Main ideas
• We use our memory of past events to predict the outcomes of future actions
• Good design takes the nature of human memory and action into account
• Jordan’s recommendations are derived from considerations of memory and action

Memory as a basis for action
• Our memory is approximate, an abstraction of previous events and objects
• Prototypes:
  – “MS Word is an exemplary word processor”
• Stereotypes
  – “All word processors need spell checkers”
• Metaphor and analogy
  – A word processor is like a typewriter…isn’t it?

Theories describe hidden states
• Example: Gravitation
• Example: Where is the margin width information stored in MS Word?
• PICTURE

Conceptual models
• A conceptual model is a theory about the hidden states of a computer program
• With experience, users develop some sort of conceptual model of how a program works
  – Beware: Not as precise as the models we make
• NNN Designs need to facilitate this process
• NNN Conceptual models become less accurate as the complexity of the program states increases

Norman’s model of action

Breakdown in action cycle
• Failure can occur at any step in this cycle
• Gulf of execution:
  – Gap between user’s intentions and allowable actions for this program
  – Example: Finding winner of women’s triple jump in Olympic web site.
    Which link do you follow?
Breakdown in action cycle—2

- Gulf of evaluation:
  - Gap between program’s presentation of its state and the user’s goals and model of the program
  - Example: Did you successfully activate the QuickTime window?

Breakdown in action cycle—3

- Action slips
  - Execution of actions doesn’t match plan
  - Example:
    - Plan: Click on MS Windows “minimize” box
    - Slip: Inadvertently click on “close” box

Design questions:
How easily can one...

- Guess functionality of device?
- Tell what operations are possible?
- Map intention to actions?
- Perform the action?
- Know system is in desired state?
- Interpret system state?
- Guess system state?
- Error recovery?
- Error prevention?

- Consistency
- Compatibility?
- Visual clarity?
- Explicitness
- Prioritization of functionality
- Explicitness
- Error recovery
- Error prevention
- Conceptual model
- Conceptual model

Computer program