

Human-Computer Interaction

CPSC 481 - Winter 2019

Lessons from The Design of Everyday Things
I

Adapted from Tony Tang

REVISED & EXPANDED EDITION

*The DESIGN
of EVERYDAY
THINGS*



DON
NORMAN

Lessons from The Design of Everyday Things

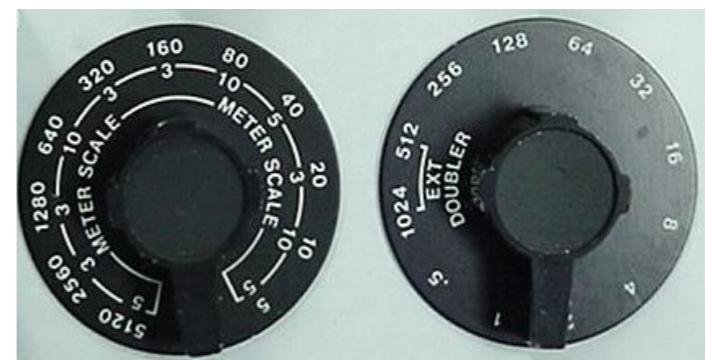
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Learning Objectives

- By the end of this lecture, you should be able to:
 - Distinguish between perceived and actual affordances
 - Describe how visible constraints can help prevent errors in interfaces
 - Discuss the role of mappings in interface intelligibility
 - Describe ways in which causality plays a role in helping people understand interfaces

Perceived Affordance

- The perceived properties of the object that suggest how one could use it

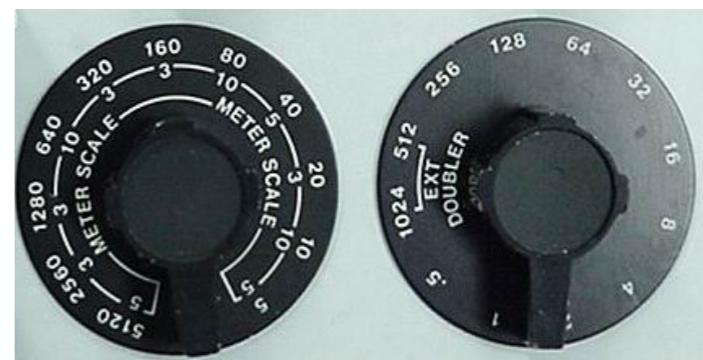


Perceived Affordance

- The perceived properties of the object that suggest how one could use it



Chairs are for sitting
Table for placing things on



Knobs are for turning



Slots are for inserting
Handles are for turning



Buttons are
for pressing



Switch for toggling



Computer for...

Perceived Affordances

- Product design
 - Perceived affordances: invitations for people to take possible actions
 - Actual affordances: actual actionable properties of the product

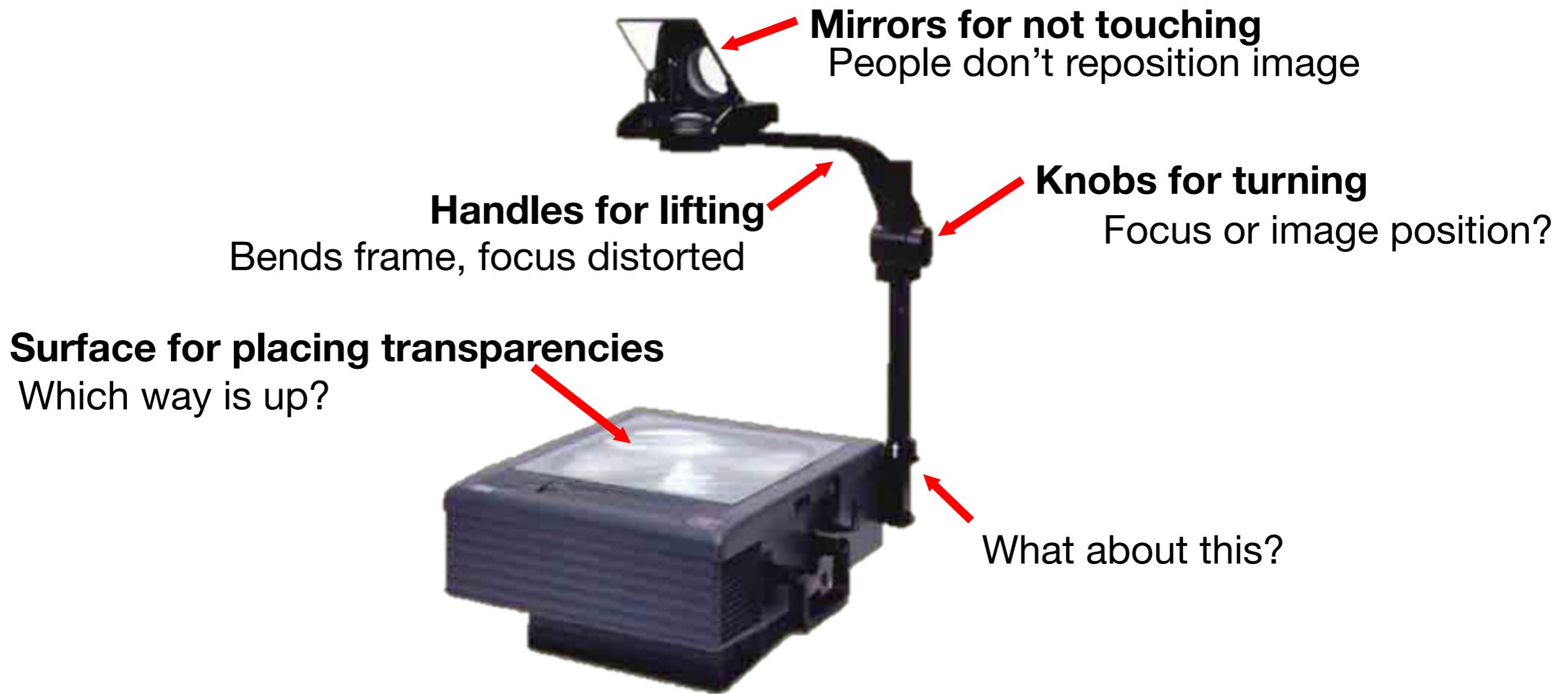
Perceived Affordances

- Product design
 - Perceived affordances: invitations for people to take possible actions
 - Actual affordances: actual actionable properties of the product
- Problems occur when
 - They are not the same
 - People's perceptions are not what the designer expects

Perceived Affordances



Perceived Affordance Problems

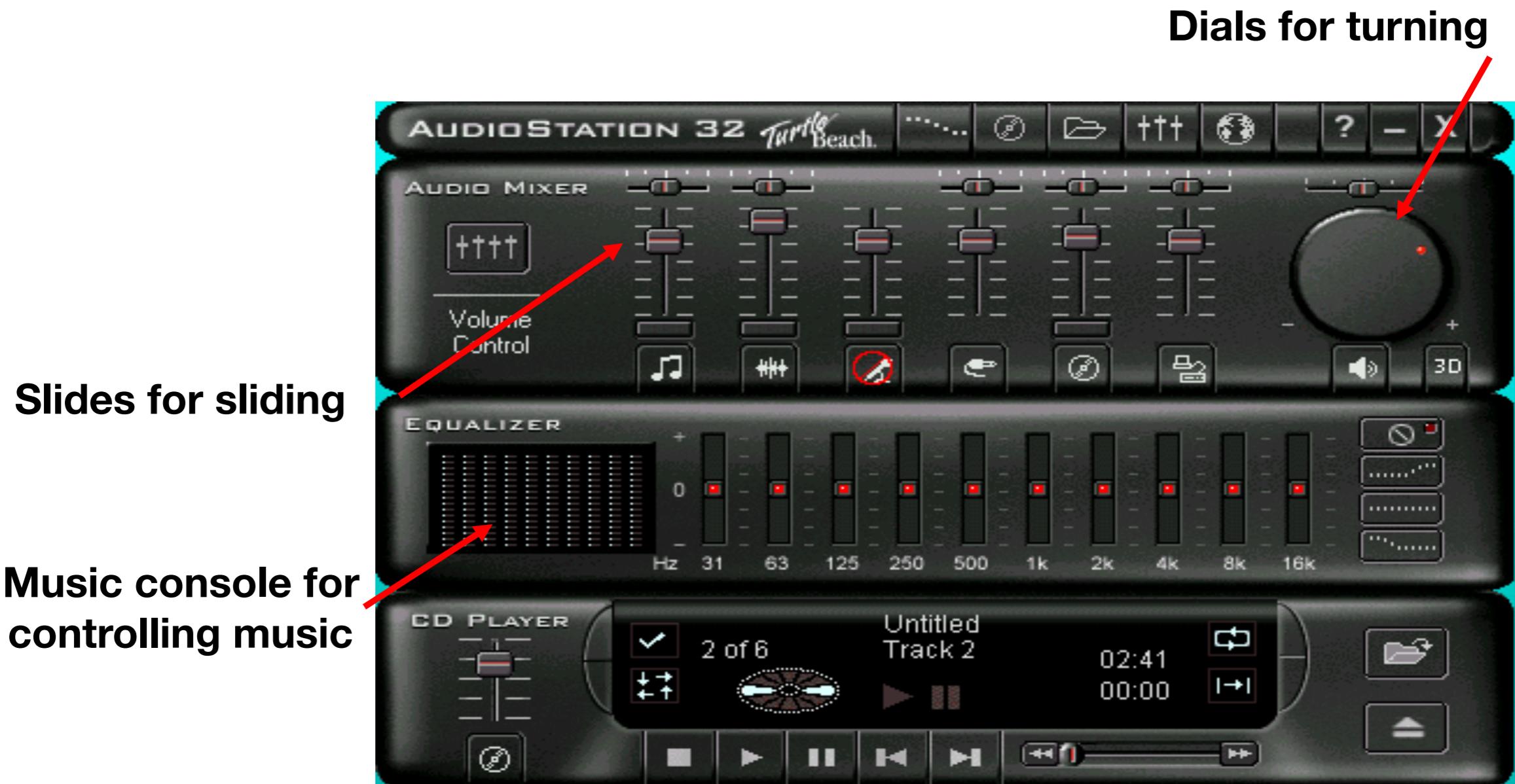


Perceived Affordances in GUI Design

- Perception is only through visuals
- Designer creates appropriate visual affordances via
 - Familiar idioms
 - Metaphors



Perceived Affordances in GUI Design



Perceived Affordances in GUI Design

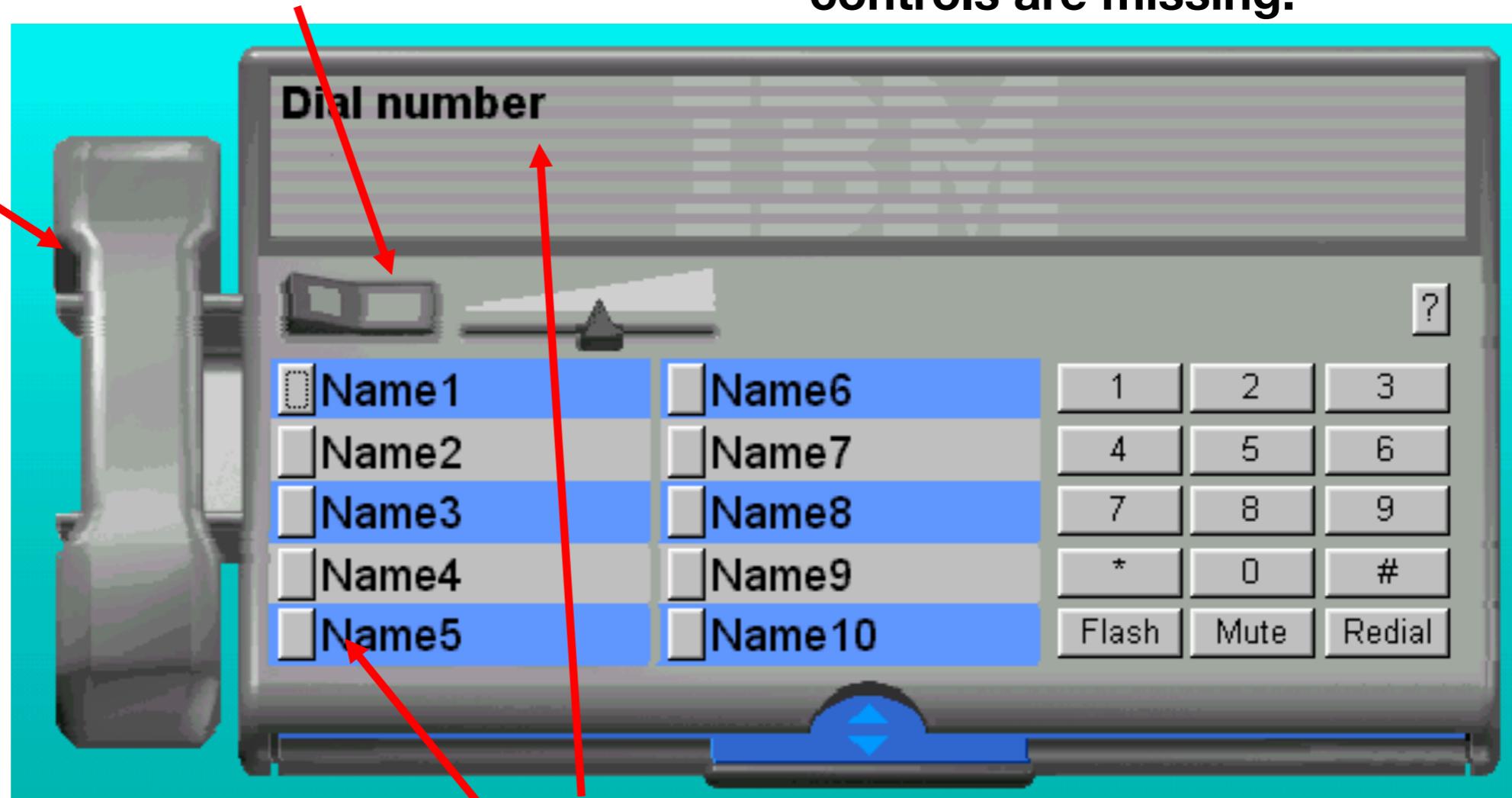


Perceived Affordances in GUI Design

Is this a graphic or a control?

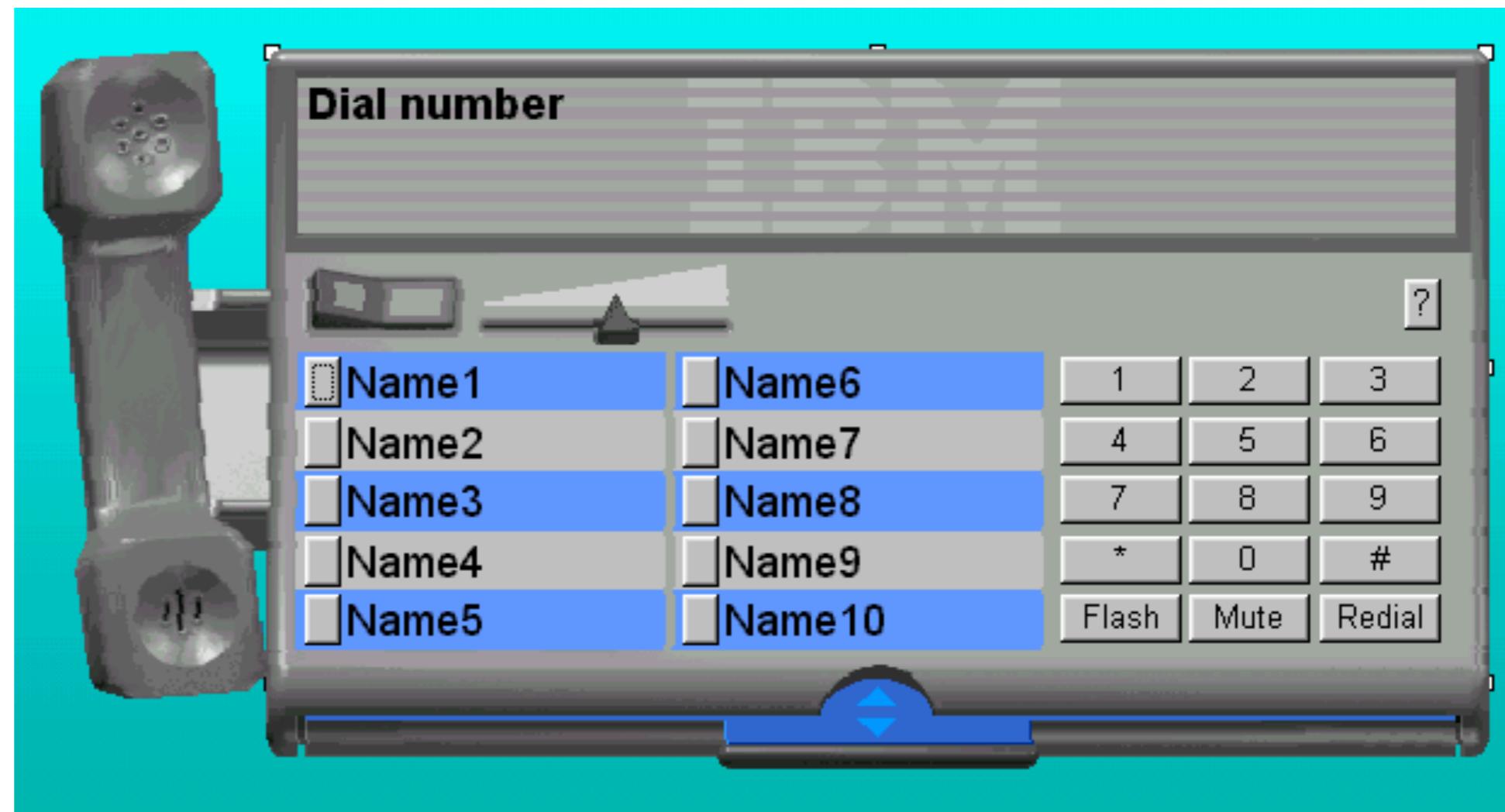
A button is for pressing, but what does it do?

Visual affordances for window controls are missing!



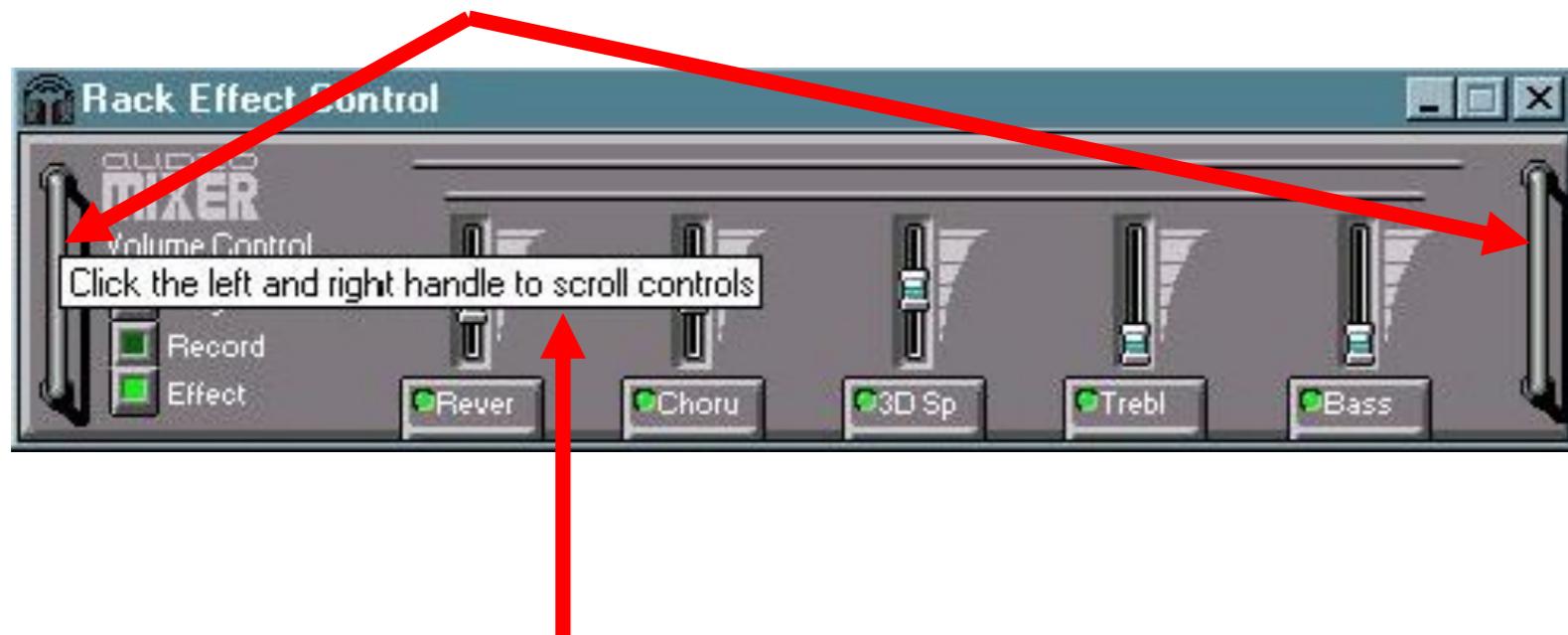
Text is for editing, but it doesn't do it

Skeumorphism in GUI Design



Perceived Affordances in GUI Design

**Handles are for lifting, but
these are for scrolling!**



**Complex things may need explaining
but simple things should not**

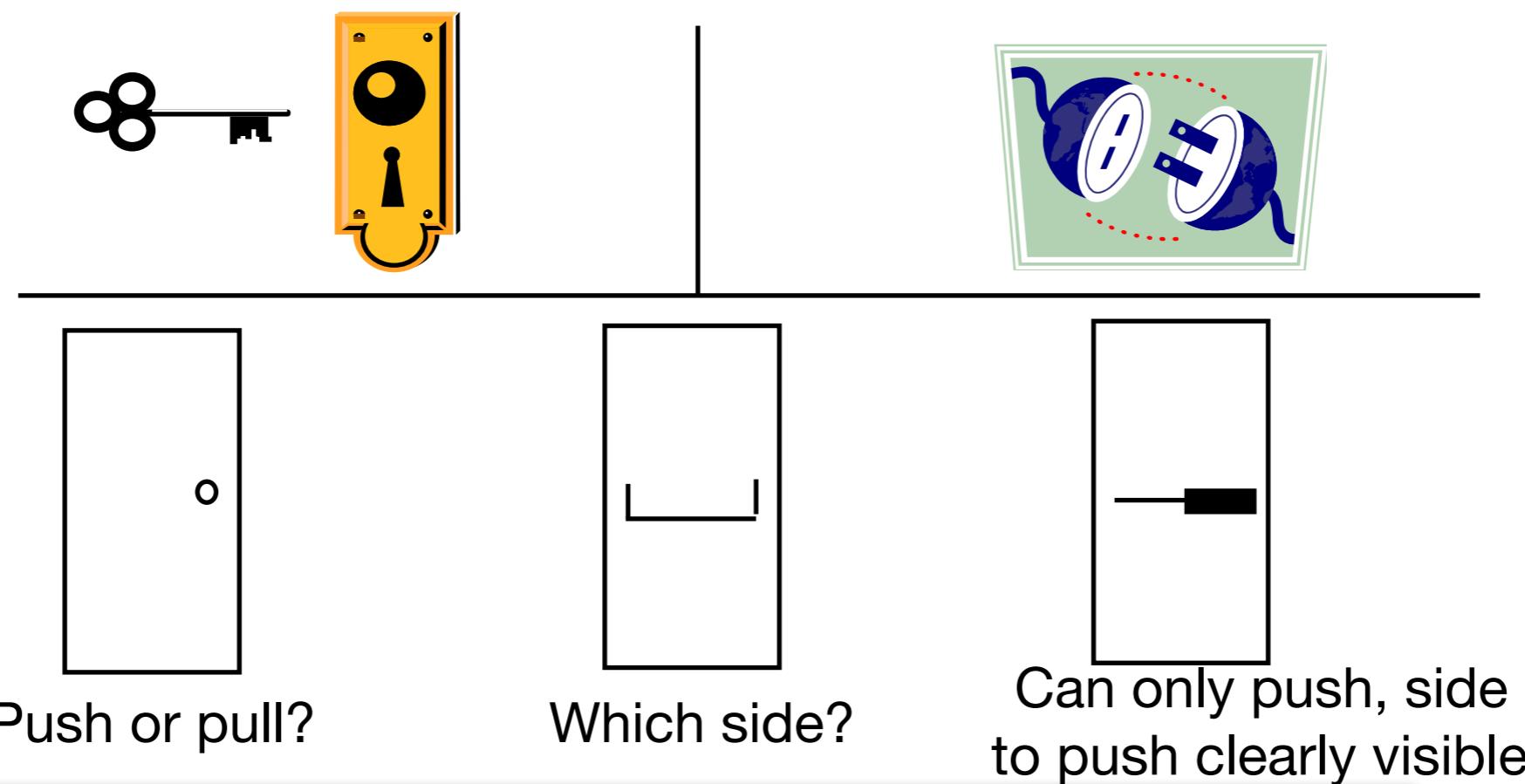
When simple things need labels & instructions, then design has failed

Visible Constraints

- Limiting the space of possible actions from an object's appearance
 - Provides people with a range of usage possibilities

Visible Constraints

- Limiting the space of possible actions from an object's appearance
 - Provides people with a range of usage possibilities



Which side do you use for cutting?



20-pathological-designs.pptx

Search in Presentation

Home Format Picture Themes Tables Charts SmartArt Transitions

Slides New Slide

B I U ABC A² A₂ AV Aa A A

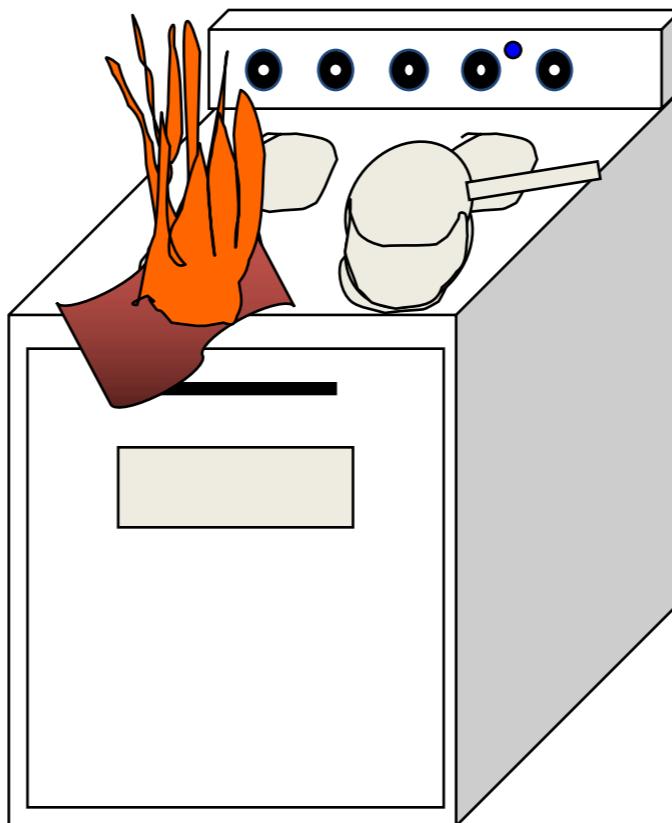
Font Paragraph

Visible Constraints

Because an image is selected, none of the font or paragraph functions are meaningful » greyed out

4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

20





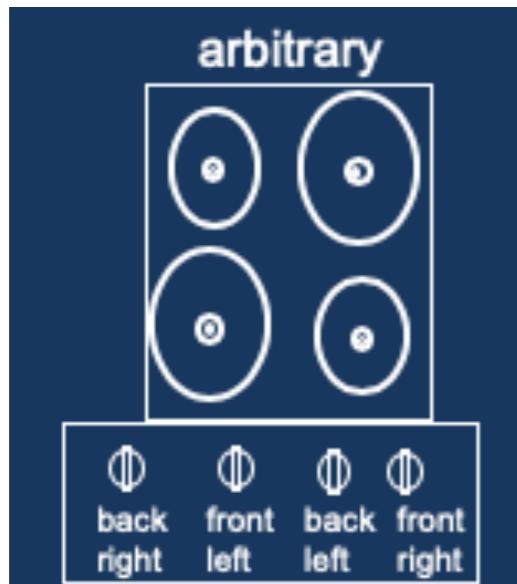


Mapping

- The set of possible relations between objects
- **Control-display compatibility**
 - The natural relationship between controls and displays

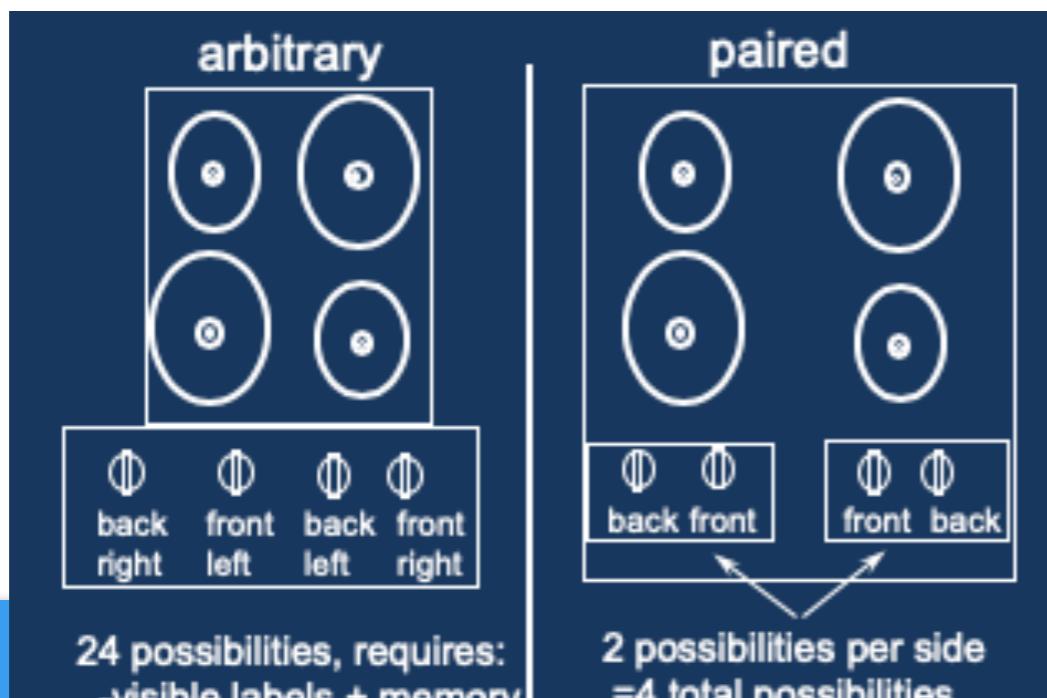
Mapping

- The set of possible relations between objects
- **Control-display compatibility**
 - The natural relationship between controls and displays
 - e.g., visual mapping of stove controls to elements



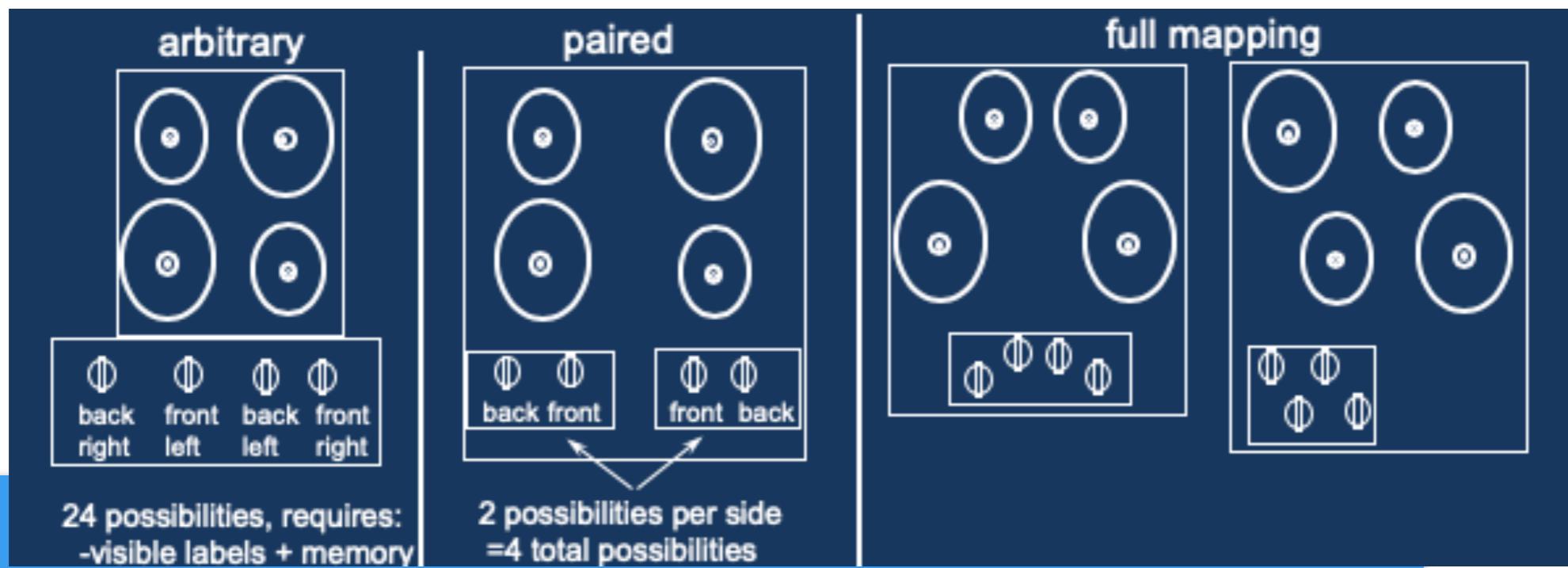
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Mapping

- The set of possible relations between objects
- **Control-display compatibility**
 - The natural relationship between controls and displays
 - e.g., visual mapping of stove controls to elements



Mapping

- Control-display compatibility -> cause and effect



Steering wheel - turn left, front tires turn left, car turns left

Mapping Scrolling in Apple products...

- In 2011, trackpad scrolling behaviour in OS X was reversed
 - Swiping fingers downwards would scroll “upwards”, and vice versa

[Why OS X Lion's "Reverse Scrolling" Is Awesome & How To Use It In ...](#)

www.cultofmac.com/.../os-x-lions-reverse-scrolli... - United States

12 Jul 2011 – [http://www.cultofmac.com/104335/os-x-lions-reverse-scrolling-is-awesome-here-why-how-to-use-it-in-snow-leopard/Why OS X Lion's "Reverse ...](http://www.cultofmac.com/104335/os-x-lions-reverse-scrolling-is-awesome-here-why-how-to-use-it-in-snow-leopard/Why OS X Lion's)

[Why Is Scrolling Backwards In OS X Lion? | Cult of Mac](#)

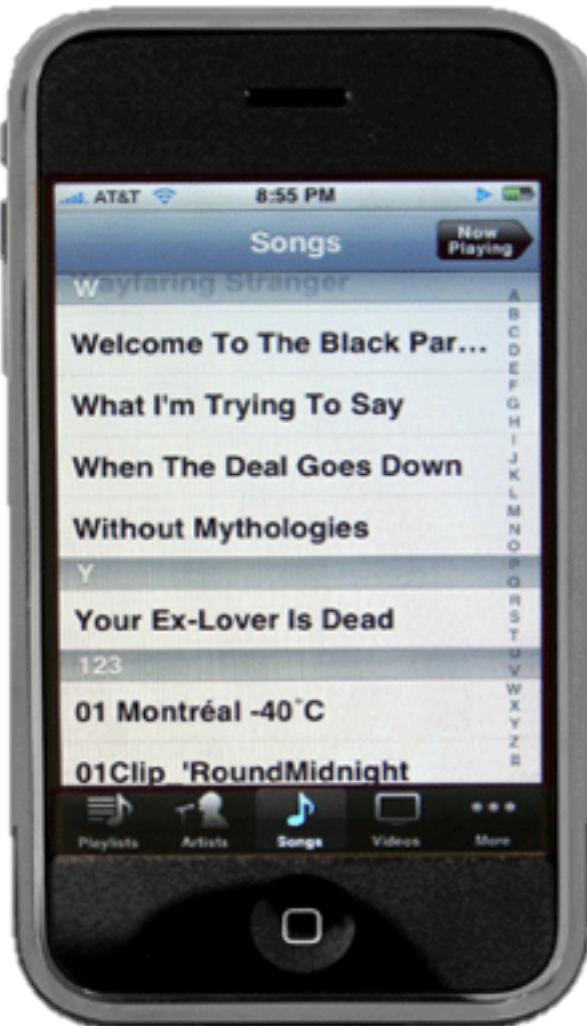
www.cultofmac.com/.../why-is-scrolling... - United States

 by Leander Kahney - in 1,772 Google+ circles
24 Feb 2011 – As you've probably heard, touchpad **scrolling** is backwards in **OS X Lion**. Instead of pulling your fingers down to **scroll** down a window, you

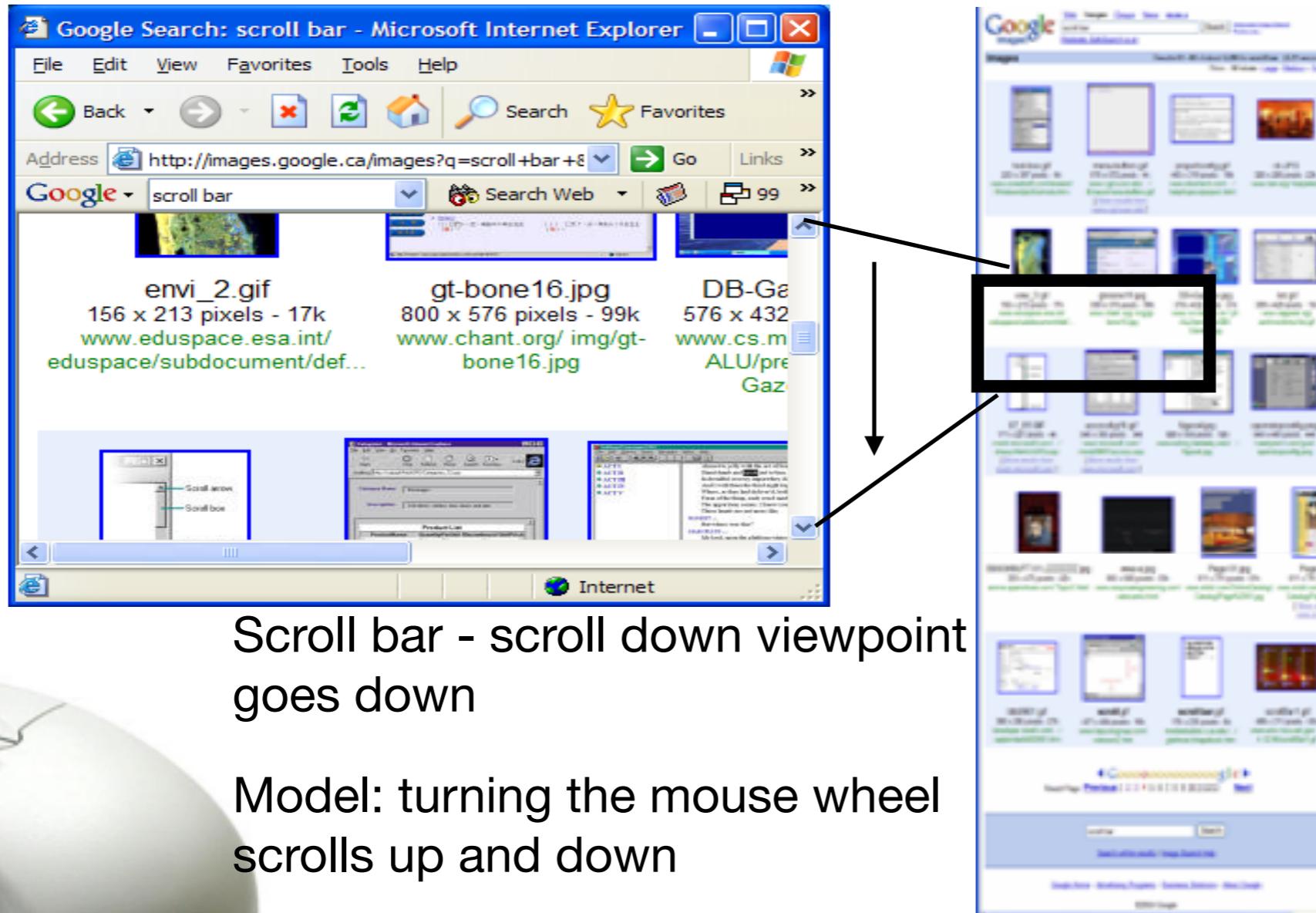
...

Why did Apple make this change?

- Goal: unify the “model” of interaction that arises from touch devices
- Model: touching something, and pushing it around



Wait, what did it change from?



Scroll bar - scroll down viewpoint goes down

Model: turning the mouse wheel scrolls up and down

Trackpad model: your swiped are controlling the little scroll widget itself



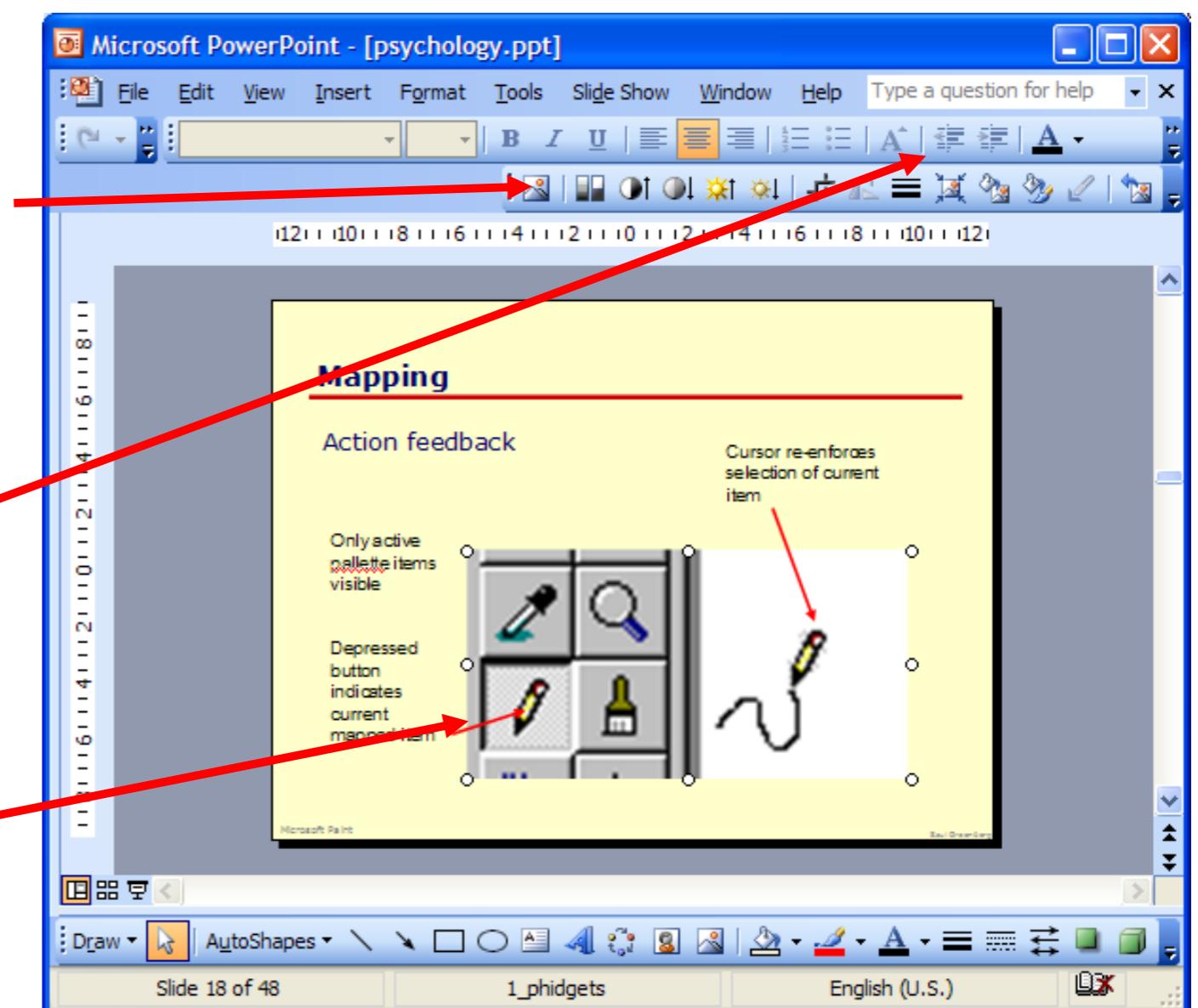
Mapping in GUILs

- **Palette controls and active objects**

Only controls that can operate on a picture are fully visible

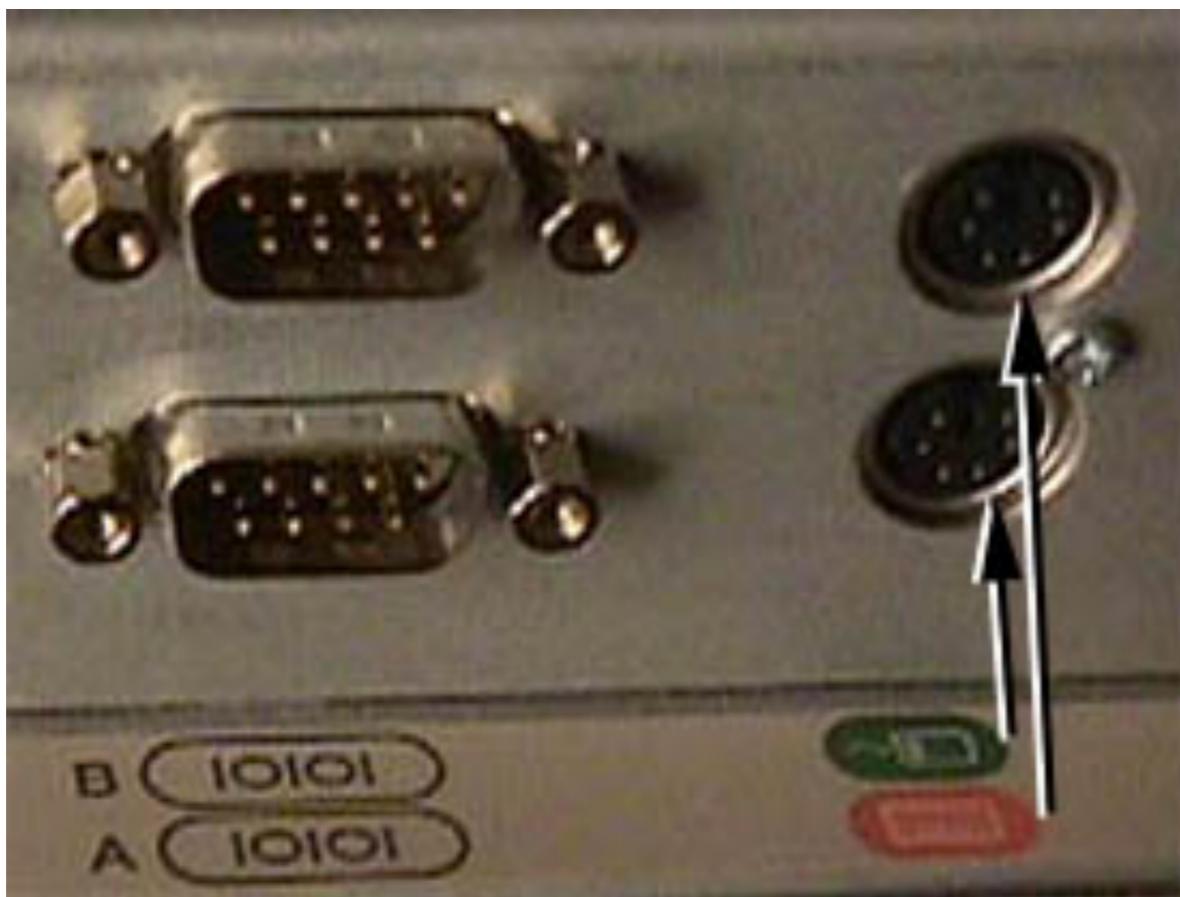
Others are grayed out

Selected picture



Mapping problems

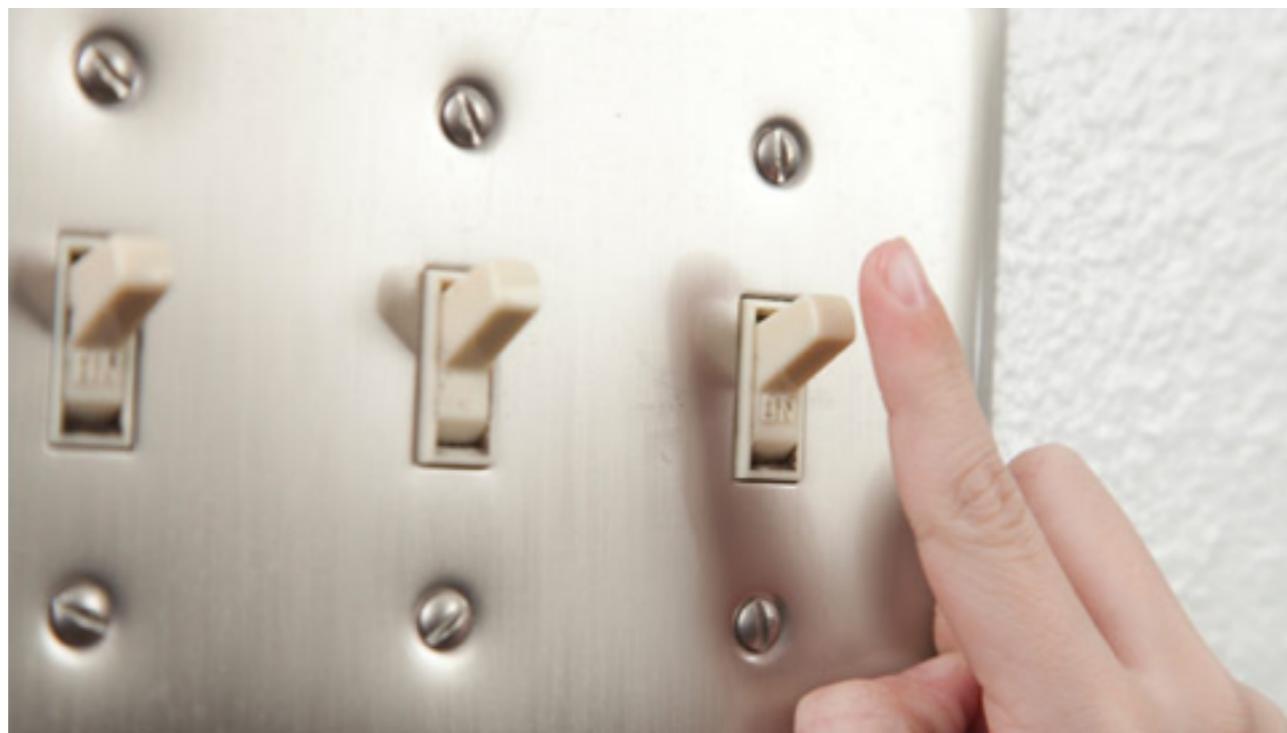
- Ambiguous mappings in real life



**Where do you plug in
the mouse?**

Causality

- The thing that happens right after an action is assumed by people to be **caused** by that action
 - This is how simple machines work



Causality -> false causality

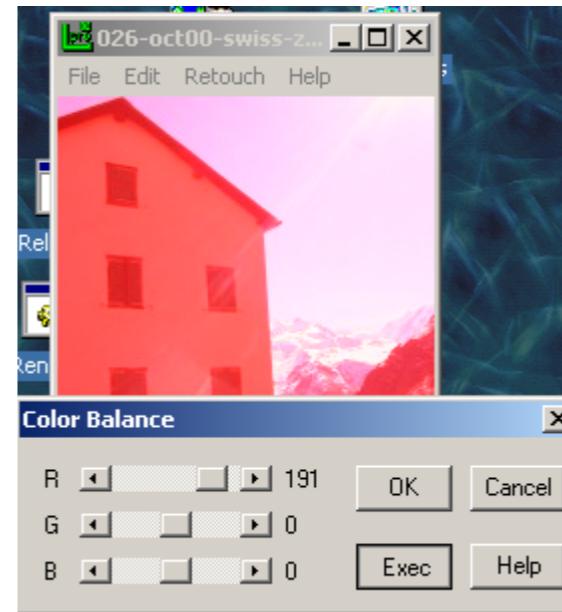
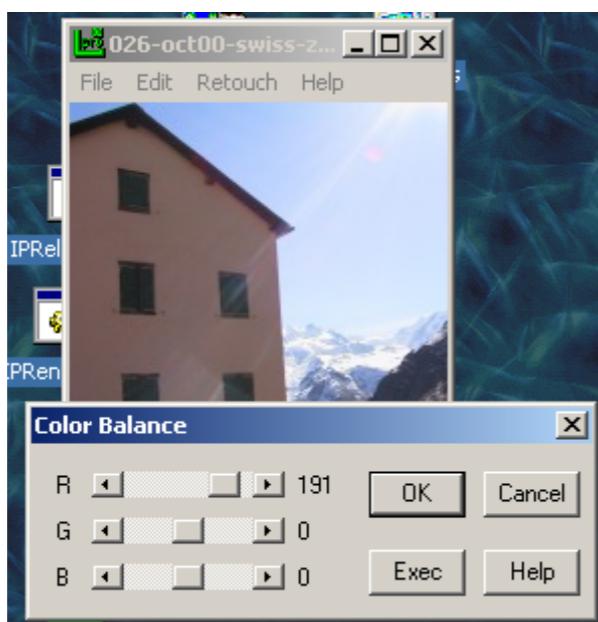
- **Incorrect effect**
 - Invoking unfamiliar function just as computer hangs
 - Causes "superstitious" behaviours

Causality -> false causality

- **Incorrect effect**
 - Invoking unfamiliar function just as computer hangs
 - Causes “superstitious” behaviours
- **Invisible effect**
 - Command with no apparent result often re-entered repeatedly
 - e.g., mouse click to raise menu on unresponsive system

Causality problems

- Effects visible only after Exec button is pressed
 - Ok does nothing!
 - Awkward to find appropriate colour level



Lessons from the DOET

- We've seen that a lot of things are designed poorly, be it computer interfaces or physical objects
- Formally, there is a vocabulary around these concepts that we have discussed
 - **Perceived affordances**
 - **Visible constraints**
 - **Causality**
 - **Mapping**
 - Transfer effects
 - Idioms & population stereotypes
 - Conceptual models
 - Individual differences

Acknowledgements

- Tony Tang
- Lora Oehlberg
- Ehud Sharlin
- Frank Maurer
- Saul Greenberg

Course information

- Website
 - GitHub Pages <https://silvadasilva.github.io/CPSC481-2019W/en/#!index.md>
- Communications
 - Slack <https://cpsc481-2019w.slack.com/>
- Readings and Slides
 - Posted online at the main website