Questions?

• Project #2
• Homework #4 in
• Midterm this Wednesday (Closed books)
Cognitive engineering

- Gulfs of execution and evaluation [Norman 86]
Gulf of evaluation: statistical analysis (1)

Real world:

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.67</td>
<td>0.79</td>
</tr>
<tr>
<td>0.32</td>
<td>0.63</td>
</tr>
<tr>
<td>0.39</td>
<td>0.72</td>
</tr>
<tr>
<td>0.27</td>
<td>0.85</td>
</tr>
<tr>
<td>0.71</td>
<td>0.43</td>
</tr>
<tr>
<td>0.63</td>
<td>0.09</td>
</tr>
<tr>
<td>0.03</td>
<td>0.03</td>
</tr>
<tr>
<td>0.20</td>
<td>0.54</td>
</tr>
<tr>
<td>0.51</td>
<td>0.38</td>
</tr>
<tr>
<td>0.11</td>
<td>0.33</td>
</tr>
<tr>
<td>0.46</td>
<td>0.46</td>
</tr>
</tbody>
</table>

Conceptual model: $x, y$ correlated?
Gulf of evaluation: statistical analysis (2)

Real world:

Gulf

Conceptual model: $x, y$ correlated?

Evaluation
Gulf of evaluation: statistical analysis (3)

Real world:

\[ \rho = -.29 \]

Conceptual model:

Do \( x, y \) correlate?
Gulf of execution: Drawing a rectangle (1)

Real world

Gulf

Conceptual model:
Draw a rectangle

Move 90 30
Rotate 35
Pen down
...

Execution
Gulf of execution: Drawing a rectangle (2)

Real world
- Draw a rectangle
- Rotate the shape

Gulf

Conceptual model:
- Draw a rectangle
Gulf of execution: Drawing a rectangle (3)

Real world

Gulf

Execution

Conceptual model: Draw a rectangle
Interaction design: a double gulf?

Interaction user

Evaluation

Conceptual model

Execution

Interaction designer

Representation

Interface

Data

Manipulation
Cognitive engineering example

- Move “paper.tex” from ~/conferences/CHI_04 to ~/conferences/UIST_04
  - Using a Unix shell (current directory is ~)
  - Using a GUI (starting from the desktop, no window open)

- What are the articulatory and semantic distances?
Direct manipulation

• Central ideas
  – Object understood by their visual characteristic
    • Using good affordances
    • Using a good conceptual model and convincing metaphors
  – Actions understood in term of their effects on the screen
    • Rapid and incremental
    • Immediate visual feedback
    • Easily reversible

• Outcome
  – Direct engagement
    • the feeling of working directly on the task
    • No need to know the implementation details
  – The display becomes reality: the WYSIWYG interface
  – Less error messages?
Interface metaphors

• Definition
  – Use of one kind of object or idea in place of another to suggest a likeness or analogy between them

• Purpose
  – Leverages our knowledge of familiar, concrete objects/experiences
  – Transfer this knowledge to abstract computer and task concepts

• Examples
  – Desktop, files, folders, trash can…
  – Paintbrush in a painting program
Metaphors caveats

• Too limited
  – The metaphor restricts interface possibility

• Too powerful
  – The metaphor makes believe that the system can do things it can’t

• Too literal or cute
  – Make it difficult to operate

• Mismatched
  – The metaphor makes it difficult to carry out the task
Direct manipulation: Good or Evil?

• Good for intermediate users
  – Recognition versus recall trade-off
  – What about expert?

• Explicit versus implicit command
  – “rename each file by adding ‘_old’ to its name”

• Limit of reification
  – How to align an object?

• Metaphor might be too restrictive
  – WYSIAYG: What You See Is All You Get

• Applications mix
  – Direct manipulation
    • Tools, drag and drop interactions...
  – Abstraction
    • Menus, dialog boxes,...