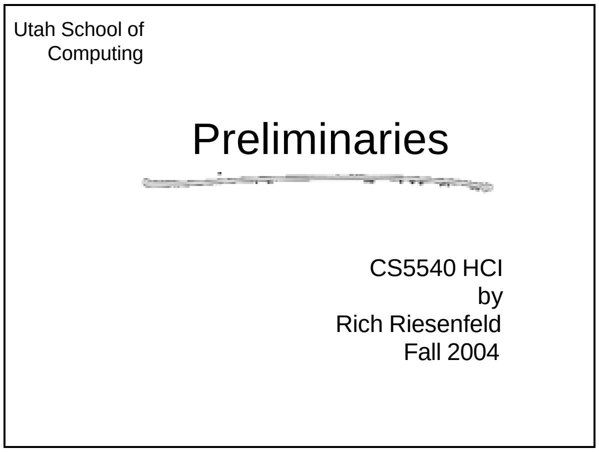

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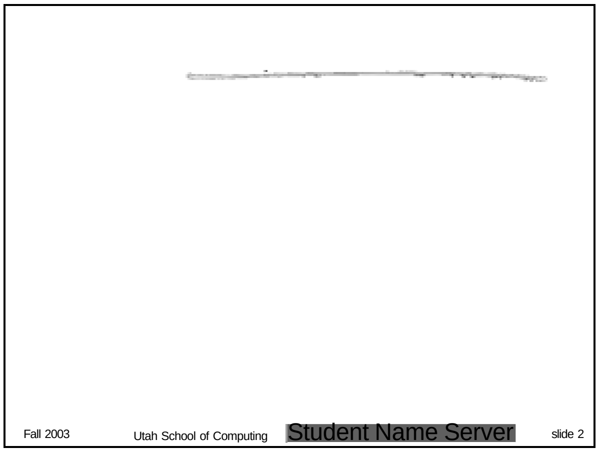
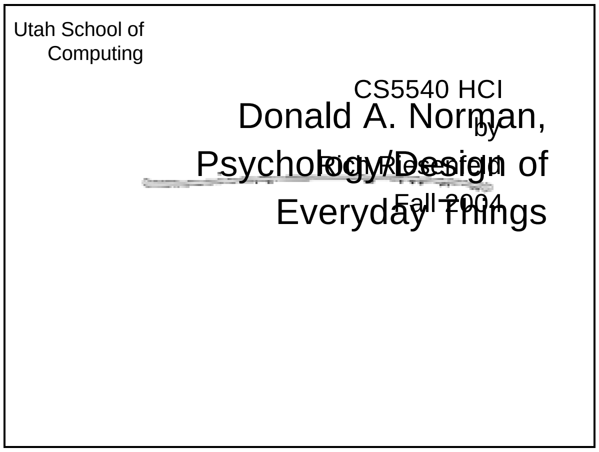
Preliminaries

CS5540 HCI
by
Rich Riesenfeld
Fall 2004





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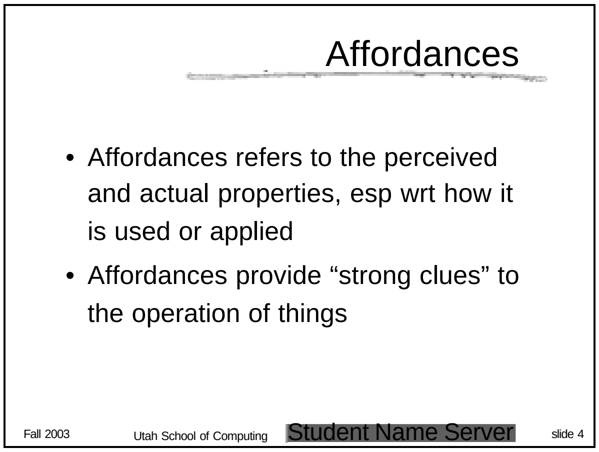
CS5540 HCI
by
Rich Riesenfeld
Fall 2004

Donald A. Norman, Psychology/Design of Everyday Things



Affordances

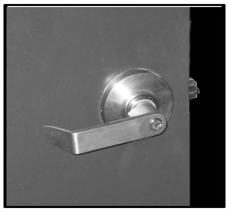
- Affordances refers to the perceived and actual properties, esp wrt how it is used or applied
- Affordances provide “strong clues” to the operation of things

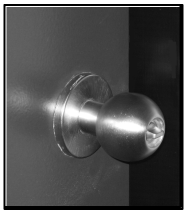
Mappings

- Mappings refers to the relationship between two things
- Eg, control and movement
  - Steering wheel
  - Door handle

Map's & Afford's: Ex's - 1

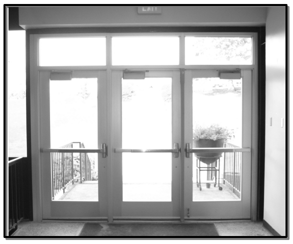
- Door Knobs v Levers





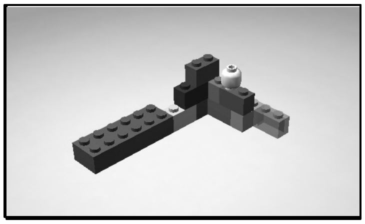
Map's & Afford's: Ex's - 2

Doors open left or right?



Map's & Afford's: Ex's - 3

Lego pieces

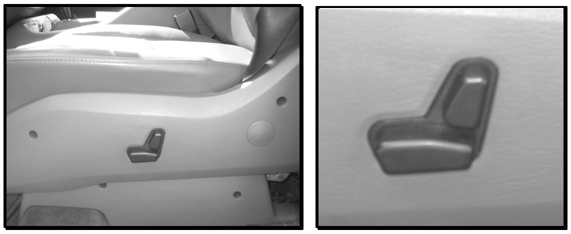


Map’s & Afford’s: Ex’s - 4

- Bicycle
  - Seat, position, handlebars, brakes

Map’s & Afford’s: Ex’s - 5

- Mercedes power seat adjustment



Map’s & Afford’s: Ex’s - 6

- Motorcycle
  - Clutch, shifting pattern,

Mappings & Affordances: Ex’s -2

- Stereo Controls
  - Knobs v Sliders
- TV Controls
  - Menus
- Triggers

Widgets

7 Stages of Action - 1

1. Form Goal
2. Form Intent
3. Specify Action
4. Execute Action
5. Perceive State of World
6. Evaluate Outcome
7. Interpret State of World

7 Stages of Action - 1

A. Abstraction
   1. Form Goal

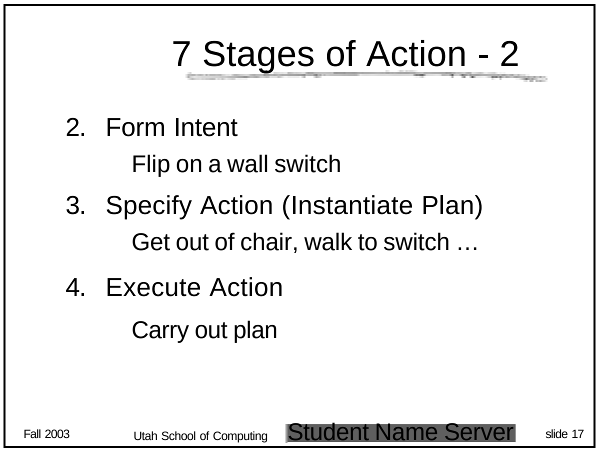
B. Execution Phase
   2. Form Intent
   3. Specify Action
   4. Execute Action

C. Evaluation Phase
   5. Perceive State of World
   6. Evaluate Outcome
   7. Interpret State of World

7 Stages of Action - 2

1. Form Goal

   Get more light to read



7 Stages of Action - 2

2. Form Intent

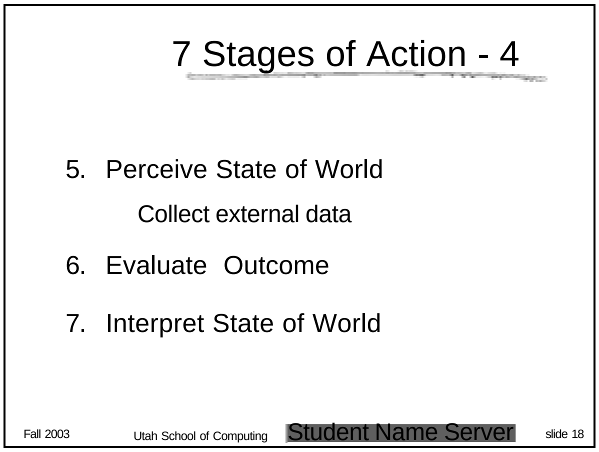
   Flip on a wall switch

3. Specify Action (Instantiate Plan)

   Get out of chair, walk to switch …

4. Execute Action

   Carry out plan

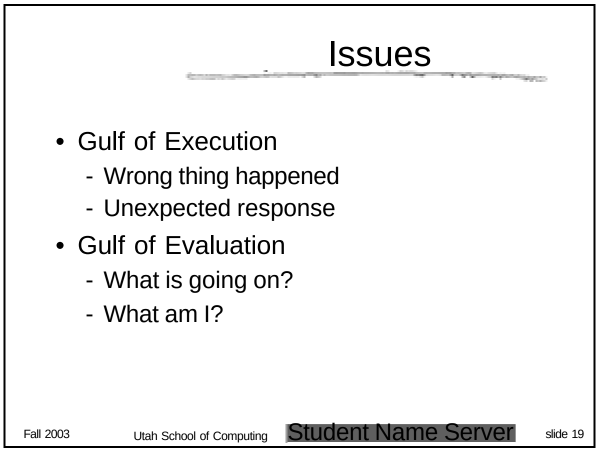


7 Stages of Action - 4

5. Perceive State of World

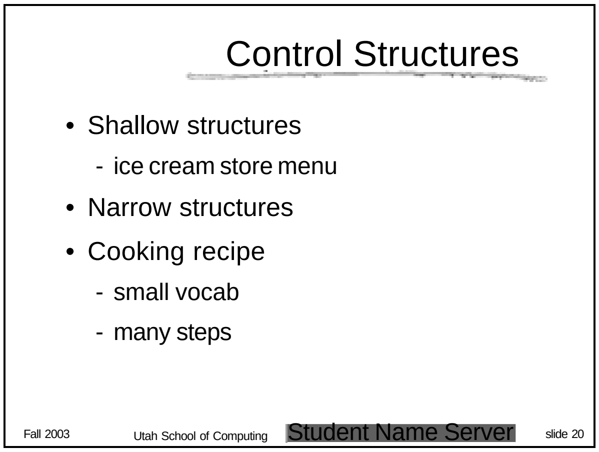
   Collect external data

6. Evaluate Outcome
7. Interpret State of World



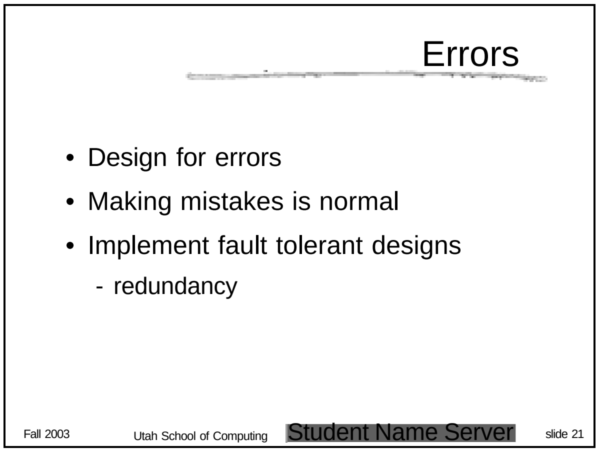
Issues

- Gulf of Execution
  - Wrong thing happened
  - Unexpected response
- Gulf of Evaluation
  - What is going on?
  - What am I?



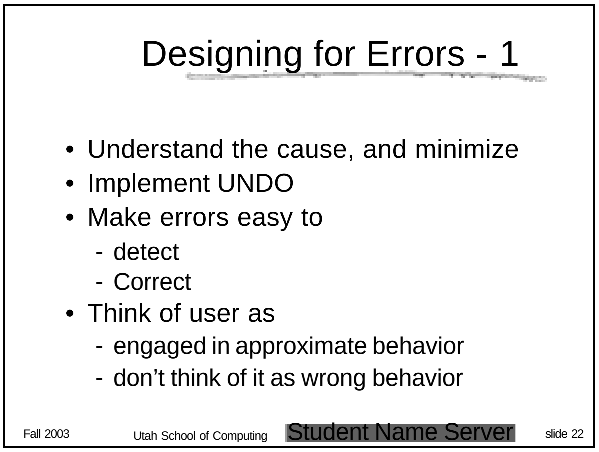
Control Structures

- Shallow structures
  - ice cream store menu
- Narrow structures
- Cooking recipe
  - small vocab
  - many steps



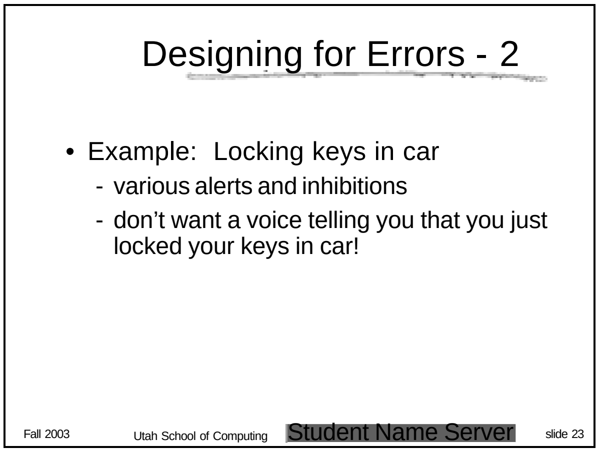
Errors

- Design for errors
- Making mistakes is normal
- Implement fault tolerant designs
  - redundancy



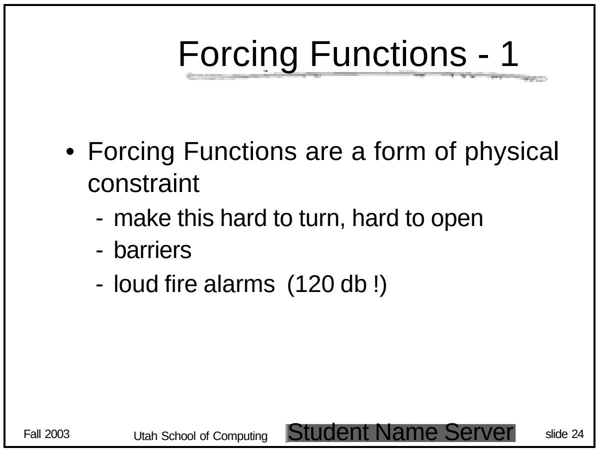
Designing for Errors - 1

- Understand the cause, and minimize
- Implement UNDO
- Make errors easy to
  - detect
  - Correct
- Think of user as
  - engaged in approximate behavior
  - don’t think of it as wrong behavior



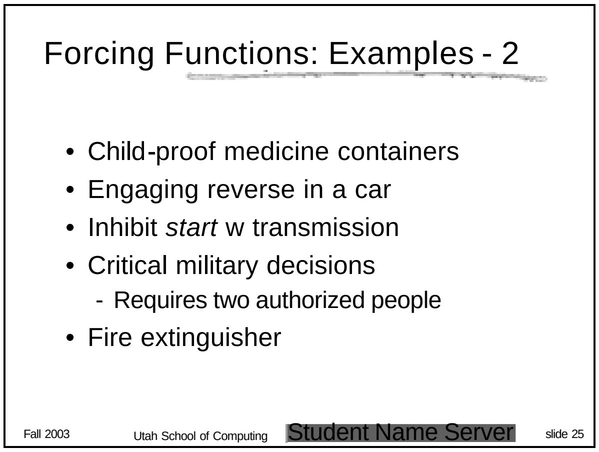
Designing for Errors - 2

- Example: Locking keys in car
  - various alerts and inhibitions
  - don’t want a voice telling you that you just locked your keys in car!



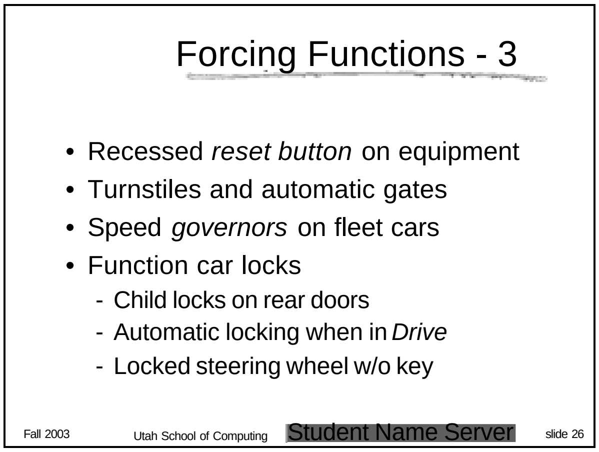
Forcing Functions - 1

- Forcing Functions are a form of physical constraint
  - make this hard to turn, hard to open
  - barriers
  - loud fire alarms (120 db !)



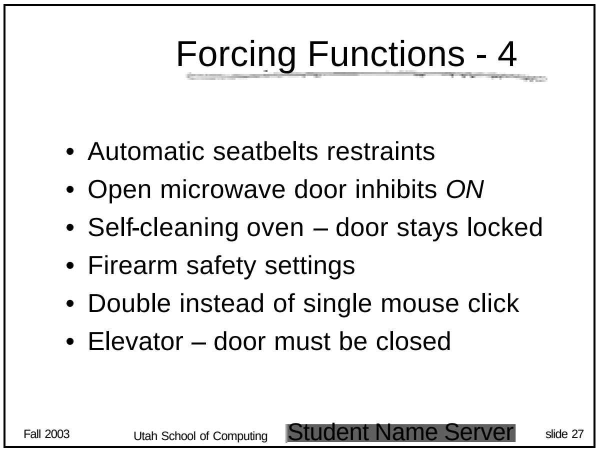
Forcing Functions: Examples - 2

- Child-proof medicine containers
- Engaging reverse in a car
- Inhibit *start* w transmission
- Critical military decisions
  - Requires two authorized people
- Fire extinguisher



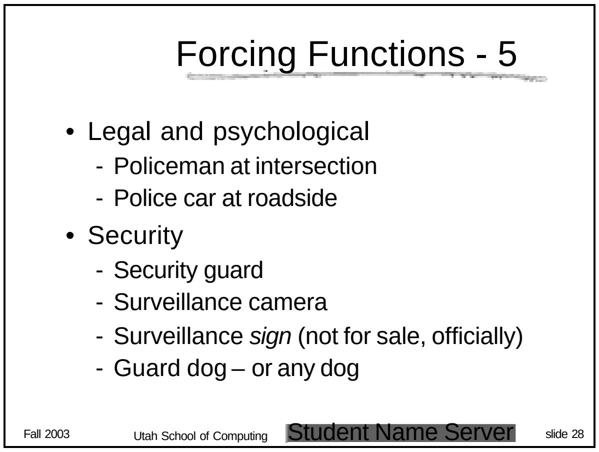
Forcing Functions - 3

- Recessed *reset button* on equipment
- Turnstiles and automatic gates
- Speed *governors* on fleet cars
- Function car locks
  - Child locks on rear doors
  - Automatic locking when in *Drive*
  - Locked steering wheel w/o key



Forcing Functions - 4

- Automatic seatbelts restraints
- Open microwave door inhibits *ON*
- Self-cleaning oven – door stays locked
- Firearm safety settings
- Double instead of single mouse click
- Elevator – door must be closed



Forcing Functions - 5

- Legal and psychological
  - Policeman at intersection
  - Police car at roadside
- Security
  - Security guard
  - Surveillance camera
  - Surveillance *sign* (not for sale, officially)
  - Guard dog – or any dog

Forcing Functions: Advisories - 6

- “Shoplifters will be *prosecuted* to the fullest extend of law”
- “Speed enforced by radar”
- Radio alert provided by police
  - Radar in operation in following areas
- Reminder of consequences
  - Punishable by fine, jail, suspension, removal, etc.

Forcing Function Approach- 7

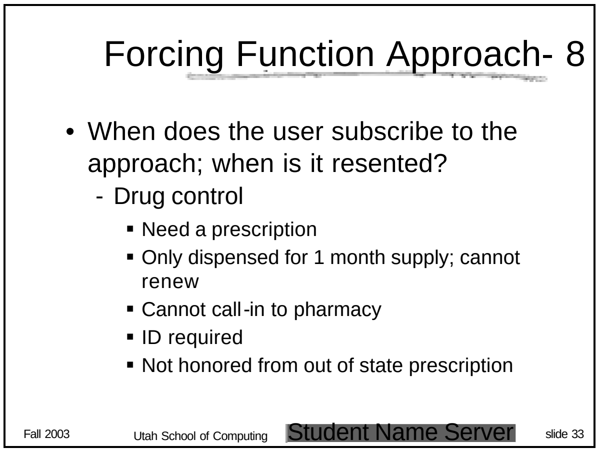
- Drastic, imposing, assertive, militant, authoritative, officious, *Big Brother*, risky
- When to use?
  - This is a choice of the *stick* over carrot
  - Often has a goodwill cost
    - ▪ Motorcycle helmets
    - ▪ Seatbelts
    - ▪ Child restraining seats

Forcing Function Approach- 8

- What circumstances justifies this approach?
  - Safety?
  - Potential for major damage?

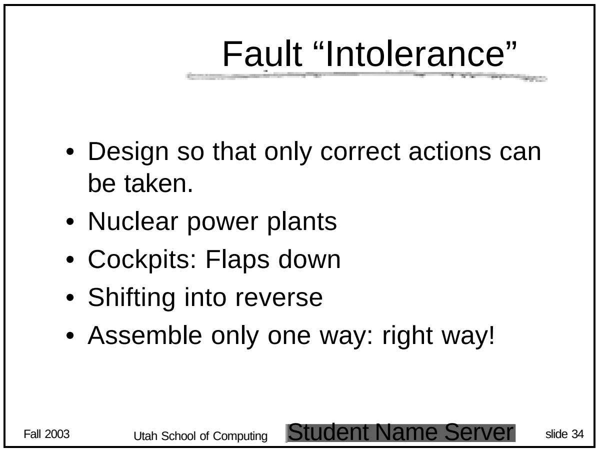
Forcing Function Approach- 8

- When does the user subscribe to the approach; when is it resented?
  - Gun control
  - Restricted (superuser) functions



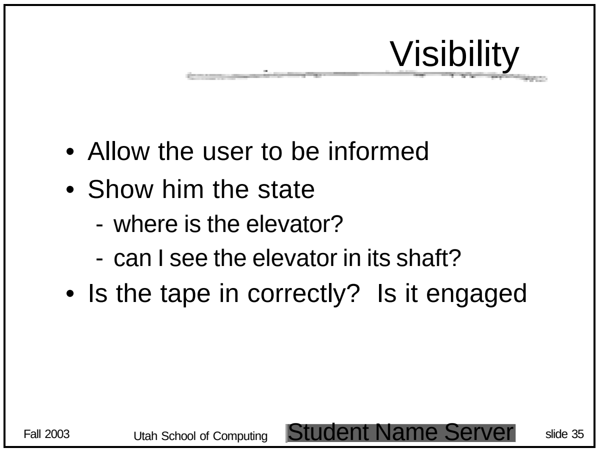
Forcing Function Approach- 8

- When does the user subscribe to the approach; when is it resented?
  - Drug control
    - Need a prescription
    - Only dispensed for 1 month supply; cannot renew
    - Cannot call-in to pharmacy
    - ID required
    - Not honored from out of state prescription



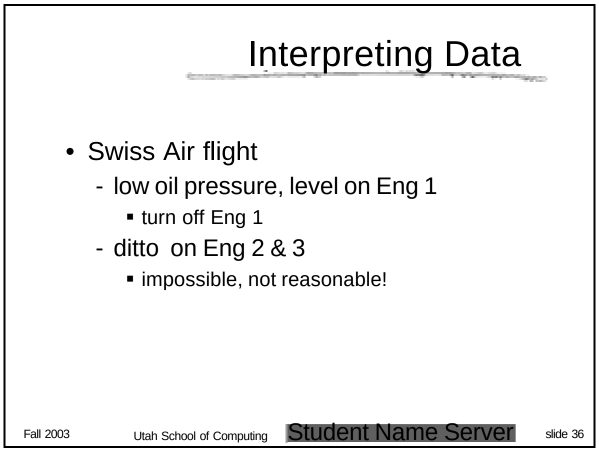
Fault “Intolerance”

- Design so that only correct actions can be taken.
- Nuclear power plants
- Cockpits: Flaps down
- Shifting into reverse
- Assemble only one way: right way!



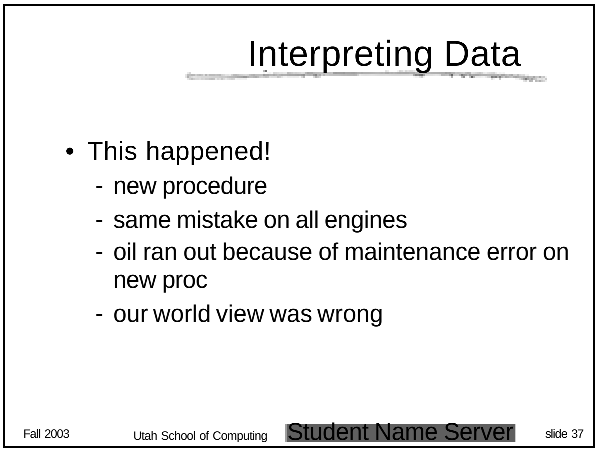
Visibility

- Allow the user to be informed
- Show him the state
  - where is the elevator?
  - can I see the elevator in its shaft?
- Is the tape in correctly? Is it engaged



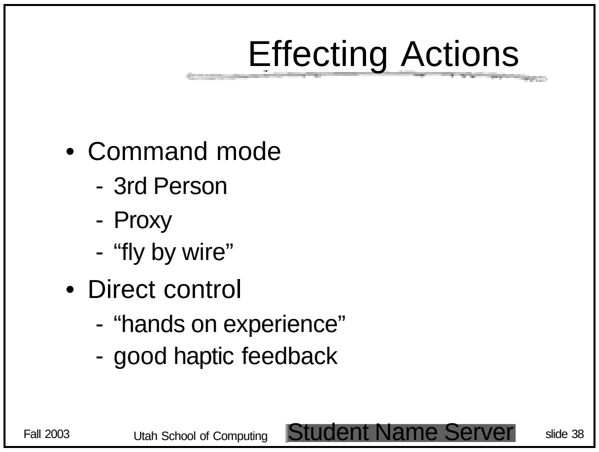
Interpreting Data

- Swiss Air flight
  - low oil pressure, level on Eng 1
    - turn off Eng 1
  - ditto on Eng 2 & 3
    - impossible, not reasonable!



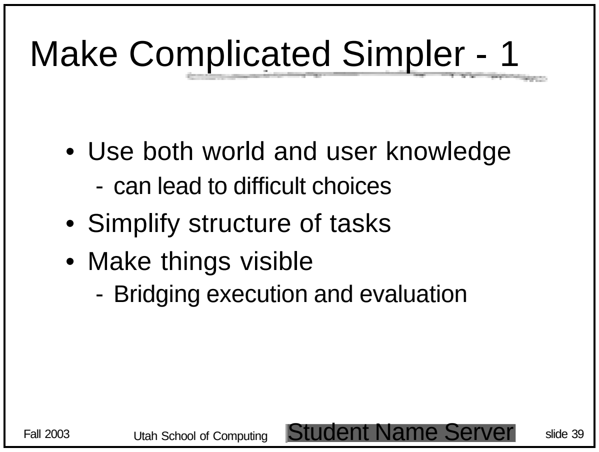
Interpreting Data

- This happened!
  - new procedure
  - same mistake on all engines
  - oil ran out because of maintenance error on new proc
  - our world view was wrong



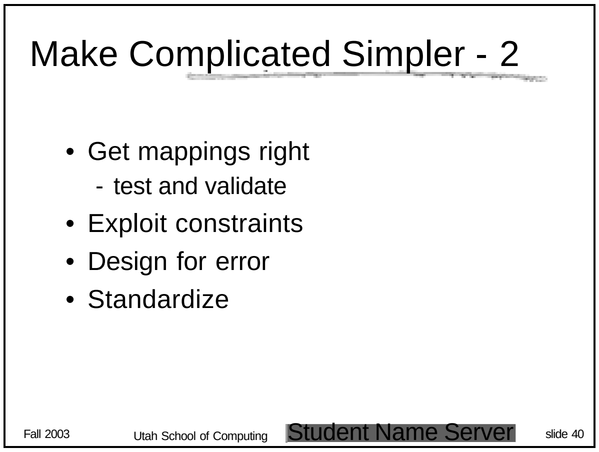
Effecting Actions

- Command mode
  - 3rd Person
  - Proxy
  - “fly by wire”
- Direct control
  - “hands on experience”
  - good haptic feedback



Make Complicated Simpler - 1

- Use both world and user knowledge
  - can lead to difficult choices
- Simplify structure of tasks
- Make things visible
  - Bridging execution and evaluation



Make Complicated Simpler - 2

- Get mappings right
  - test and validate
- Exploit constraints
- Design for error
- Standardize

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End *Lecture Set 3*

D A Norman Notes

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Pick up here...

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End of Lecture Set 1

Preliminaries