



Human-Computer Interaction IS4300

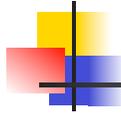
1



I5 *due next class*

- Your mission in this exercise is to implement a very simple Java painting application. The app must support the following functions:
- Draw curves, specified by a mouse drag.
- Draw filled rectangles or ovals, specified by a mouse drag (don't worry about dynamically drawing the shape during the drag - just draw the final shape indicated).
- Shape selection (line, rectangle or oval) selected by a combo box OR menu.
- Color selection using radio buttons OR menu.
- Line thickness using a combo box OR menu.
- A CLEAR button.

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P3 – Conceptual Design

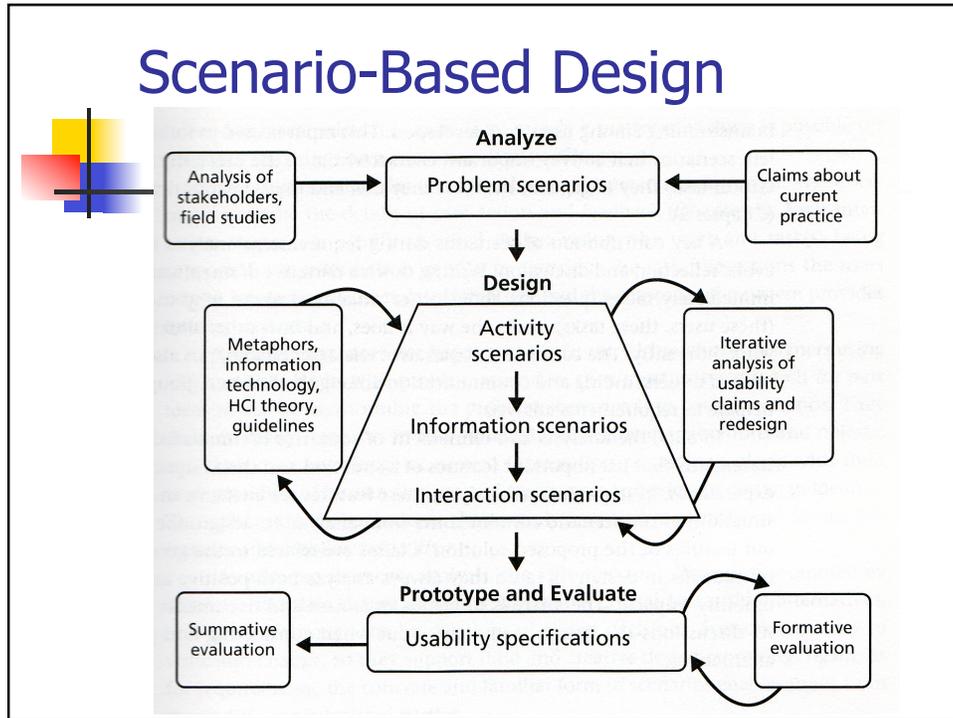
- Convert task scenarios and hierarchical task analyses into a conceptual design.
- Metaphors.
 - Make a list of possible interaction metaphors for your interface (per the examples in class). For each of your task scenarios list at least two options for interaction metaphors and some of the implications of your choice.
- Activity Design Scenarios
 - Transform each of your problem scenarios into an activity design scenario, following the examples in Rosson & Carroll Ch 3, Figures 3.4 and 3.5.

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P4 – Moving to screen design

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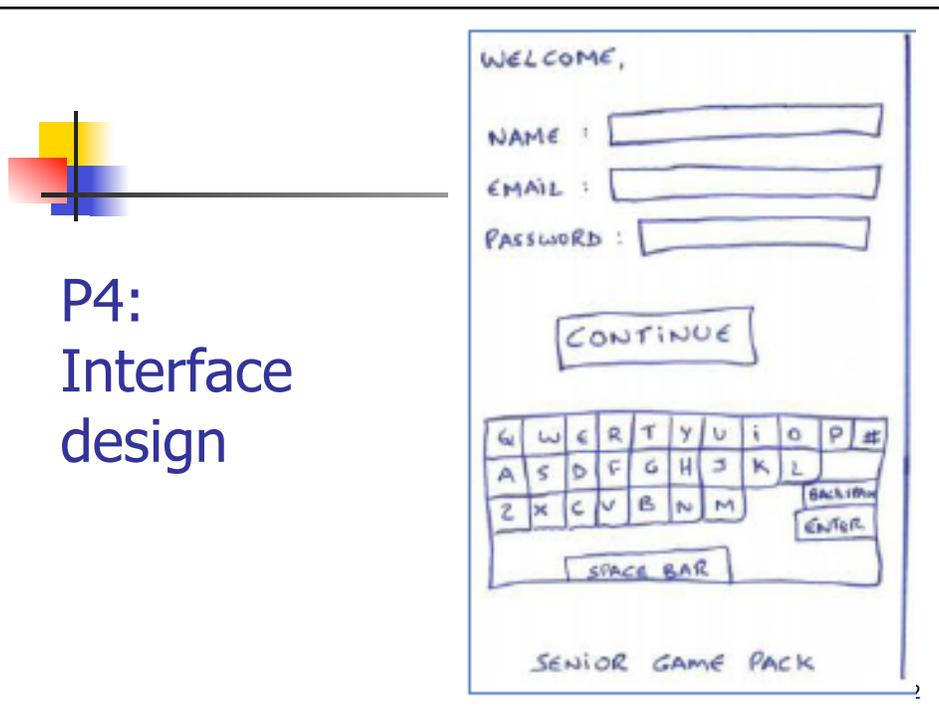
Example Activity Design Scenario	➤	Transformed into Information Design Scenario
<p>3) <i>Alicia and Delia go to the science fair.</i></p> <p>Background on Alicia, Delia, and their motivations, . . .</p> <p>When Delia shows Alicia an email invitation to a virtual science fair (VSF), the two of them decide to follow the link right then and there. They are curious about how this will be different from a regular fair.</p> <p>When they arrive at the VSF, they are able to get an overview of what and who is there and the current activities taking place. They can see that some exhibits are still "under construction," so they figure that one difference may be that this fair is ongoing. A welcome note confirms this, indicating that all virtual exhibits will be complete by next Thursday, when the judging will take place.</p> <p>They decide to look around anyway since they have time, and Delia suggests that they visit the exhibit that already has several people viewing it, thinking it must be</p>	<p>3) <i>Alicia and Delia go to the science fair.</i></p> <p>The email includes a string that Delia recognizes as a URL in MOOsburg.</p> <p>At the VSF they recognize the standard MOOsburg layout—panorama view of the fair, brief list of objects to work with, chat tool, and interactive map.</p> <p>Alicia recognizes the map as a high-school floor plan. She shows Delia where she worked in the office as a peer counselor. They see a green dot in the gym, blue dots in other rooms. Alicia infers they are "in" the gym; she plans to check out the rest later.</p> <p>The main view is crowded. At the back is a large Welcome sign, with thanks to organizers, and other announcements.</p> <p>Exhibits are arrayed around the room, each with a student name attached. Some are covered with a black and yellow banner; Delia suggests that these must be "under construction."</p>	

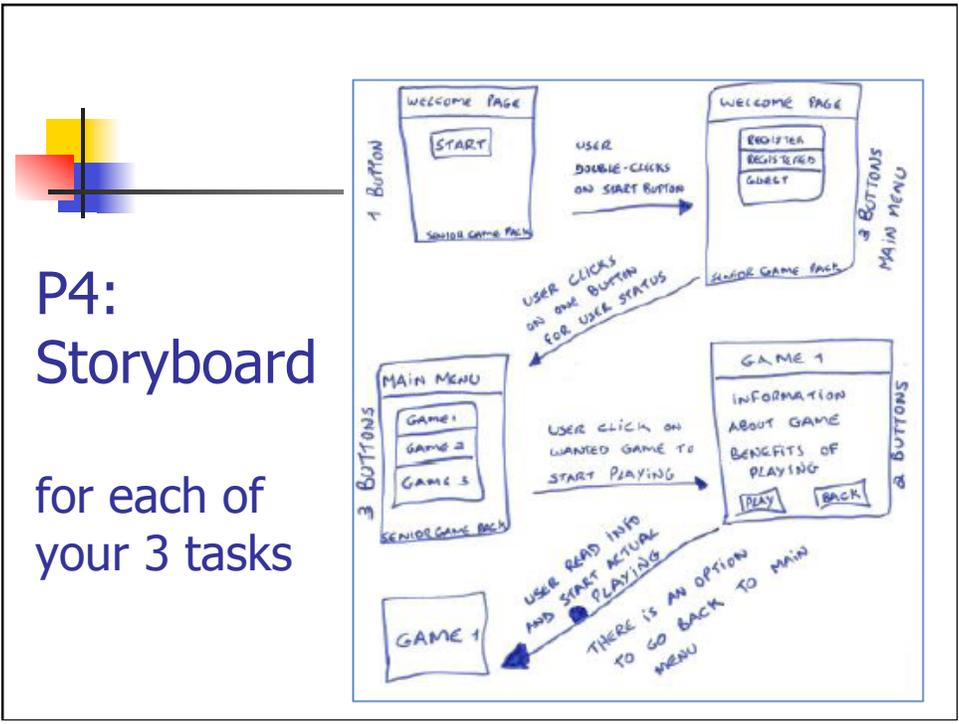
Interaction Scenario

Mr. King can see that Sally is already there when he arrives: The Current Visitors list shows her name. When he arrives, his name is added and flashes briefly in red, so Sally notices him arrive and greets him with a chat message. He quickly notes that she has already added several new items—a title page (which is displayed by default in the main view) and a slide show. He selects her name in the Visitors list, and then uses Control+I to see what she is viewing. The miniature window titled Slide Show flashes in red, so he figures she must be working on her slides. Leaving her name selected in the list, he uses Control+F to synchronize his view with hers. His main viewing area updates to display the message, "Slide show being modified." PowerPoint then opens to the side, positioned at the slide she is working on. Mr. King's view of the slides is now controlled by Sally; when she moves to a new slide, so does he. He watches and makes suggestions as she refines the slides, using the text chat.

Sally tells Mr. King that several elements in the template are still empty, but that she has developed most of her material and is about to upload it. Because he is still synchronized with her, he is able to watch this process. She selects a template icon, then selects Get File from the Construction menu. A familiar file-browsing dialog box appears, and he watches as she selects the files from her PC and then presses the Upload button. After each upload, the miniaturized window updates and flashes in red briefly.

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Screen Layout

What do we know so far?

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Screen Layout

What do we know so far?

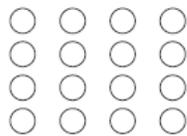
How do we implement these?

- Human memory & attention
- Gestalt laws of human perception
- Design Principles
 - Nielsen's Heuristics
 - Norman's Heuristics

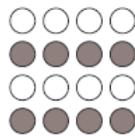
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Gestalt principles of grouping

proximity



similarity



continuity



closure

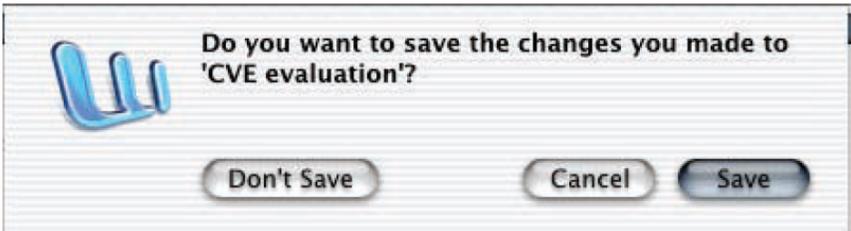


symmetry



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Proximity



Do you want to save the changes you made to 'CVE evaluation'?

Don't Save Cancel Save

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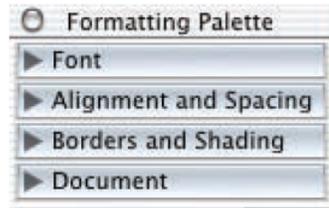
Continuity



timeline
dynamic
aggregation
version2
composition
moviedyna...

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STM/WM Chunking



STM/WM is Short-lived





Nielsen's Heuristics

How do we implement them?

1. Simple and Natural Dialogue
2. Speak the User's Language
3. Minimize User Memory Load
4. Consistency
5. Feedback
6. Clearly Marked Exits
7. Shortcuts
8. Good Error Messages
9. Prevent Errors
10. Help and Documentation



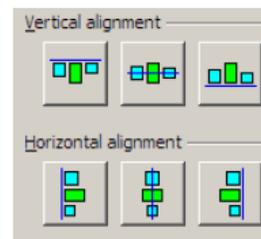
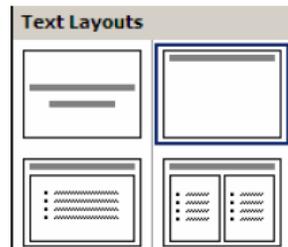
Guidelines for Graphic Design

Designing Visual Interfaces, Mullet '95

- Simplicity
- Contrast
- White space
- Alignment

Simplicity

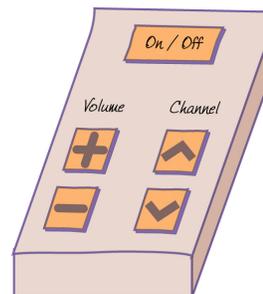
- Remove unnecessary widgets
- Use regularity in design (fonts, lines, colors)



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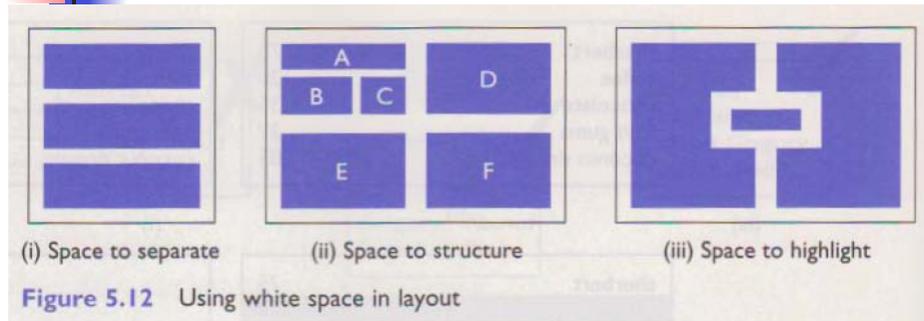
Interface Layout

- Simplicity is the key



Dix 5.7

Using whitespace

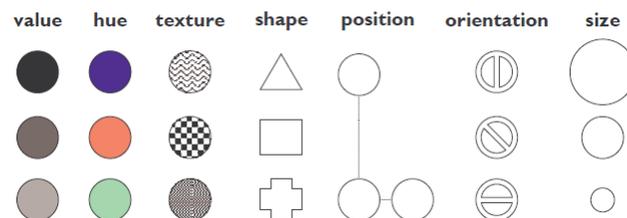


- Use to group controls instead of lines
- Don't crowd controls together

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Contrast

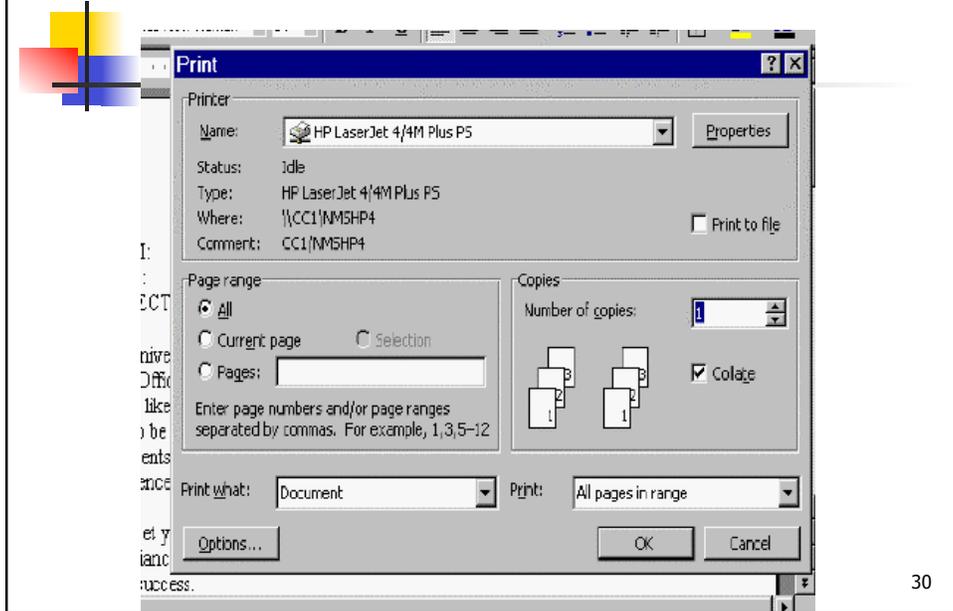
- The irregularity in a design that communicates information
- Dimensions that afford low effort contrast



- Use the "squint test"

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Example: Word 97 print



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How to create "natural groupings"?

- Card sort!

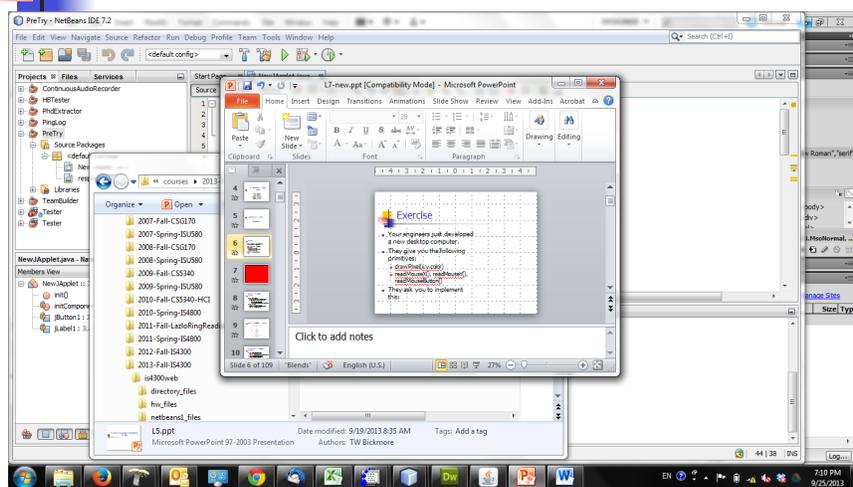


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Designing Menus



WIMP components



Direct manipulation

- Graphical objects on the screen are directly manipulated with a pointing device.
- Physical actions or labeled button presses instead of complex syntax.
- Rapid, incremental, reversible operations with immediately visible impact.
- Direct manipulation requires bitmapped screens so that each picture element or pixel can be used for input and output, and a pointing device.

Icons

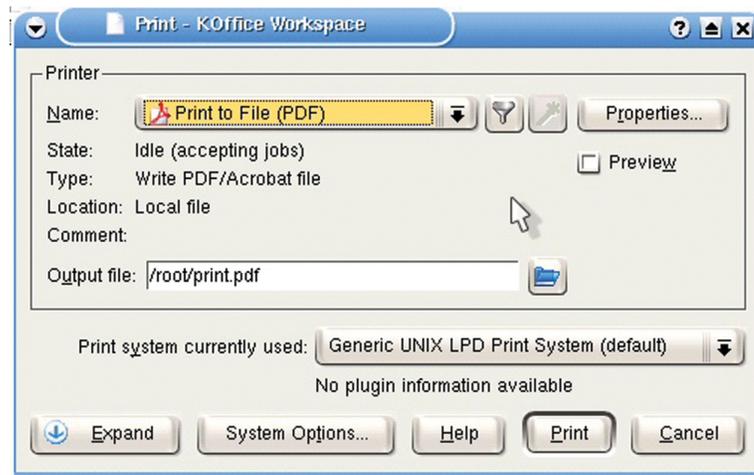


- Icons represent features and functions.
- Help people recognize which feature they need to access.
- Icons make use of three principle types of representation
 - Metaphor relies on people transferring knowledge from one domain and applying to another.
 - Direct mapping - creating a more or less direct image of what the icon is intended to represent.
 - Convention - arbitrary design, which has become accepted as standing for what is intended over time.

Horton's checklist for icon designers

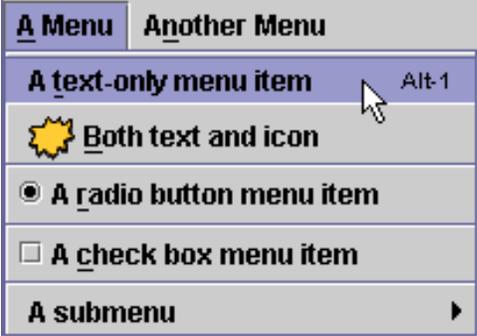
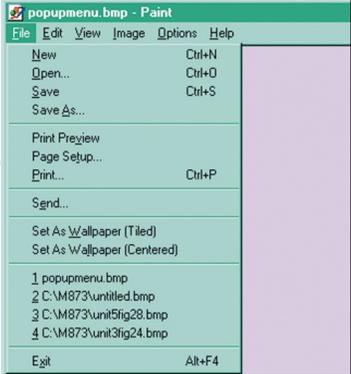
- Understandable. Spontaneously suggest the intended concept to the viewer?
- Familiar. Objects in the icon ones familiar to the user?
- Unambiguous. Are additional cues (label, other icons documentation) available to resolve any ambiguity?
- Memorable. Feature concrete objects in action?
- Informative. Why is the concept important?
- Few. Is the number of arbitrary symbols less than 20?
- Distinct. Is every icon distinct from all others?
- Attractive. Does the image use smooth edges and lines?
- Legible. Test all combinations of color and size?
- Compact. Is every object, every line, every pixel necessary?
- Coherent. Is it clear where one icon ends and another begins?
- Extensible. Can I draw the image smaller? Will users still recognize it?

Modal (vs. Modeless) Dialog



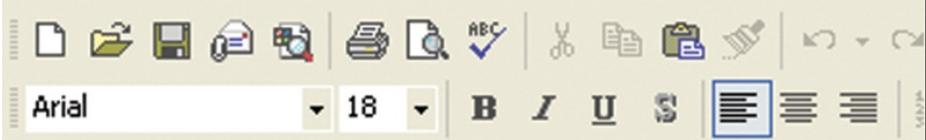
Menus

- Drop-down
- Cascading
- Roll-up
- Pop-up

Tool Bars

- Good for efficiency of expert users





Command Buttons

- Labels are important
- Most important at left and top
- Same size, but adjusted for label length OK



Text

Some heuristics

- Line length ~60 chars / 8-12 words
- Left-justified
- Lines with distinct thoughts, or that end on grammatical boundaries are best

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Dix 5.7

Laying out columns

Hard to scan across cols

(i)

sherbert	75
toffee	120
chocolate	35
fruit gums	27
coconut dreams	85

(ii)

sherbert	75
toffee	120
chocolate	35
fruit gums	27
coconut dreams	85

(iii)

sherbert	75
toffee	120
chocolate	35
fruit gums	27
coconut dreams	85

(iv)

sherbert	75
toffee	120
chocolate	35
fruit gums	27
coconut dreams	85

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Color

This text is difficult to read

This text is easy to read

(a)

Use sparingly.

Don't rely on it exclusively:
Remember 5-8% of users
are likely to be color blind.

Keep contrast in mind.

Red on blue

Blue on red

Green on pink

Pink on green

Dark blue on yellow

Yellow on dark blue

(b)

Designing with color

Marcus '92

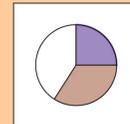
- Use a maximum of 5 +/- 2 colors.
- Use foveal (central) and peripheral colors appropriately.
- Use a color area that exhibits a minimum shift in color and/or size if the color area changes in size.
- Rule 5. Use familiar, consistent color codings with appropriate references.
- Color connotations can vary dramatically even within a culture.
 - E.g., blue in the US is interpreted different by different groups – for healthcare professionals it is taken to indicate death; for movie-goers it is associated with pornography; for accountants it means reliability or corporateness (think of the 'Big Blue' – IBM).

Images: Graphs

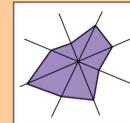
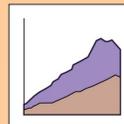
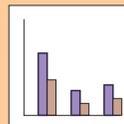
Scatterplots



Pie charts

Line graphs
or curves

Radar

Area, band,
strata or
surface chartsStar, circular
or pattern
chartsBar graphs,
column charts
or histograms

Sound

kinds? when to use?

- Different Types of Sound
 - music, speech, "earcons"
- Making Good Use of Sound Effects
 - Reinforcement, completion of an operation, attract attention.
- Using Music Effectively
 - evocative, atmosphere
- Using Speech Effectively
 - Tone, pace, accent

Generated Speech

- demo



Component Heuristics

Stone, et al, User Interface Design and Evaluation

- Primary windows
 - Driven by main tasks & task objects
- Tabs
 - Information on different tabs should be independent.
 - Should not be used for sequential steps.

Modem-2	F-Macros	F-Macros-2	AutoMacros	AutoMacros-2	Buttons		
Buttons -2	AutoReply	AutoReply-2	Window	Window-2	Safety		
Device	Device-2	Terminal	Logging	Emulation	Transfer	Transfer-2	Modem

- Menus
 - Names should indicate purpose

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Component Heuristics

Stone, et al, User Interface Design and Evaluation

- Toolbars
 - ToolTips can help users learn the meanings of icons.
- Icons
 - Design icons that are visually simple but informative, represent concrete objects.
- Buttons
 - Label indicates the action the button does
 - Place along bottom of dialog boxes
 - Should be same size and shape. Different widths OK for row of buttons.

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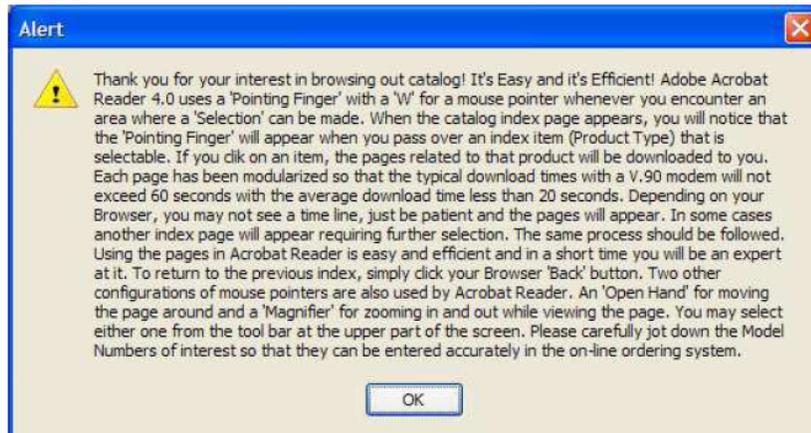
Component Heuristics

Stone, et al, User Interface Design and Evaluation

- List (combo) boxes
 - Use when there are a large number of options, OR if the list is likely to change
- Text box
 - If you cannot anticipate user input
 - Size of the box should indicate amount of info required

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Critique?



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Critique?



```

usCallback(TRUE));

ction(strServerName, nPort);
CHttpConnection::HTTP_VERB_GET,
NULL, dwHttpR
aders);

Ret);

pt the user fo
ED)

g(NULL, ERROR_INTERNET_INCORRECT_PASSWORD,
GENERATE_DATA | FLAGS_ERROR_UI_FLAGS_CHANGE_O
the dialog, bail out

```

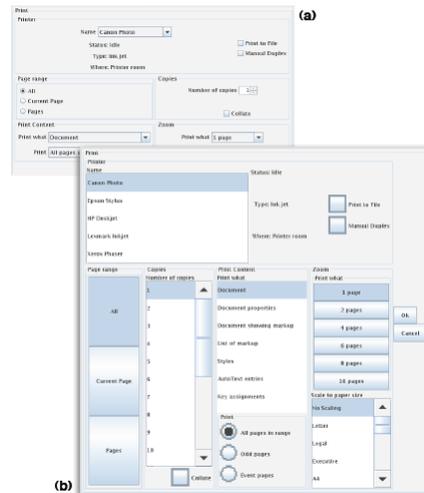


Exercise

- Project teams
- Sketch three versions of the main screen/window/dialogue for your most complex task
- Assume you are implementing in Java Swing

Research: SUPPLE

Krzysztof Gajos (now Harvard)

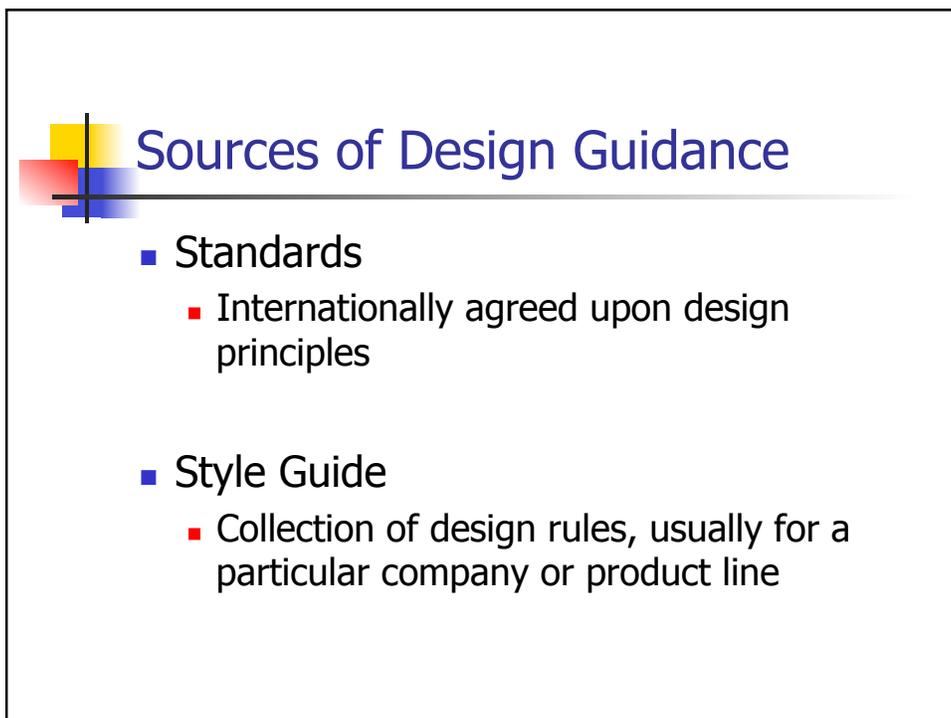


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SUPPLE: Automatically Generating User Interfaces Adapted to Users' Motor and Vision Abilities

Krzysztof Z. Gajos
Jacob O. Wobbrock
Daniel S. Weld

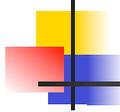






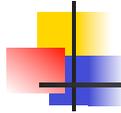
User Interface Standards

- Official, publicly available documents that define standards for user interface design
 - International
 - ISO 9241 – *Ergonomic requirements for office work with visual display terminals*
 - ISO 14914 – *Software ergonomics*
 - ISO 13407 – *Human-centered design process (now ISO 9241-210)*
 - ISO 20282 – *Operation of everyday products*
 - US federal, e.g.,
 - Section 508 of Rehabilitation Act of 1973 - Standards for Electronic and Information Technology (accessibility)



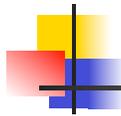
Style Guides

- A typical guide includes:
 - Description of required interaction styles and user interface controls
 - Guidance on when and how to use the various styles or controls
 - Illustrations of styles and controls
 - Screen templates



Commercial Style Guides

- Apple Interface Guidelines
- Microsoft Windows UI Guidelines
- IBM's Common User Access
- Motif Style Guide
- Java Look and Feel

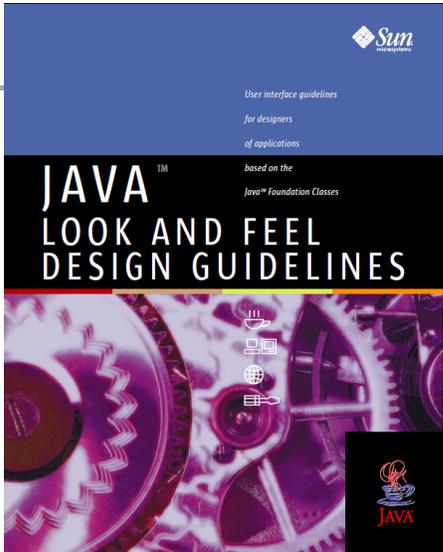


1999!

Fundamentals

The Java look and feel is the default interface for applications built with Java. The Java look and feel is designed for cross-platform use and can provide:

- Consistency in the appearance and behavior of common design elements
- Compatibility with industry-standard components and interaction styles
- Aesthetic appeal that does not distract from application content



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Java Look and Feel

- Accessibility
- Internationalization
- Colors, Fonts, Capitalization
- Layout and Spacing of Widgets
- Icon design
- etc

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Mouse Pointers

TABLE 7 Pointer Types Available in JDK 1.1 and the Java 2 SDK (200%)

Pointer	Macintosh	Windows 95	CDE	Usage In Java Look and Feel Applications
Default				Pointing, selecting, or moving
Crosshair				Interacting with graphic objects
Hand				Panning objects by direct manipulation
Move				Moving objects
Text				Selecting or inserting text
Wait				Indicating that an operation is in progress and the user cannot do other tasks
S Resize				Adjusting the lower (southern) border of an object
N Resize				Adjusting the upper (northern) border of an object
E Resize				Adjusting the right (eastern) border of an object



Customized Style Guides

- Create your own! For your specific project or product line...
- Helps focus on design issues early
- Enables use of principles and guidelines
- Steer decision making and serve as record
- Ensures internal consistency



Style Guides Bottom Line

- If you are building internal tools or one-off projects, using a GUI-builder will ensure most relevant design rules are followed.
- If you are building commercial UIs, your company will provide you with the style guidelines to use.
- You should not be worrying too much about this now in your team project, but may provide guidance for design decisions.

P4 – Design Sketches

Due in 1 week (10/19)

- You will explore possible design options, and sketch what your interface will look like.
- **Interaction Scenarios**
 - Expand each of your activity design scenarios (3+) into full interaction scenarios, thinking about what the user perceives and the actions he/she performs at each major step in the scenario.
- **Design Options**
 - Three options for your most important window or dialog box, and brief rationale for why you selected one over the other two.
- **Preliminary interface design.**
 - One or more sketched windows or dialog boxes, along with the menus and controls that the user manipulates.

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P4 – Design Sketches

Due in 1 week

- **Storyboards.** For each of your tasks/scenarios, describe how your preliminary interface would be used to perform the task. Use rough sketches to illustrate how the interface would look at important points in the task.

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To Do

- Read
 - Evaluation (Benyan Ch 10).
 - Swing layout managers.
- Finish by Next class
 - I5 – Painting applet
- Start
 - P4 – Design Sketches