

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation!

Lecture 04: Design Principles I

Instructor: Amy Zhang, 10/12/2021

Today's Topics

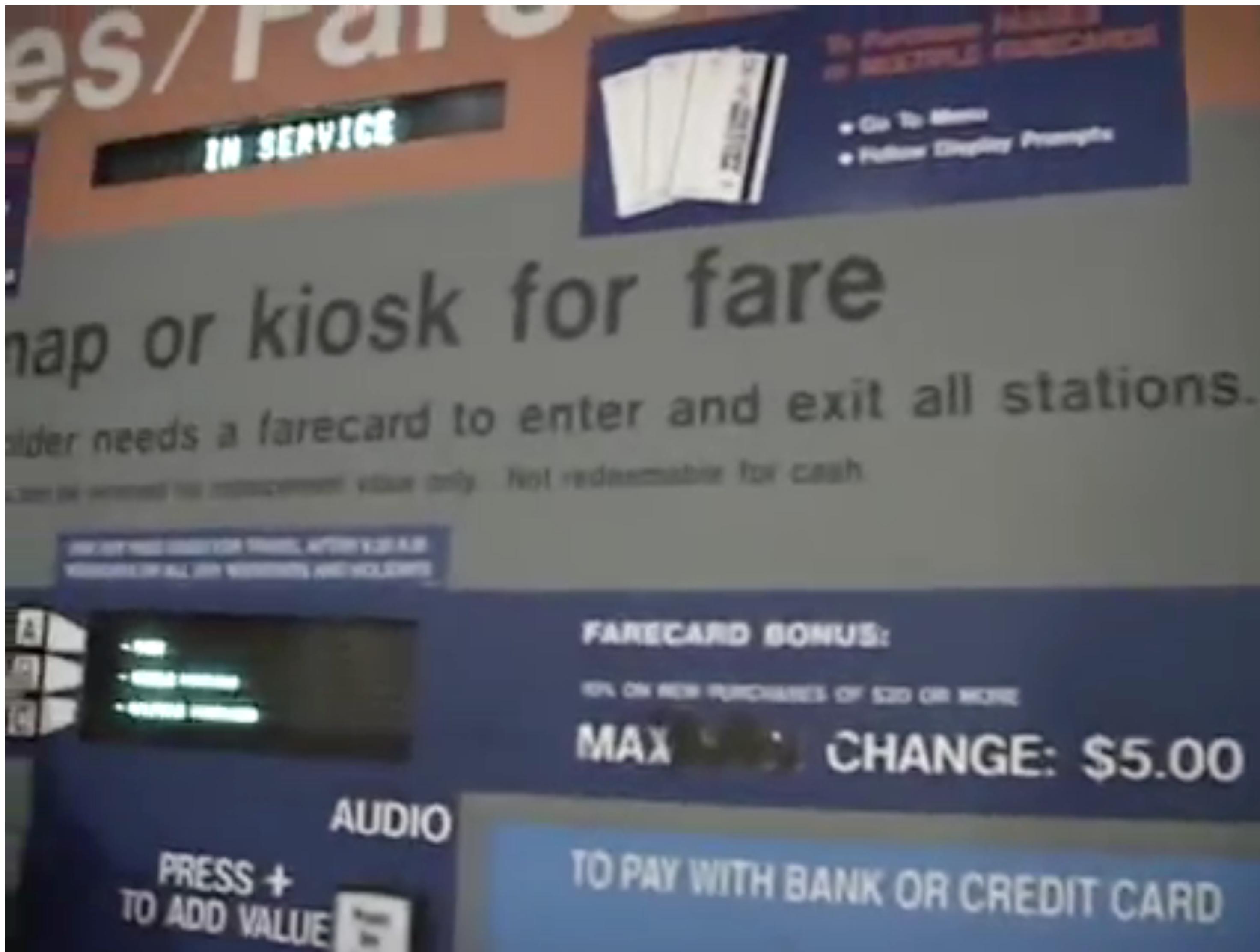
- UI Hall of Fame or Shame
- Design Principles: Learnability
 - How do people learn a new UI?
 - How can we design more learnable UIs?
 - Affordances, recognition, consistency, metaphors, mapping, visibility
 - How does learning break down?
 - Group work time on 2a!

UI Hall of Fame 😁 **and Shame** 😞

A tale of two cities...



A tale of two cities...

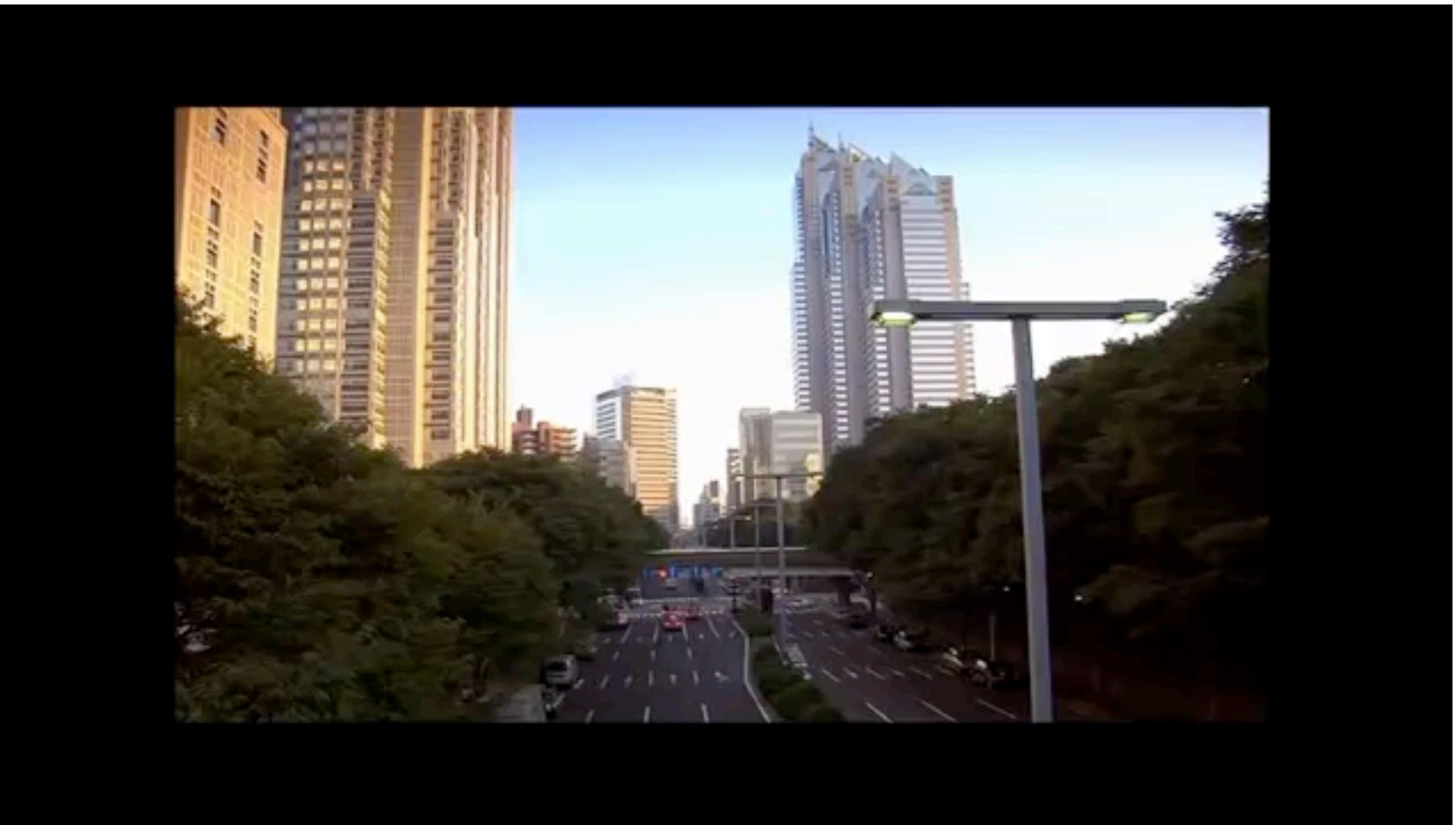




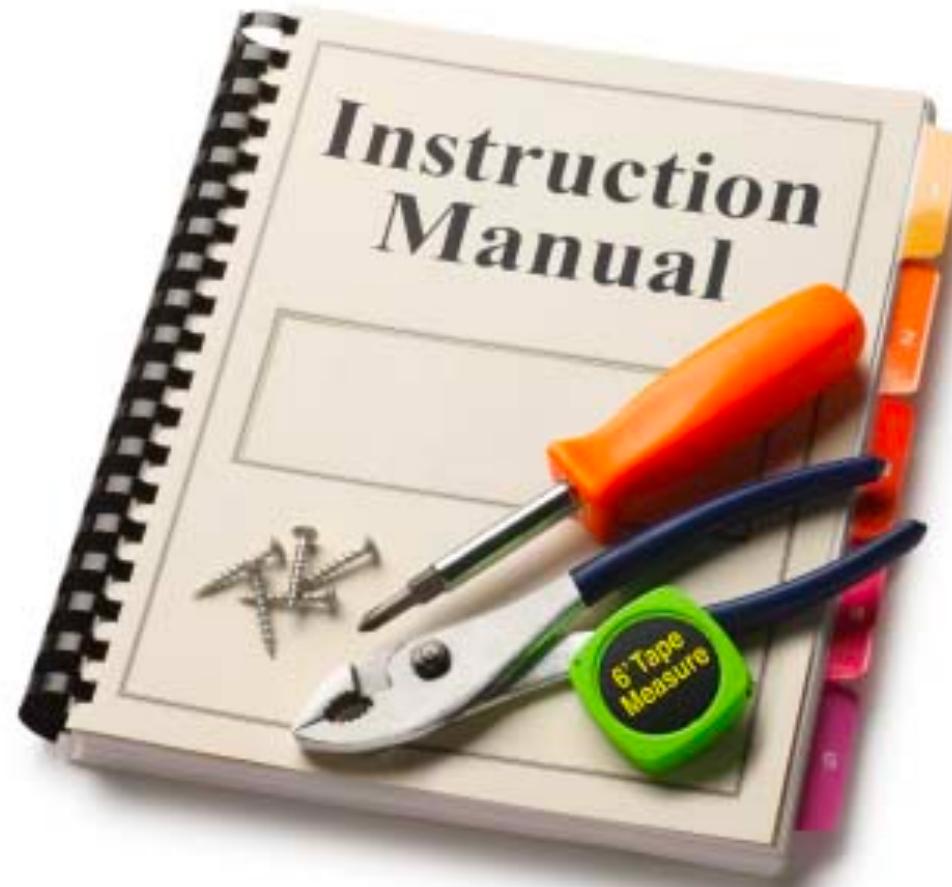
What about efficiency?
Safety?

Which interface is easier to learn? Why?





How do people learn a new UI?



reading a manual? **X**

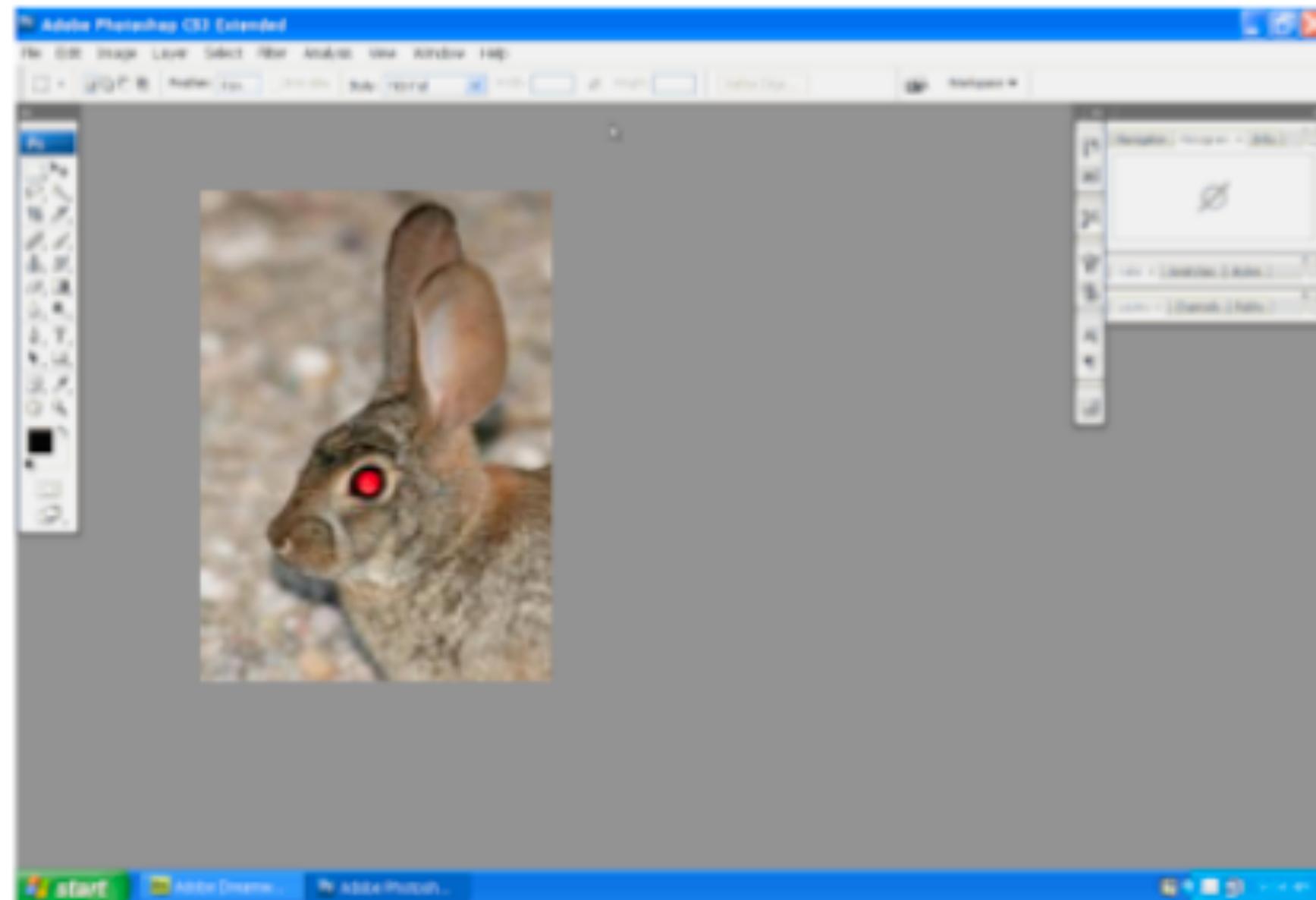


taking a class? **X**



consult the help page /
anthropomorphized
paperclip? **X**

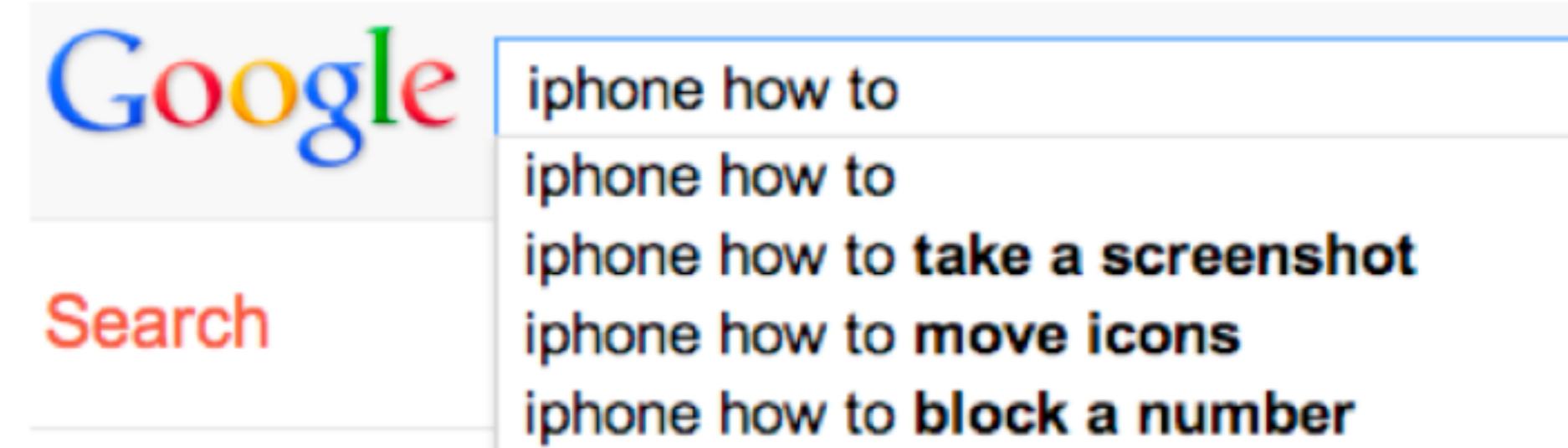
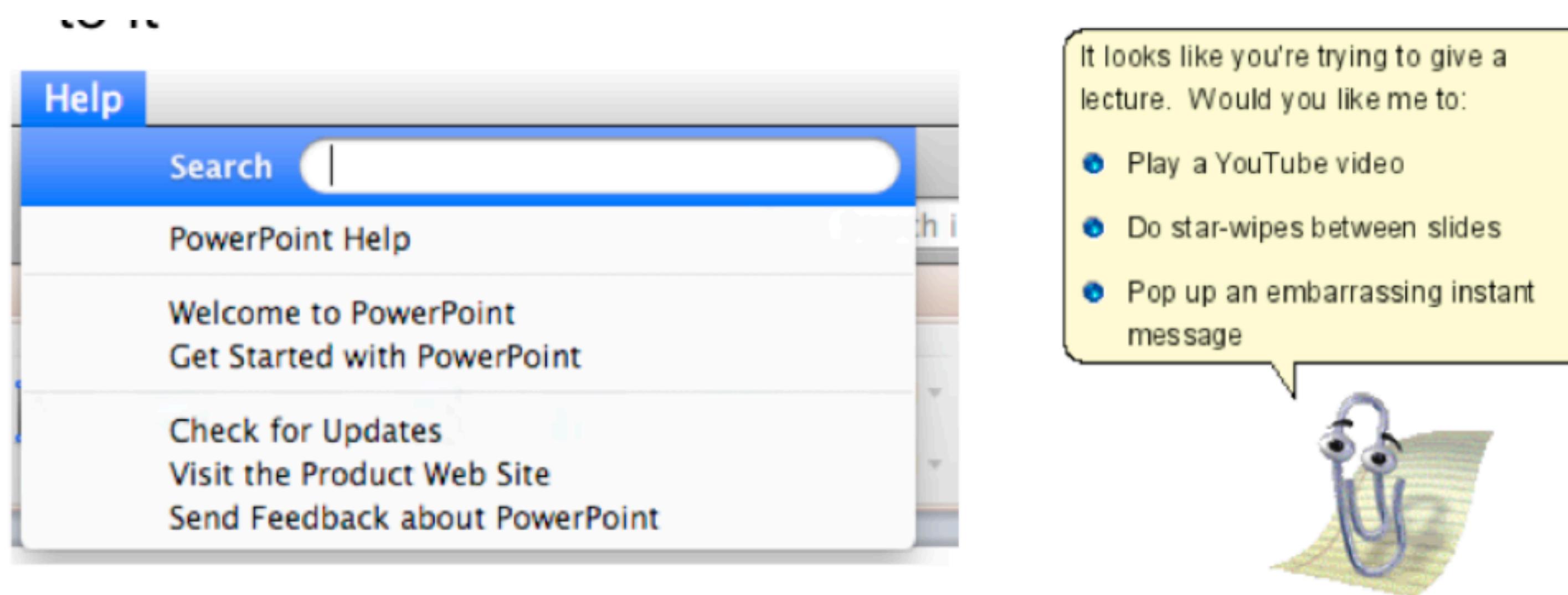
Learn by Doing



- A user has a **goal** they want to achieve
 - “Get rid of the redeye from my photo”
- The user **explores** the interface for features that satisfy the goal

Learn by Doing

- Only when they are stuck, do they resort to seeking help or going back to read instructions



Learn by Watching



- Since people mostly learn by doing when it comes to UIs, **we should know the user's goals when we design.**
- The UI should **itself** communicate how it works and how to use it. This doesn't mean lots of explanatory text (because people will oftentimes ignore that).

**How can we design more
learnable UIs?**





MIT Confessions

2h ·

#49398 I'm an alum and I still lie awake at night sometimes thinking about the fact that I accidentally threw away my trash in the outgoing mail slot next to the trash slot in building 56 and 66 for an entire year before realizing. The number of mostly finished Cosi soups that got dumped in there...still haunts me.

15

4 Comments

Like

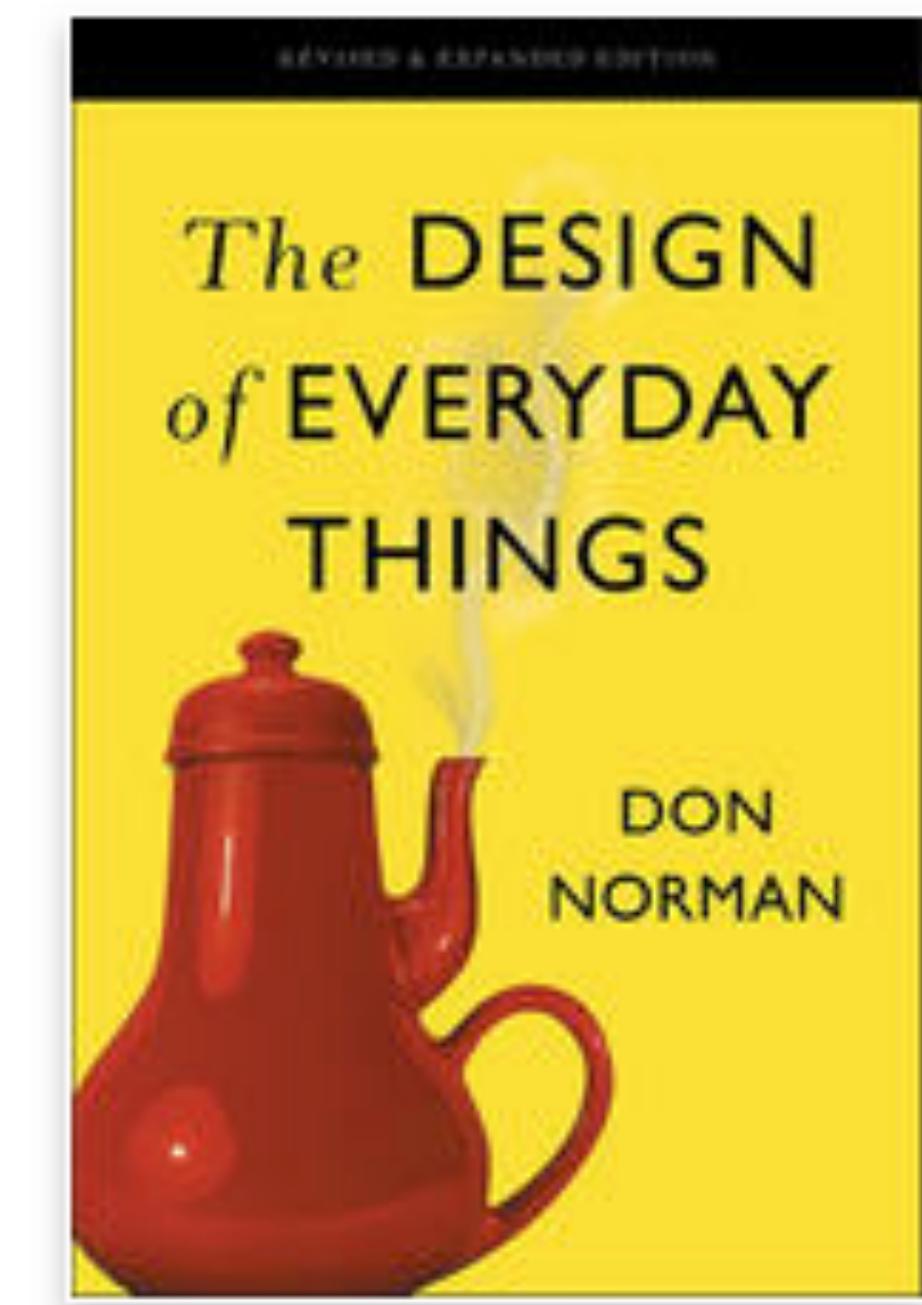
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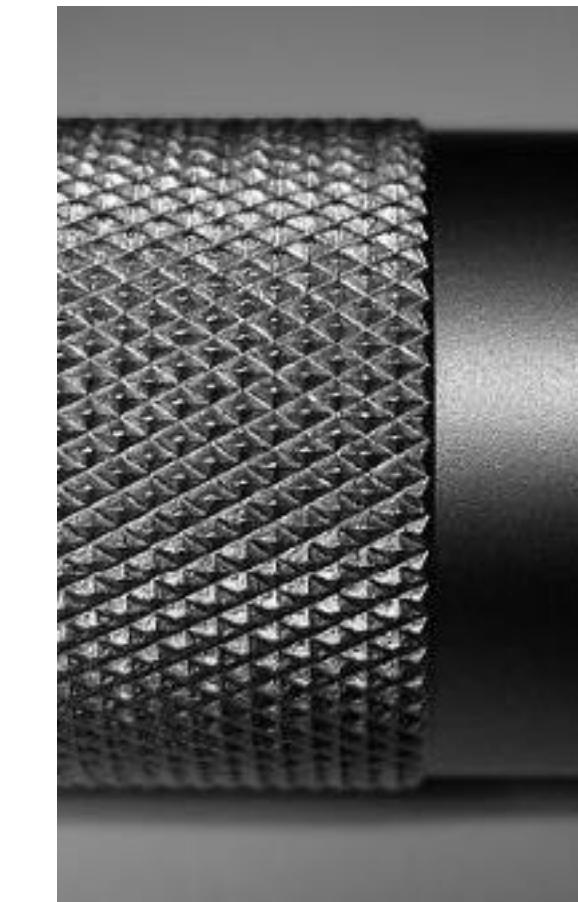
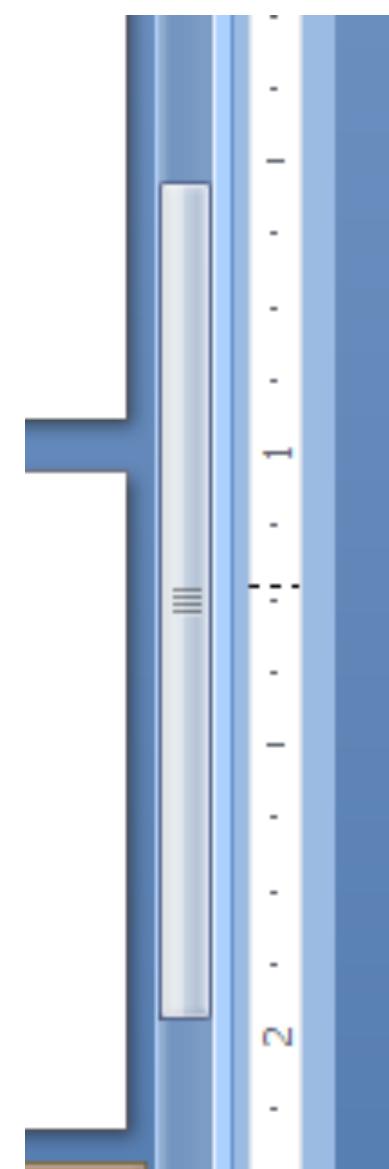
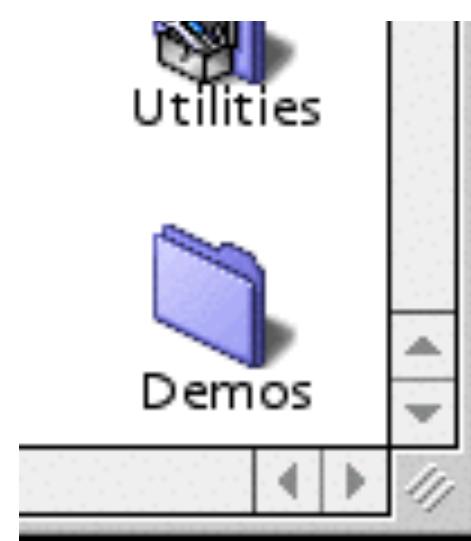
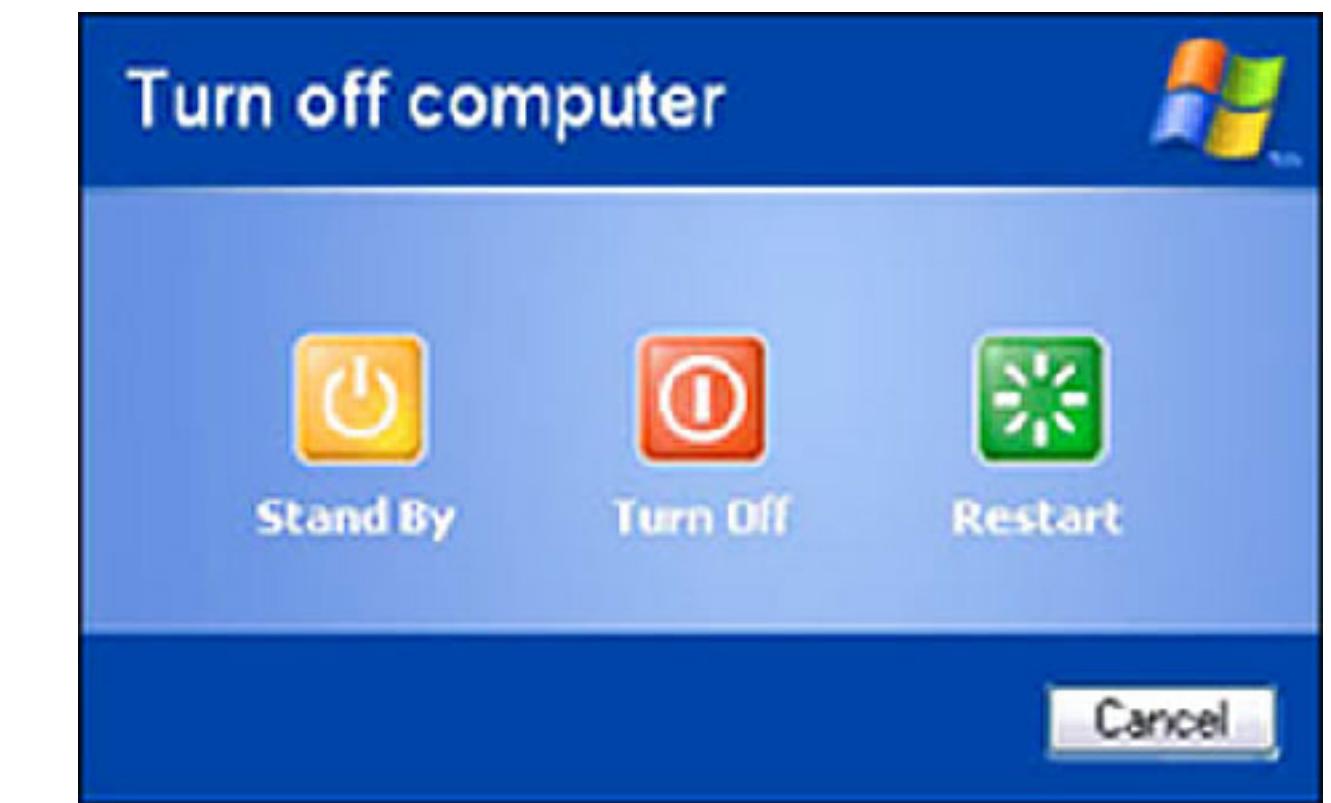
Design in Affordances

- Affordances refer to both the **perceived** and **actual** properties of a thing—primarily, the visual cues and properties that clue us in to how the thing could be operated.





Technology affordances are often based in affordances from the physical world

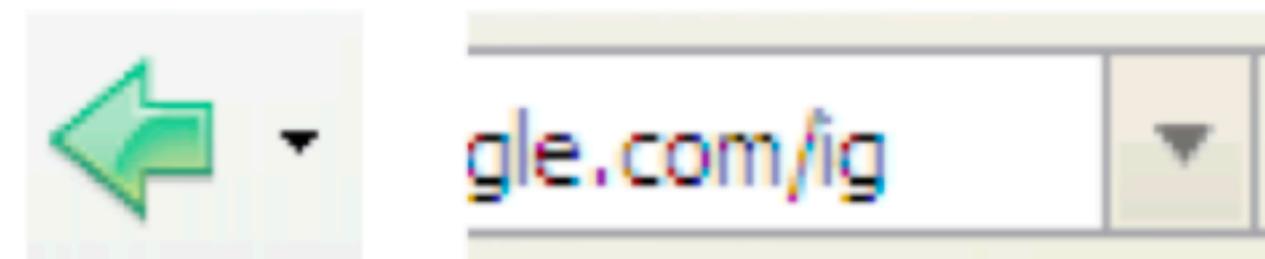


Some affordances, like the underlined hyperlink, have become an affordance all on its own, without reference to any physical metaphor.

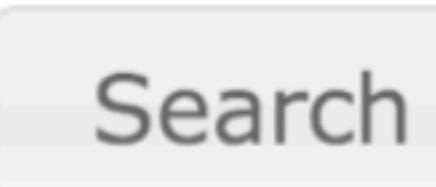
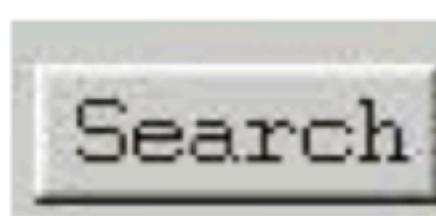
- Buttons & links



- Drop-down arrows

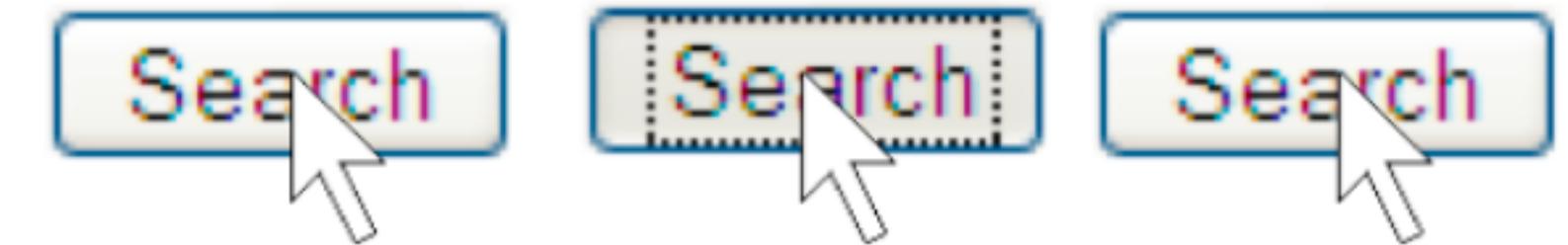


- Mouse cursor



Feedback

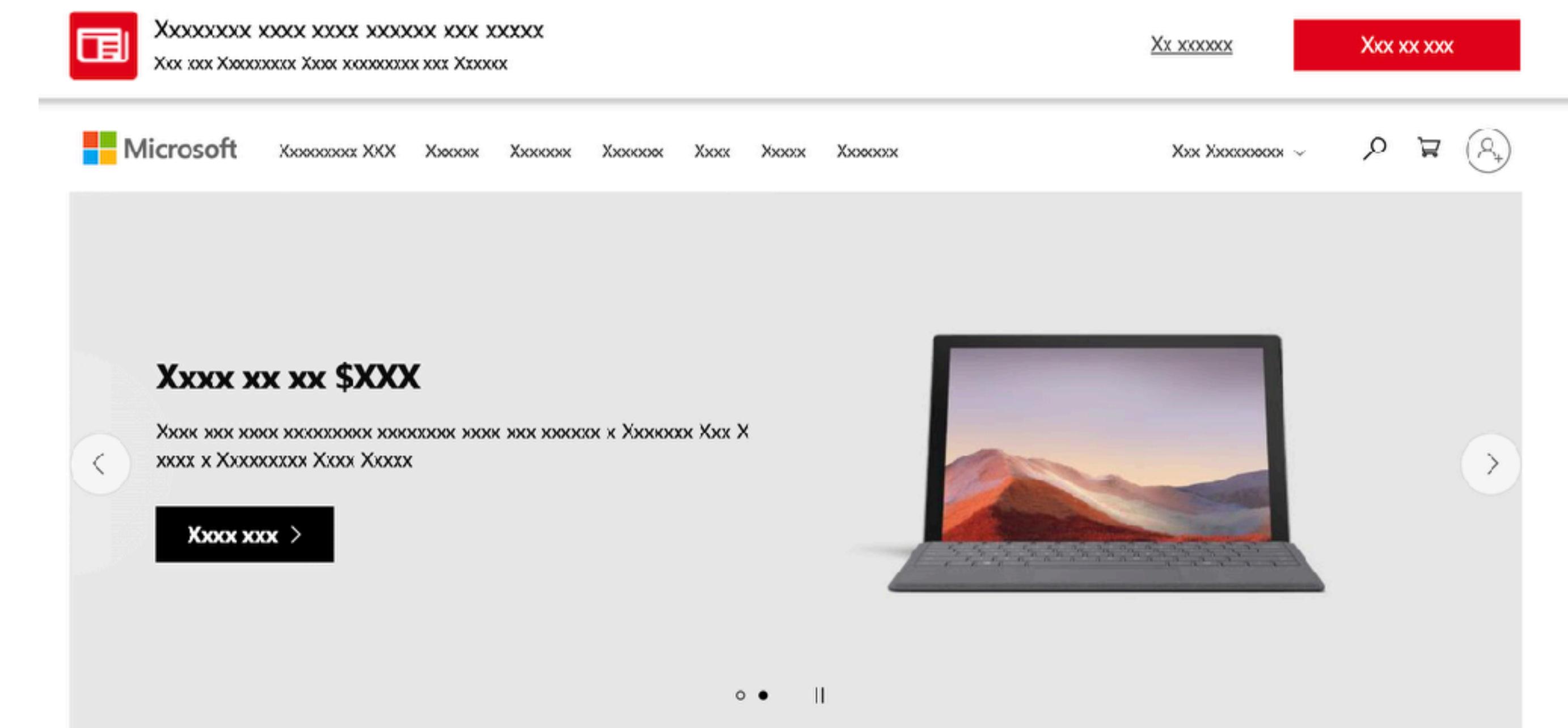
- actions should have immediate visible effects
 - low-level feedback (button press, highlight on hover, cursor change)
 - high-level feedback (new page loads)



Activity (10 min)!

- Work in groups - at least one person needs a laptop, preferably with Chrome installed
- Use Javascript to obscure all the text on a webpage.
- What do the affordances tell you nonverbally?
- Are any of the affordances lying to you?

Instructions and questions here:
<https://tinyurl.com/3tdx93by>

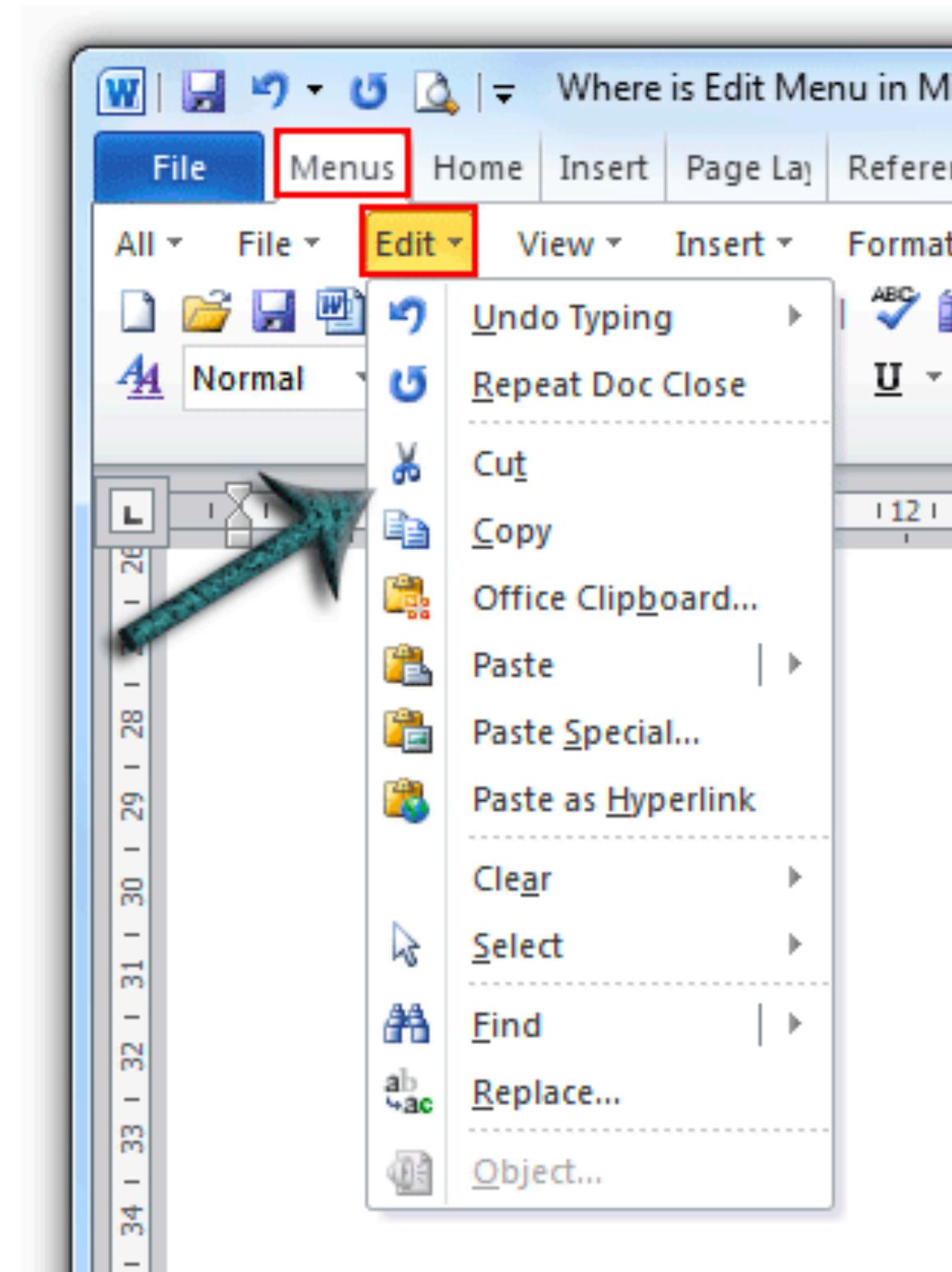


Using Recognition over Recall

Recognition vs. Recall

- Recognition: remembering with the help of a visual cue
 - uses **knowledge in the world** (external information)
- Recall: remembering with no help
 - uses **knowledge in the head** (memorization)
- Recognition is much easier!!

```
john@ubuntu:~$ ls
john_directory john_file
john@ubuntu:~$ ls -l
total 8
drwxrwxr-x 2 john john 40 Oct  1 11:10 john_directory
-rw-rw-r-- 1 john john 5120 Oct  1 11:17 john_file
john@ubuntu:~$ ls -l -h
total 8.0K
drwxrwxr-x 2 john john 40 Oct  1 11:10 john_directory
-rw-rw-r-- 1 john john 5.0K Oct  1 11:17 john_file
john@ubuntu:~$ ls -lh john_file
-rw-rw-r-- 1 john john 5.0K Oct  1 11:17 john_file
john@ubuntu:~$ ls -l --human-readable john_file
-rw-rw-r-- 1 john john 5.0K Oct  1 11:17 john_file
john@ubuntu:~$
```



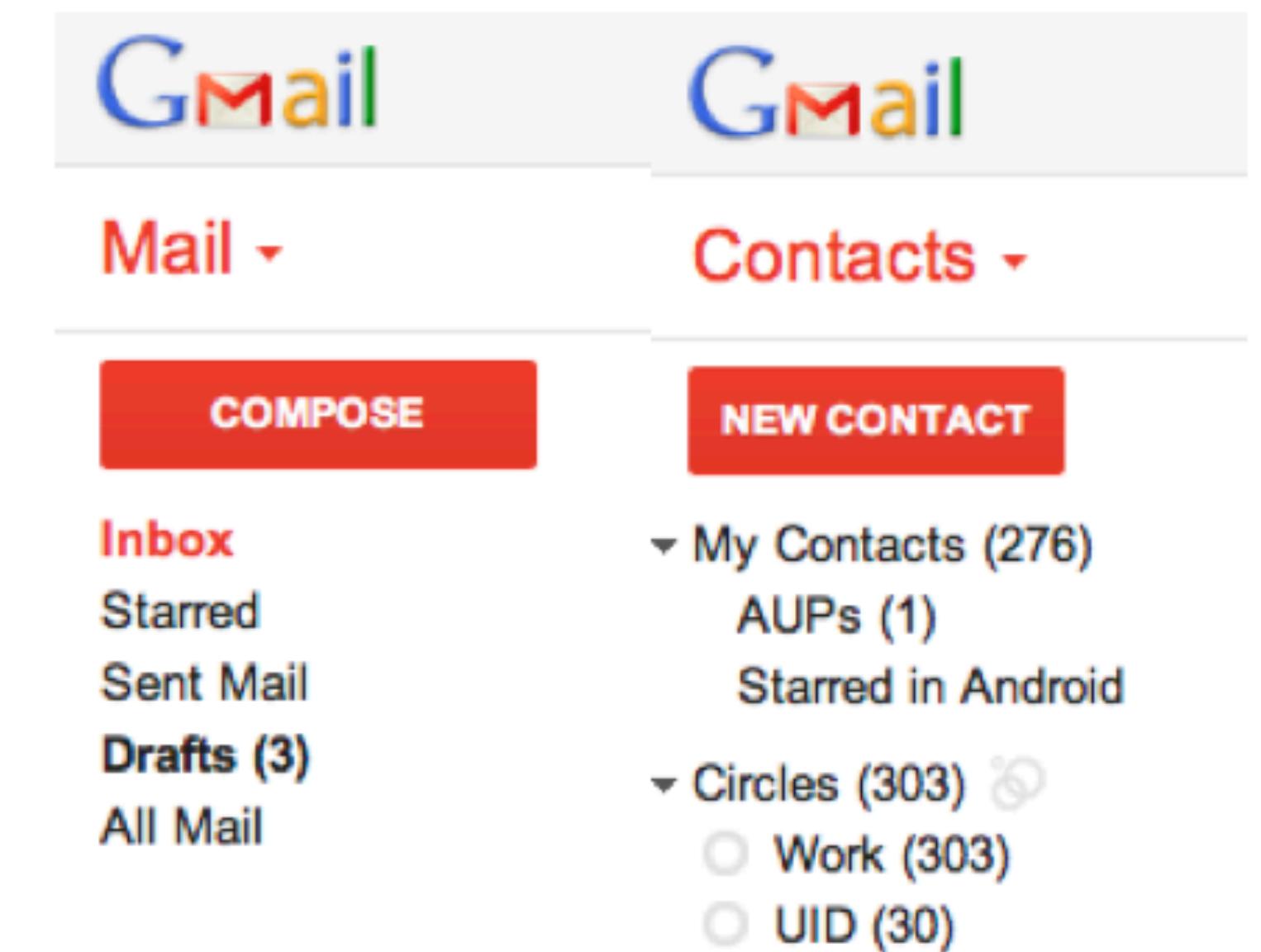
Use Multiple Interaction Styles



Consistency

Consistency

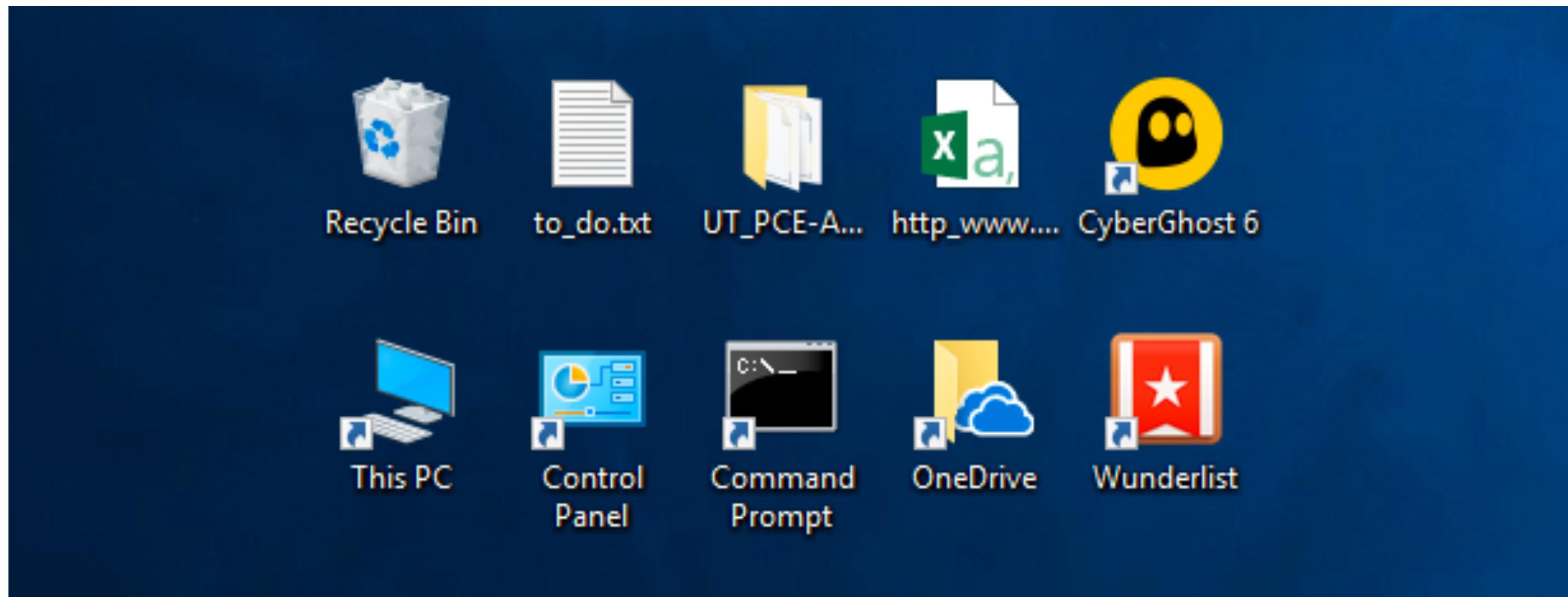
- Similar things should look and act similarly
- Different things should look different
- Types of Consistency
 - **Internal** consistency - within your application
 - e.g., same terminology and layout throughout
 - **External** consistency - with other applications
 - e.g., common widget appearance
 - e.g., design patterns common across applications



Metaphors

Metaphors

A way to bring the outside world into your interface so the user has less to learn.



Desktop metaphor:

Not a perfect attempt to simulate a real desktop

But it leverages knowledge of files, folders, trash

Explains why some windows can be overlapping each other

Should you use metaphors?

Advantages

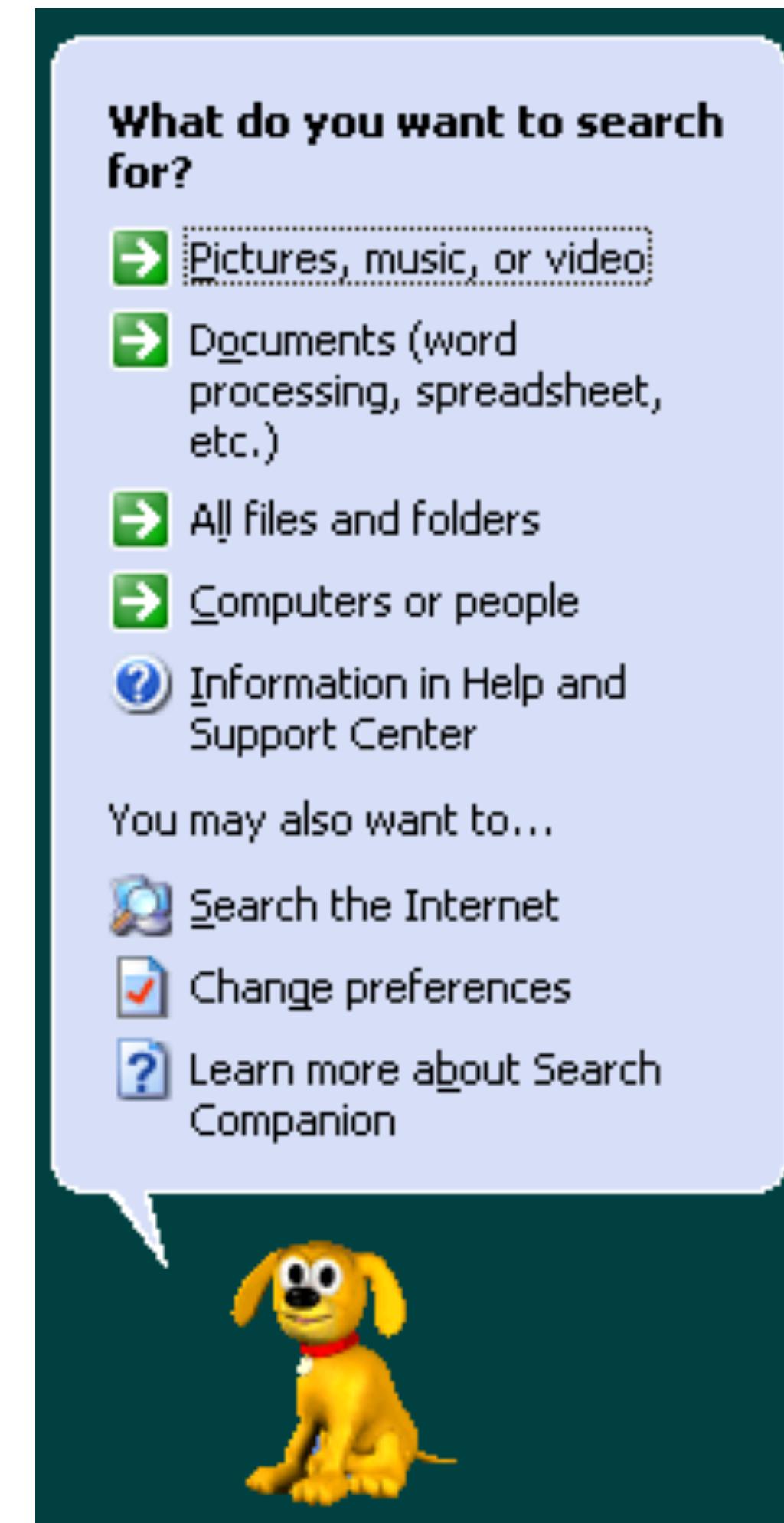
- Highly learnable when appropriate
- Hooks into a user's existing mental model easily

Use it if you have a good one, but don't stretch to force one if you don't!

Dangers

- May be constraining
- Metaphors always break down at some point
- Metaphors can be not useful
- Metaphors can die

Not a useful metaphor

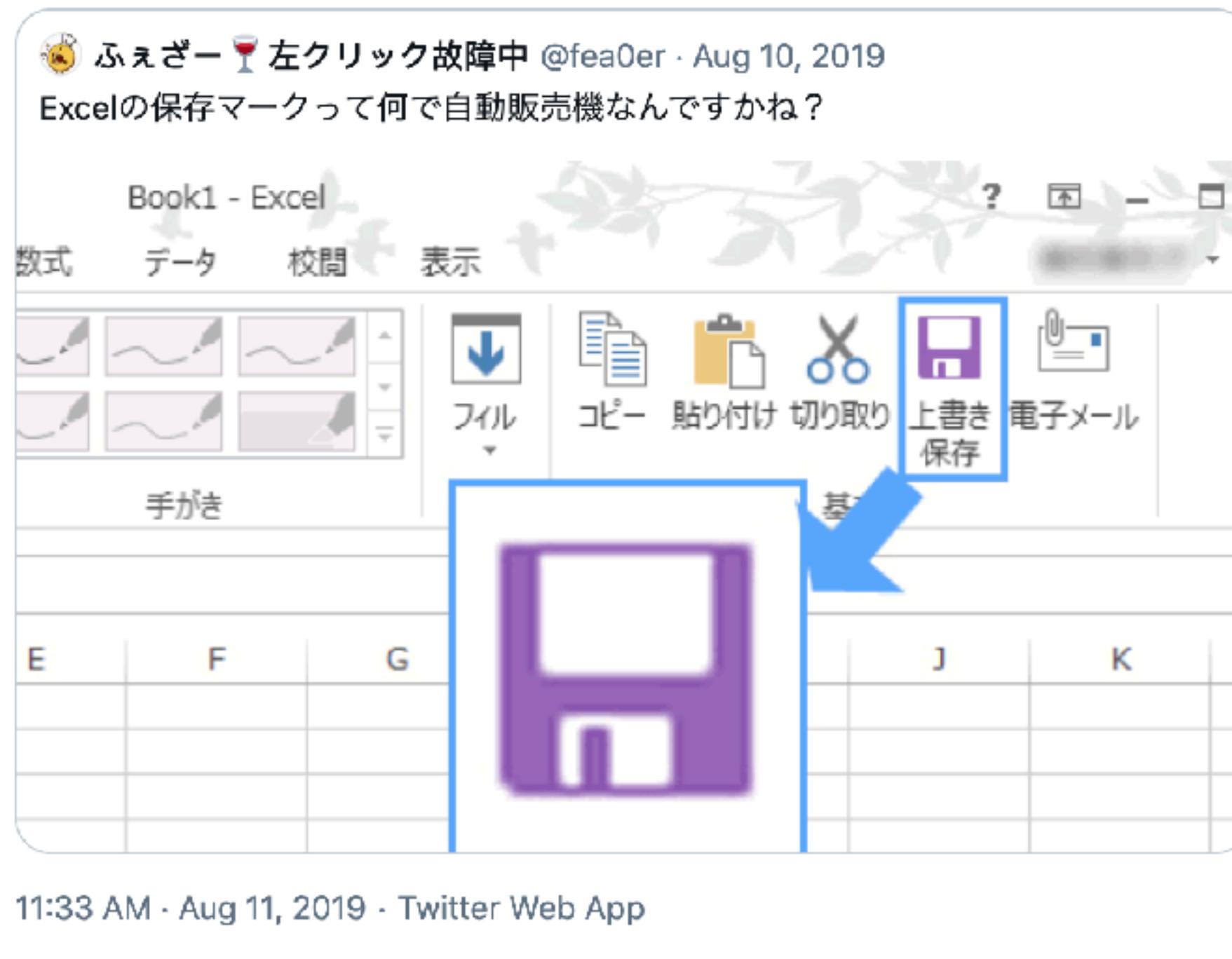




trihex ✅
@trihex

Oh my, I'M DEAD! Japanese user of Microsoft Excel asks
"Why is the SAVE ICON a 'Vending Machine w/ a
Beverage dispensed?'"

(Would a 10 y/o in 2019 even know what a VHS tape is at
this point, much less a Floppy Disc? 🤔)



5.9K Retweets 617 Quote Tweets 17.7K Likes

Dead Metaphors

Lost the original imagery of their meaning



- Milk
- Butter
- Cheese
-
- Water
- Beer
- Wine

Mapping

Mapping

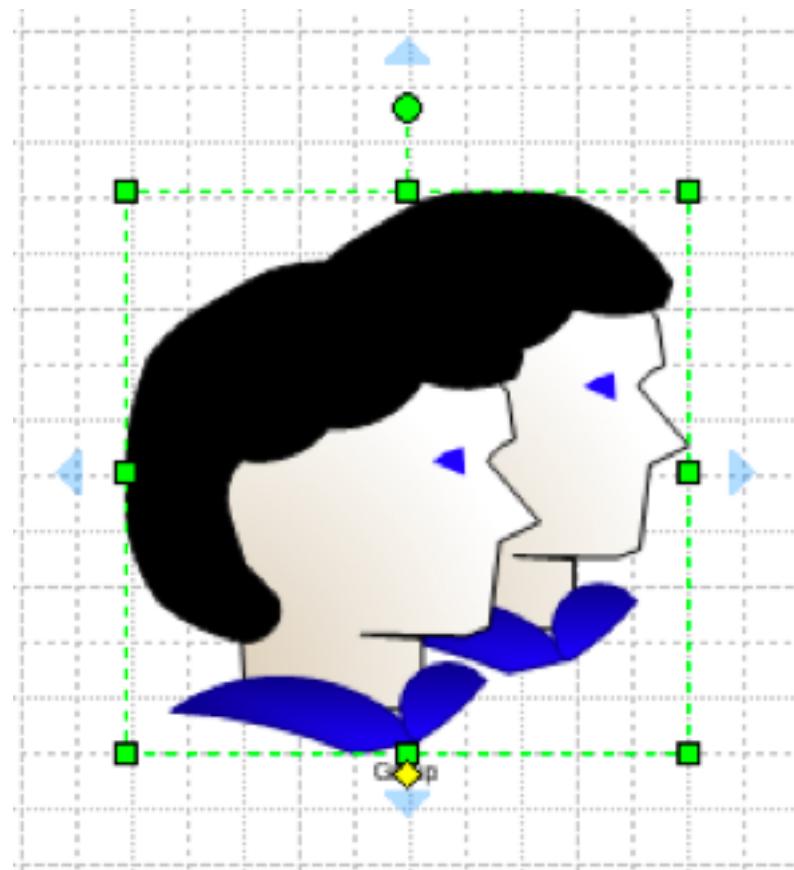
The physical arrangement of controls should match arrangement of function



Visibility and Exposing State

Visible Selection State

selection highlight



. Manage your synced data on [Google Dashboard](#)

- When the user selects an object to operate on, highlight the object somehow. Don't just leave the selection invisible and implicit.
- Visible selection provides important feedback that the selection operation was successful; it also shows the current state of the selection if the user has forgotten what was previously selected.

Visible Navigation State

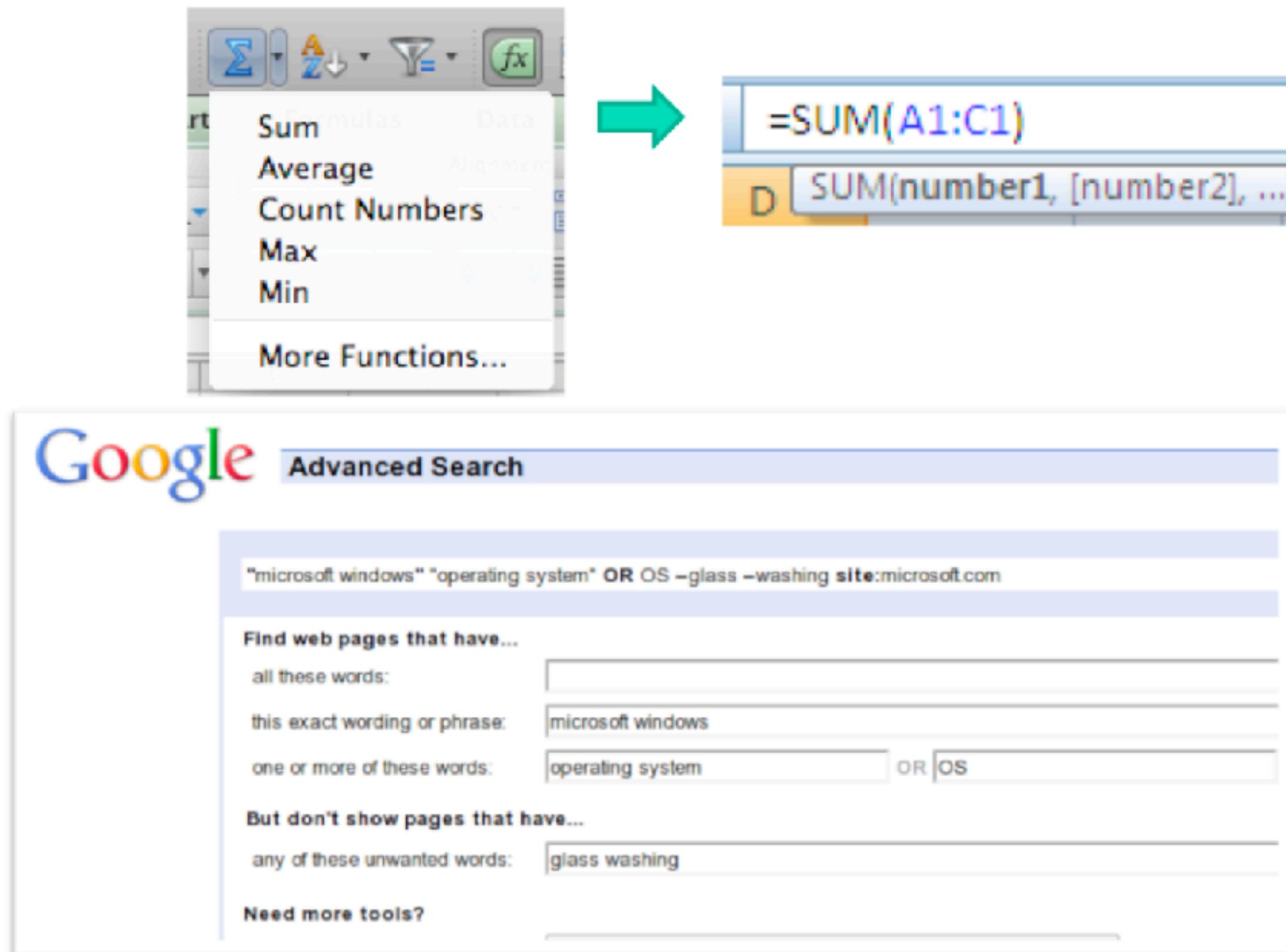
- Breadcrumbs [Travel](#) > [Guides](#) > North America

- Pagination **Results Page:**
1 [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [Next](#)

- Tabs



Self-Disclosure



- A technique for making a command language more visible, helping the user learn the available commands and syntax.
- Self-disclosure is useful for interfaces that have both a traditional GUI (with menus and forms and possibly direct manipulation) as well as a command language (for scripting).

Visible Modes

- Modes = state changer: Same action, different results (ex: Caps Lock key, Shift key)
- Use spring-loaded modes (need the finger down to activate the mode) or otherwise have a lot of visual cues to clue users in on the currently active mode

+ ADD NEW RECORD				
ProductName	Unit Price	Units In Stock	Discontinued	
Chai T	\$1... ▲▼	39.00 ▲▼	<input type="checkbox"/>	<button>✓ UPDATE</button> <button>✗ CANCEL</button>
Chang	\$19.00	17	false	<button>>Edit</button> <button>Delete</button>
Aniseed Syrup	\$10.00	13	false	<button>>Edit</button> <button>Delete</button>
Chef Anton's Cajun Seasoning	\$22.00	53	false	<button>>Edit</button> <button>Delete</button>
Chef Anton's Gumbo Mix	\$21.35	0	true	<button>>Edit</button> <button>Delete</button>
Grandma's Boysenberry Spread	\$25.00	120	false	<button>>Edit</button> <button>Delete</button>
1 2 3 4 > <		1 - 20 of 77 items		

How does learning break down?

Models

- There are 3 models in UI Design:
 - **System** model (implementation model) - how the system actually works
 - **Interface** model (manifest model) - the model the interface presents to the user
 - **User** mental model (conceptual model) - how the user thinks the system works
- Mismatch between system and interface model should always happen to some degree
- Same for mismatch between user and system.

User's Mental Model could be Wrong

- Electricity flows like water
- Thermostat



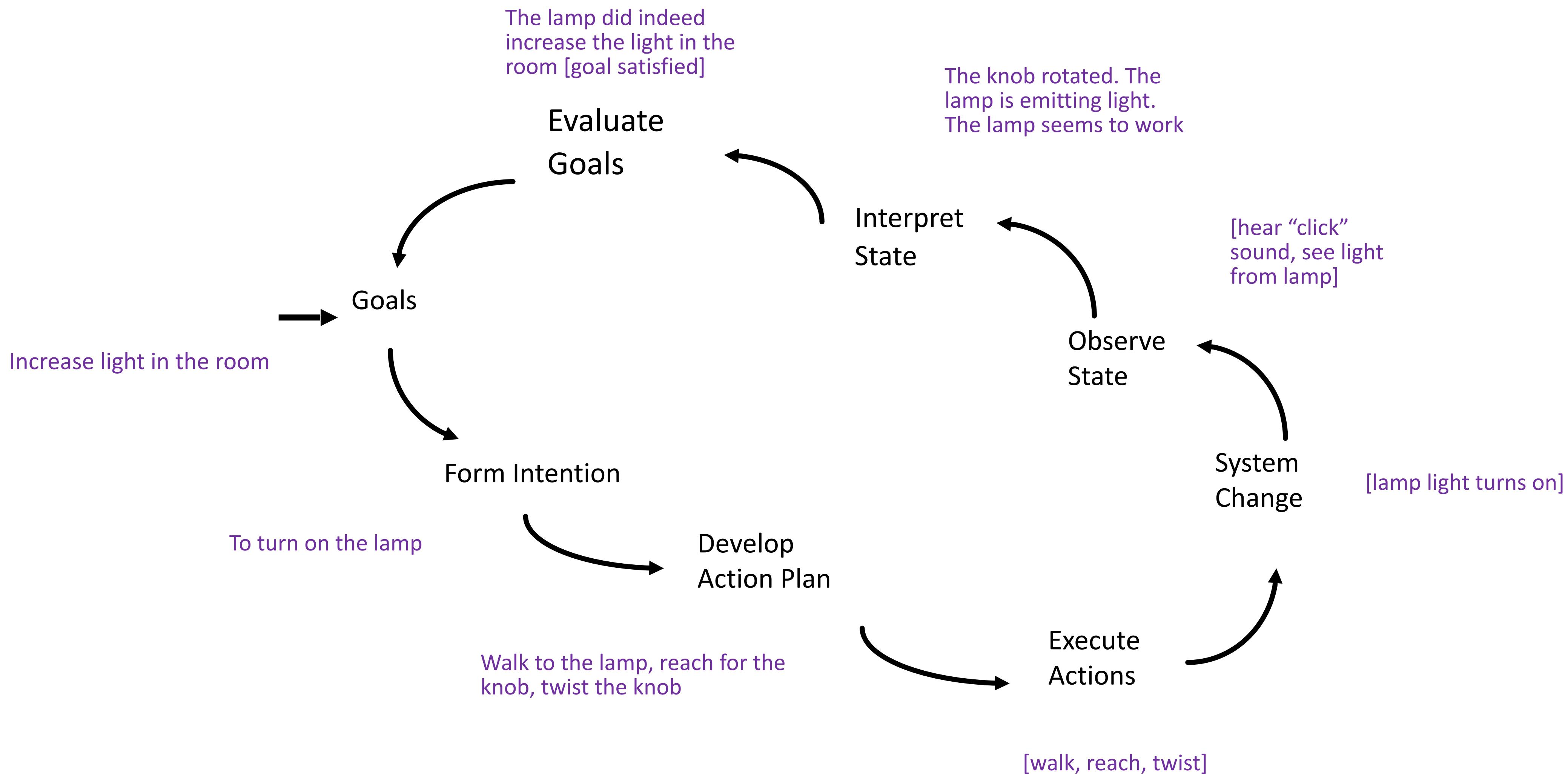
System model



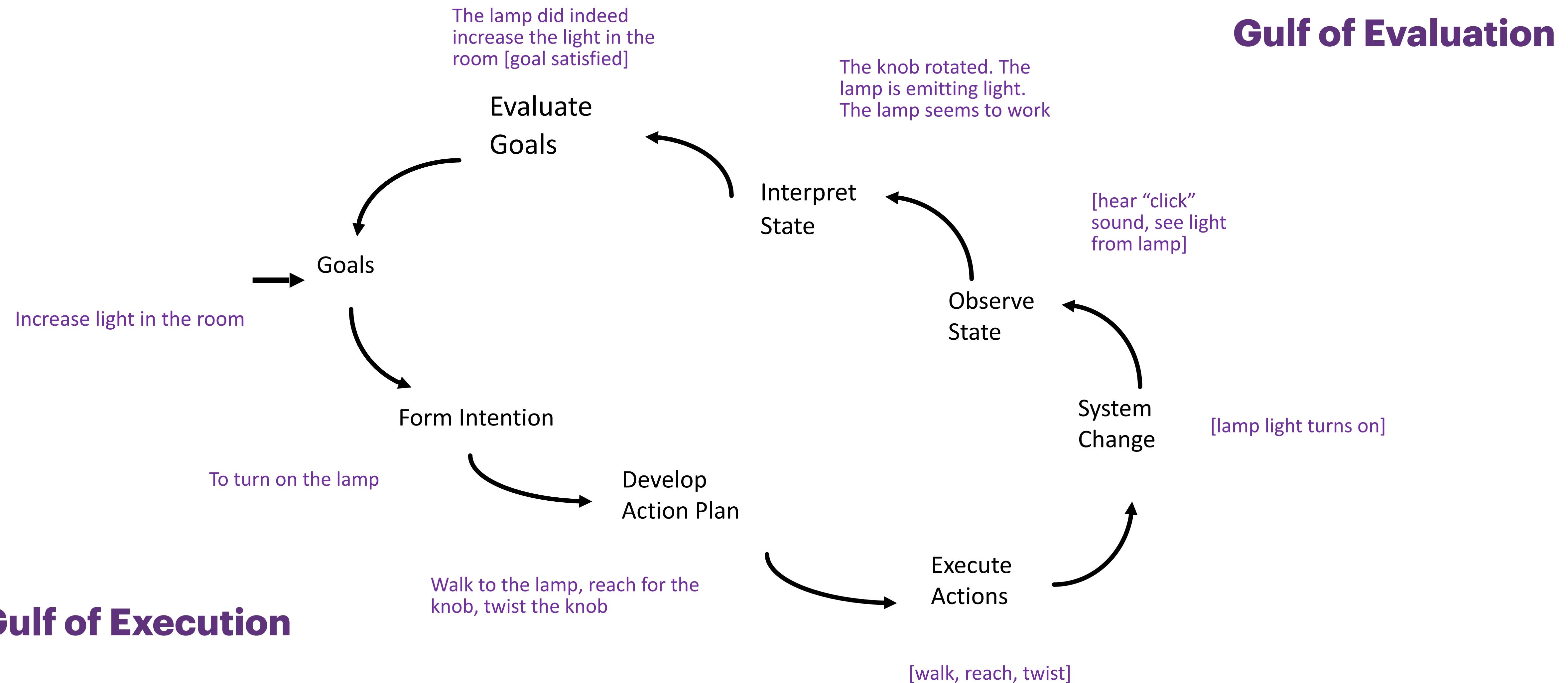
Interface model



Norman's Execution/Evaluation Cycle



Norman's Execution/Evaluation Cycle



Activity 2!

- Design a new thermostat that communicates its true model (switch) to a new user
- Consider:
 - Would it be most learnable to print an explanation on the thermostat? If so, what exactly would it say?
 - Think about a sink faucet: why is it easy to tell whether it's a valve or a switch
 - Is the problem with the old thermostat a gulf of execution or a gulf of evaluation?
- Sketch a design by yourself first and submit: <https://tinyurl.com/svzejanp>
- When you're done, get into your groups and share your sketch.
- Then, you'll transition to work on 2a for the remainder of the class.
- **2a is due 11AM on Thursday!** Remember what you learned last lecture on tips for how to rapidly come up with lots of good+bad ideas in parallel, and then bring multiple ideas to your group.



That's all for today!