

MENTAL MODELS

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www.hci-class.org

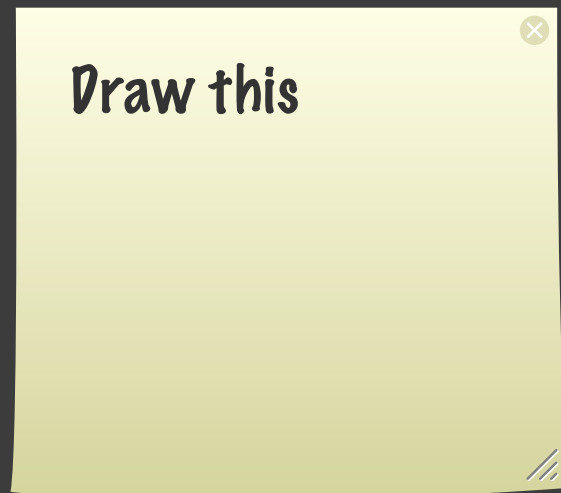
Key to good design:

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



Consider this refrigerator...

problem: freezer too cold, but fresh food just right



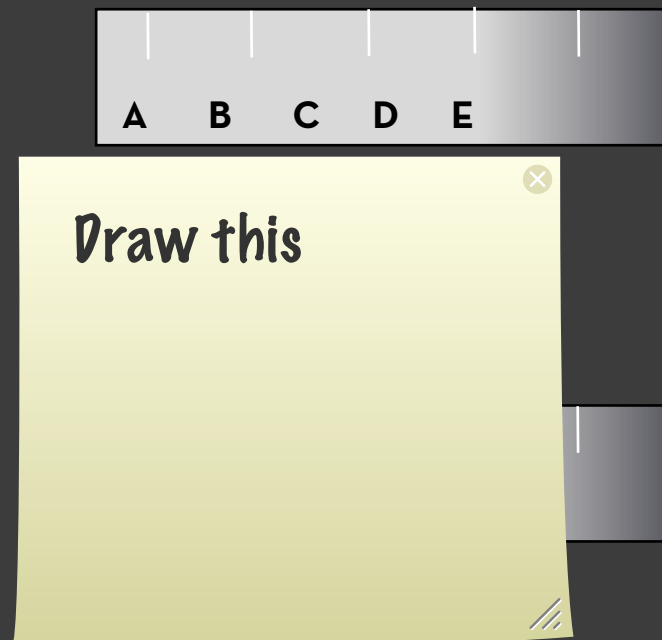
The refrigerator has 2 dials



Normal Setting
Colder Fresh Food
Coldest Fresh Food
Colder Freezer
Warmer Fresh Food
OFF (both)

Draw this

A likely model...



Actual Model



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

1

OFFICIAL BALLOT, GENERAL ELECTION
PALM BEACH COUNTY, FLORIDA
NOVEMBER 7, 2000

ELECTORS FOR PRESIDENT AND VICE PRESIDENT <small>(A vote for the candidates will actually be a vote for their electors.)</small> <small>(Vote for Group)</small>	(REPUBLICAN)	3 ➔
	GEORGE W. BUSH - PRESIDENT DICK CHENEY - VICE PRESIDENT	
	(DEMOCRATIC)	5 ➔
	AL GORE - PRESIDENT JOE LIEBERMAN - VICE PRESIDENT	
	(LIBERTARIAN)	7 ➔
	HARRY BROWNE - PRESIDENT ART OLIVIER - VICE PRESIDENT	
	(GREEN)	9 ➔
RALPH NADER - PRESIDENT WINONA LaDUKE - VICE PRESIDENT		
(SOCIALIST WORKERS)	11 ➔	
JAMES HARRIS - PRESIDENT MARGARET TROWE - VICE PRESIDENT		
(NATURAL LAW)	13 ➔	
JOHN HAGELIN - PRESIDENT NAT GOLDHABER - VICE PRESIDENT		

OFFICIAL BALLOT, GENERAL ELECTION
PALM BEACH COUNTY, FLORIDA
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4 ←	(REFORM)
PAT BUCHANAN - PRESIDENT EZOLA FOSTER - VICE PRESIDENT	
6 ←	(SOCIALIST)
DAVID McREYNOLDS - PRESIDENT MARY CAL HOLLIS - VICE PRESIDENT	
8 ←	(CONSTITUTION)
HOWARD PHILLIPS - PRESIDENT J. CURTIS FRAZIER - VICE PRESIDENT	
10 ←	(WORKERS WORLD)
MONICA MOOREHEAD - PRESIDENT GLORIA La RIVA - VICE PRESIDENT	
WRITE-IN CANDIDATE <small>To vote for a write-in candidate, follow the directions on the long stub of your ballot card.</small>	

VISIBILITY



Example (good)



Mercedes S500 Car Seat Controller

Direct Manipulation Provides

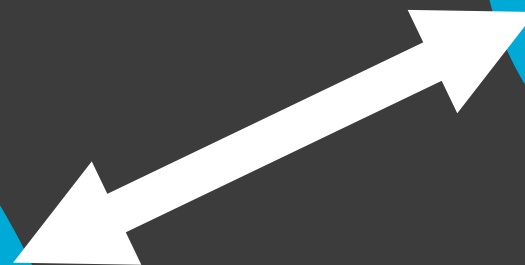
- Leverages real-world metaphors
- Good idea of how each object works and how to control it
- Interface discloses how to use it

“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...

- JM Carroll, JR Olson, *Mental models in human-computer interaction: Research issues*, 1987
- Don Norman, *Design of Everyday Things*
- James Reason, *Human Error*
- Butterfly Ballots in Palm Beach County, 2000: <http://elections.berkeley.edu/statement/hbrady/node4.html>