Last Topic -- Command Languages and Response Time

- Command Languages
  - Rationale
  - Structure and Syntax
  - Naming issues
  - Abbreviations
  - Natural Language

- Response Time
  - Errors related to timing
  - Expectations
  - Variability

Overview

- Error Messages
- Graphic Layout
- Color

System Messages

- Instructions
- Labels
- Titles
- Error messages
- Prompts

System Messages -- Opposing criteria

- Terse vs. Descriptive/Understandable
- Expert needs vs. Novice needs
- Here, we will present information specific to error messages. Other more general information about language and text will be covered when we talk about user help systems and manuals.

Error Messages -- Be specific

- Examples
  - SYNTAX ERROR vs. “Unmatched left parenthesis”
  - ILLEGAL ENTRY vs. “Type Send, Read, or Drop”
  - INVALID DATA vs. “Days range from 1 to 31”
  - BAD FILE NAME vs. “File names must begin with a letter”

- Often these problems are the fault of lazy programming.
### Error Messages -- Constructive, positive tone

- **Examples**
  - 10 FATAL ERRORS. 12 NON-FATAL ERRORS. RUN ABORTED.
  - DIASTEROS STRING OVERFLOW. JOB ABANDONED.
  - CATASTROPHIC ERROR. LOGGED WITH OPERATOR.
- Avoid words like “illegal” “error” “invalid” or “bad”.
- Give constructive help.
- Give choices for correct responses if possible.

### Error Messages -- Put the user in control.

- “Hit any key to continue.”
- “Enter a number” or “Ready to accept an integer”

### Error Messages -- Physical format

- **Brief**
- **Upper-lower case**
- **Placement choices**
  - near the problem
  - bottom of screen
  - dialog box
- **Sound?**
- **Font (later)**

### Error Messages -- Guidelines from Shneiderman

- **Product**
  - Be as specific and precise as possible.
  - Be constructive: Indicate what the user needs to do.
  - Use a positive tone; avoid condemnation.
  - Choose user-centered phrasing.
  - Maintain consistent grammatical form, terminology, and abbreviations.
  - Maintain consistent visual form and placement.

### Error Messages -- Guidelines from Shneiderman

- **Process**
  - Establish a message quality-control group.
  - Include messages in the design phase.
  - Place all messages in a file.
  - Review messages during development.
  - Design the product to eliminate the need for most messages.
  - Carry out acceptance tests.
  - Collect frequency data for each message.
  - Review and revise messages over time.

### Display Design

- **Overall layout (graphical information display next week)**
- **Graphic Layout**
Display Design -- Six categories of principles

- Elegance and simplicity (unity, refinement, and fitness)
- Scale, contrast, and proportion (clarity, harmony, activity, and restraint)
- Organization and visual structure (grouping, hierarchy, relationship, and balance)
- Module and program (focus, flexibility, and consistent application)
- Image and representation (immediacy, generality, cohesiveness, and characterization)
- Style (distinctiveness, integrity, comprehensiveness, and appropriateness)

Display Design -- Data presentation

- labels
- grouping
- highlight data (vs. labels)
- graphical help
- example on the next slide

Data Layout Example

<table>
<thead>
<tr>
<th>Employee</th>
<th>Susan Taylor</th>
<th>034-78-7931</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
<td>William Taylor</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Birthdate</td>
<td></td>
</tr>
<tr>
<td>Alexandra</td>
<td>09-02-1972</td>
<td></td>
</tr>
<tr>
<td>Thomas</td>
<td>10-20-1974</td>
<td></td>
</tr>
<tr>
<td>Ann</td>
<td>08-21-1977</td>
<td></td>
</tr>
</tbody>
</table>

Compare with:

TAYLOR, SUSAN 034-78-7931 WILLIAM TAYLOR; THOMAS 10-20-1974 ANN 08-21-1977

Display Complexity

- Overall density
- Local density
- Grouping
- CS types almost always overcrowd displays and undervalue white-space.
- Bad examples on the following slides

Example of cluttered layout

More clutter
Ordering

- Left to right
- Top to bottom
- Standard components
  - rulers
  - scroll bar
  - status bar
  - tool bar
  - menu bar
  - title bar

3-d Effects

- Useful for feedback and user evaluation of device state
- “richness” of the display
- “professional” quality

Using color

- Nature of color and vision
- Guidelines for use in applications

Color and vision

- rods (black/white)
- cones (color)
  - red-catching
  - green-catching
  - blue-catching
- parameters
  - hue (pure colors)
  - saturation
  - brightness

Primary colors and mixtures

Visible range of color

- violet (420 nm)
- blue (465 nm)
- cyan
- green (495 nm)
- yellow (570 nm)
- red
- deep red (700 nm)
Color Wheel

Color blindness (1)
- monochromats (no or only one function cone system)
- two function cone systems
  - protanopia (red-catchng cones do not work)
    - see blends of blue and green
  - dalton, english chemist, 1700's, scarlet robe to receive ph. d., quaker
  - deuteranopia (green-catchng cones do not work)
    - hard to distinguish between greens and combinations of red and blue
    - most common
  - tritanopia (malfunctioning blue-catchng cones)
    - very rare

Color blindness (2)
- Many mild color perception anomalies
- 8% of men, 0.05% of women have some form of color blindness.
- age, illness, and medication can affect color discrimination

Affective responses to color
- A detergent manufacturer found that the color of the box affected how users evaluated the strength of the detergent.
- People will set a thermostat to a higher temperature in a blue room vs. a yellow room.
  - Blue ... cool
  - Yellow/red ... warm
- What is a “colorful” person?

Presenting color on terminals
- Be careful!
- Pixels (density/size)
- Refresh rate
- Brightness and color controls
- Palettes (B/W, 8-bit gray, 16 color, 256 color, 24-bit color, 30-bit color)

Eye strain and terminals
- Personal account
- Background lighting and glare
- Be especially careful with highly saturated colors
Contrasts

Bad example of color use

Next Topic

- Information Visualization