Design of Everyday Things

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Overview

1. Design of Everyday Things
2. Design Principles
   - Affordance
   - Constraints
   - Consistency
   - Mapping
   - Feedback
3. Design Theory
   - Mental Models
   - Don't Make Me Think

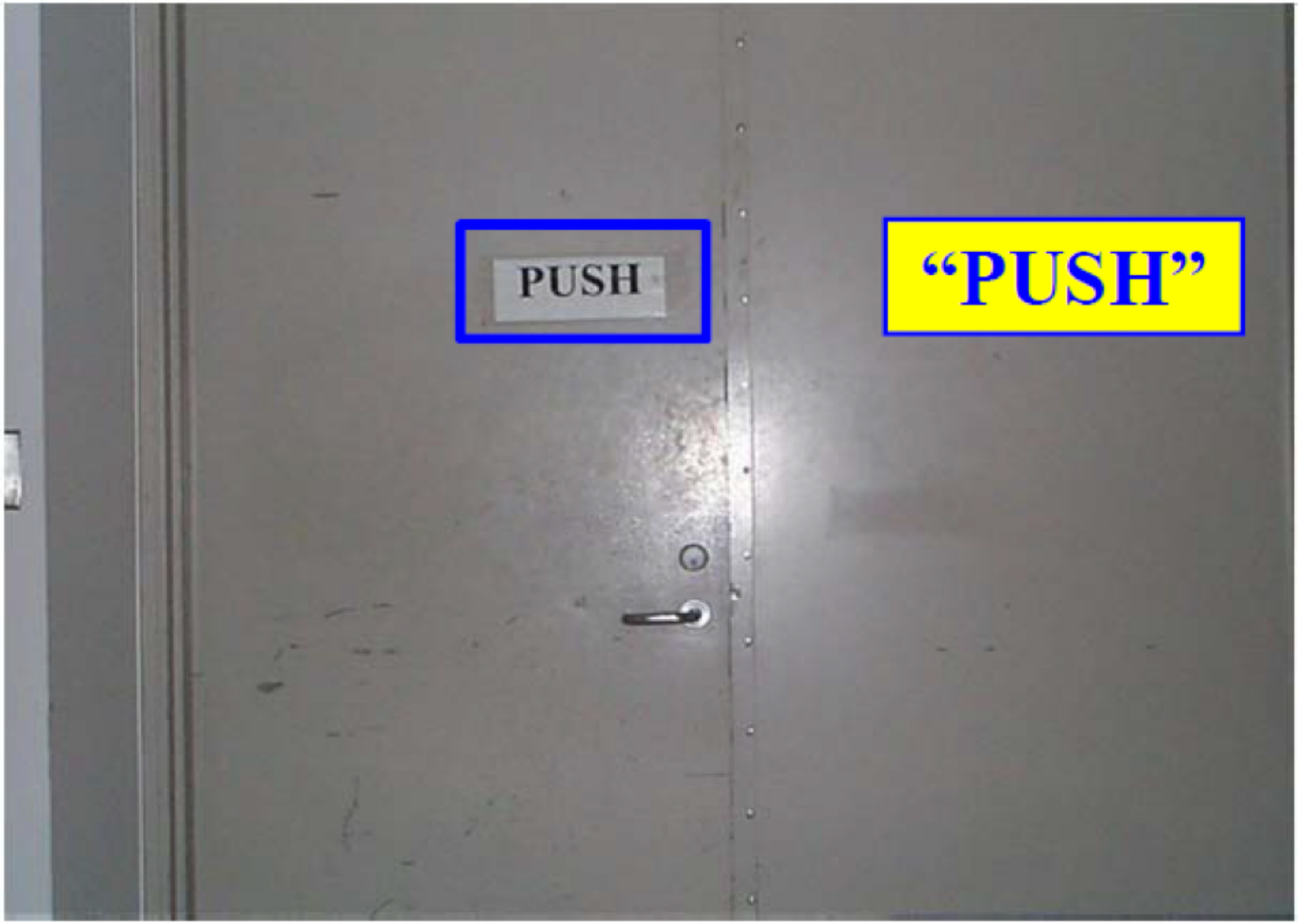
Sources

- Norman, **The Design of Everyday Things**, Revised and Expanded ed. (2013)
- Shneiderman, **Designing the User Interfaces**, 6th ed. (2016).
- Steve, **Don't Make Me Think: A Common Sense Approach to Web Usability**, 2nd ed. (2006).
- Keith, Chapter 4, 6, 7, **Human Computer Interaction Course Notes**, Graz University (2017) - `https://courses.isds.tugraz.at/hci/hci.pdf`
- Jeff, **Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Guidelines**, 2nd ed. (2014).

Doors

Doors

Doors



Doors

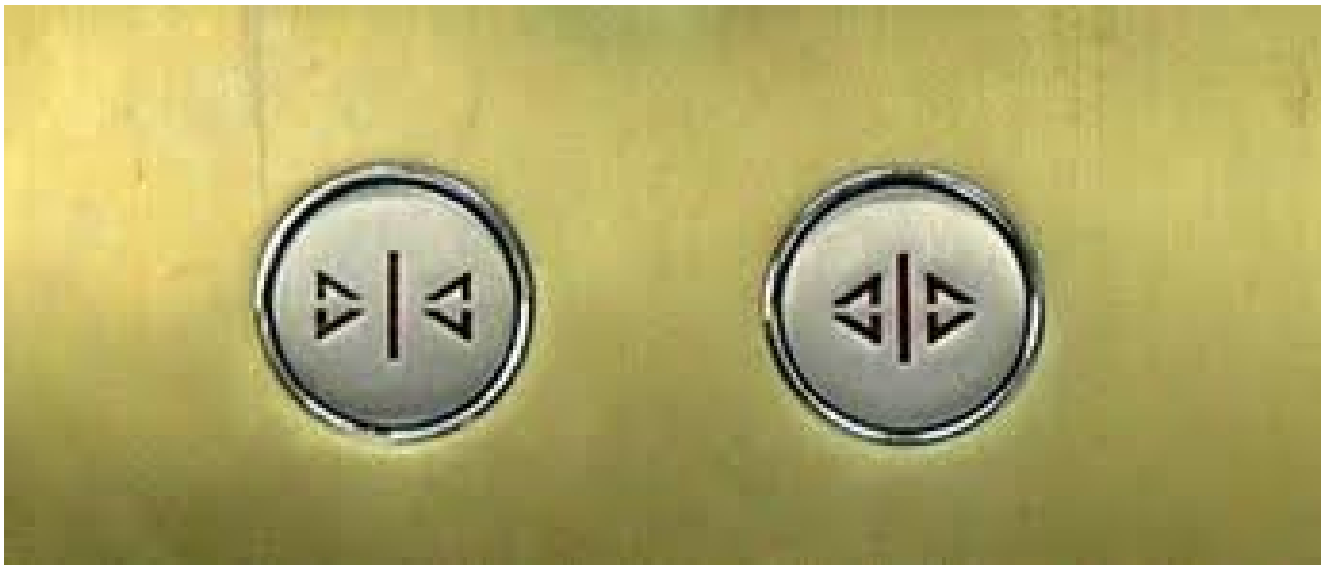
Doors

- Simple things *should* be simple. **Instructions/explanations for simple things** are a **sign of failure**
- Good design is _____. It has only _____.
- Any better door?

Doors

Elevators

Good design relies on _____. not _____.



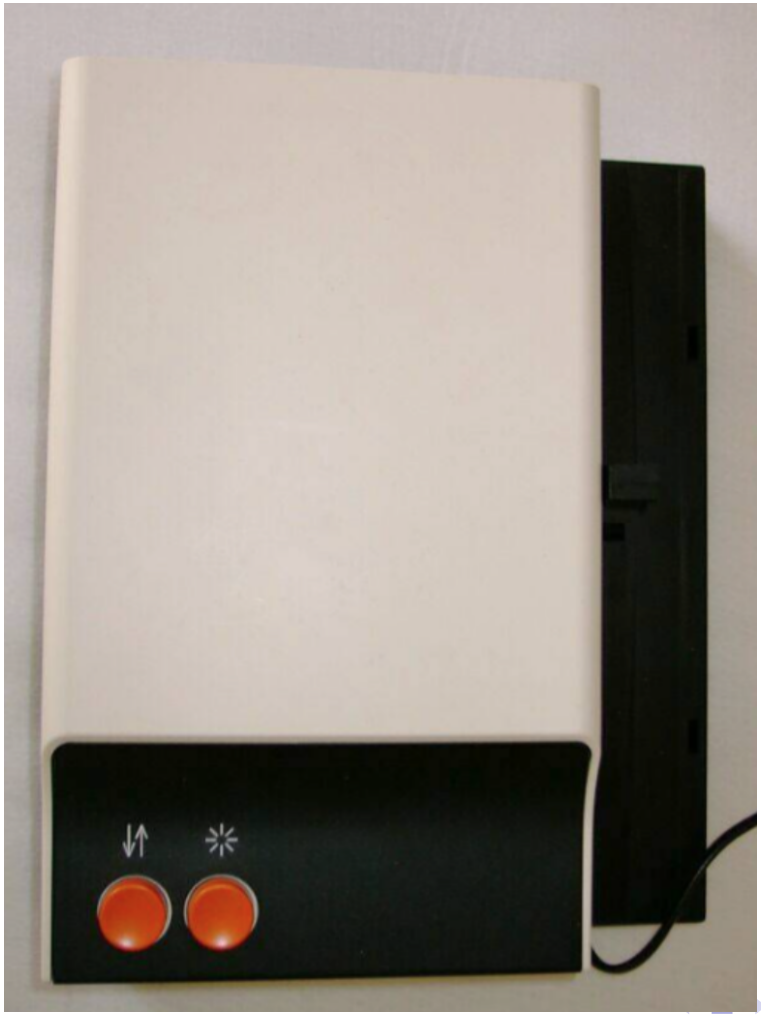
Elevators

In a popular flanker test, the mean accuracy score 0.76 for incongruent trials and 0.98 for congruent trials

Compatible	**Incompatible**
Congruent	Congruent
> > > > >	> > > > >
Response Right	Response Left
Compatible	**Incompatible**
Incongruent	Incongruent
> > < > >	> > < > >
Response Left	Response Right

Projector

Good design facilitates _____.



Toilet sign

_____ is NOT design.

Desk

Good design is _____.

Mcdonald

Good design prevents _____.

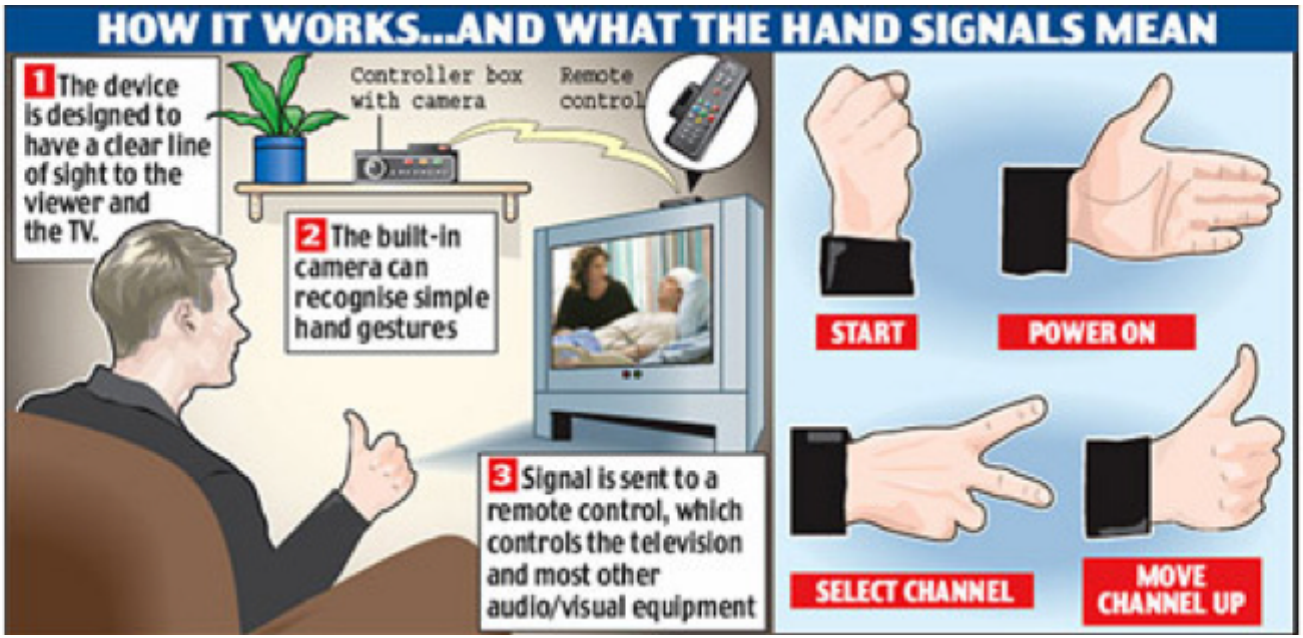
Remote control

_____ is NOT design.

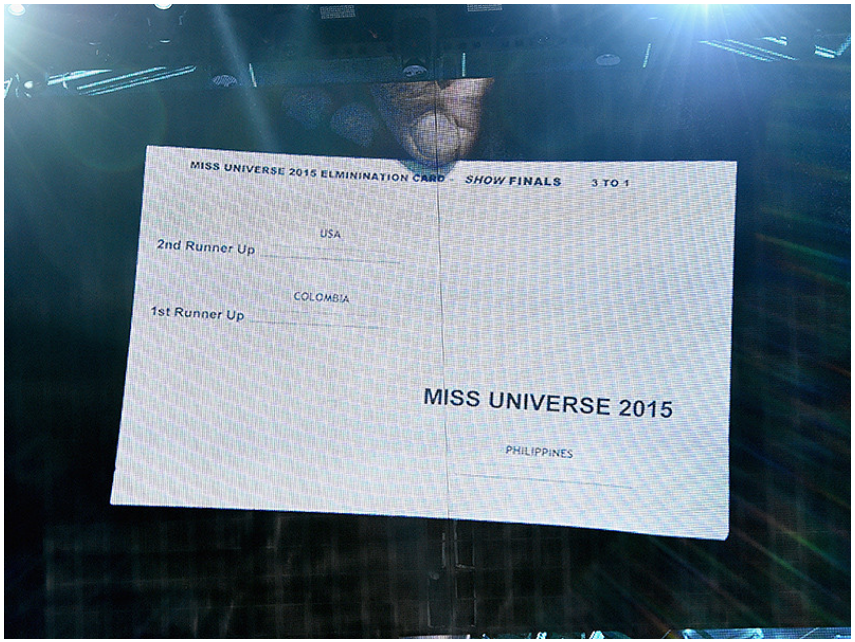
TV gestures

_____ is NOT design.

Never a commercial success.....why?



List goes on....



- Do you remember **Miss Universe 2015** incident?
- How many times you or your acquaintances forgot to **withdraw your card from ATM**?
- How many times we forgot to **turn off the front lights of the car**?
- Have your mom/grandma go to a hotel and wonder **how to use the shower**?

Stupid design is easy to avoid though

- Of course, this class won't discuss these silly mistakes though

Hmm...so why design goes wrong?

- Most engineers will often make the excuse of "*if the user read the instructions or manual*", or "*if the user click this before this*". Preach **NEVER the fault of users, but of designers**

Why design is hard?

- Design is hard because of **tradeoffs**
  - Top designers know what makes design good, but the problem is that you cannot always take all the good things
  - Common **tradeoffs** - e.g., security vs convenience? familiarity vs. cool new experience? speed vs accuracy? customizability vs. learnability?
- Design is hard because of **context**
  - Context of use - which tasks the tools/systems are being used
  - Expertise - novice vs. experts
  - Cultural differences
  - User groups (e.g., old vs. young, blind, female)
  - Personal preferences!
  - Difficult to have **one-fits-all** solution

Why design is hard?

- Design is hard because of **human nature**
  - Human **perception** is flawed
  - Human **attention span** is limited
  - Users does not like to **memorize**, nor **read**, nor **think**
  - Users are **impatient**
  - Humans are **NOT rational**
- Design is hard because of **engineer nature**
  - Engineer usually assumes users are same as him/her
  - Engineer usually interested in solving technical challenge
  - Engineers make stuff that only make sense to technical people
  - Engineers make stuffs that usually are very logical and rational, which most users (could be engineers) are not

What are some ways out? Mindset.

- Understand people **expectations** and **knowledge**; they are not necessarily like you
- **Don't assume** people will read, learn, think, or care
- Embrace **diversity** - aged, blind, left-handed, experienced, lang. etc.
- **Rapid prototyping and failure**
- **Interview** but NOT follow
- NOT making it **simpler** nor **minimal** nor **looking/feeling good** or **high-tech**, they are secondary. Primary is about _____
- Do **quantitative** user evaluation; don't argue
- Use **design principles**
- Willing to receive **criticisms** and feedback

Affordance

- When we see a glass, we know we need to hold it. When we see a knob, we know we need to turn it. The key principle here is **affordances**
- Affordance refers to the **relationship** between a physical object and a person. A chair *affords* support and, therefore, *affords* sitting.
- The notion of affordance comes with J. J. Gibson, an eminent psychologist who studied human perception. He argued that the world contained **clues** what to do, and he called them **direct perception**. In addition, he claimed that physical objects conveyed what actions are possible, which he named "affordance"

Affordance

Affordance

Affordance

Affordance

Affordance

Lack of affordance

Figure: Not sure how to open?

Lack of affordance

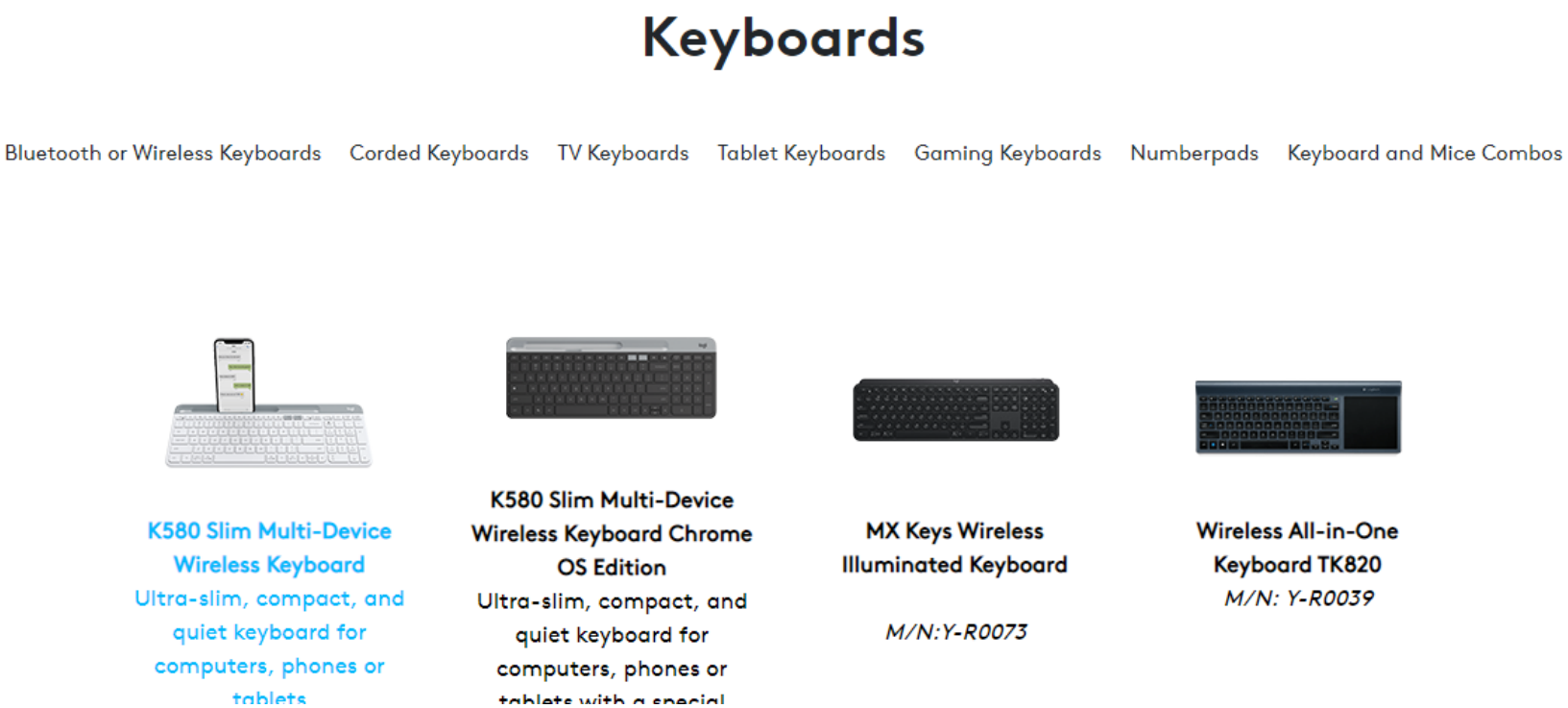


Figure: Clickable?

Bad affordance

Bad affordance also exists! How many times did your family members put something on top of this similar machine?

Affordance but lack of signifiers

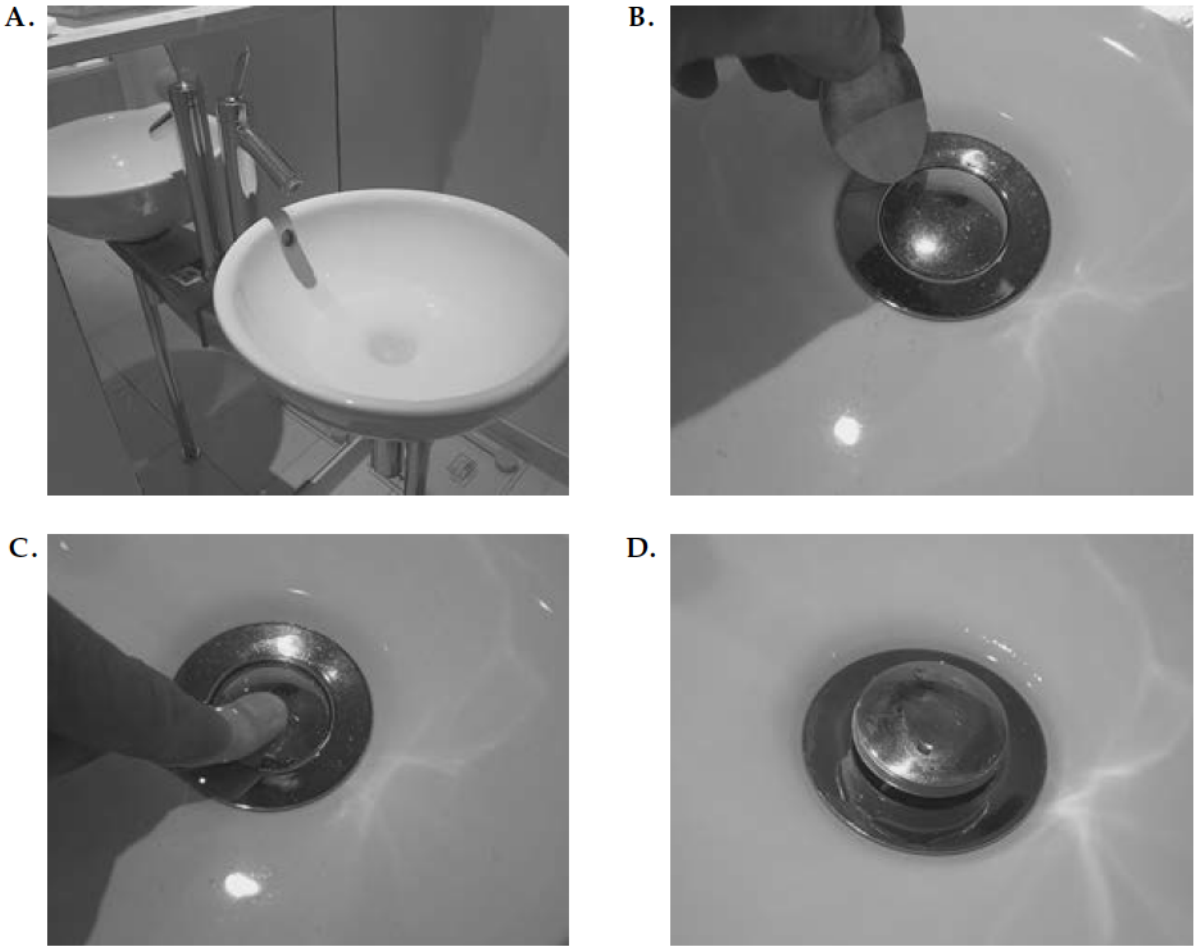


Figure: Source: Fg 1.4 (Norman) - Not sure how to take out!

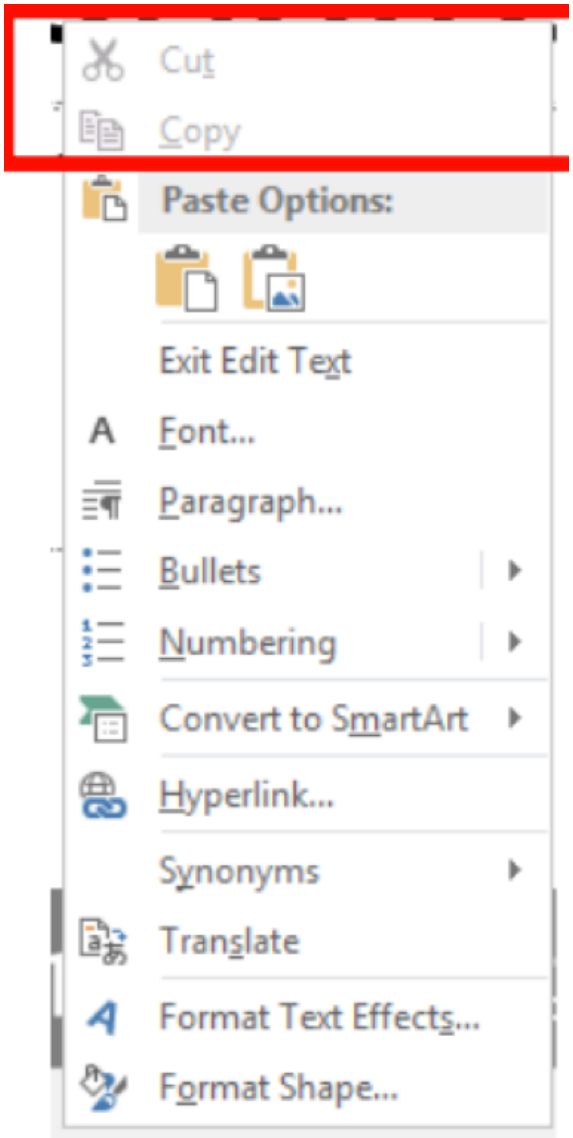
Constraints

- Constraints is about **limiting what user can do**. Why it is good?
- By **limiting users' options**, user has a better idea what to do
- **Lower** the chance for errors
- Humans also feel good when they see **limited** choices

Constraints

Constraints

Constraints



Constraints

Conventions - cultural constraints

Conventions are cultural constraints. They are initially arbitrary, but evolve and become accepted over time. They can vary enormously between cultures.

- Light switches:
  - America: down is off
  - Britain: down is on
- Water taps:
  - America: anti-clockwise is on
  - Britain: anti-clockwise is off

- The colour red:

America	danger
Egypt	death
India	life
China	happiness

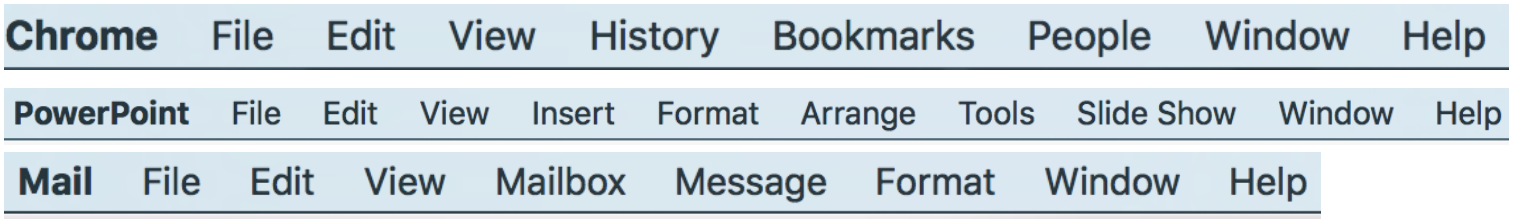
Constraints

- How to better design this Mcdonald tray using the constraint concept?

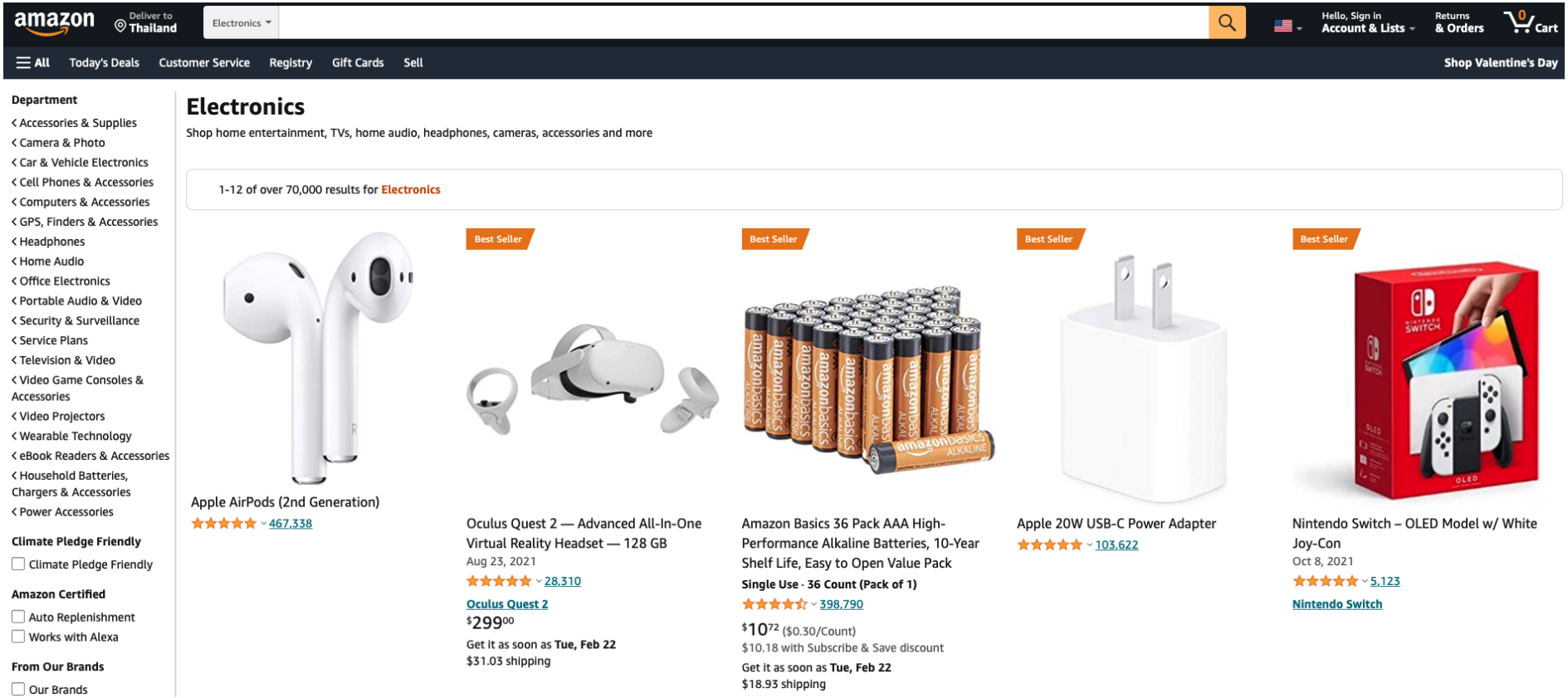
Consistency

- **Consistency** in design is virtuous. When things are consistent, it becomes easy for users to catch the pattern, and thus learn.
- Example: Ctrl-S, Cltr-C, Cltr-V (This function is same across all applications)

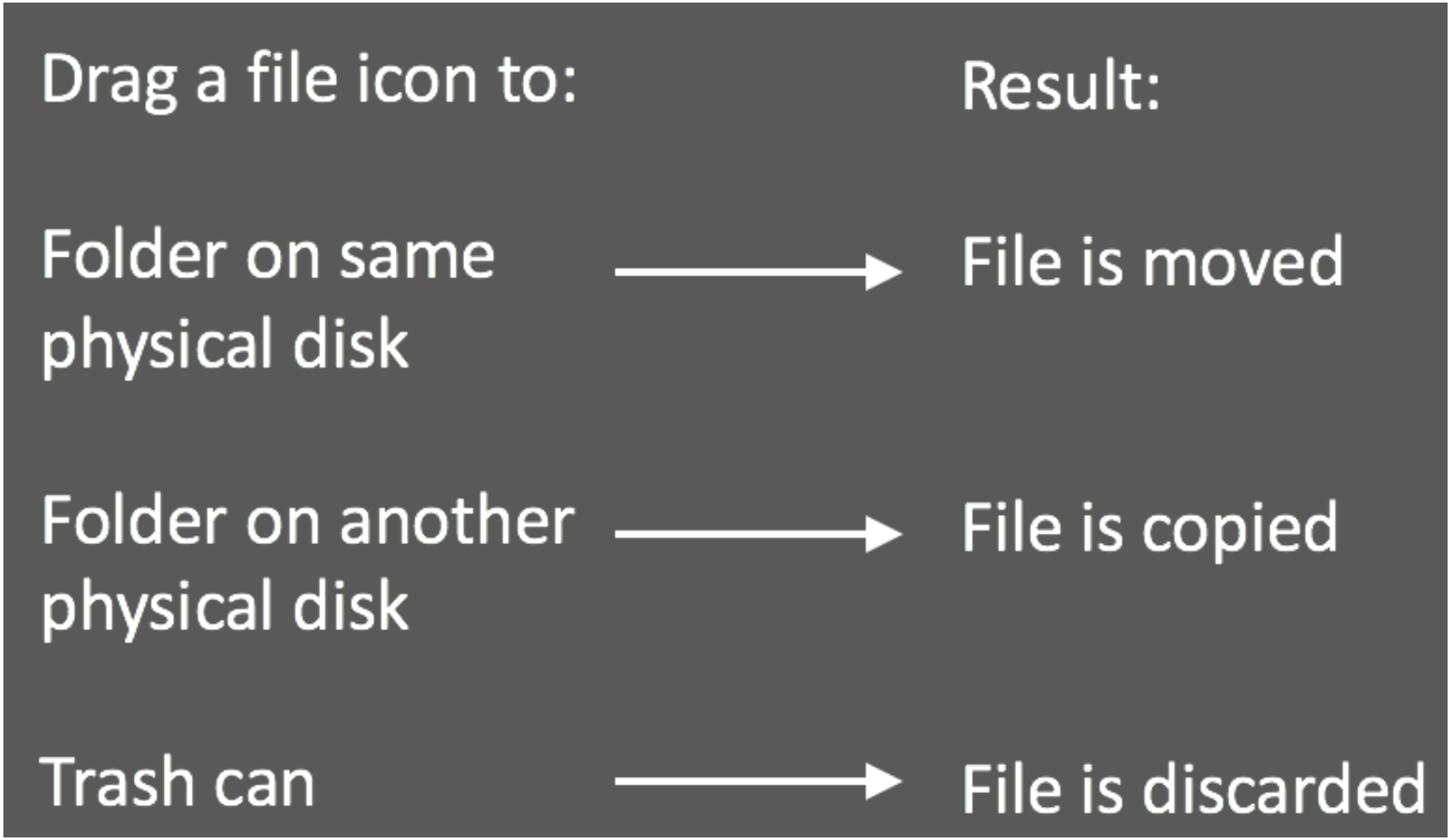
Consistency



Consistency

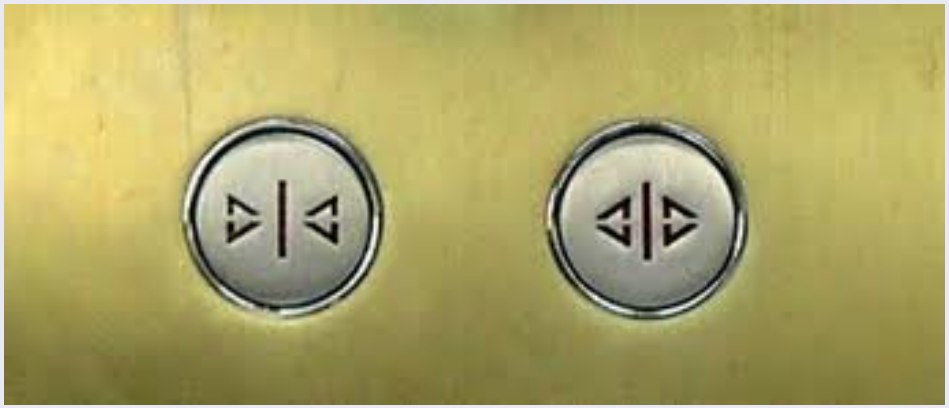


Inconsistency



Activities

Classwork



- Attempt to redesign the elevator buttons so to *minimize* people accidentally closing the door.
- Submit a screenshot and roughly 300 words arguing why you think your design will solve the problem to Google Classroom.

Discussion

Questions

Mapping

- **Mapping** is the spatial relationship between objects
- When the mapping uses **spatial correspondence** , it is easy to determine how to use them.
- Mappings vary with **culture** - Arabic (right to left), Chinese (top to bottom), Roman (left to right). So how to design an elevator buttons layout depends on **culture**

Mapping

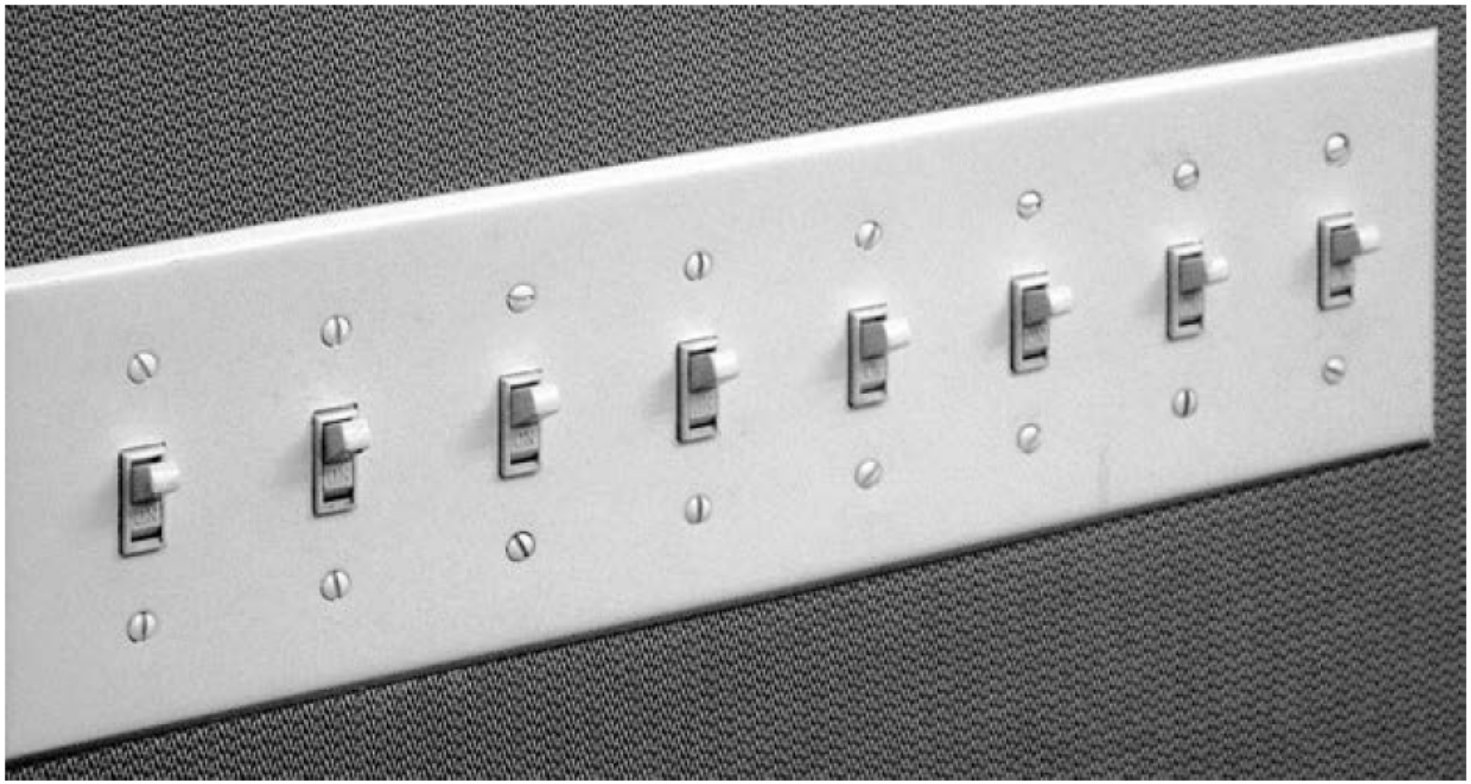


Figure: Source: Fg 4.4 (Norman) - Incomprehensible Light Switches

Mapping

FIGURE 4.5. A Natural Mapping of Light Switches to Lights. This is how I mapped five switches to the lights in my living room. I placed small toggle switches that fit onto a plan of the home's living room, balcony, and hall, with each switch placed where the light was located. The X by the center switch indicates where this panel was located. The surface was tilted to make it easier to relate it to the horizontal arrangement of the lights, and the slope provided a natural anti-affordance, preventing people from putting coffee cups and drink containers on the controls.

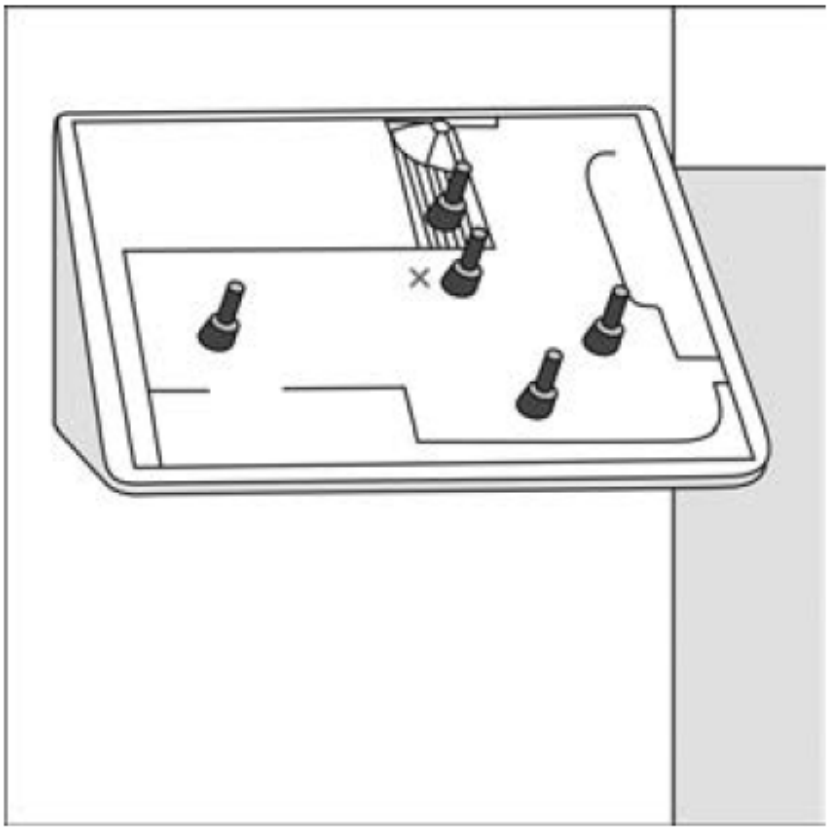


Figure: Source: Fg 4.5 (Norman)

Mapping

Figure: Source: Fg 1.7 (Norman)

Mapping

Mapping

Mapping

Mapping

Mapping

Mapping

Mapping

Mapping

Mapping


REGISTRATION
PARKING
RESTAURANTS • LOBBY BAR
COCKTAIL LOUNGE
SHOPS
MEETING ROOMS
BOARD ROOMS
EXECUTIVE OFFICES
BALLROOMS
MEETING ROOMS
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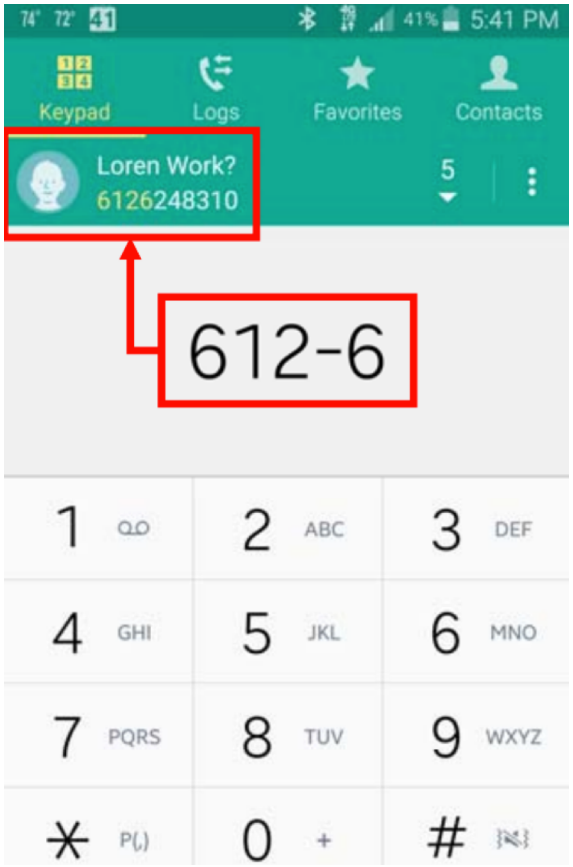
Mapping

Feedback

- When there is **no feedback**, we get **confused**. Why?
- Feedback must be **immediate**
- Feedback must be **informative** - one flash and two flashes error message isn't very helpful
- **Too much feedback** can be annoying. Why?

Feedback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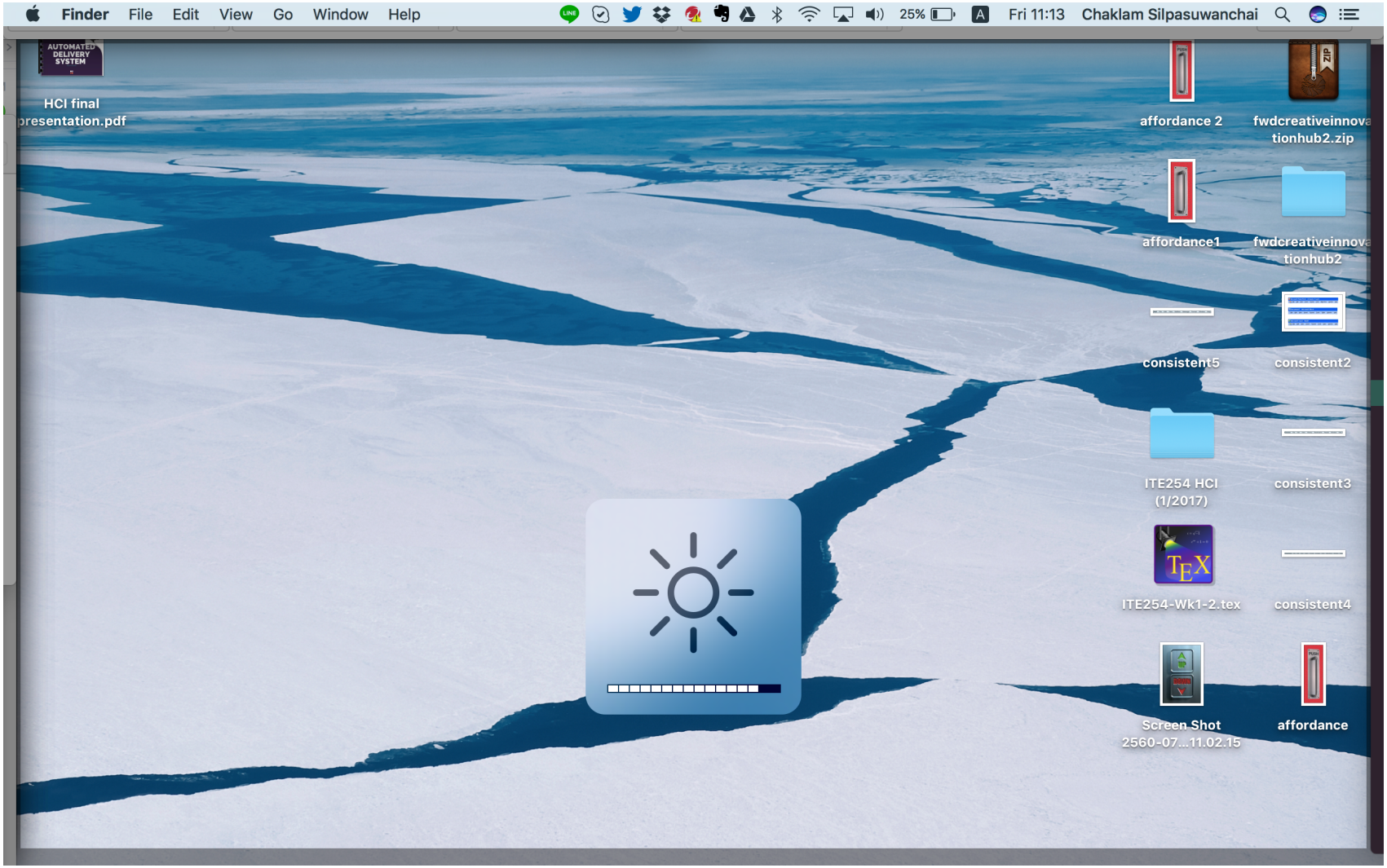
Feedback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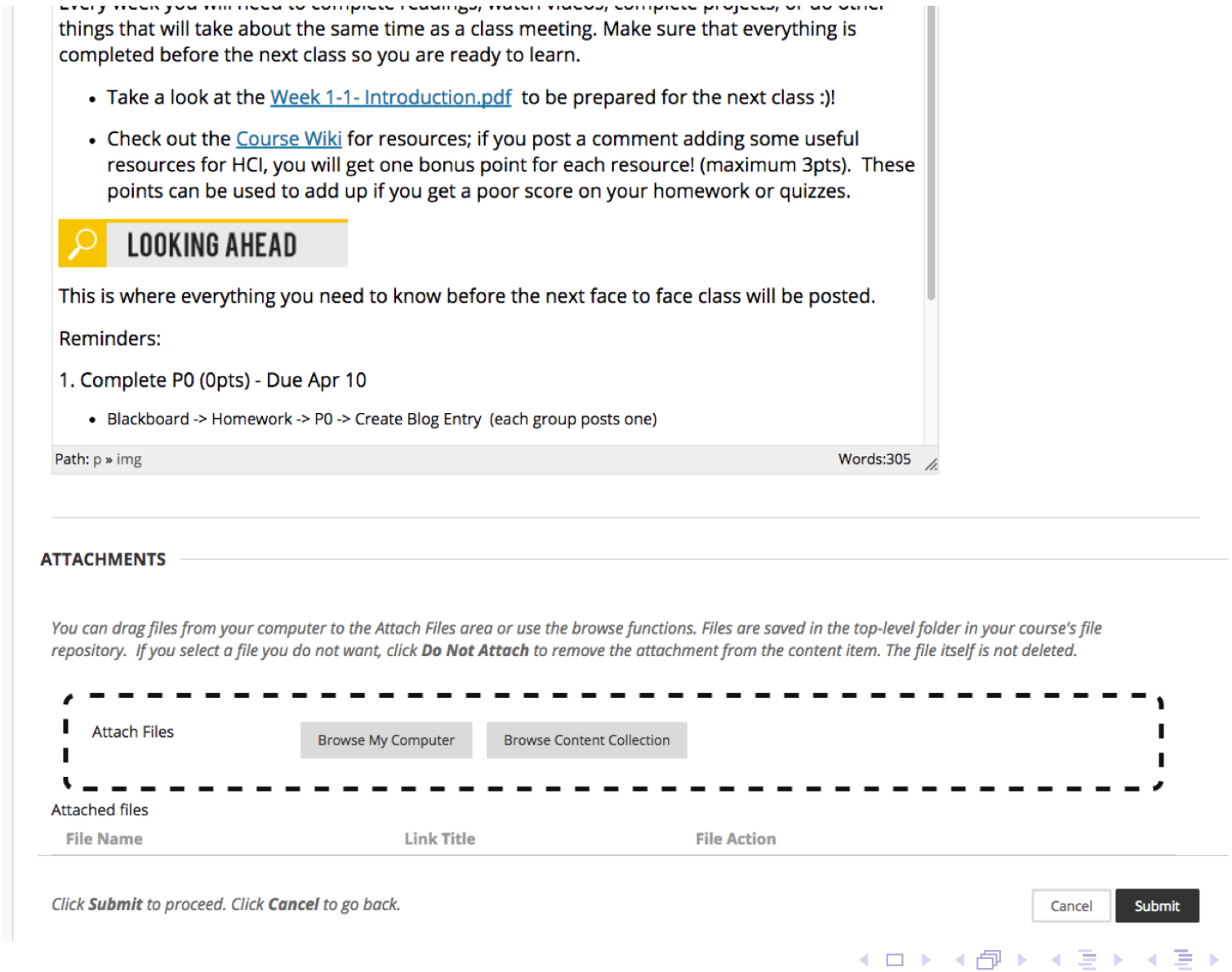
Feedback

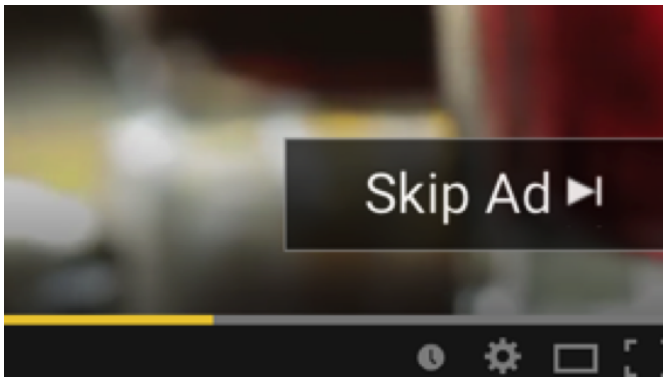
Feedback


things that will take about the same time as a class meeting. Make sure that everything is completed before the next class so you are ready to learn.
Take a look at the Week 1-1- Introduction.pdf to be prepared for the next class :)!
Check out the Course Wiki for resources; if you post a comment adding some useful resources for HCI, you will get one bonus point for each resource! (maximum 3pts). These points can be used to add up if you get a poor score on your homework or quizzes.
LOOKING AHEAD
This is where everything you need to know before the next face to face class will be posted.
Reminders:
1. Complete P0 (0pts) - Due Apr 10
Blackboard -> Homework -> P0 -> Create Blog Entry (each group posts one)
Path: p » img
Words:305
ATTACHMENTS
You can drag files from your computer to the Attach Files area or use the browse functions. Files are saved in the top-level folder in your course's file repository. If you select a file you do not want, click Do Not Attach to remove the attachment from the content item. The file itself is not deleted.
Attach Files
Browse My Computer
Browse Content Collection
Attached files
File Name
Link Title
File Action
Click Submit to proceed. Click Cancel to go back.
Cancel
Submit

Feedback

- A clever trick Instagram uses to upload photo quick
- Whenever you upload a photo, Instagram will quickly finish uploading
- Trick users to think it finishes already

Feedback



- Human attention span is 8 secs (goldfish has a 12 secs!)
- 0.1 sec - is the limit that humans can wait while **manipulating**
  - Important for direct manipulation, virtual world navigation
- 1 sec - the limit that user's **flow of thoughts** go uninterrupted
  - Display a busy cursor if things take longer than 1 sec
- 10 sec - the limit that user can **wait**
  - Display a progress bar if things take longer than 10 sec

So...what's a successful design? - Mental Models

- **Mental model** is how one thinks something works
- **If designer and user mental model matches, it is a successful design**
- **Good** mental model examples:
  - Folder and files icons
  - Scissors
- Matching mental model is **hard**. Novice and experts, for example, have completely different models. Designers and users also have often very different models

Mental Models

FIGURE 1.8. Junghans Mega 1000 Digital Radio Controlled Watch. There is no good conceptual model for understanding the operation of my watch. It has five buttons with no hints as to what each one does. And yes, the buttons do different things in their different modes. But it is a very nice-looking watch, and always has the exact time because it checks official radio time stations. (The top row of the display is the date: Wednesday, February 20, the eighth week of the year.) (Photograph by the author.)

Figure: Source: Fg 1.8 (Norman)

- When users have incorrect mental models, your design fails
- **Watch**: There are five buttons. There are **affordances** of buttons but it does not **signifies** what to do. There are also no clear **mappings** between functions and buttons. **Constraints** are also not applied properly - each button can be pressed or hold or press twice, none of which are explained clearly. Only way to use this watch is to read the manual....too bad

Mental Models

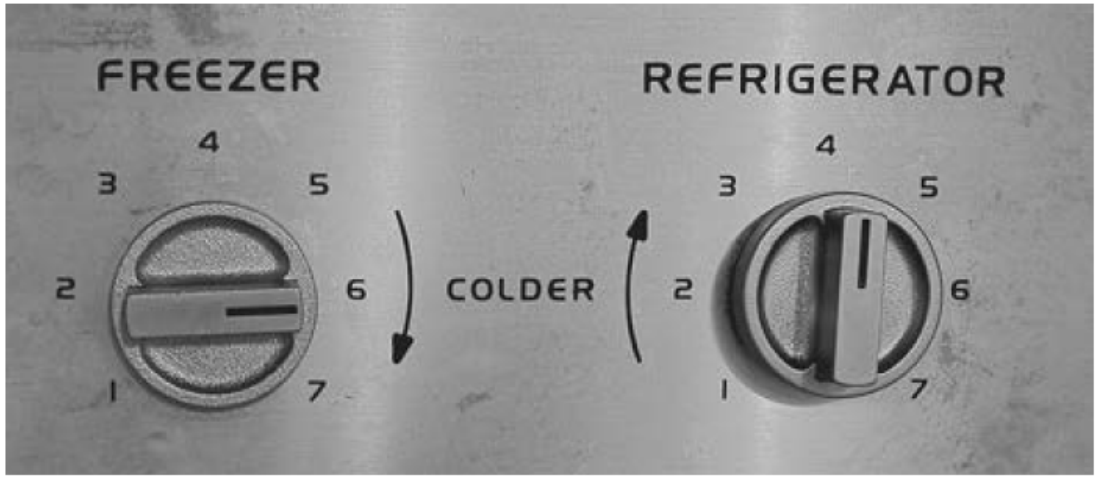


FIGURE 1.9. Refrigerator Controls. Two compartments—fresh food and freezer—and two controls (in the fresh food unit). Your task: Suppose the freezer is too cold, the fresh food section just right. How would you adjust the controls so as to make the freezer warmer and keep the fresh food the same? (Photograph by the author.)

Figure: Source: Fg 1.9 (Norman)

- **Refrigerator**: If the freezer is too cold, what you will do?

Mental Models

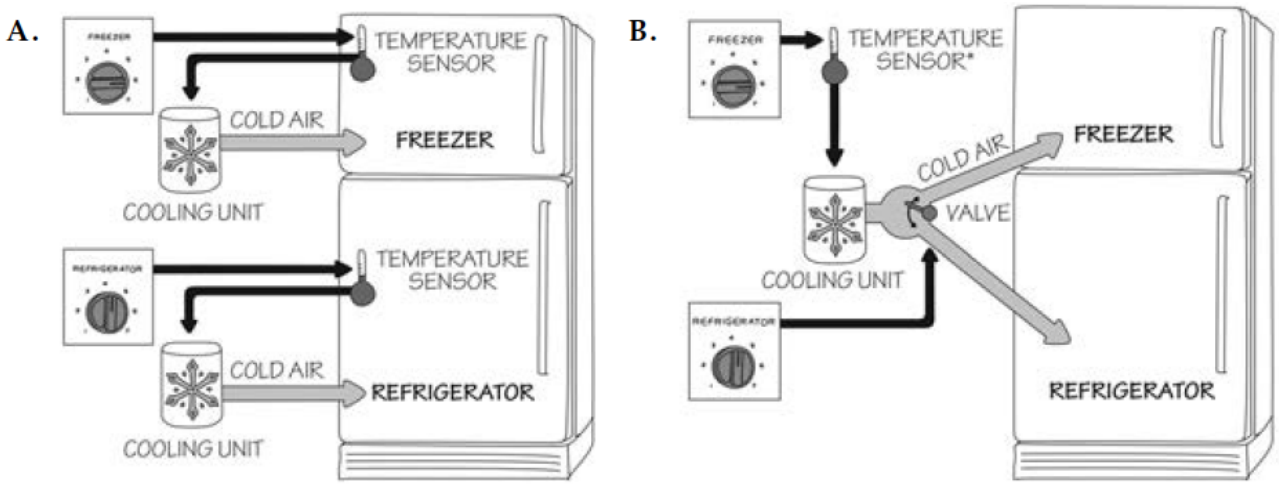


FIGURE 1.10. Two Conceptual Models for a Refrigerator. The conceptual model A is provided by the system image of the refrigerator as gleaned from the controls. Each control determines the temperature of the named part of the refrigerator. This means that each compartment has its own temperature sensor and cooling unit. This is wrong. The correct conceptual model is shown in B. There is no way of knowing where the temperature sensor is located so it is shown outside the refrigerator. The freezer control determines the freezer temperature (so is this where the sensor is located?). The refrigerator control determines how much of the cold air goes to the freezer and how much to the refrigerator.

Figure: Source: Fg 1.10 (Norman)

Don't Make Me Think

- Famous book of Steve Krug's *Don't Make Me Think*
- Key concept of the book is **Don't make users think**
- **Not thinking** means that users should be able to quickly reach their goal without unnecessary cognitive effort

Don't Make Me Think

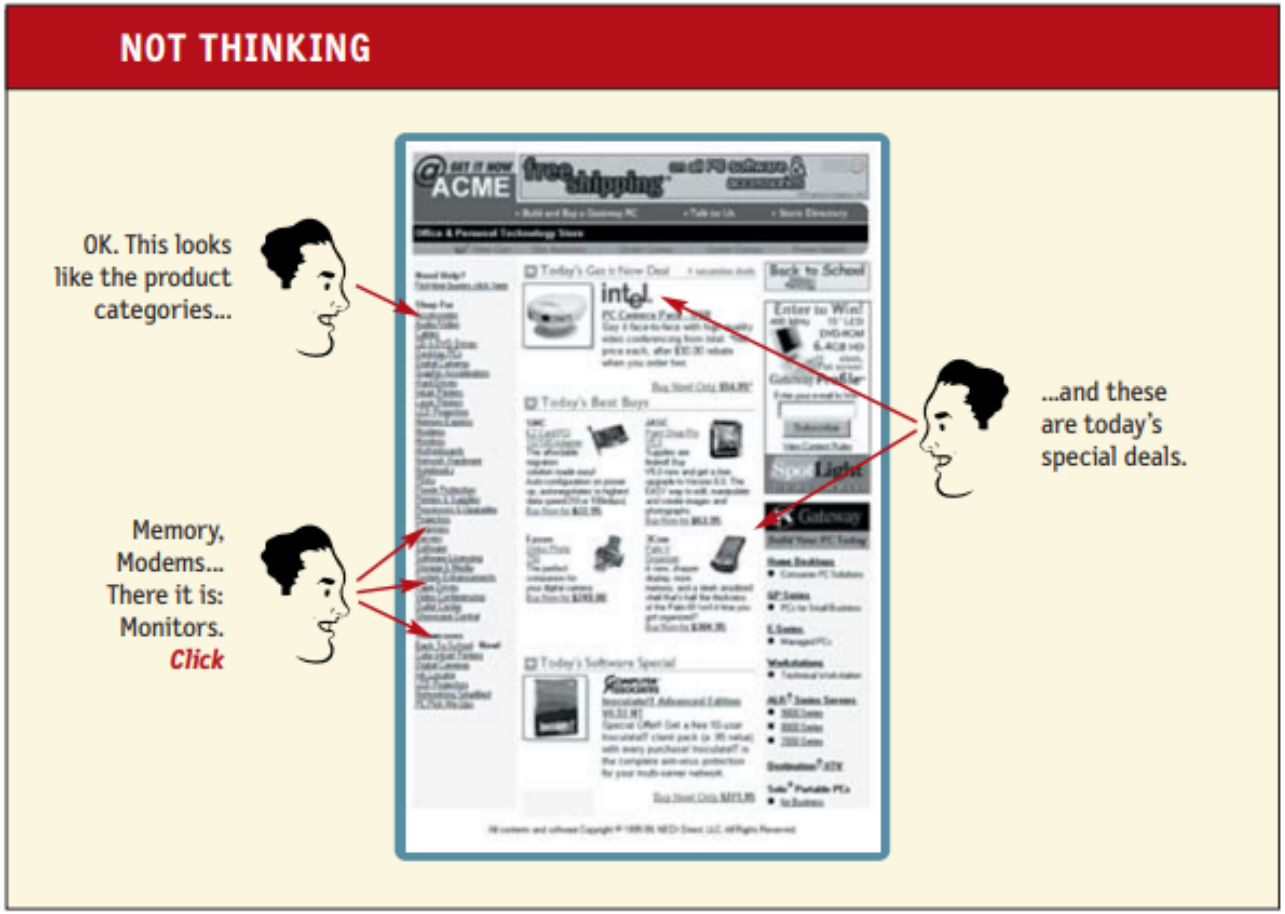


Figure: Source: Pg. 12 (Steve)

Don't Make Me Think

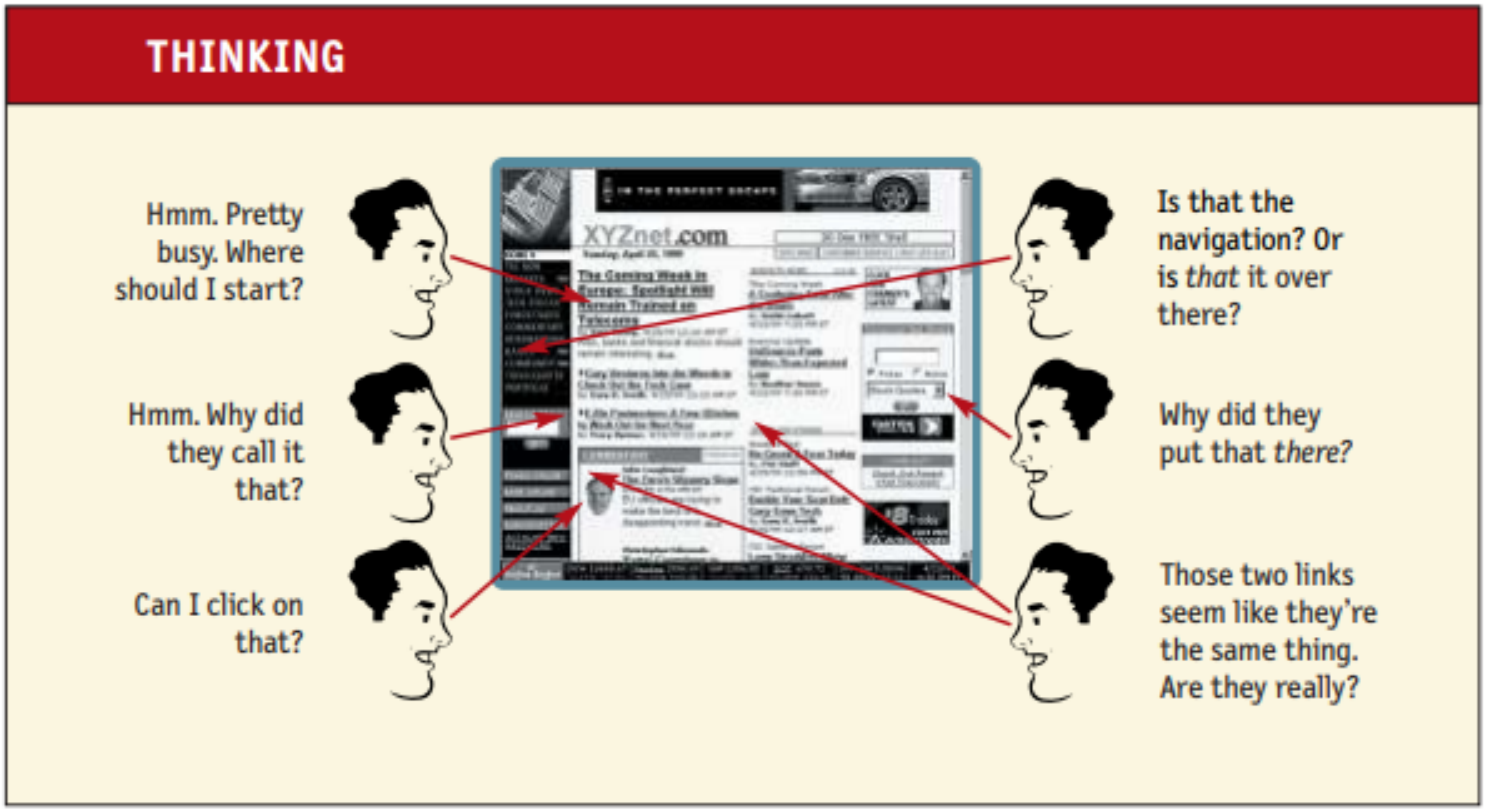


Figure: Source: Pg. 13 (Steve)

Things that Make Us Think - Names

- Typical culprits include cute or clever **names**, marketing-induced names, company-specific names, and unfamiliar names

Figure: Source: Pg. 14 (Steve)

Things that Make Us Think - Links and Buttons

- Needless source of question marks over people's heads is **links and buttons that aren't obviously clickable**. The point is simple things like links should not cause any such headache

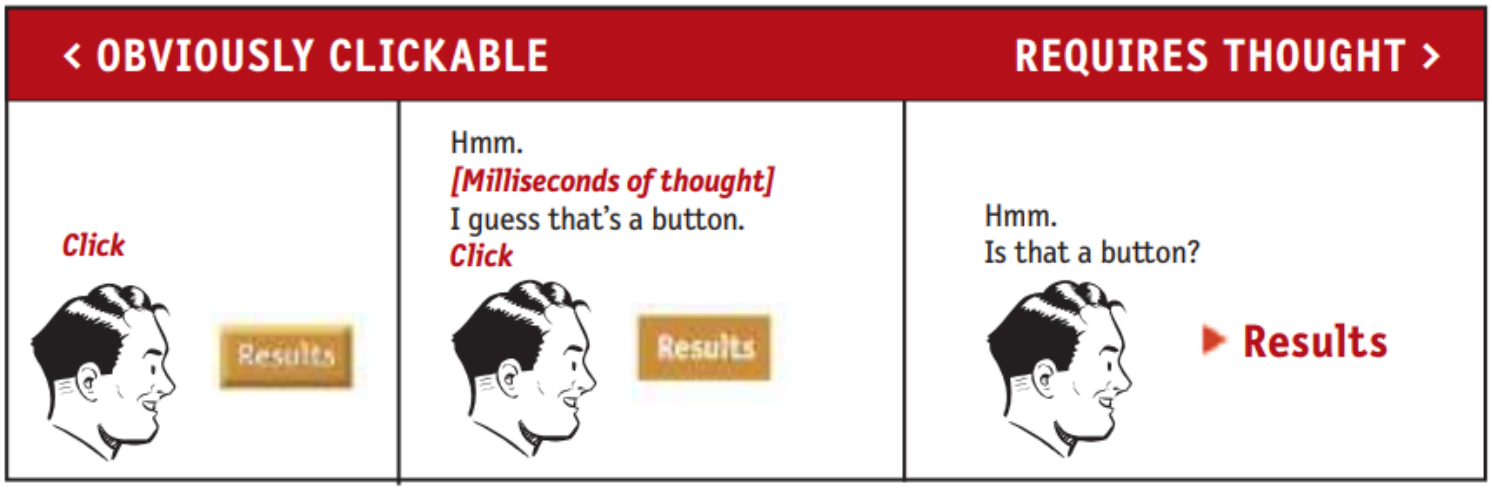


Figure: Source: Pg. 15 (Steve)

Things that Make Us Think - Search

- Many bookstore sites require us to **think how we want to search** which adds up the cognitive effort

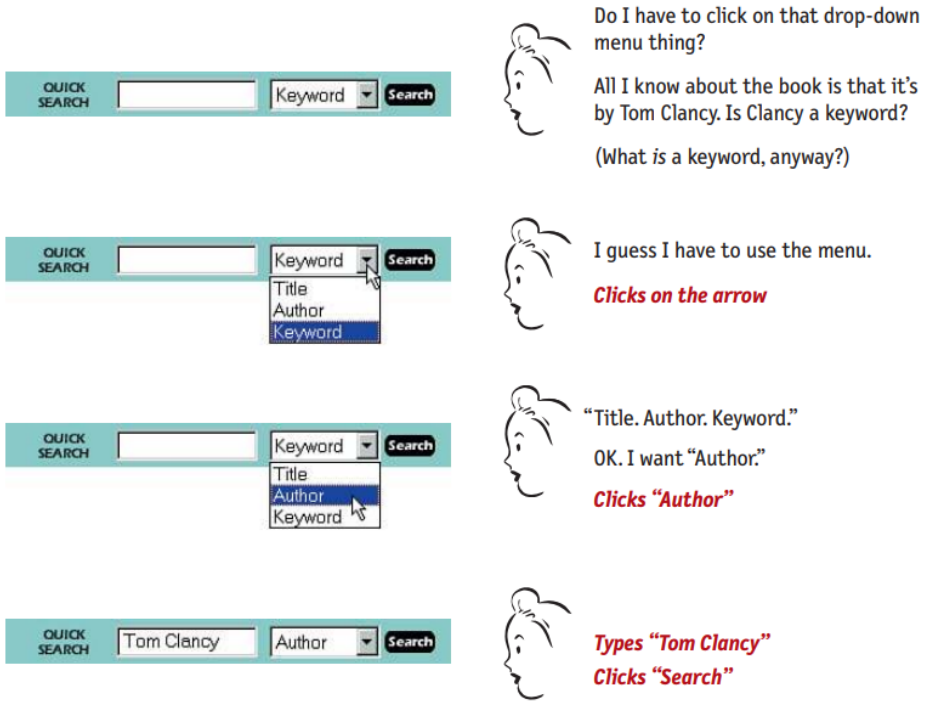


Figure: Source: Pg. 16 (Steve)

How We Really Use the Web

- A gap often between how we think people use Websites and how they actually use them
- In fact, people mostly is **impatient** and usually in hurry, only care about their **goal**, **does not like to think**
- Thus, most people will just **scan** and **click**, within tenth of a second...

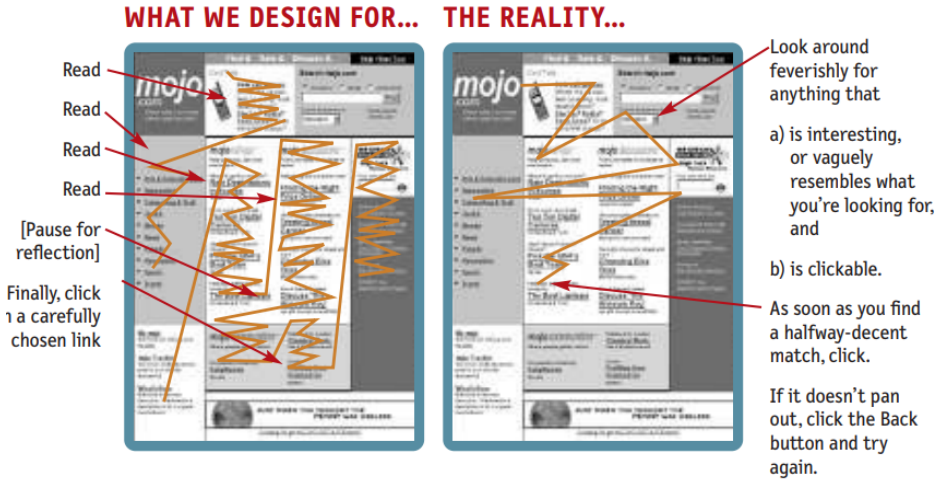


Figure: Source: Pg. 21 (Steve)

Fact of Life I - We scan

- We don't read. We scan. We are smart to know we do not need to read everything

Figure: Source: Pg. 23 (Steve)

Fact of Life II - local optima

- We don't choose the **best** option. We choose the **first reasonable** option because
  - We are usually in a **hurry**
  - The **penalty** for guessing wrong is low with the Back button always available
  - Not to mention guessing is **fun**

Fact of Life III - We don't like to learn/think

- We don't like to think or learn, we usually just **muddle through**
- If we find something that works, we stick to it, we **hardly change our way**

Activities

Classwork

Shower at hotel is something simple that is often frustrating. Have your encounter relatives where they have difficulty understanding how the shower works? Have you ever turn on the shower with water splash right on your face when it's not intended? Attempt to redesign the shower system.

Discussion

What's next

Read my slide on **Humans**, and these complimentary resources.

- Jeff, **Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Guidelines**, 2nd ed. (2014).
- Mackenzie, Chapter 2, **Human Factors**, Human Computer Interaction: An Empirical Research Perspective, 1st ed. (2013)

Also please download **PEBL** and make sure you have some simple **spreadsheet** programs for simple graphs generation.

Questions