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Conceptual Models

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Your interpretation of what the system is doing is different if you:

(a) Think that turning it far enough turns it off, vs.

(b) Think that you can press (click) the knob to turn it off.

Human-Computer Interaction

CPSC 481 - Spring 2019

Lessons from The Design of Everyday Things IV

Adapted from Tony Tang

Lessons from the Design of Everyday Things

- We've seen that a lot of things are designed poorly, be it computer interface, or physical objects
- Formally, there is a vocabulary around these concepts that we have discussed
    - Perceived affordances
    - Visible contraints
    - Causality
    - Transfer effects
    - Idioms & population stereotypes
    - Conceptual models
    - **Individual differences**

Learning Objectives

- By the end of this lecture, you should be able to:
    - Discuss the role of individual differences in design; describe a good “rule of thumb”, and the consequences of that rule of thumb
    - Identify and discuss factors that make design difficult that are unrelated to design itself

Who should you design for?

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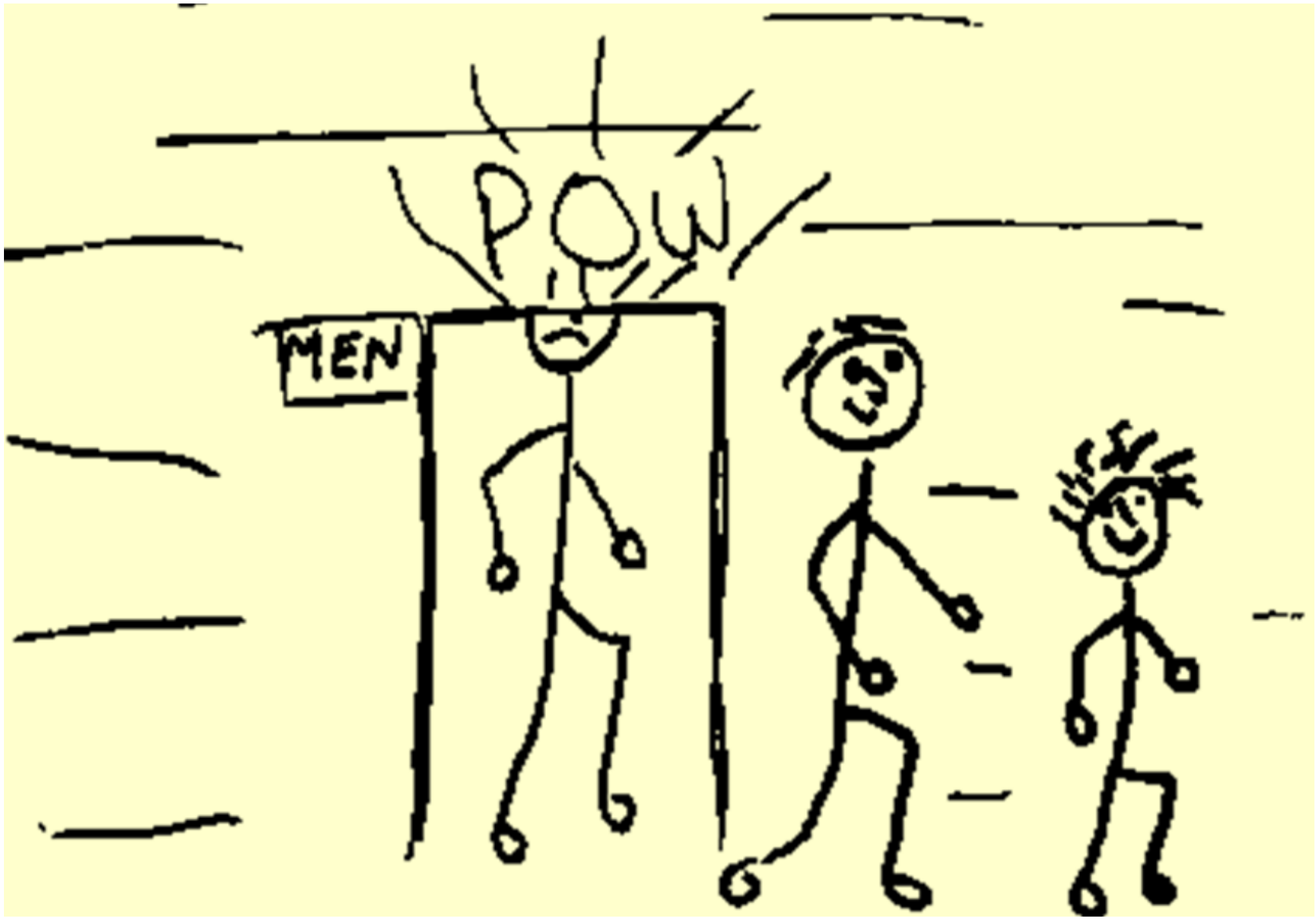

Who should you design for?

- People are different
- It is rarely possible to accommodate everyone perfectly

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  - Standard ceiling height: 8’
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- People are different
- It is rarely possible to accommodate everyone perfectly
- Design is often a compromise
  - Standard ceiling height: 8’
  - But the tallest man: 8’ 11”!
- People vary as much in how **they think and perceive things** as much as they vary physically!

Who should you design for?

- Question: **Design for the average?**

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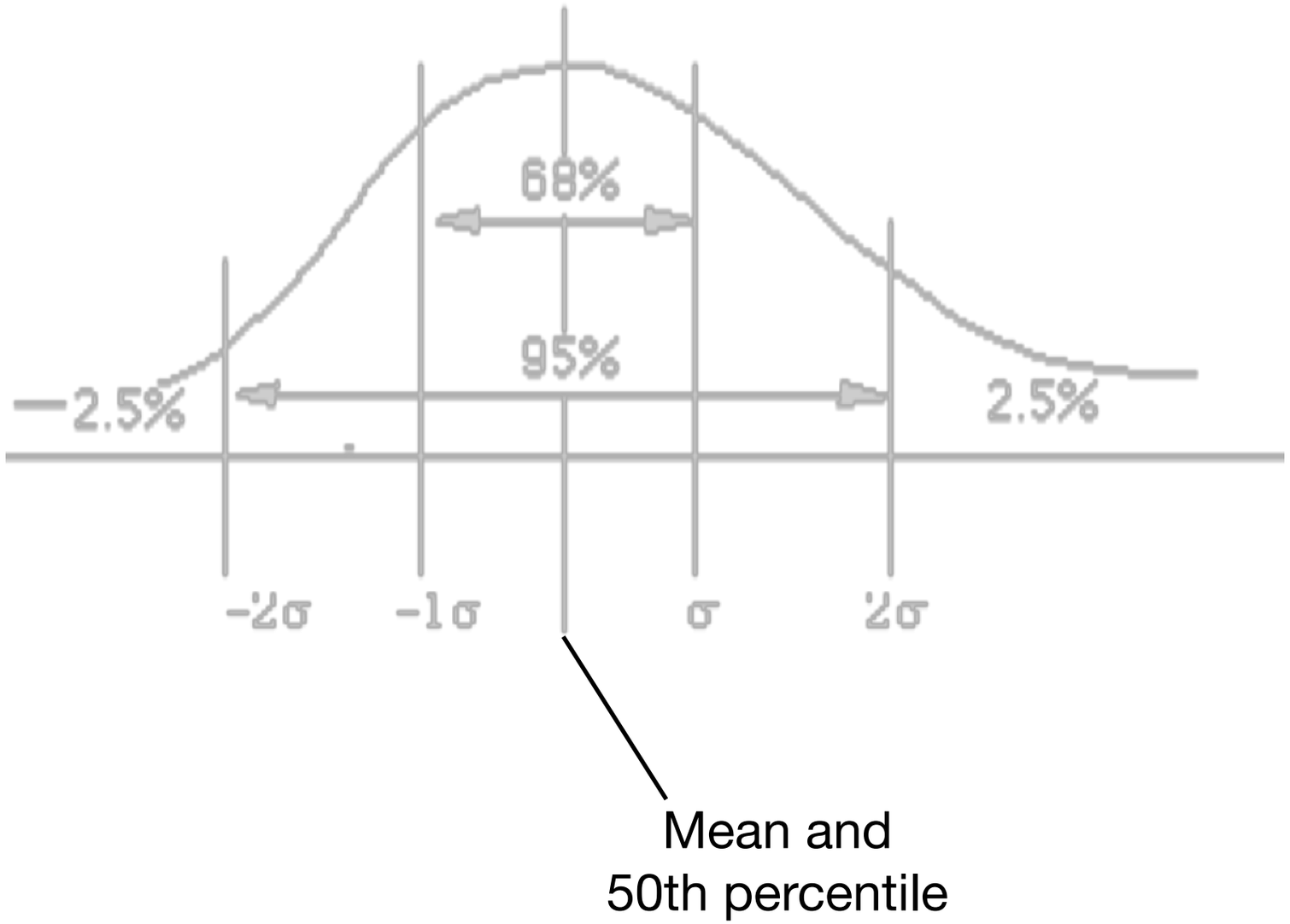
    - Often considered a mistake: you may exclude half the audience

Who should you design for?

- Question: **Design for the average?**
    - Often considered a mistake: you may exclude half the audience
- **Rule of thumb:**
    - Design for 95% of audience
    - Note: 5% of population may be **seriously** compromised
- Examples:
    - Cars and height: headrest, seat size
    - Computers and visibility: font size, line thickness, colour for colour-blind people?

Gaussian (“Normal”) Distribution



IKEA Instructions

- What 95% means is **up to you**:
  - 95% of local population?
  - 95% of world population?
- IKEA instructions
  - “universally” understandable

You *vs.* 95%

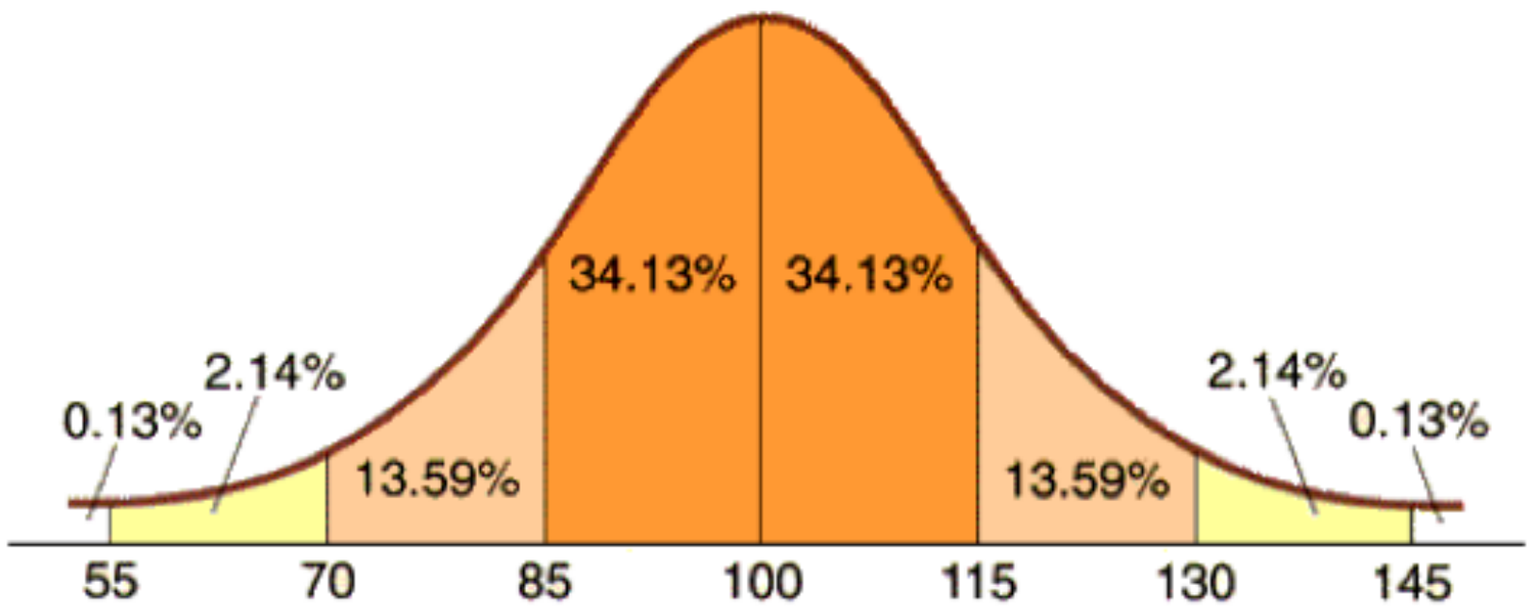
- You do not necessarily represent a good average user of equipment or systems you design

- Do not expect others to think and behave as you do, or as you might like them to

- People vary in thought and behaviour just as they do physically
  - Life experiences are different
  - Cultural expectations are different

IQ - Intelligence Quotient

- WW1 US Troops: notion of IQ and mass testing
  - Idea was to separate groups for training
  - Designed as bell curve, with average being 100



IQ - Intelligence Quotient

- Assumptions:
  - Innate
  - Constant
  - Correlated with performance on everything

- How was it designed?

IQ - Intelligence Quotient

- Assumptions:
  - Innate
  - Constant
  - Correlated with performance on everything

- How as it designed?
  - Primarily with white, english-speaking US citizens
  - How generalisable was this test?

IQ - Intelligence Quotient

1. Bull Durham is the name of a
A. chewing gum
B. aluminum ware
C. tobacco
D. clothing

2. Seven-up is played with
A. rackets
B. cards
C. pins
D. dice

3. The Merino is a kind of
A. horse
B. sheep
C. goat
D. cow

4. The most prominent industry of Minneapolis is
A. flour
B. packing
C. automobiles
D. brewing

5. Garnets are usually
A. yellow
B. blue
C. green
D. red

6. The Orpington is a kind of
A. fowl
B. horse
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1 (C), 2 (B), 3 (B), 4 (A), 5 (D), 6 (A)

IQ - Intelligence Quotient

- Early tests were clearly bound to the (then) current culture - white, urban, middle-class culture
  - African-Americans tested poorly
  - non-English speakers tested poorly
  - Illiterate tested poorly
- Since then, early assumptions about IQ have been questioned:
  - General ‘g’ factor intelligence?
  - Mental age?
  - Heritability?
  - IQ fixed?
- **Point:** be aware that you are often making cultural assumptions in your designs.

Designing for experience & style of use?

- **Novice**
    - Walk up and use systems
    - Interface affords restricted set of tasks
    - Introductory tutorials to more complex uses
- **Casual**
    - Standard idioms
    - Recognition (visual affordances) over recall
    - Reference guides
    - Interface affords basic track structure
- **Intermediate**
    - Advanced idioms
    - Complex controls
    - Reminders and tips
    - Interface affords advanced tasks
- **Expert**

Most kiosk + internet systems

Most shrink-wrapped systems

Custom software

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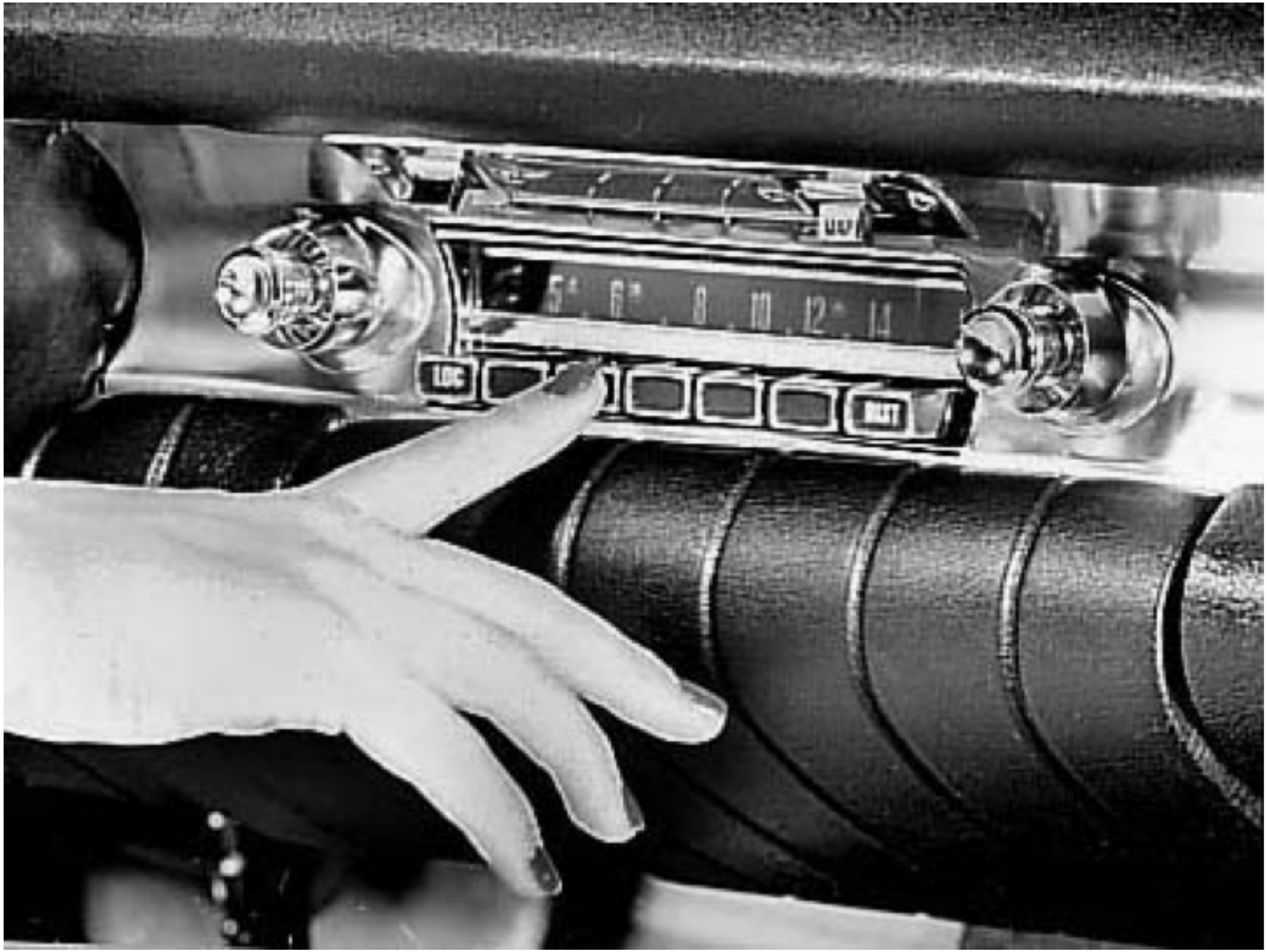

5 6 8 10 12 14

Why design is hard

- Over the last century
    - **The number of things to control has increased dramatically**
        - Car radio/CD player/DVD player/ MP3 player/ iPod connector or dock/AUX input…: AM, FM1, FM2, 5 pre-sets, station selection, balance, fewer, bass, treble, distance, mono/stereo, dolby, tape eject, fast forward and reverse etc (while driving at night!)
    - Display is increasingly artificial
        - Red lights in car indicate problems *vs*. flames for fire
    - Feedback more complex, subtle, and less natural
        - On your phone(?) is your alarm on and set correctly?
    - Errors increasing serious and/or costly
        - Airplane crashes, losing days of work…

Why design is hard

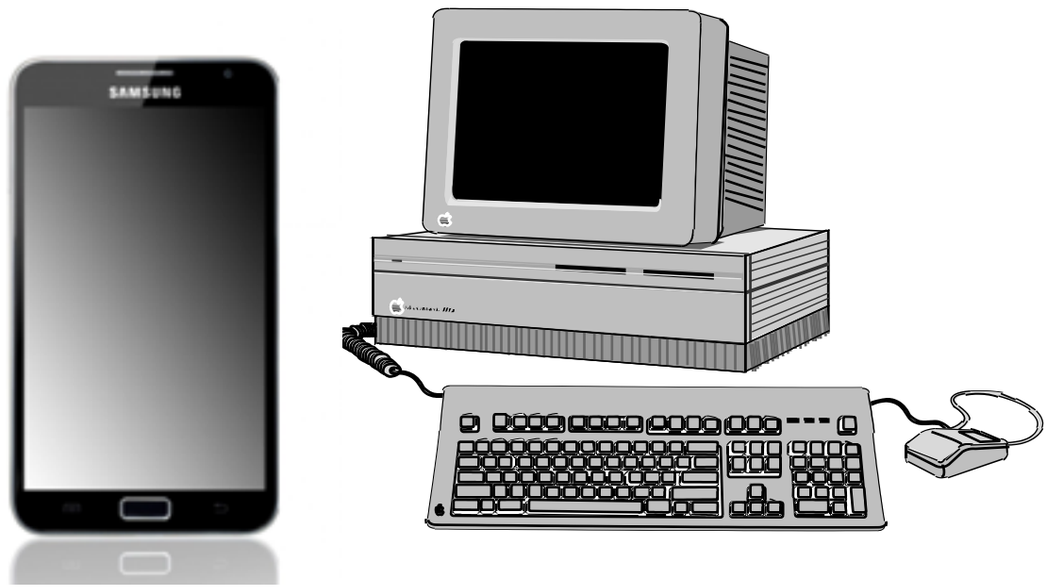
- **Marketplace pressures**
    - Adding functionality (complexity) now easy and cheap computers
    - Adding controls/feedback expensive
        - Physical buttons on calculator, microwave oven
        - Widgets consume screen real estate
- Design usually requires several iterations before success
    - Product pulled if not immediately successful

Why design is hard

- **People consider cost and appearance over design**
  - Bad design is not always visible
  - People tend to blame themselves when errors occur
    - “I was never very good with machines.”
    - “I knew I should have read the manual!”
    - “Look at what I did! I feel stupid!”

Human factors in computing systems

- What do these do?



- Computers far more complex to control than everyday devices
- General purpose computer contains no natural conceptual model
- Completely up to the designer to craft a conceptual model

Lessons from the Design of Everyday Things

- Many human errors are actually errors in design
    - don’t blame the user
- Designers help by providing a good conceptual model
    - Affordances
    - Causality
    - Constraints
    - Mapping
    - Positive transfer
    - Population stereotypes and idioms
- Design to accommodate individual differences
    - Decide on the range of users
- **Design is difficult for reasons that go beyond design**

Acknowledgements

- Tony Tang
- Lora Oehlberg
- Ehud Sharlin
- Frank Maurer
- Saul Greenberg

Course information

- Website
  - GitHub Pages https://silvadasilva.github.io/CPSC481-2019S/
- Communications
  - Slack https://cpsc481-2019s.slack.com/
- Readings and Slides
  - Posted online at the main website