CSE 440:
Introduction to HCI

06: Design of Everyday Things

April 11, 2024

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Course Reminders

2b - Design Research Plan due Today (Thurs) @ 3pm

- Be sure to check (& refresh!) website for latest spec
- Tomorrow: Crit on 2b in Section

2a - Design Ideation due Tomorrow (Fri) @ 3pm

2c – Design Research Check-in due Monday @ 3pm

- Need to have completed at least *one* study session!
- *(Remaining sessions completed by 2d, due next Thurs)*

2c – “Findings”?

In 2c, you are asked to report **6 key “findings”**

Should be something that:

- Will meaningfully influence your design
- Highlights a need/want/objective you did not already know about
- Is deeper than “something you get on the first Google result”

Depending on the Participant/Method:

- *Could* be something the participant directly expressed
- Will *probably* be an insight you derive from analysis/reflection

2c – “Findings”?

EX: In an interview about coffee drinking habits, a participant stated:

> *“I always order an extra espresso shot on Tuesdays–that’s when I have a 3-hour lecture at 8am. But usually, I don’t want to be drinking that much caffeine.”*

What are some findings you might report?

2c – "Findings"?

EX: In an interview about coffee drinking habits, a participant stated:

> *"I always order an extra espresso shot on Tuesdays–that's when I have a 3-hour lecture at 8am. But usually, I don't want to be drinking that much caffeine."*

What are some findings you might report?

- Events happening that day relate to how much coffee someone drinks
- There is sometimes a tradeoff between "desired caffeine intake" and "what someone feels they need to function"
- Long, early morning classes can be a reason to increase caffeine consumption

NOT: Participant orders an extra espresso shot on Tuesdays

2b – Follow-Up Questions

EX: In an interview about coffee drinking habits, a participant stated:

> *"I always order an extra espresso shot on Tuesdays–that's when I have a 3-hour lecture at 8am. But usually, I don't want to be drinking that much caffeine."*

Your next scripted question is about favorite coffeeshops.
What is the next thing you ask your participant?

2b – Follow-Up Questions

What about the lecture makes you want the extra coffee?

Get a deeper rationale: Could be the time, could be a boring class, could be a really interesting class they want to be engaged for, could be…

Have you ever gone to lecture without an extra shot? What happened?

Prompt additional stories: about relationship between caffeine & experiences, about consequences of *not enough* caffeine, why they started drinking coffee…

Are there other circumstances that lead you to drink more caffeine than you want?

Identify patterns: maybe academic stress is the underlying reason, or sleep issues, or…

[Scripted] Do you have any favorite coffeeshops? What do you like about them?

Move on: maybe you already have enough info, maybe it's not your focus

2b – Follow-Up Questions

Asking good questions is a skill! You will get better with practice.

Some Tips:

- Go in with written notes of what topics you really want to explore
  - Feel free to tell participants what your focus is! But be careful not to "seed"
- Prepare specific follow-ups for "IF participant says X: [pre-written follow-up Q]"
- Have some Tools in your Toolbelt:
  - *That's interesting, can you tell me more about [why/what happened/…]?*
  - *Do you have an example of a [different] time where [that / something similar] happened?*
  - *Are there other [things] that you feel that way about?*

Overview

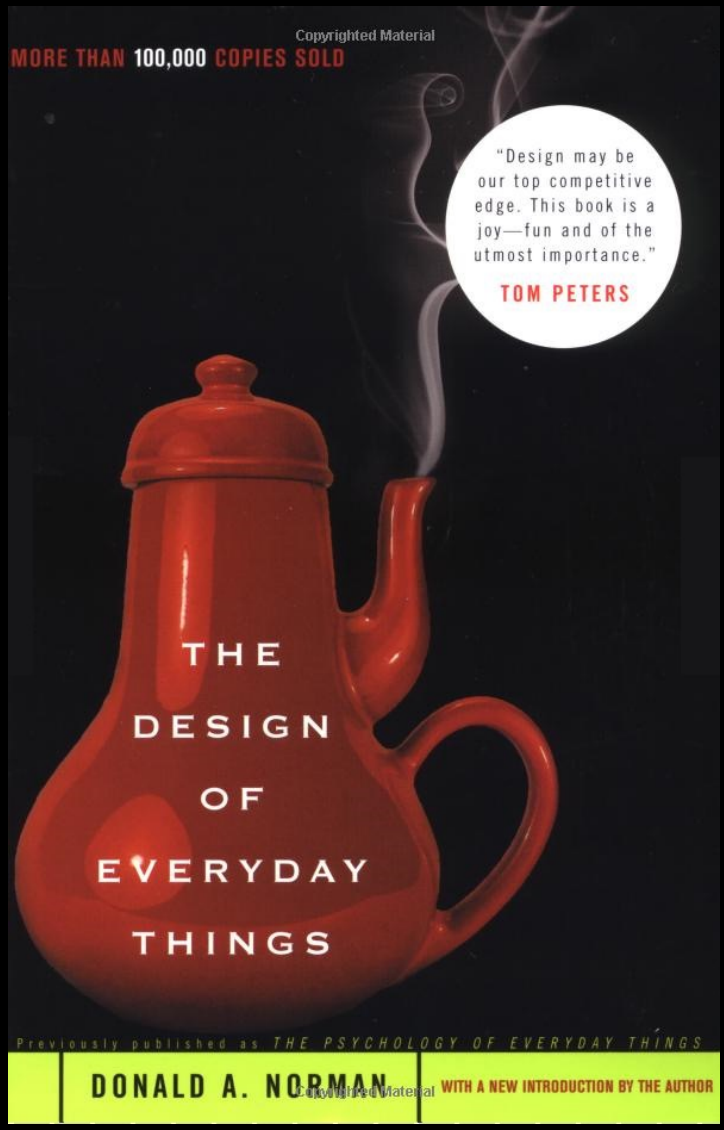
Objectives

Design Terminology

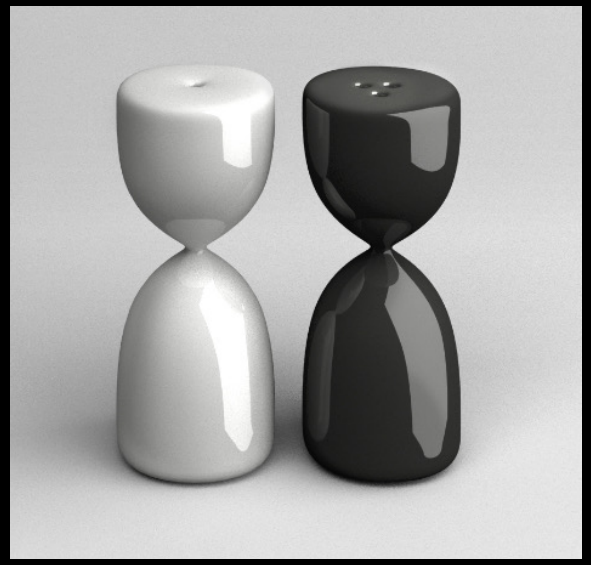
Design of Everyday Things reviews
a common and useful vocabulary of design

We will use these in feedback and conversations without even realizing that we are doing it

You should know these terms
and recognize them in practice



“The Uncomfortable” – Katerina Kamprani



Objectives

Be able to:

Describe and identify examples of metaphors

In terms of mental models, describe and differentiate affordances, metaphors, and idioms.

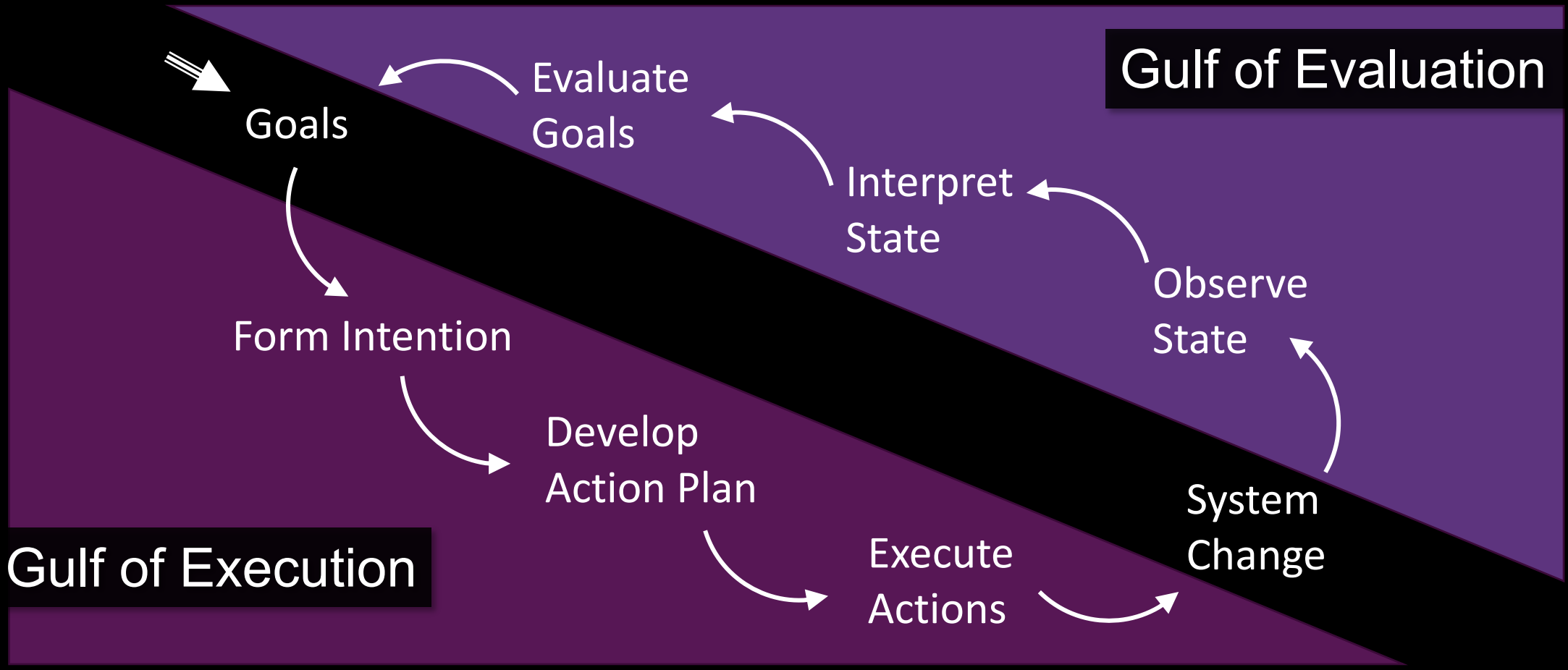
Describe and identify examples of visibility, constraints, and mappings.

In terms of mental models, describe and identify examples of consistency, including internal and external consistency.

In terms of mental models, describe the effect of modes.

So here's what happened last week…

Norman's Execution-Evaluation Cycle



Bridging the Gulfs

Gulf of Execution: "How do I do it?"

Commands and mechanisms need to match the goals, thoughts, and expectations of a person

Gulf of Evaluation: "What does it mean?"

Output needs to present a view of the system that is readily perceived, interpreted, and evaluated

Bridging the Gulfs

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Gulf of Evaluation: "What does it mean?"

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People build **mental models** to anticipate and interpret system response to their actions

- What can I do?
- How do I do it?
- What result will it have?
- What is it telling me?

Cooper's Mental Model Terminology

Implementation Model

- How it works
- (Design Model, Designer's Conceptual Model)

Manifest Model

- How it presents itself
- (System Image)

Mental Model

- How a person thinks it works
- (User Model, User's Conceptual Model)

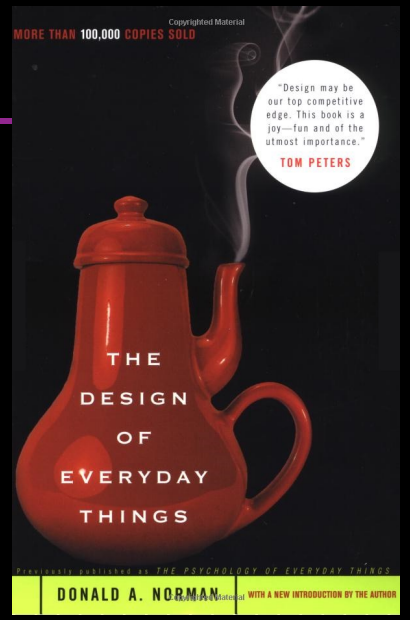
These terms are sloppy and ambiguous out in the world

Building the Right Model

Having **the right model** helps people bridge the Gulf of Execution and the Gulf of Evaluation

How can we help people build the right models:

- Affordances
- Visibility
- Constraints
- Consistency
- Metaphors
- Knowledge in the World
- Mapping
- Modes



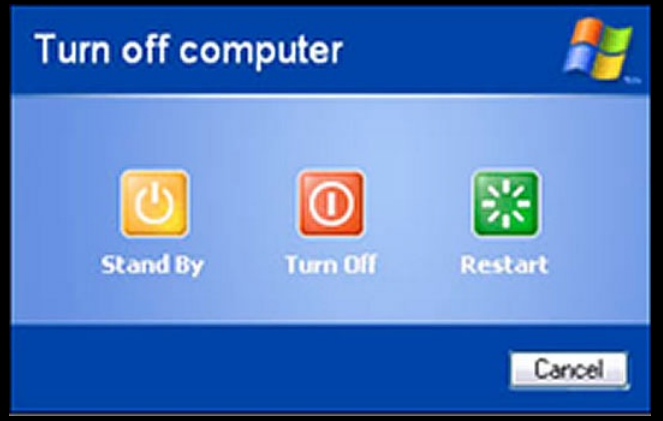
Affordances

Visual clue to interaction

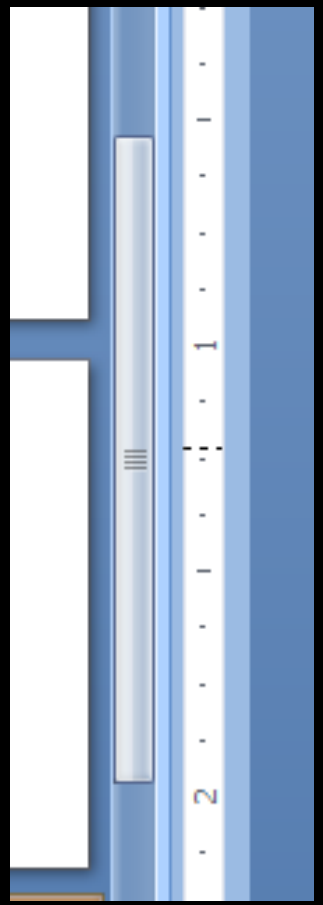
- knobs afford turning
- levers afford moving
- buttons afford pushing

Affordances

Digital affordances are often
based in affordances from the physical world



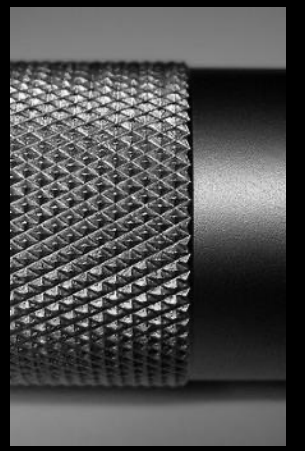
Affordances



What is the affordance?

Where does it come from?

Knurling



And that’s what you missed on [CSE 440]!

Poll: who got the reference?

Surprise EXP! References Game

Throughout this lecture, I've peppered in references from AT LEAST X different pieces of *moderately* well-known media (tv, movies, video games & songs).

Everyone grab a sheet of paper and write your name on it:

- Write down each reference you catch / what's being referenced
  - If you don't know the exact name, just include as much detail as you can
  - If you don't know what I'm referencing but you notice me say something weird that you think is probably a reference, that also counts!
- If I accidentally quote a meme, that's also fair game
- Turn in your papers at the end of lecture (this is also attendance)
- Top 3 # of references caught win 1EXP!

(Everyone can write down Glee as a freebie)

References in Design

References are everywhere in Design

- References are often meant to relate to a user's mental model
- When they're used well, they can be great!
- When they're used poorly, they can be awful.

Your Mission:

1. Understanding what references a user has
2. Having your references understood by the user
3. Considering how users learn if they *don't* get the reference

There are Many Types of References

Including but not limited to:

- Metaphors
- Mechanical-Age Affordances
- Idioms
- Mappings
- Conventions / Consistency

Each has their uses, each has their limitations

Metaphors

Suggest an existing mental model

"horseless carriages", "iron horses", "wireless"

What is the deal with Desktop Metaphors?

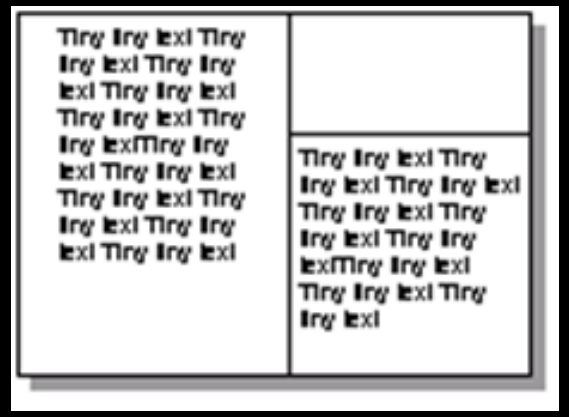
Metaphors

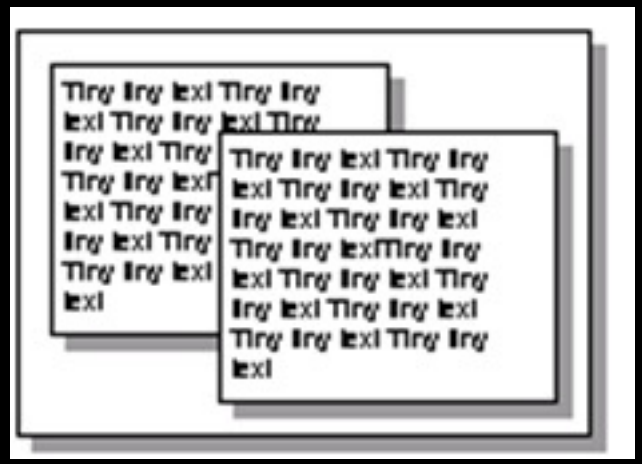
Suggest an existing mental model

- “horseless carriages”, “iron horses”, “wireless”

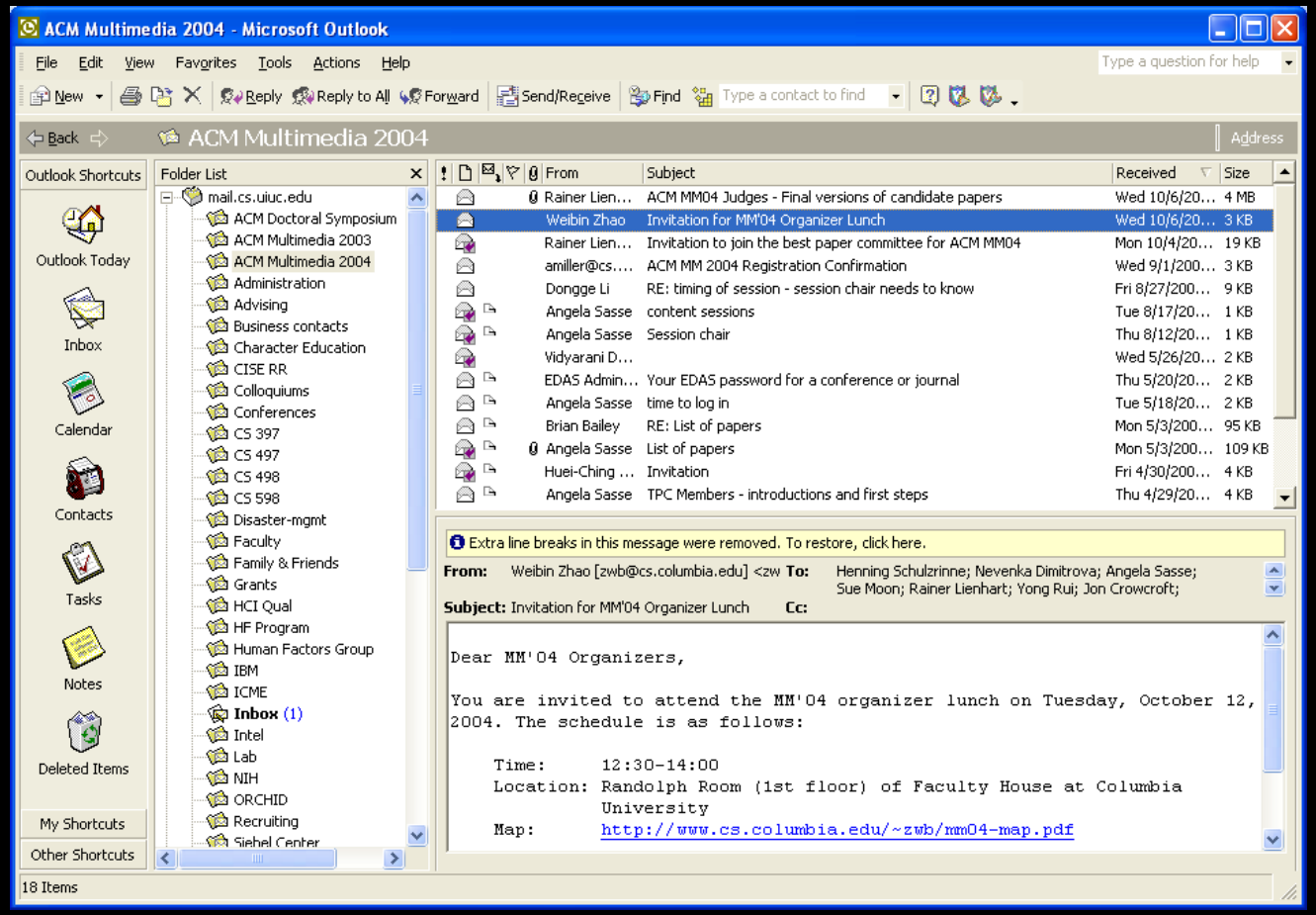
What is the deal with Desktop Metaphors?

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

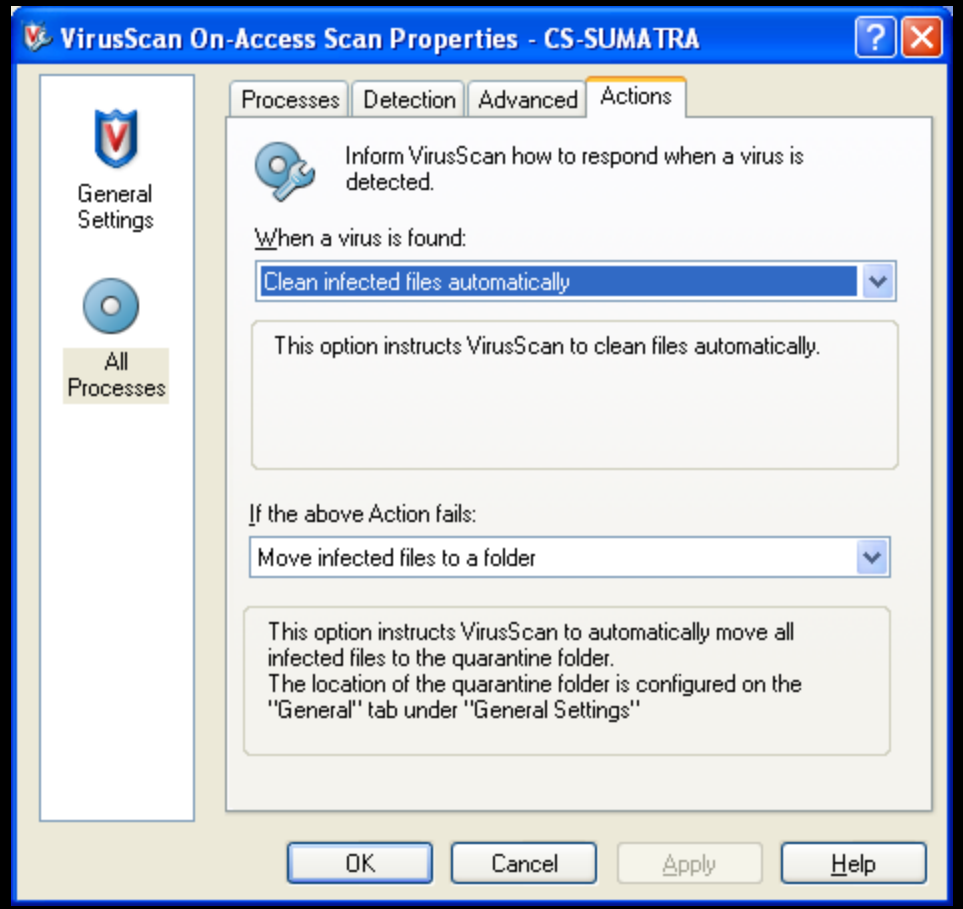




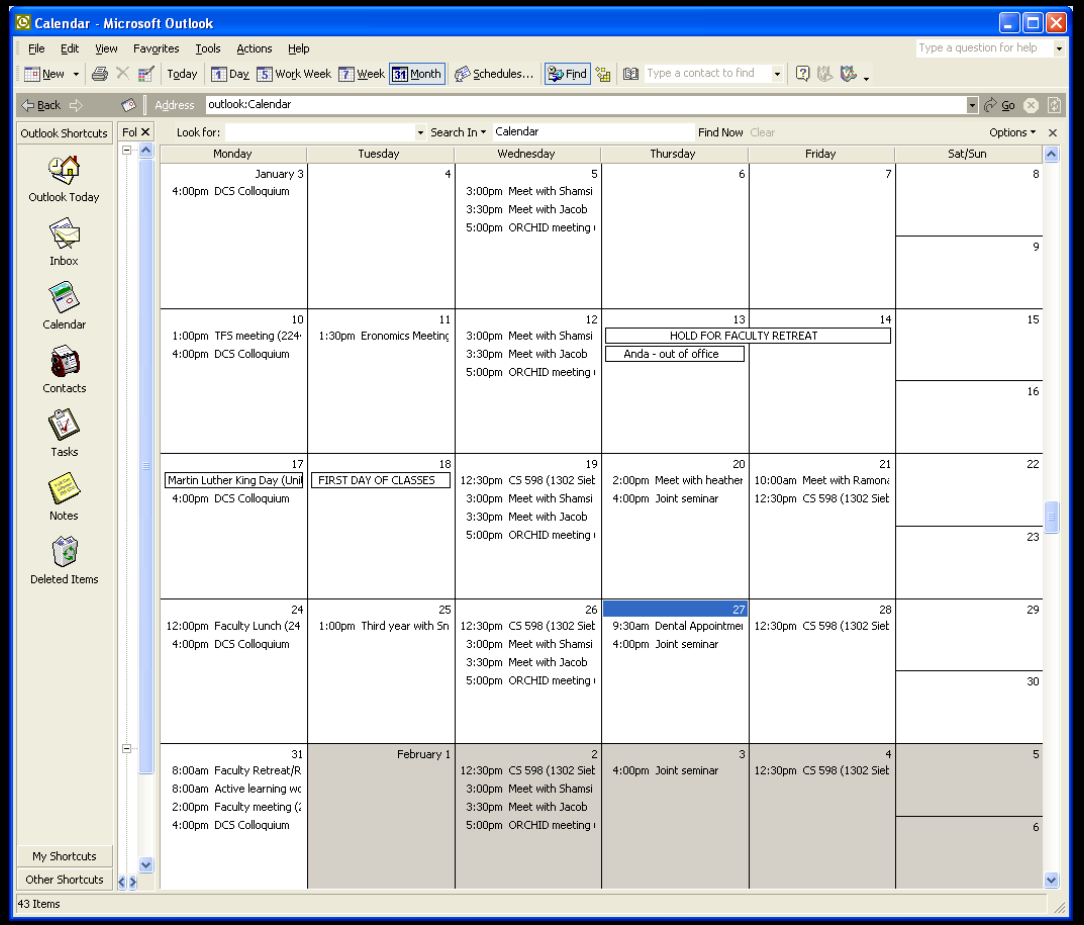
Mail Metaphor



Health Metaphor

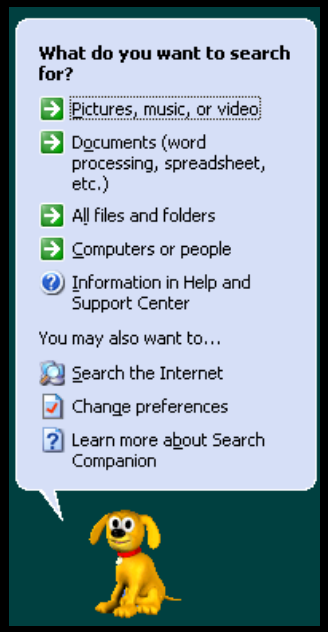


Calendar… Metaphor?



Shallow or Inappropriate Metaphors

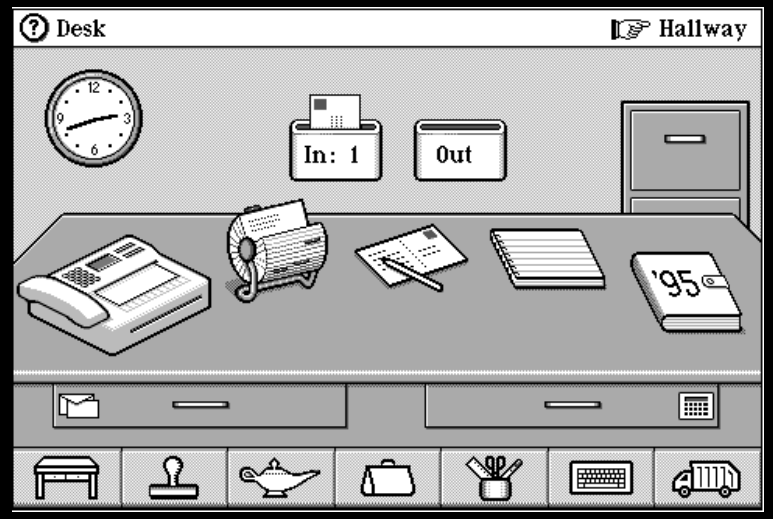
Informs a small range of possibilities, or none at all



It is just a menu and a dialog box?

What does the living room add?

Microsoft Bob

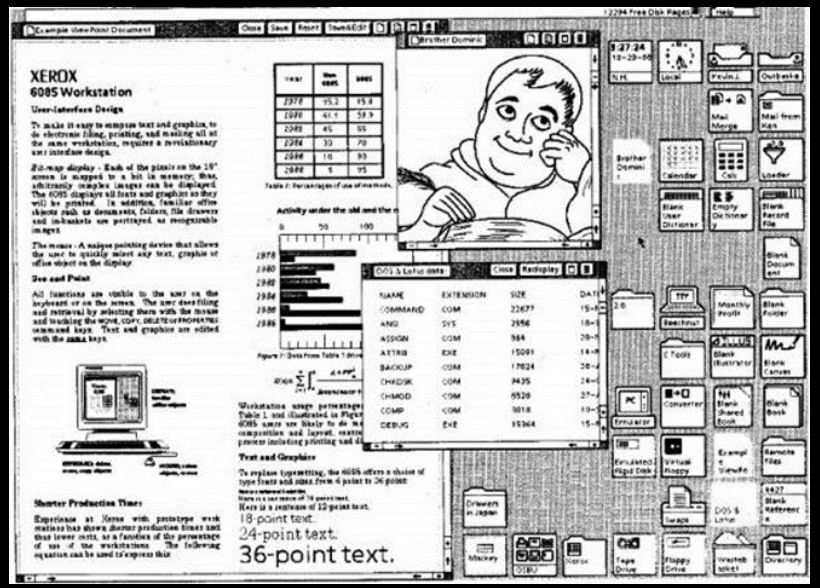


Magic Cap

Mixed Metaphors

Two or more different metaphors coexist with some relation

- The desktop metaphor
- Windows into content



Good? Bad?

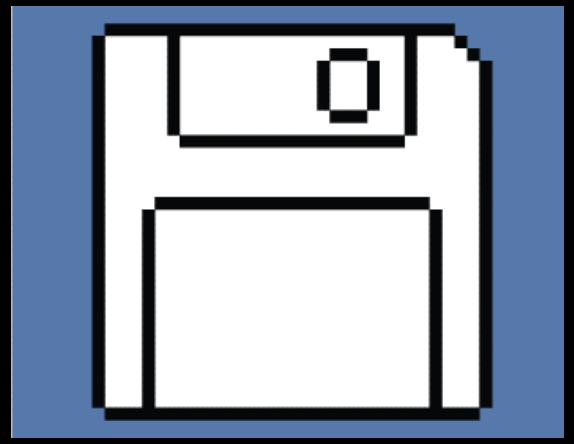
Neither? Both?

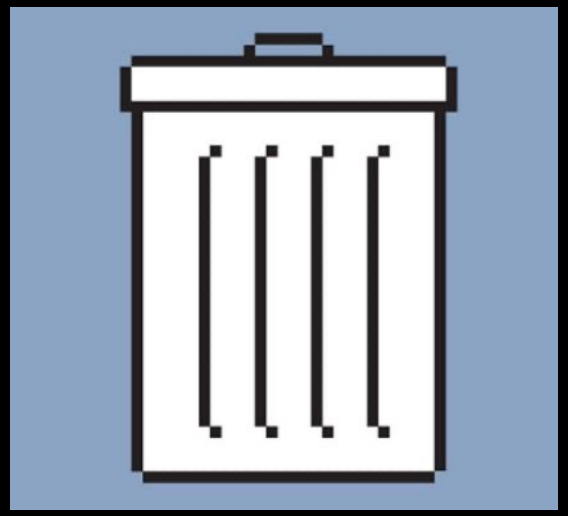
Windows are views into larger content regions

No desktop has windows

Broken Metaphors

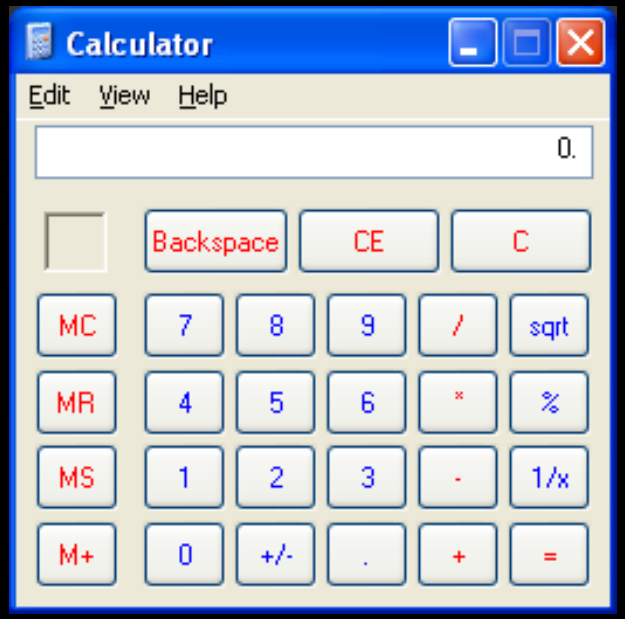
Are not consistent, do not operate in every circumstance,
or do not uphold things consistent with
what the metaphor would suggest





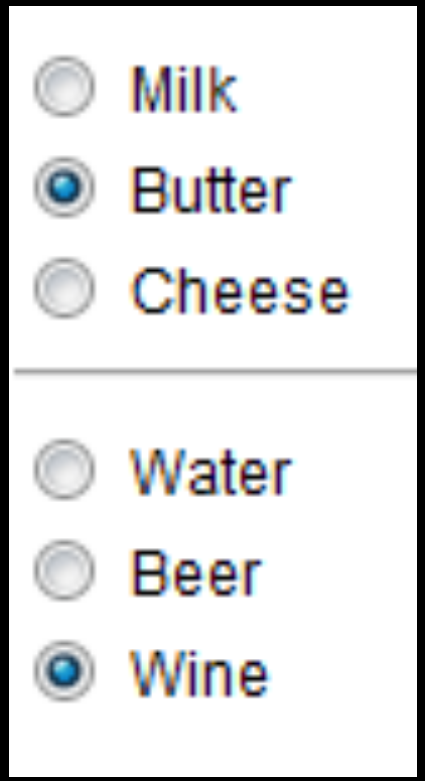
Mechanical-Age Metaphors

Operate as their mechanical-age counterparts did,
not taking advantage of the digital domain
to escape the limitations of the original



Dead Metaphors

Lost the original imagery of their meaning



Metaphors versus Idioms

Idioms

- rely on shared experience or custom
- are learned, often early in life
- are supported or revealed by context
- become conventions
- do not rely on metaphors

Idiomatic widgets (e.g., screen splitter, dragable title bar)

Single click to select, double click to open

Hyperlinks

Idioms

[REDACTED]: Scotty Uses a Mouse

Idioms

[REDACTED]: Scotty Uses a Mouse

Metaphors and Affordances

Affordances “jump start” a model for interaction

Metaphors “jump start” a model of a system

But if designed poorly, both can be damaging

- Lead to an incorrect model, undermine interaction
- Can limit designer creativity
- Can reduce the advantages of software
- Can be “cute” at the expense of functional

Signifiers

"There are trails. There are behaviors. We know how to behave by watching the behavior of others, or if others are not there, by the trails they have left behind."

Norman

Signifiers

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"I call any physically perceivable cue a signifier, whether it is incidental or deliberate. A social signifier is one that is either created or interpreted by people or society, signifying social activity or appropriate social behavior."

Norman

Signifiers

"There are trails. There are behaviors. We know how to behave by watching the behavior of others, or if others are not there, by the trails they have left behind."

"I call any physically perceivable cue a signifier, whether it is incidental or deliberate. A social signifier is one that is either created or interpreted by people or society, signifying social activity or appropriate social behavior."

"Social signifiers replace affordances, for they are broader and richer, allowing for accidental signifiers as well as deliberate ones, and even for items that signify by their absence, as the lack of crowds on a train platform. The perceivable part of an affordance is a signifier, and if deliberately placed by a designer, it is a social signifier."

Norman

Social Signifiers

How do you eat each pizza?

Visibility

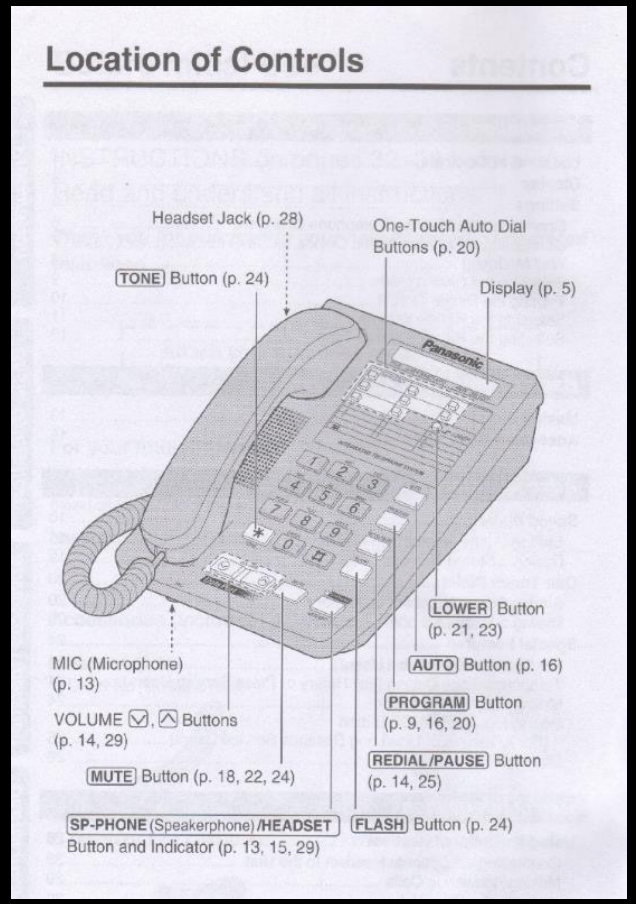
Phones

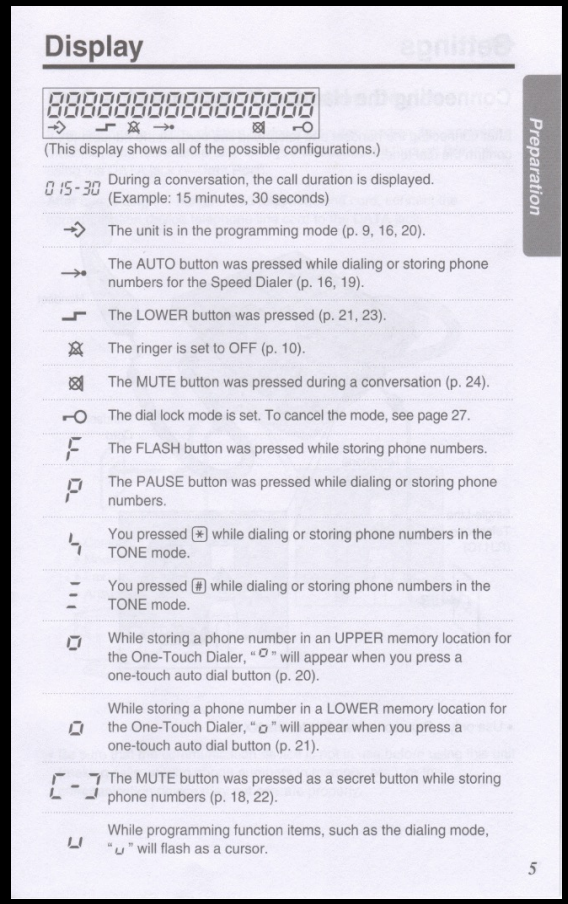
How do you

put somebody on hold

change volume

Visibility


Location of Controls
Headset Jack (p. 28)
One-Touch Auto Dial Buttons (p. 20)
TONE Button (p. 24)
Display (p. 5)
Panasonic
LOWER Button (p. 21, 23)
MIC (Microphone) (p. 13)
AUTO Button (p. 16)
PROGRAM Button (p. 9, 16, 20)
VOLUME ▽, △ Buttons (p. 14, 29)
REDIAL/PAUSE Button (p. 14, 25)
MUTE Button (p. 18, 22, 24)
SP-PHONE (Speakerphone)/HEADSET Button and Indicator (p. 13, 15, 29)
FLASH Button (p. 24)


Display
(This display shows all of the possible configurations.)
0:15-30 During a conversation, the call duration is displayed. (Example: 15 minutes, 30 seconds)
The unit is in the programming mode (p. 9, 16, 20).
The AUTO button was pressed while dialing or storing phone numbers for the Speed Dialer (p. 16, 19).
The LOWER button was pressed (p. 21, 23).
The ringer is set to OFF (p. 10).
The MUTE button was pressed during a conversation (p. 24).
The dial lock mode is set. To cancel the mode, see page 27.
The FLASH button was pressed while storing phone numbers.
The PAUSE button was pressed while dialing or storing phone numbers.
You pressed ✱ while dialing or storing phone numbers in the TONE mode.
You pressed # while dialing or storing phone numbers in the TONE mode.
While storing a phone number in an UPPER memory location for the One-Touch Dialer, "P" will appear when you press a one-touch auto dial button (p. 20).
While storing a phone number in a LOWER memory location for the One-Touch Dialer, "p" will appear when you press a one-touch auto dial button (p. 21).
[-] The MUTE button was pressed as a secret button while storing phone numbers (p. 18, 22).
While programming function items, such as the dialing mode, "␣" will flash as a cursor.
Preparation
5

Visibility

Changing Ringer Volume

- Press “Program”
- Press “6”
- Set Volume
  - Low - Press “1”
  - Medium - Press “2”
  - High - Press “3”
- Press “Program”

Visibility

Controls available on watch with 3 buttons?

- Too many and they are not visible

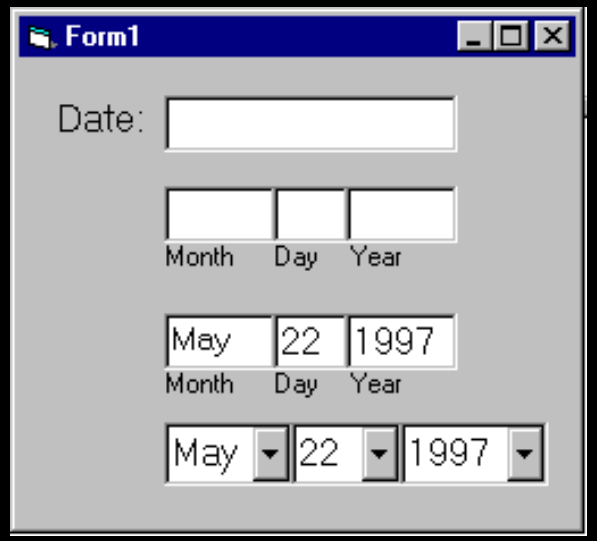
Compare to controls on simple car radio

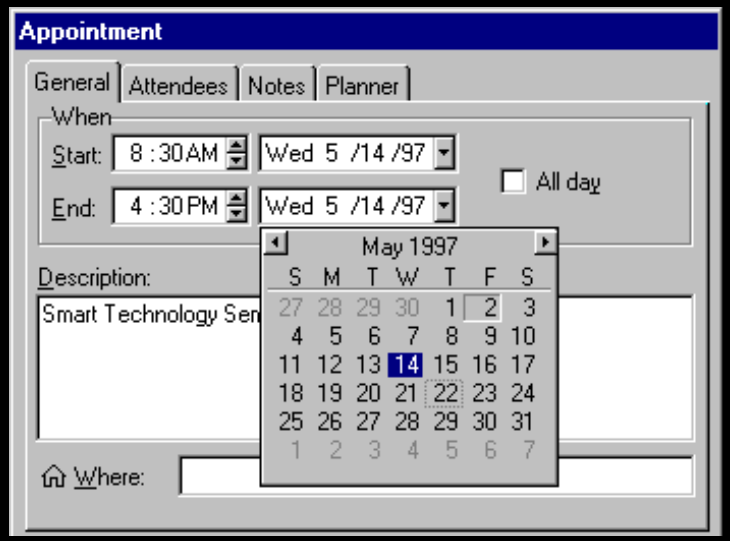
- Number of controls ≈ Number of functions
- Controls are labeled and grouped together

Knowledge in the World

Constraints

Prevent some actions while allowing others





Prevent errors before they can happen

- Disruptive error messages are a last resort

Constraints

Constraints

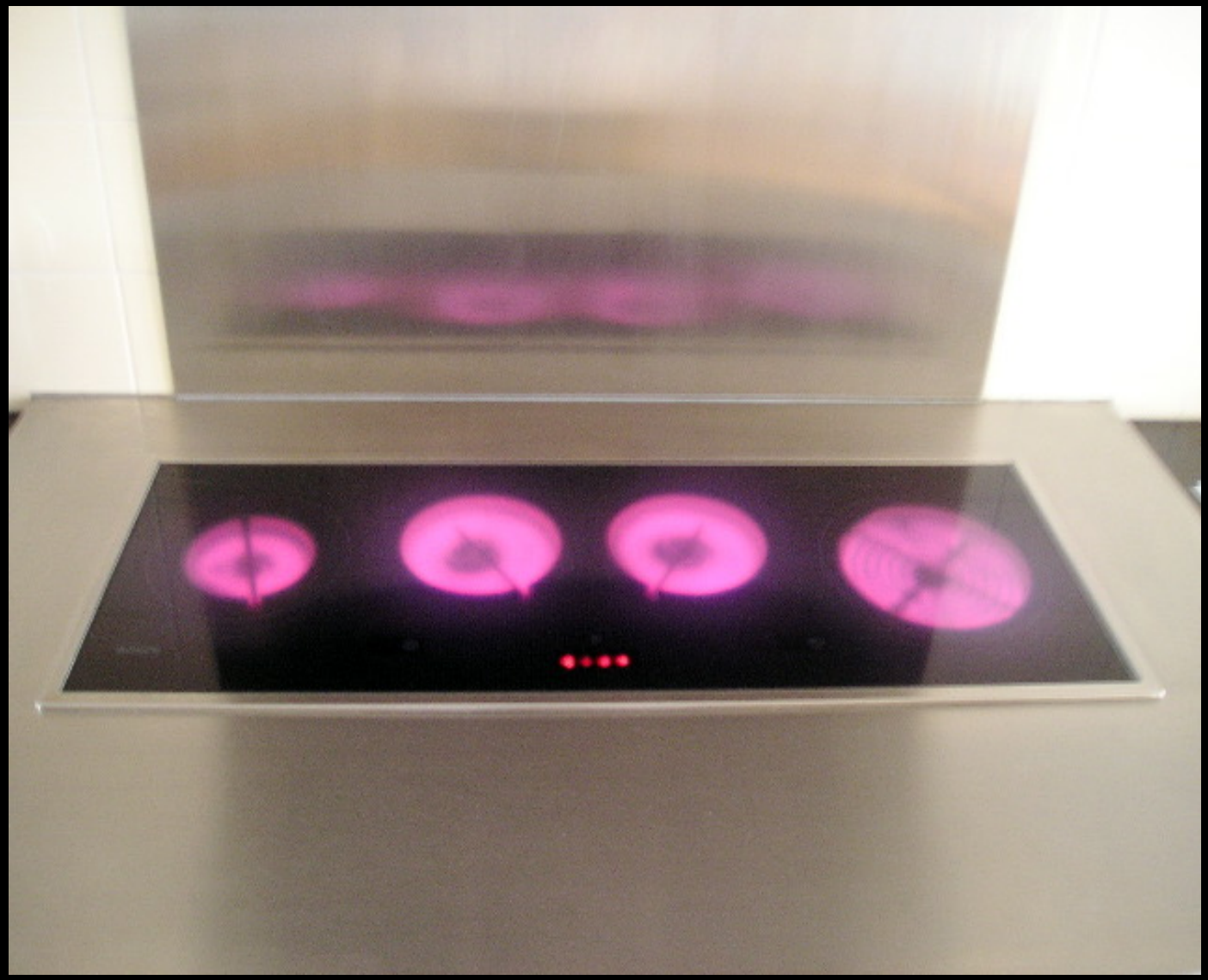
Constraints

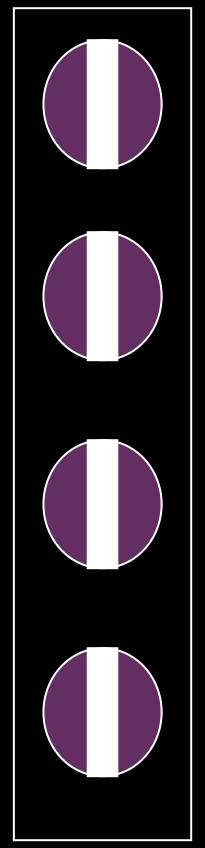
Mapping

Correspondence between an interface and the corresponding action in ‘the world’

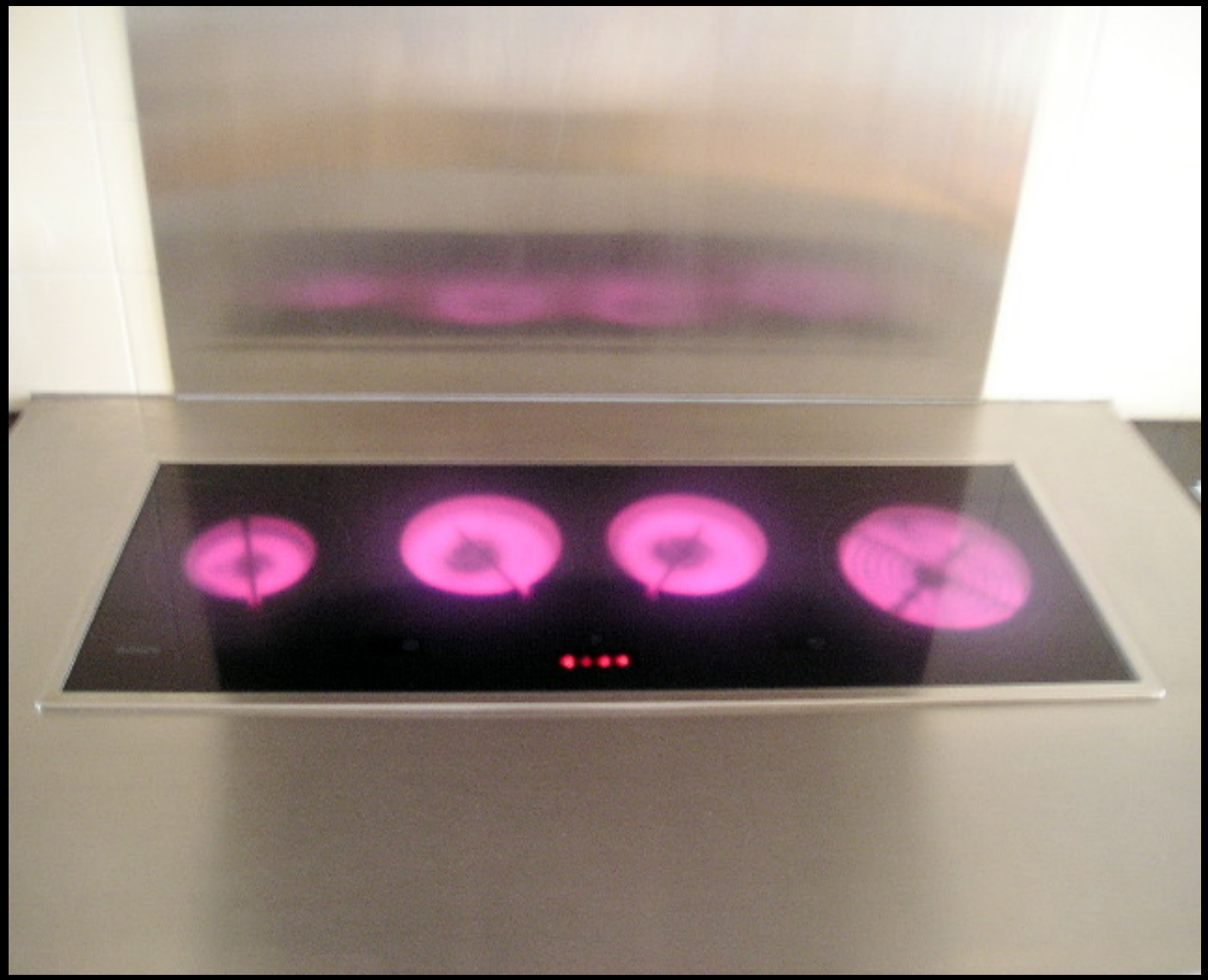
Minimize cognitive steps to transform action into effect, or perception into comprehension (i.e., execution and evaluation)

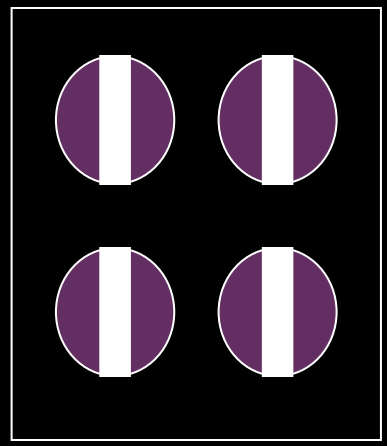
Very Bad Mapping





Slightly Better Mapping



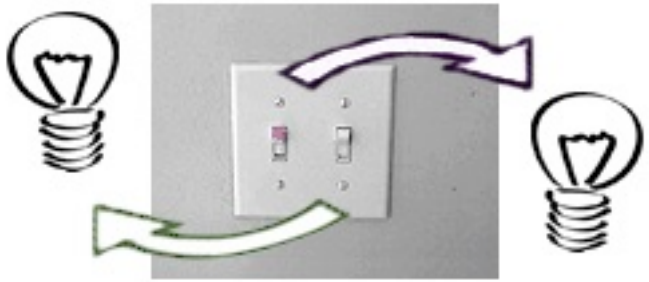


Good Mapping

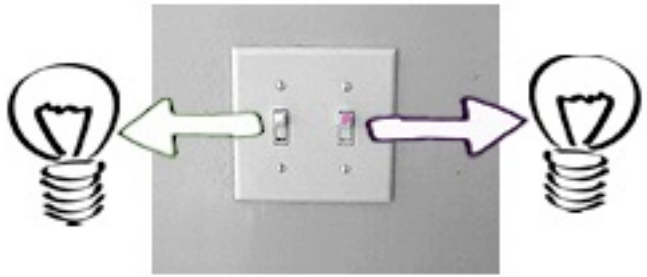
Not this Stove

Great Mapping

Mapping

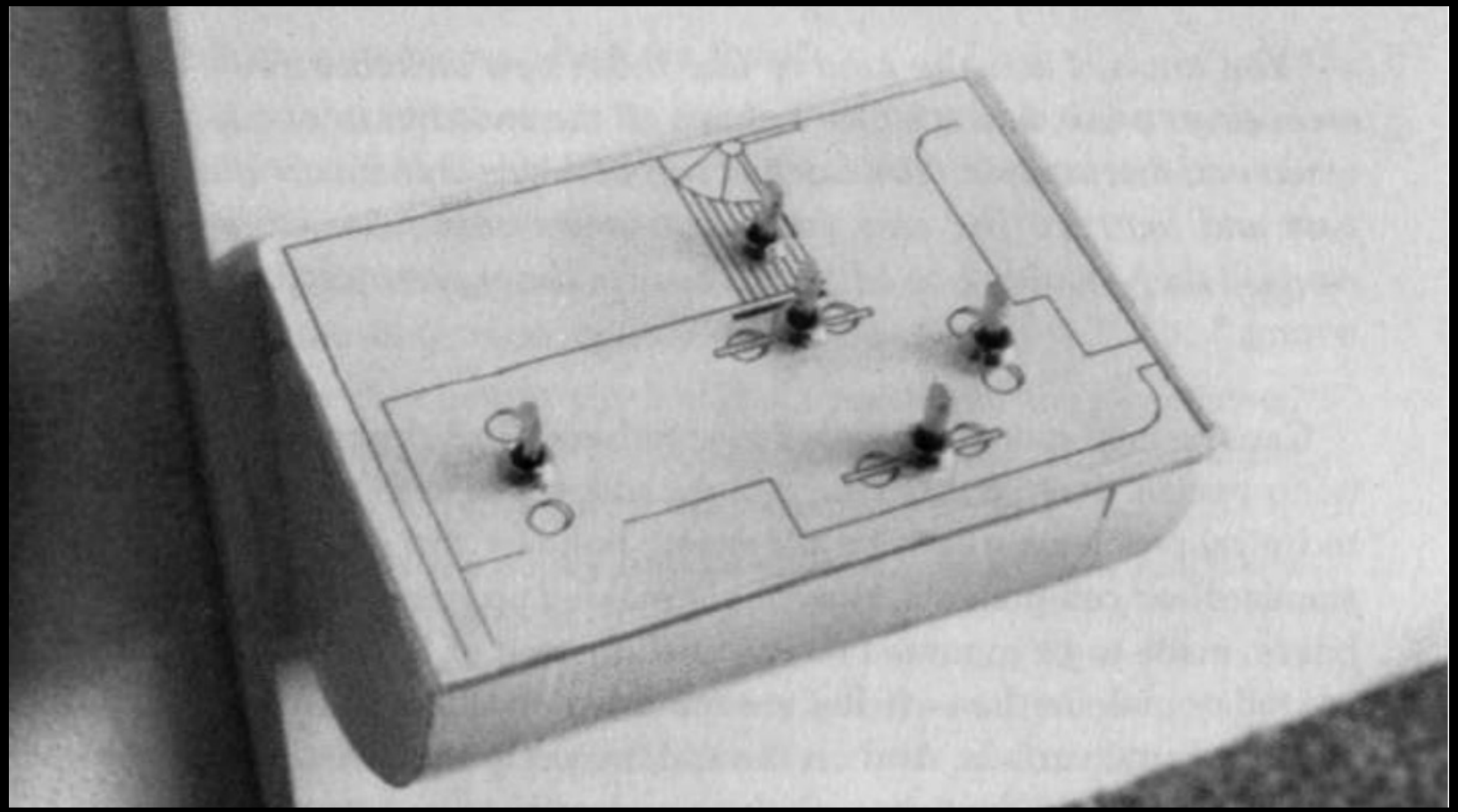


Removing the cover plate, then removing and swapping the switches.



From http:/ /fivesketches.com/2009/11/natural-mapping-of-switches/

Great Mapping

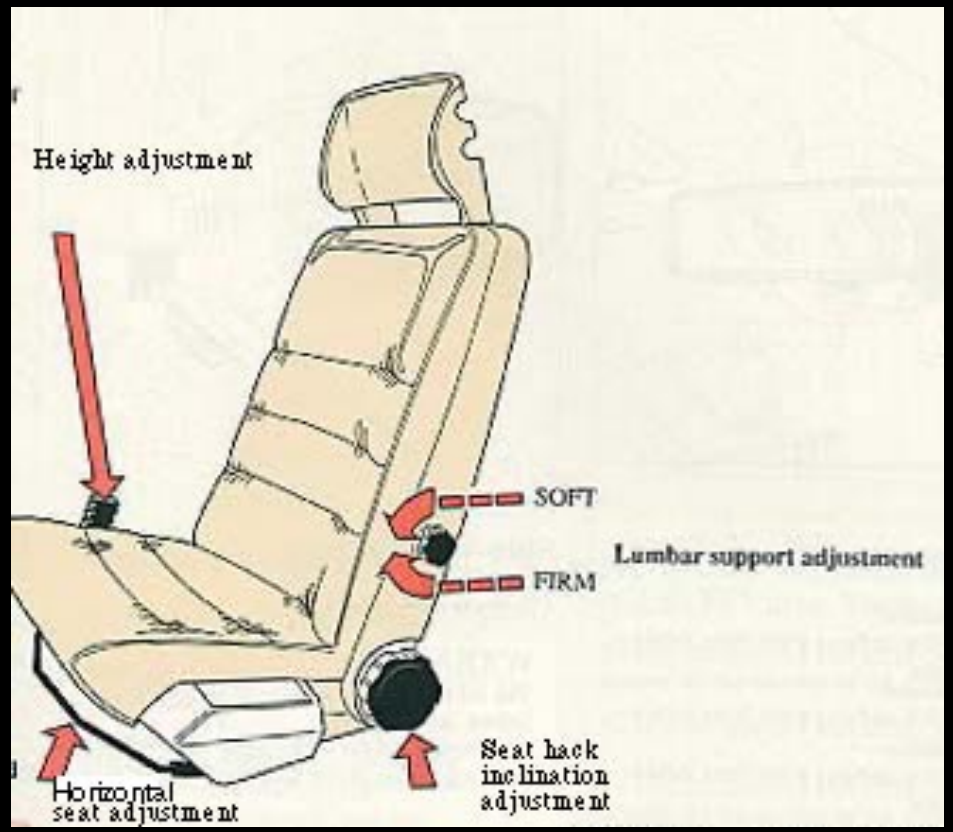


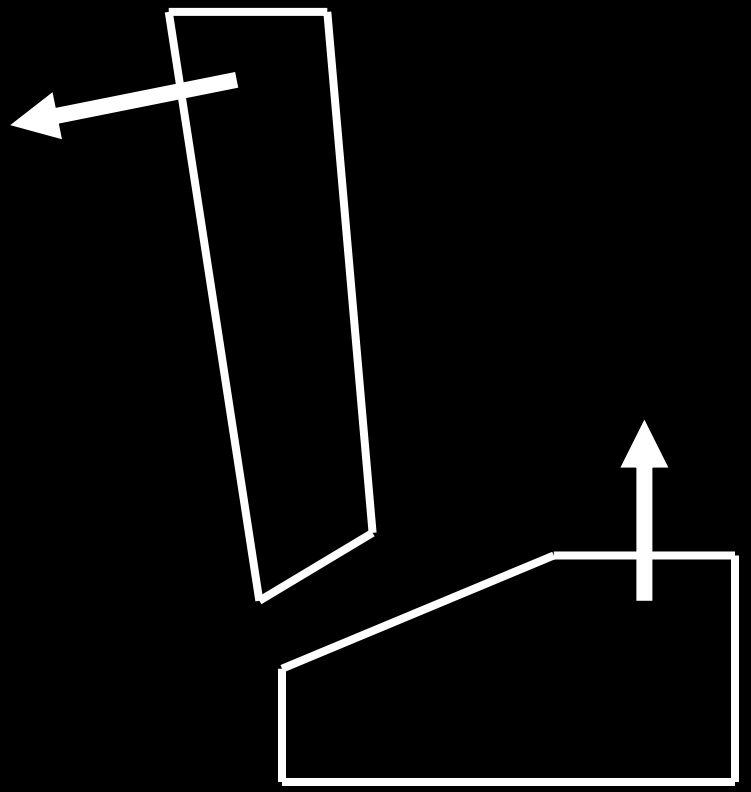
Also has an "anti-affordance"

Mapping


500
500 EURO
500
500 EURO
200
200 EURO
200
200 EURO
100
100 EURO
100
100
10
10 EURO
10
10 EURO
50
EURO CENT
20
EURO CENT
10
EURO CENT

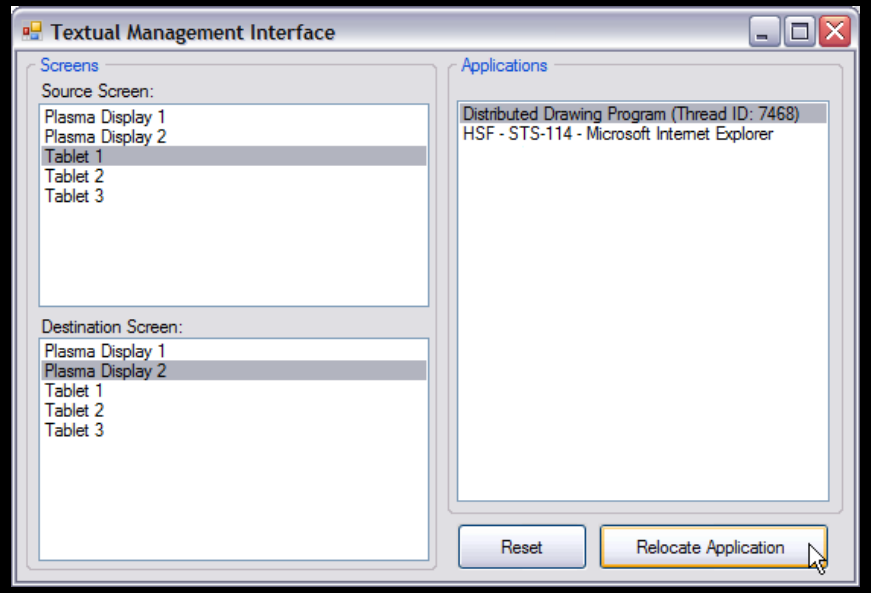
Mapping


Height adjustment
SOFT
Lumbar support adjustment
FIRM
Seat back inclination adjustment
Horizontal seat adjustment

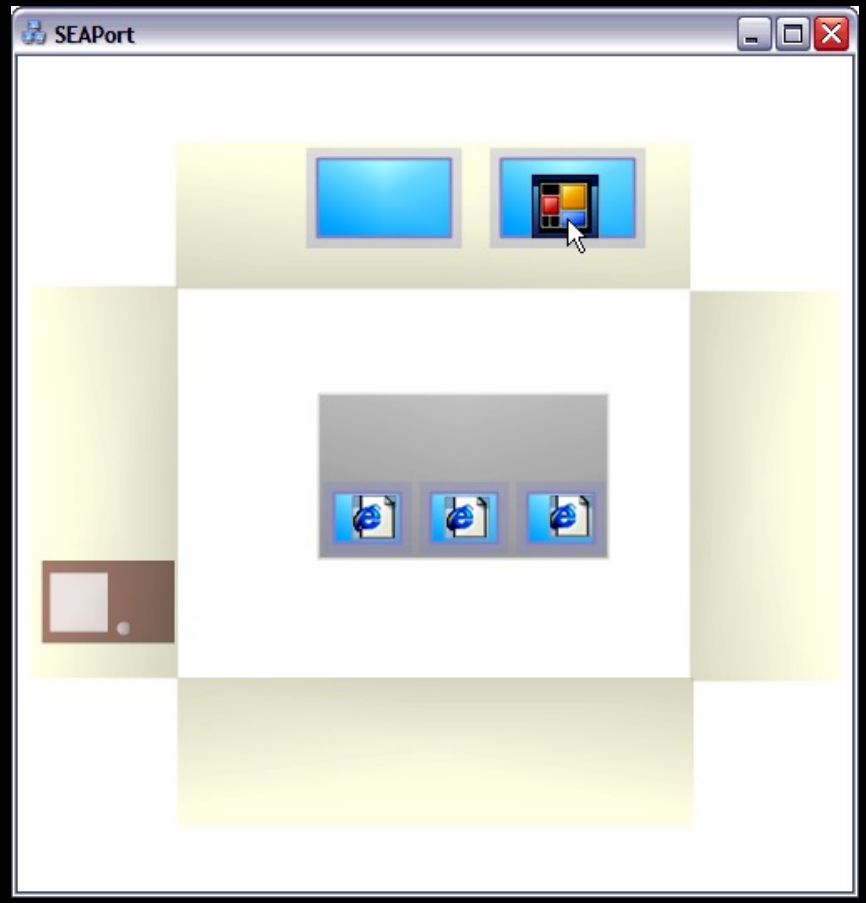


Mapping


ORCHID


Textual Management Interface
Screens
Source Screen:
Plasma Display 1
Plasma Display 2
Tablet 1
Tablet 2
Tablet 3
Destination Screen:
Plasma Display 1
Plasma Display 2
Tablet 1
Tablet 2
Tablet 3
Applications
Distributed Drawing Program (Thread ID: 7468)
HSF - STS-114 - Microsoft Internet Explorer
Reset
Relocate Application

Mapping



Consistency

Interfaces should be meaningfully consistent

- Ubiquitous use of same keys for cut/copy/paste
- Helps in developing / applying a mental model

Types of consistency

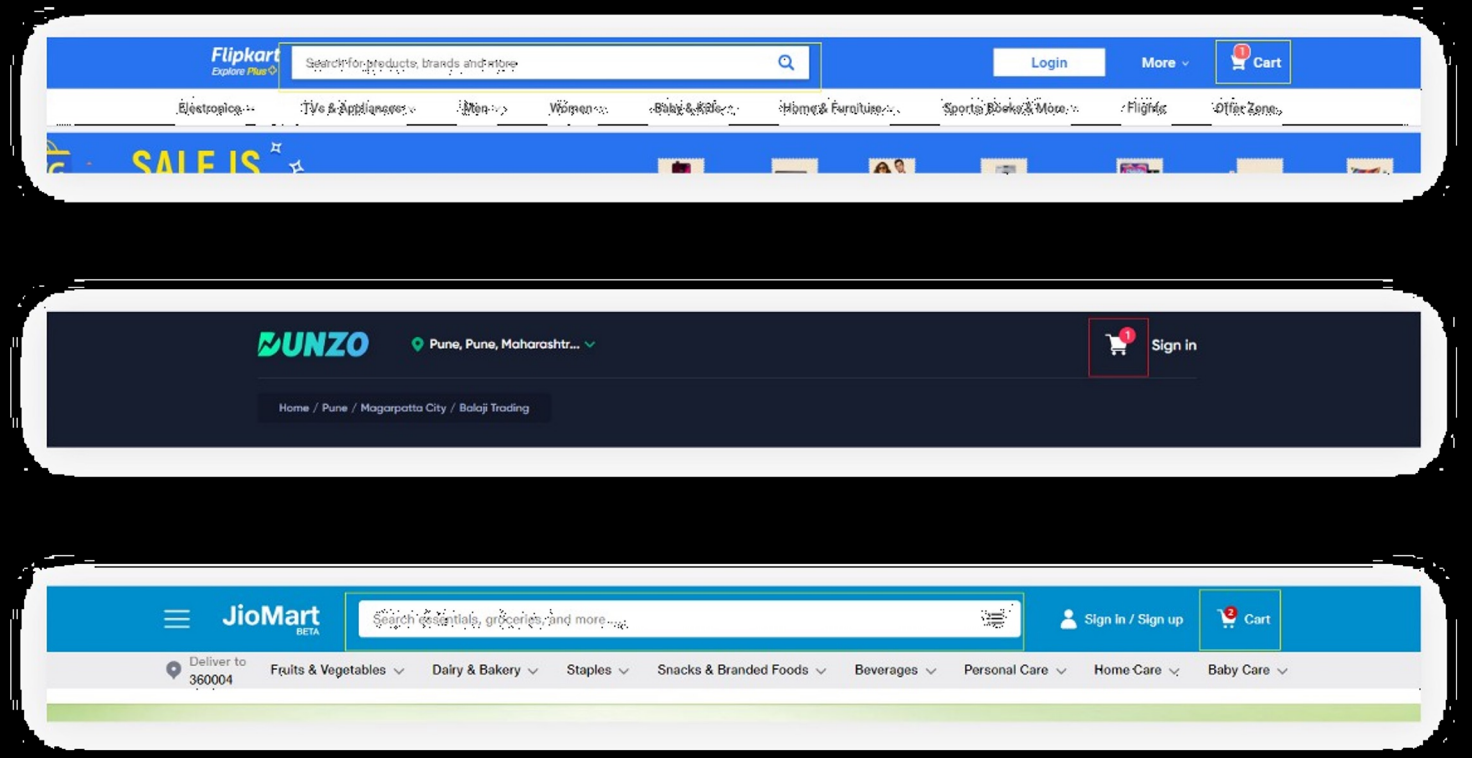
- Internal (i.e., within itself)
  - e.g., same terminology and layout throughout
- External (i.e., with other applications)
  - e.g., common widget appearance
  - e.g., design patterns common across applications

Internal Consistency

Includes but not limited to use of icons, words

Harsh Gorasia

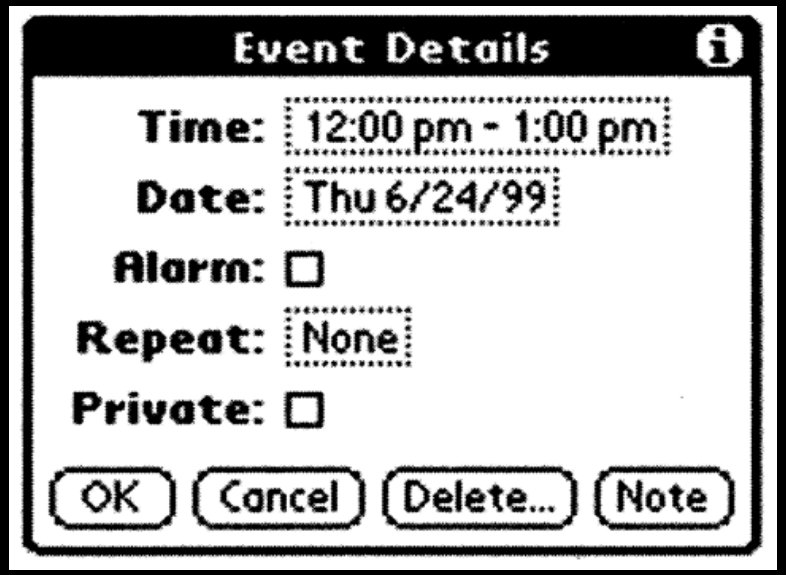
External Consistency



Harsh Gorasia

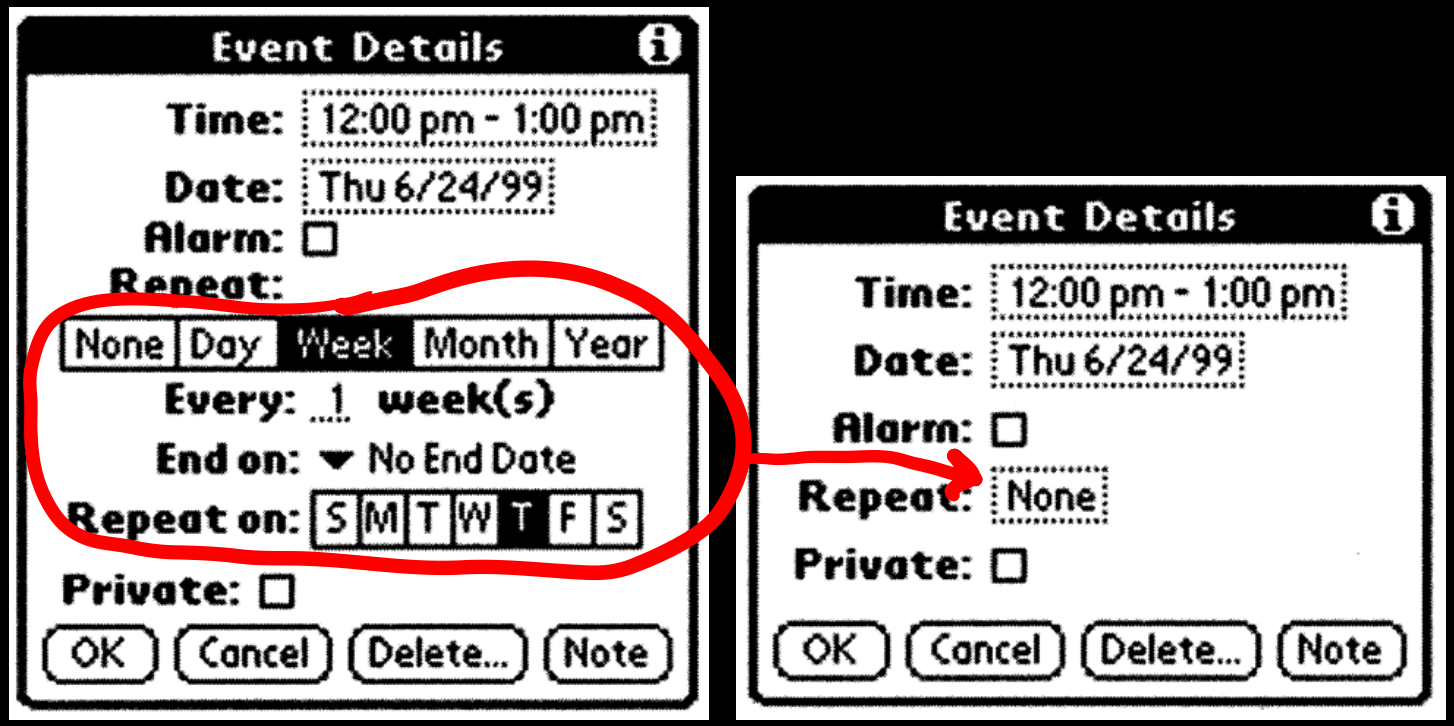
Is Consistent Always Better?

Should “new” & “delete” be in the same place?



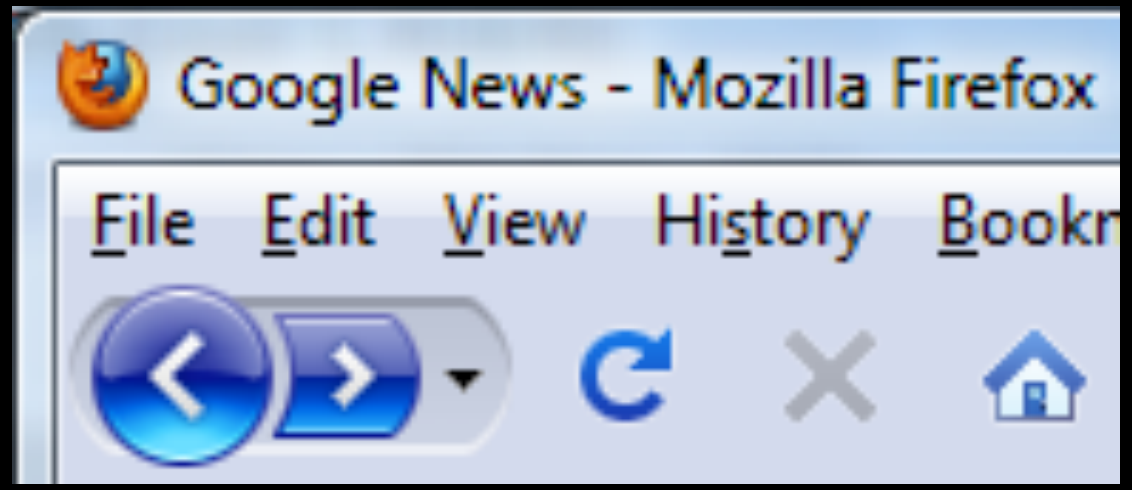
New is common, delete is not

Is Consistent Always Better?



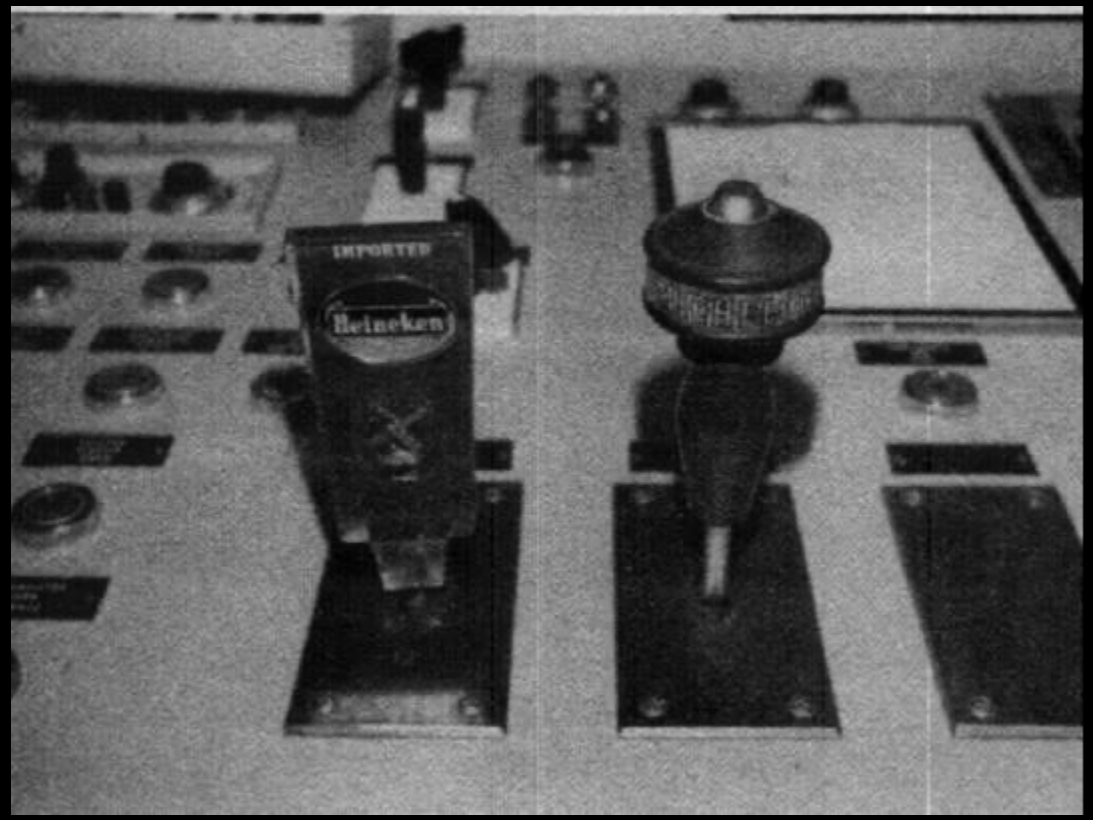
Original focus on consistency with desktop, later design for mobile form

Is Consistency Always Better?



Is Consistency Always Better?

Is Consistency Always Better?



Modes

States of a system where different things happen when you perform the same action

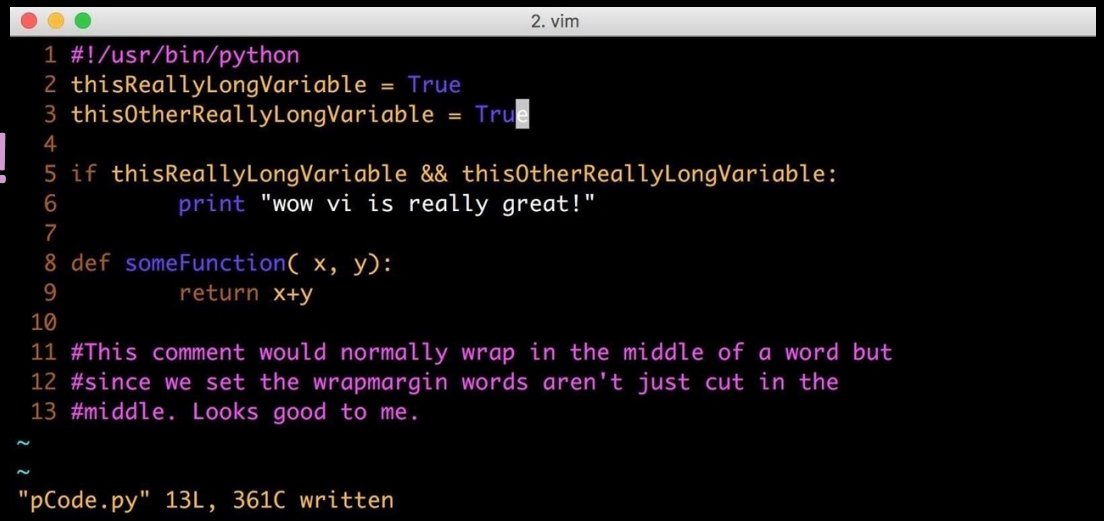
Every computer scientist's favorite OR least favorite example?

Modes

States of a system where different things happen when you perform the same action

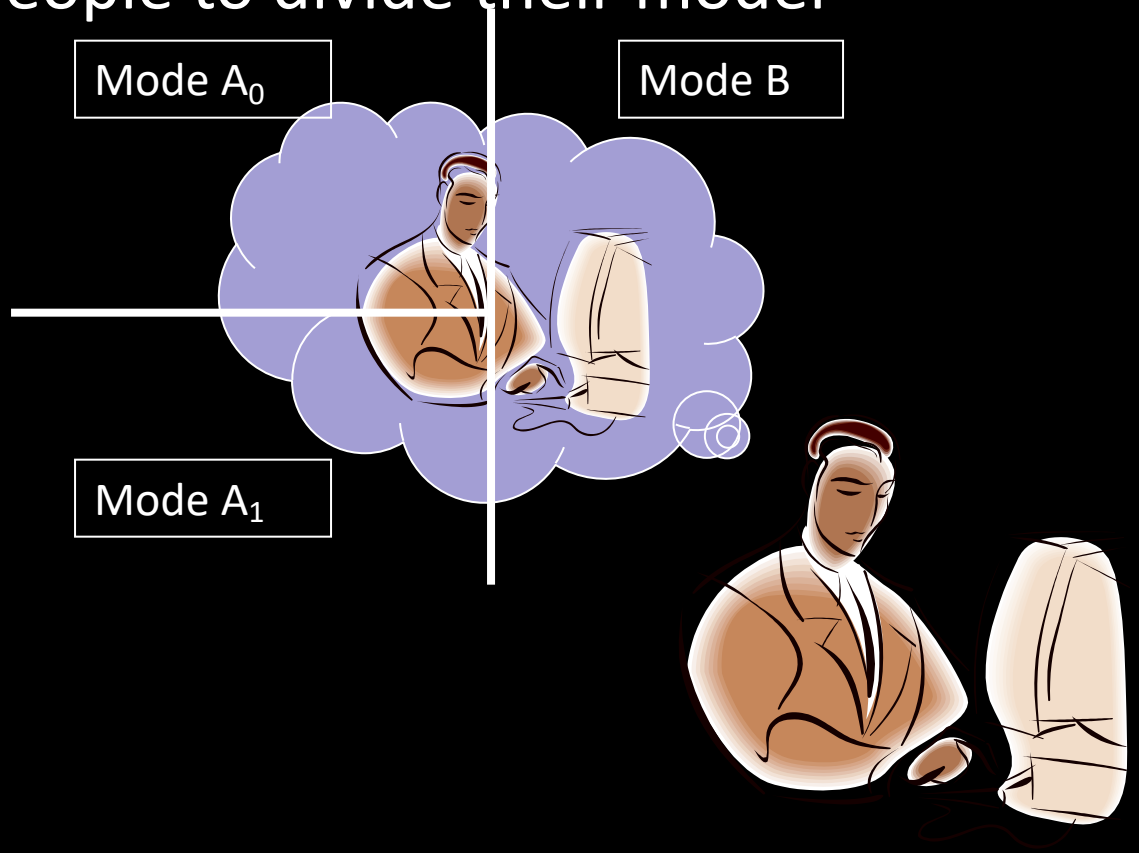
Every computer scientist's favorite OR least favorite example?

Vim!!



Modes

Modes force people to divide their model



Pros & Cons?

Active versus Passive Modes

Active modes require constant action to maintain

- When that action has ended, so does the mode
- e.g., Shift

Passive modes require action to set, and a separate action to unset, or to set again

- e.g., CAPS LOCK

Active modes are generally preferred

Standardization

If all else fails, standardize

- Fewer things to memorize
- Reduced learning time
- Adapt to new situations faster

e.g., keyboard layout not optimal, but standard

Norman's Seven Principles for Design

Use knowledge in the head and in the world

Simplify the structure of tasks

Making things visible

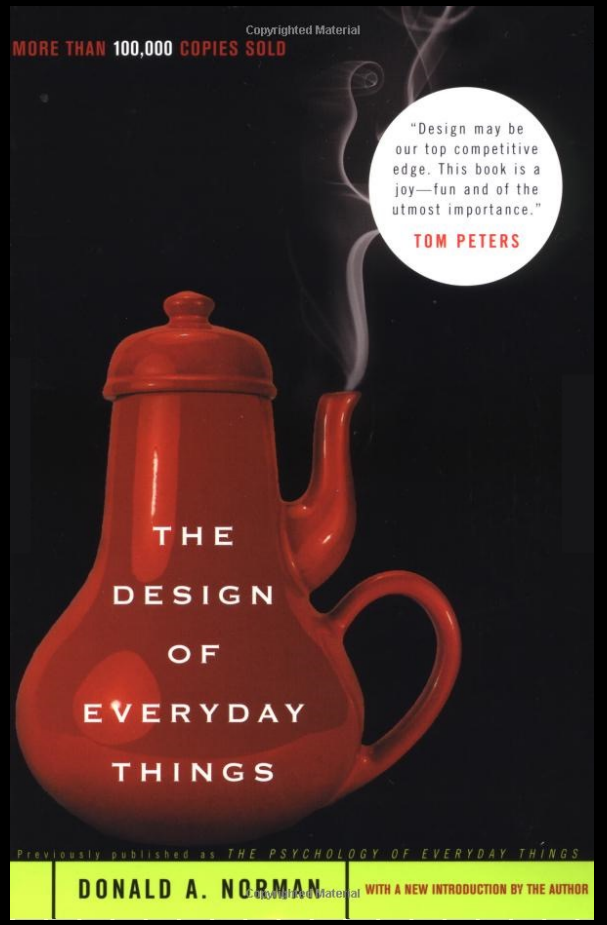
Get the mappings right

Exploit the power of constraints

Design for error

When all else fails, standardize

Additional Reading



Turn in your Attendance Slips / Game Answers

List of (Planned) References

CSE 440:
Introduction to HCI

06 – Design of Everyday Things

April 11, 2024

Jesse J. Martinez | Avery Mack | Simona Liao