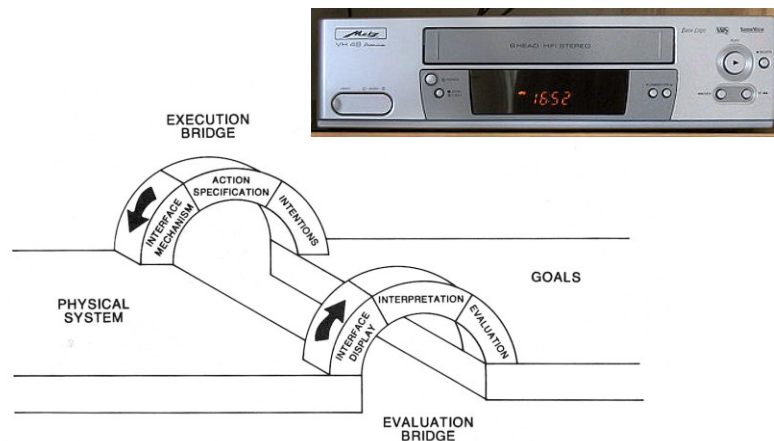


Questions?

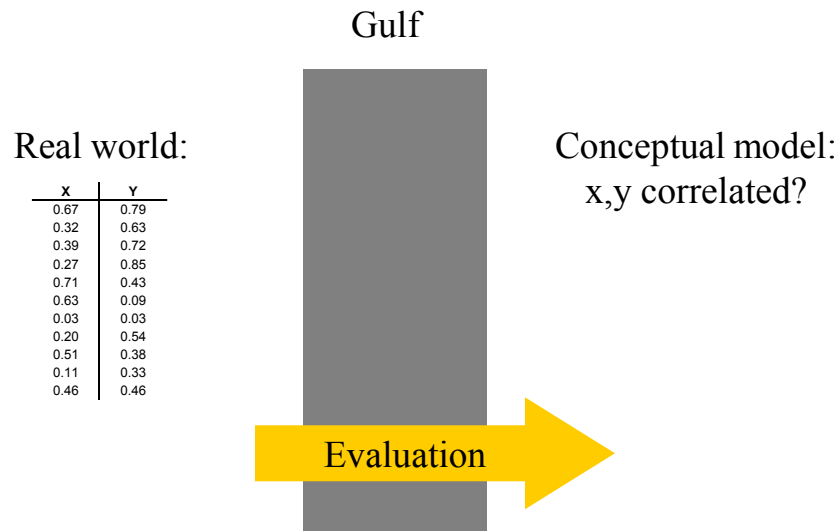
- Google storage now 8 times cheaper
- Droid
- Quiz
- HW
- Next week

Cognitive engineering

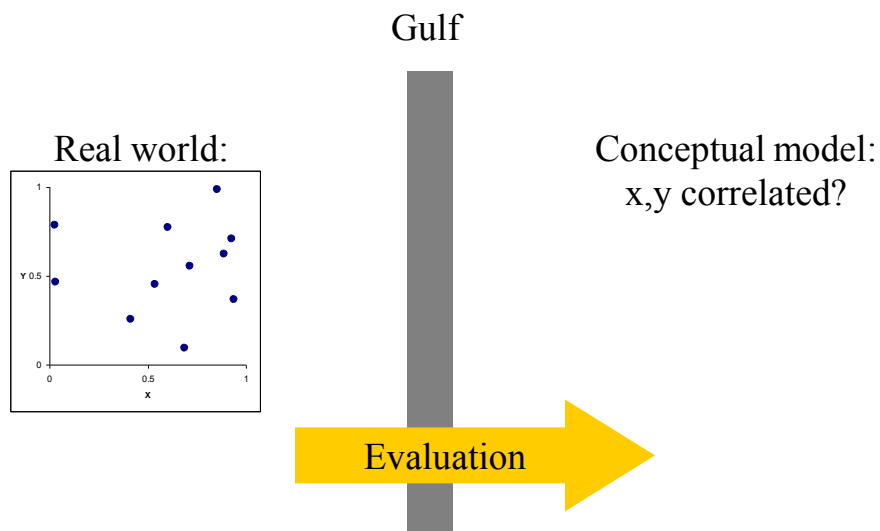
- Gulfs of execution and evaluation [Norman 86]



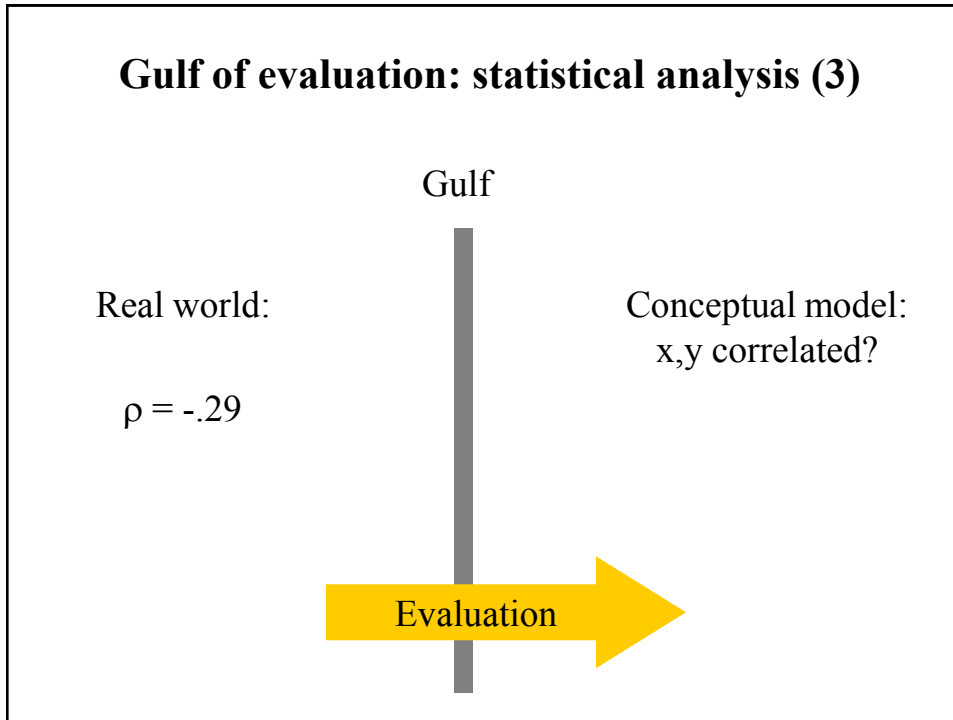
Gulf of evaluation: statistical analysis (1)



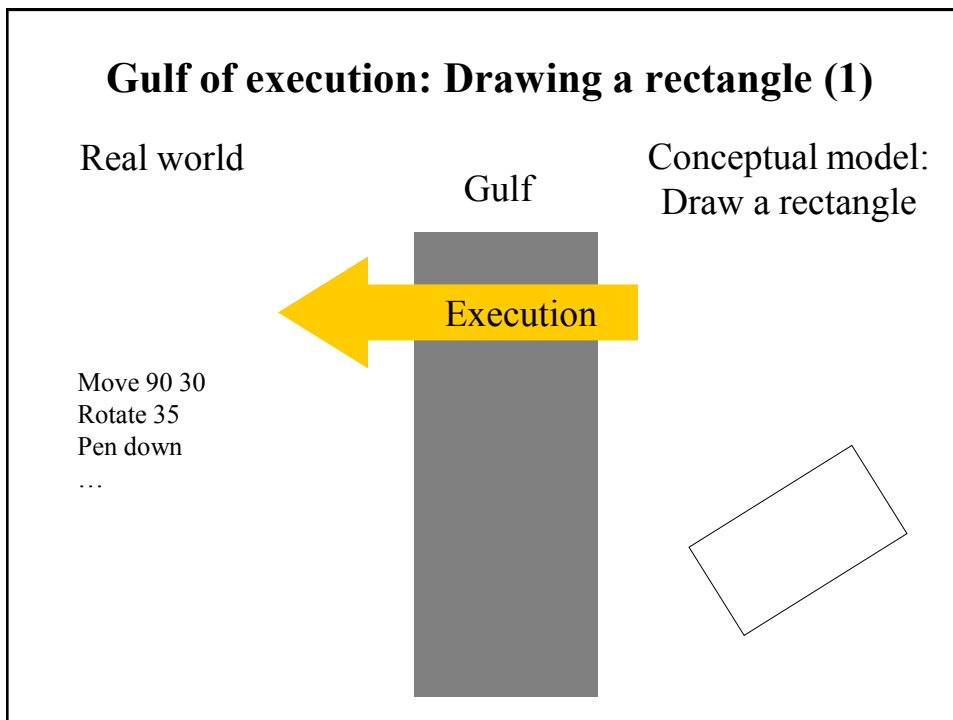
Gulf of evaluation: statistical analysis (2)



Gulf of evaluation: statistical analysis (3)



Gulf of execution: Drawing a rectangle (1)



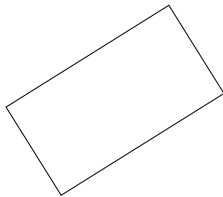
Gulf of execution: Drawing a rectangle (2)

Real world

Draw a rectangle



Rotate the shape

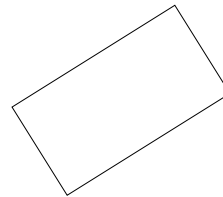


Gulf

Conceptual model:

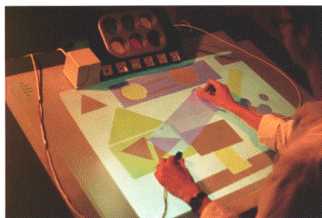
Draw a rectangle

Execution



Gulf of execution: Drawing a rectangle (3)

Real world

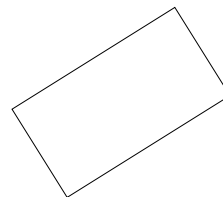


Gulf

Conceptual model:

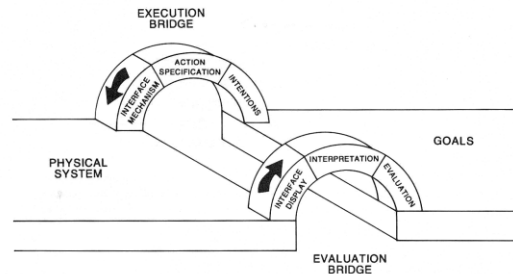
Draw a rectangle

Execution



Cognitive engineering example

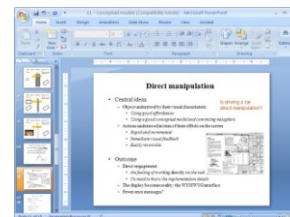
- Move “paper.tex” from `~/conferences/CHI_04` to `~/conferences/UIST_04`
 - Using a Unix shell (current directory is `~`)
 - Using a GUI (starting from the desktop, no window open)
- What are the evaluation and execution gulfs?



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*
 - *Incremental*
 - *Easily reversible*
 - *Immediate visual feedback*

Is driving a car
direct manipulation?



- 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?

Direct Manipulation Tradeoffs

- 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
- In practice, often mix
 - Direct manipulation
 - *Tools, drag and drop interactions...*
 - Abstraction
 - *Menus, dialog boxes, scripting, ...*



Grammatical structure

- Action-Object (Verb noun)
 - Modal
 - *Modes are problematic*
 - Often more efficient
 - Examples
 - *Pick a tool, then use it...*
- Object-action (Noun verb)
 - Modeless
 - Action always within the context of objects
 - Examples
 - *Drag and drop...*
 - *Select and delete*

Why not always
go modeless?