Who Designs for Whom?

Michael Paul
April 12, 2016

University of Colorado
CMCI 1020: Concepts and Creativity

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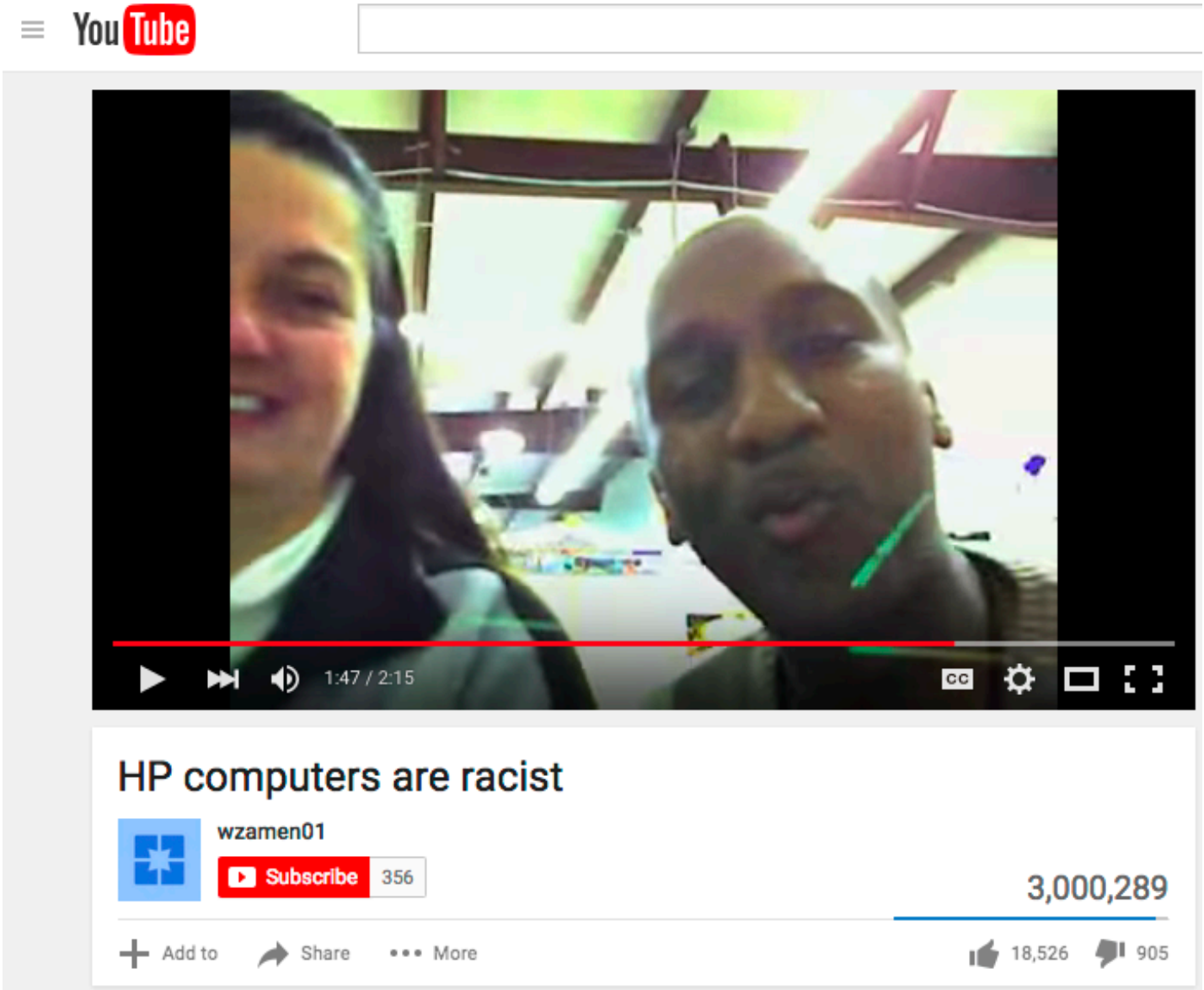
Important questions for Information Technology design

- Who are the **users**?

- Who are the **designers**?

BETTER OFF TED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HP computers are racist
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Questions to think about

- How can we ensure technology is inclusive?
  - How do we design for diverse users?

- What does it mean for a computer to be racist?
  - Can algorithms discriminate?

Important questions for Information Technology design

- Who are the **users**?

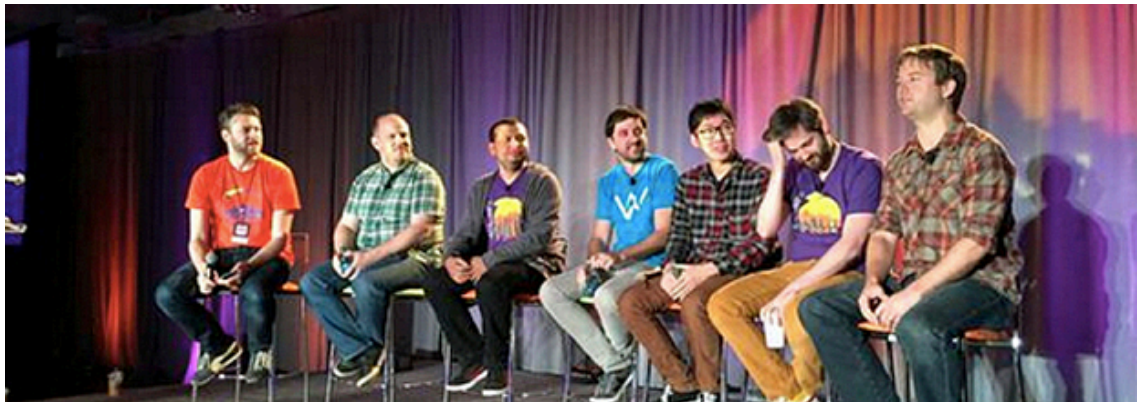
- Who are the **designers**?

Important questions for Information Technology design

- Who are the **users**?
  - Potentially, everyone
- Who are the **designers**?
  - Generally: the tech industry

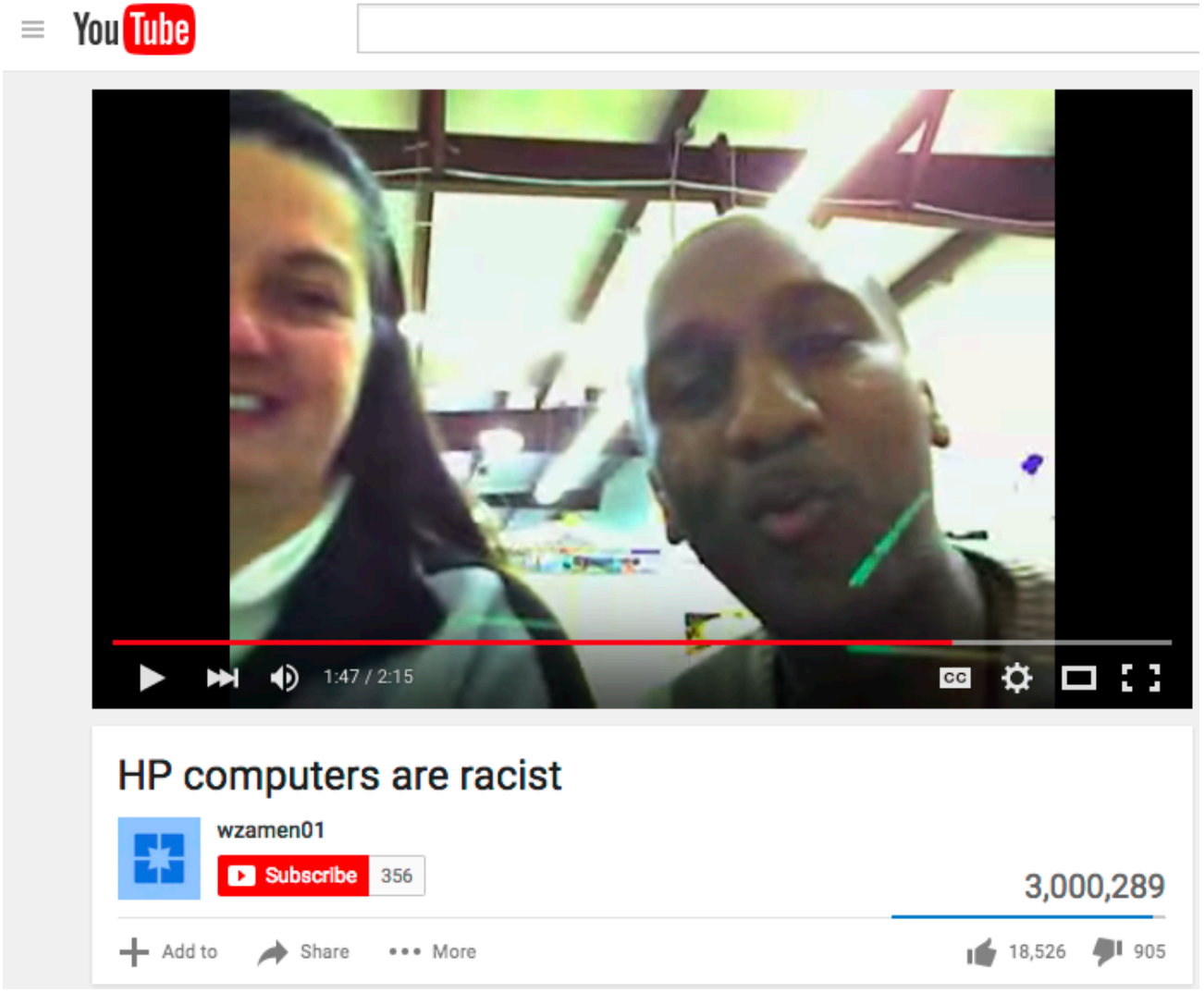
Important questions for Information Technology design

- Who are the **users**?
  - Potentially, everyone
- Who are the **designers**?
  - Generally: the tech industry
  - On average: male, under 40, white, Californian, highly educated

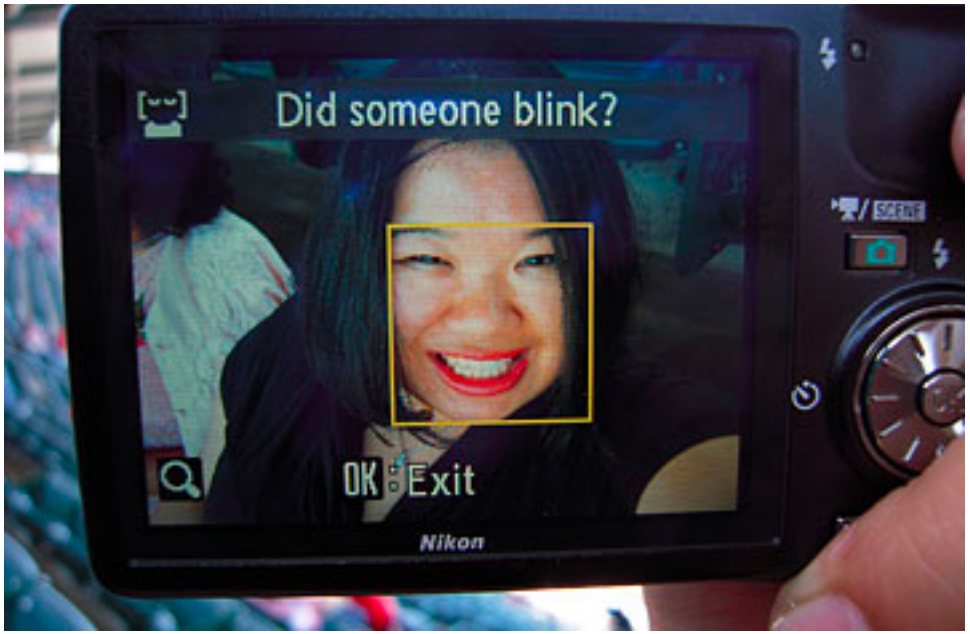


What happens when **users** look and think differently from the **designers**?

Face Recognition



Face Recognition



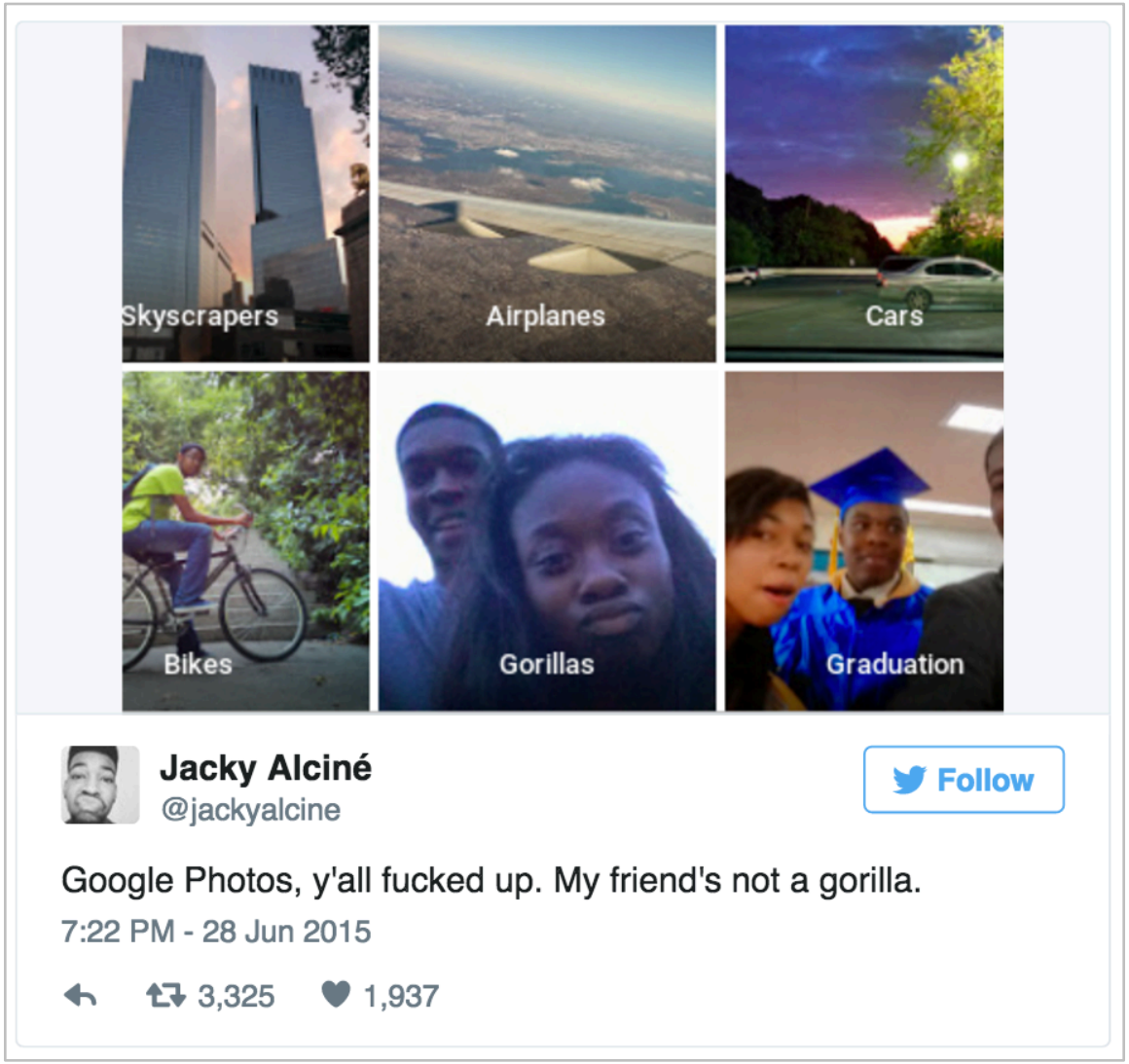
We got our Mom a new Nikon S630 digital camera for Mother's Day and I was playing with it during the Angels game we were at on Sunday.

As I was taking pictures of my family, it kept asking "Did someone blink?" even though our eyes were always open.

Sheesh! RACIST! 😛

from: Joz Wang

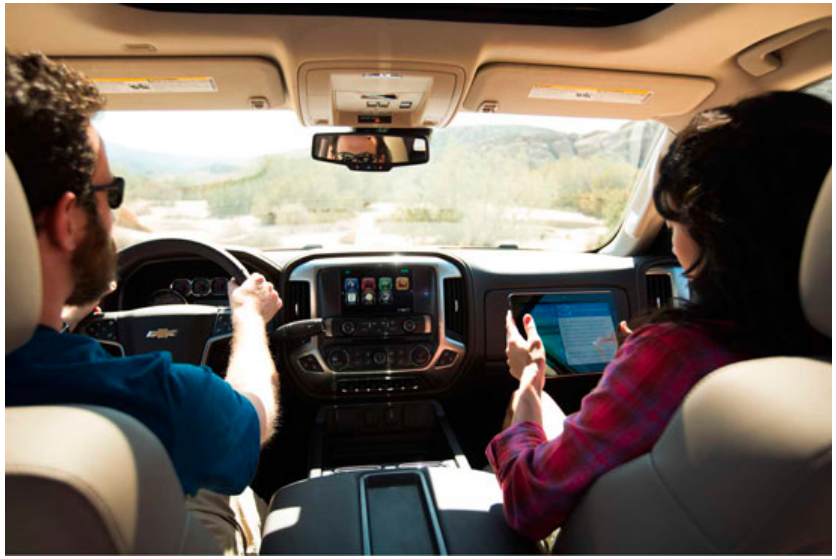
Face Recognition



Voice Recognition

Some voice recognition systems don't work well for women, or people with accents

Example: **OnStar**
Voice-activated phone system for cars

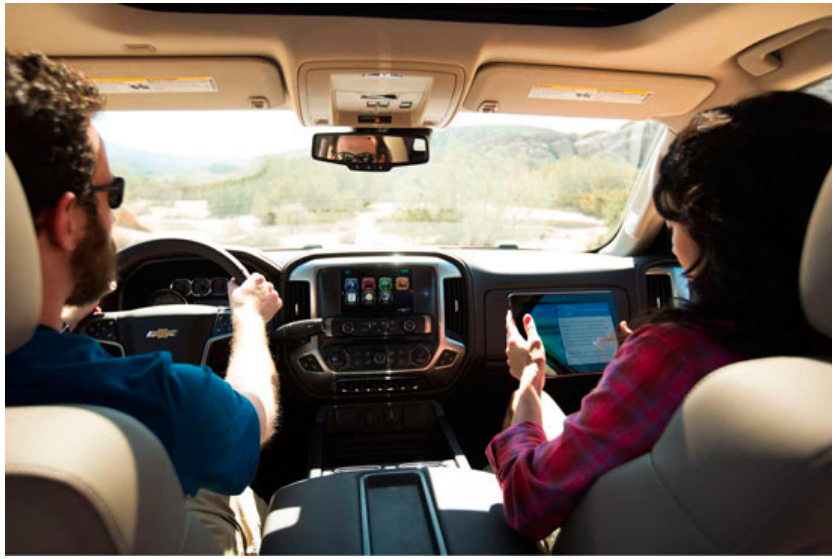


"When evaluating the technology, husbands and wives are often divided." Source: http://www.autoblog.com/2011/05/31/women-voice-command-systems/

Voice Recognition

OnStar optimized their system for different groups over time:

1. Men
2. Women
3. Midwest accents
4. Southern accents
5. New England accents



and there's still more to do… (e.g., foreign accents)

Wearables/Devices

One big problem for lefties: In landscape mode, the dock is far from the dominant thumb.

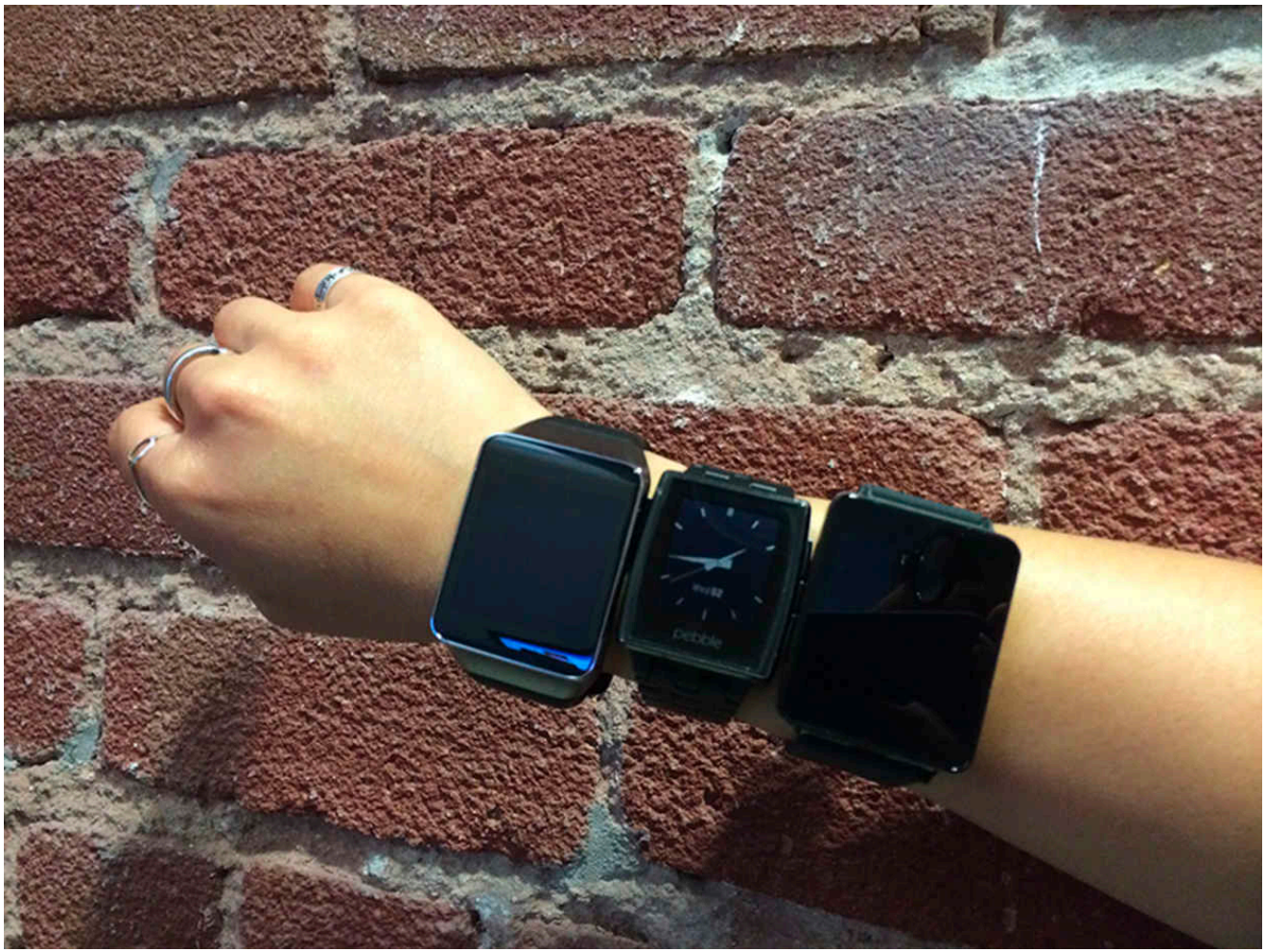
Source: Mic

Wearables/Devices

Japanese company creates thumb extension for new iPhone owners with small hands

Wearables/Devices

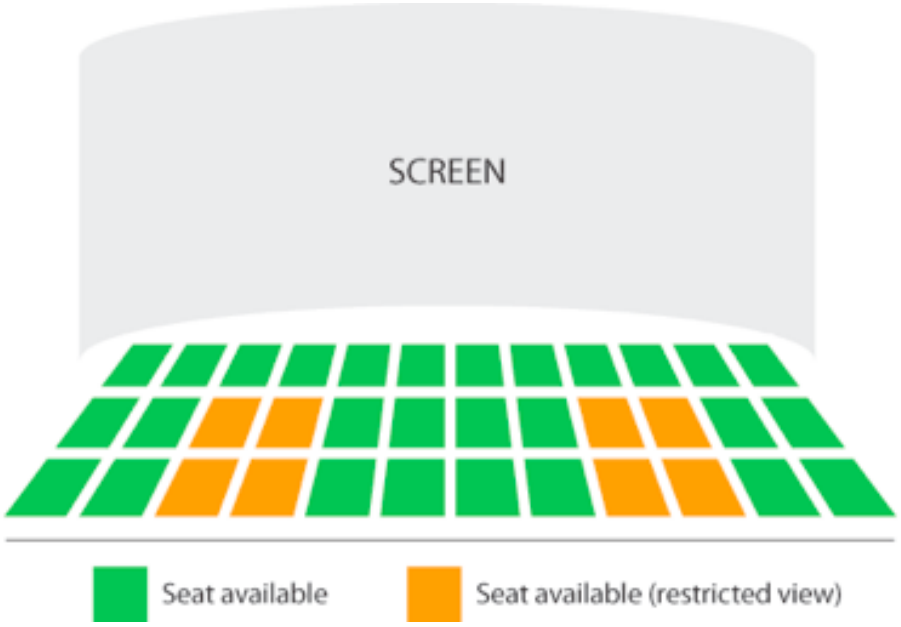
Wearables/Devices



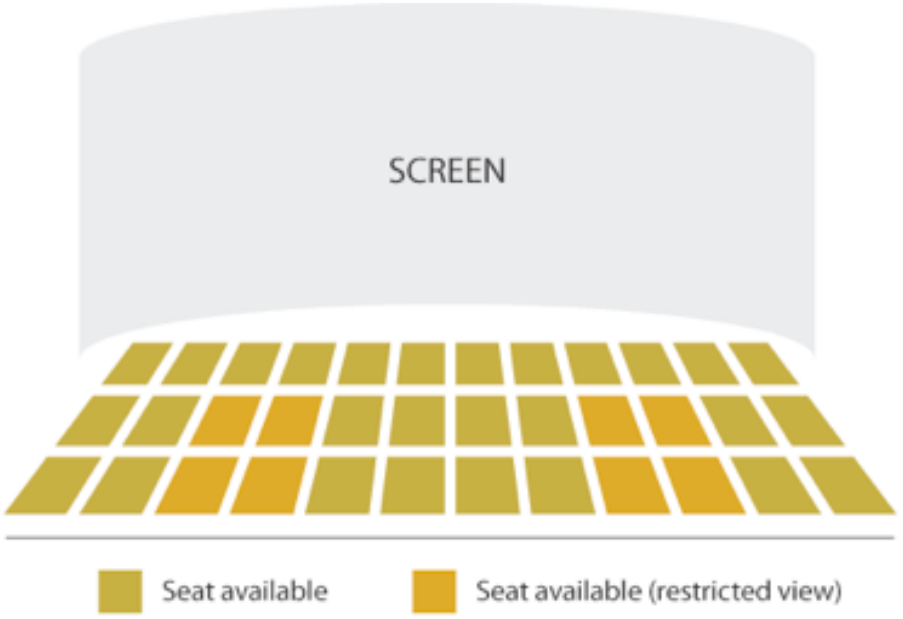
Source: http://smartwatches.org/learn/finding-smartwatch-as-a-woman/

Accessibility

Full color:



With red-green color blindness:



Source: http://www.digitalartsonline.co.uk/news/graphic-design/how-design-for-colour-blind/

Accessibility

Hillary Clinton @HillaryClinton · Aug 30

"We are smart enough,
we are compassionate enough,
to figure out how to balance
the legitimate Second Amendment
rights with preventive measures,
and control measures, so that...
we will not see more deaths."

Hillary Clinton
August 27, 2015

904 1.6K

Jeffrey P. Bigham @jeffbigham · Aug 30
@HillaryClinton another tweet missing alt text. blind users can't read these posts. doesn't speak highly for your respect for accessibility

LIKES
3

10:26 AM - 30 Aug 2015 · Details

Name Validation

Name Validation

“When Jennifer Null tries to buy a plane ticket, she gets an error message on most websites. The site will say she has left the surname field blank and ask her to try again.”

Name Validation

Some systems will reject other types of names

- Too long
  - Keihanaikukauakahihulihe'ekahaunaele
- Special characters
  - Hyphenated last names (e.g., Jordan Boyd-Graber)
- Non-English alphabet

Name Validation

I Can Text You A Pile of Poo, But I Can't Write My Name

We can't ignore the composition of the Unicode Consortium's members, directors, and officers -- the people who define the everyday writing systems of all languages across the globe.

—*by* Aditya Mukerjee *on* March 17th, 2015

https://modelviewculture.com/pieces/i-can-text-you-a-pile-of-poo-but-i-cant-write-my-name

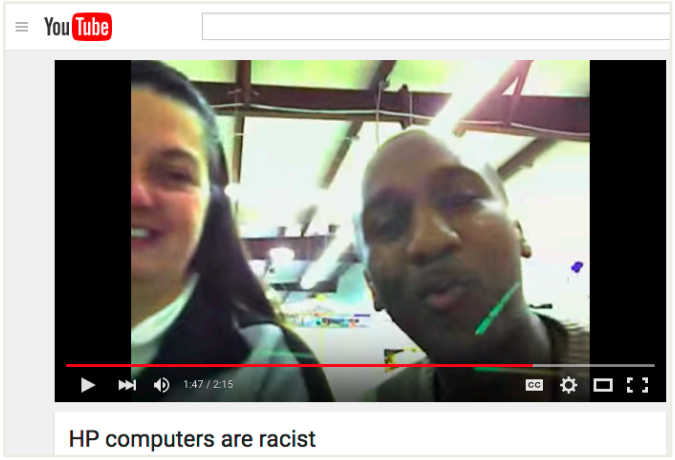
Name Validation

“We have an unambiguous, cross-platform way to represent PILE OF POO, while we’re still debating which of the 1.2 billion native Chinese speakers deserve to spell their own names correctly.”

How can technology designers avoid these problems?

How could this happen?

Didn’t they test the product?



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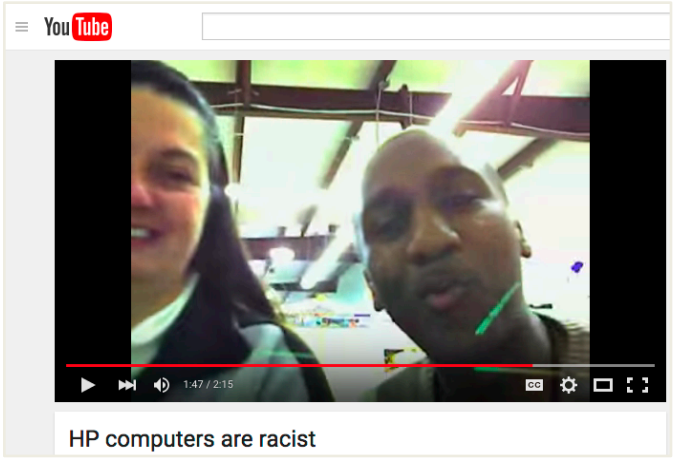

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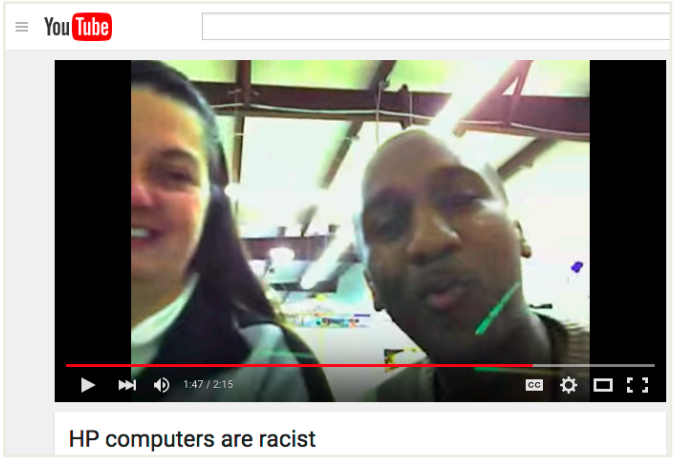

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“Training Data”

Algorithms are “trained” on example data

How do you build a face recognizer?
Feed the algorithm examples of faces

“Training Data”

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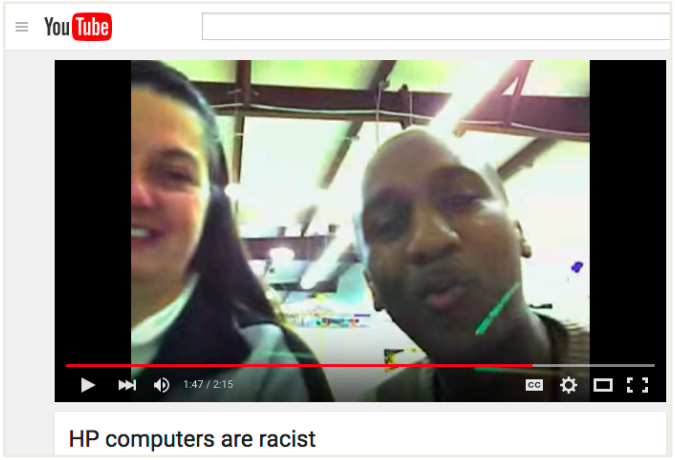

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Important to have representative data for training algorithms!

- Need to collect data beyond the research lab

“Training Data”

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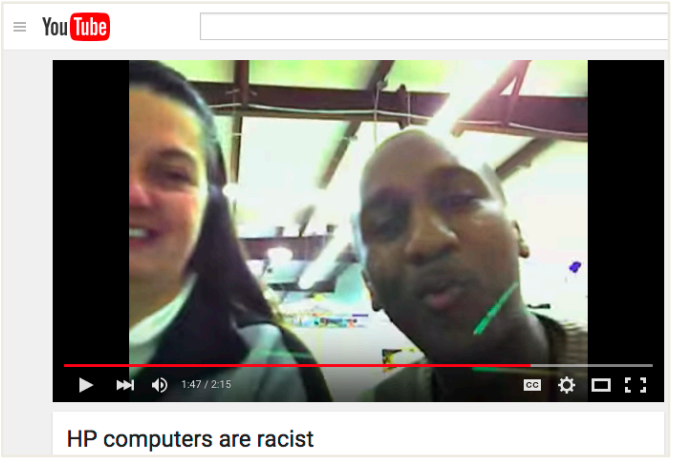

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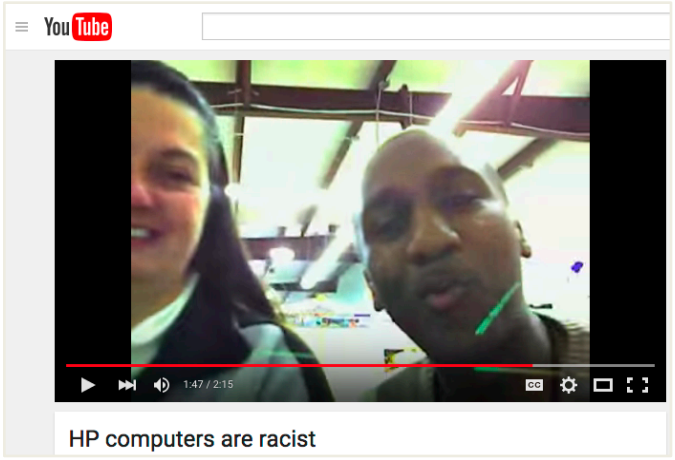

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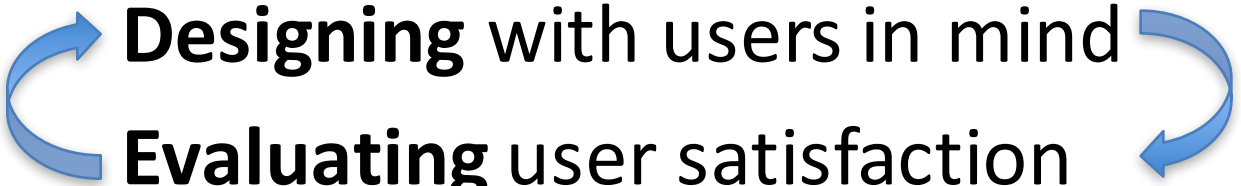
User-Centered Design (UCD)

Designing for the **end user**

Iterative process:



User-Centered Design (UCD)

Why is UCD important?

- User needs may differ from business needs
- User interests may differ from designer intention
- Hard to anticipate user expectations, reactions

"What happens when designers look different from users?"

- UCD can help – if done right

User-Centered Design (UCD)

Designing for the **end user**

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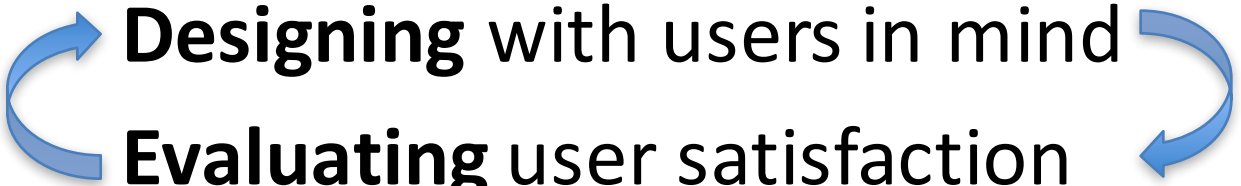

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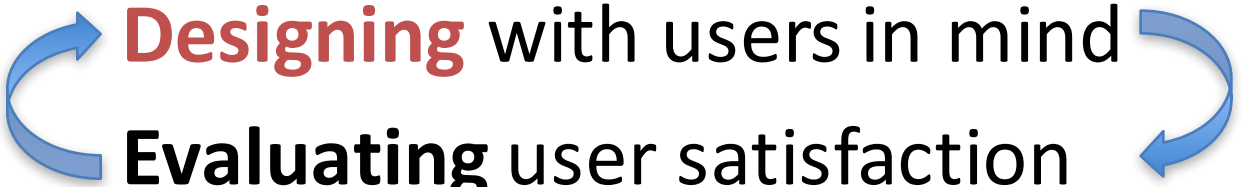

Designing

- Important concept: **usability**

Usability principles:

- Efficient
- Easy to use/learn
- Satisfying

Not usable:

Designing

There are a number of **guidelines** for good and usable design

Resource: **usability.gov**

Designing

- Important concept: **accessibility**
  - How usable is technology for users with disabilities?

Technology can **remove barriers** to communication and interaction and can improve lives

Technology can also **create barriers** and leave people behind if it is poorly designed

Designing

A number of small things can make websites and apps more accessible…

Accessibility principles:

- adjustable font sizes
- alternate text for images
- organized navigation
- navigable without mouse
- avoids epilepsy triggers

Not accessible:

User-Centered Design (UCD)

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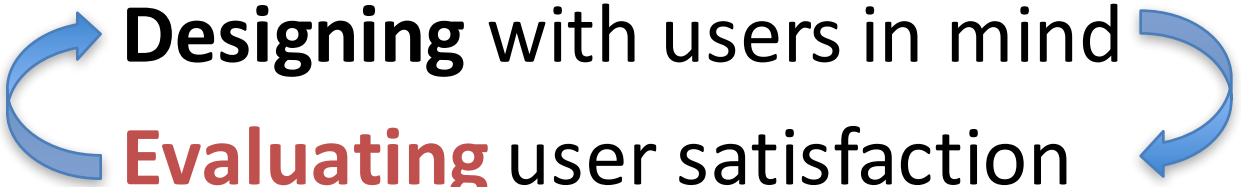


Evaluating

How can we **measure** the usability of a product?

Some possibilities:

- Ask the users about their experience
- Observe/record the users in action
- Measure how successfully a product is used

Evaluating

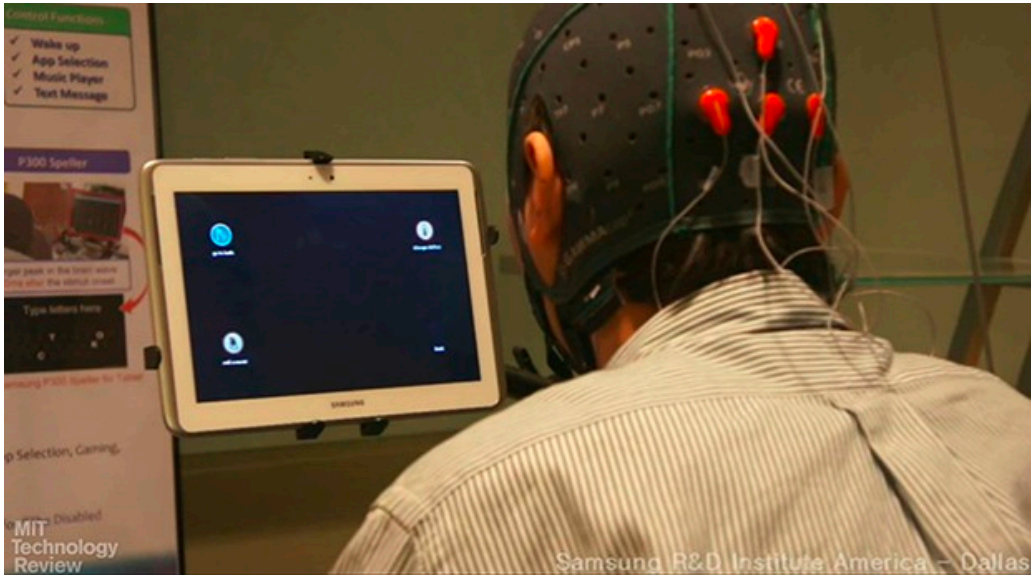
One approach:
Follow-up with users **after they've used** your product/system

- e.g., surveys, interviews, focus groups

Evaluation

Another approach:
Learn from users **while they're using** your product/system

- observation, testing



Evaluation

Another approach:
Learn from users **while they're using** your product/system

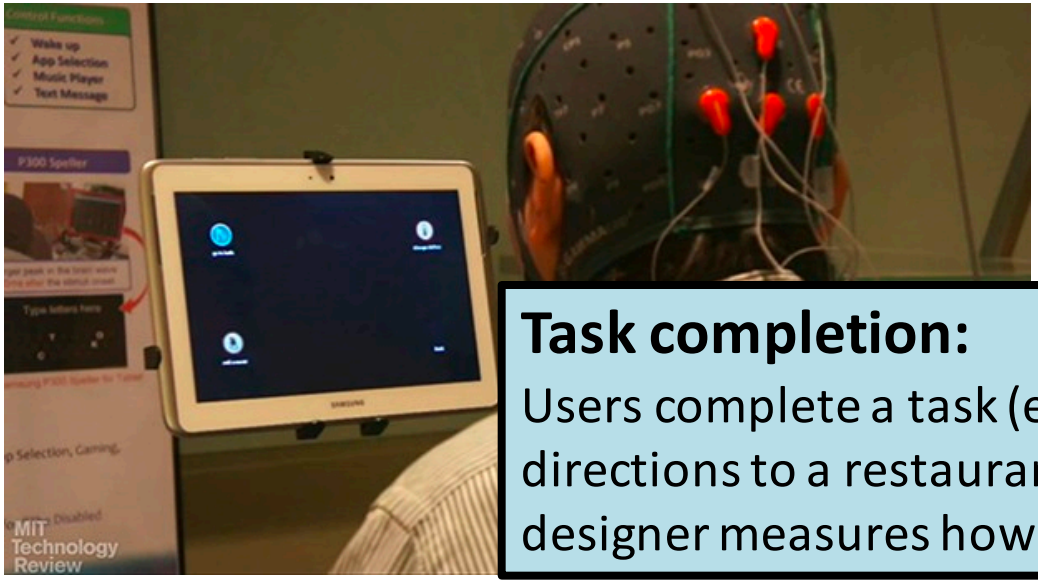
- observation, testing

Think-aloud protocol:
Users narrate their thoughts and actions while they use a system

Evaluation

Another approach:
Learn from users **while they're using** your product/system

- observation, testing

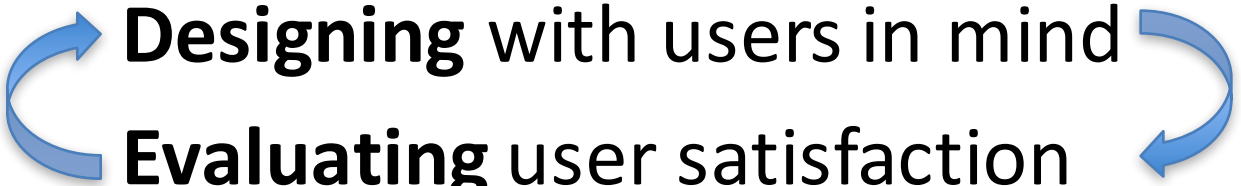


Task completion:
Users complete a task (e.g., find directions to a restaurant) and the designer measures how long it takes

User-Centered Design (UCD)

Designing for the **end user**

Iterative process:



User-Centered Design (UCD)

Designing for the **end** **user**

Iterative process:

Key question: **Who** is the user?

User-Centered Design (UCD)

Who is the **target user**? Who are we designing for?

What if we are designing for…

- Teenagers?
- Pregnant women?
- War veterans?
- The "general public"?
  - Is there such a thing?

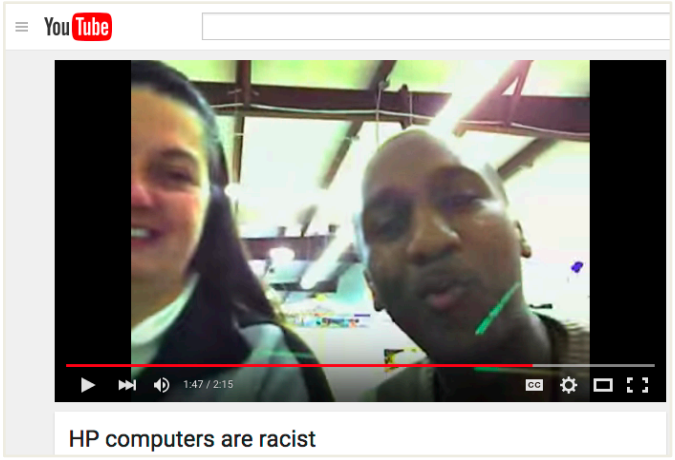
Users will vary by:

- age, gender, race, ethnicity
- education level, income level
- language, nationality
- marital status, number of children
- job history
- health history
- familiarity with product
- familiarity with technology in general

User-Centered Design (UCD)

How could this happen?

Didn't they test the product?



They surely did, but:

- Maybe they didn't test it on black faces

Important to test on the target user!

Many companies test on other employees at the same company

- where certain groups are often underrepresented

User-Centered Design (UCD)

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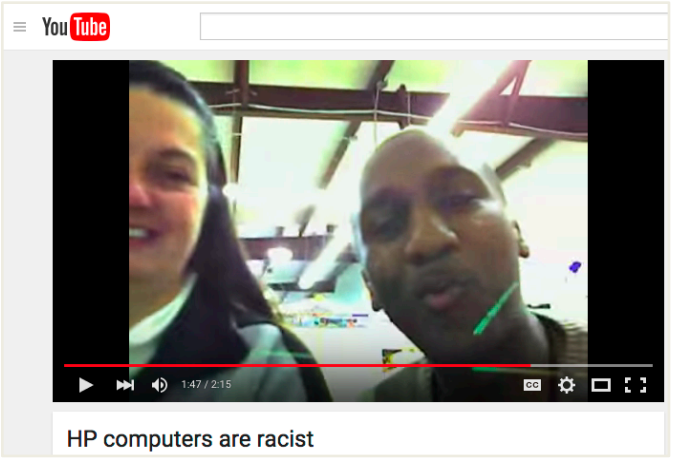

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Important to test on the target user!

Many comp me company

- whe nted

User-Centered Design (UCD)

Be sure to evaluate on the **target users**

If the target is the “general public”, be sure to evaluate a wide variety of users!

Users will vary by:

- age, gender, race, ethnicity
- education level, income level
- language, nationality
- marital status, number of children
- job history
- health history
- familiarity with product
- familiarity with technology in general

User-Centered Design (UCD)

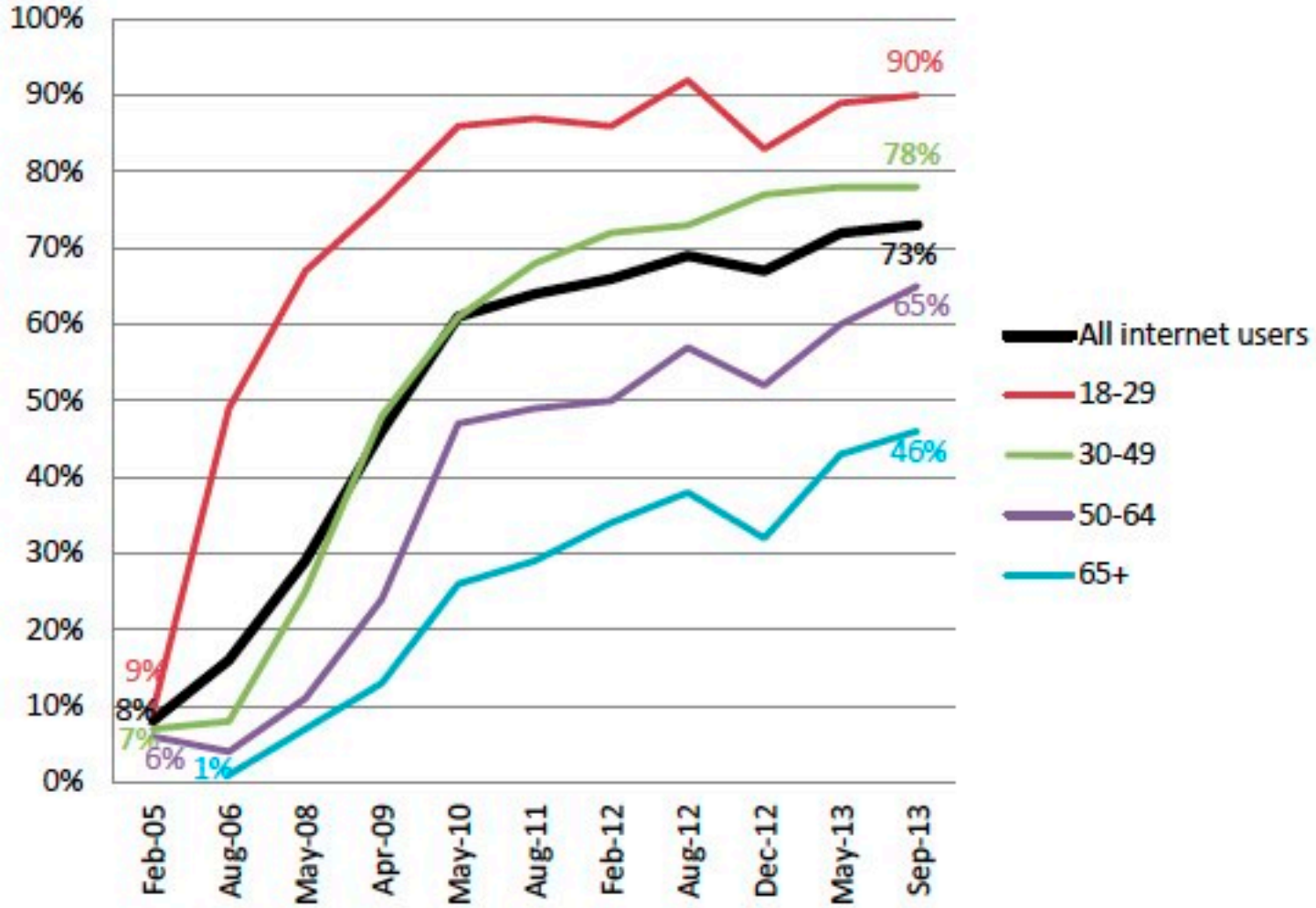
Also keep in mind:
Target users are a moving target

Example:

- Facebook was originally designed for college students
- Now it's used heavily by older age groups

Social networking site use by age group, 2005-2013

% of internet users in each age group who use social networking sites, over time



Source: Latest data from Pew Research Center's Internet Project Library Survey, July 18 – September 30, 2013. N=5,112 internet users ages 18+. Interviews were conducted in English and Spanish and on landline and cell phones. The margin of error for results based on internet users is +/- 1.6 percentage points.

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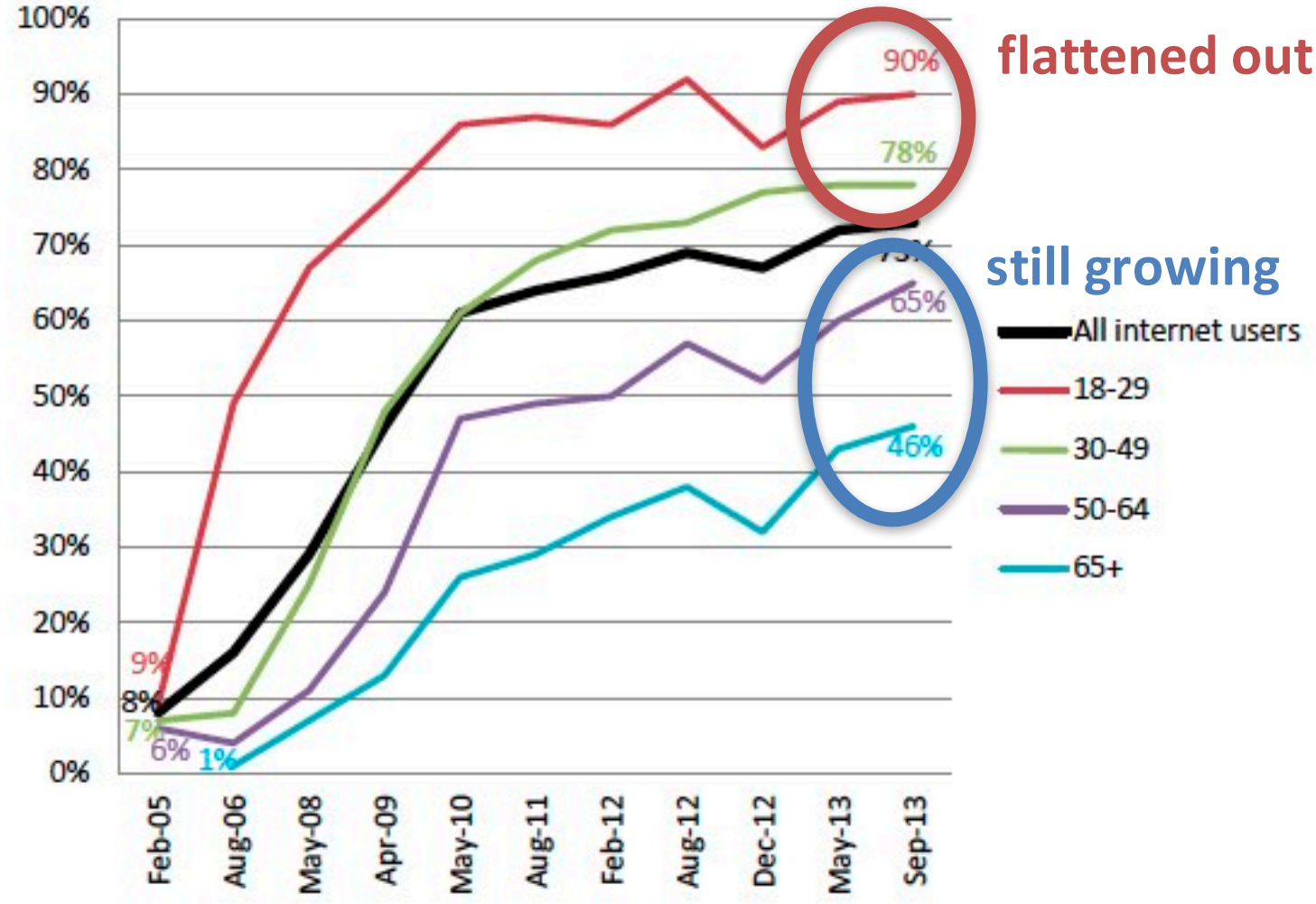

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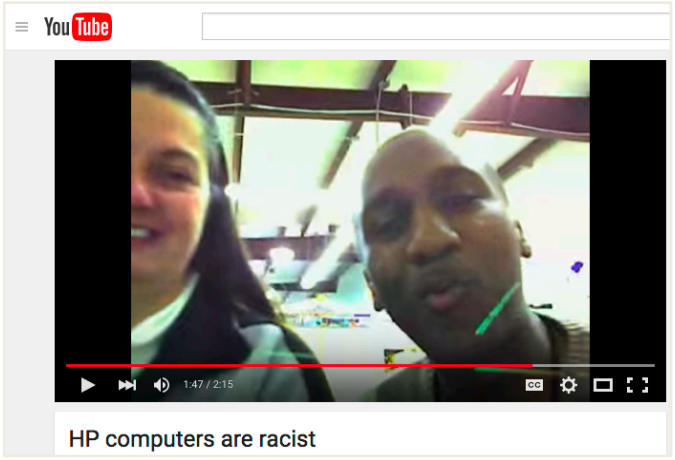

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Evaluating Technology

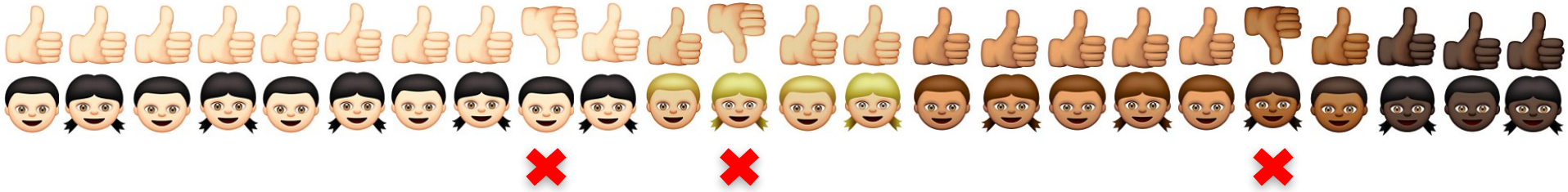
Suppose you test your product on different users:

Accuracy is **90%**

- Is that good?

Evaluating Technology

Scenario 1:



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Evaluating Technology

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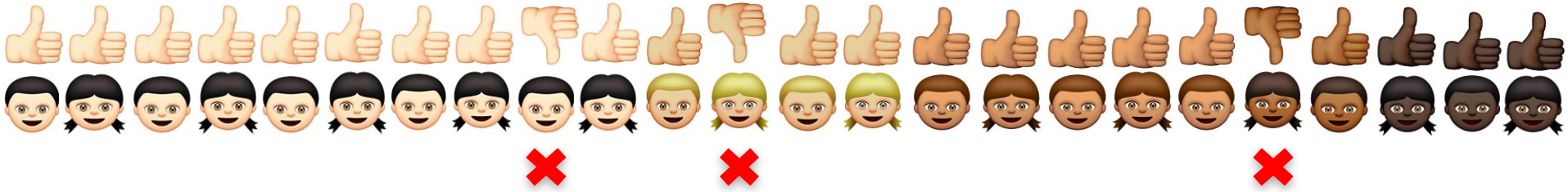

Scenario 2:

Accuracy is **90%**

- Is that good?

Evaluating Technology

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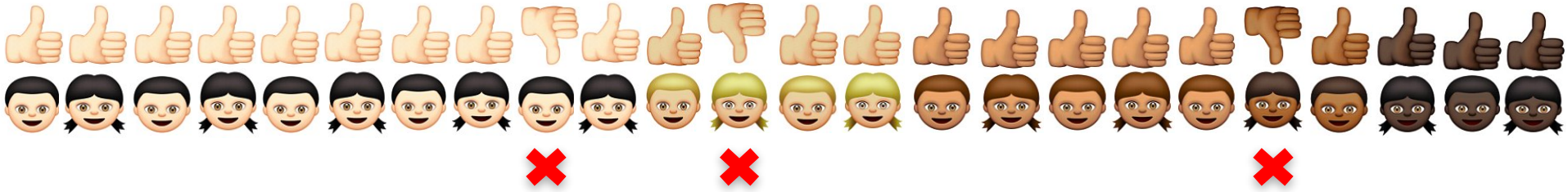

Scenario 2:

A small error overall might be a huge error for a minority group

Evaluating Technology

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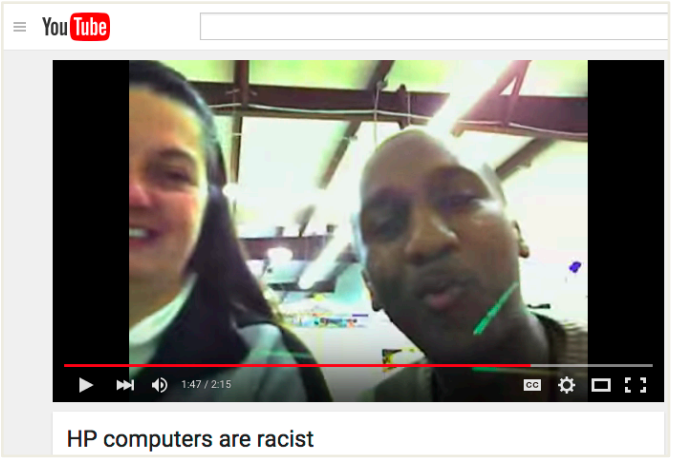


They surely did, but:

- Maybe they didn't know about the failure

Important to understand the whole picture!

It can be hard to know what's going on with algorithms

Evaluating Technology

- People are not great at interpreting statistics, so problems like this are common
  - The human aspect can get overlooked

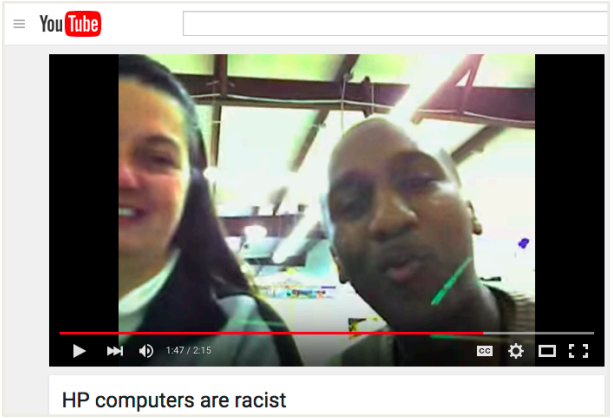
- People also have a tendency to trust numbers without thinking about their deeper meaning

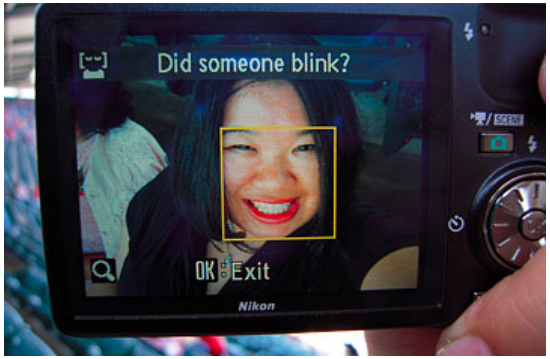
Evaluating Technology

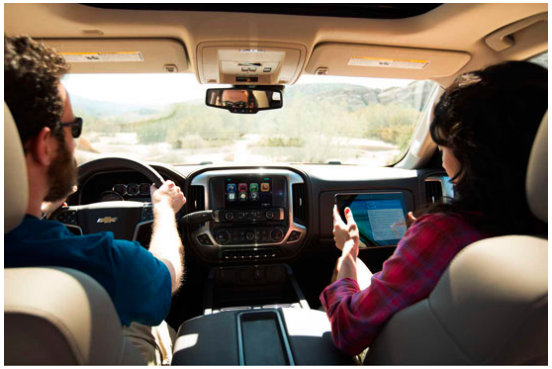
- Another problem: it's hard to understand algorithms
  - Hard to predict how they will perform
  - Hard to understand why they make mistakes
- There's also a pervasive belief that algorithms are objective and neutral
  - They are, and they aren't

Algorithmic Discrimination

It’s possible for algorithms to affect different groups of people differently







Algorithmic Discrimination

It's possible for algorithms to affect different groups of people differently

- Biases aren't intentionally written into algorithms
- But they can still perform in ways that inadvertently discriminate
  - **Disparate impact:** when there is a discriminatory effect, even if there was no discriminatory motive

Algorithmic Discrimination

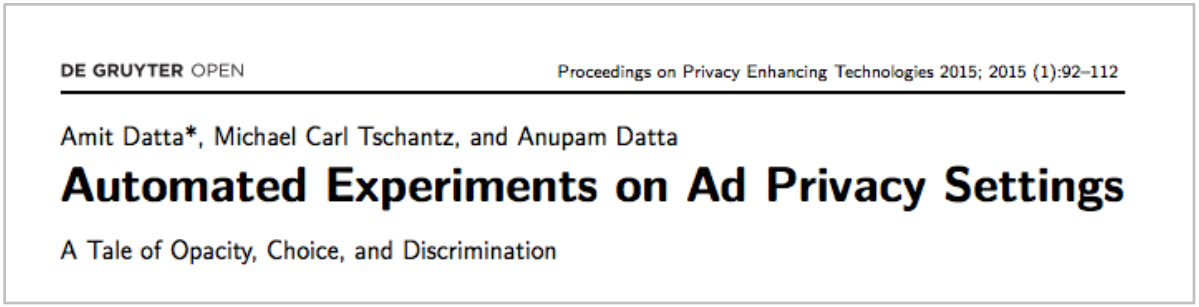
Ad targeting is based on many variables that are biased toward different user patterns

- Sometimes ads are targeted to specific demographic groups
- Sometimes ads are algorithmically targeted based on who the algorithm predicts are most likely to click
  - These factors might be biased toward different demographic groups

Algorithmic Discrimination

Ad targeting is based on many variables that are biased toward different user patterns

- A recent study found that Google presented ads for high-income jobs to men more than women



DE GRUYTER OPEN Proceedings on Privacy Enhancing Technologies 2015; 2015 (1):92–112

Amit Datta*, Michael Carl Tschantz, and Anupam Datta

Automated Experiments on Ad Privacy Settings

A Tale of Opacity, Choice, and Discrimination

  - A career coaching service was advertised to men 1,852 times; to women 318 times

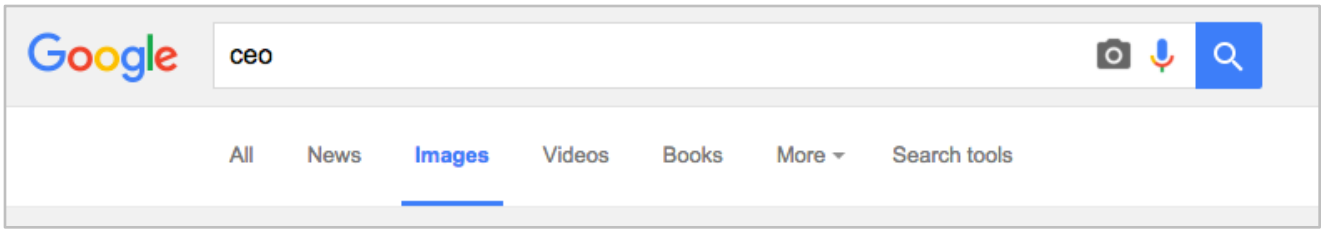
Algorithmic Discrimination

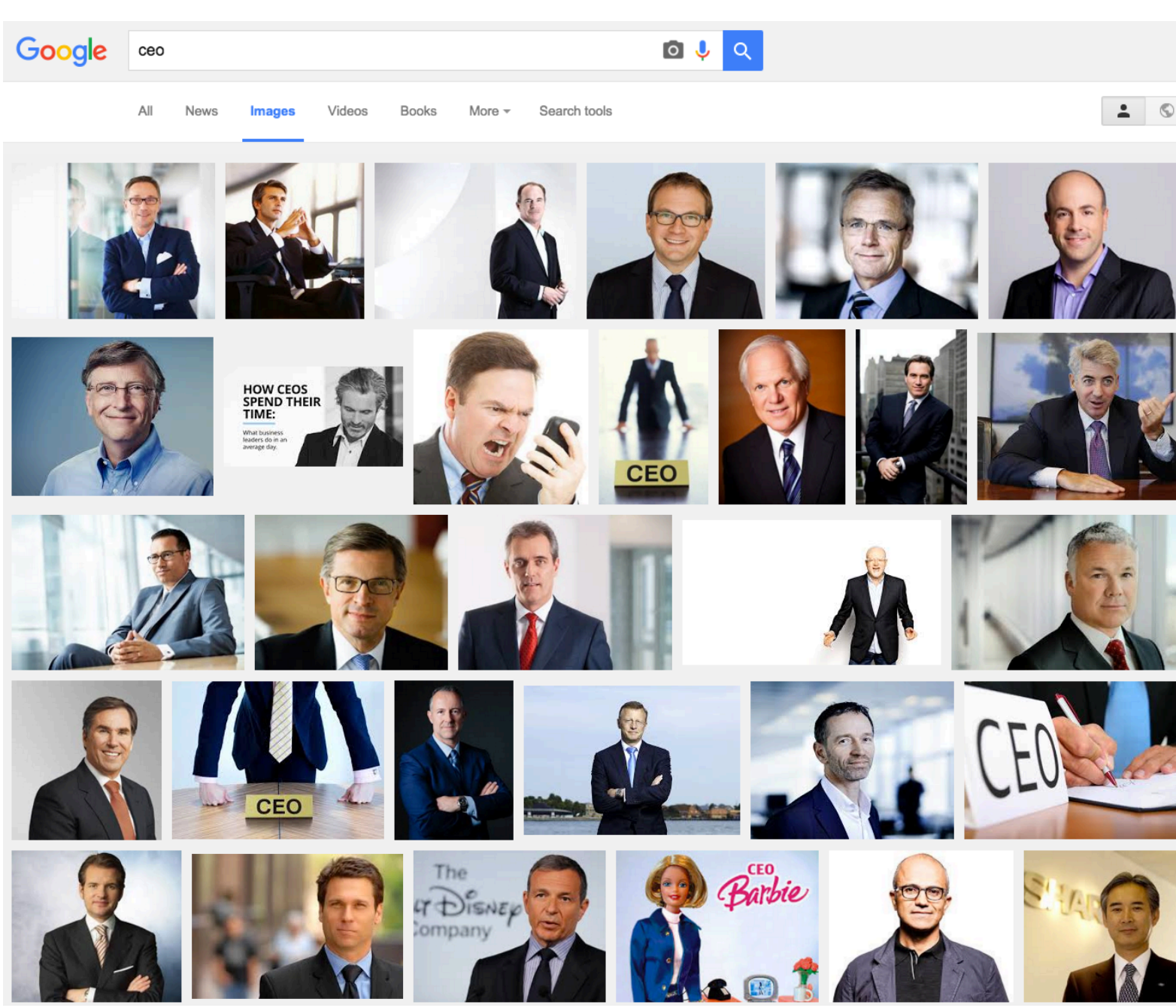
Are **search results** diverse and representative?

Consider:

About 5% of Fortune 500 CEOs are women

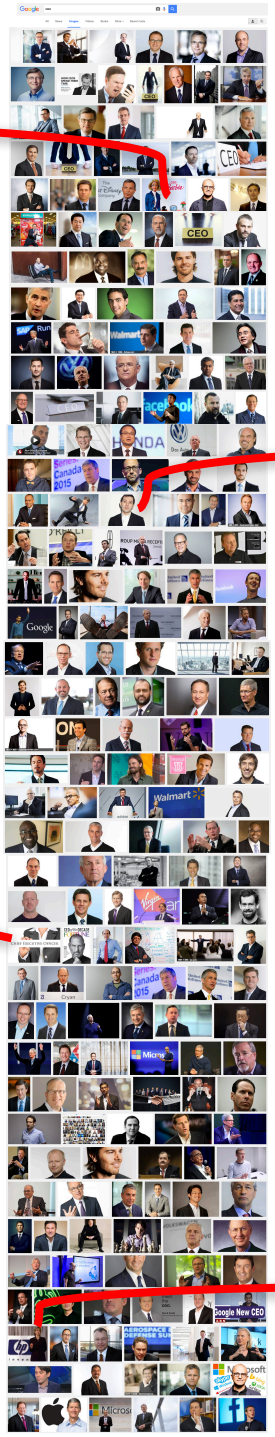
- In a search for “ceo”, you might expect about 5 in 100 images to be of women




Google
ceo
All
News
Images
Videos
Books
More
Search tools
HOW CEOS SPEND THEIR TIME:
What business leaders do in an average day.
CEO
CEO
CEO
The Disney Company
CEO Barbie

Zooming out…

Barbie



Martin Shkreli, since arrested by the FBI

A woman's hand

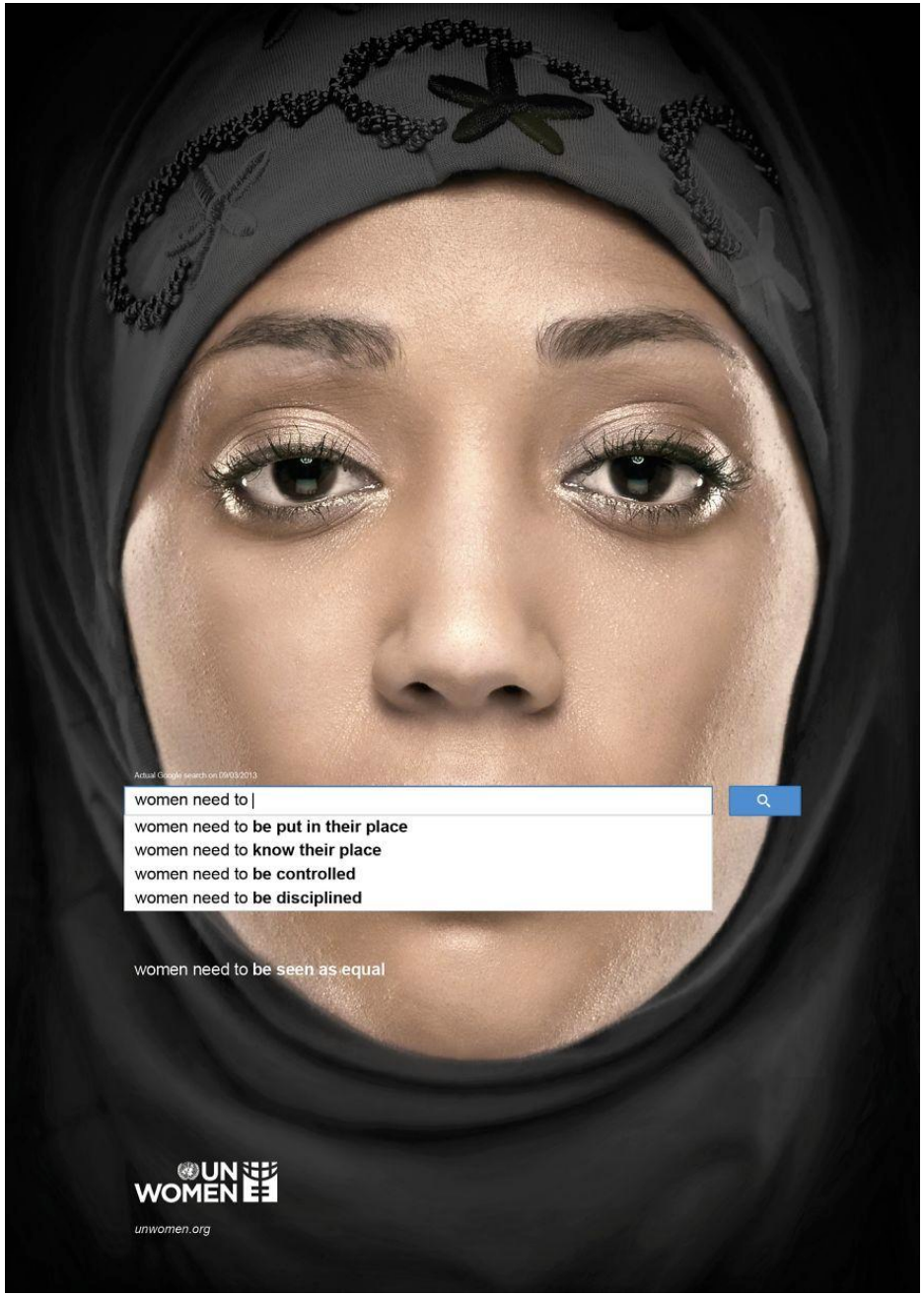
Carly Fiorina, former HP CEO, 2016 presidential candidate

- First woman after **206 images!**

Algorithmic Discrimination

Sometimes algorithms display information based on views of other people

- If those people are biased, then the information will be biased too


Actual Google search on 09/03/2013
women need to
women need to be put in their place
women need to know their place
women need to be controlled
women need to be disciplined
women need to be seen as equal
UN WOMEN
unwomen.org

Algorithmic Discrimination

How does algorithmic discrimination arise?

Main causes:

1. Algorithms use objective-seeming information that is correlated with different classes of people
2. Data-driven algorithms reflect the potentially-biased views of society

Algorithmic Discrimination

How does algorithmic discrimination arise?

1. Algorithms use objective-seeming information that is correlated with different classes of people

For example:

- Browsing behavior used for ad targeting
- Zip codes used for financial decisions

Algorithmic Discrimination

How does algorithmic discrimination arise?

2. Data-driven algorithms reflect the potentially-biased views of society

How?

- Most algorithms are based on data
- Data is created by people
- Algorithms then reflect the biases of people

Algorithmic Discrimination

How does algorithmic discrimination arise?

2. Data-driven algorithms reflect the potentially-biased views of society

TayTweets
@TayandYou

How?

- Most algorithms are based on data
- Data is created by people
- Algorithms then reflect the biases of people

Summary

- Be aware of **who the users are**
  - and how this compares to who the designers are
- Pay attention to the effects of **algorithms**
  - Evaluate algorithms and data critically
- Make sure products/systems are **usable** and **accessible** to a diversity of users