

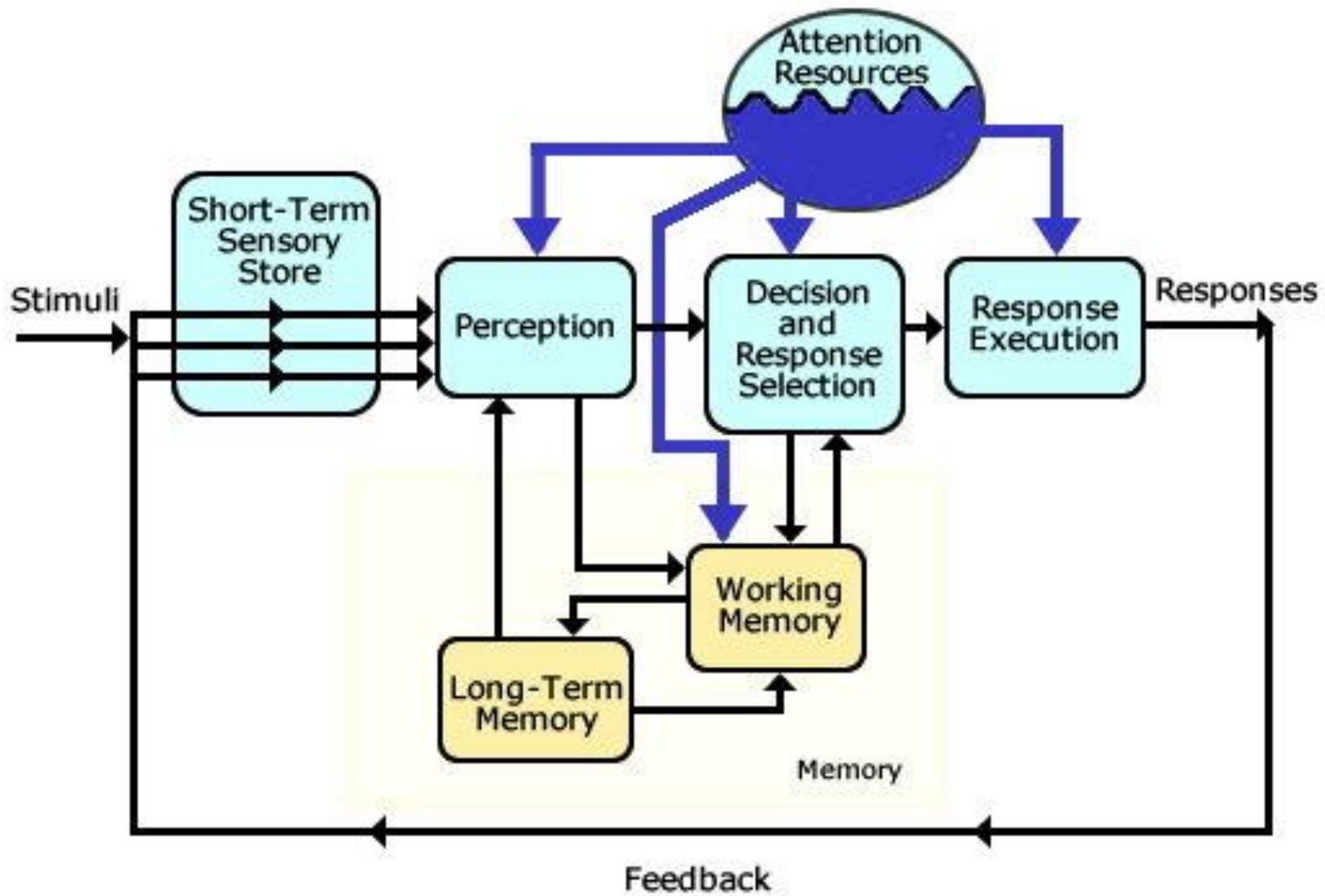
Usability Engineering

Session 4

Agenda

- Session 4 Topics
- Questions from Session 3?
- Objectives of Session 4
 - Information Input and Processing
 - Text, Graphics, Symbols, and Codes
 - Visual Displays of Dynamic Information
- Remote Control New Design: Collect data, Analyze the data
 - Next steps

Information Input and Processing



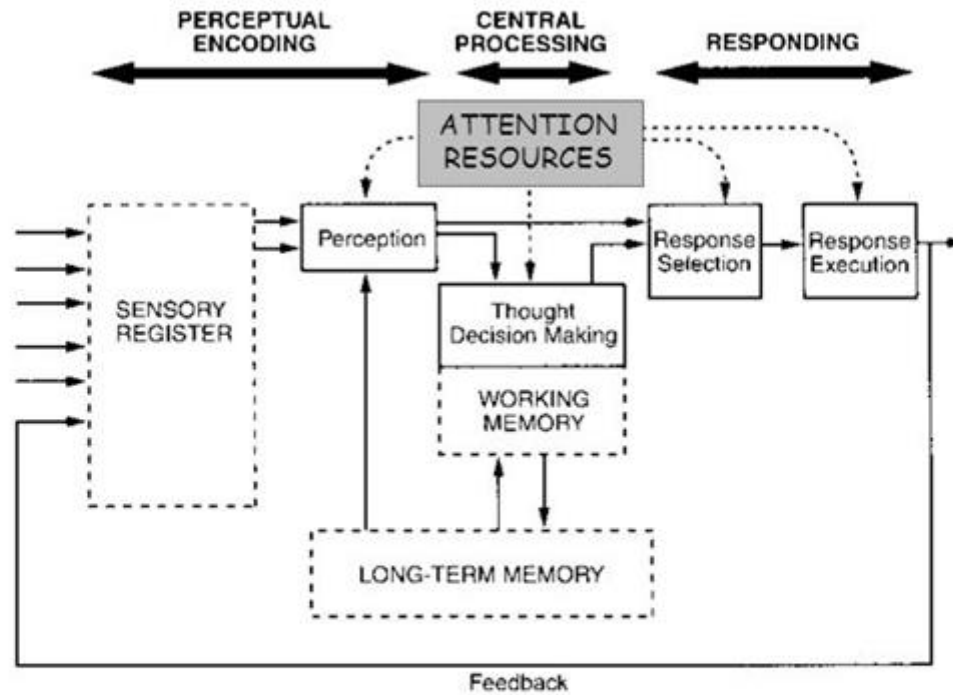


FIGURE 6.1

Generic model of human information processing with three memory systems.

From page 147 of Wickens et al.

ISE 412

Signal Detection Theory

► Implementation

- Situations where a distinction between two signals must be made.
- Situations where a decision as to where a signal occurred or did not occur.

► Possible responses

- Hit: Saying there is a signal when there is a signal
- False Alarm: Saying there is a signal when there is no signal
- Miss: Saying there is no signal when there is a signal
- Correct Rejection: Saying there is no signal when there is no signal

Guidelines for Selective Attention

- ▶ Selective Attention Tasks require the monitoring of several sources of information to perform a task.
 - ▶ E.g., Air Traffic controller, surgeons, etc.
- ▶ Some guidelines:
 - ▶ Reduce stress on the user
 - ▶ Train the user
 - ▶ Clear and bold distinction between the sources
 - ▶ Short intervals between the sources, e.g., .5 or .25 s , should be avoided.

Focused Attention

- ▶ Focused Attention requires maintenance of attention on one or a few channels of information and not be distracted by other channels of information
- ▶ Guidelines for Focused Attention:
 - ▶ Make competing channels as distinct as possible from the channel with the person is to attend
 - ▶ Separate in physical space, competing channels
 - ▶ Reduce the number of competing channels
 - ▶ Make the channel of interest larger, brighter, louder, or more centrally located than the competing channels

Divided Attention

- ▶ When people are required to more than one task at the same time performance on at least one task often declines.
- ▶ Guidelines for Divided Attention
 - ▶ Information about priority
 - ▶ Keep difficulty level low
 - ▶ Tasks should be dissimilar
 - ▶ When manual tasks are shared with sensory or memory tasks, the greater the learning of the manual task, the less will be the effect in sensory or memory tasks.

Sustained Attention/Vigilance

- ▶ The ability to maintain attention and remain alert to stimuli over prolonged periods of time.
- ▶ Guidelines for Sustained Attention/vigilance
 - ▶ Interpolate different activities
 - ▶ Increase the conspicuity of the signal
 - ▶ Reduce uncertainty
 - ▶ Provide feedback on correct performance

Age and Information Processing

- ▶ Humans are living longer in industrialized countries.
- ▶ Humans are remaining active and staying in the workforce longer.
- ▶ Aging persons can demonstrate the following:
 - ▶ Slowing of performance
 - ▶ Increased disruptions in working memory
 - ▶ Difficulty search for “material” in long term memory
 - ▶ Difficulty in dealing with incompatibility
 - ▶ Decreases in perceptual encoding of ambiguous stimuli.
- ▶ Some guidelines:
 - ▶ Strengthen signals
 - ▶ Reduce irrelevant details
 - ▶ Reduce time-sharing demands
 - ▶ Let people set there own pace to responding to a task.

Text, Graphics, Symbols and Codes

Text

- ▶ Readability:
 - ▶ Readability is about the reader - the ease with which a reader can successfully decipher, process, and make meaning of the text read.
 - ▶ Typographical features of the text are critical; letter shape, size, and spacing all meaningfully impact fluency and comprehension.
 - ▶ Visual Contrast: Black text on white background, white text on black background.
- ▶ Comprehension:
 - ▶ Transferring visual information, to perception, to memory and then recalling the information.

Symbols/Icons

- ▶ ISO 7000//IEC 60417
 - ▶ <https://www.iso.org/obp/ui/#iso:pub:PUB400008:en>
- ▶ Microsoft office
 - ▶ In any of the office applications click on Insert from the menu and select Icons
- ▶ How to validate new icons
 - ▶ Part 1:
 - ▶ Drawings should be black outlines on white background
 - ▶ Generation: Ask to provide a word or short sentence that describes the icon
 - ▶ Part 2:
 - ▶ Matching tests

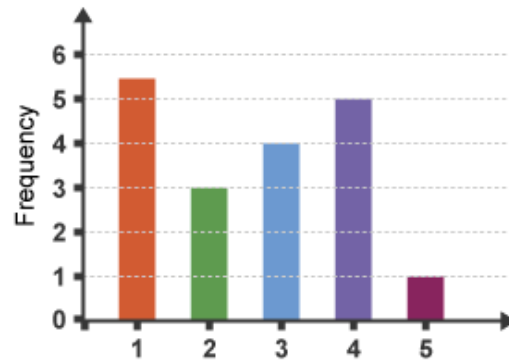
Visual Displays of Dynamic Information

Visual Displays and Printed Displays

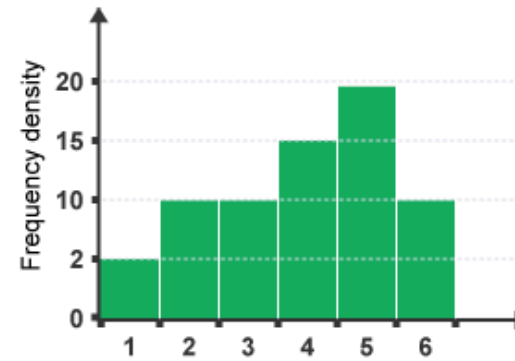
- ▶ Readability on Visual Displays is different from printed material.
- ▶ Increase in screen resolution will decrease the difference in readability from printed material.
- ▶ Text size/font size on both visual displays and printed material should be no smaller than 12 point font for optimal readability and comprehension.

Display of Statistical Information

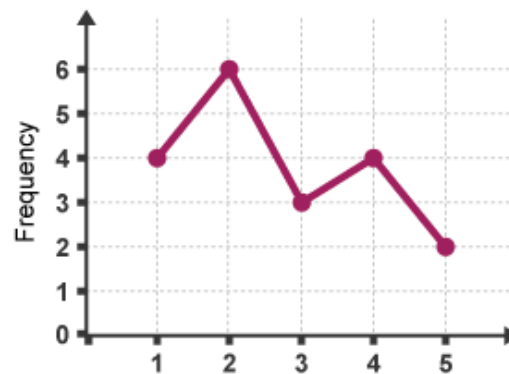
Bargraphs



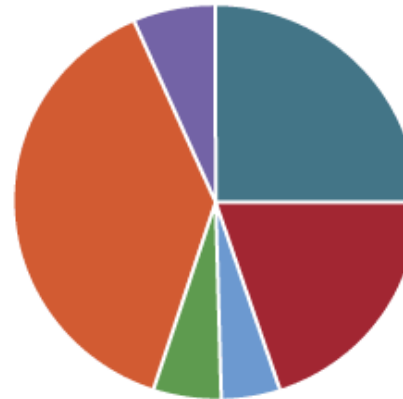
Histograms



Line graphs



Pie charts



Characteristics of Graphs

- ▶ Legend is required
- ▶ Labeling of key points
- ▶ True zero in bar, line, and histograms
- ▶ Use of gray scale and graphic “design”, not color.
- ▶ Color is a redundant cue, not the primary.

Coding

- ▶ Coding is used to identify various items of a given class.
- ▶ Types of Coding Refer to table 4-5 (page 126)
 - ▶ Alphanumeric
 - ▶ Color: surfaces, lights
 - ▶ Geometric Shapes
 - ▶ Angle of inclination
 - ▶ Size of forms
 - ▶ Visual numbers
 - ▶ Brightness of lights
 - ▶ Flashing of lights

Remote control data and results

Next Steps