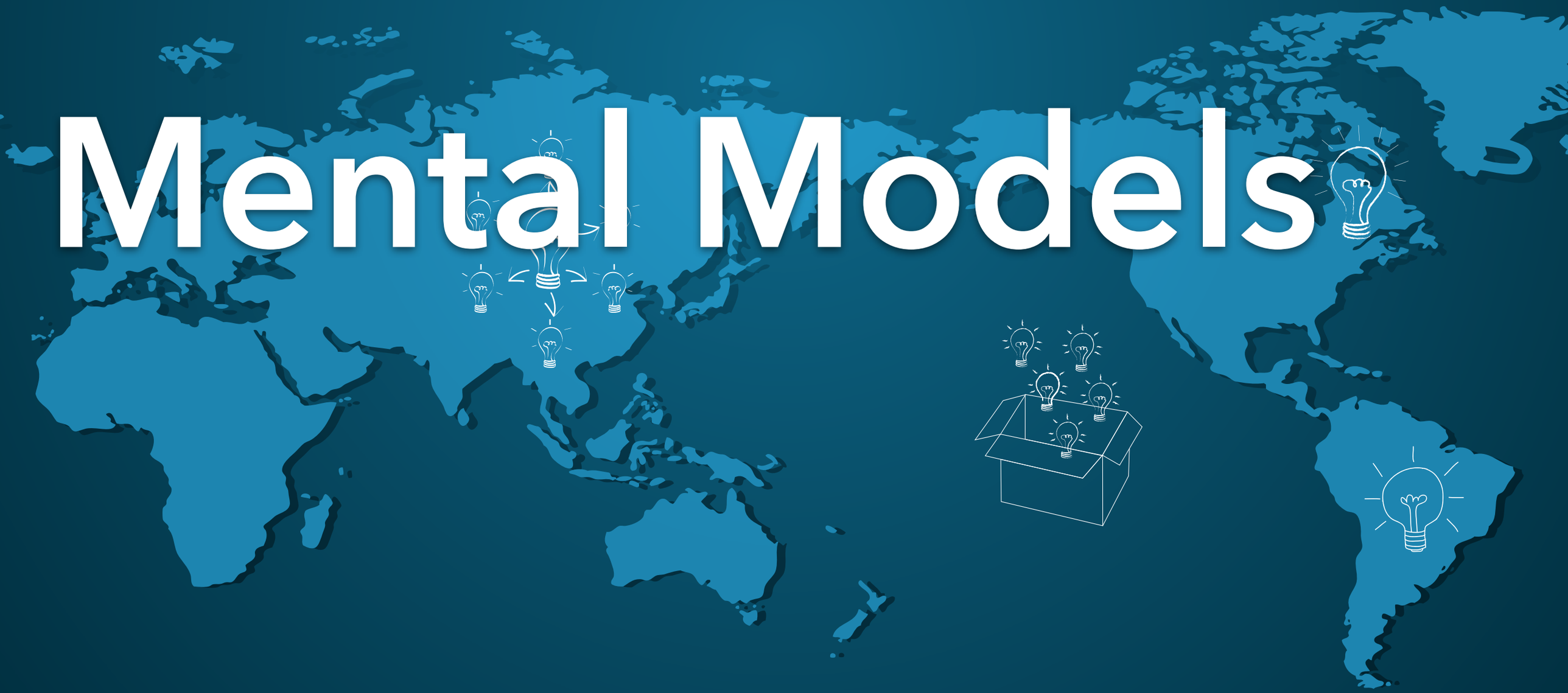
Mental Models



UC San Diego
The Design Lab

Created by Scott Klemmer, shared via CC BY 4.0

Key to good design:

- What makes an interface learnable?
- What leads to errors?

H S

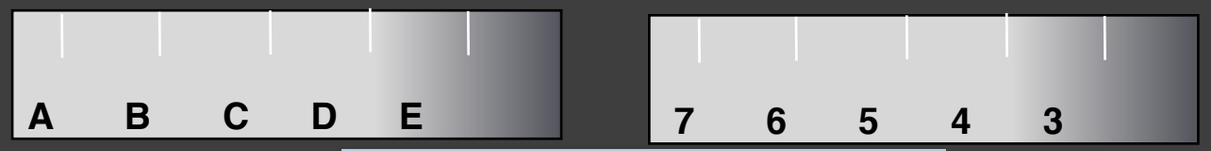
Video goes here

Consider this refrigerator...

problem: freezer too cold, but fresh food just right

Concept from: Don Norman, The Design of Everyday Things.

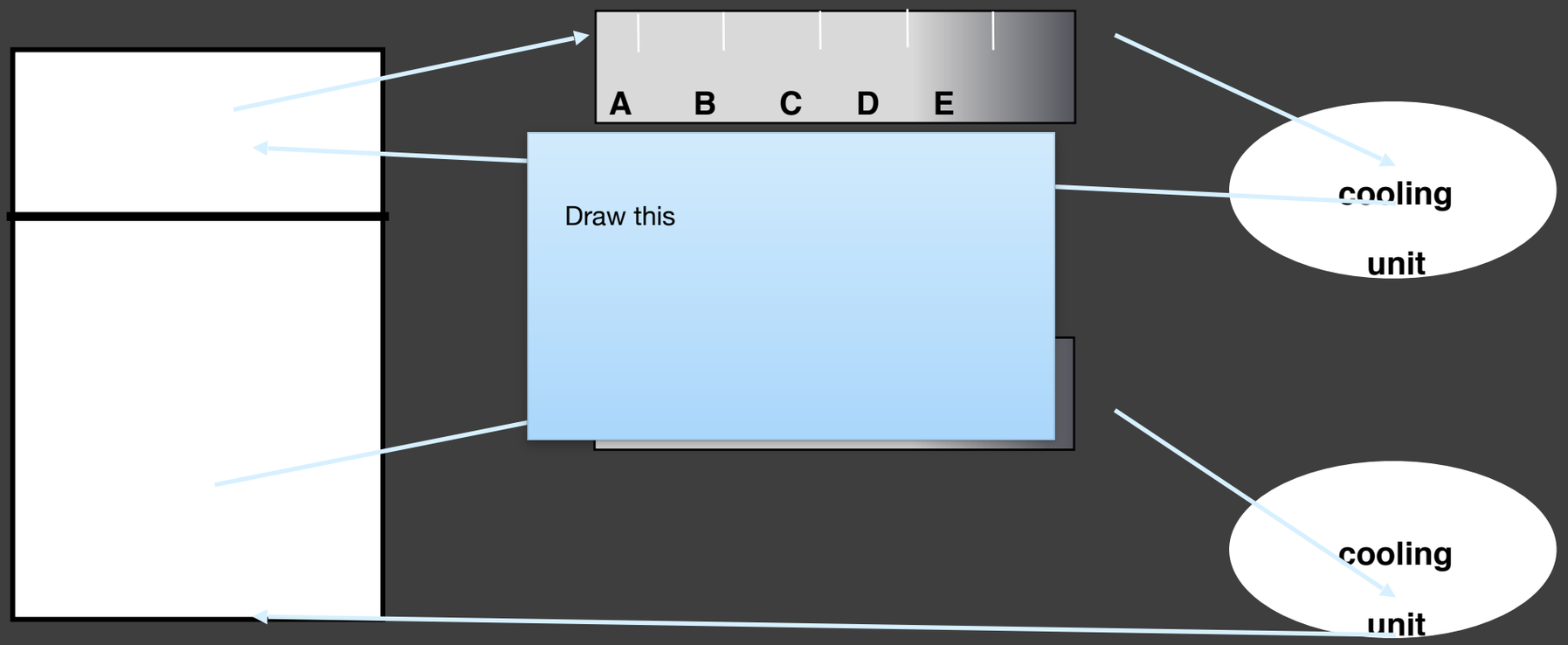
This frig has two dials...



Normal Setting	
Colder Fresh Food	
Coldest Fresh Food	
Colder Freezer	**D and 6-7**
Warmer Fresh Food	**C and 3-1**
OFF (both)	**OFF (both) 0**

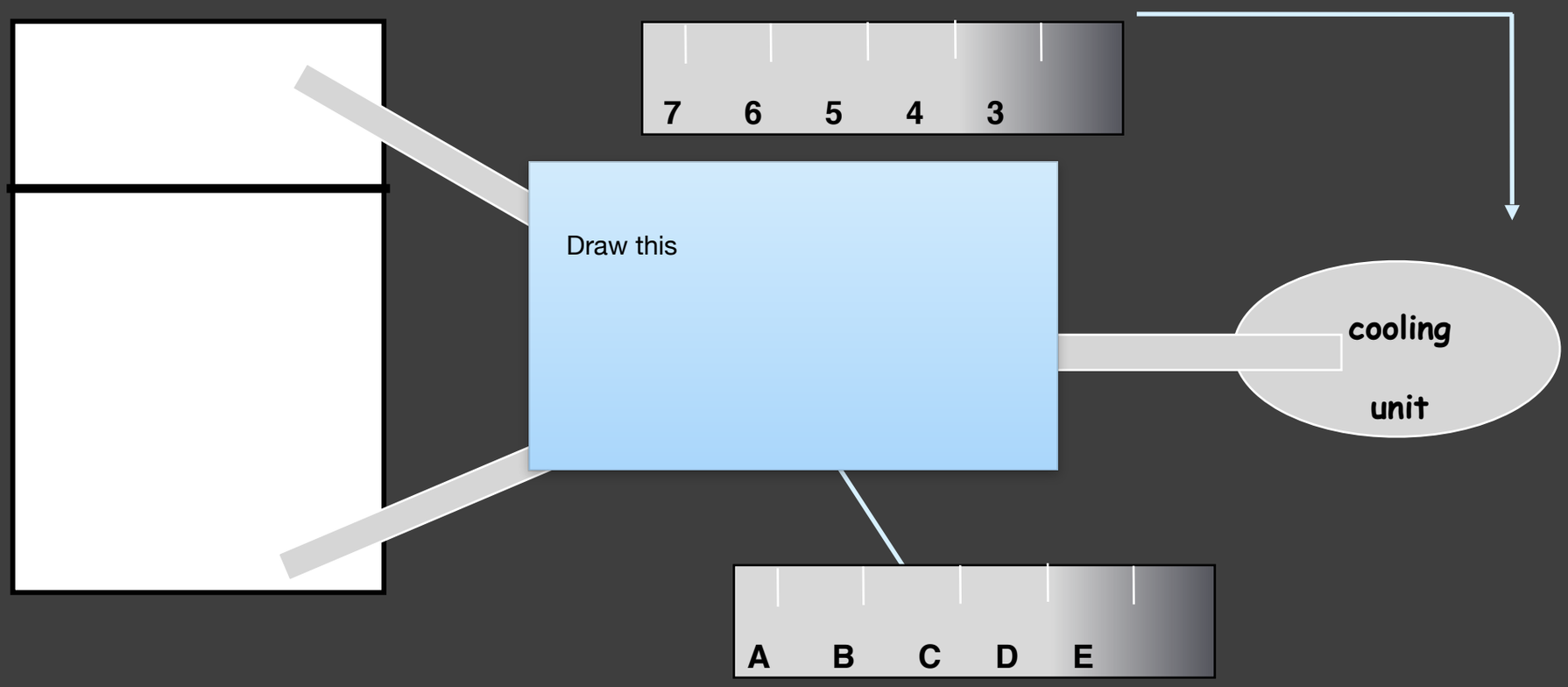
Concept from: Don Norman, The Design of Everyday Things.

A likely model...



Concept from: Don Norman, The Design of Everyday Things.

Actual Model



Concept from: Don Norman, The Design of Everyday Things.

The goal: design beacons the right model

- User's model develops through interaction with the system
- Designers often expects user's model to be the same as theirs
- But often it isn't!

Conceptual Model Mismatch

- Mismatch between designer's & user's conceptual models leads to…
  - Slow performance
  - Errors
  - Frustration
  - ...

Mental models arise from experience, metaphor, and analogical reasoning

- "A text processor is a typewriter"
- We have models (beliefs) about our own behavior, of others, of objects, software...
- Our models are incomplete, inconsistent, unstable in time, and often rife with superstition

Slips v. Mistakes

Butterfly Ballot

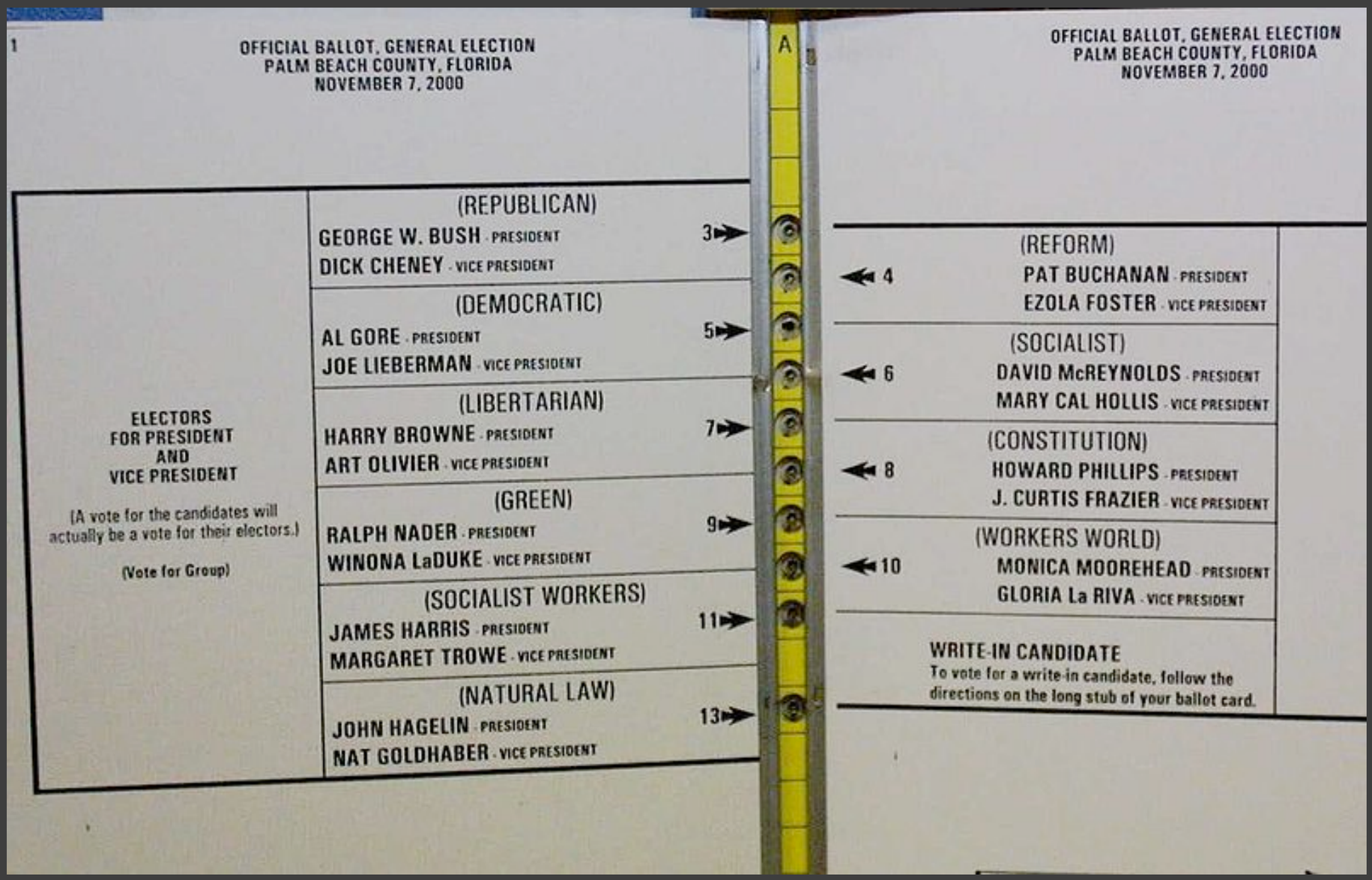


Image Courtesy Wikipedia: http://en.wikipedia.org/wiki/File:Butterfly_large.jpg

visibility

Image courtesy of Wikipedia: //en.wikipedia.org/wiki/File:Urna_eletrônica.jpeg

Example (good)

Mercedes S500 Car Seat Controller

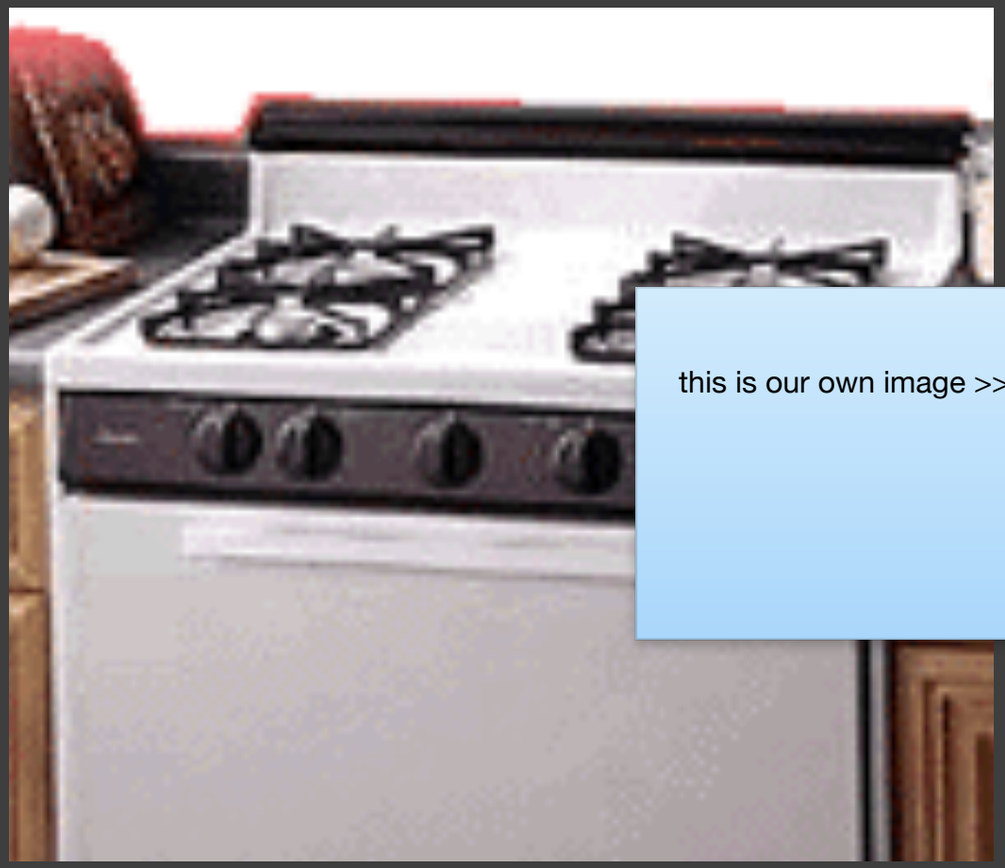
Map Interface Controls

- Control should mirror real-world
- Which is better for dashboard speaker front / back control?

Das

scott will draw these instead of the images

Map Interface Controls



this is our own image >>

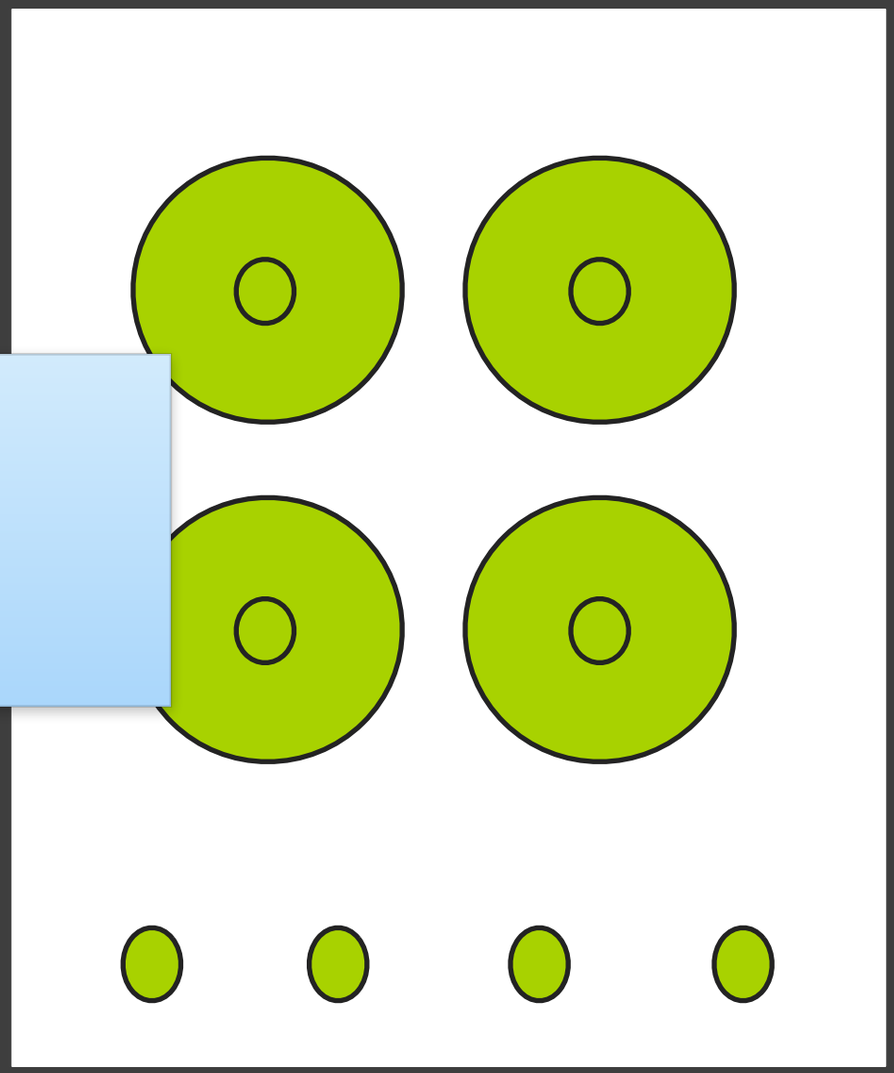
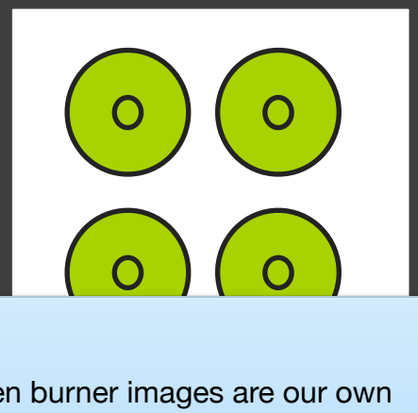
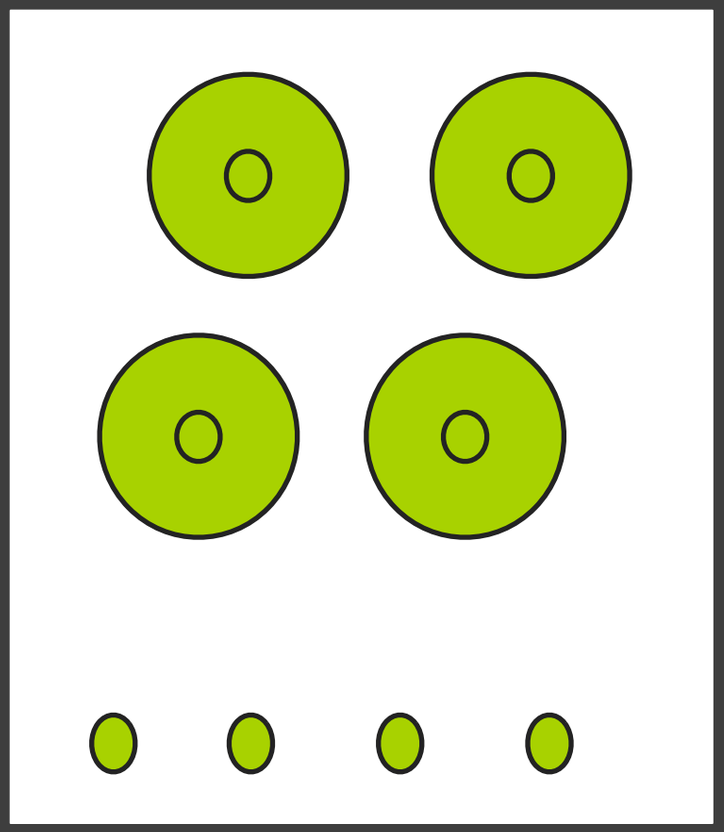


Image Courtesy Wikipedia: http://en.wikipedia.org/wiki/File:Gas_stove.jpg

Map Interface Controls



the green burner images are our own



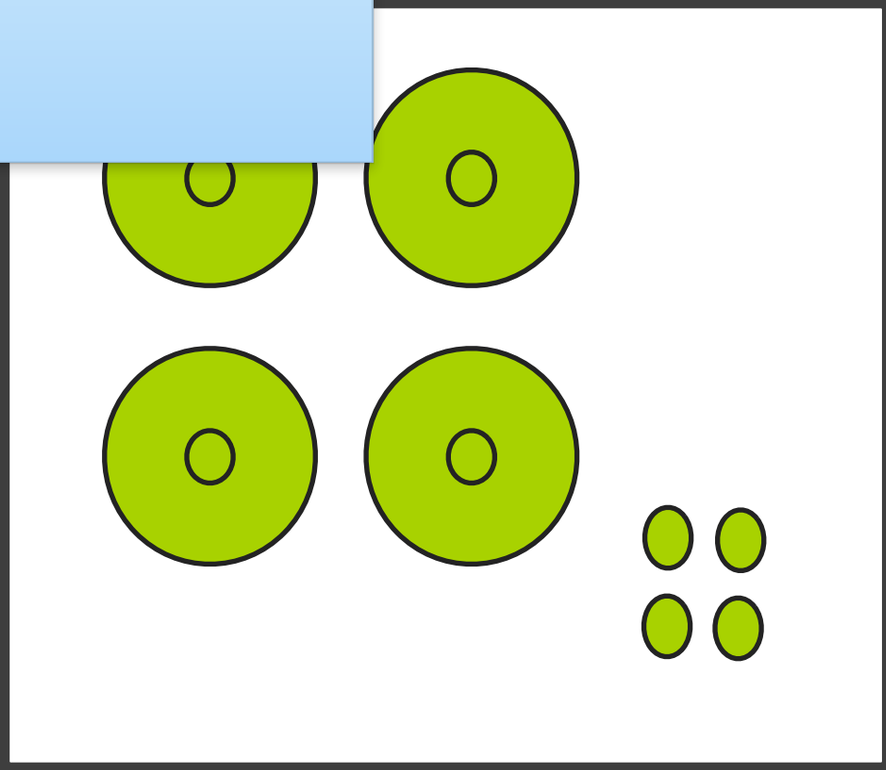


Image Courtesy Wikipedia: http://en.wikipedia.org/wiki/File:Gas_stove.jpg

Direct Manipulation Provides

- Good idea of how each object works and how to control it
- Interface itself discloses how it is used
- The art in design is to translate users cognitive capabilities and existing mental models into interfaces that work!

“If technology is to provide an advantage, the correspondence to the real world must break down at some point.”

- Jonathan Grudin

CURRENT

PRACTICE

NEW

TECHNOLOGY

minimize

this distance

Final Scratch

To learn more...

- Mental Models
  - Olson and Carroll 1984
  - Gentner and Stevens, Mental Models
- Errors
  - Norman, Design of Everyday Things
  - Norman, Things that Make Us Smart (chapter 5)
  - Norman, Design Rules based on analyses of human error
  - James Reason, Human Error
- Direct Manipulation
  - Shneiderman
  - Hutchins, Hollan, Norman

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