Week 8:
Mental Models

Nicole Meng-Schneider

Recap Mental Models

There are three models of the system

- **User Model** - How the user thinks the product works. The mental model.
- **UI Model** - How the product is presented to the user in the user interface.
- **Implementation Model** - How the product is actually implemented.

| User Model | ⟷ | UI Model | ⟷ | Implemented Model |

"A mental model is what the user believes about the system at hand."

– Jacob Nielson

Mental Models (User Models)

- Representation of systems and environments
- Based on experiences
- People understand and interact with systems by comparing the outcomes of their mental models with the real-world systems
  - When outcomes match, the model is seen as accurate
  - When outcomes do not match, the model is adjusted
- Two types of mental models
  - System Models – Mental models of how systems work
  - Interaction models – Models of how people interact with systems

Building a mental model

Typical process for children:

Ex: How hard should I hit the egg so it cracks, but doesn't make a mess?

Photo by Hannah Tasker on Unsplash

Building a mental model

Also for adults:

Ex: How long after the cars get red till the pedestrian crossing shows green?

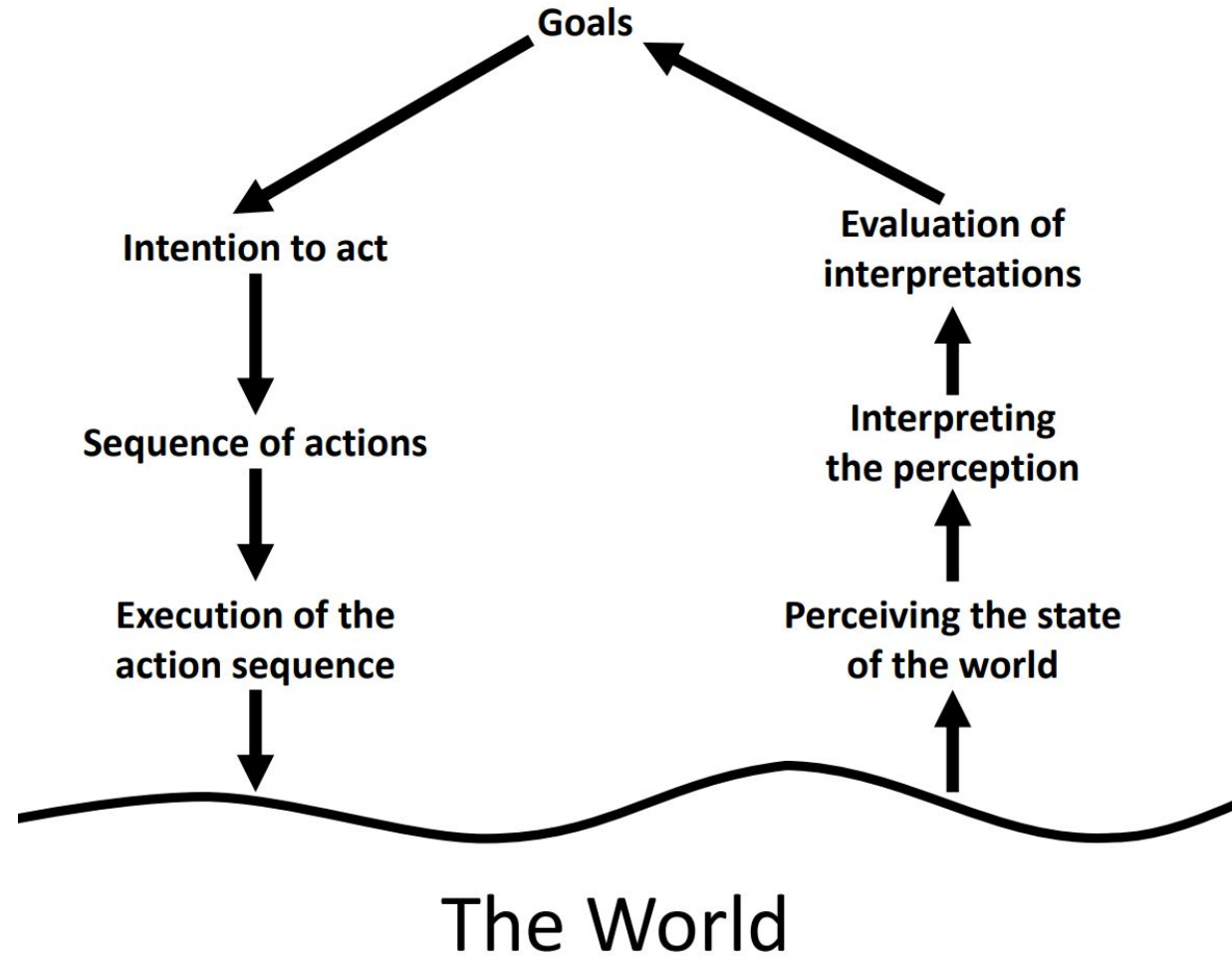Photo by Alex Padurariu on Unsplash

Building a mental model

Goals

Intention to act

Sequence of actions

Execution of the action sequence

Evaluation of interpretations

Interpreting the perception

Perceiving the state of the world

The World

"A user interface is well designed when the program behaves just as the user thought it would."

– Joel Spolsky

"A user interface is well designed when the program behaves just as the user thought it would."

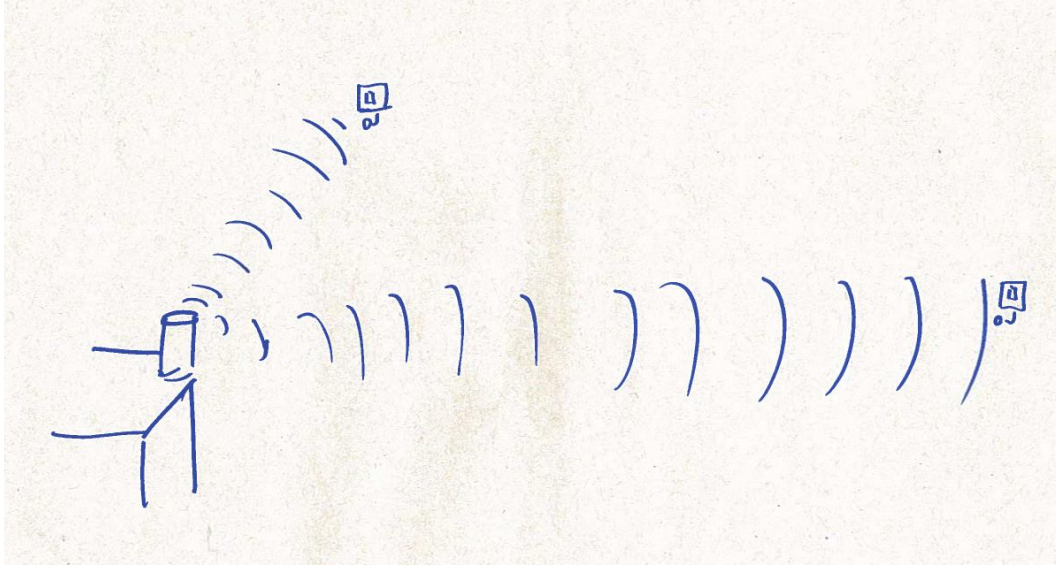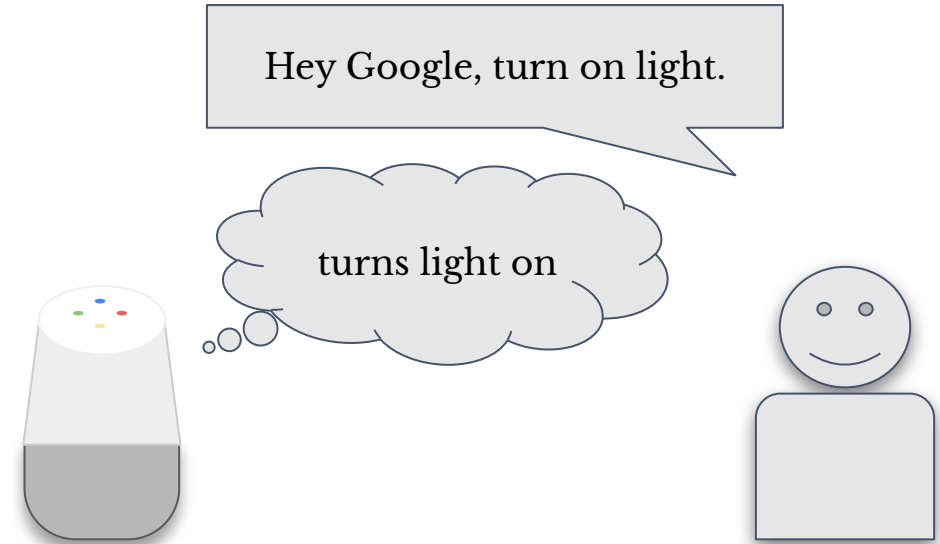– Joel Spolsky

Intuitive
Interaction

User Model – Smart Light

Hey Google, turn on light.

turns light on

System Model: Smart speaker communicated with mains

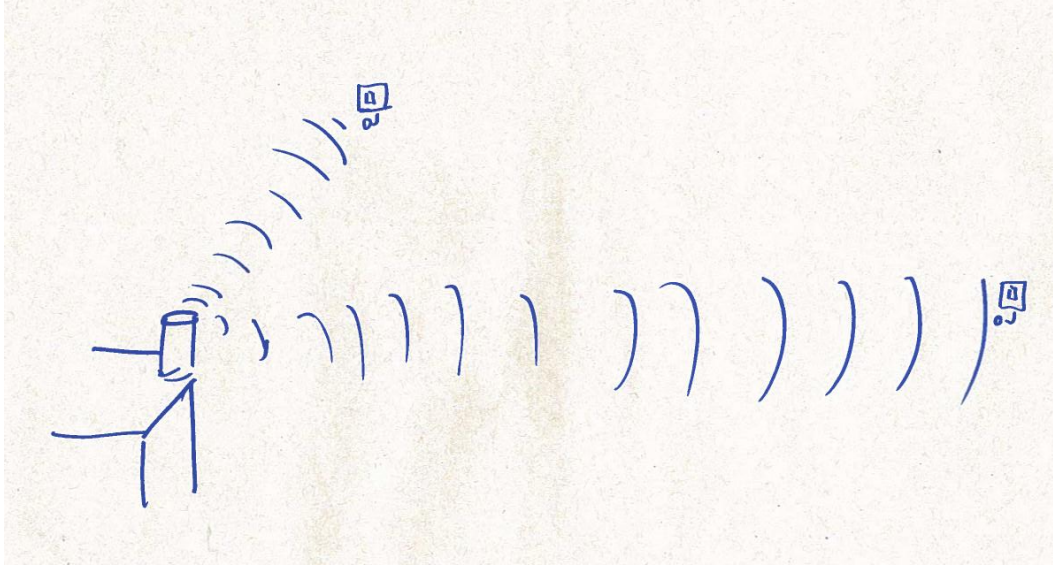**Interaction Model:** We say the words, it contacts the light and light turns on

* Nicole Meng, Dilara Keküllüoğlu, and Kami Vaniea. 2021. Owning and Sharing: Privacy Perceptions of Smart Speaker Users. Proc. ACM Hum.-Comput. Interact. 5, CSCW1, Article 45 (April 2021), 29 pages. https://doi.org/10.1145/3449119

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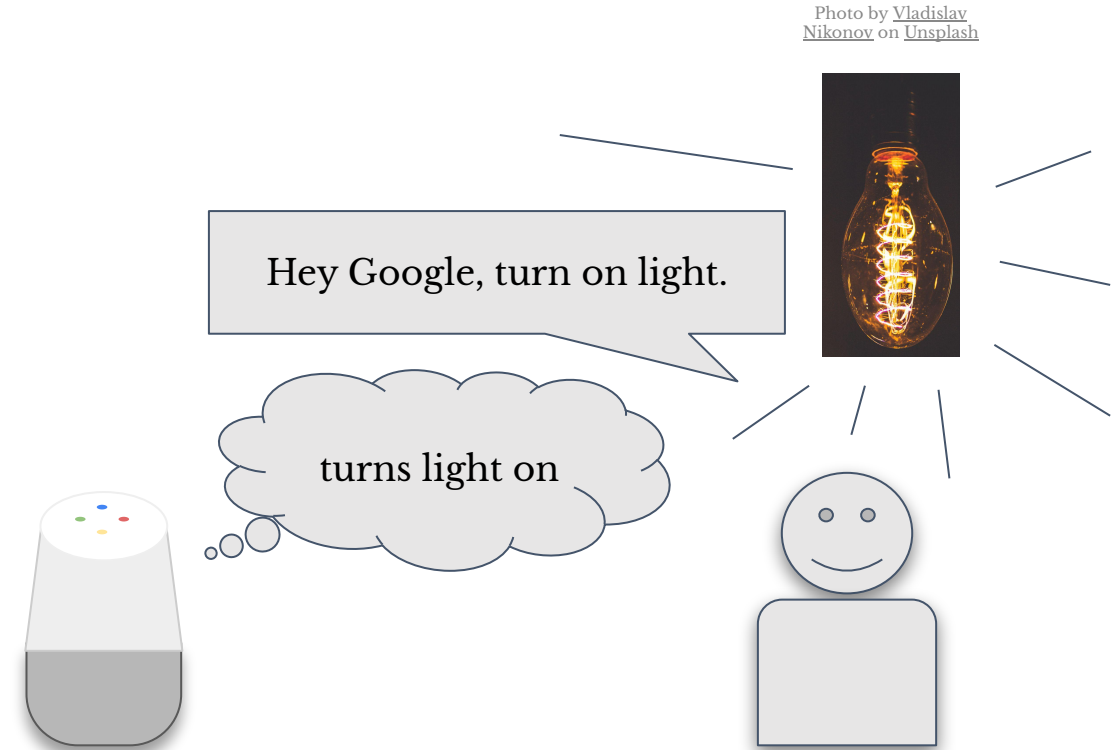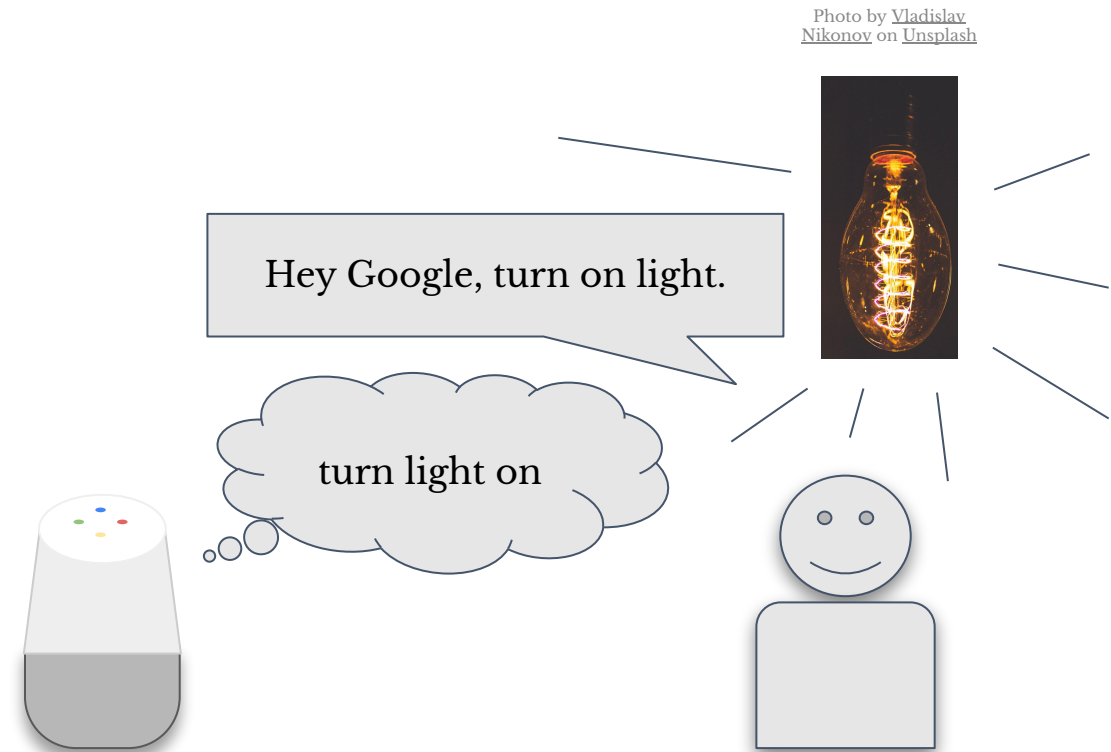* Nicole Meng, Dilara Keküllüoğlu, and Kami Vaniea. 2021. Owning and Sharing: Privacy Perceptions of Smart Speaker Users. Proc. ACM Hum.-Comput. Interact. 5, CSCW1, Article 45 (April 2021), 29 pages. https://doi.org/10.1145/3449119

UI Model – Smart Light

Two ways to interact:

Via Smartphone App

Hey Google, turn on light.

turn light on

Via Voice Interaction

image from https://hueblog.com/2024/03/12/not-a-mistake-but-intentional-cleaned-up-home-page-in-the-hue-app/
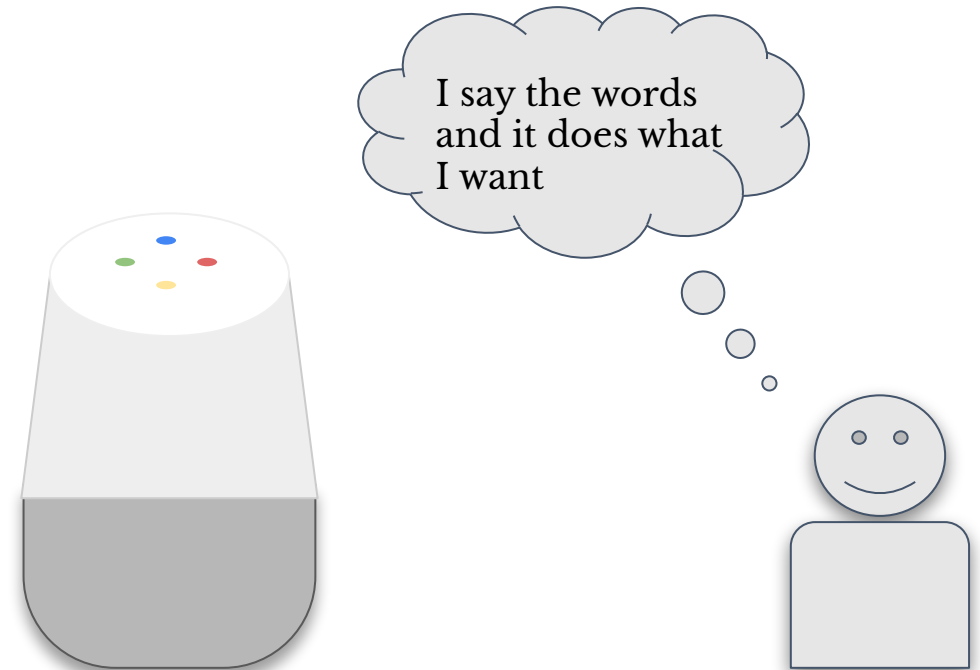
UI Model – Smart Light

Two ways of interactions presented to user:

Via Smartphone App

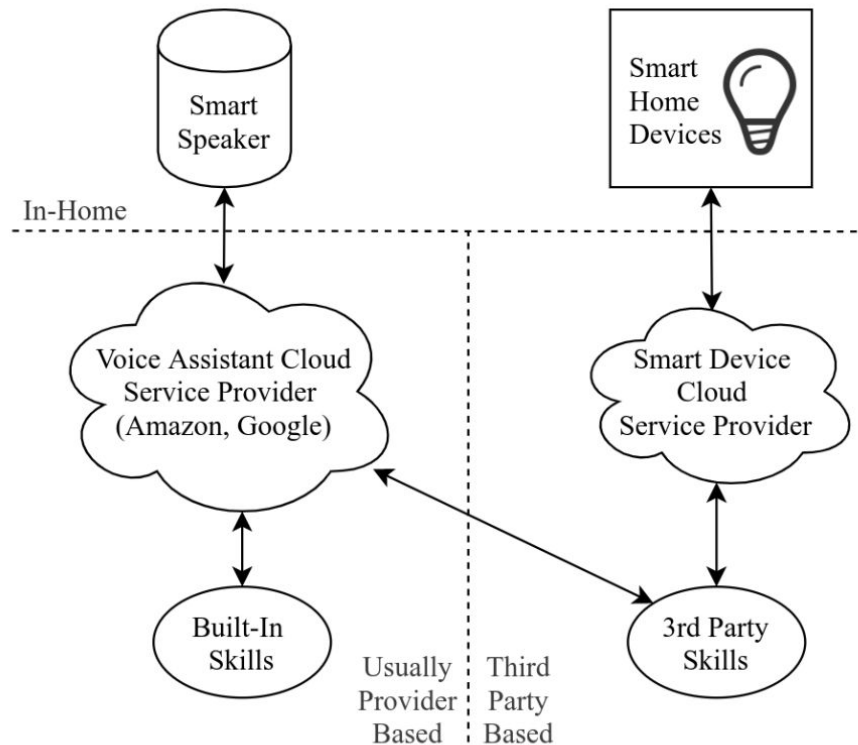I say the words and it does what I want

Via Voice Interaction

Implemented   Model – Smart Light

How is it actually implemented:

Graphic from Meng et al.*

Hey Google, turn on light.

1. listen for wake word
2. parse request
3. send request to 3rd party provider
4. receive confirmation
5. view request as complete

Input and output match user expectations

* Nicole Meng, Dilara Keküllüoğlu, and Kami Vaniea. 2021. Owning and Sharing: Privacy Perceptions of Smart Speaker Users. Proc. ACM Hum.-Comput. Interact. 5, CSCW1, Article 45 (April 2021), 29 pages. https://doi.org/10.1145/3449119

Activity

Influence of mental model on user experience

Pair up and consider a smart light bulb.
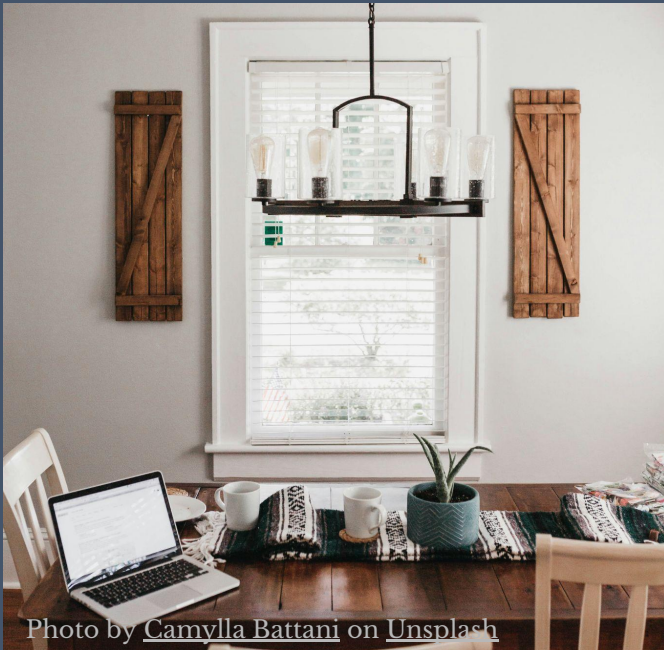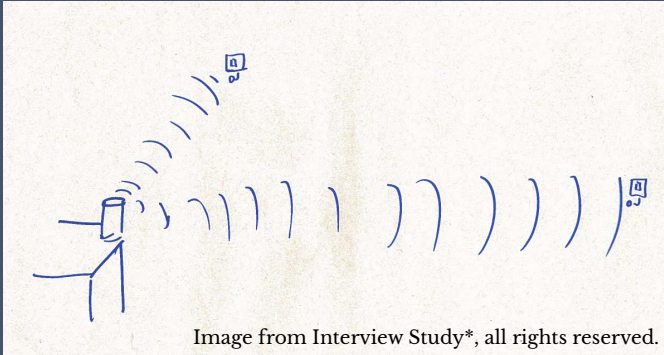
1. Assume users have the just described mental model. How could it influence their
   a. interaction?
   b. ability to install the device?
   c. ability to recognise and recover from errors?
   d. awareness of risks?
   e. general feeling about the system?(10min)

2. Share with the class. (5min)

3. Discuss how an improved understanding of how the bulb works will help with the aspects above. (10min)

4. Share with the class. (5min)

Any questions?

Lecture Structure

Nicole:

1. Recap Mental models (15 min)
2. Examples with mental models (25 min)
   a. activity on Example 1
3. think pair share on Example 2 (10min)
4.

Think Pair Share

Engage with your own mental model

Pair up again and look at xyz.

How do you think this works?

Think for 1 min

Share with neighbour for 2 min

Share with class for 3 min

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