Principles of Design

CS 88S | Kevin Tan | Lecture 2

Designs can be evaluated using concrete criteria.

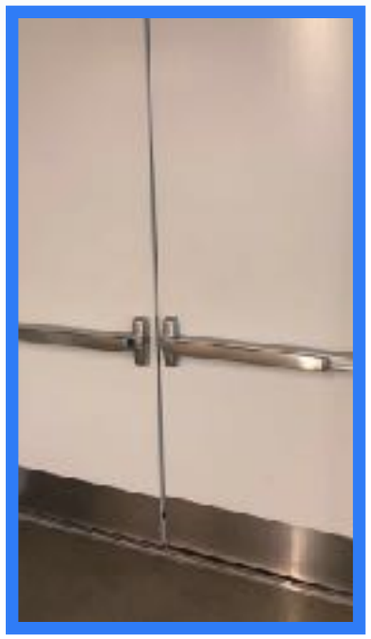
Arguably, designs can be objectively good or bad.

Affordances

- Fundamental properties of a product that determine how it can possibly be used

- Restrict the set of actions a user can perform with a product

- What actions does the product *afford*?



Notes on Affordances

- The only action the door *affords* is pushing.
- Scissors - **small hole** only affords one finger and the **big hole** affords more than one finger
    - You pick the scissors up putting your thumb in the smaller hole almost subconsciously

Visibility

- The correct parts of a product must be *visible*, and they must convey the correct message

- Includes visibility of the **effects** of the operations, e.g. if the lights have been turned on properly

Notes on Visibility

- The toaster is made out of stainless steel so the majority is a **silver color**.

- The only things to be interacted with are the lever and dial and are a **black color** so they are most *visible* to the user

- Automatic sinks suffer from a **lack of visibility**, which makes it awkward to figure out where to put your hands so that water begins to flow

Mapping

- The relationship between two things, in most cases, between **controls** and their **results** in the real world

- Mapping can take advantage of physical analogies and cultural standards

Notes on Mapping

- You turn the steering wheel to the right, the car goes right

- Some cars have buttons arranged in the shape of a car seat on the door so it’s easy to adjust your seat - great use of mapping

- The dials on stoves are arranged in a line so it’s very difficult to figure out which dial corresponds to which flame - **poor mapping**

Notes on Mapping

- We automatically know that the image of a triangle facing right means “Play”, but why? **This is a cultural mapping that we have created**
- Another example of cultural mapping is associating “right” with a positive direction, and “left” with a negative direction (i.e. turning a volume knob to the right)
    - There’s no reason “right” inherently means positive, yet we chose it to be that way

Conceptual Models

- Before you use any product, your brain forms a **conceptual model** of how it works
    - Visibility, affordances, and mappings help create this model
- A conceptual model allows us to predict the effects of our actions

The Uncomfortable

A collection of deliberately inconvenient everyday objects by architect Katerina Kamprani

https://www.theuncomfortable.com/#the-uncomfortable


© Katerina Kamprani - The Uncomfortable


© Katerina Kamprani - The Uncomfortable

Feedback

- Sending the user information about what action has actually been done

- **Causality**: something that happens after an action appears to be *caused* by that action

- When an action has no apparent result, you may conclude that the action was ineffective. So you repeat it

Notes on Feedback

- Feedback can make use of **all five** human senses
- “You’ll know if it’s on if the light is on”
- “Press it and you should hear a beep”

Error Handling

- **If an error is possible, someone will make it.**
- The designer should *minimize* the chance and effects of the error.
- Errors should:
  - Be easy to detect
  - Have minimal consequences
  - If possible, be reversible

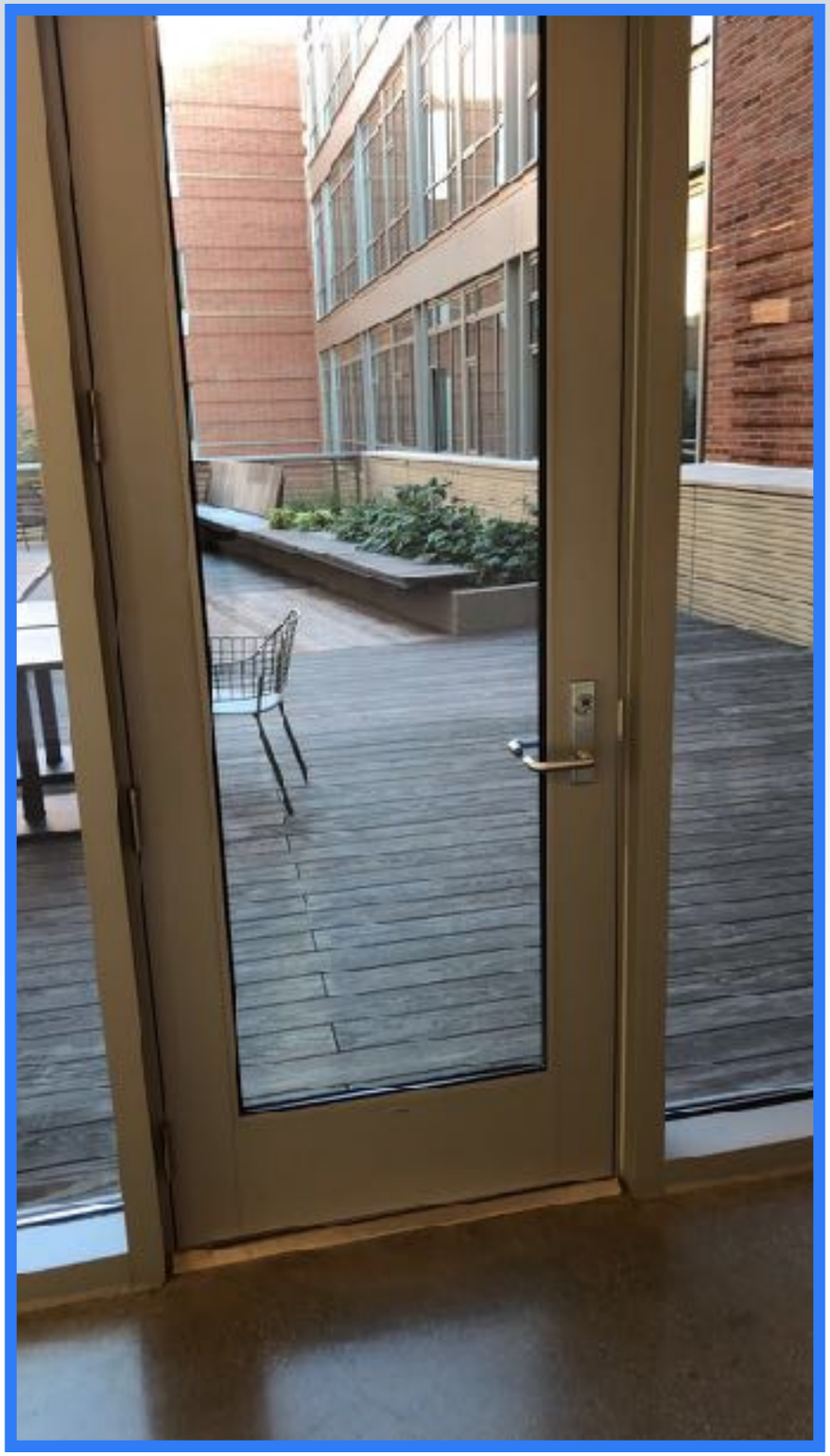
Notes on Error Handling

- Skydiving is an area where error handling is crucial
  - They have an **experienced professional** skydiving with you
  - **Emergency parachute** in case the main one doesn’t work for whatever reason

An (Oversimplified) Recipe for Good Design

- Use visibility, affordances, and mapping to create a good **conceptual model**
- Provide feedback for every meaningful user action
- Think of possible errors ahead of time and design accordingly

Bad Designs



Notes on Door

- **Poor visibility** - Not enough visual hints to figure out if door is push or pull

- **Poor affordances** - The handle affords both pushing and pulling


Heated Dry Cycles
No Heated Dry
Sanitize
Heavy
Normal
Light
Glasses
Speed
Rinse
Select

Notes on Dishwasher

- **Poor visibility** - The user is being shown *too much* and cannot make sense of the differences between modes

- **Poor conceptual model** - No idea what each of the different modes does

Notes on Shower

- **Poor mapping** - There’s no mapping between the knobs and their consequences (e.g. hot vs. cold water)
- **Poor conceptual model** - No idea how this shower works

Activity: Good vs. Bad

Get into groups of 3 or 4!

Activity: Good vs. Bad

- There will be 3 groups trying to make as **good** of a design as possible (using the principles we've discussed)
- The other 3 groups will try to make as **bad** of a design as possible
- At the end, we'll all compare!

The Paradox of Technology

- Technology offers the potential to make life **easier and more enjoyable**

- At the same time, added complexities arise to **increase our difficulties and frustrations**

The paradox of technology should never be used as an excuse for poor design

Principles of good design can make complexity manageable!

Notes

- The key point is that the principles of design for **physical** products are directly applicable to **digital** designs as well.

Digital Designs

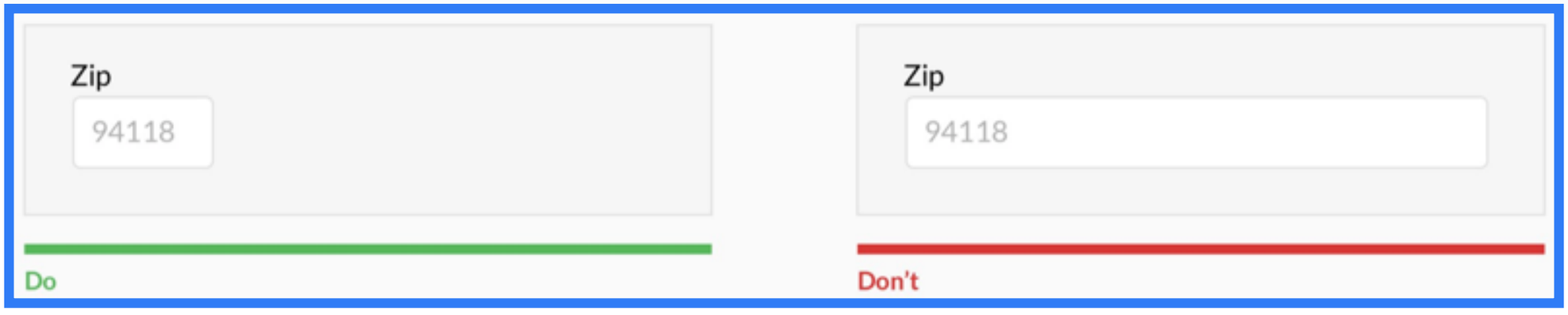
What do you envision your role in ICPC being? *

300 words max.

Your answer

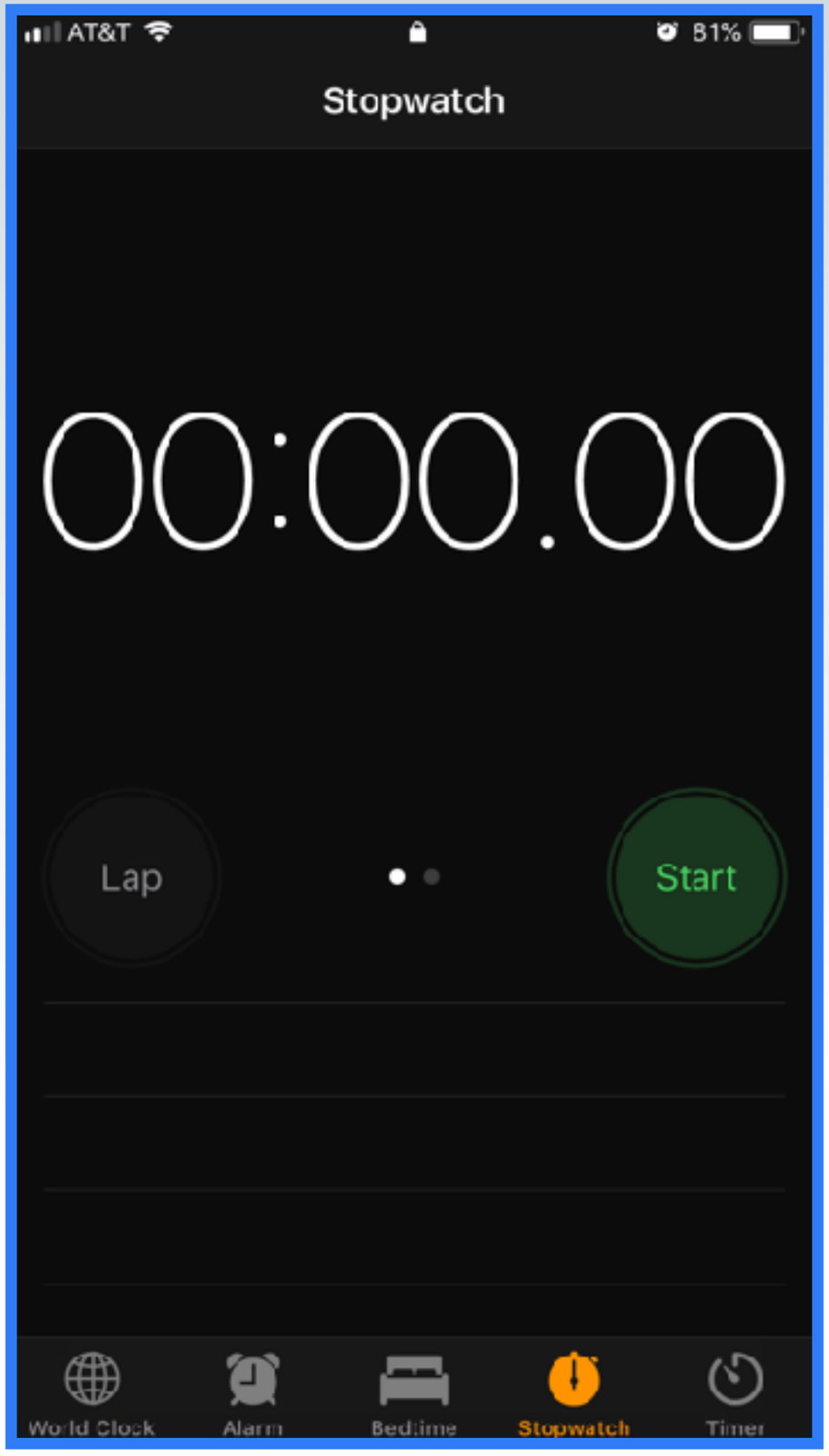
If you could invent a programming language, what would it be called? *

Your answer



Notes on Form

- **Affordances** - The length of the answer line/field *affords* the length of the user input

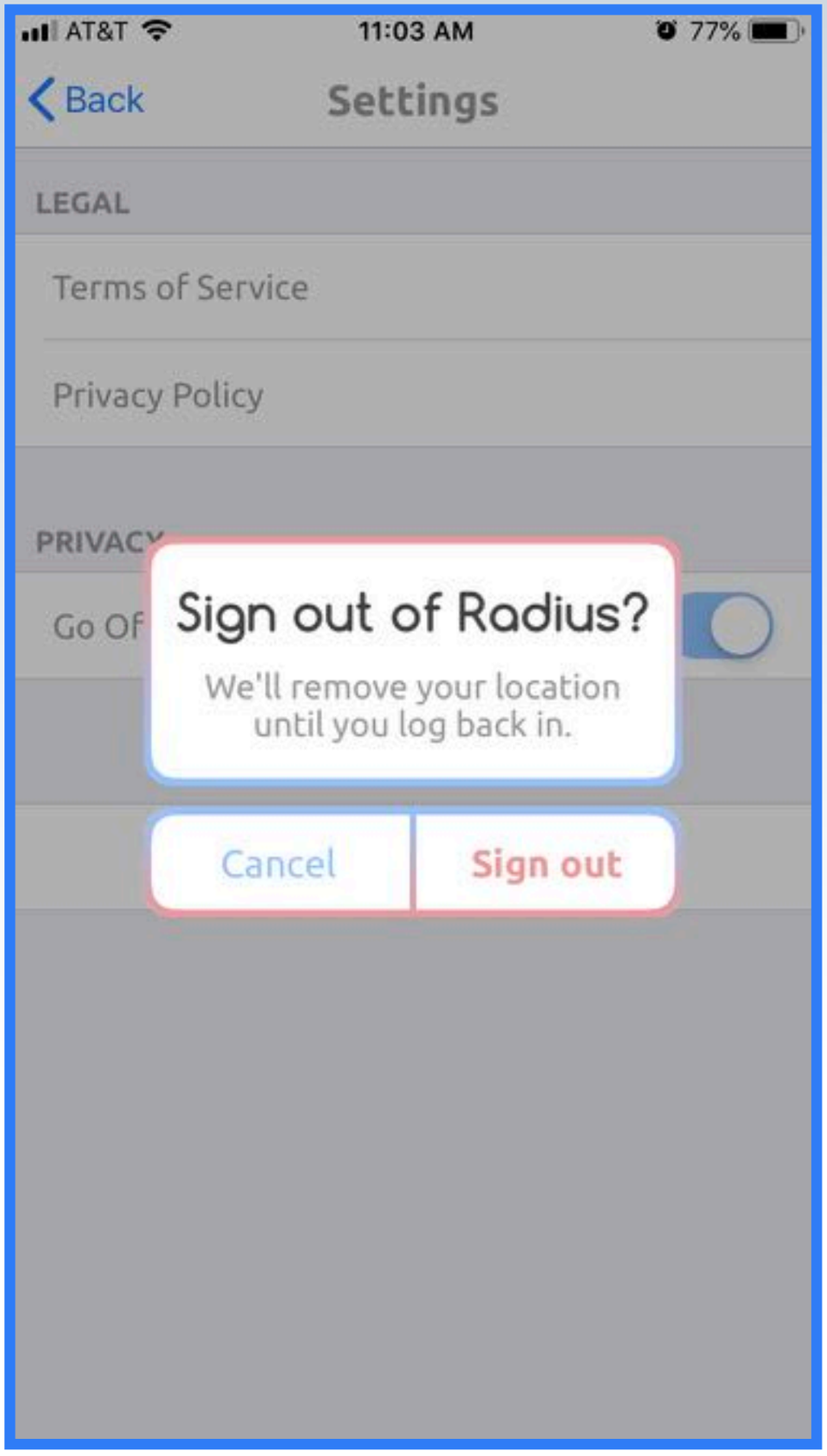

AT&T
81%
Stopwatch
00:00.00
Lap
Start
World Clock
Alarm
Bedtime
Stopwatch
Timer

Notes on Timer

- **Visibility** - The majority of the background is a **dark** color and the only thing to be interacted with (the “Start” button) is **green**

- **Mapping** - There is a cultural association between “green” and “go”, which is why the “Start" button is green

- **Visibility** - The two dots in the middle of the screen indicate that area can be swiped

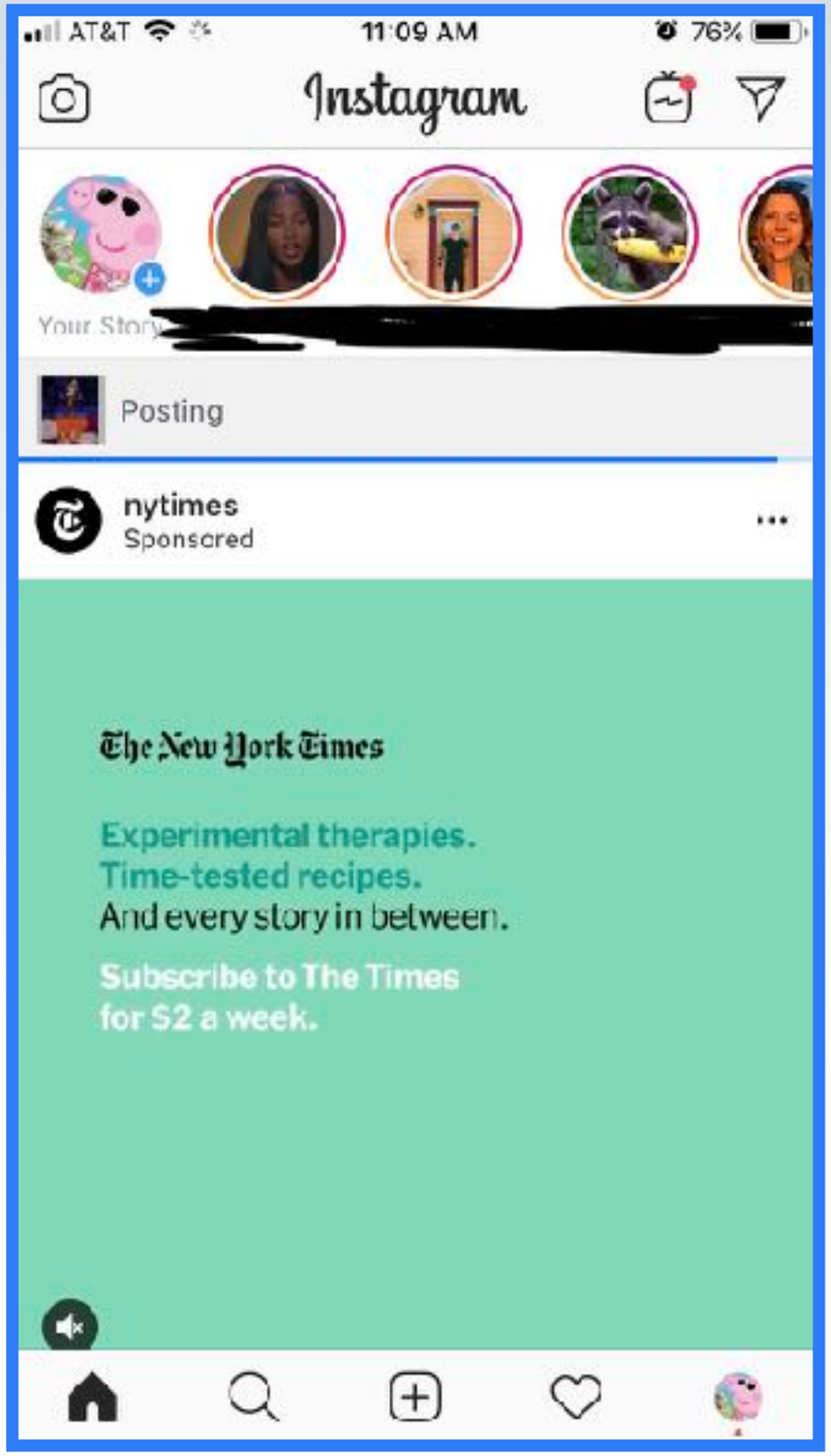

AT&T
11:03 AM
77%
Back
Settings
LEGAL
Terms of Service
Privacy Policy
PRIVACY
Go Of
Sign out of Radius?
We'll remove your location until you log back in.
Cancel
Sign out

Notes on Sign Out

- **Error Handling** - Give the user a confirmation box in case they tapped the “Sign out” button accidentally

- **Visibility** - When presenting a notification, the background is dimmed to make the notification stand out more

- **Mapping** - The “Sign out” button is red and bolded to make it clear to the user that the action is destructive


AT&T
11:09 AM
76%
Instagram
Your Story
Posting
nytimes
Sponsored
The New York Times
Experimental therapies.
Time-tested recipes.
And every story in between.
Subscribe to The Times
for $2 a week.


AT&T
11:10 AM
76%
Instagram
Your Story
"SOH CAH TOA!"

Notes on Sign Out

- **Feedback** - After posting a photo, the image that was just uploaded by the user is visible on their feed

- Design is not just **static** (i.e. what color is this button, where should it go).

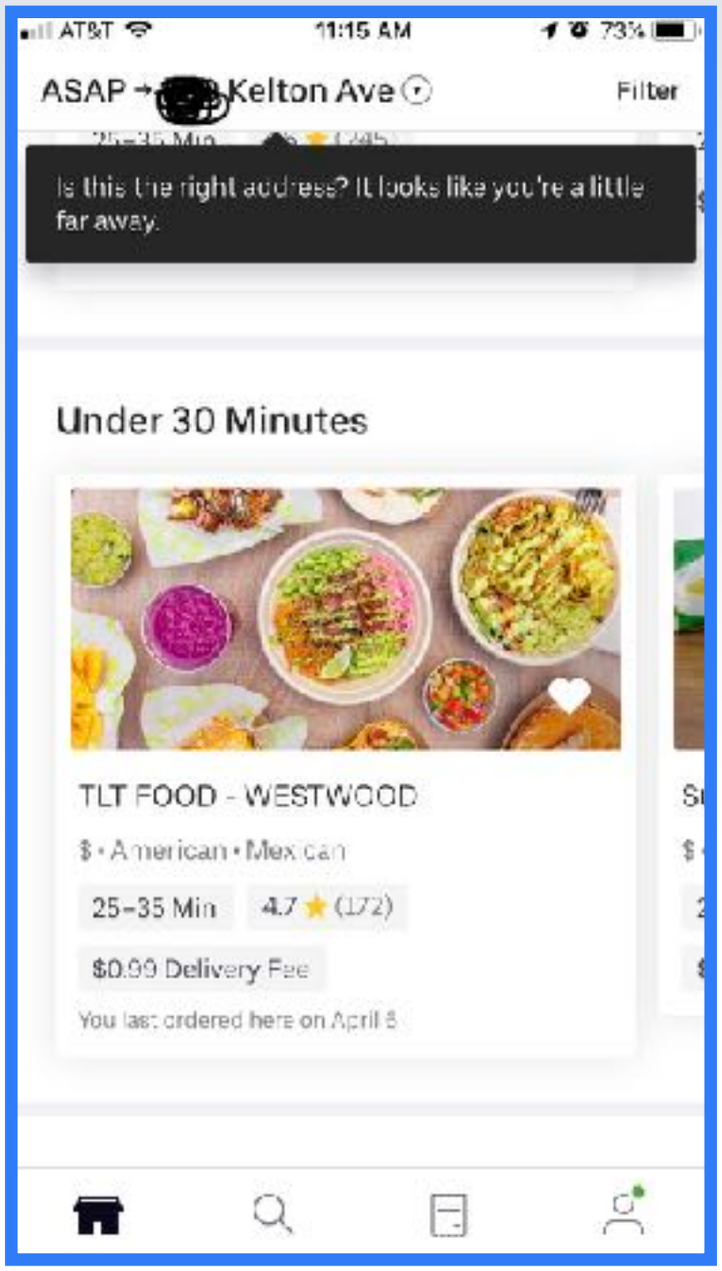
- It is important that **processes** (such as the entire photo uploading process) are designed well too

Discussion Post

Write a few sentences analyzing this product's design.

- What is the purpose of the product? Is its design conducive for that purpose?
- How could the user misuse the product? Does the design take this into account?
- What do you like about the design? What does it do well?
- How could it be improved?

Uber Eats


AT&T
11:15 AM
73%
ASAP
Kelton Ave
Filter
Is this the right address? It looks like you're a little far away.
Under 30 Minutes
TLT FOOD - WESTWOOD
$ • American • Mexican
25–35 Min
4.7 (172)
$0.99 Delivery Fee
You last ordered here on April 5

Reading for Next Week

- Ken Segall - *Insanely Simple: The Obsession That Drives Apple's Success* (pg. 8-9, 99-101)

- Scott Robertson - *Human-Centered Design and the Missile False Alarm in Hawaii* (~4 pages)

- Download the **UCLA Mobile App** and try it out!