

CS-399: INTRODUCTION TO HUMAN-COMPUTER INTERACTION

DD.MM.YY

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Human-centered Design Guidelines,  
Principles and Theories

Week 3

# ANNOUNCEMENTS

- Listen to the following announcements!

# RATIONALE FOR DESIGN GUIDANCE

- Designing systems that is human-centred is a complex venture.
- Because human intuitive judgement is diverse, we must apply some sort of guidance to overcome this complexity when designing.
- The guidance includes
  - Guidelines
  - Principles
  - Theories

# GUIDELINES

- Low-level focused advice about good practices and cautions against dangers.
- Prescribe cures for design problems, provide helpful reminders based on general/common knowledge/experiences;
- are very specific and practical.

# GUIDELINES EXAMPLE:

## Navigating the interface

- Sample of the National Cancer Institute's guidelines (see [www.usability.gov](http://www.usability.gov)):
  - Standardize task sequences
  - Ensure that embedded links are descriptive
  - Use unique and descriptive headings
  - Use check boxes for binary choices
  - Develop pages that will print properly
  - Use thumbnail images to preview larger images

# GUIDELINES EXAMPLE CONT'D:

## Accessibility guidelines

### ➤ Sample Guidelines:

- Provide a text equivalent for every non-text element
- For any time-based multimedia presentation, synchronize equivalent alternatives
- Information conveyed with color should also be conveyed without it
- Title each frame to facilitate identification and navigation

### ➤ References:

- U.S. Access Board
  - <http://www.access-board.gov/508.htm>
- World Wide Web Consortium (W3C)
  - <http://www.w3.org/TR/WCAG20/>

# GUIDELINES EXAMPLE CONT'D:

## Getting the user's attention

- Intensity
- Marking
- Size
- Choice of fonts
- Inverse video
- Blinking
- Color
- Audio

# PRINCIPLES

- Mid-level strategies or rules to analyze and compare design alternatives..
- Help to facilitate a structured design process; are more abstract and widely applicable.
- More fundamental, widely applicable, and enduring than guidelines
- Need more clarification
  - Fundamental principles
  - Determine user's skill levels
- Identify the tasks



# PRINCIPLES CONT'D

- 5 interaction style
  - Direct manipulation
  - Menu selection
  - Form fill-in
  - Command language
  - Natural language

## Advantages

### Direct manipulation

Visually presents task concepts  
Allows easy learning

Allows easy retention  
Allows errors to be avoided  
Encourages exploration  
Affords high subjective satisfaction

### Menu selection

Shortens learning  
Reduces keystrokes  
Structures decision making  
Permits use of dialog-management tools  
Allows easy support of error handling

### Form fill-in

Simplifies data entry  
Requires modest training  
Gives convenient assistance  
Permits use of form-management tools

### Command language

Flexible  
Appeals to "power" users  
  
Supports user initiative  
Allows convenient creation of user-defined macros

### Natural language

Relieves burden of learning syntax

## Disadvantages

May be hard to program  
May require graphics display and pointing devices

Presents danger of many menus  
May slow frequent users  
Consumes screen space  
Requires rapid display rate

Consumes screen space

Poor error handling  
Requires substantial training and memorization

Requires clarification dialog  
May not show context  
May require more keystrokes  
Unpredictable

# PRINCIPLES CONT'D

- 8 golden rules of interface design
  - Strive for consistency
  - Cater to universal usability
  - Offer informative feedback
  - Design dialogs to yield closure
  - Prevent errors
  - Permit easy reversal of actions
  - Keep users in control
  - Reduce short-term memory load

# PRINCIPLES CONT'D

- Prevent errors
  - Make error messages specific, positive in tone, and constructive
  - Mistakes and slips (Norman, 1983)
  - Correct actions
    - Gray out inappropriate actions
    - Selection rather than freestyle typing
    - Automatic completion
  - Complete sequences
    - Single abstract commands
    - Macros and subroutines

# PRINCIPLES CONT'D

- Automation and human control
  - Successful integration:
    - Users can avoid:
      - Routine, tedious, and error prone tasks
    - Users can concentrate on:
      - Making critical decisions, coping with unexpected situations, and planning future actions
- Supervisory control needed to deal with real world open systems
  - e.g. air-traffic controllers with low frequency, but high consequences of failure
  - FAA: design should place the user in control and automate only to improve system performance, without reducing human involvement

# THEORIES

- High-level widely applicable frameworks to draw on during design and evaluation, as well as to support communication and teaching.
  - Theories can also be predictive, such as pointing times by individuals or posting rates for community discussions.
- Describe objects and actions with consistent terminologies, help in analyzing and comparing design alternatives,
- Are largely very abstract

# THEORIES CONT'D

- Beyond the specifics of guidelines
- Principles are used to develop theories
- Some theories are descriptive
  - Explanatory
  - Prescriptive
  - Predictive
- Some theories are based on human capacity
  - Motor task
  - Perceptual
  - Cognitiv

# THEORIES CONT'D

## Explanatory and predictive theories

- Explanatory theories:
  - Observing behavior
  - Describing activity
  - Conceiving of designs
  - Comparing high-level concepts of two designs
  - Training
- Predictive theories:
  - Enable designers to compare proposed designs for execution time or error rates

# THEORIES CONT'D

## Perceptual, cognitive, and motor tasks

- Perceptual or cognitive subtasks theories
  - Predicting reading times for free text, lists, or formatted displays
- Motor-task performance times theories:
  - Predicting keystroking or pointing times





## LET'S MEET IN THE NEXT CLASS!

Remember to read-up the text and  
keep every due date.