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DESIGN PRINCIPLES



University of
Washington

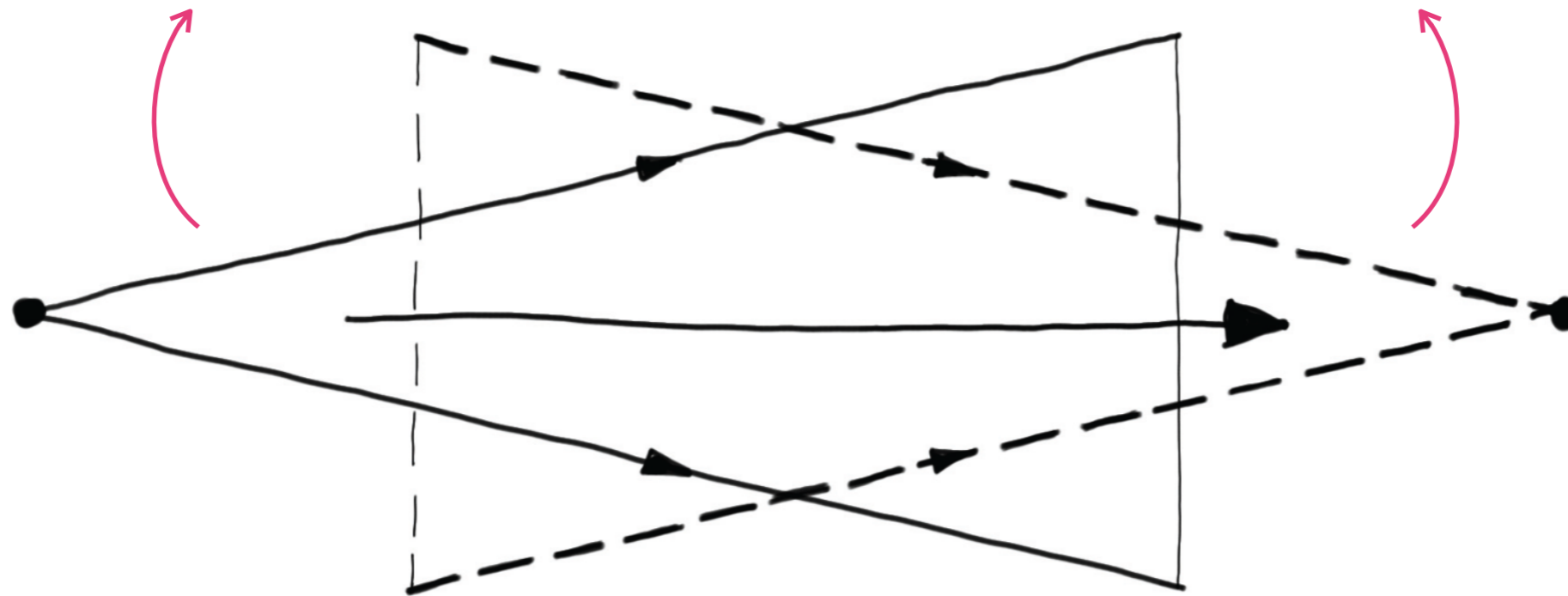
human-computer interaction
CSE 440 WINTER 2015

JAN 27 - WEEK 4 - TUESDAY

SO FAR...

getting the right design

getting the design right



Brainstorming

Information gathering

Prototyping: tasks

TODAY

- Conceptual/mental models
- Design principles
 - Norman's principles
 - Nielsen's heuristics

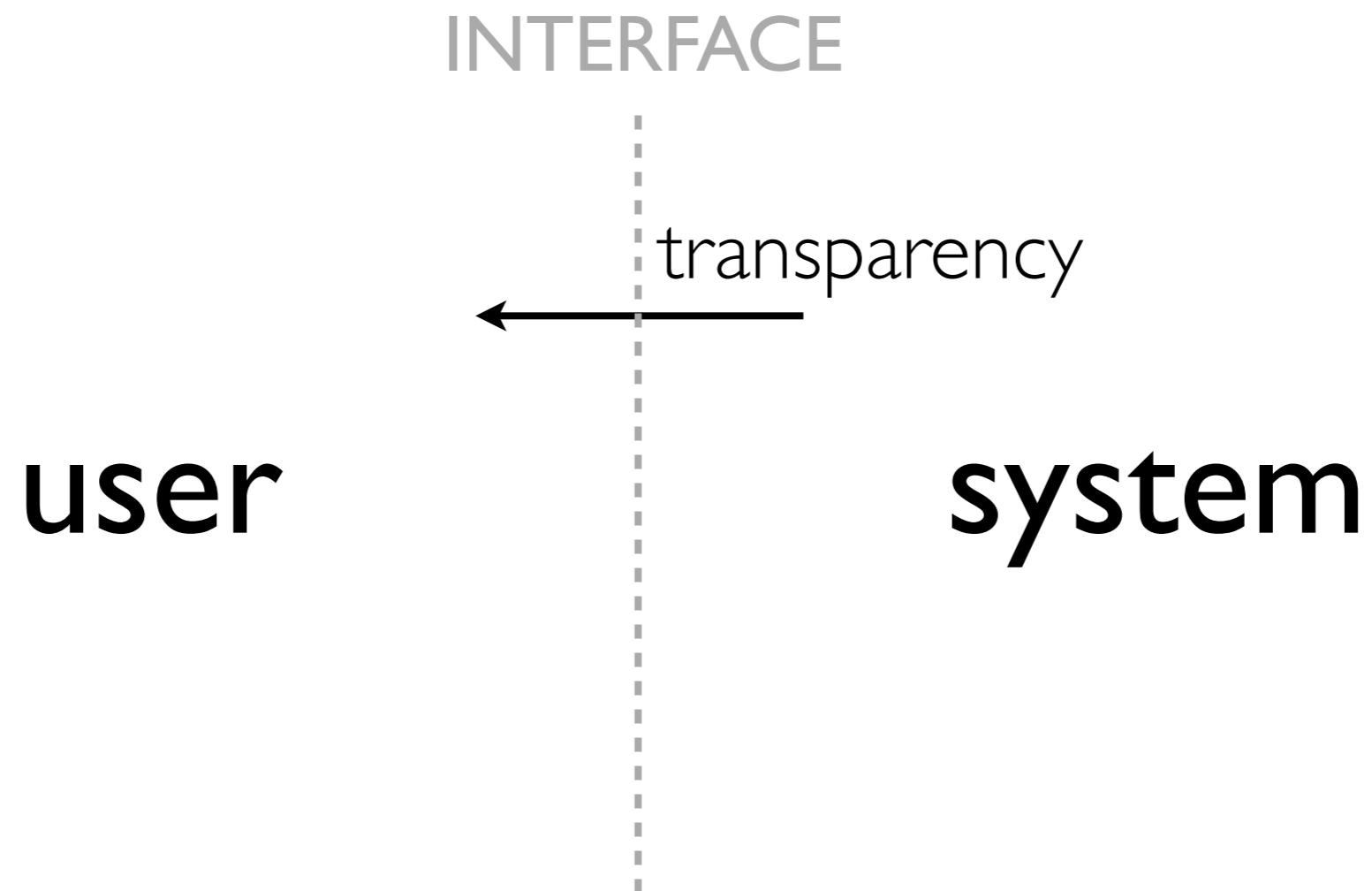
Interface

INTERFACE

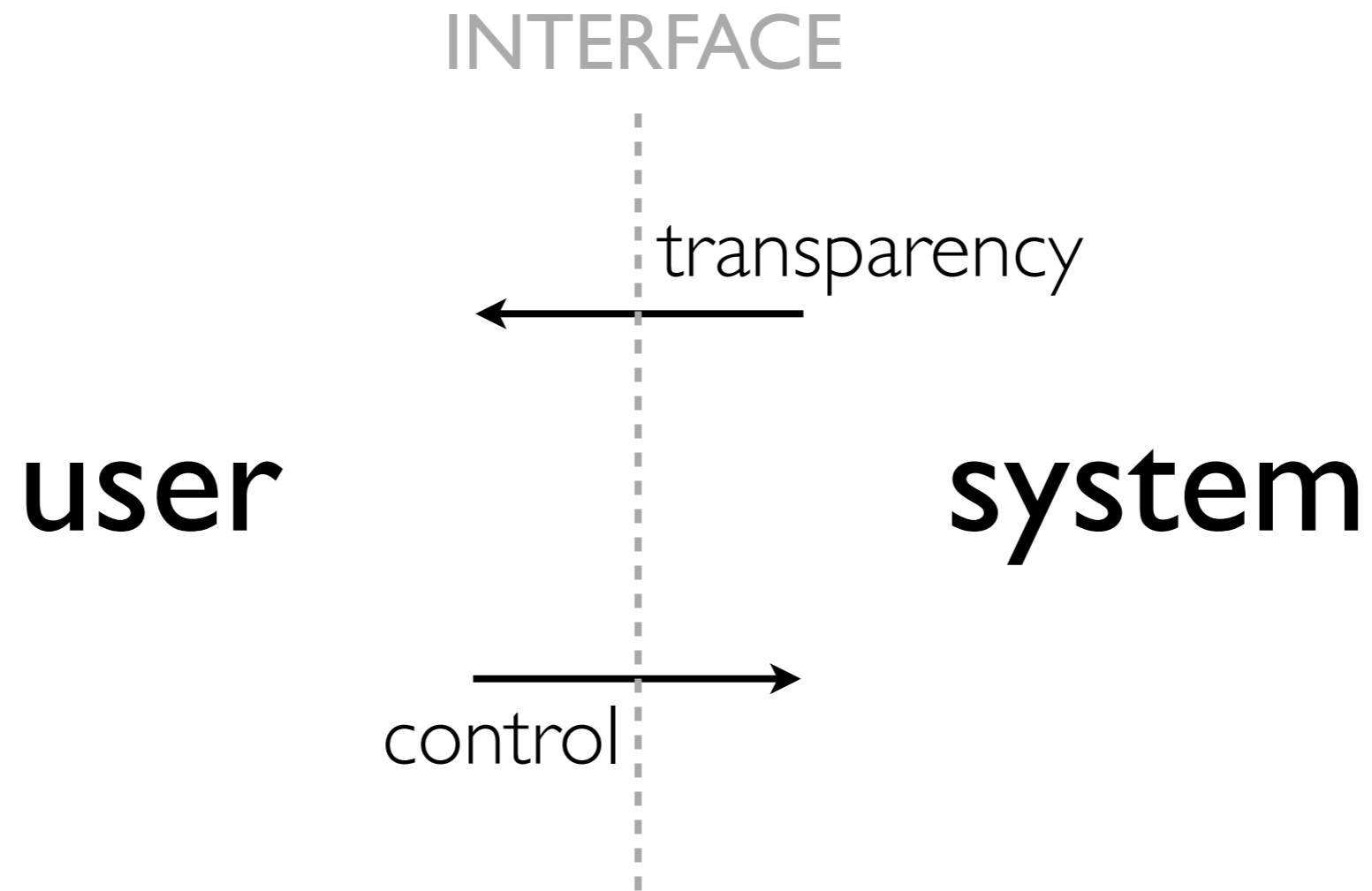
user

system

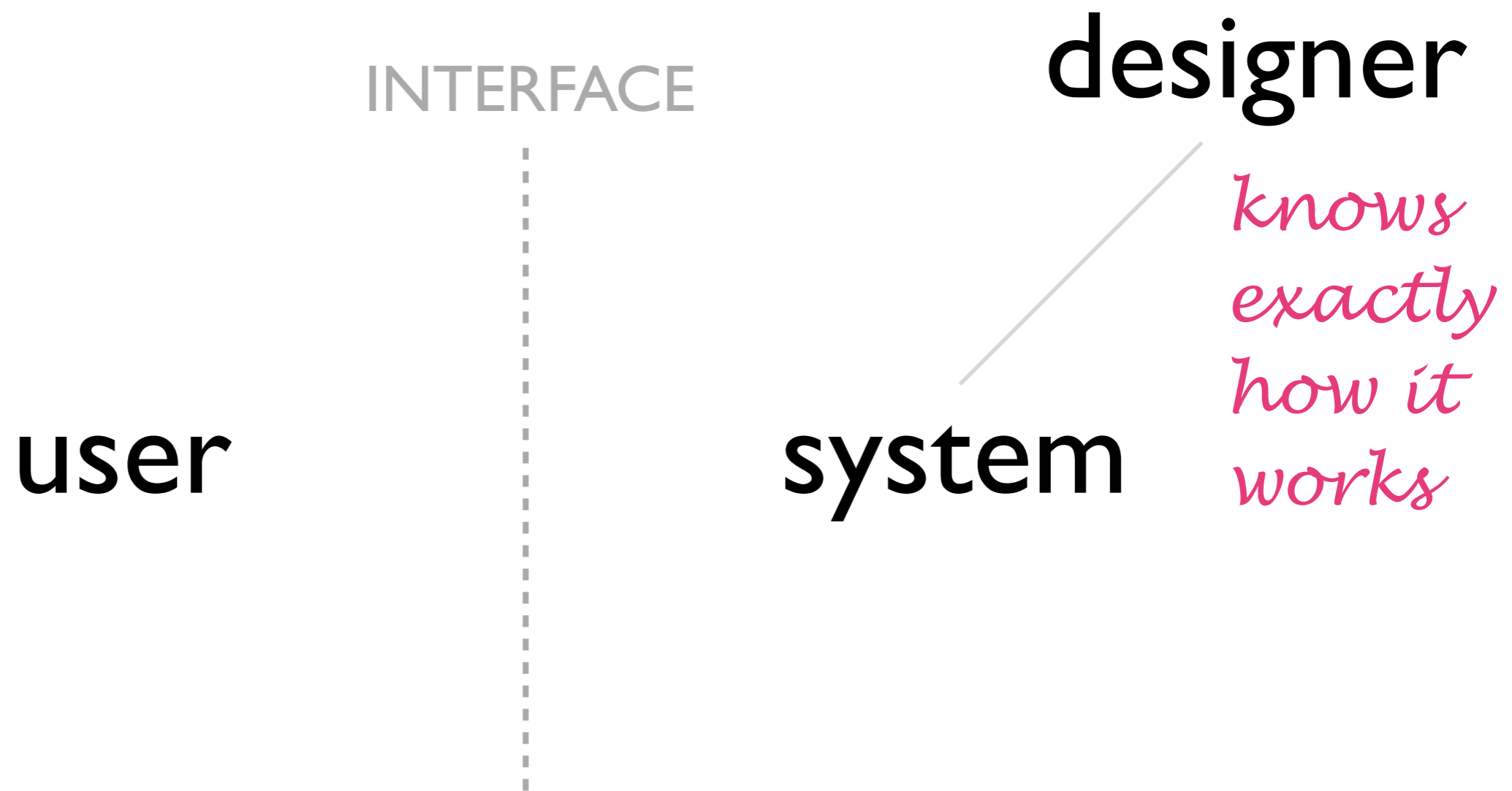
Interface



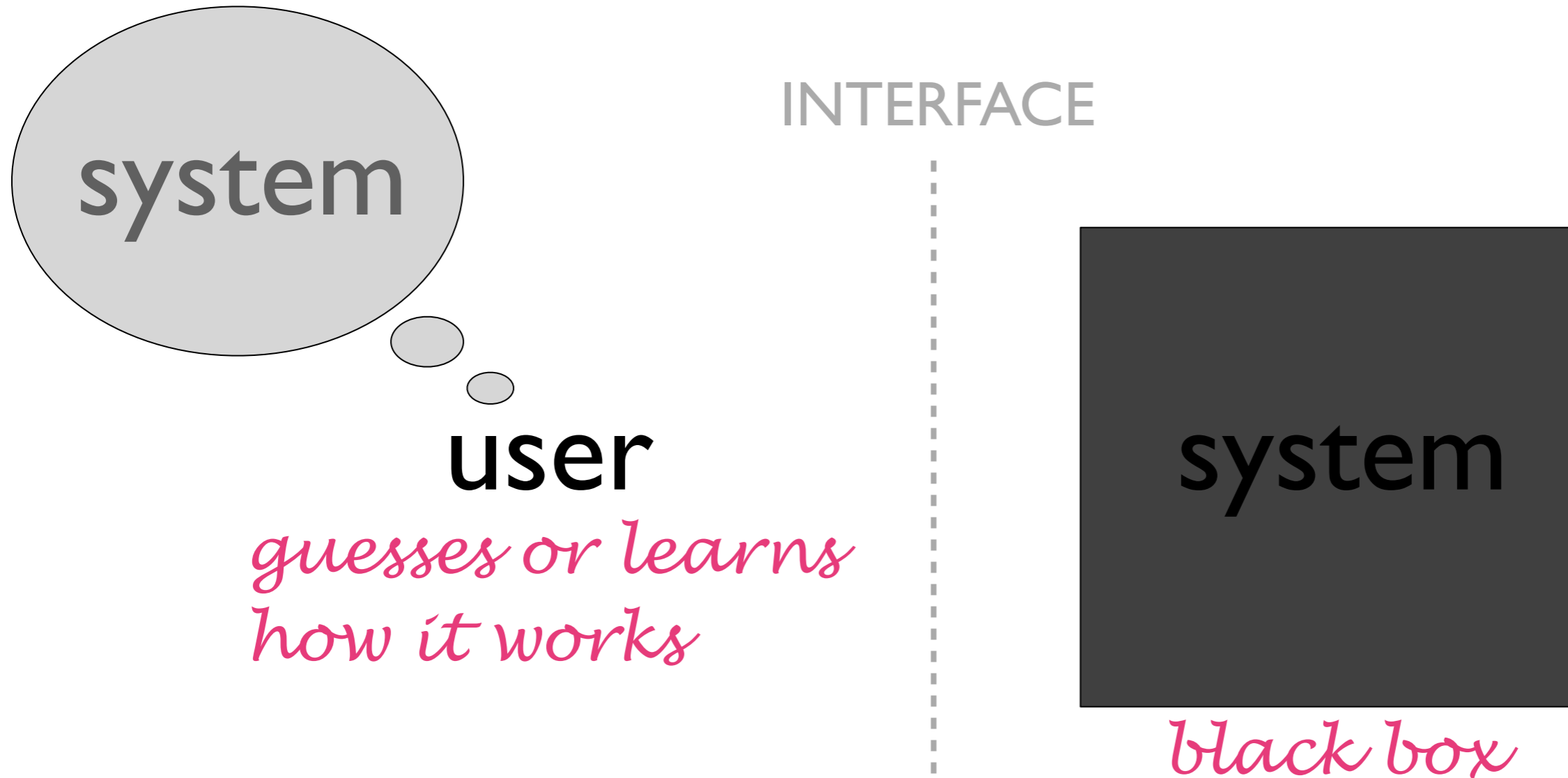
Interface



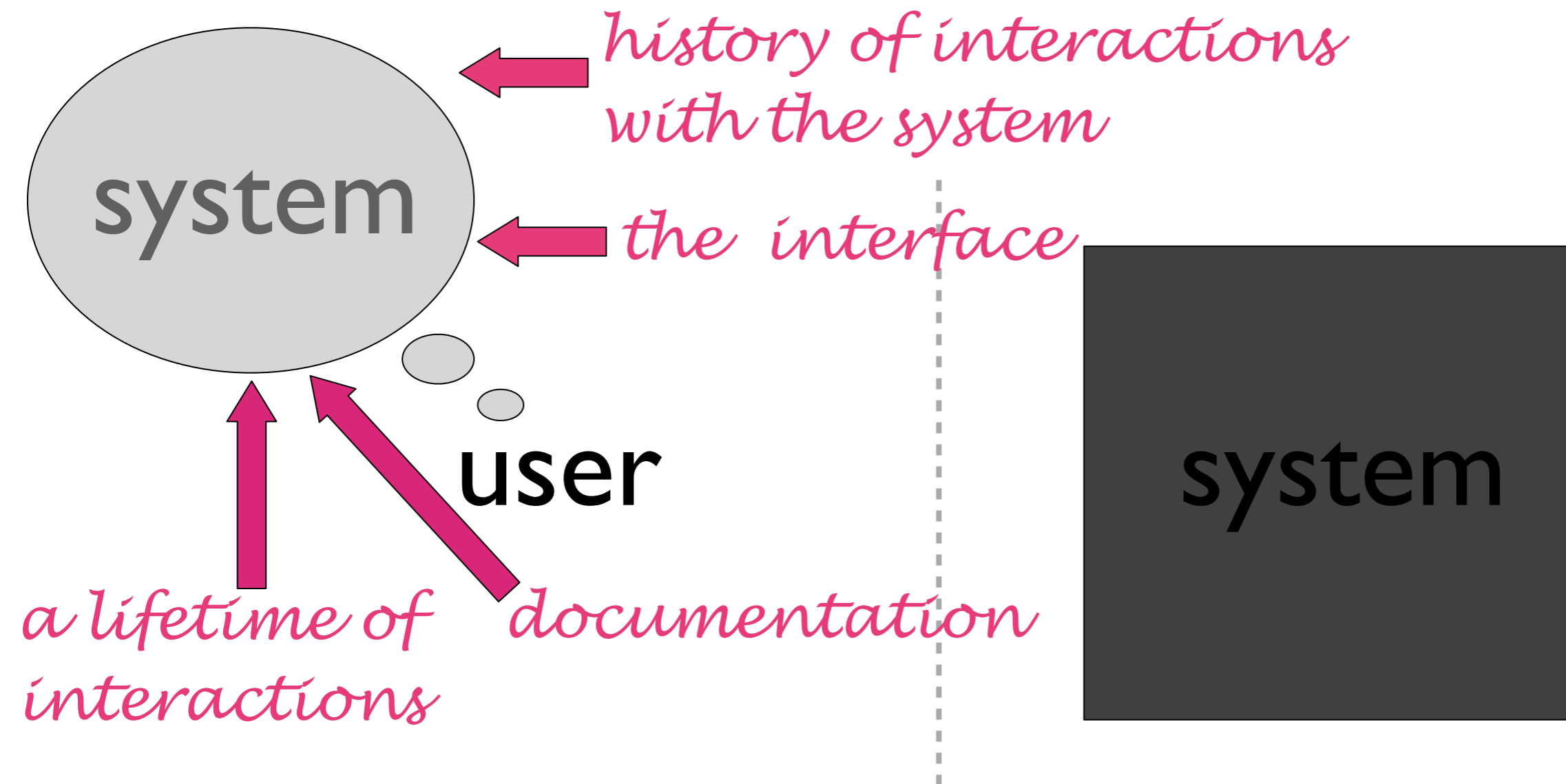
Design model



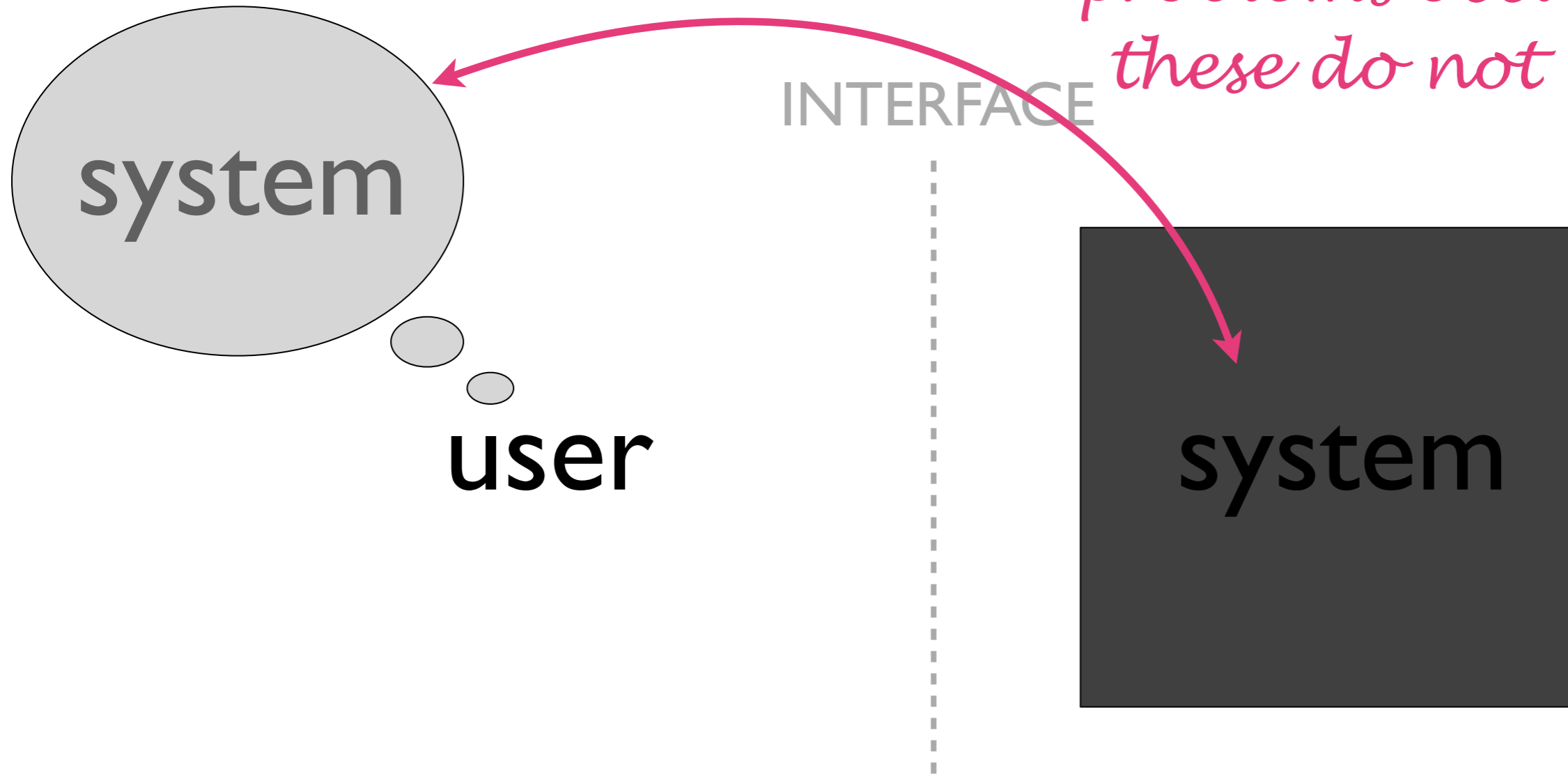
Conceptual model



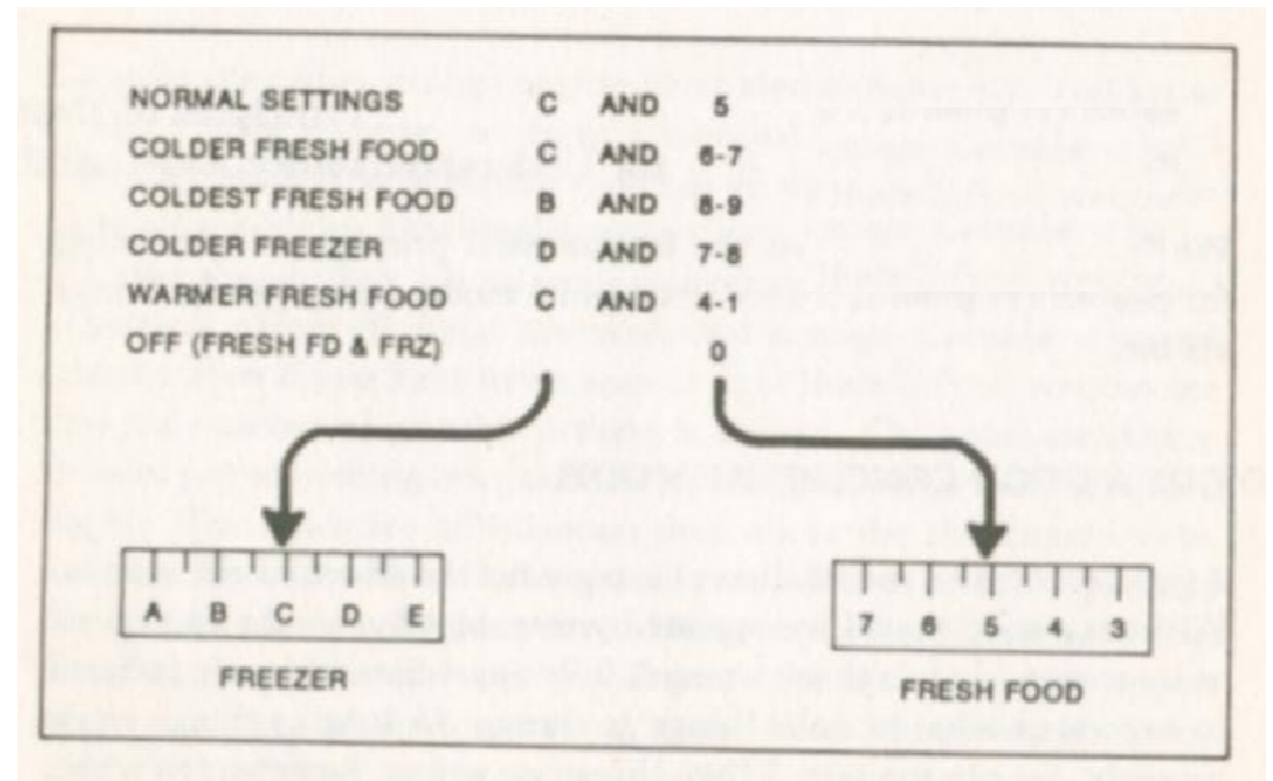
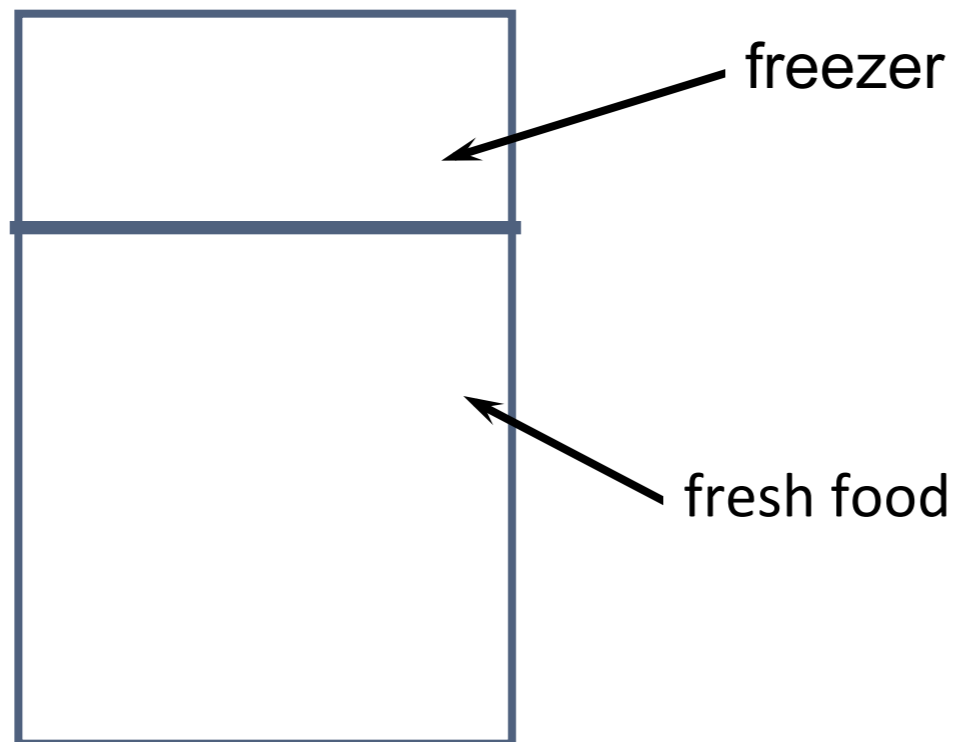
Conceptual model



Conceptual model



Example: Flawed conceptual model

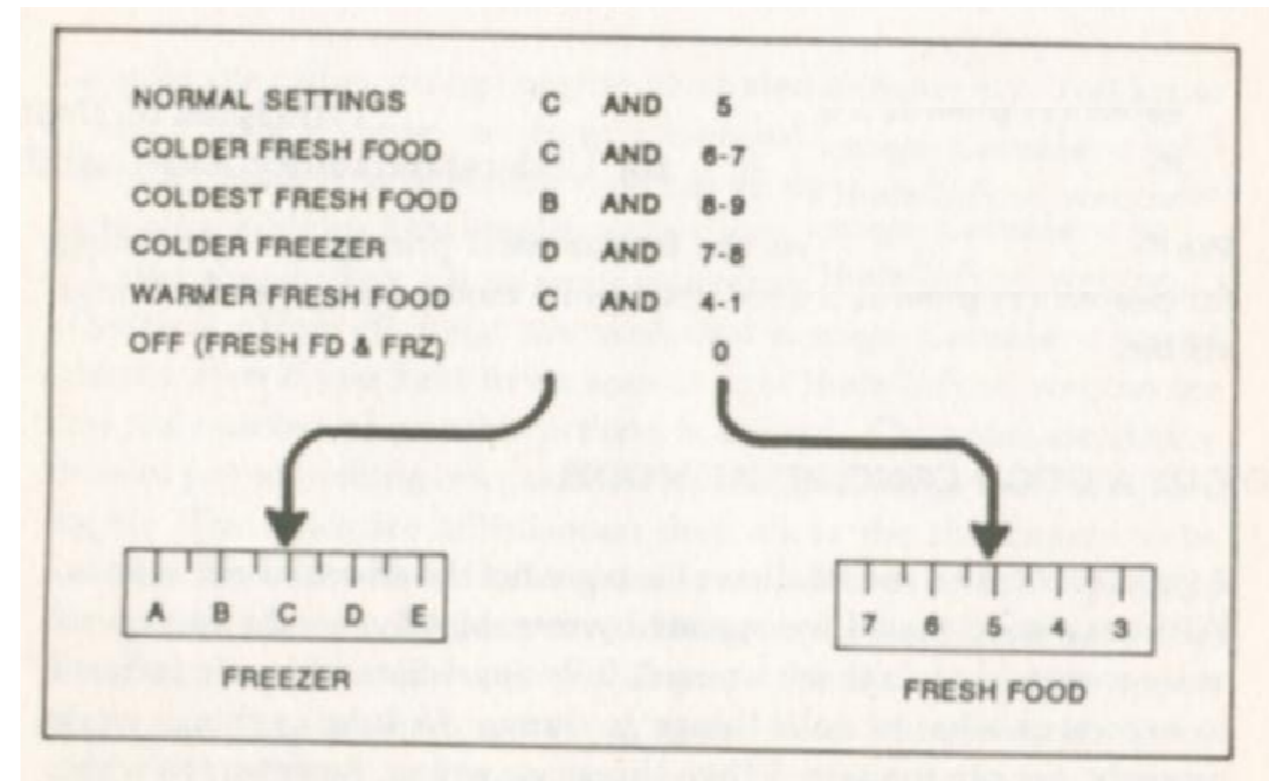
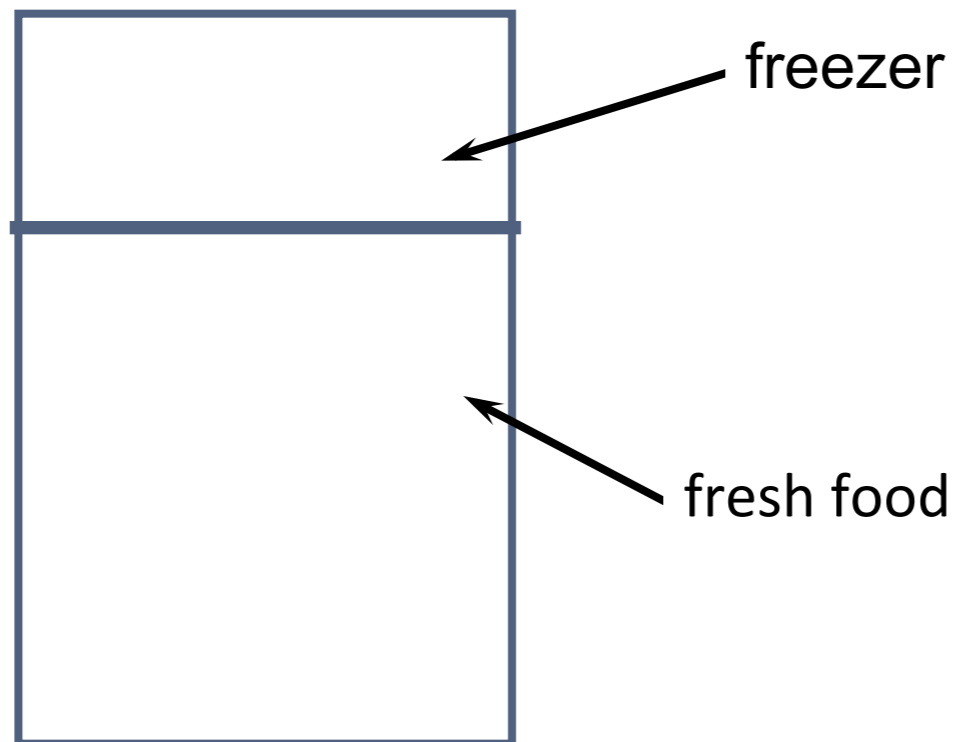


Let's say:

Freezer is too cold and fresh food is just right.
I want to make just the freezer warmer

Example: Flawed conceptual model

hint: instructions - already a bad sign!



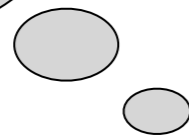
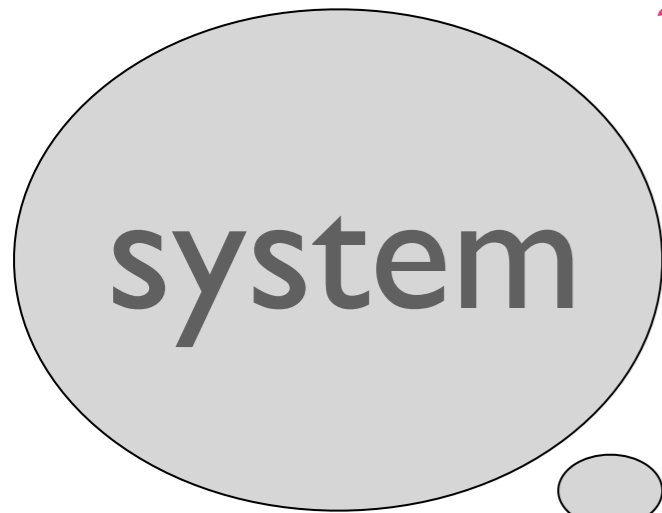
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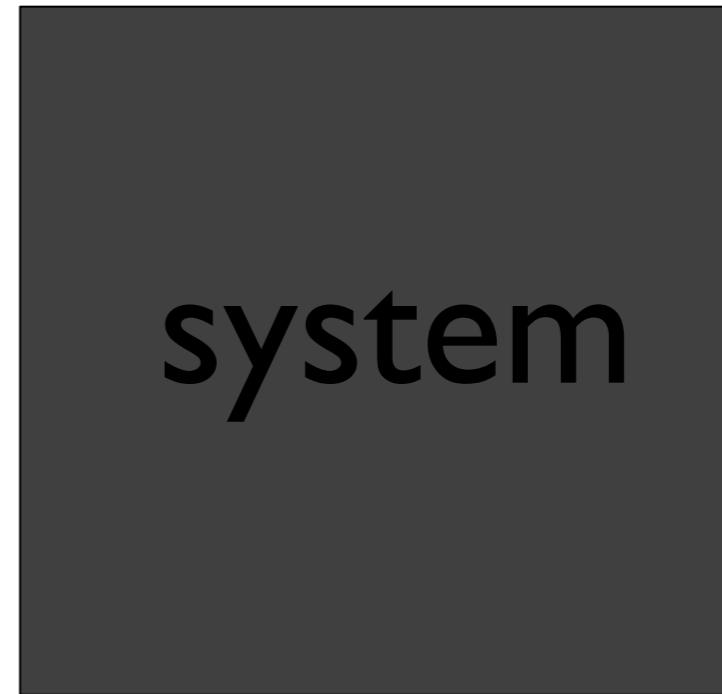
Example: Flawed conceptual model

Two compartments, two controls

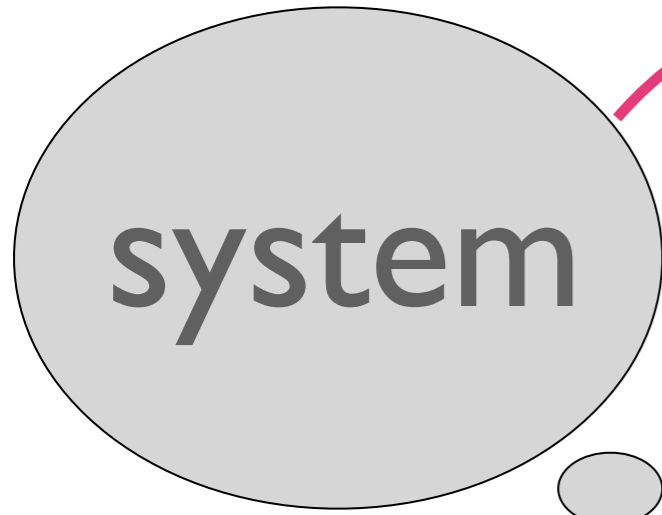
INTERFACE



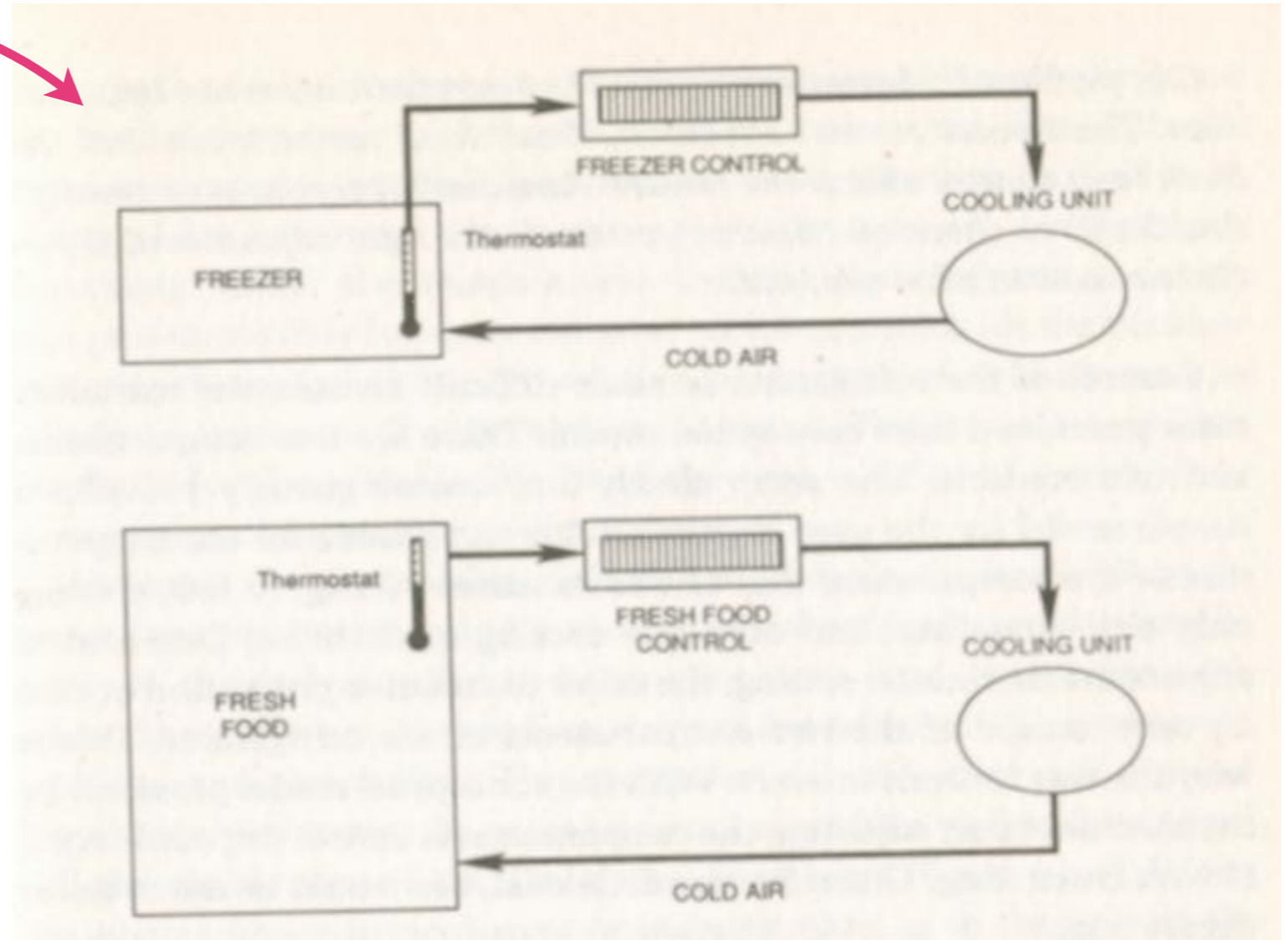
user



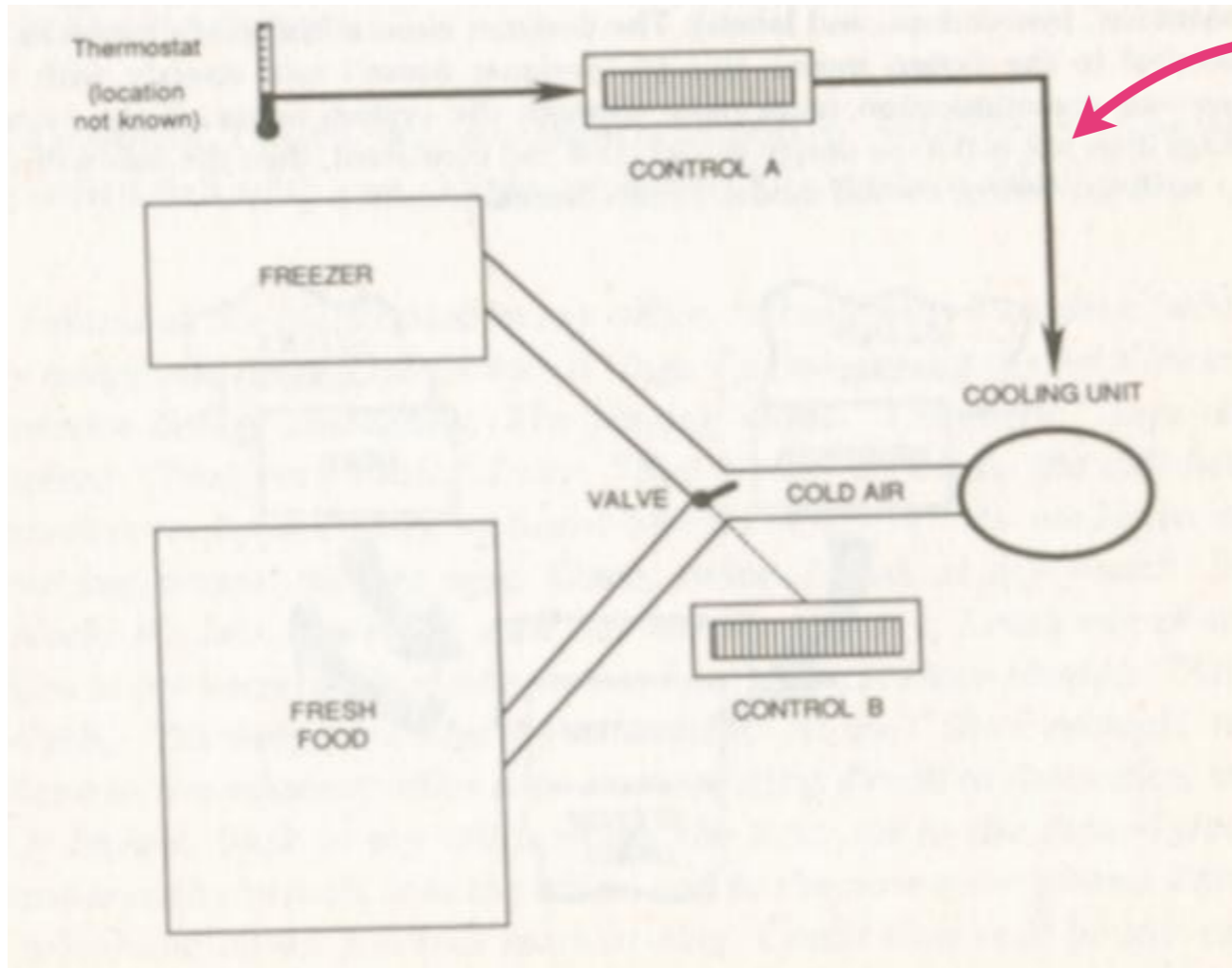
Example: Flawed conceptual model



user



Example: Flawed conceptual model

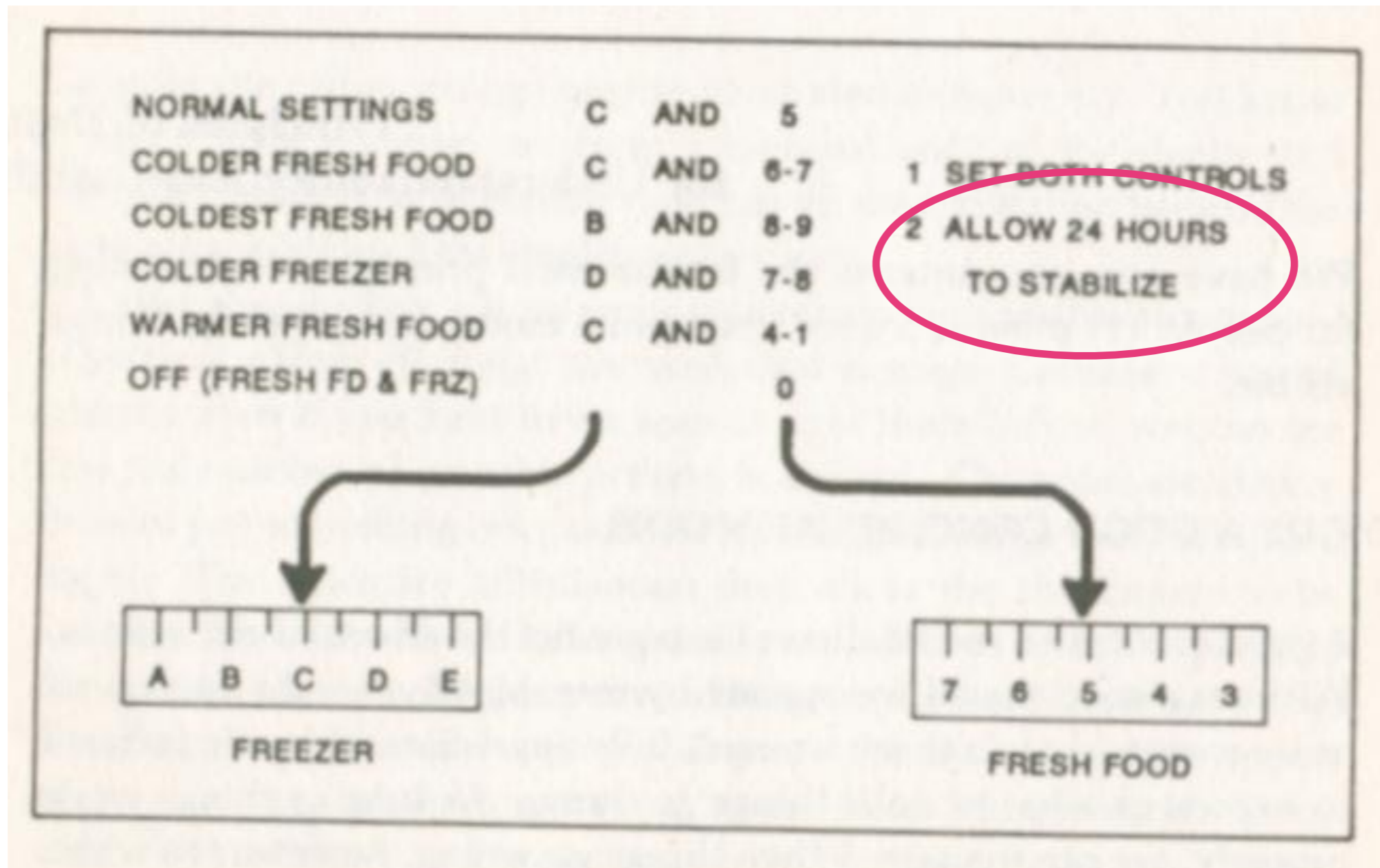


system

Flawed conceptual models...

result in wrong actions!

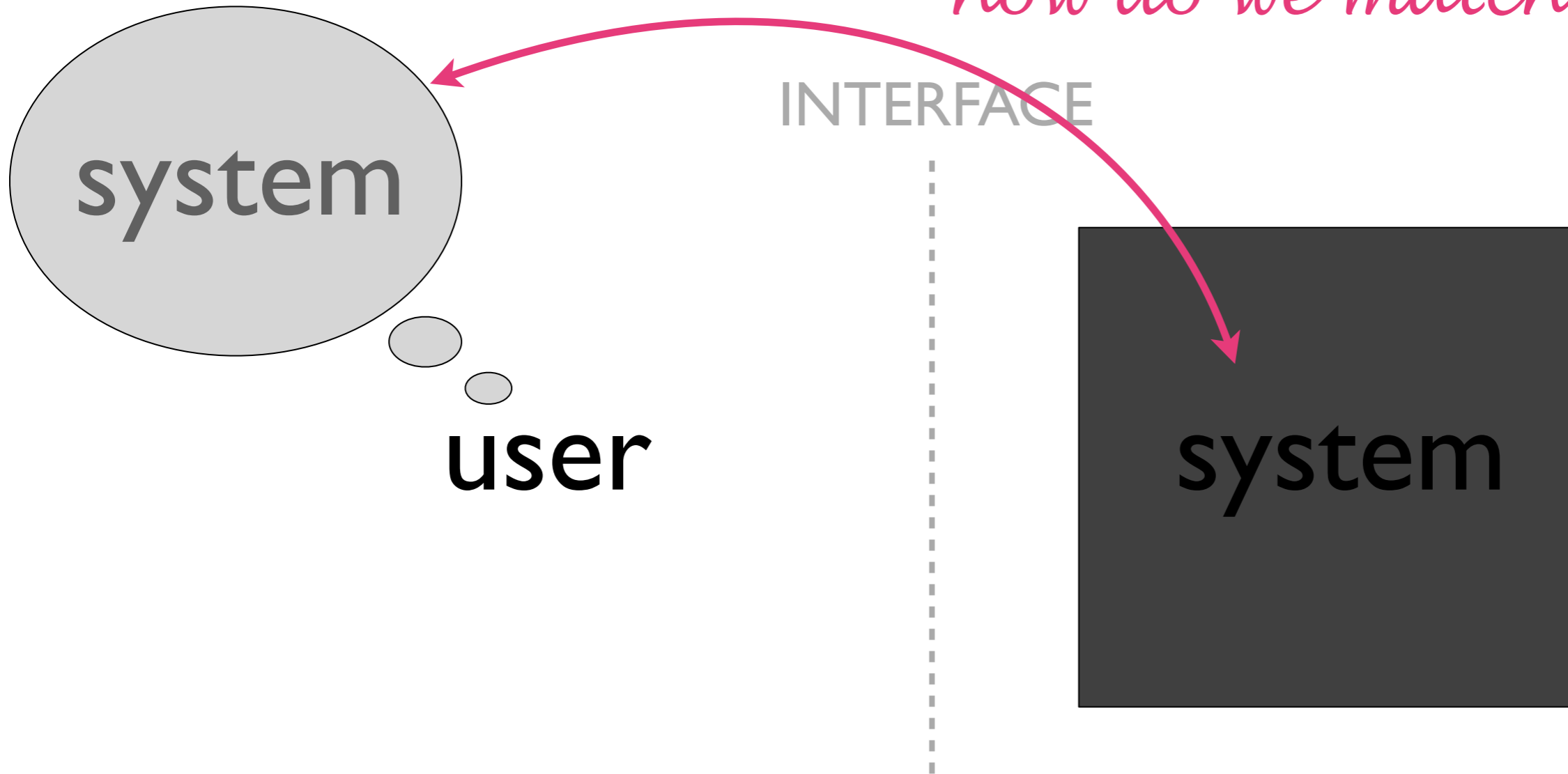
A problem with feedback



Seeing the results of wrong actions will take time...

Design principles

how do we match these?

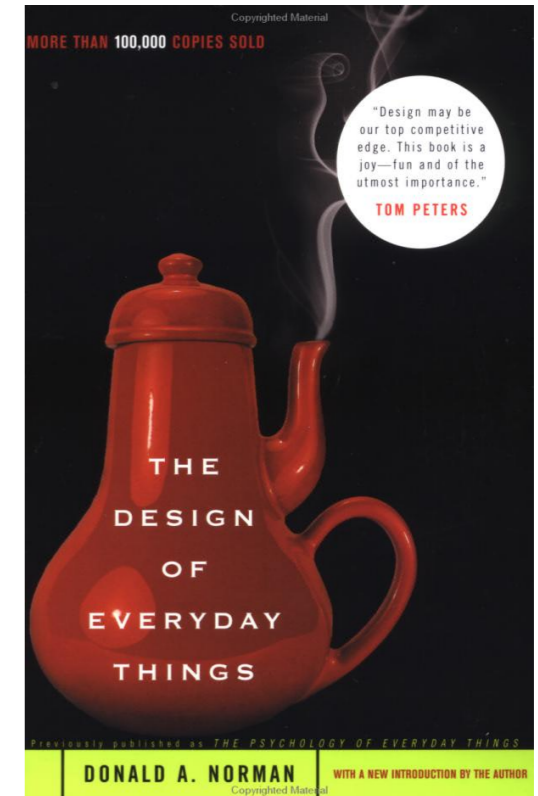


Design principles

Don Norman, Design of Everyday Things.

Affordances
Visibility
Constraints
Mapping
Metaphors
Consistency

*important concepts for understanding
Norman's design principles*



Affordances

- Visual clue to interaction
 - knobs afford turning
 - levers afford moving
 - buttons afford pushing

Pull or push?



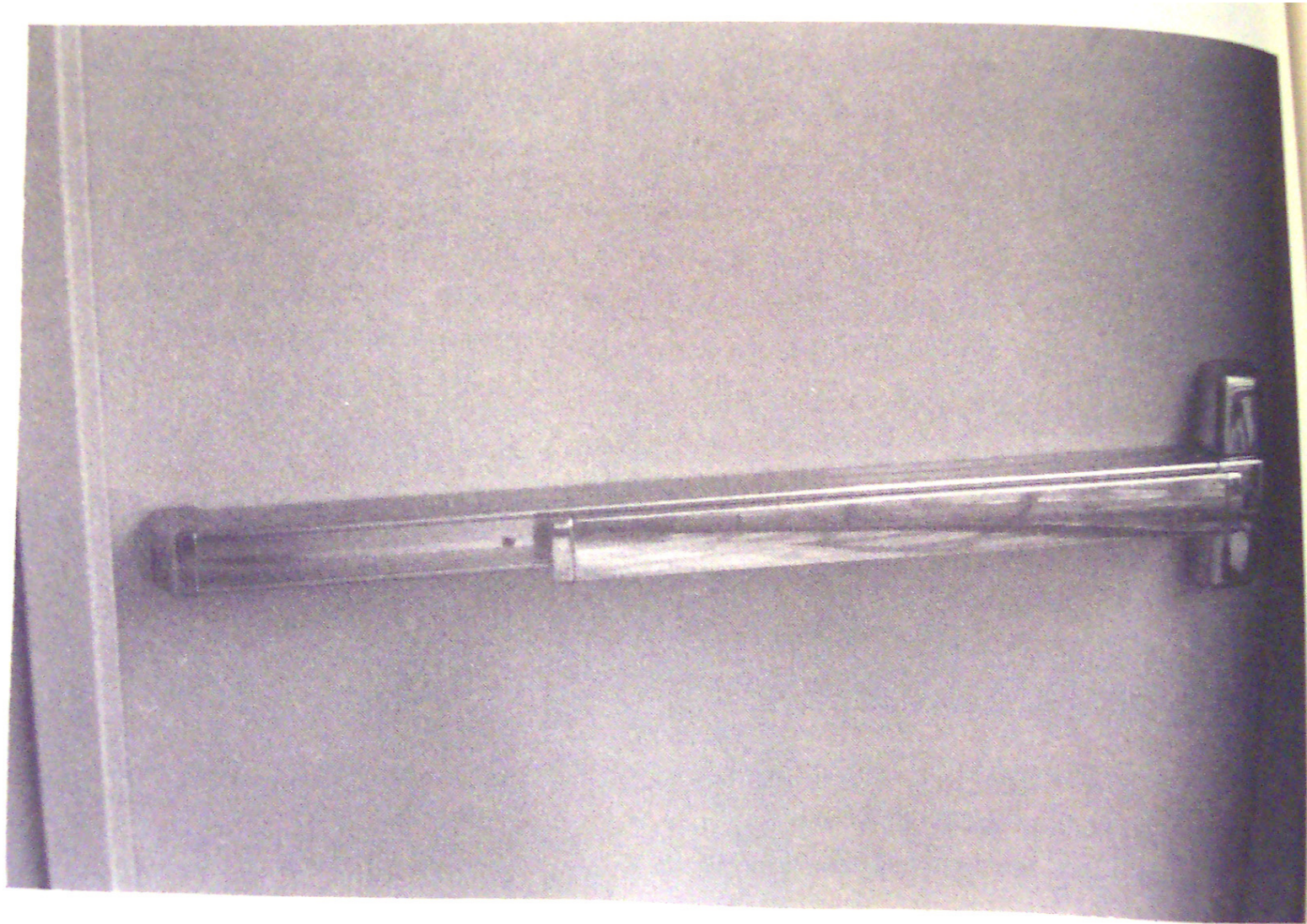
Pull or push?



Pull or push?



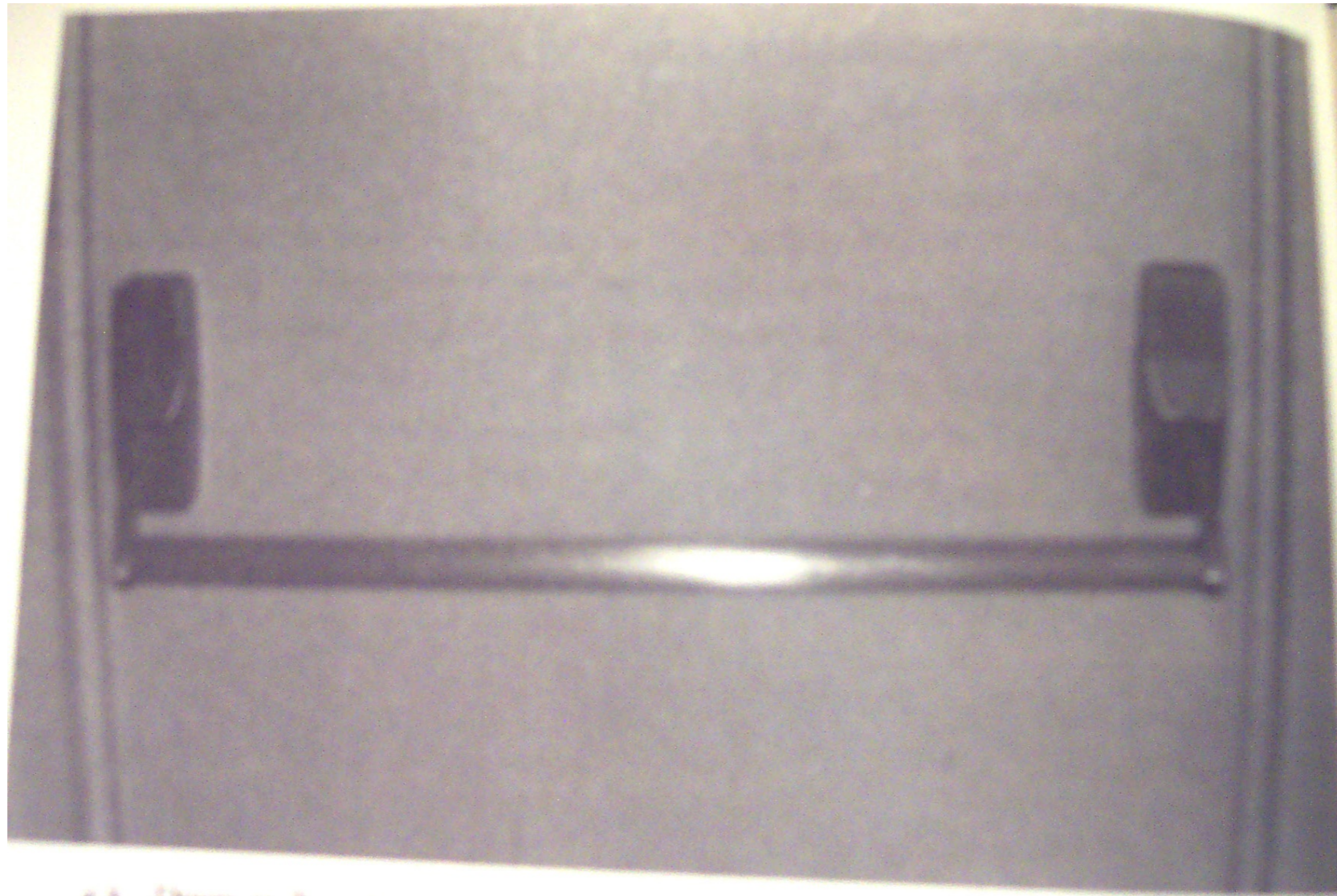
Pull or push?



Pull or push?



Pull or push?



Pull or push?



Pull or push?



Affordances

- Visual clue to interaction
 - knobs afford turning
 - levers afford moving
 - buttons afford pushing



Handles afford pulling

Using a flat plate would constrain the user to push

Affordances



DO NOT PRESS!



Affordances

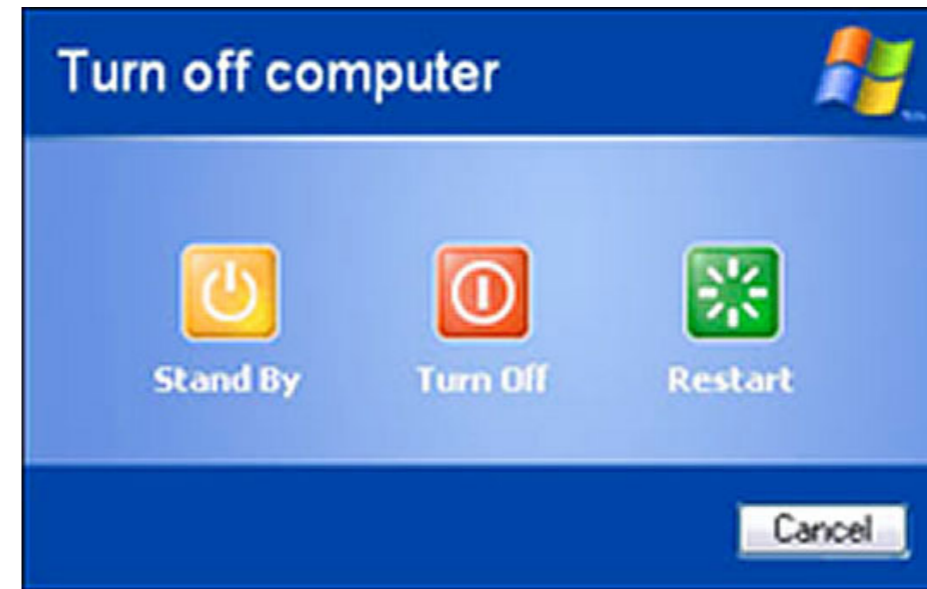


DO NOT PRESS!

THIS IS A MOP SINK



Affordances



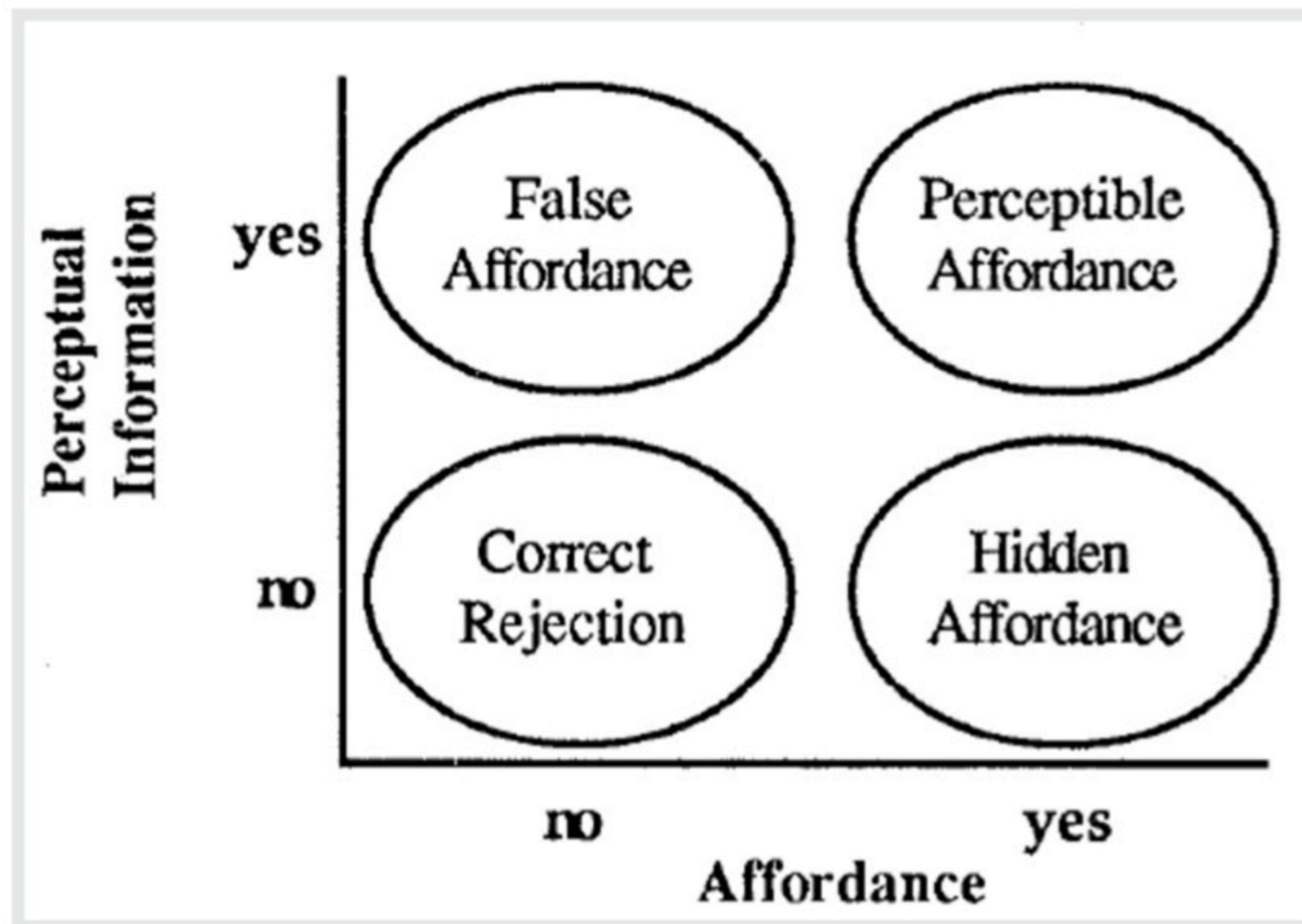
Affordances

- Visual clue to interaction: what a thing communicates about how it can be used, often by its appearance

Design principle: Make affordances clear and accurate

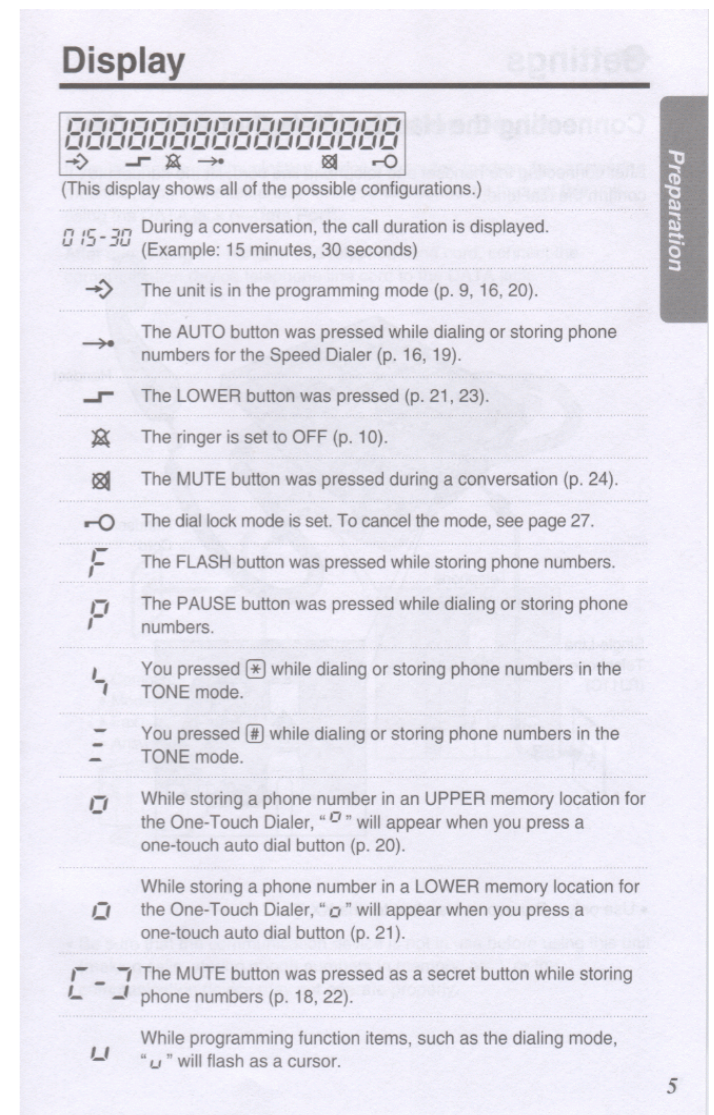
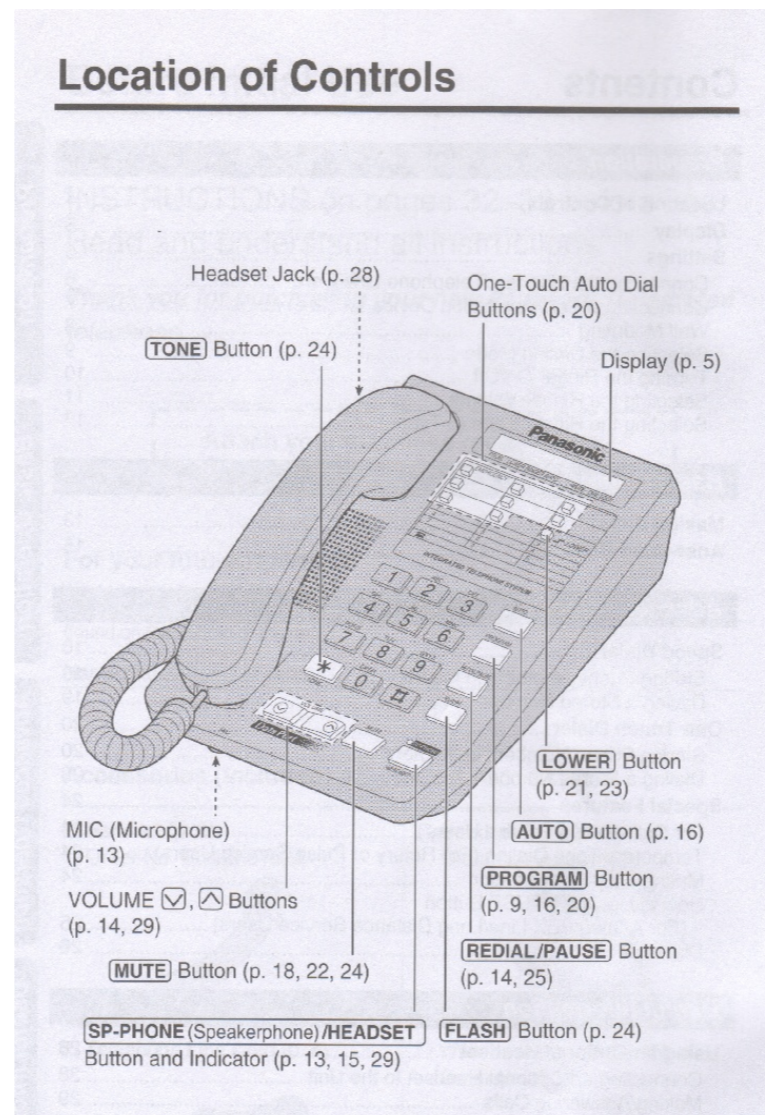
Affordances

- Visual clue to interaction: what a thing communicates about how it can be used, often by its appearance



Visibility

- Phone: How do you put someone on hold? How do you change volume?



Visibility

- Controls available on watch w/ 3 buttons?
 - too many and they are not visible
- Compare to controls on simple car radio
 - #controls \approx #functions
 - controls are labeled and grouped together



Knowledge in the world



Constraints

Form1

Date:

Month Day Year

May 22 1997
Month Day Year

May 22 1997

Appointment

General Attendees Notes Planner

When

Start: 8:30 AM Wed 5 /14 /97

End: 4:30 PM Wed 5 /14 /97 All day

Description:

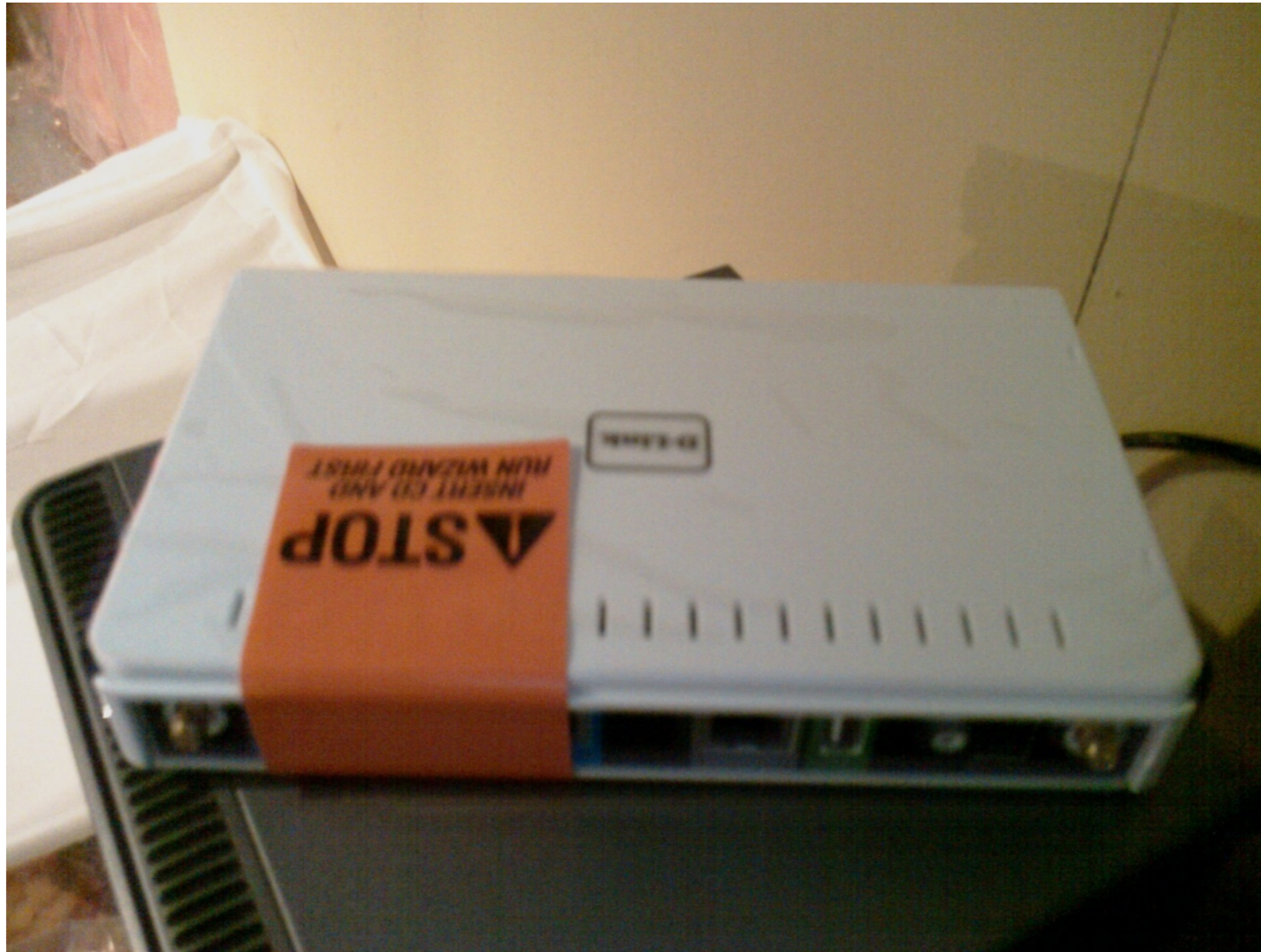
Smart Technology Ser

Where:

May 1997

S	M	T	W	T	F	S
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

Constraints



Constraints

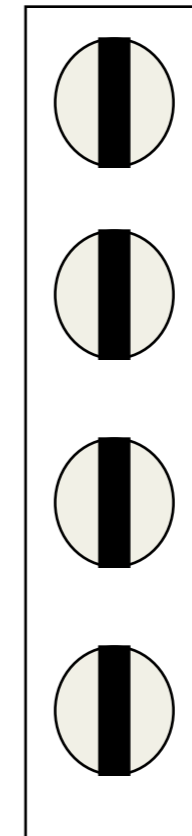
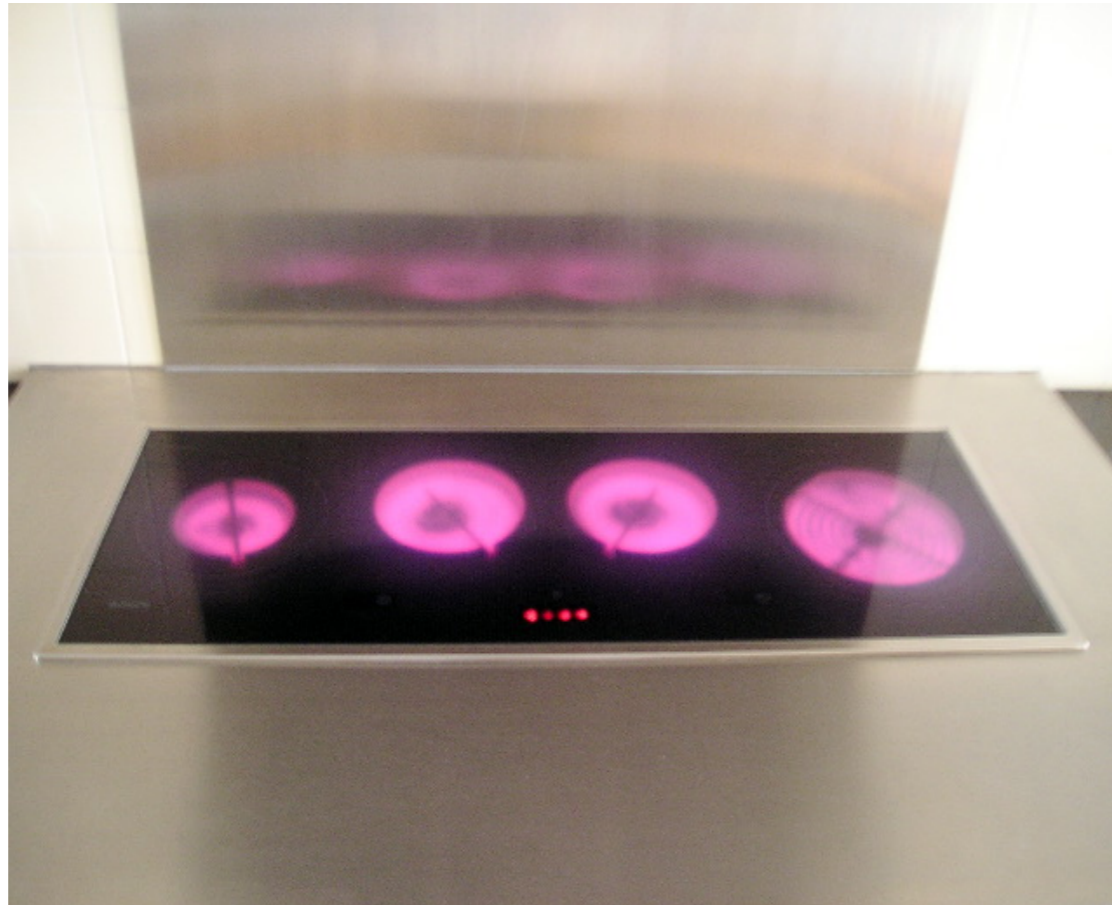


Mappings

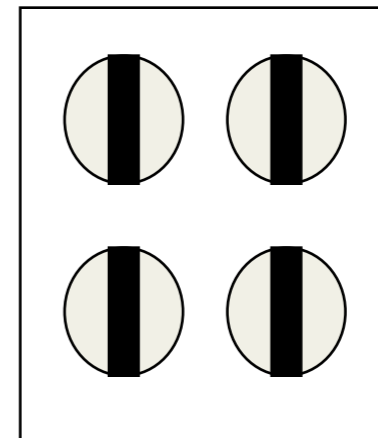
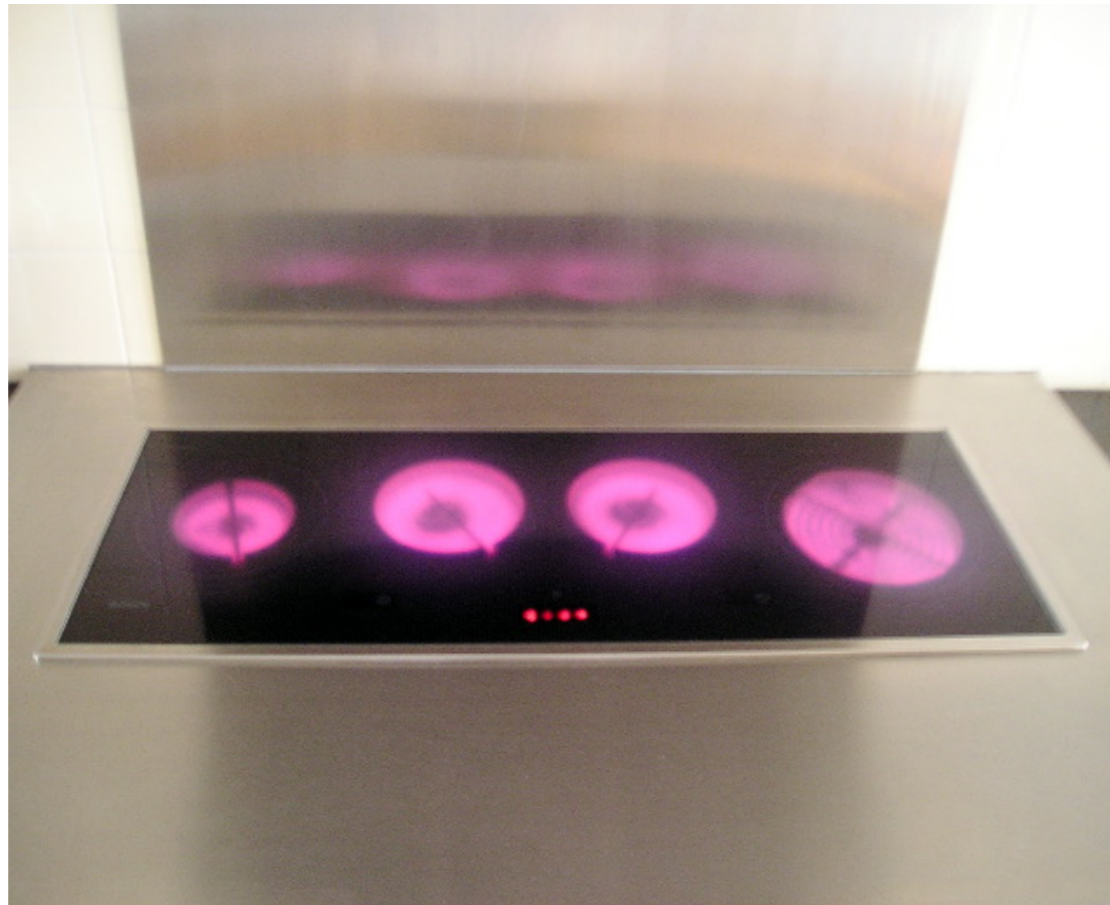
Correspondence between an interface and action in 'the world'



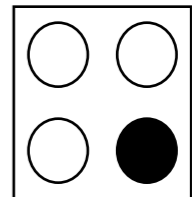
Mappings



Mappings



Mappings



Mappings

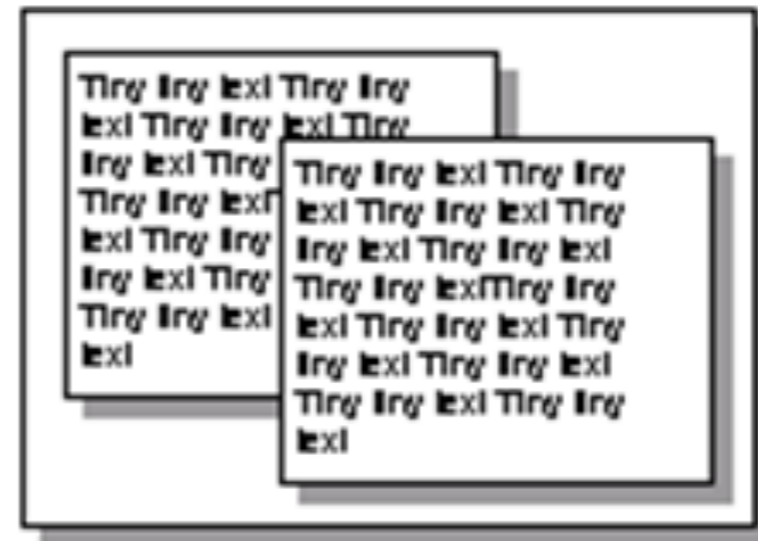
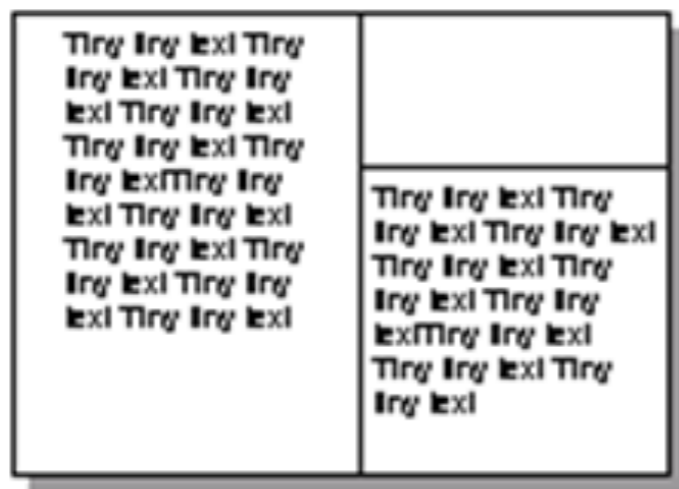


Mappings



Metaphors

- Suggest a conceptual model
- Desktop metaphor
 - Not an attempt to simulate a real desktop
 - Leverages knowledge of files, folders, trash
 - Explains why some windows seem hidden



Consistency

- Ubiquitous use of same keys for cut/copy/paste
- Types of consistency
 - Internal (same terminology/layout)
 - External
 - consistent with other apps
 - common widget appearance
 - design patterns (across many apps)
 - consistent with physical world

Standardization

- If all else fails, standardize
 - fewer things to memorize, reduced learning time, adapt to new situations faster

QWERTY KEYBOARD

~ `	! 1	@ 2	# 3	\$ 4	% 5	^ 6	& 7	* 8	(9) 0	- _	+ =	Delete
Tab	Q	W	E	R	T	Y	U	I	O	P	{ [}]	 \ _
Caps	A	S	D	F	G	H	J	K	L	:	" "	;	Enter
Shift	Z	X	C	V	B	N	M	< ,	> .	? /	Shift		
Ctrl	Alt										Alt	Ctrl	

<http://www.computerhope.com>

keyboard layout not optimal, but standard

Norman's Seven Principles for Design

- Provide a good conceptual model
- Make things visible
- Get the mappings right
- Exploit the power of constraints
- Design for error
- Provide feedback in response to actions
- When all else fails, standardize

Nielsen's heuristics

*Note overlaps
with Norman's
principles*

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help recognize, diagnose, and recover from errors
- Help and documentation

Exercise: Discuss design principles



Exercise: Discuss design principles



Task review critiques

- Maya
 - Success in a course
 - Food spoilage
 - Relationships
 - Sunlight
- King
 - Alcohol
 - Habits
 - Pet informatics
- Matt
 - Drugs
 - Eldercare
 - GI symptoms
- Brad
 - Decision making
 - Mood factors
 - Speech

*Start thinking
about team names!*