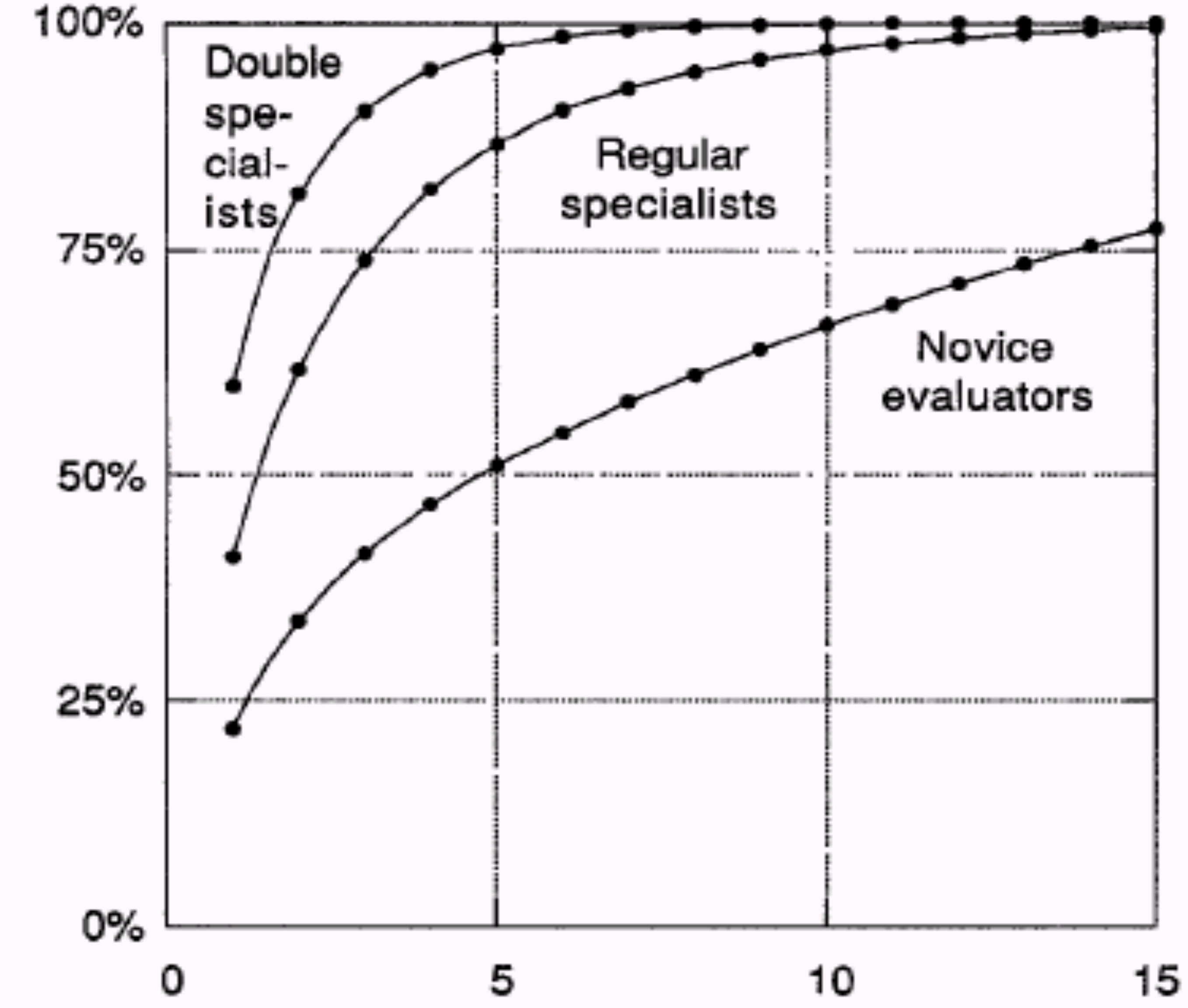


Figure 2 *Average proportion of usability problems found as a function of number of evaluators in a group performing the heuristic evaluation.*

Advantages of HE

- "Discount usability engineering" - Intimidation low
- Don't need to identify tasks, activities
- Can identify some fairly obvious fixes
- Can expose problems user testing doesn't expose
- Provides a language for justifying usability recommendations

Disadvantages of HE

- Un-validated
- Do not employ real users
- Can be error prone
- Better to use usability experts
- Problems unconnected with tasks
- Heuristics may be hard to apply to new technology

Ways to use HE

- Early in design process to catch major issues
- When time or resources are not available for empirical usability evaluation

In class activity

- Form groups of 3 or 4
- Together select an application or website (e.g., Word, Twitter)
- Work individually to identify at least 1 usability issue
- For each issue, identify the heuristic, identify the functionality in the application, and summarize how the heuristic is violated in a few sentences

Heuristics

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition vs. recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation