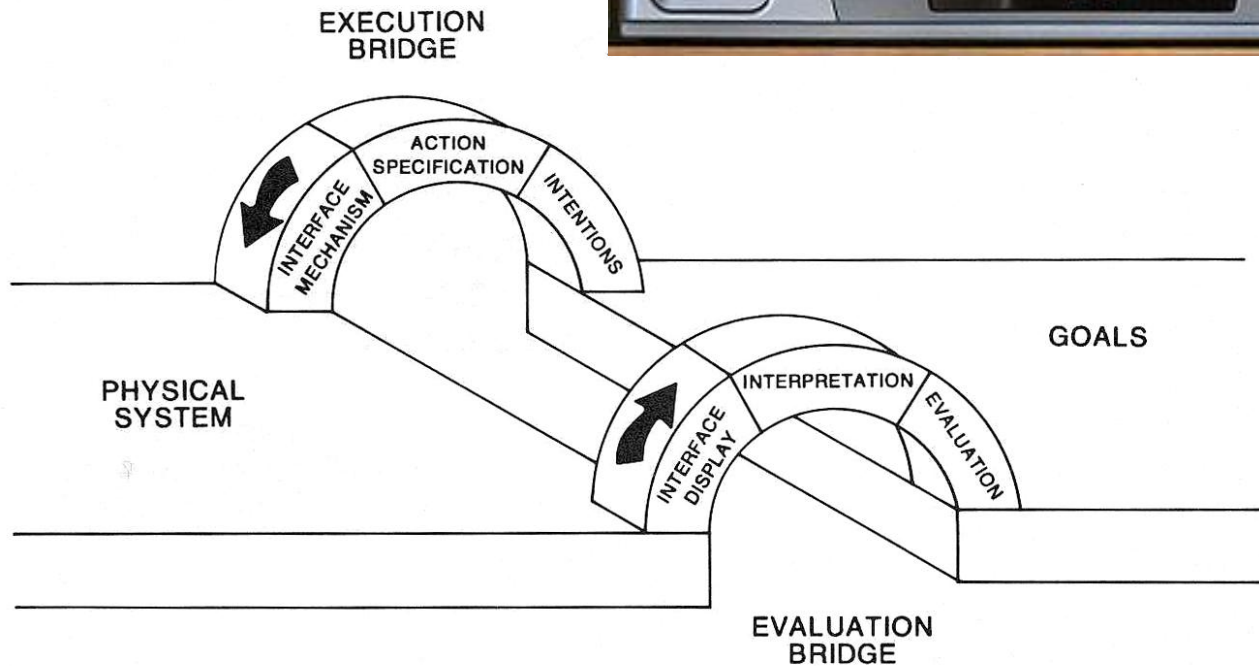


Questions?

Cognitive engineering

- Gulfs of execution and evaluation [Norman 86]



Gulf of evaluation: statistical analysis (1)

Gulf

Real world:

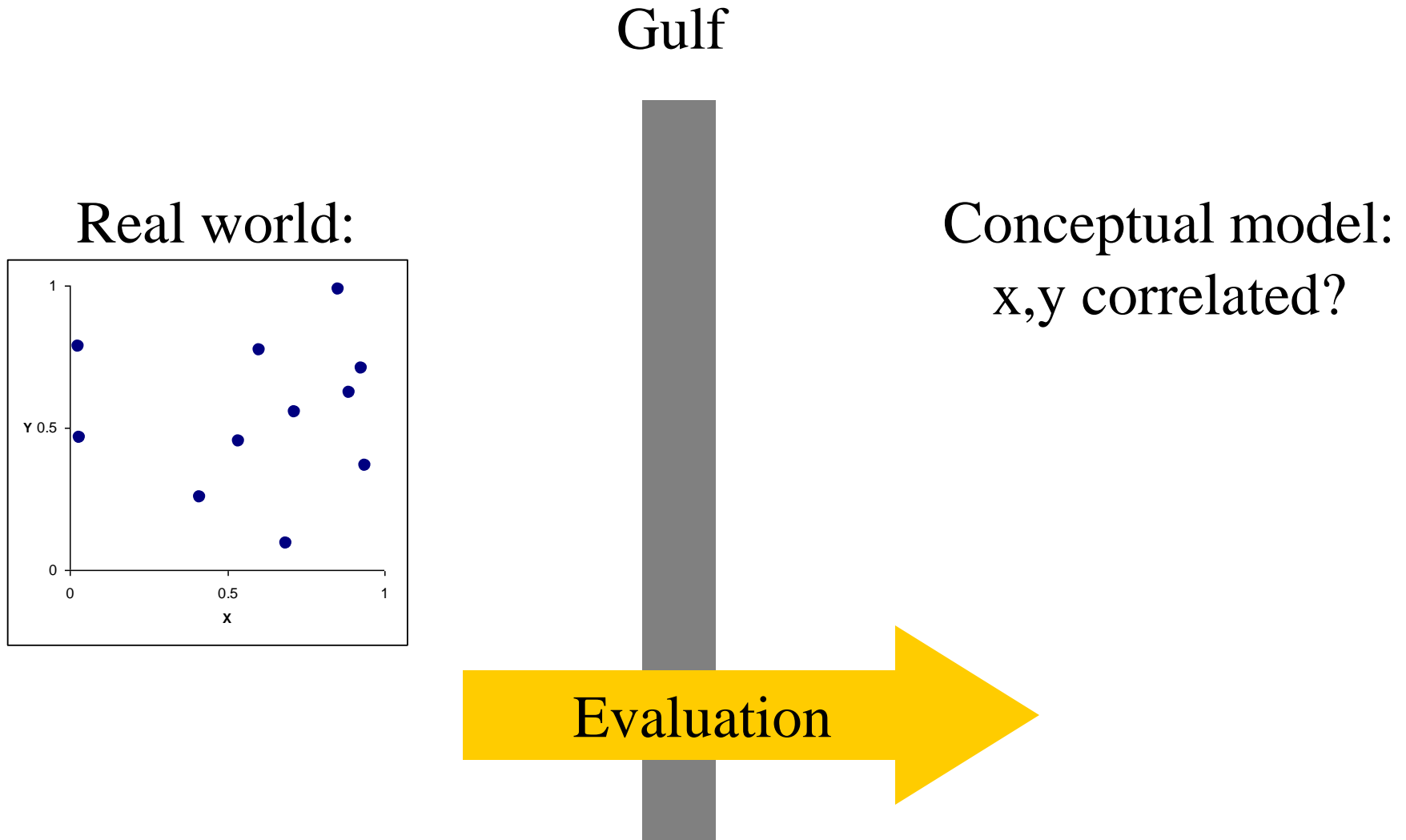
x	y
0.67	0.79
0.32	0.63
0.39	0.72
0.27	0.85
0.71	0.43
0.63	0.09
0.03	0.03
0.20	0.54
0.51	0.38
0.11	0.33
0.46	0.46

Conceptual model:
x,y correlated?

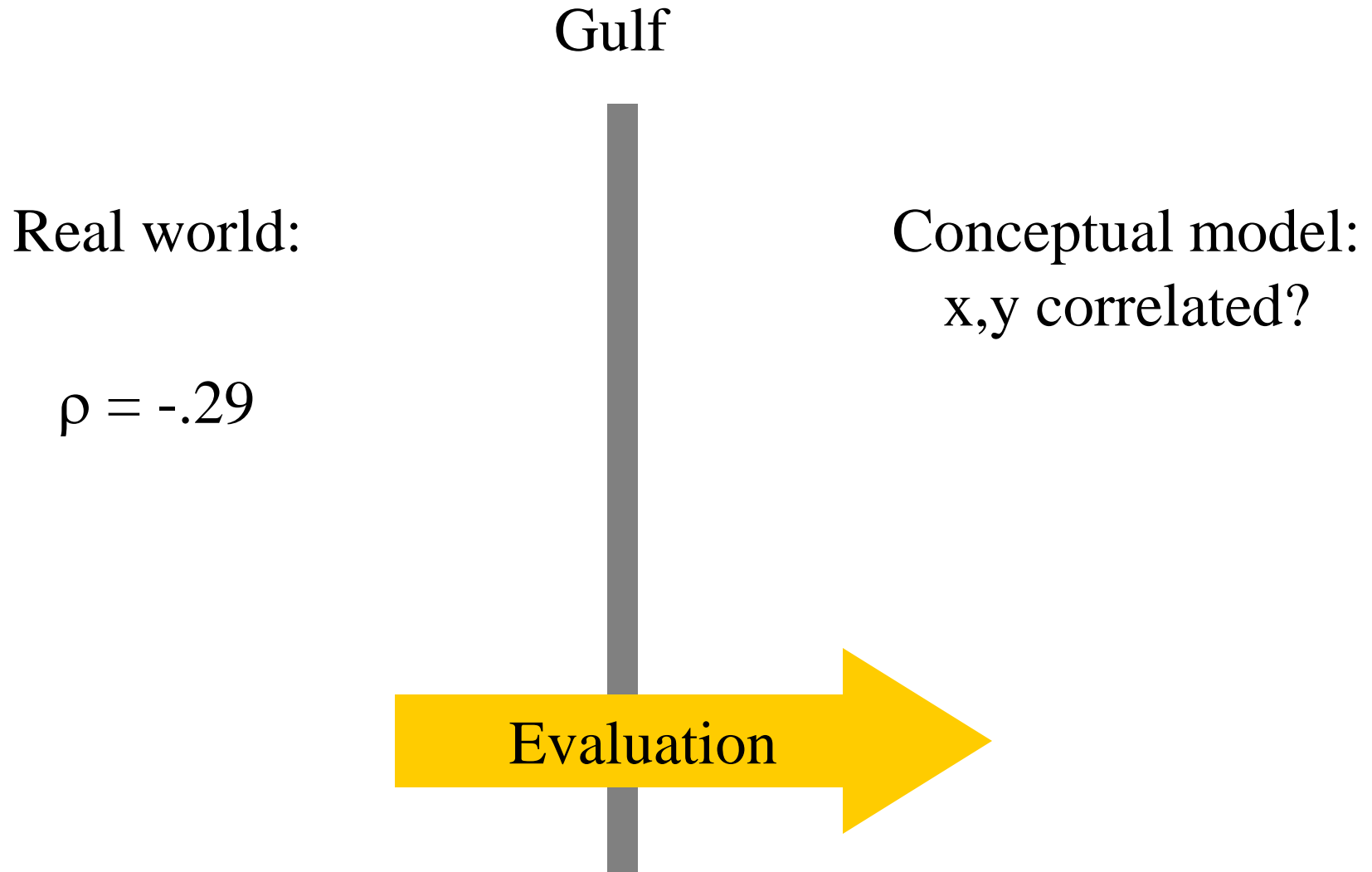
Evaluation



Gulf of evaluation: statistical analysis (2)



Gulf of evaluation: statistical analysis (3)

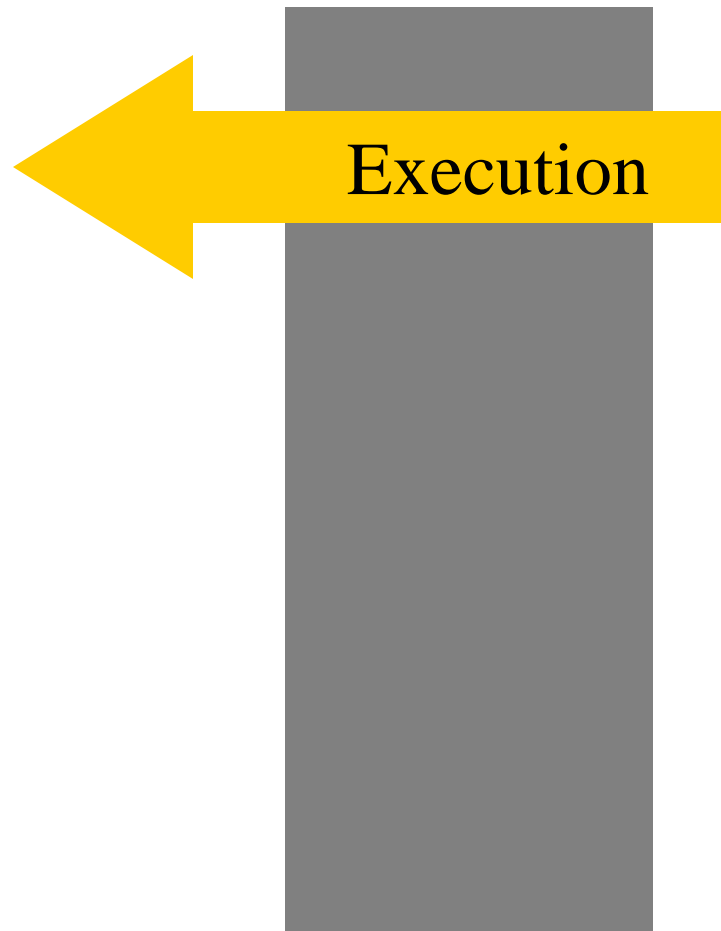


Gulf of execution: Drawing a rectangle (1)

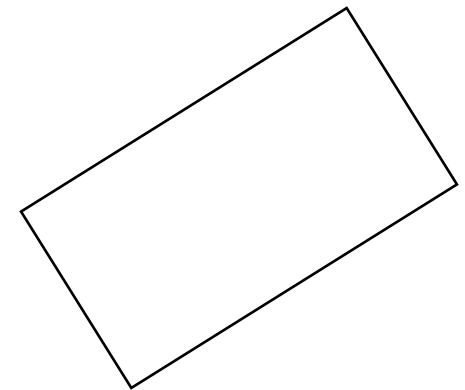
Real world

Conceptual model:
Draw a rectangle

Gulf



Move 90 30
Rotate 35
Pen down
...



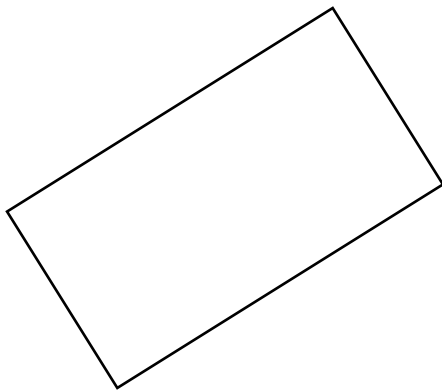
Gulf of execution: Drawing a rectangle (2)

Real world

Draw a rectangle



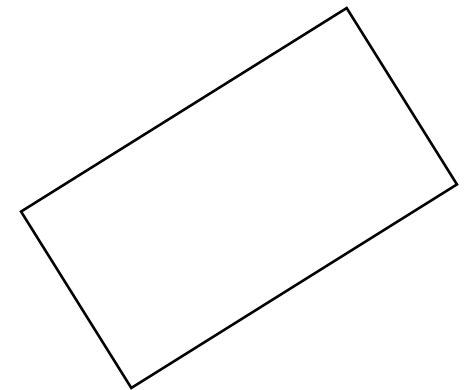
Rotate the shape



Gulf

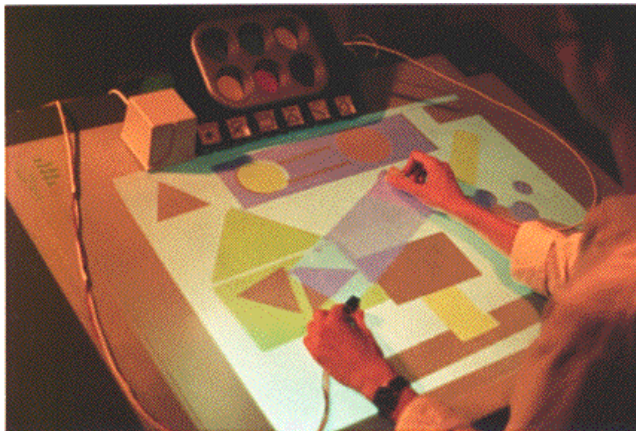
Conceptual model:
Draw a rectangle

Execution



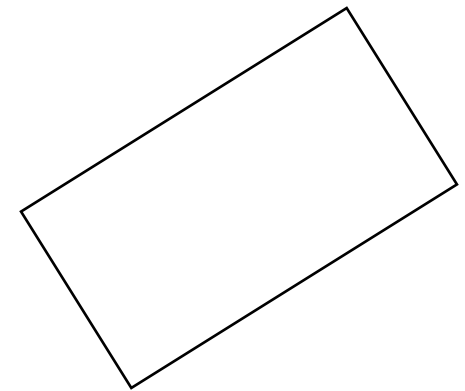
Gulf of execution: Drawing a rectangle (3)

Real world



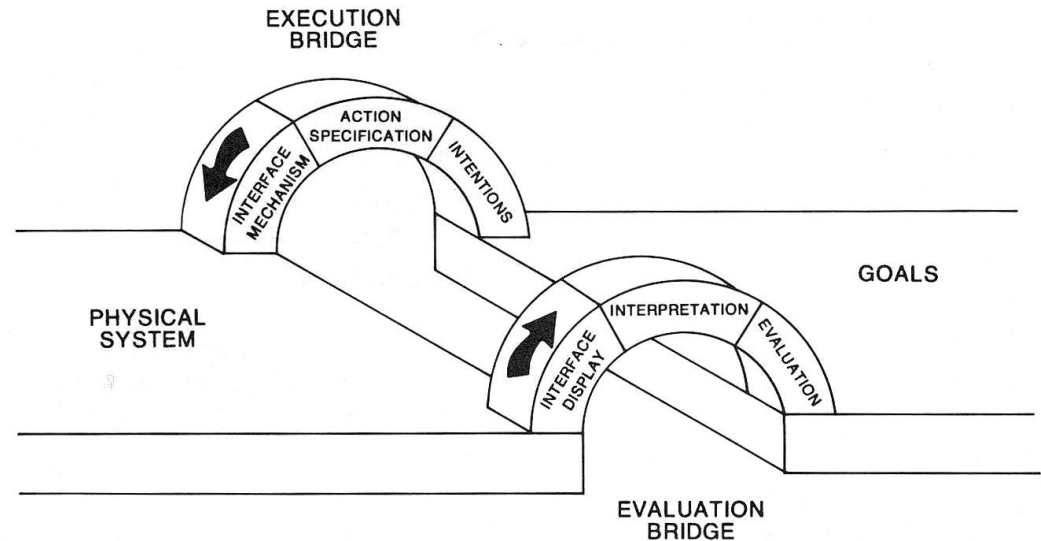
Gulf

Conceptual model:
Draw a rectangle



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 evaluative and execution gulfs?



Direct manipulation

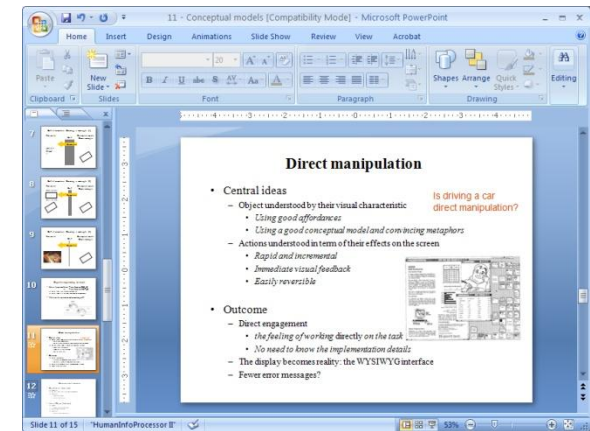
- Central ideas

- 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
- Fewer error messages?

Is driving a car
direct manipulation?



Direct manipulation: Good or Evil?

- Good for intermediate users
 - Recognition versus recall trade-off
 - What about expert? Fast?
 - Accuracy?
- Explicit versus implicit command
 - How to automate, generalize tasks?
 - “rename each file by adding ‘_old’ to its name”
- 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, scripting, ...*

