The Design of Everyday Things

Harley Eades

It’s never a users fault!

https://youtube.com/watch?v=yY96hTb8WgI

What is interaction?

Two-way

One-way is reaction

Communicative

Information is sent

Receptive

Information is received

Effective

There are changes as a result

What is interaction?

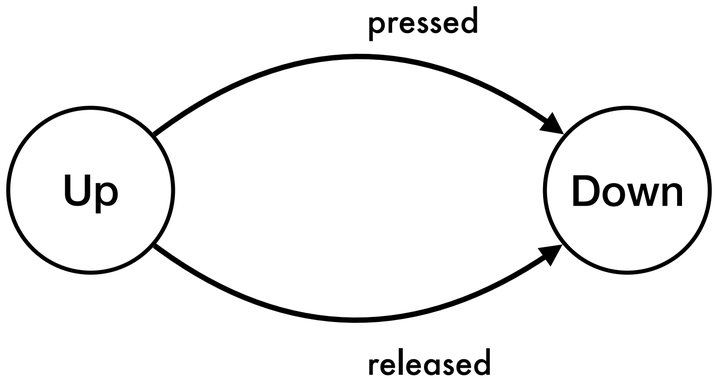
Two-way: One-way is reaction

Communicative: Information is sent

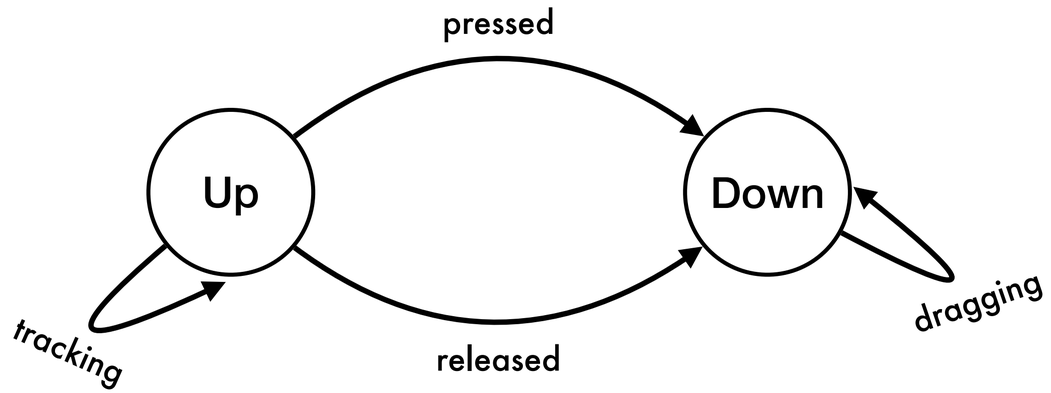
Receptive: Information is received

Effective: There are changes as a result

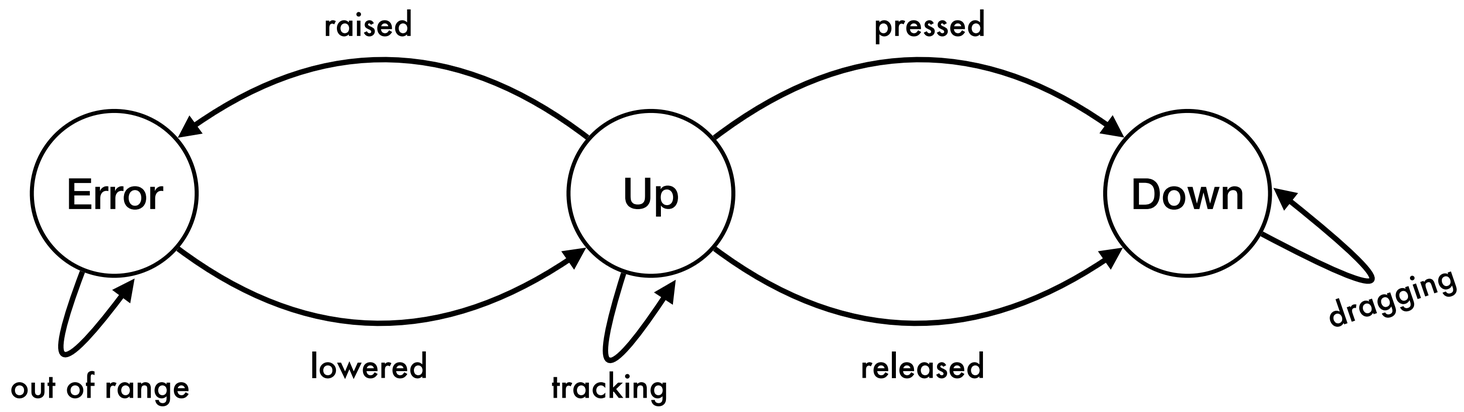
Model of a Button



Model of a 1-button mouse



Buxton's 3-State Model



Buxton's 3-State Model

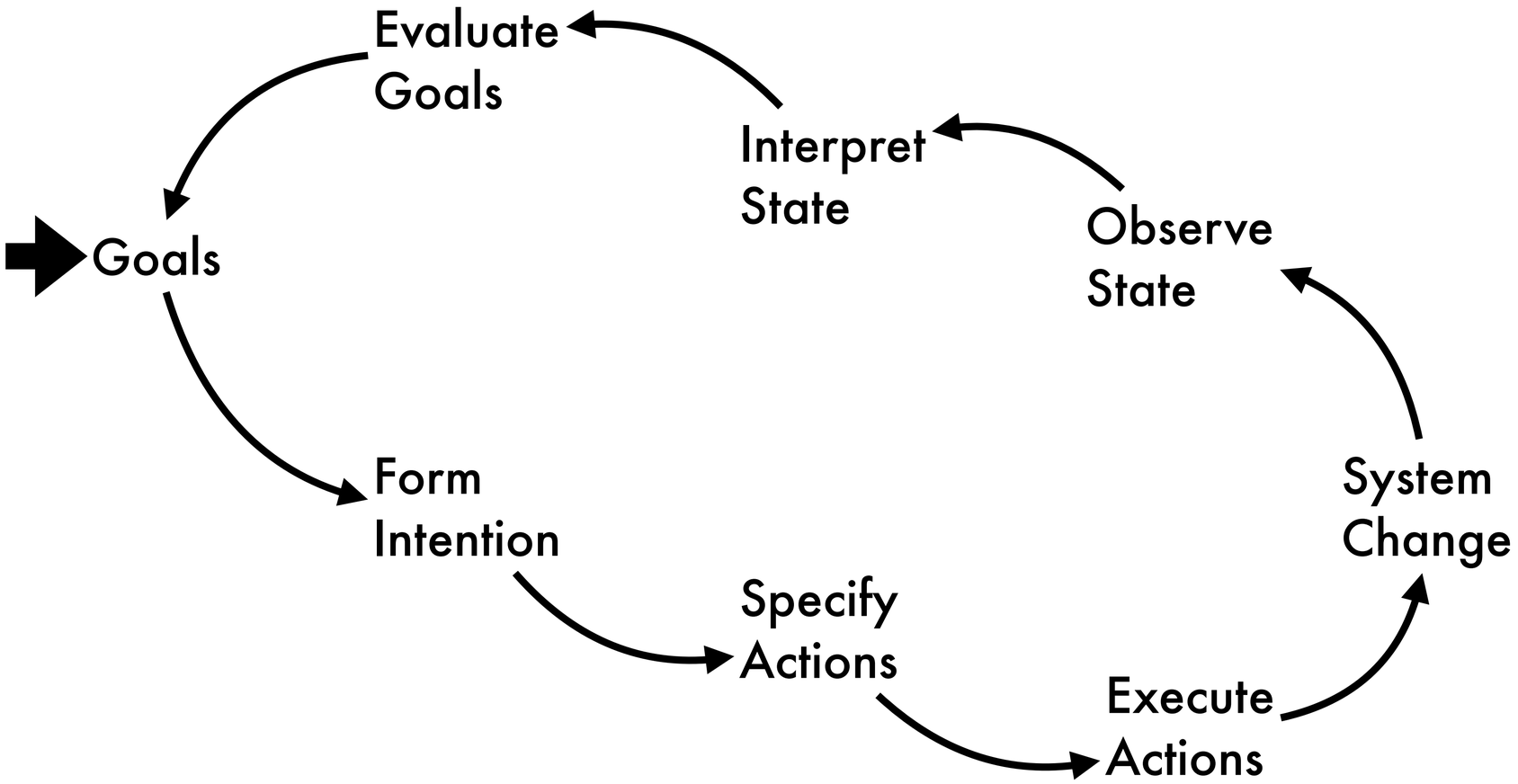
Reading assignment, due in lab next session

https://www.dgp.toronto.edu/OTP/papers/bill.buxton/3state.html

Norman's Execution-Evaluation Cycle

1. Establish the goal
   - Increase light in the room
2. Form the intention
   - To turn on the lamp
3. Specify the action sequence
   - Walk to the lamp, reach for the knob, twist the know
4. Execute the action sequence
   - [walk, reach, twist]
5. Perceive the system state
   - [head "click" sound, see light from the lamp]
6. Interpret the system state
   - The knob rotated. The lamp is emitting light. The lamp seems to work.
7. Evaluate the system state with respect to the goals and intentions.
   - The lamp did indeed increase the light in the room [goal satisfied]
8. [REPEAT]

Norman's Execution-Evaluation Cycle



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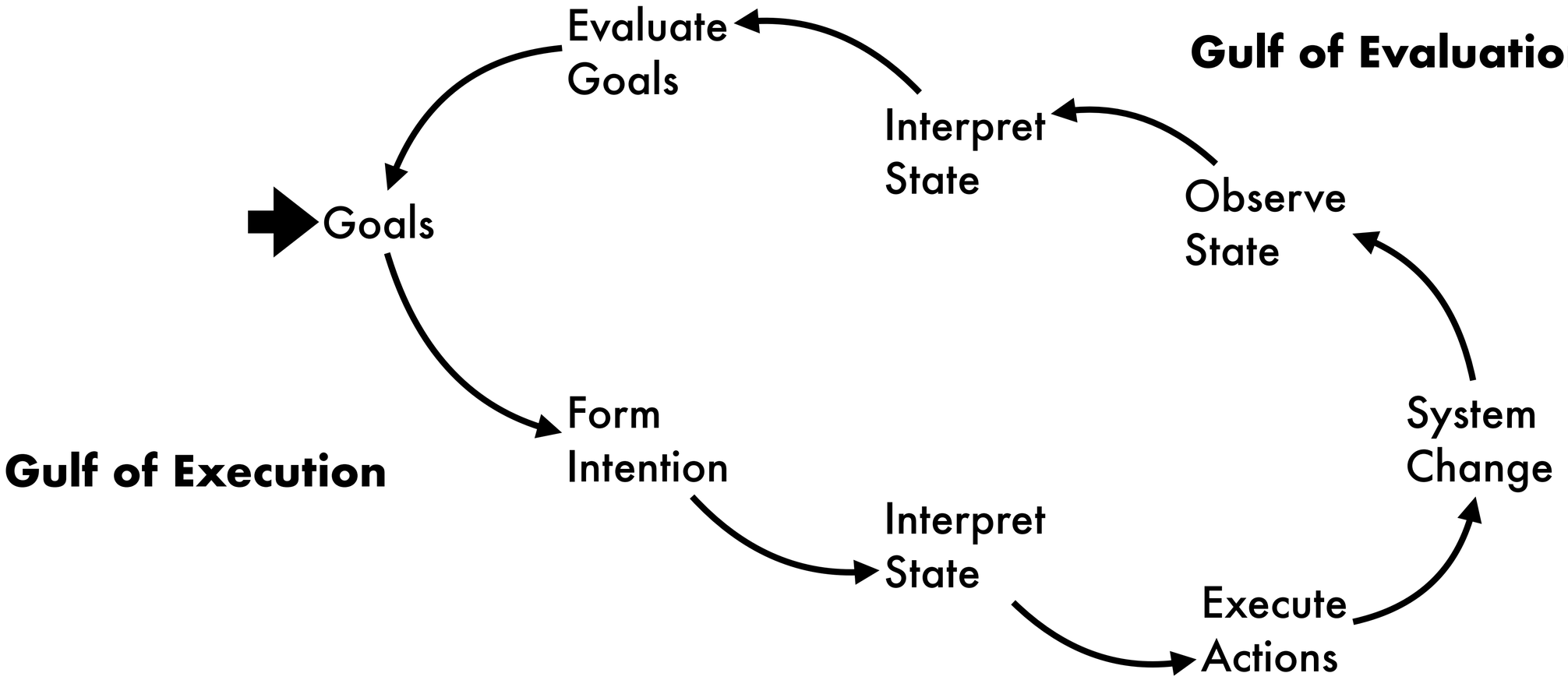
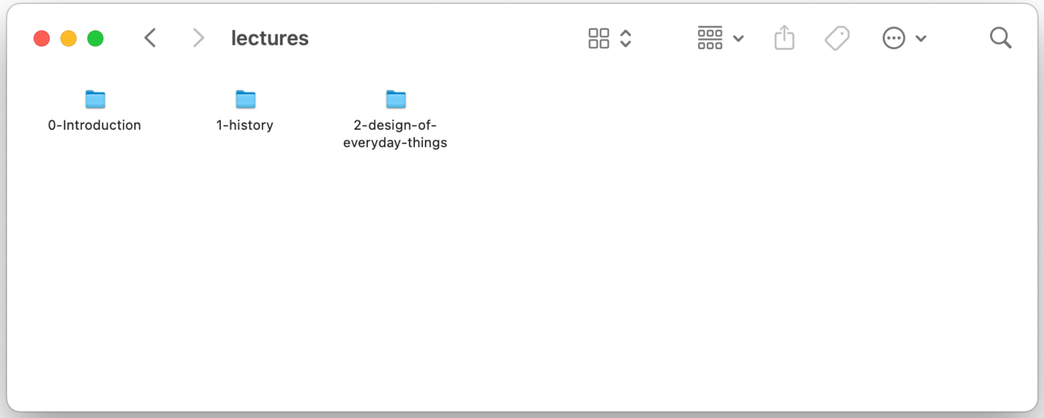


Gulf of execution example

1. Establish the goal
2. Form the intention
3. Specify the action sequence
4. Execute the action sequence

Goal: Make the folders easier to read



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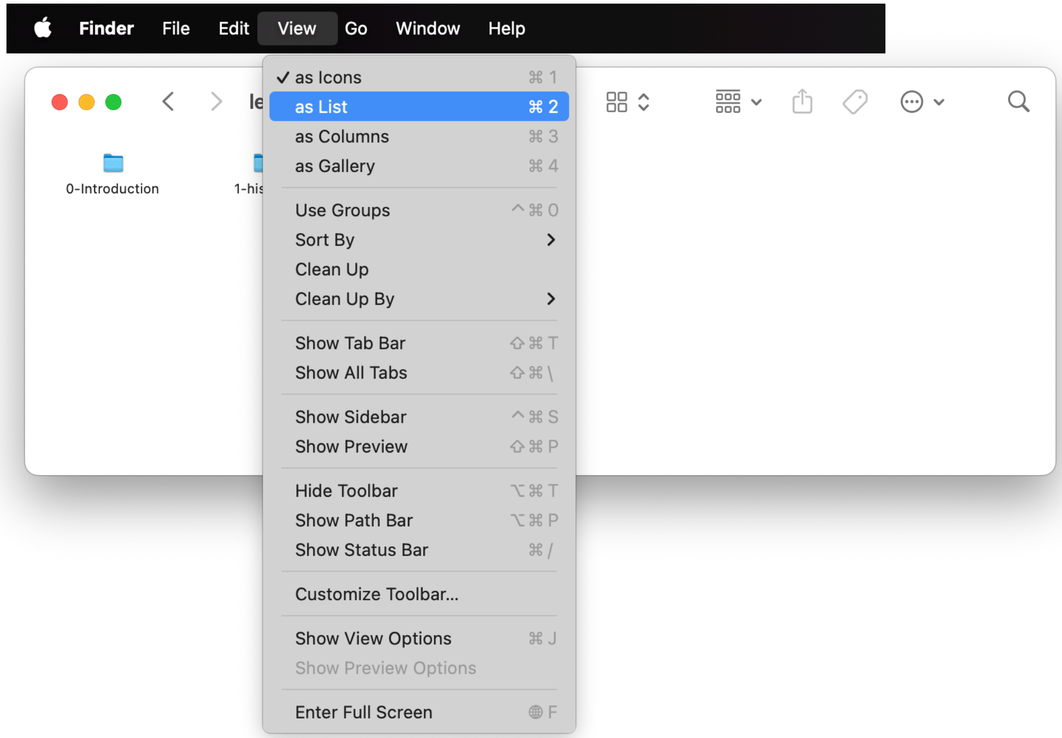
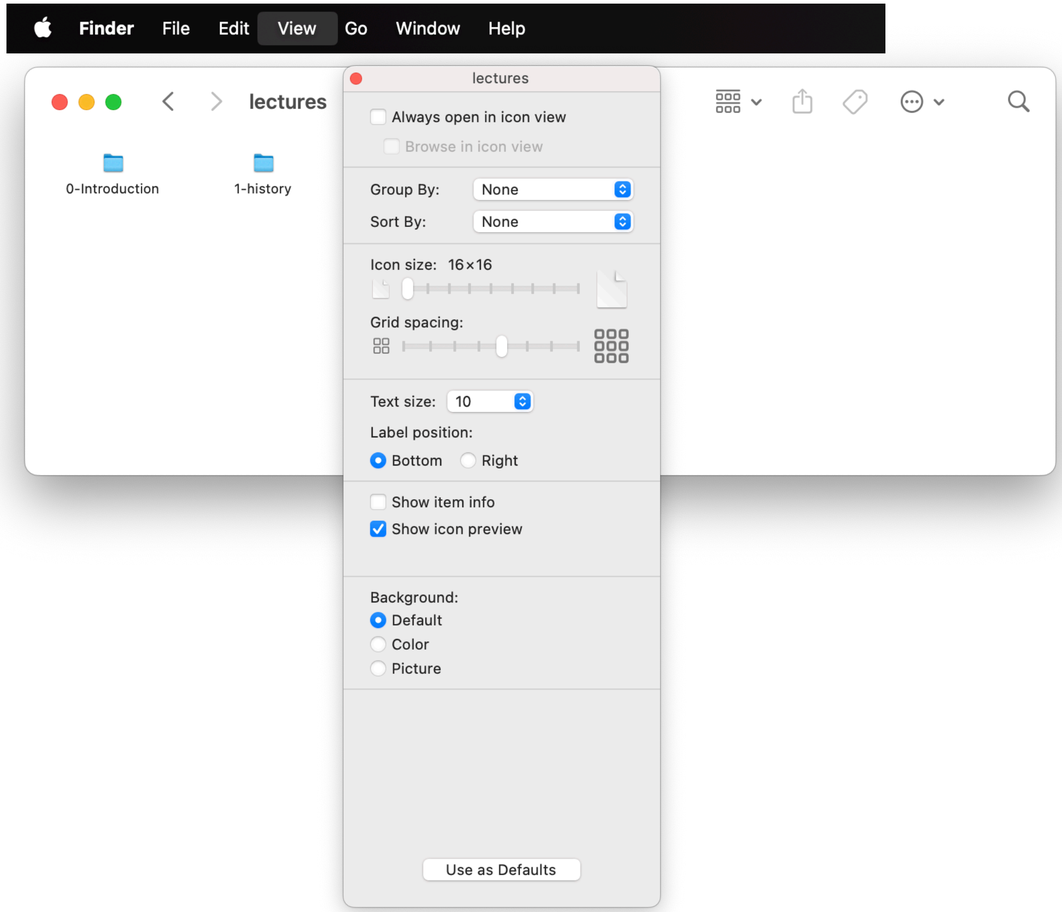


Gulf of execution example

1. Establish the goal
2. Form the intention
3. Specify the action sequence
4. Execute the action sequence

It was hard to specify the action sequence.
This extends the gulf of execution.

Goal: Make the folders easier to read

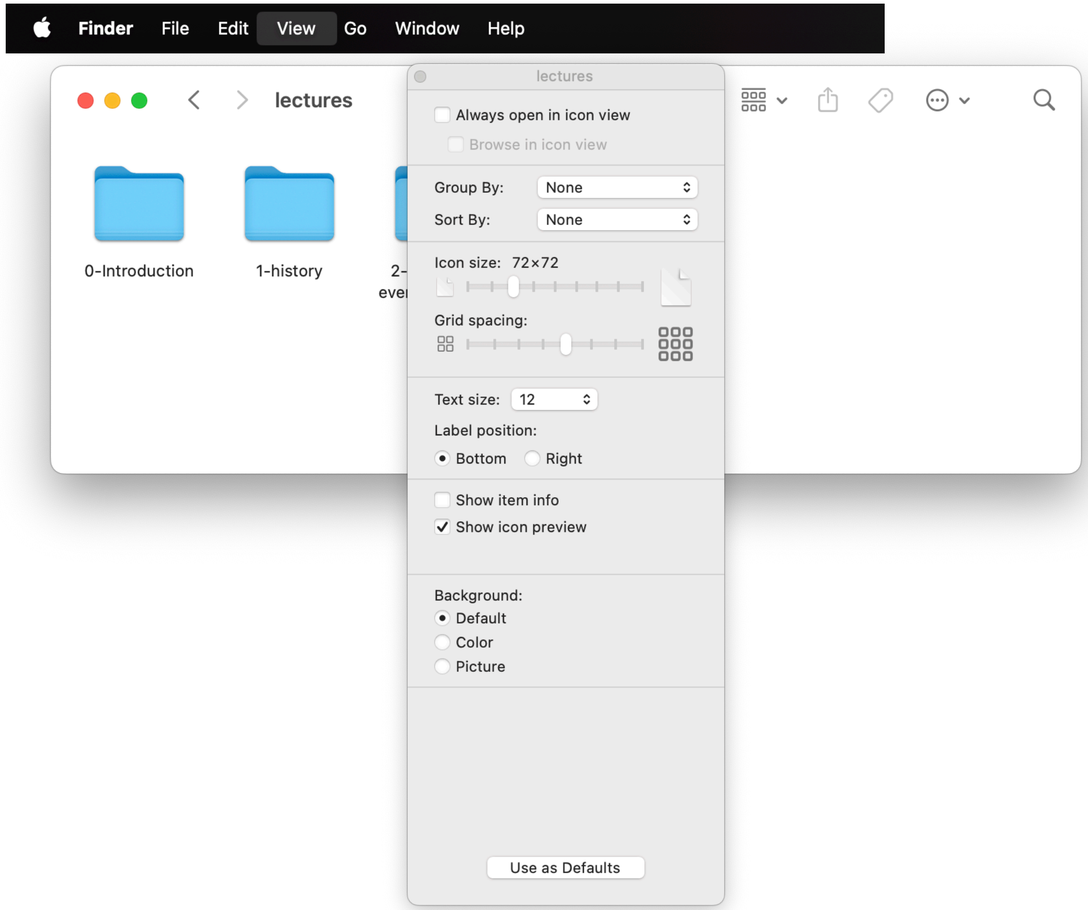


Gulf of evaluation example

5. Perceive the system state
6. Interpret the system state
7. Evaluate the system state with respect to the goals and intentions.

✅ The system made evaluation easy.

Goal: Make the folders easier to read



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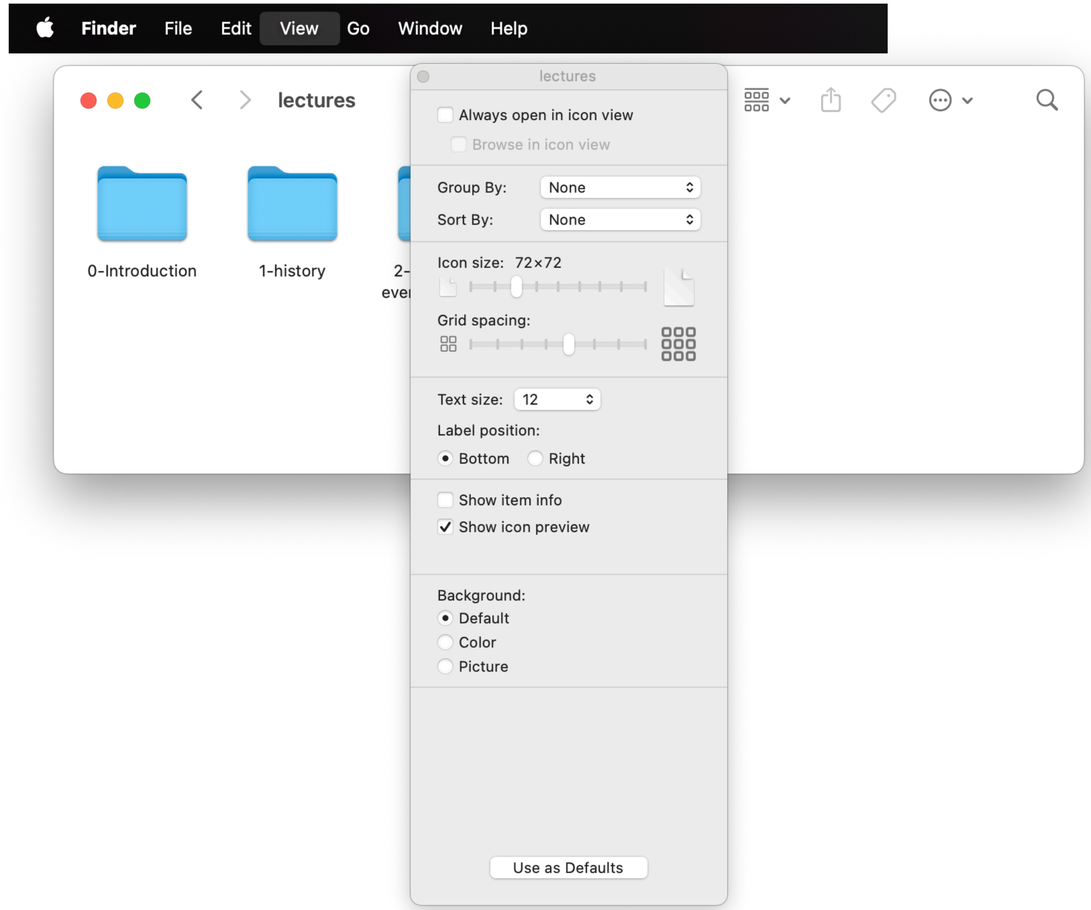
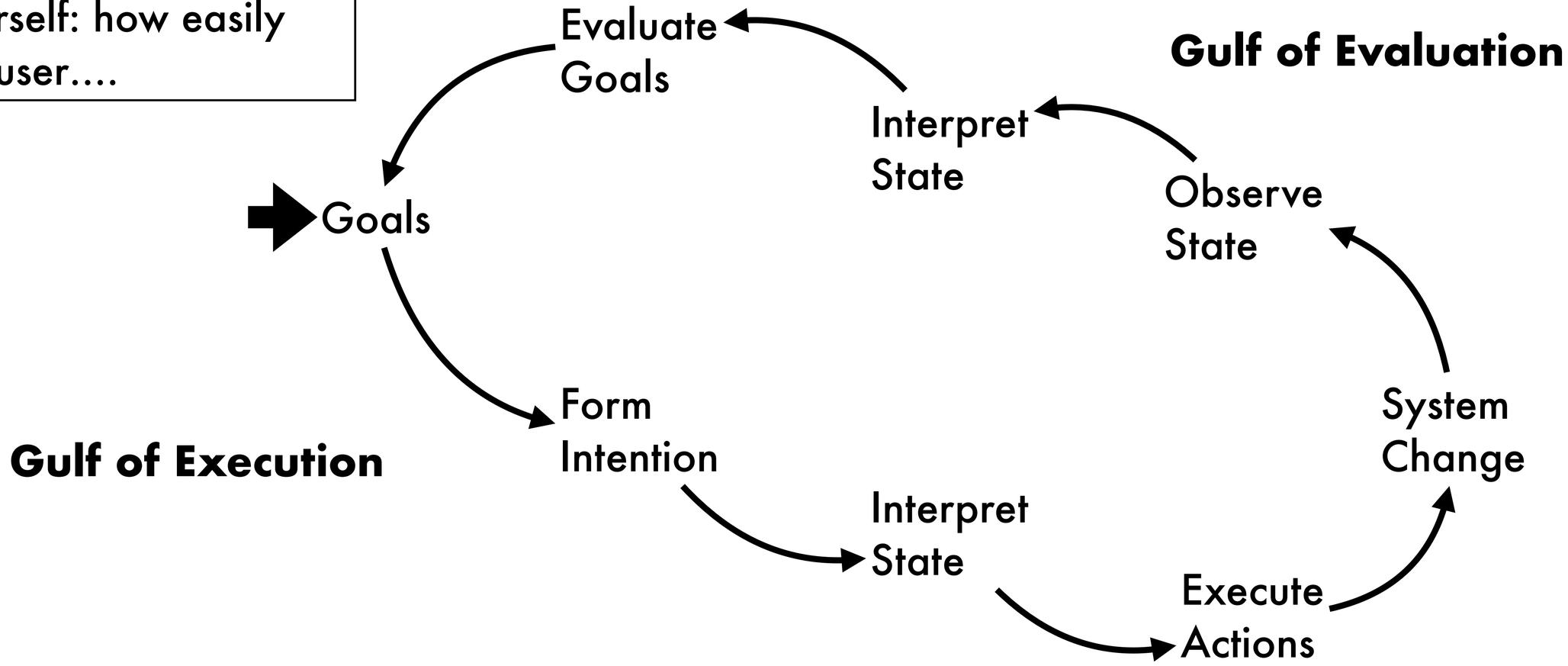


✅ The system made evaluation easy.

!! Ask yourself: how easily can the user….



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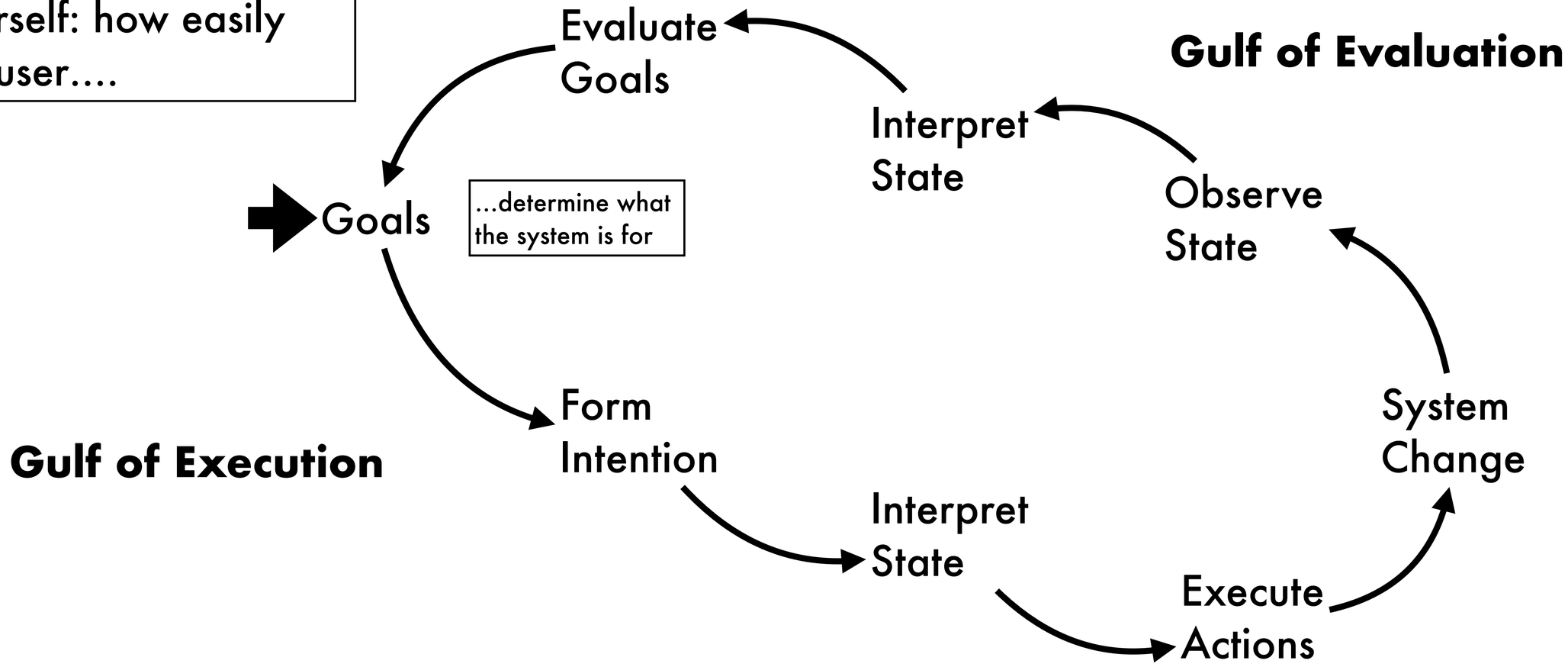

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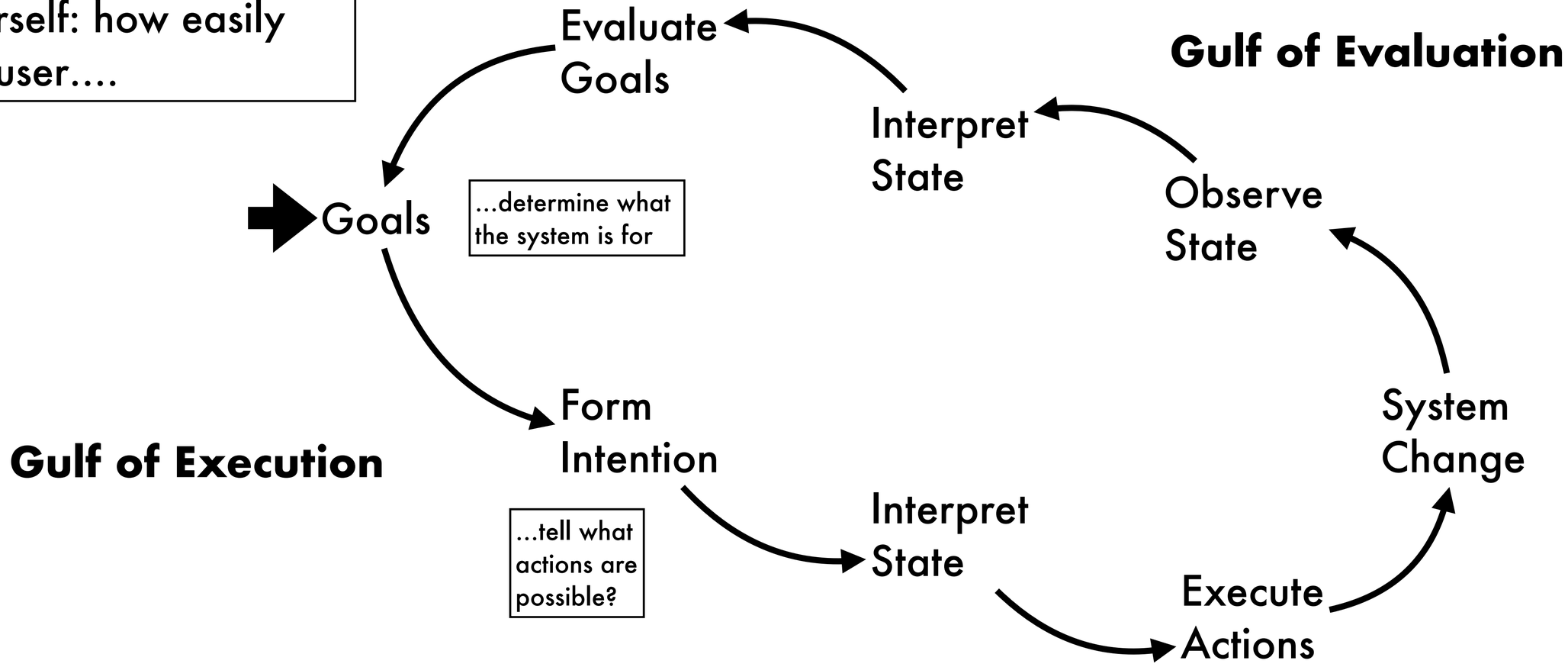

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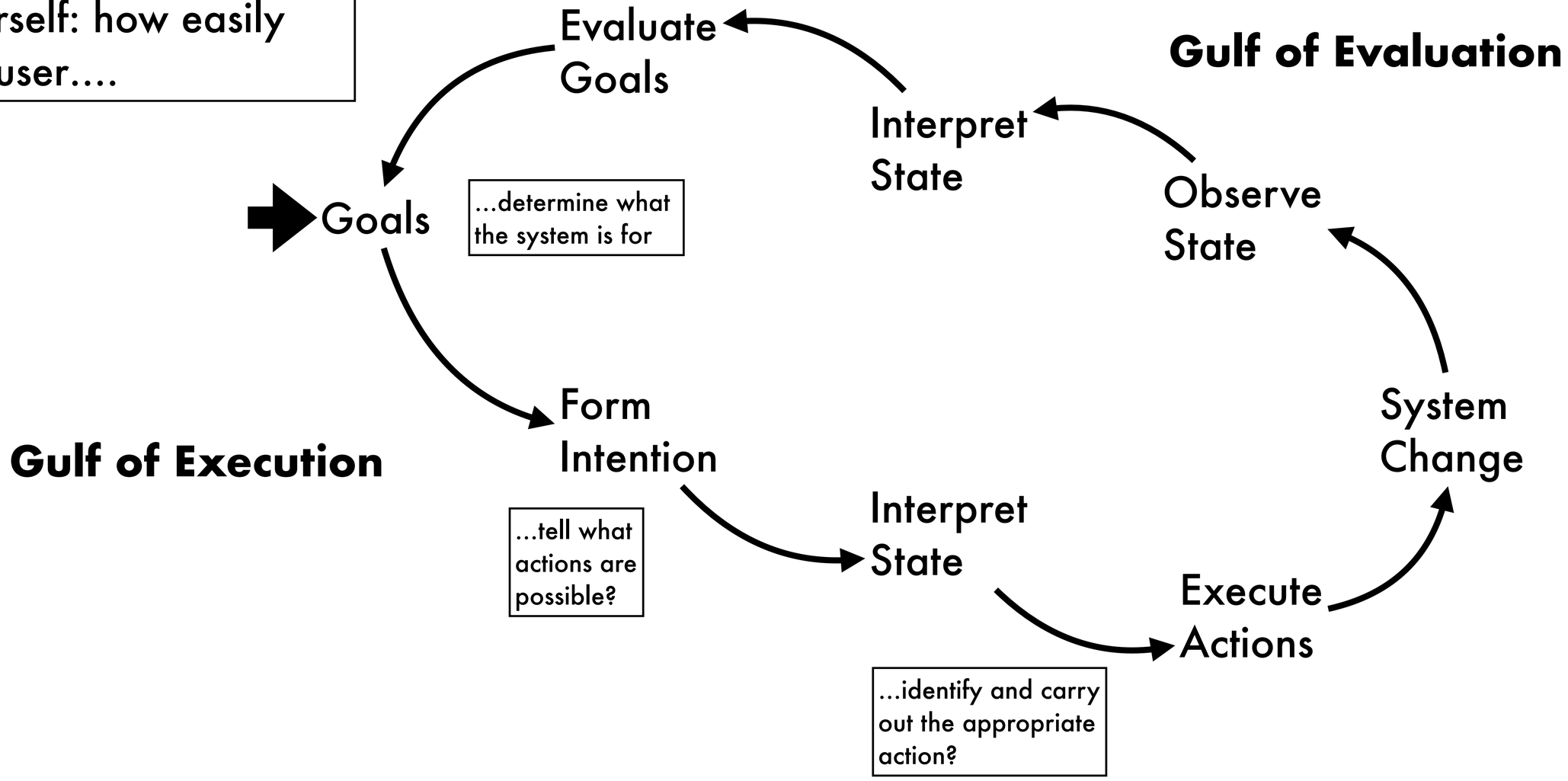

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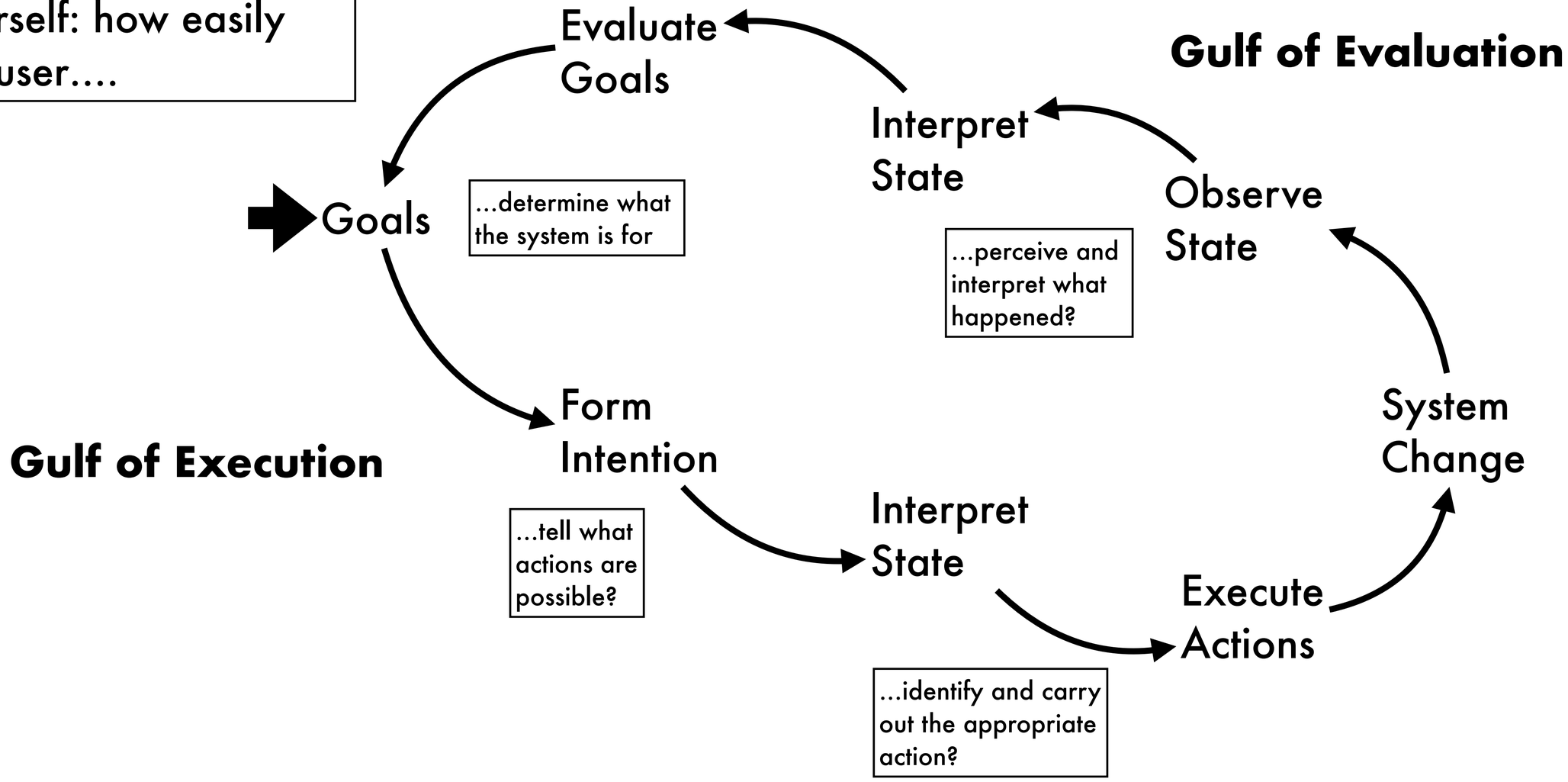

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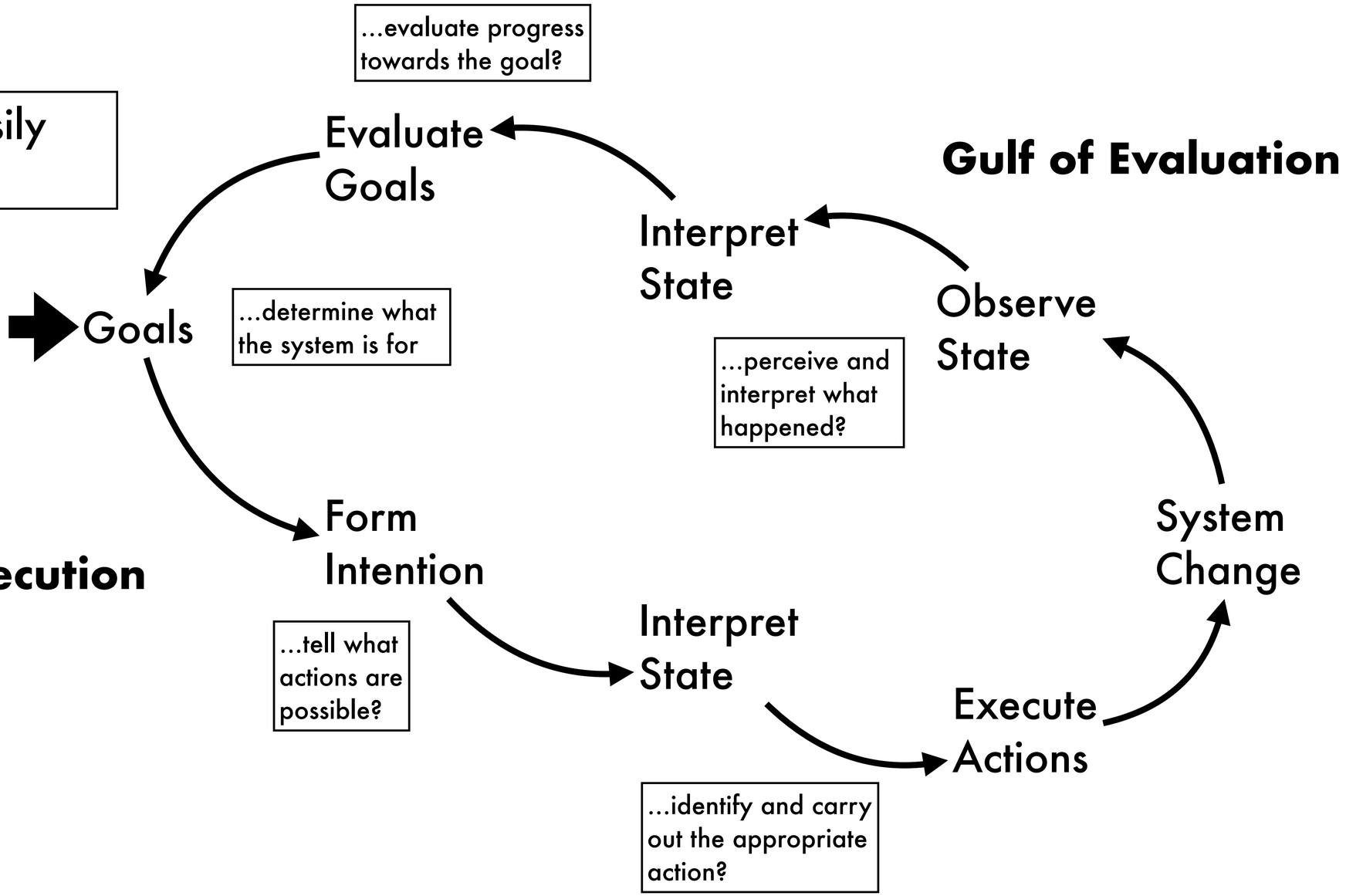


Design Principles

Affordances
Constraints
Feedback
Consistency

Metaphors
Mappings
Visibility

They help us answer the questions the execution-evaluation cycle pose to us.

Design Principles

Affordances

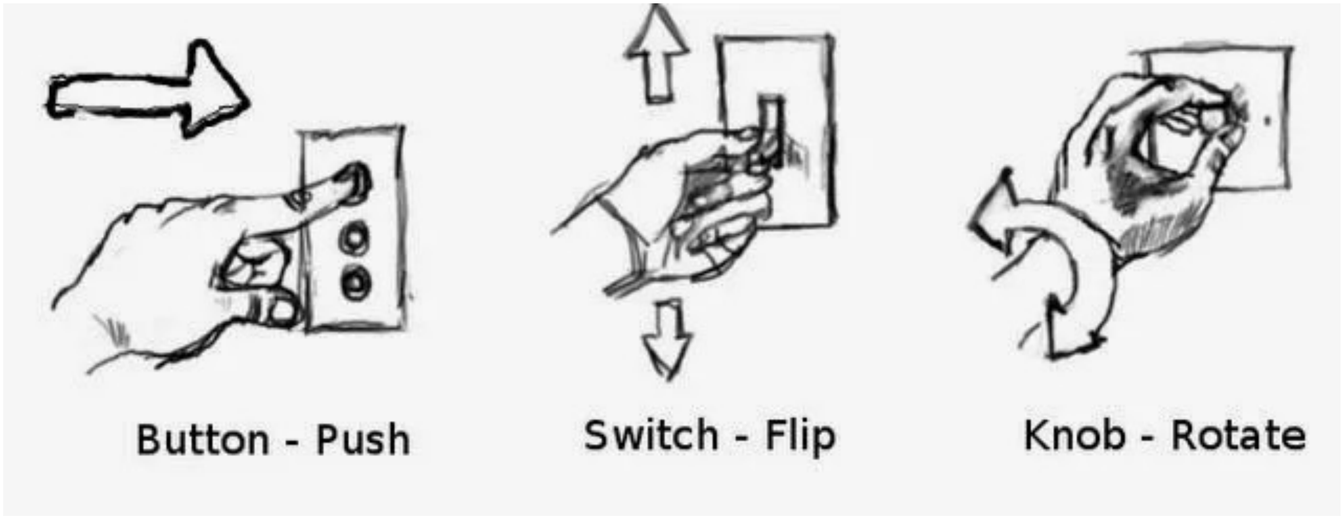
Affordances

Perceived Action Possibilities

What does this chair afford?

Affordances

Perceived Action Possibilities



Affordances

Perceived Action Possibilities

Affordances

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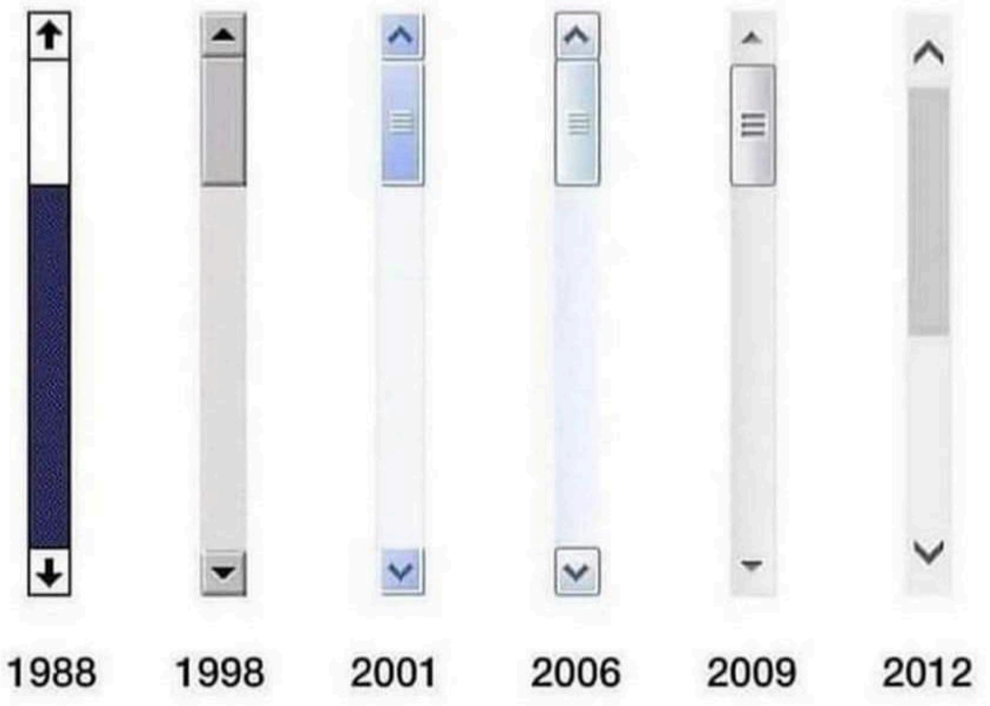
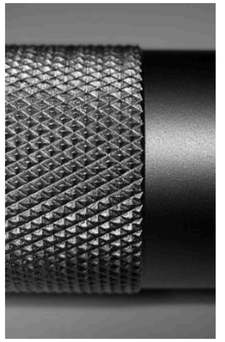


Real-world example

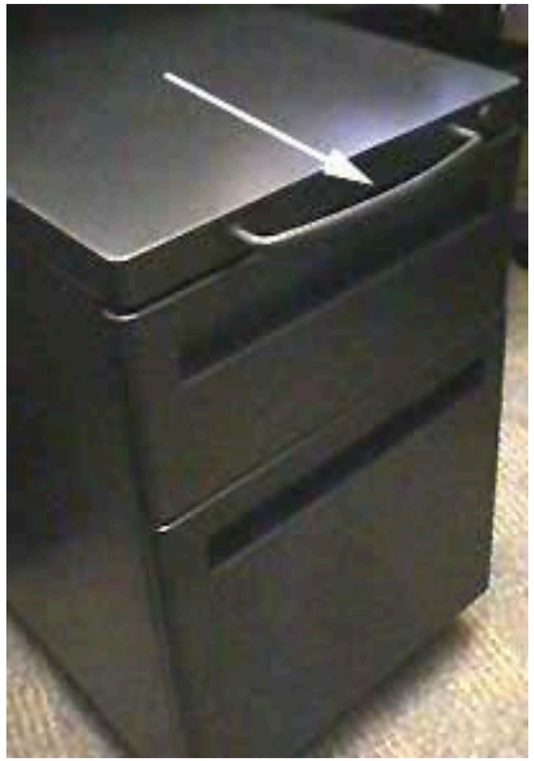


Affordances

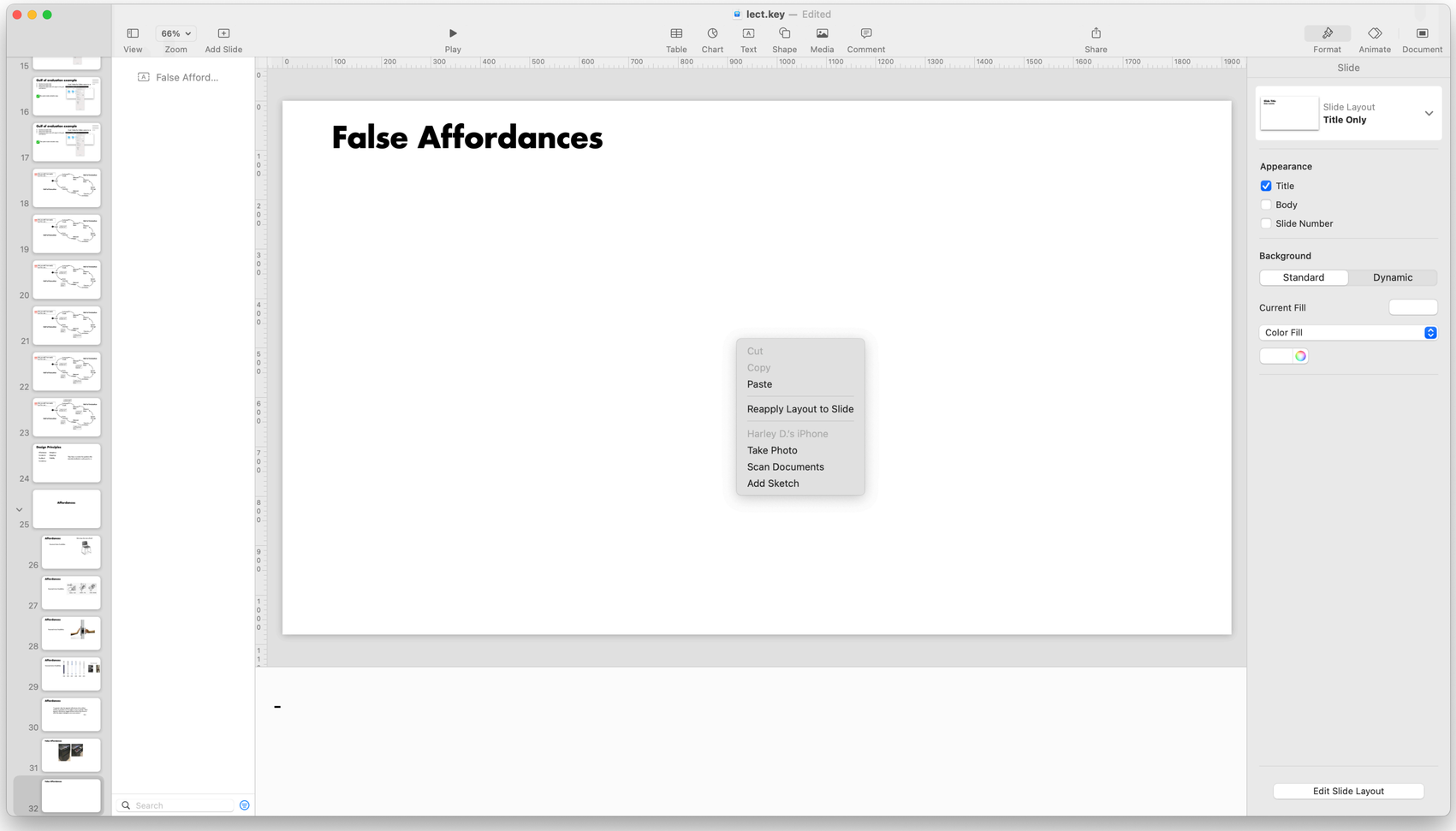
"In general, when the apparent affordances of an artifact matches its intended use, the artifact is easy to operate. When apparent affordances suggest different actions than those for which the object is designed, errors are common."

Gaver

False Affordances

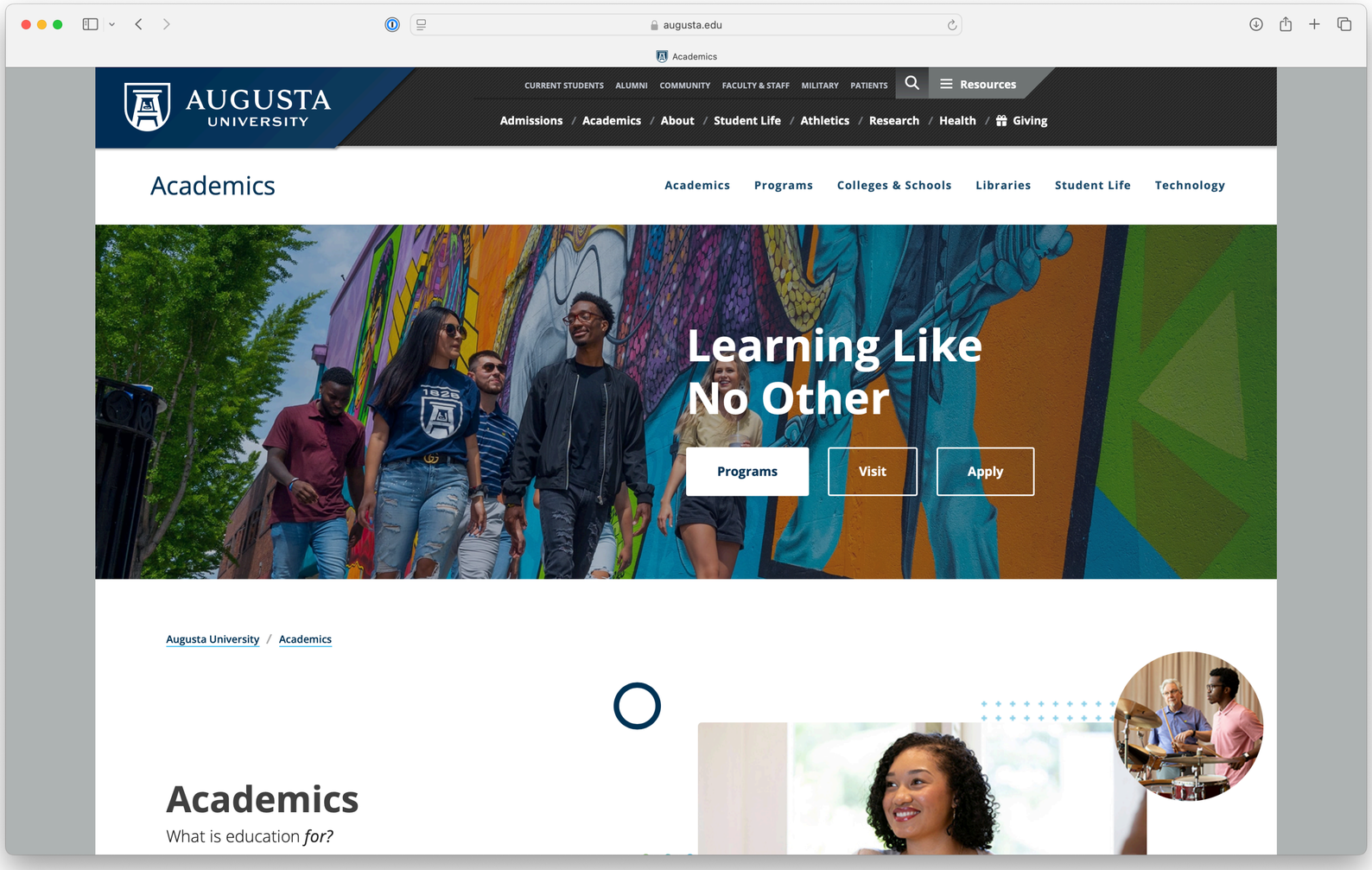


Hidden Affordances



Hidden Affordances

Clicking the logo on websites to return to the home page is a convention, but not afforded by the page.



Convention vs Affordances

"Designers sometimes will say that when they put an icon, cursor, or other target on the screen, they have added an 'affordance' to the system. This is a misuse of the concept. … It is wrong to claim that the design of a graphical object on the screen 'affords clicking.' … Yes, the object provides a target and it helps the user know where to click and maybe even what to expect in return, but those aren't affordances, those are conventions, and feedback, and the like. … Don't confuse affordances with conventions."

Norman

Affordances vs Signifiers

Affordances are the possible interactions between people and the environment.
(It is not a property of the "thing"!)

Perceived affordances often act as signifiers, but they can be ambiguous.

Signifiers signal things, in particular what actions are possible and how they should be done. Signifiers must be perceivable, else they fail to function.

Design Principles

Constraints

Constraints

Prevent some actions while allowing others.

Prevent errors before they can happen

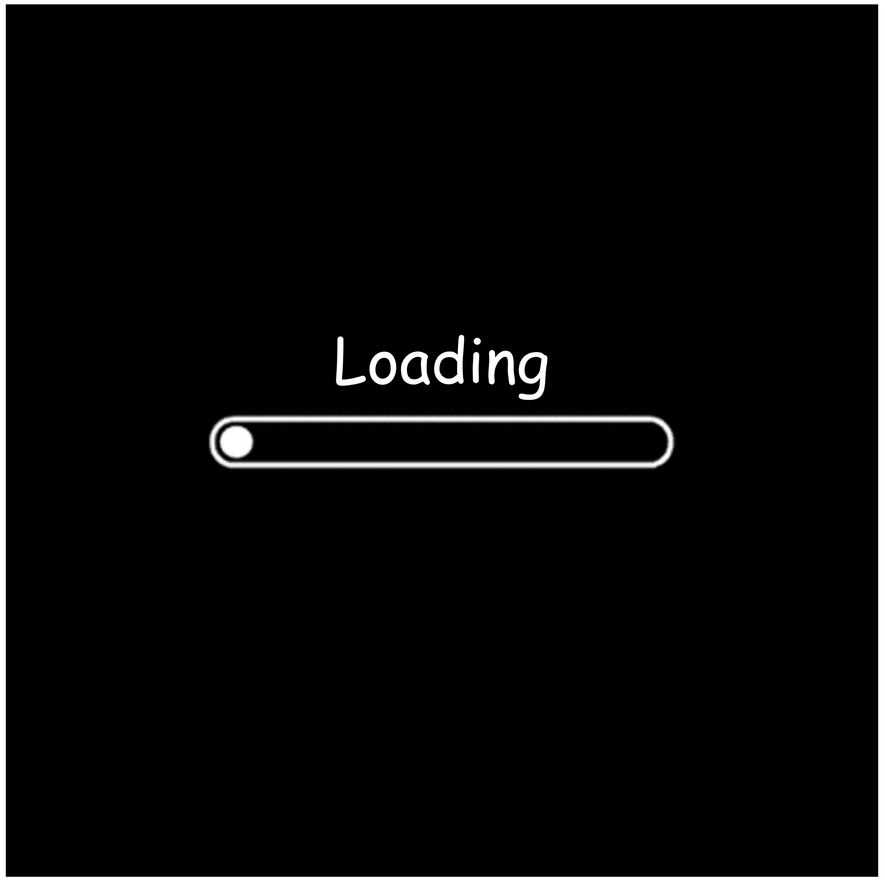
<u>Disruptive error messages are a last resort</u>

Constraints

Design Principles

Feedback

Feedback



Feedback

All actions have to be confirmed

Must be immediate

Must be informative

Preferably non-distracting and unobtrusive

Design Principles

Consistency

Consistency

Interfaces should be consistent in meaningful ways

Ex: Ubiquitous use of the same keys for cut/copy/paste

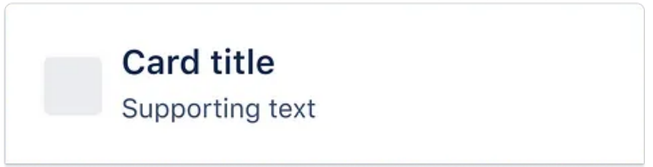
Types of consistency

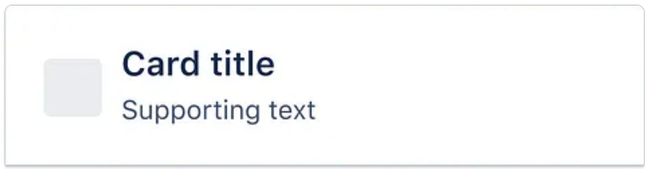
- Internal (i.e., within itself)
  - Ex: The same terminology and layout throughout
- External (i.e., with other applications)
  - Ex: common widget appearance
  - Ex: design patters common across applications

Consistency

Is consistency always better?

Original design





Consistent design

Design Principles

Metaphors

Metaphors

Suggest an existing mental model

Examples

Desktop metaphor

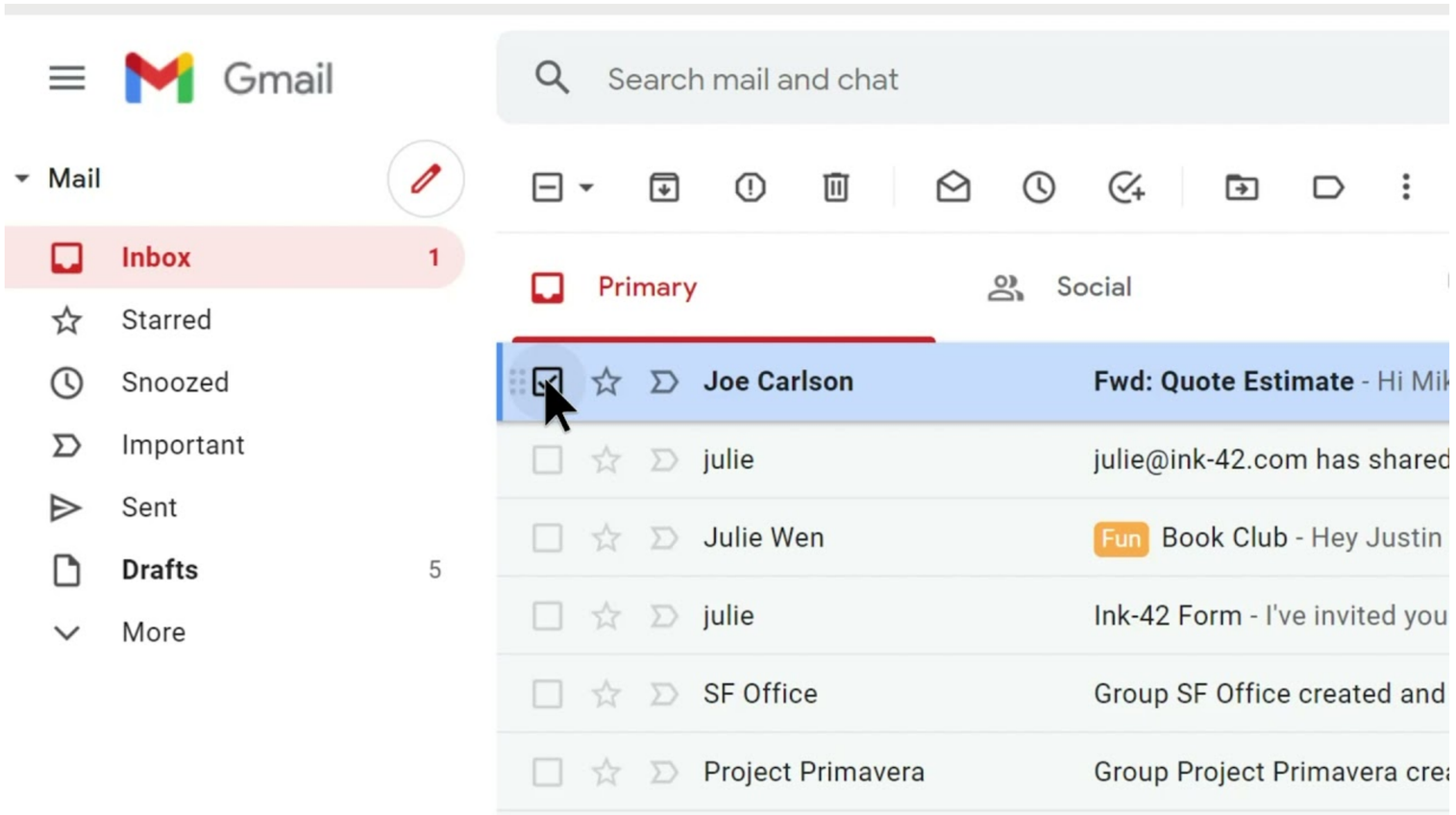
- Simulate a real desktop
- files, folders, trash
- Hidden windows

Wireless

- Invisibility
- distance

Metaphors

Ex: Email!



Metaphors

Ex: icon for zooming

Broken Metaphors

Are not consistent, do not operate in every circumstance, or do not uphold things consistent with what the metaphor would suggest

Dead Metaphors

Lost the original imagery of their meaning

Ex: Radio buttons!

Appearance hide

Text

- ○ Small
- ◉ Standard
- ○ Large

Width

- ◉ Standard
- ○ Wide

Color (beta)

- ○ Automatic
- ◉ Light
- ○ Dark

Design Principles

Mappings

Mappings

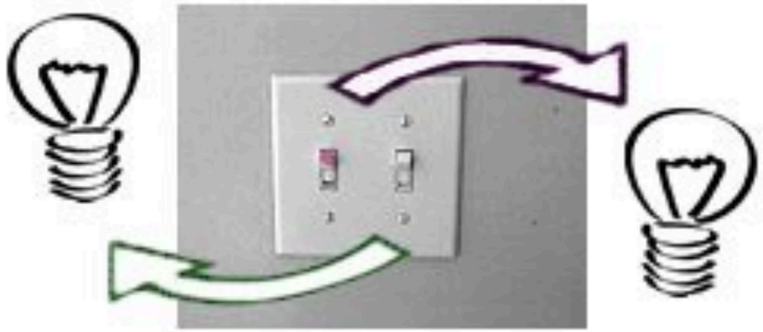
Correspondence between an interface and the corresponding action in the world.

Minimizes cognitive steps to:

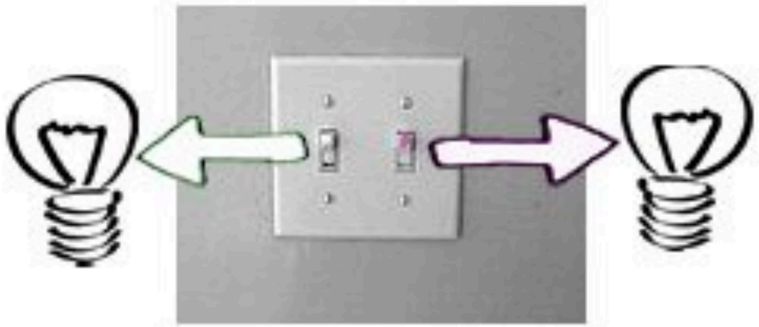
- transform action into effect
- perception into comprehension

Mappings

Ex: Light switches



Removing the cover plate, then removing and swapping the switches.



From http:/ /fivesketches.com/2009/11/natural-mapping-of-switches/

Mappings

Ex: Stovetop

Mappings

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Mappings

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Mappings

Ex: Stovetop

Mappings

Ex: Euros

Mappings

Ex: Euros

Design Principles

Visibility

Visibility

Use visual function to confirm the user's mental model of operation

Differentiate opposing functionality

- Sound can, sometimes, be used to make things visible.
  - e.g., vacuum cleaner clogging up
- Just the right things have to be visible: excess is as bad as lack of visibility

Visibility

Ex: Cockpits

Visibility

Ex: Elevator with security panel

Features of Good Design

- **Affordances**: make each operation visible
- **Mappings**: makes the relationship between the actual action of the device and the action of the user obvious
- **Feedback**: make the result the users action obvious
- **Mental model:** make the underlying behavior of the device easy to understand and remember
- **Constraints**: make errors less possible by forcing the only action to work to be the right action