

# Overview and Heuristic Evaluation

SWE 632  
Fall 2015



# In class exercise

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

# Characteristics of usability

- readable
- informative
- logic flow, order and organization to elements
- working based on a mental model that the user has
- demand for the software - people want to use it
- robust and reliable
- intuitive



# Characteristics of usability

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



# Usable or unusable?

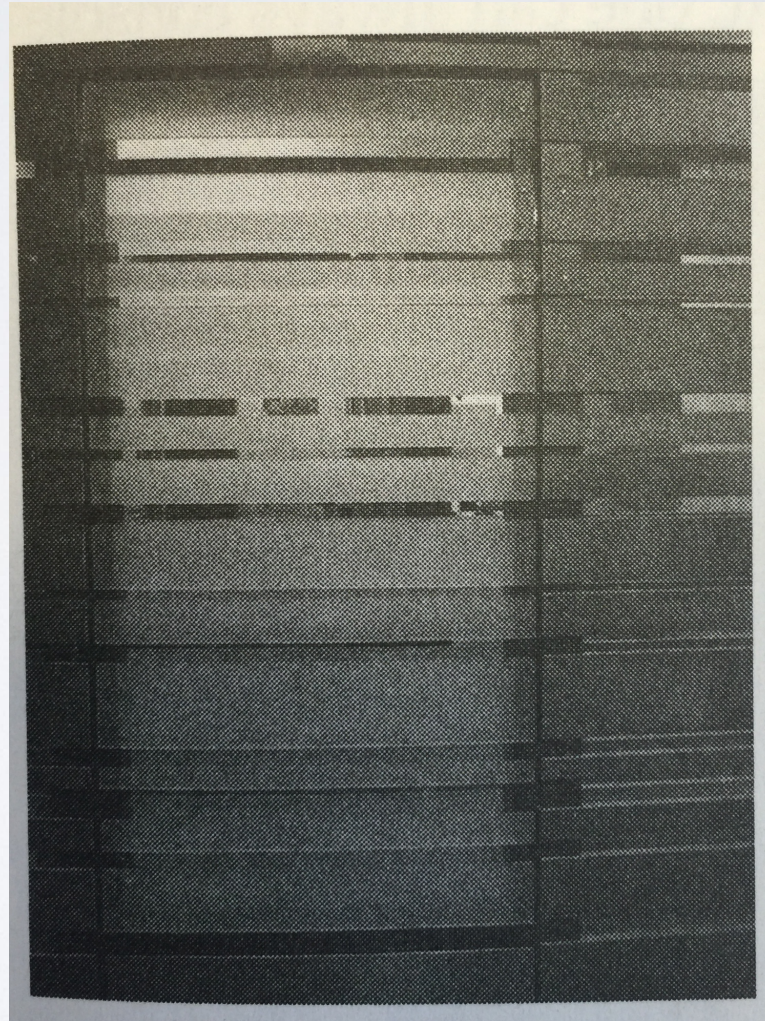
**A teapot**



From Don Norman, Emotional Design

# Usable or unusable?

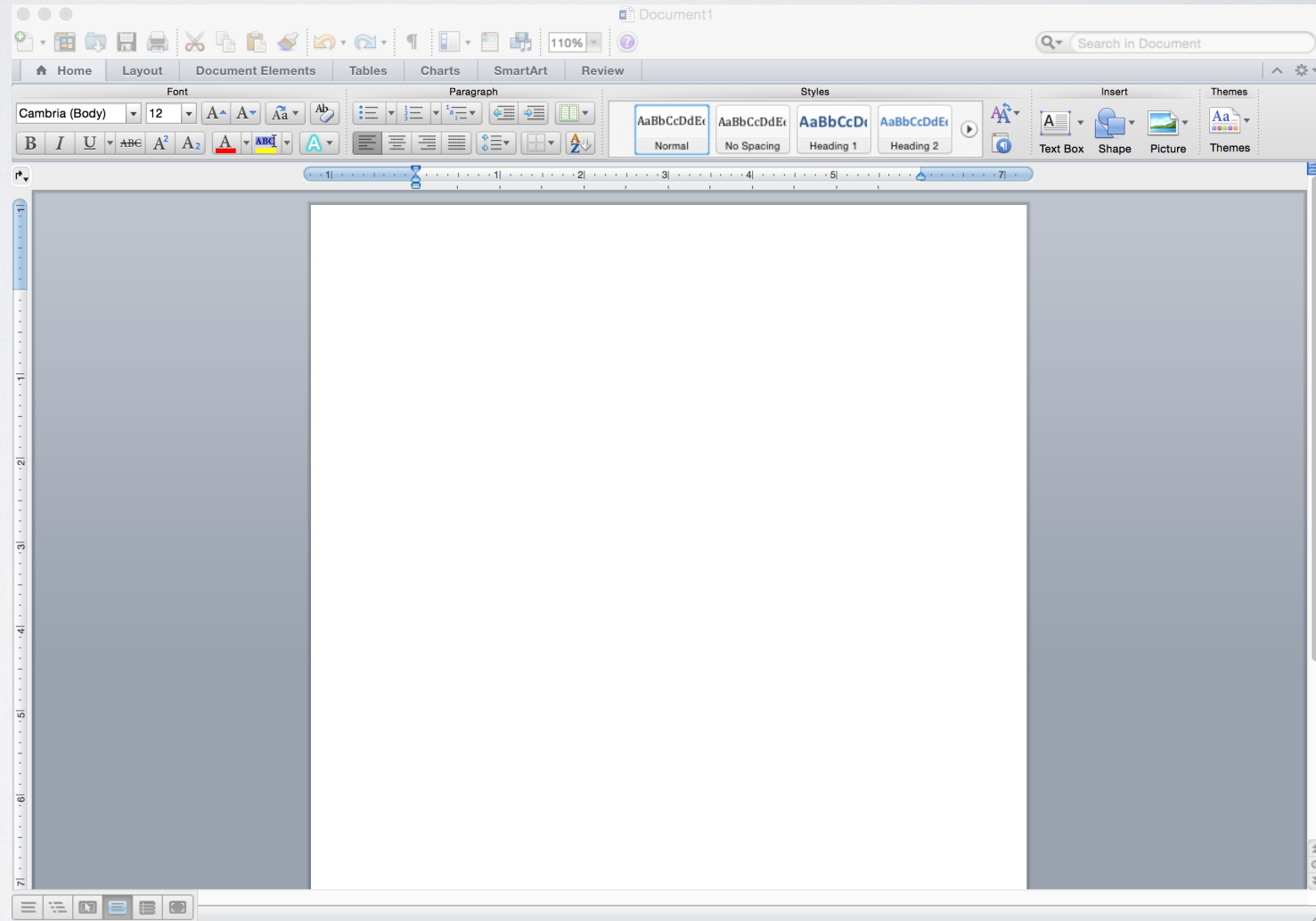
**A door**





# 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

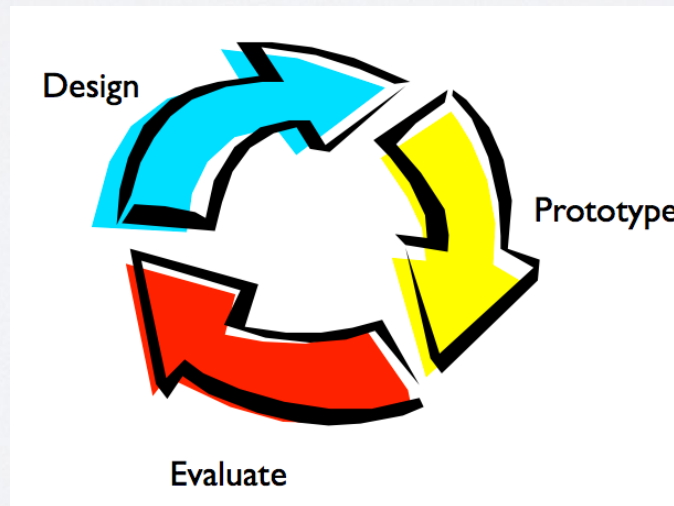
# User-centered design

- 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, **redesign** an **existing** artifact that helps to accomplish these tasks **faster** and **more successfully**

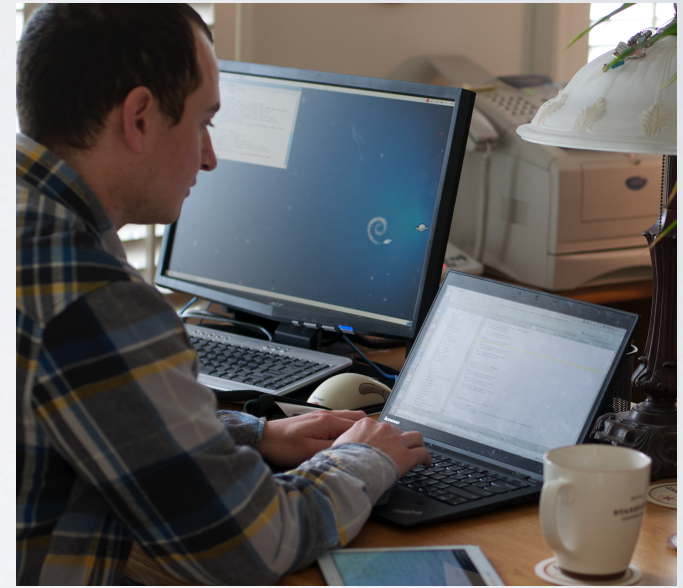


# Usability evaluation

- 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?



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](http://en.wikipedia.org/wiki/American_Airlines_Flight_965)



# What usability is not

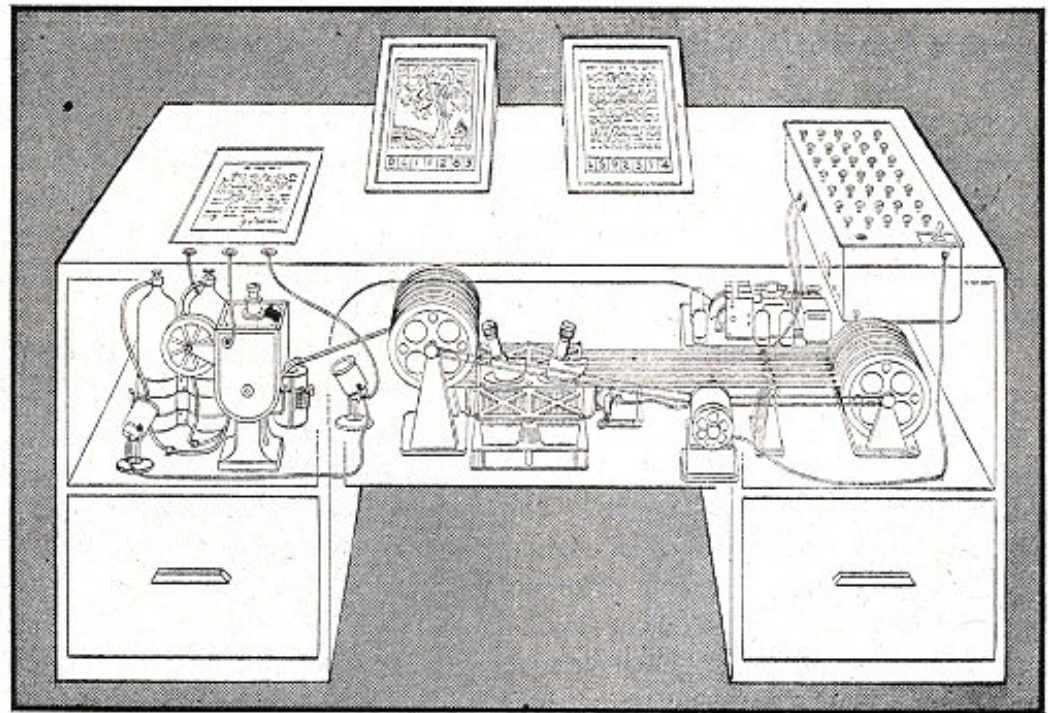
- Not “dummy proofing”
- Not being “user-friendly”
- Not just “usability testing”
- Not just making software pretty



# 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.

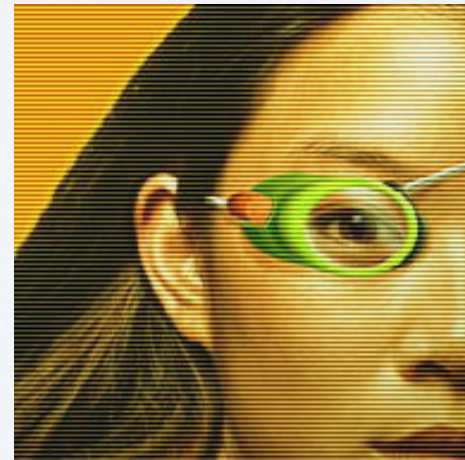
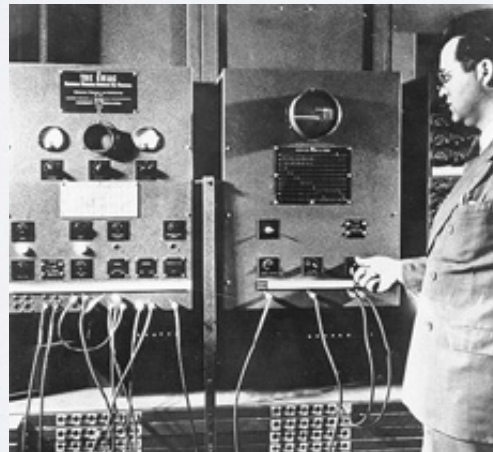


# The user is NOT like me

- 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

- Piazza - Syllabus, Announcements, Schedule, Assignments, Discussion
- Blackboard - grades

# HWs (a.k.a. “project”)

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

# HWO

- Due next Thurs 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



# Online discussion participation

- Real-life usability failures: Start a discussion about a usability problem that you found. Tell us what happened, how it affected users, and how it could be corrected.
- Real-life usability successes: Start a discussion about a very effective UI that you found. Tell us specifically what the designers did that was effective for the intended users.
- Post questions to an appropriate thread and they will be answered by your instructor, TA, or classmates.

# In class activity

- 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

- In-class and online discussion participation: 5%
- Tech talk: 10%
- 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”

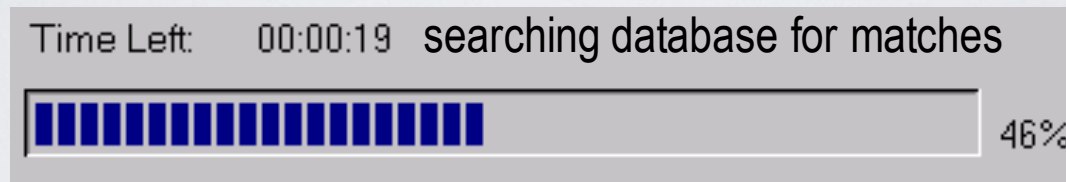
Adapted from slides by Bonnie John and Jennifer Mankoff

# 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

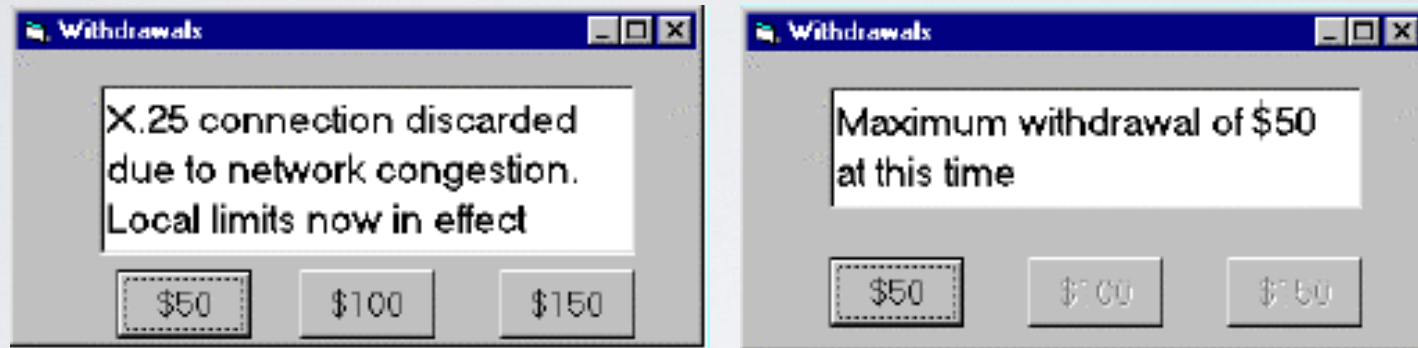


# H1: Visibility of System Status



- 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



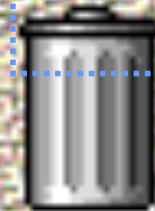
- Speak the users' language
- Follow real world conventions







Transfer Disk



Trash

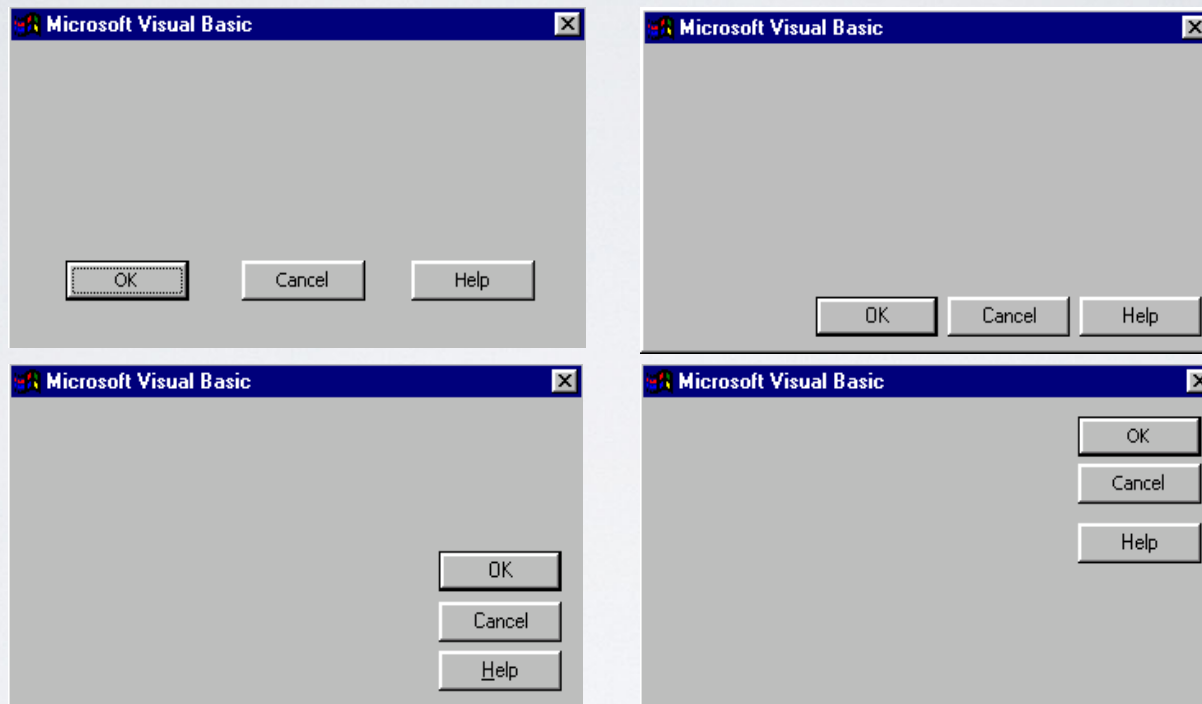


# H3: User Control and Freedom



- “Exits” for mistaken choices, undo, redo
- Don’t force down fixed paths

# H4: Consistency and Standards

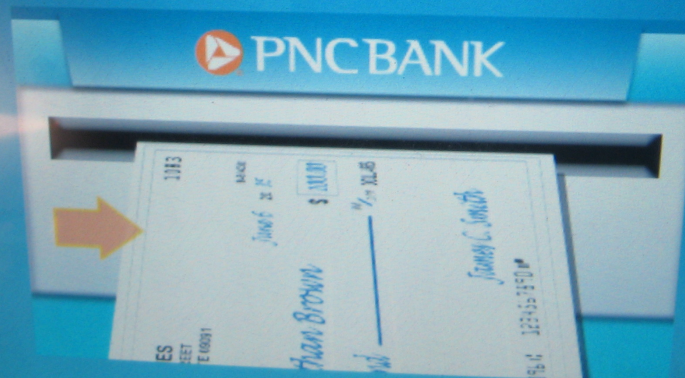


- Same words, situations, actions, should mean the same thing in **similar** situations; same things look the same, be located in the same place.
- Different things should be different





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



MEMBER FDIC [pnc.com](http://pnc.com)

# H5: Error prevention

Form1

Date:

Month Day Year

May 22 1997  
Month Day Year

May 22 1997

Appointment

General Attendees Notes Planner

When

Start 8:30 AM Wed 5 /14 /97

End 4:30 PM Wed 5 /14 /97

☐ All day

Description

Smart Technology Sen

Where:

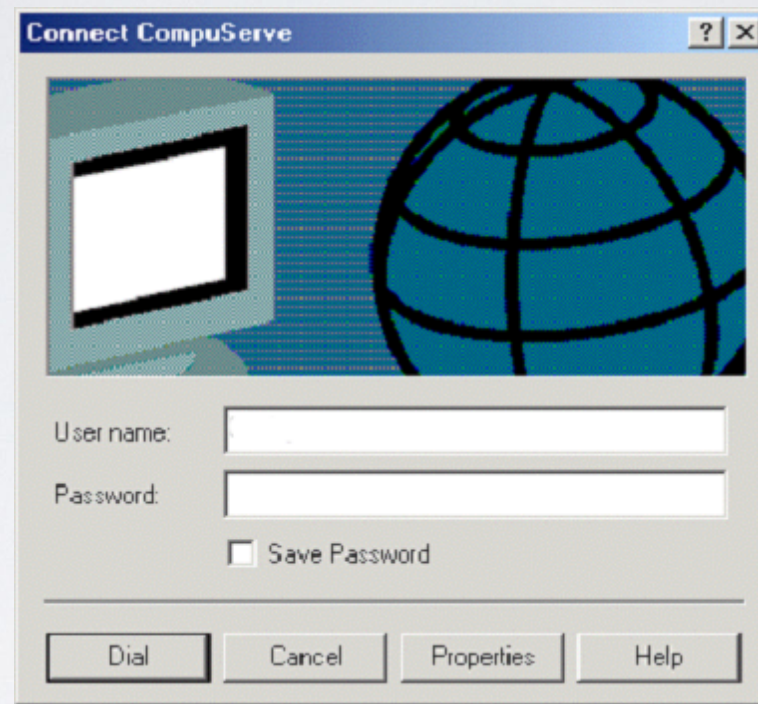
May 1997

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

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



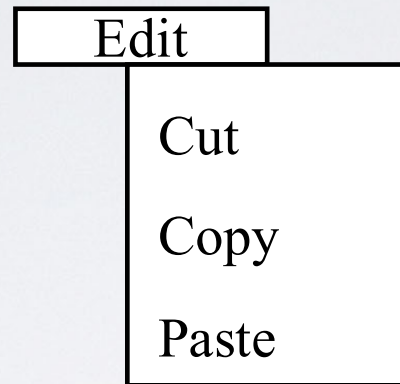
# H6: Recognition rather than recall



- 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 'w/w/w' search)		Background Color:
Q&D Software Development Order Desk		FFFBF0
Form Heading -- (appears at top of Web page in bold type)		Text Color:
Q&D Software Development Order Desk		000080
E-Mail responses to (will not appear on)	Alternate (for mailto forms only)	Background Graphic
dversch@q-d.com		
Text to appear in Submit button	Text to appear in Reset button	<input type="radio"/> Mailto
Send Order	Clear Form	<input checked="" type="radio"/> CGI
Scrolling Status Bar Message (max length = 200 characters)		
***WebMania 1.5b with Image Map Wizard is here!***		
<< Prev Tab		Next Tab >>

- Interfaces should not contain irrelevant or rarely needed information

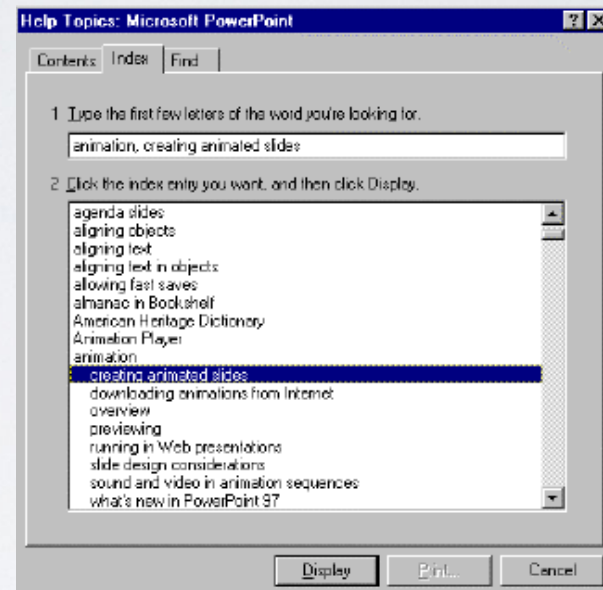
# H9: Help users recognize, diagnose, and recover from errors



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



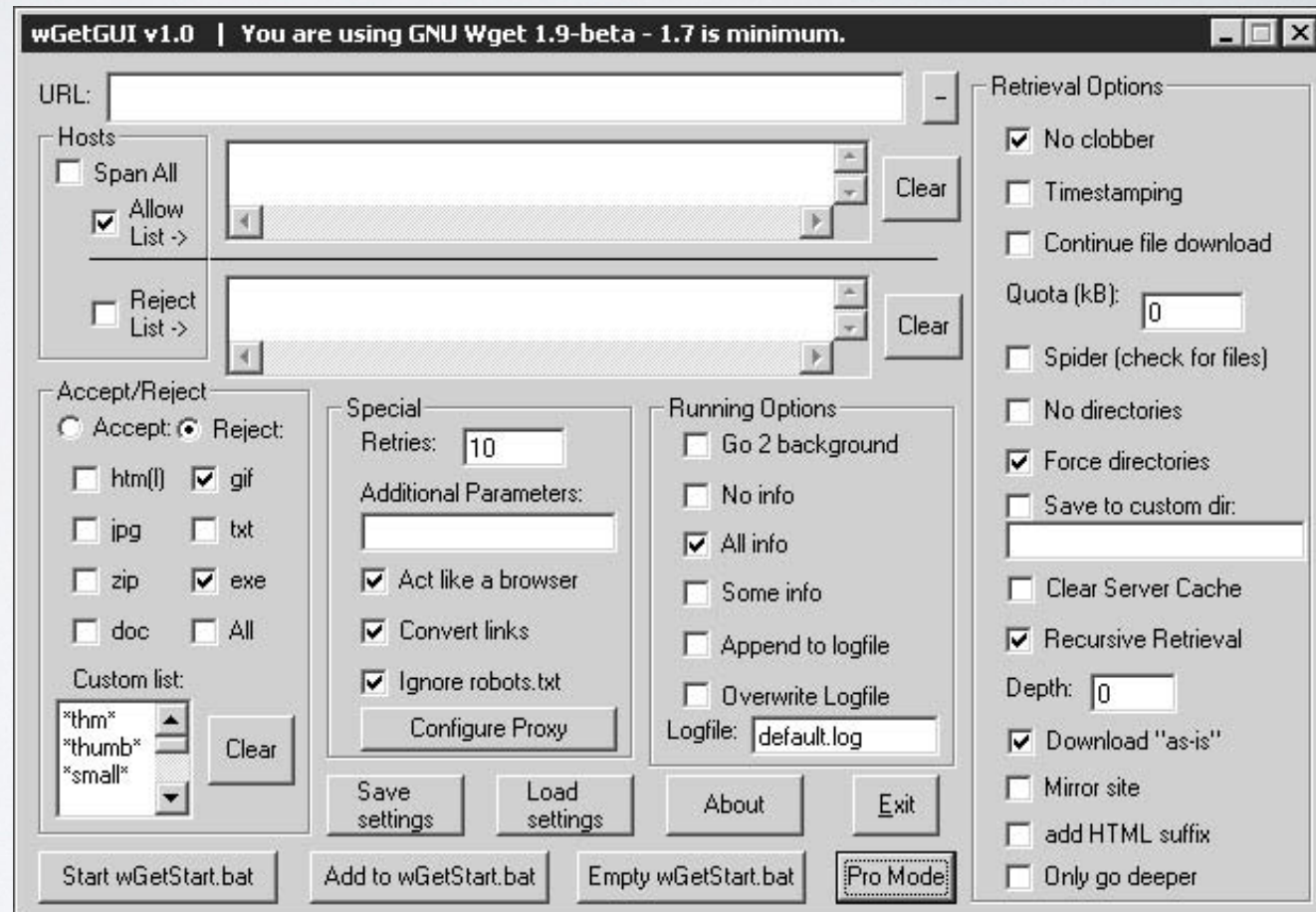
# HIO: Help and documentation



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

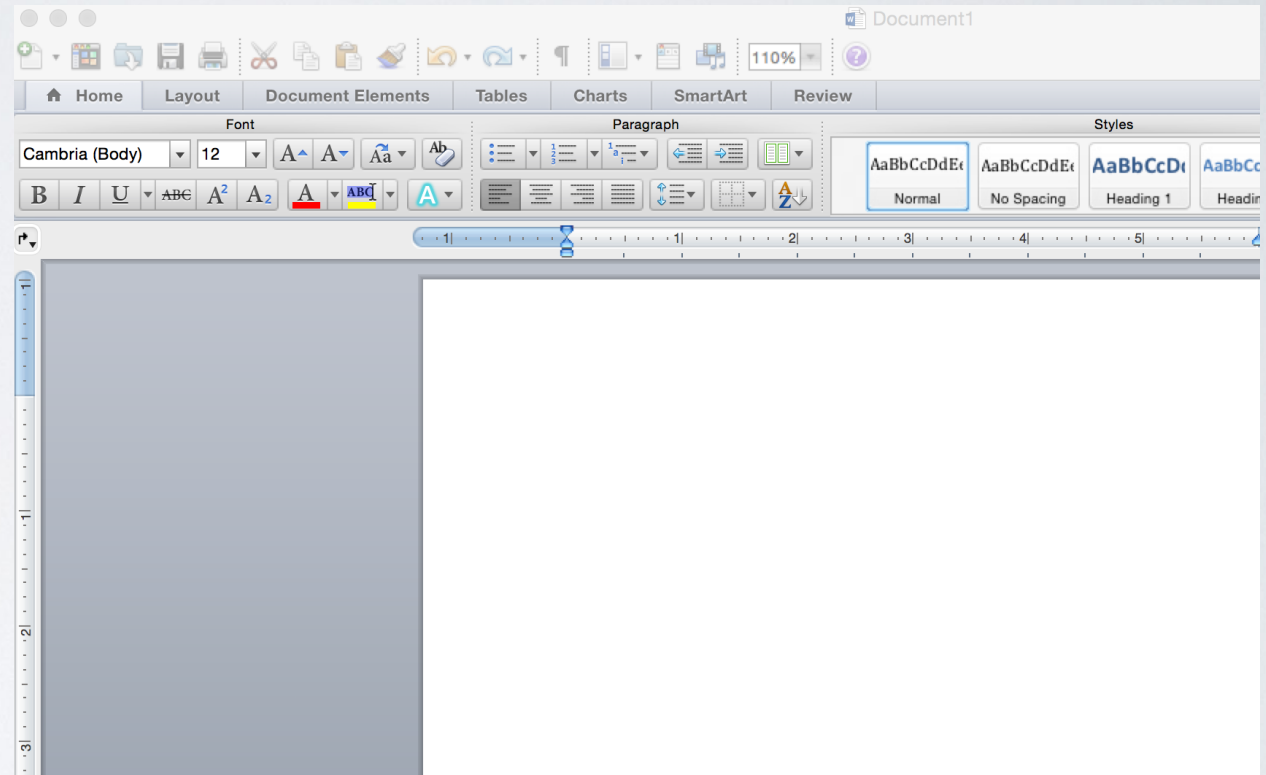
# Example

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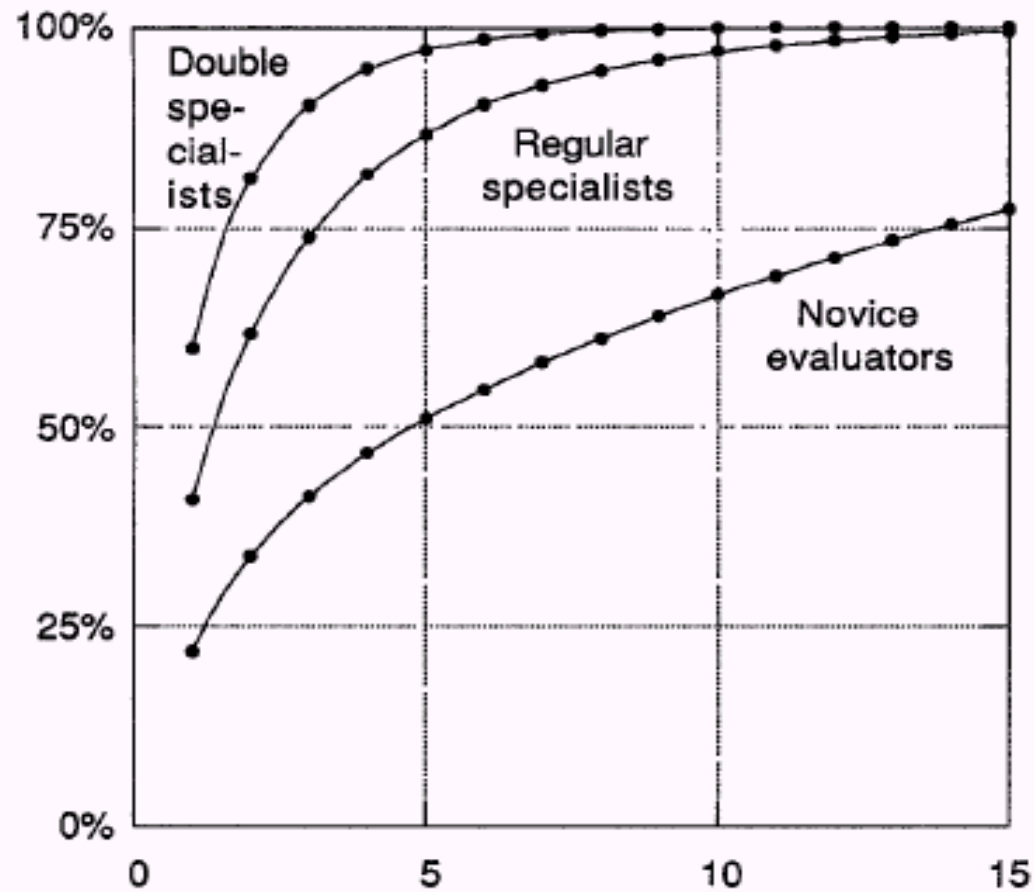




# Using heuristic evaluation

- 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 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



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