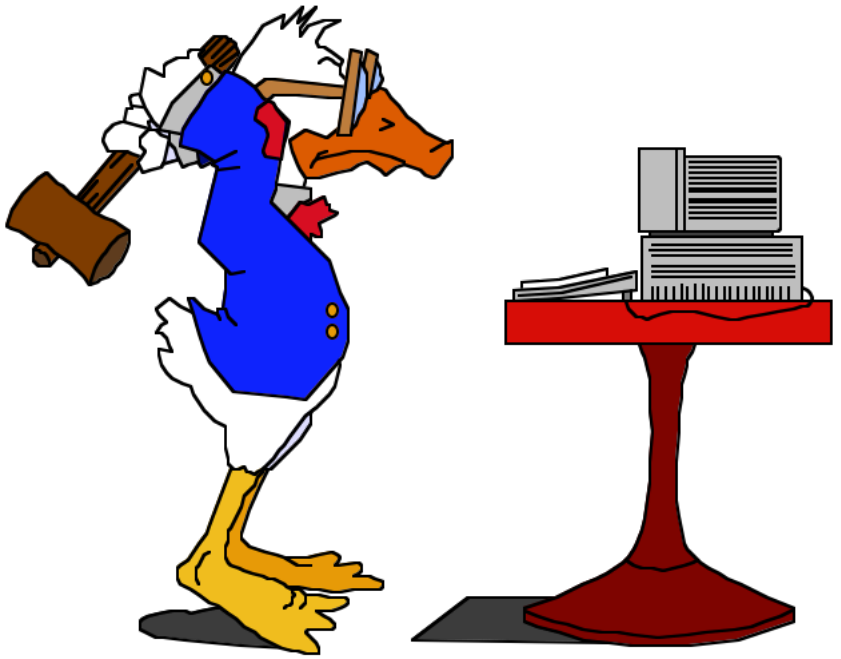
Overview - Cognitive Walkthroughs

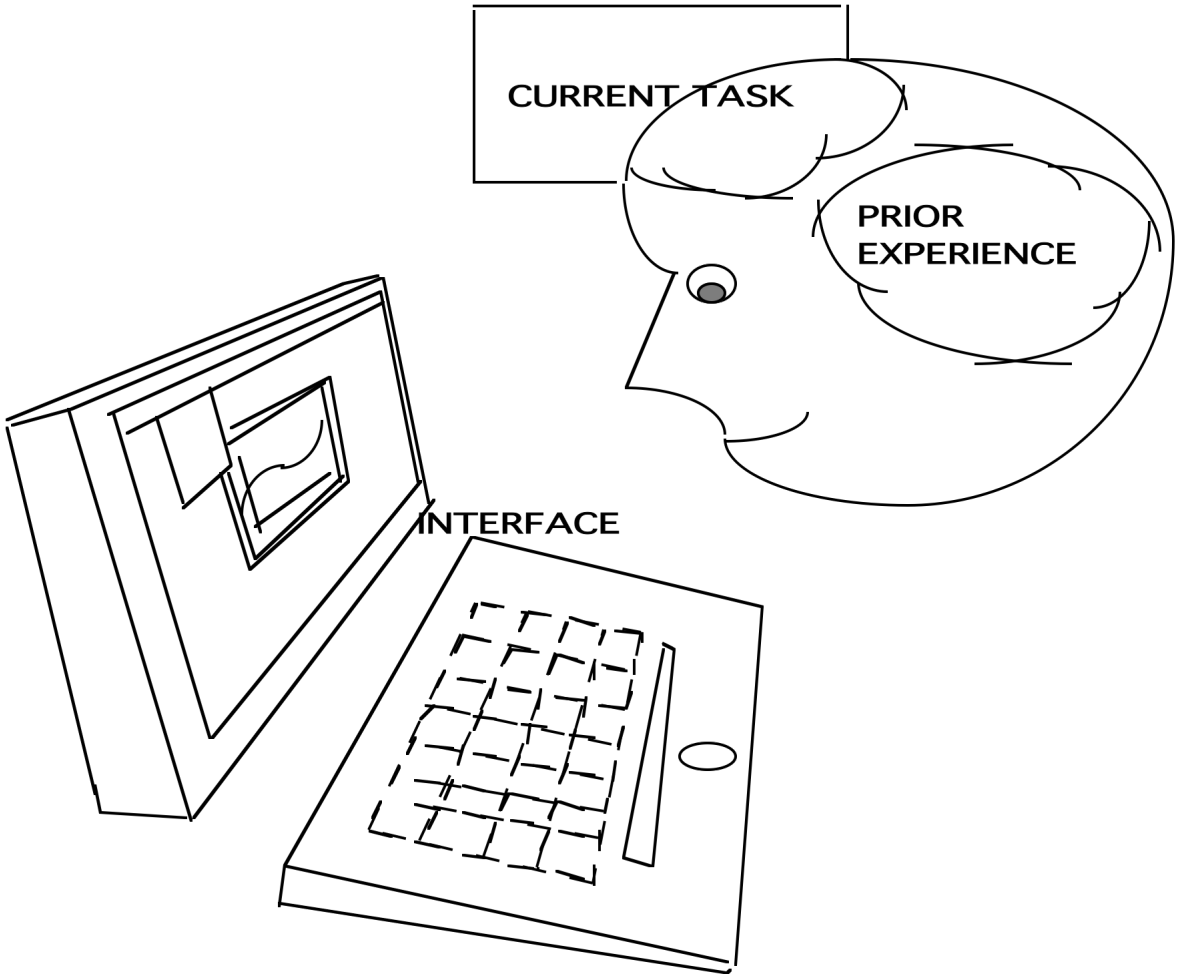
- Introduction to Cognitive Walkthroughs
- Cognitive Walkthrough Example

Human-Computer Interaction (HCI or CHI)

- Usability is a combination of
  - a user's task
  - a user's skills or experience
  - the system's interface
- Hopefully, we can avoid this!!!



More seriously....



Functionality is not Enough!

- For an interface to be a success
  - it must provide
    - the right functionality
    - at the right time
    - in the right place
    - and in the right form
    - from the user's point of view.
- Such interfaces are called usable
  - usability testing: the process of ensuring that a user-interface is usable

Example

- When designing an ATM, each user action should be justified
  - Insert card?
  - Enter PIN?
  - Press Quick Cash Key?
  - Press Okay?
  - Remove Card?
  - Remove money?
  - Remove receipt?

Cognitive Walkthrough Introduction

- The cognitive walkthrough is one way to test the usability of interactive software.
- It focuses on
  - User's task(s)
  - System's Interface
- The cognitive walkthrough may be used
  - without "real" uses, e.g. proposed vs. actual tasks
  - before a system is implemented

Cognitive Walkthrough Procedure

- Define the inputs
- Gather the walkthrough team
- Walk through the action sequences for each task
- Record critical information
- Revise the interface to fix the problems
- Repeat...

Performing the Cognitive Walkthrough

- Define the inputs
  - Identify users and tasks
  - Create a description (screenshots, storyboard) or implementation (rapid prototype) of the interface
  - Define the action sequences for completing each task
- Gather the team
  - Facilitator maintains the pace of the discussion
  - Scribe records information
    - ¤ problems (and suggested solutions)
    - ¤ assumptions (about tasks and user's skills)

Performing the Walkthrough, cont.

- Gather the team, cont.
  - Participants walk through (discuss) the tasks with respect to the interface (prototypes or screenshots) and action sequences
  - They try to tell a credible story
    - What is the user trying to achieve at this point? What is the user's goal and why is it their goal?
    - What actions are obviously available in the interface?
    - Does the label for the correct action match the user's goal?
    - If the user performs the correct action, will they get good feedback?

Performing the Walkthrough, cont.

- Record critical information
  - The credible success (or failure) story
  - Assumptions (about tasks and user's skill)
  - Problems (and suggested solutions)
- Revise the interface to fix the problems
  - Re-implement rapid prototype or create new screenshots
- Repeat
  - Designing the "correct" interface requires iteration
    - Proposed solutions may turn out to be wrong!

Inverting a portion of an image (Example)

- Users
  - We want novice users of Photoshop to be able to invert selections of an image with little or no training;
  - Assume that user's have had experience with other imaging programs
- Tasks
  - Select a subregion of an image and invert it
- Interface
  - We have screenshots from the latest version of the product

Example, cont.

- Action Sequences
  - Zoom display to area of interest
  - Select the Lasso Tool
  - Select the subregion of the image
  - Select Inverse from the Image menu

Photoshop Interface

Description of Interface

- Photoshop presents
  - a toolbar (far left)
    - vertically arranged
    - Assume that novice users are unfamiliar with the toolbar's icons
  - the image (center)
  - a control panel (far right)
    - Assume that novice users are unfamiliar with the operation and purpose of the control panel

Zoom in on Face

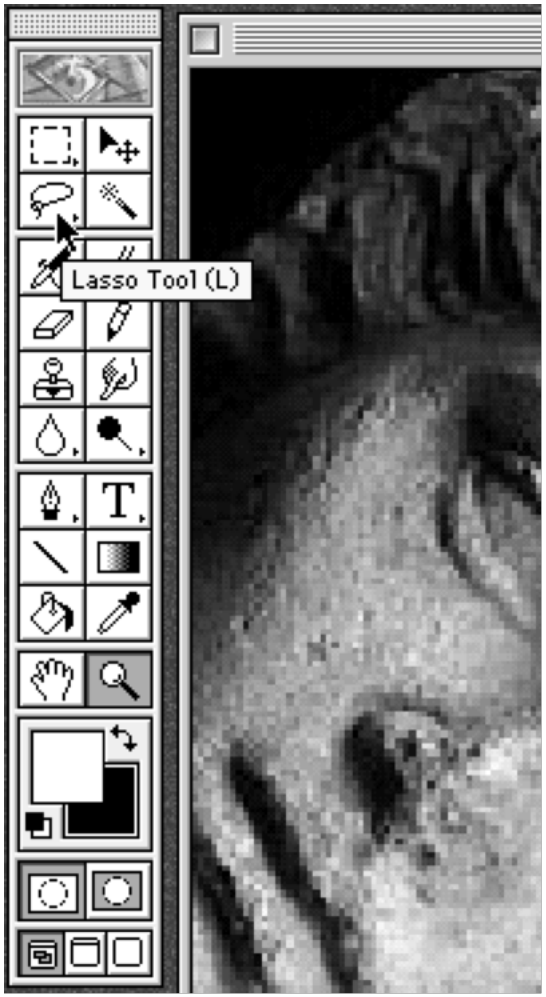
Action: Zoom in on Image

- What's the user's goal, and why?
  - The user wants to specify the portion of the image to invert exactly. Zooming in on the region of interest helps to increase the accuracy of the selection
  - Is the action obviously available?
  - The default tool in Photoshop is the Zoom tool; if the user has just started Photoshop its the current tool
  - Novice users may have to search for this tool on the toolbar if they need it later on
  - This tool uses the magnifying glass as its icon

Zoom in on Image, cont.

- Does the action or label match the goal?
  - No label involved here, however magnifying glass icon represents task well
  - Clicking on image, zooms the tool
  - Dragging on image, specifies zoom region more accurately
  - Assume: novice users will click rather than drag (despite screenshot!)
- Is there good feedback?
  - Yes, Photoshop instantly zooms the image

Select Lasso Tool



Select the Lasso Tool

- What's the user's goal, and why?
  - They need a tool to select a portion of the image
- Is the action obviously available?
  - They are familiar with the lasso tool from other image programs
  - The lasso icon is available at the top of the toolbar (increasing the chance that it will be seen)
  - The tooltip provides confirmation of the icon's information

Select the Lasso Tool, cont.

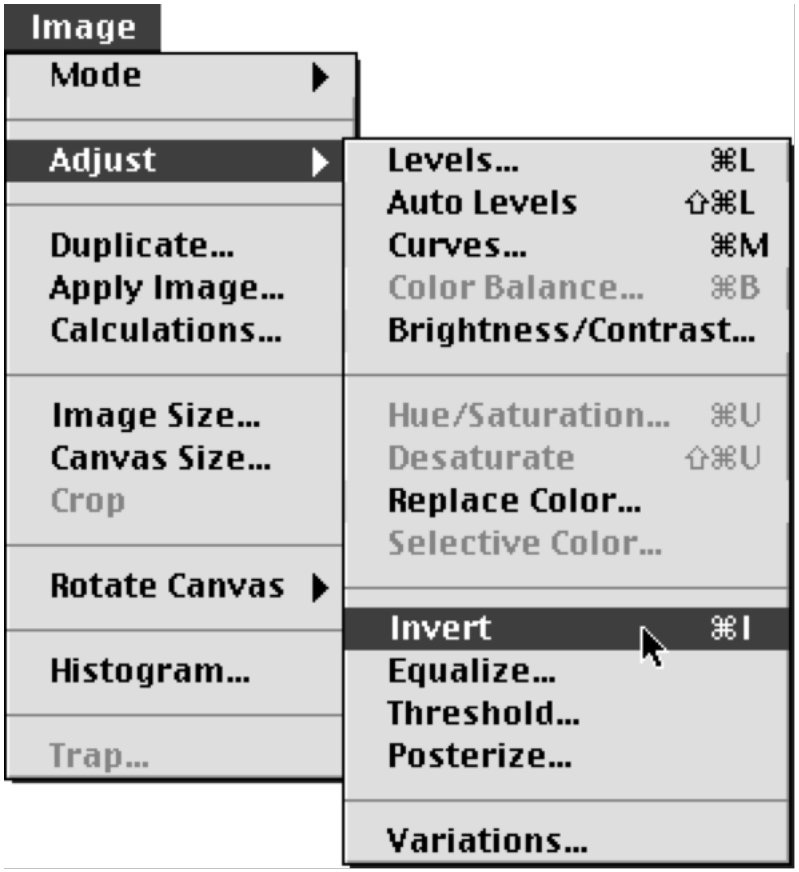
- Does the action or label match the goal?
  - Tooltip serves as label and confirms the meaning of the familiar lasso icon
- Is there good feedback?
  - Not shown but toolbar icon highlights when selected

Select Image

Select the Image

- What's the user's goal, and why?
  - Select a portion of the image
- Is the action obviously available?
  - Assume novice user is familiar with using the lasso tool
- Does the action or label match the goal?
  - Yes, the lasso tool's sole purpose is selecting regions
- Is there good feedback?
  - Yes, the lasso tool produces a "rubber-band" that indicates the current selection

Select Invert Operation



Invert the Image

- What's the user's goal and why?
  - The overall task is to invert a region of the image
- Is the action obviously available?
  - No, previous experience will lead them to look for action in the menus
- Does the action or label match the goal?
  - Yes, but the invert operation is buried in a submenu called Adjust within the Image menu; novice users may look for the command in the "Edit" menu
  - Is there good feedback? Yes, the image inverts

Operation Complete

Example Wrap-up

- Action 1: Zoom In
  - Available as default tool; novice users may have to search for tool on subsequent operations
- Action 2: Select Lasso Tool
  - Lasso Icon is located in prominent place on toolbar; novice users are familiar with this tool
- Action 3: Select Image
  - No problem here
- Action 4: Invert Image
  - Invert command is buried in submenu

Possible Improvements?

- The Invert selection command is a common operation yet it is buried in a submenu
  - Image→Adjust may not be intuitive to a novice user
  - Note: It is assigned an intuitive keyboard short-cut (□I) which is good!
- Suggestions
  - Move Invert up one level into the Image menu?
  - Place a command for inverting the selection on one of the toolbars?

Walkthrough results

- A walkthrough does not necessarily generate a lot of suggestions per task
  - Location within requirements phase
    - More suggestions common at the beginning
  - Task Dependent
    - Certain problems may only be revealed by a particular type of task
  - User skill level
    - Does the program try to support both novice and expert users?
    - Photoshop for example has traditionally focused on expert users...

Other Usability Attributes (Nielsen, 1993)

- Learnability
  - allows users to began work quickly
- Efficiency
  - enables a high degree of productivity
- Memorability
  - does not require retraining when use is infrequent
- Errors
  - mistakes are infrequent, easy to recover from
- Satisfaction
  - enjoyable to work with

Usability Testing

- Discount Usability Testing (Nielsen)
  - Usability testing can be done in a cost effective manner
- As a result...
  - Many organizations have usability labs
    - Microsoft
    - Intuit
    - Sun
  - Usability Engineer is a job title!

References (not required for class)

- Usability Engineering
  - Jakob Nielsen, Academic Press, 1993
- The Cognitive Walkthrough Method: A Practitioner's Guide
  - by C. Wharton, J. Rieman, C. Lewis, and P. Polson
- Chapter 5 of Usability Inspection Methods
  - J. Nielsen and R. Mack, editors
  - John Wiley & Sons, Inc., 1994