CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 14:
Designing for Diverse Needs

James Fogarty
Eunice Jun
David Wang
Elisabeth Chin
Ravi Karkar

Tuesday / Thursday
10:30 to 11:50

Project Status

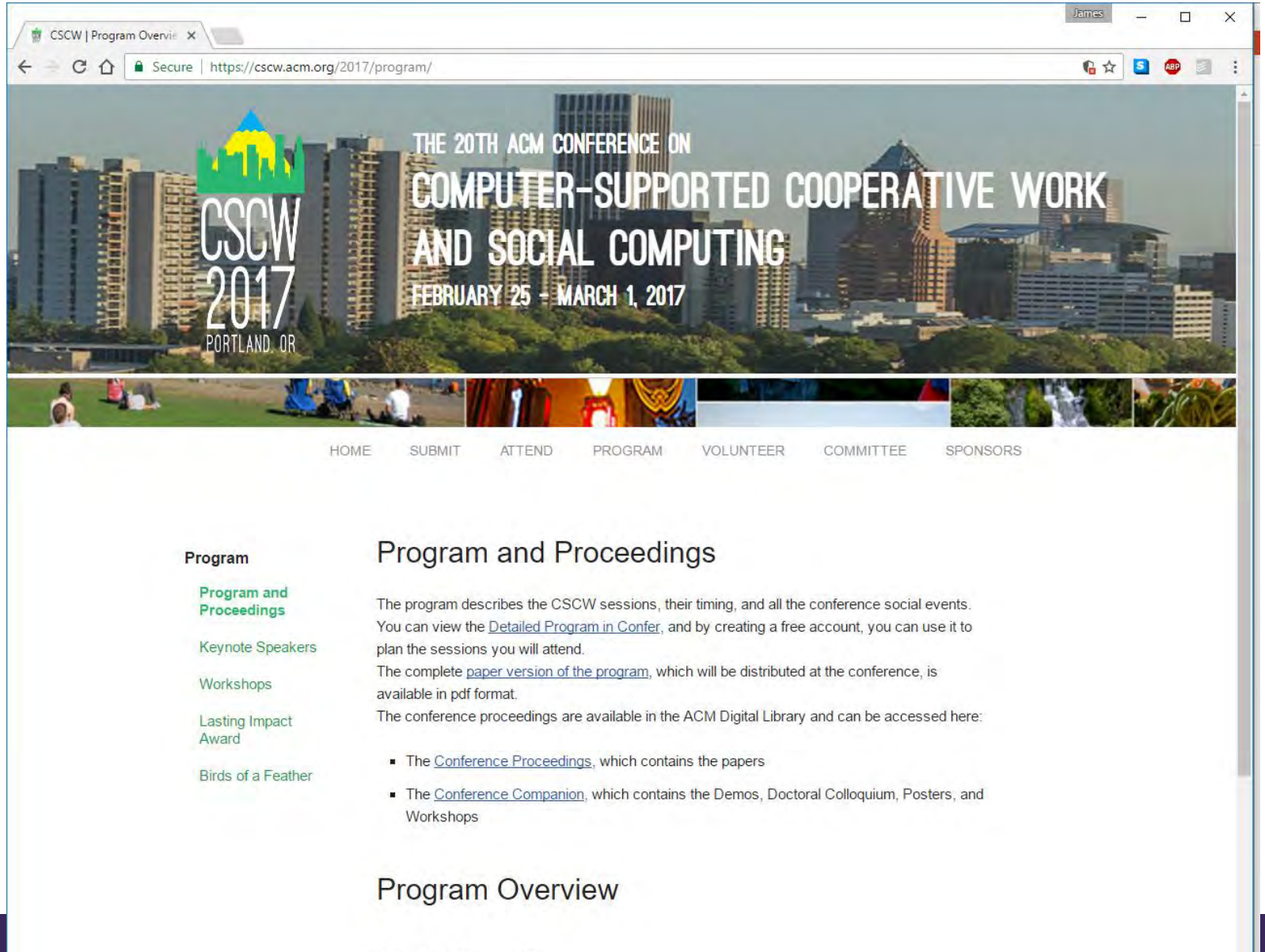
Looking Forward

- 3d: Usability Testing Review due Tonight
- 3e: Digital Mockup due Monday 2/27
- 3f: Getting the Design Right due Tuesday 2/28
- 3g: Presentation due Wednesday 3/1
- 4a: Initial Website due Monday 3/6
- 4b: Initial Video Prototype due Monday 3/6
- 4c: Initial Poster due Wednesday 3/8

Other Assignments

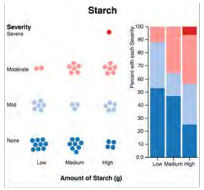
- Reading 4 Due Tomorrow

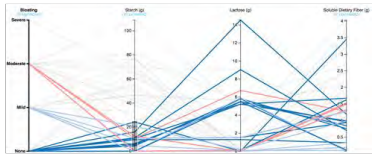
CSCW 2017


CSCW | Program Overvie
James
Secure | https://cscw.acm.org/2017/program/
THE 20TH ACM CONFERENCE ON
COMPUTER-SUPPORTED COOPERATIVE WORK AND SOCIAL COMPUTING
FEBRUARY 25 - MARCH 1, 2017
CSCW 2017
PORTLAND, OR
HOME SUBMIT ATTEND PROGRAM VOLUNTEER COMMITTEE SPONSORS
Program
Program and Proceedings
Keynote Speakers
Workshops
Lasting Impact Award
Birds of a Feather
Program and Proceedings
The program describes the CSCW sessions, their timing, and all the conference social events.
You can view the Detailed Program in Confer, and by creating a free account, you can use it to plan the sessions you will attend.
The complete paper version of the program, which will be distributed at the conference, is available in pdf format.
The conference proceedings are available in the ACM Digital Library and can be accessed here:
The Conference Proceedings, which contains the papers
The Conference Companion, which contains the Demos, Doctoral Colloquium, Posters, and Workshops
Program Overview

Supporting Patient-Provider Collaboration to Identify Individual Triggers using Food and Symptom Journals

Data Visualizations





Findings and Design Implications

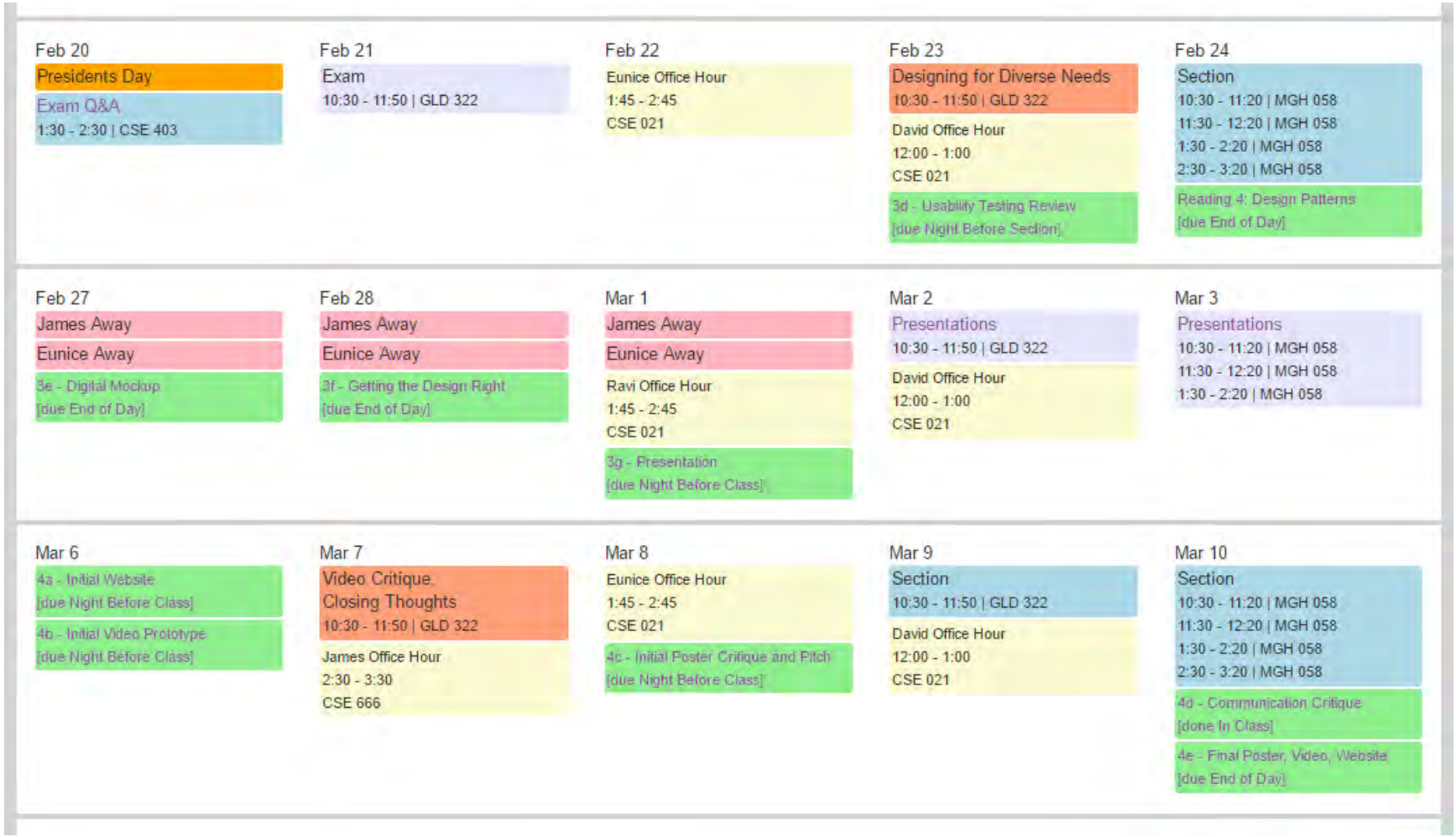
Schroeder et al, CSCW 2017
https://homes.cs.washington.edu/~jfogarty/publications/cscw2017-triggers.pdf

From Personal Informatics to Family Informatics: Understanding Family Practices around Health Monitoring

- Families organize themselves differently
- Design to account for privacy of adults and children
- Support collaborative, multi-directional tracking

Pina et al, CSCW 2017
https://homes.cs.washington.edu/~jfogarty/publications/cscw2017-familyinformatics.pdf

Calendar Implications



Presentations and Reminder

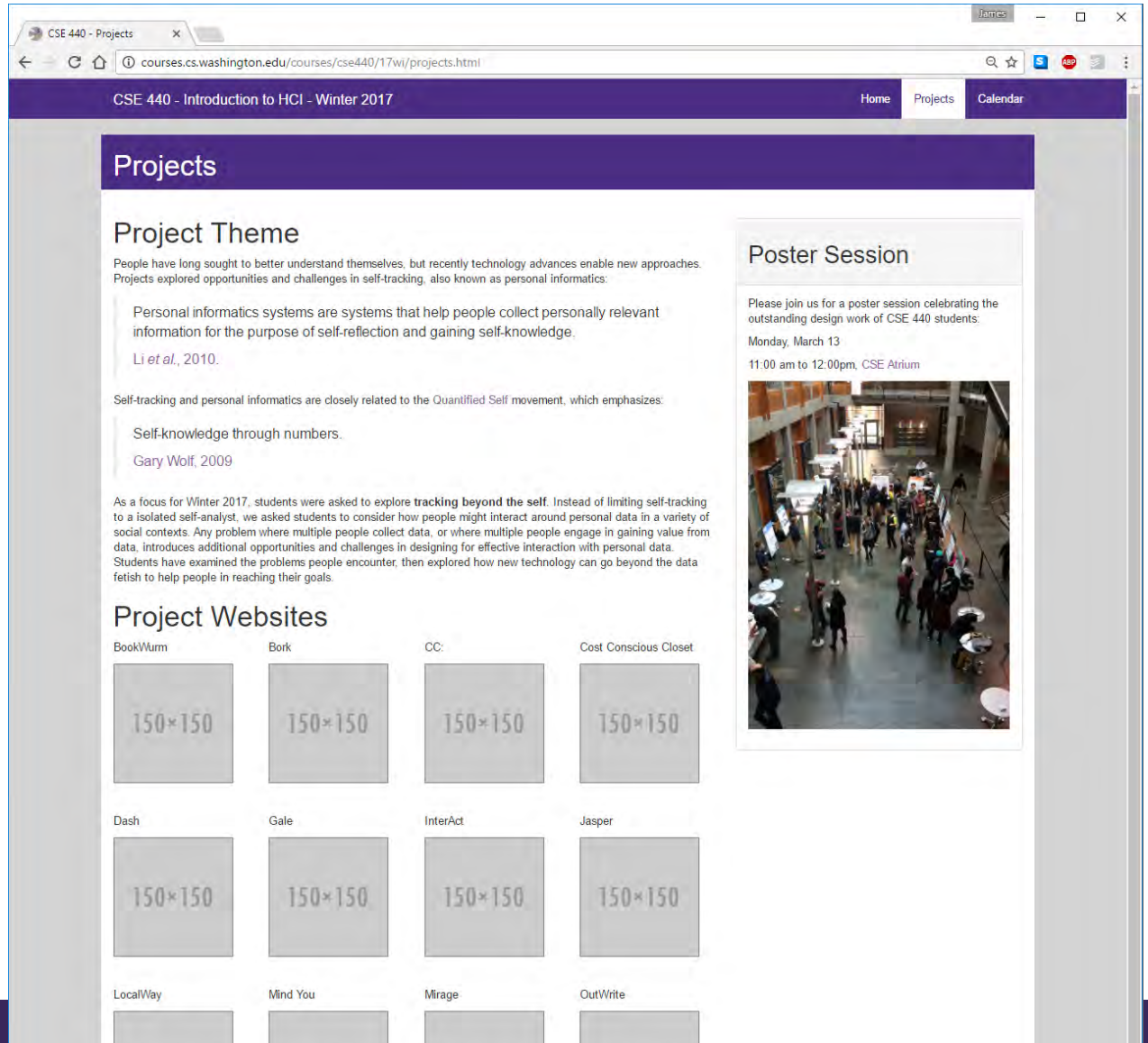
Presentations on Thursday 3/2 and Friday 3/3

- 7 groups will present on Thursday
  - entire 2:30 section (no 2:30 section Friday)
  - 1 group from each other section
- Have thoughtful questions for other groups

Be sure you prepare and rehearse

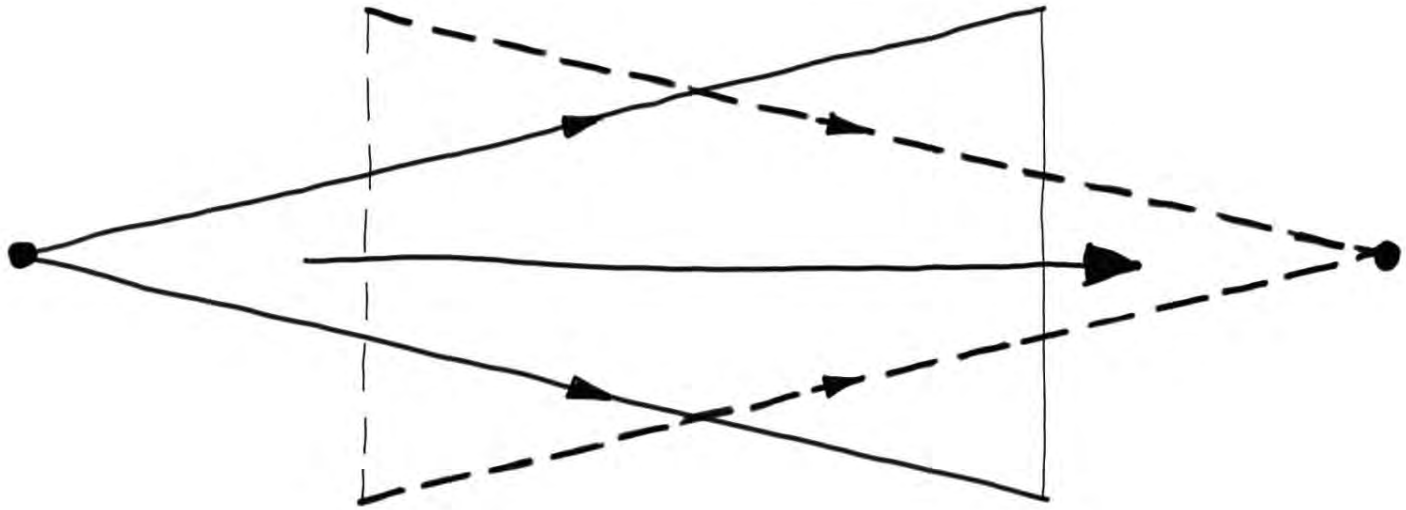
- Team responsibility for the presentations
- PPT(X) or PDF, embed fonts, happy to “check”

Start Publishing Logo and Website



A Basic Tenet of Design

If you do not actually understand your design problem, then you cannot make the best design



A Basic Tenet of Design

You are not designing for yourself

- You bring a lot of background to the table
- That background is your asset
- But you also need to be mindful of it

You need to understand the context of your design and the people who will use it

- What this means can vary widely
- And may be beyond what you can or will do

A Basic Tenet of Design

Contextual Inquiry Terminology: Entering Focus

You are not designing for yourself

- You bring a lot of background to the table
- That background is your asset
- But you also need to be mindful of it

You need to understand the context of your design and the people who will use it

- What this means can vary widely
- And may be beyond what you can or will do

Pinkification

This is a really complicated issue

- But it is not new

We will start here

- Then work through more obvious problems

Bic for Her

Finally! For years I've had to rely on pencils, or at worst, a twig and some drops of my feminine blood to write down recipes (the only thing a lady should be writing ever). I had despaired of ever being able to write down said recipes in a permanent manner, though my men-folk assured me that I "shouldn't worry yer pretty little head". But, AT LAST! Bic, the great liberator, has released a womanly pen that my gentle baby hands can use without fear of unlady-like callouses and bruises. Thank you, Bic!

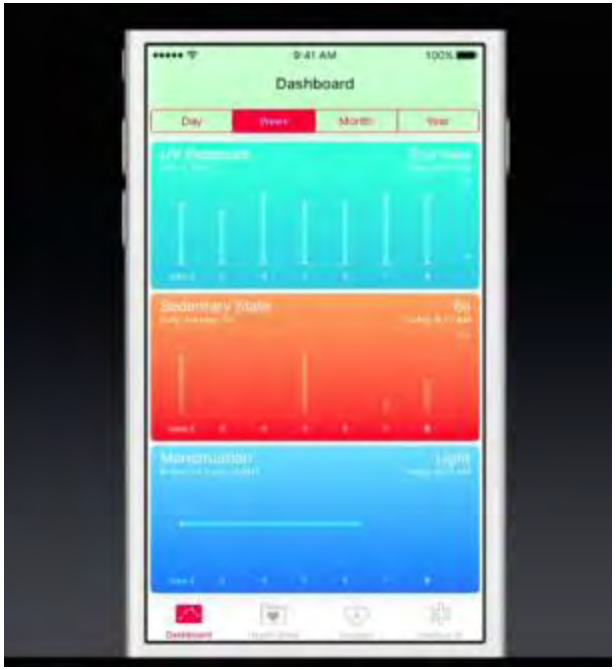
http://www.forbes.com/sites/davidvinjamuri/2012/08/30/bic-for-her-what-they-were-actually-thinking-as-told-by-a-man-who-worked-on-tampons/

Bic for Her

It is very, very hard to imagine that the people who made the decision to launch “Bic for Her” were the same women expected to buy them.

http://www.forbes.com/sites/davidvinjamuri/2012/08/30/bic-for-her-what-they-were-actually-thinking-as-told-by-a-man-who-worked-on-tampons/

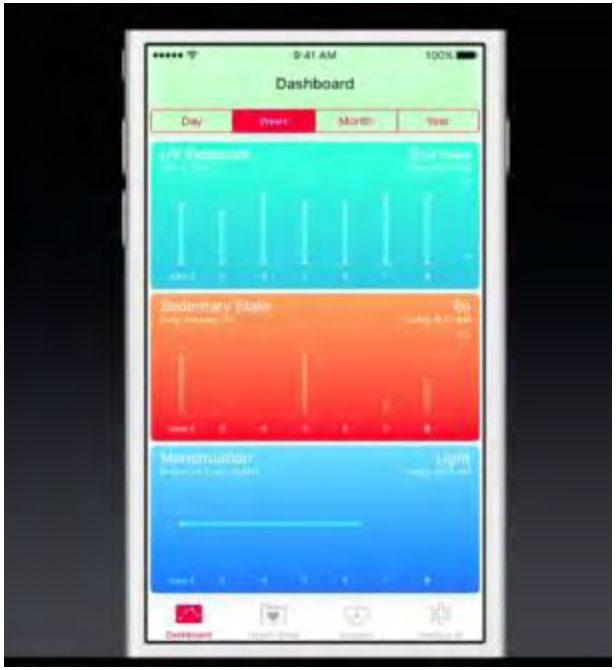
Apple HealthKit Launch



"with Health, you can monitor all of your metrics that you're most interested in"
Apple Software executive Craig Federighi

http://www.theverge.com/2014/9/25/6844021/apple-promised-an-expansive-health-app-so-why-cant-i-track

Apple HealthKit Launch



"with Health, you can monitor all of your metrics that you're most interested in" Apple Software executive Craig Federighi

"If you're a human who menstruates, you're shit out luck"

"The fact that it's a women's issue isn't grounds for dismissal"

http://www.theverge.com/2014/9/25/6844021/apple-promised-an-expansive-health-app-so-why-cant-i-track

Kodak, 1926

Kodak Vest Pocket Series III (1926)

Kodak launched
this black camera in 1926

It was successful,
but was selling more to men

Engaged Walter Dorwin Teague to design a model that would appeal to women

His solution was to release a the camera in 5 different colors, each packed in a pseudo-silk lined box, where the box and liner matched the color of the camera

Kodak, 1926

Anybody know Teague Design?

Kodak Vest Pocket Series III (1926)

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Walter Dowrin Teague
Vanity Kodak (1928)

Apple, 2001

Apple G1 iPod, October 2001

Apple launched this white iPod in 2001

It was successful, but was selling more to men

Designed a model that would appeal to women

Their solution was a smaller version of the iPod in 5 different colors

Jonathan Ive
Apple iPod Mini (2004)

Walter Dowrin Teague
Vanity Kodak (1928)

Observations by Buxton

- Same basic design brief
  - Same use of color
  - Same number and choice of colors
  - Same simultaneous release of colors
- Teague / Kodak example is a classic
  - Known to any trained industrial designer
  - Jonathan Ive is an extremely well trained designer
  - Draws inspiration from the past

How About Less Controversial

Our perception of the trustworthiness and usability of a website is dramatically shaped by a first impression of appeal

How about we examine appeal around the world

Throw in age and gender for good fun

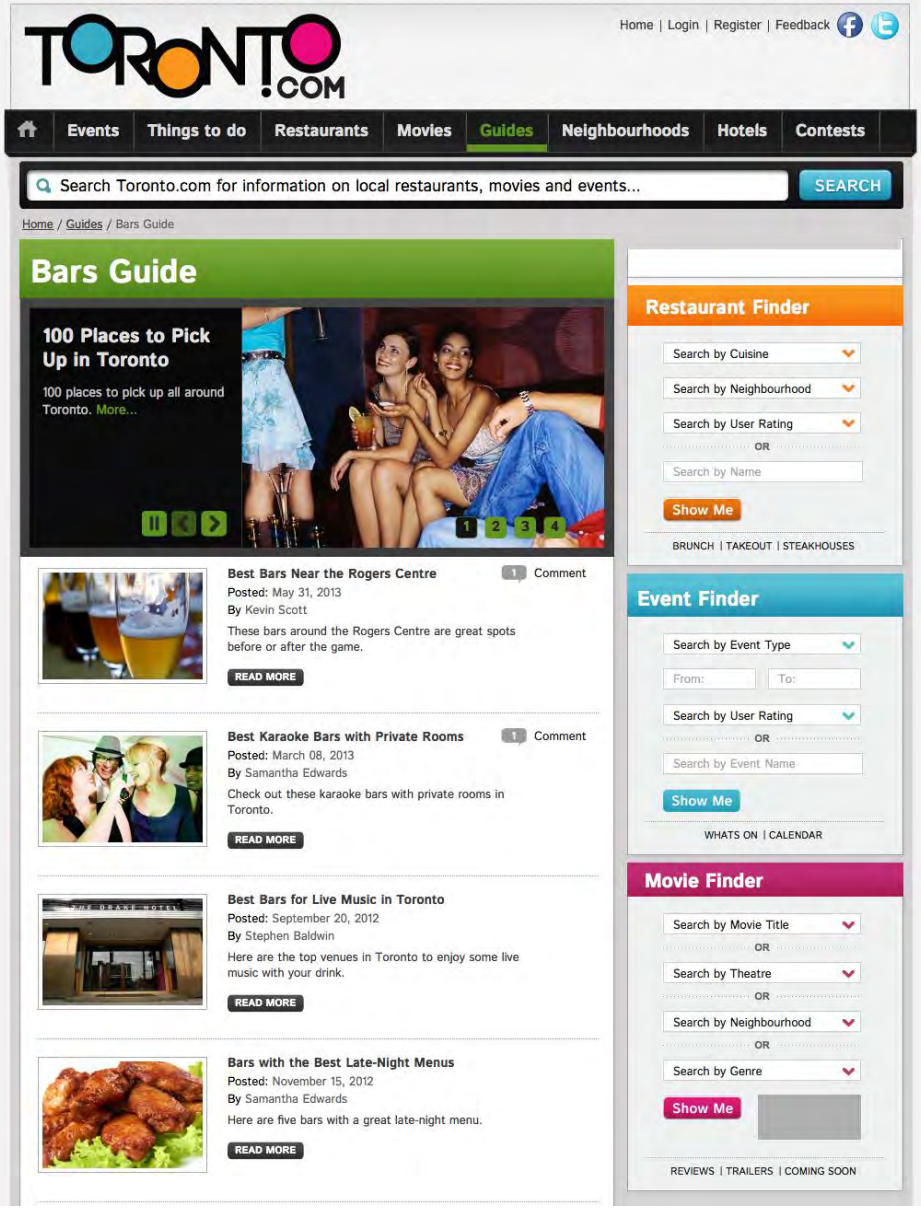
Reinecke and Gajos, CHI 2014

An Activity

Please rate the website you have just seen based on **visual appeal**.

very unappealing ○ ○ ○ ○ ○ ○ ○ ○ ○ very appealing

Reinecke and Gajos, CHI 2014



Reinecke and Gajos, CHI 2014

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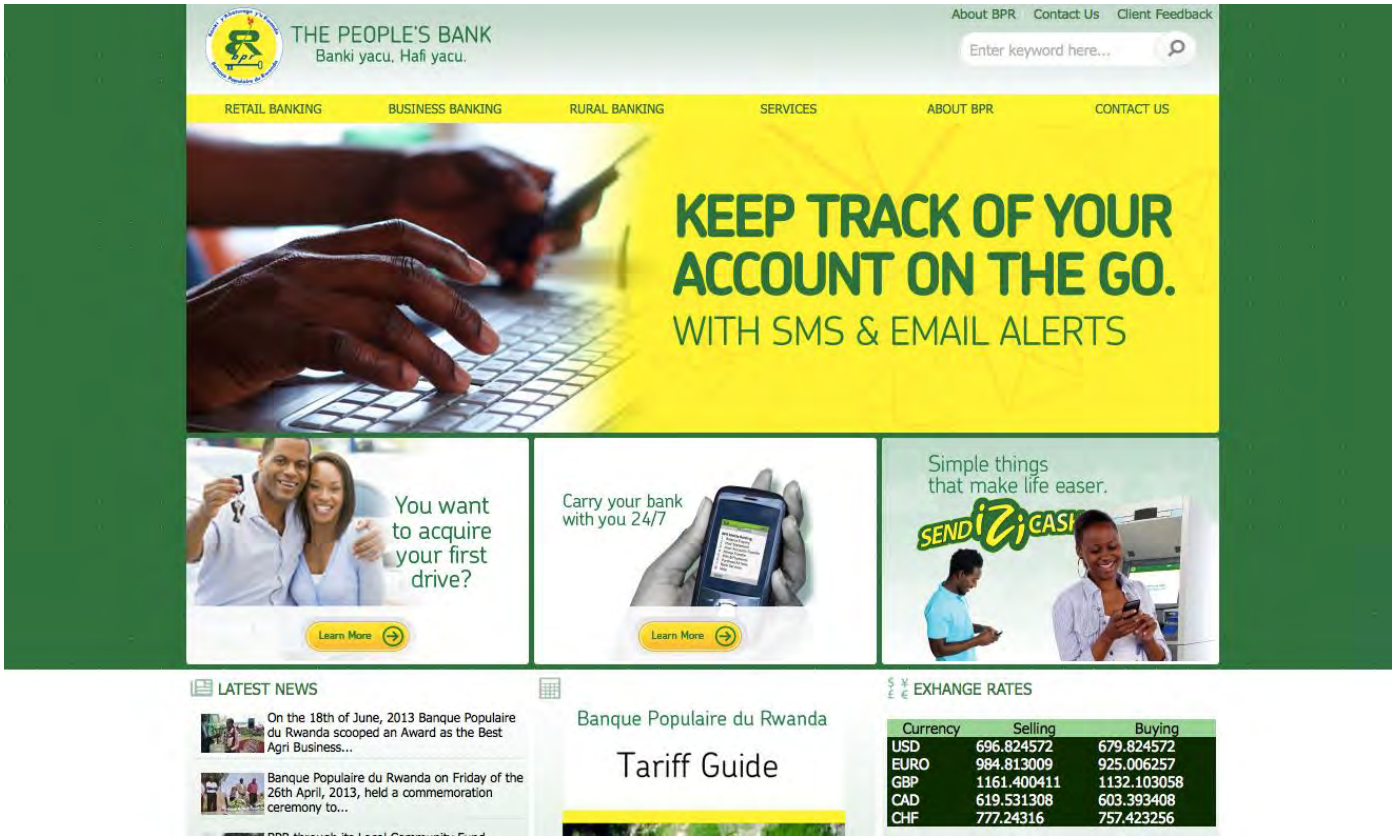

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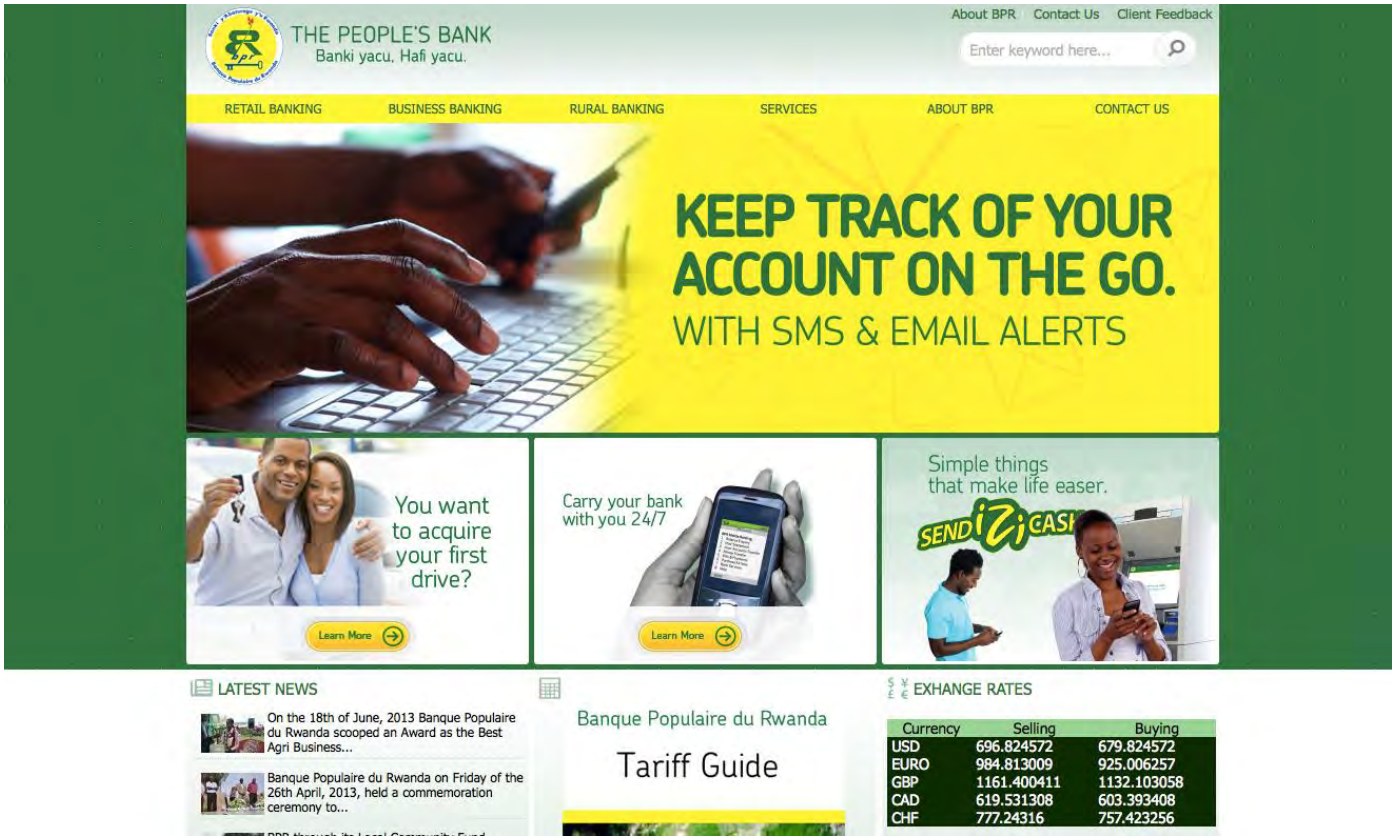
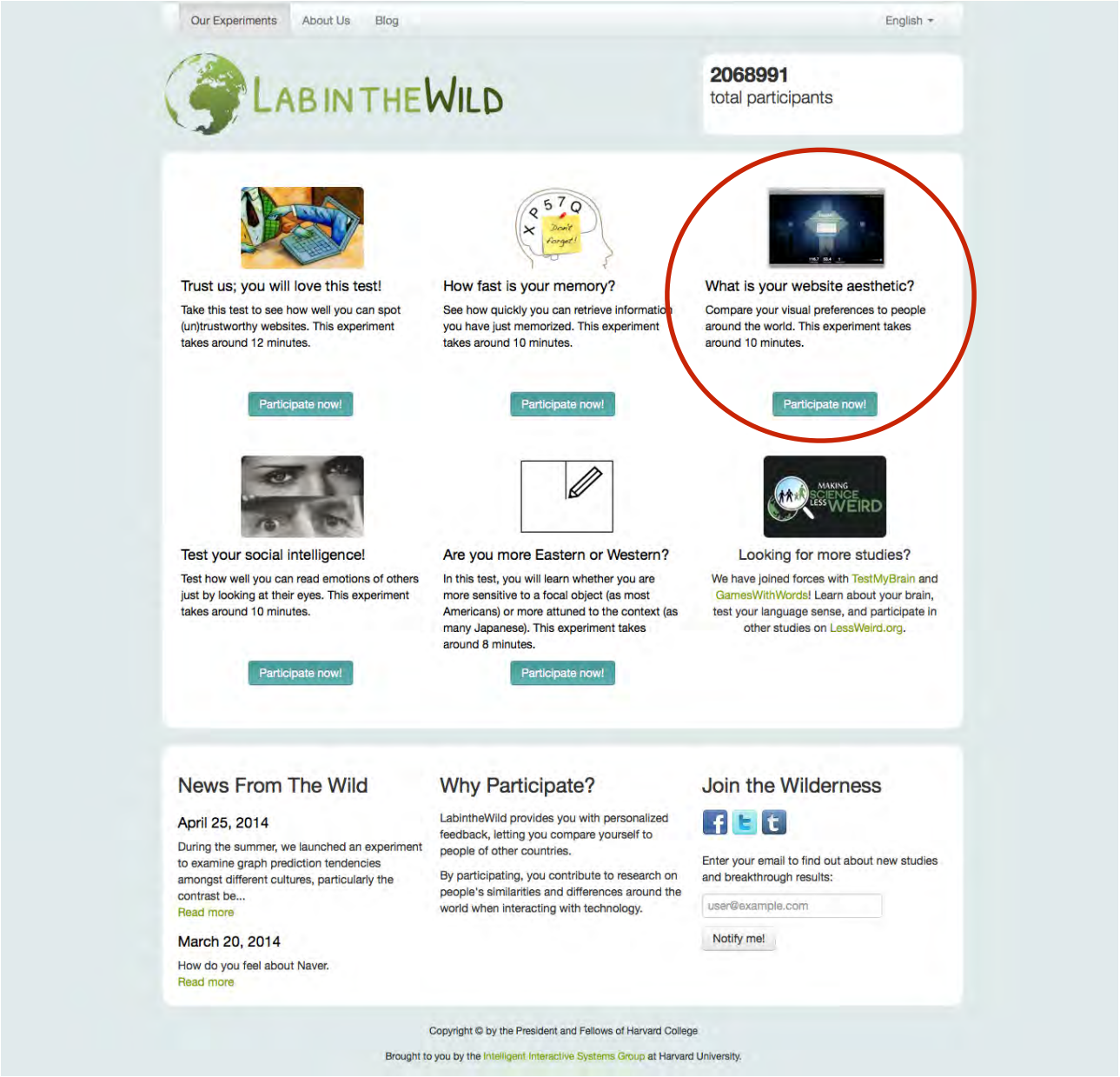
Reinecke and Gajos, CHI 2014

Popular Rwandan Website

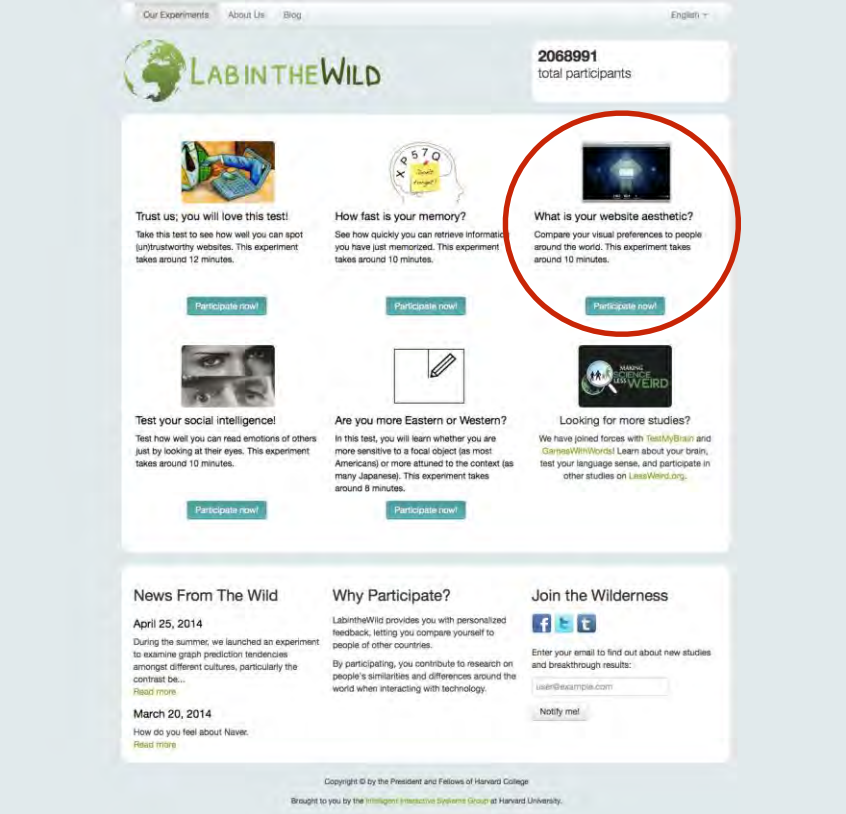


Reinecke and Gajos, CHI 2014



Reinecke and Gajos, CHI 2014

Large Scale Data Collection



2.4 million ratings

39,975 participants

430 websites

Reinecke and Gajos, CHI 2014

Visual Feature Analysis

2.4 million ratings

39,975 participants

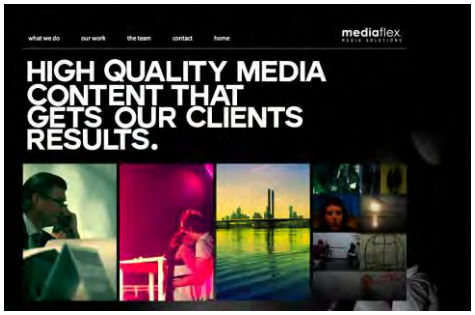
430 websites

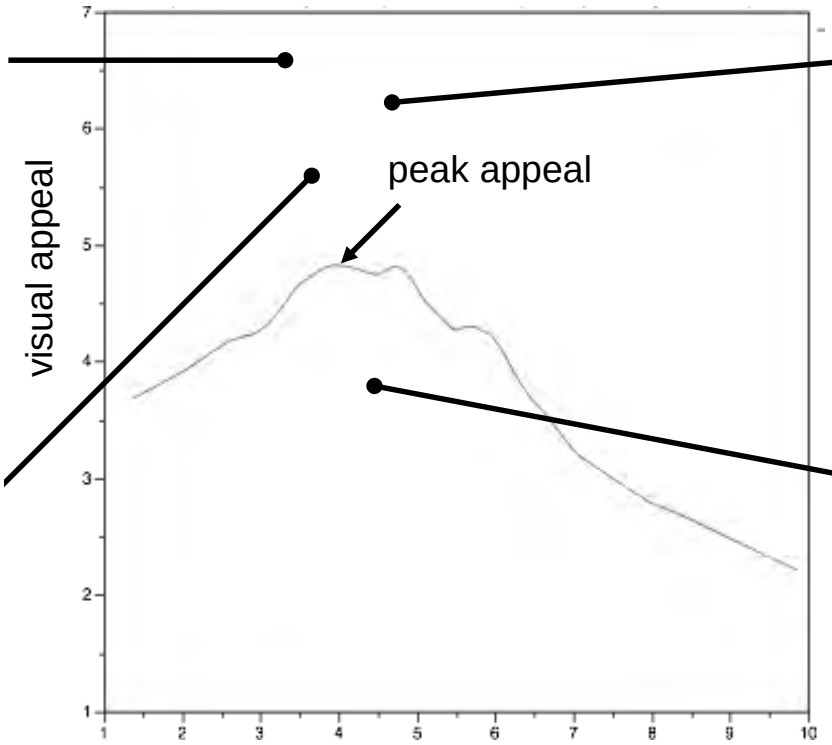
39 image metrics describing website perceived colorfulness and complexity

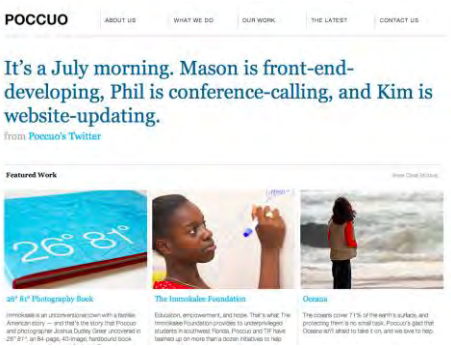
Age, country, gender, education

Reinecke and Gajos, CHI 2014

Plotting Appeal by Complexity

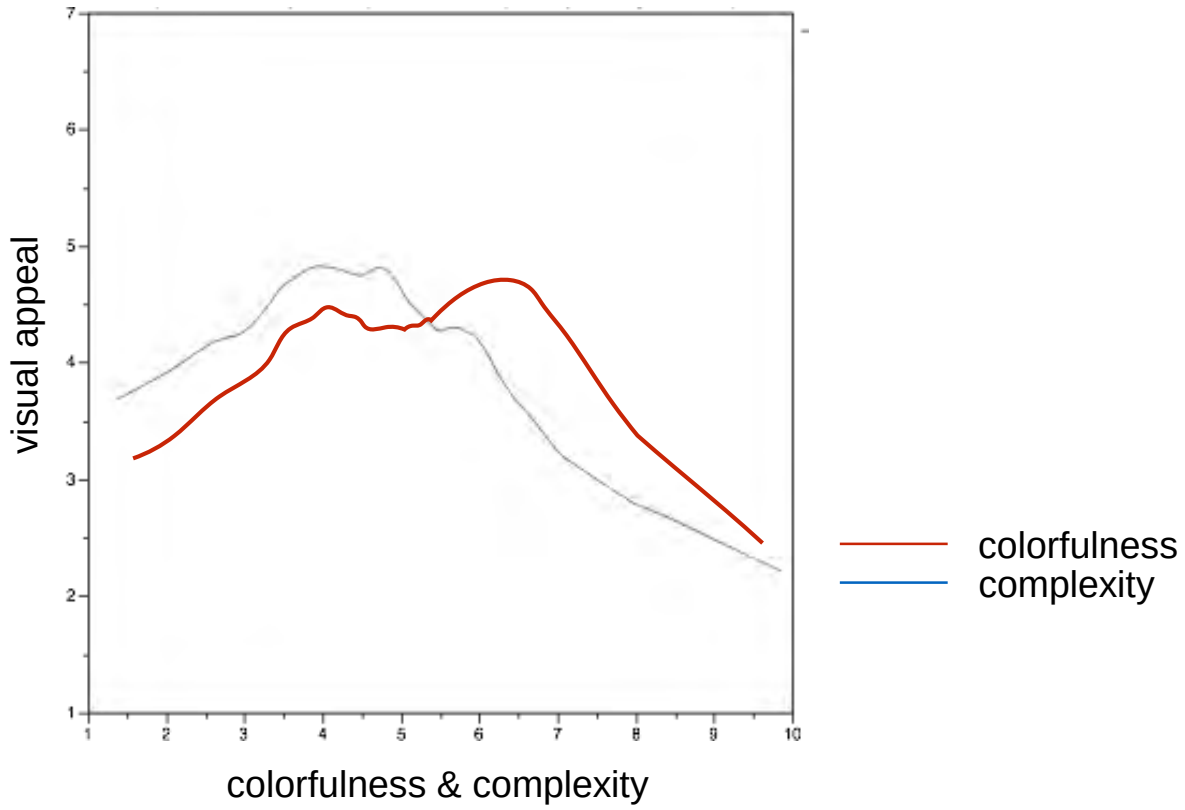






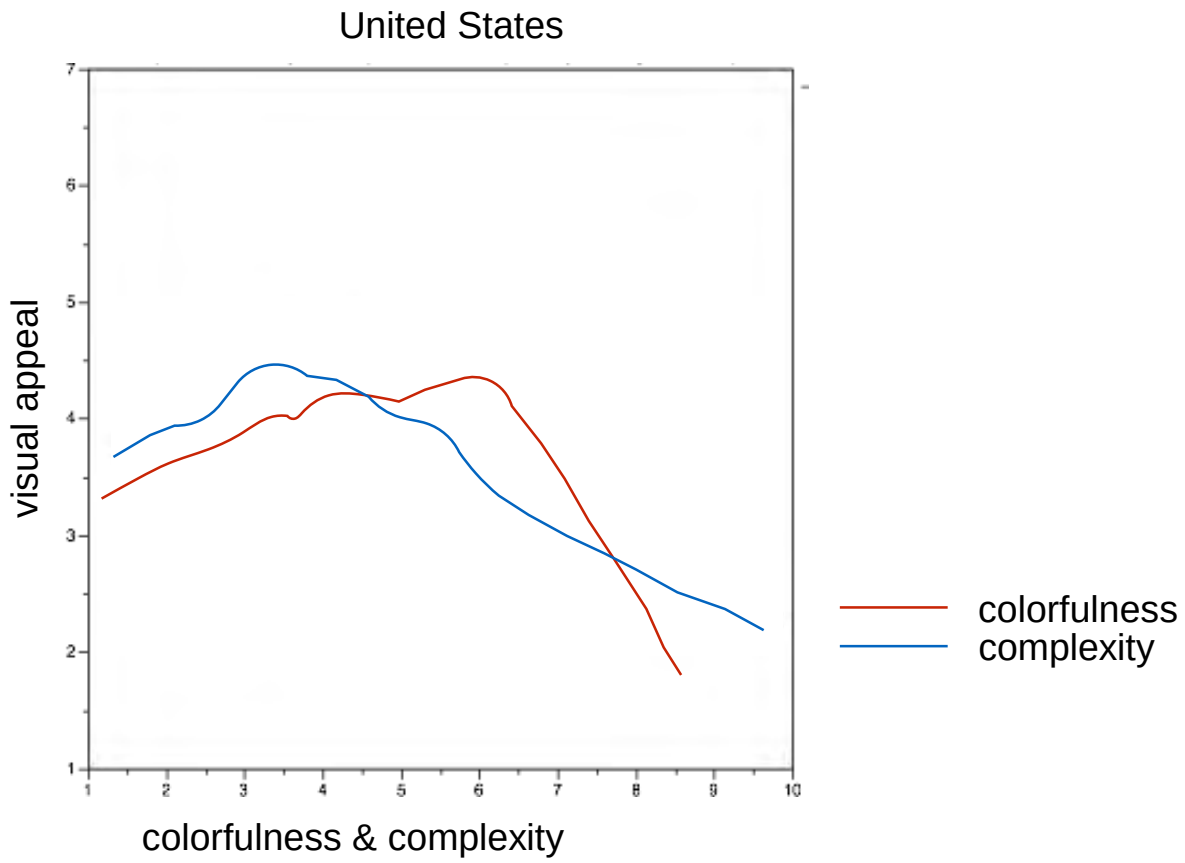
Reinecke and Gajos, CHI 2014

Plotting Appeal by Colorfulness



Reinecke and Gajos, CHI 2014

United States

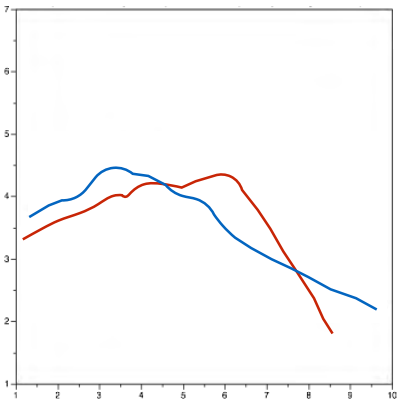


Reinecke and Gajos, CHI 2014

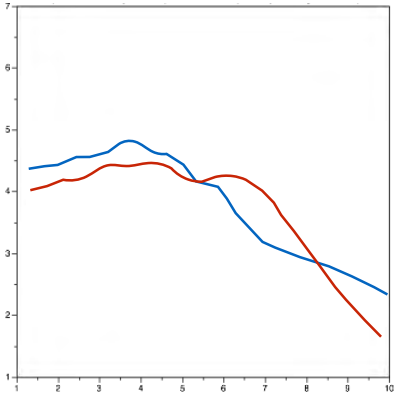
Other Countries

colorfulness
complexity

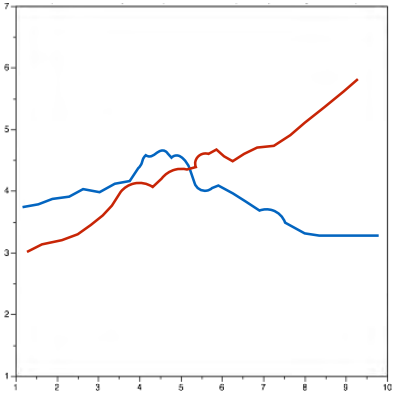
United States



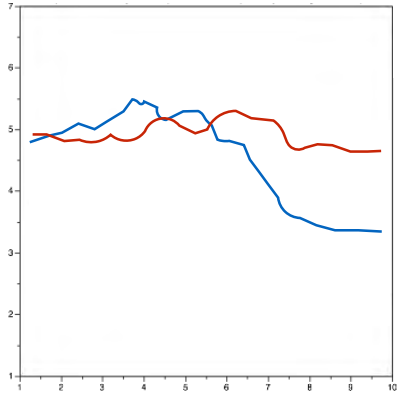
Germany



Macedonia



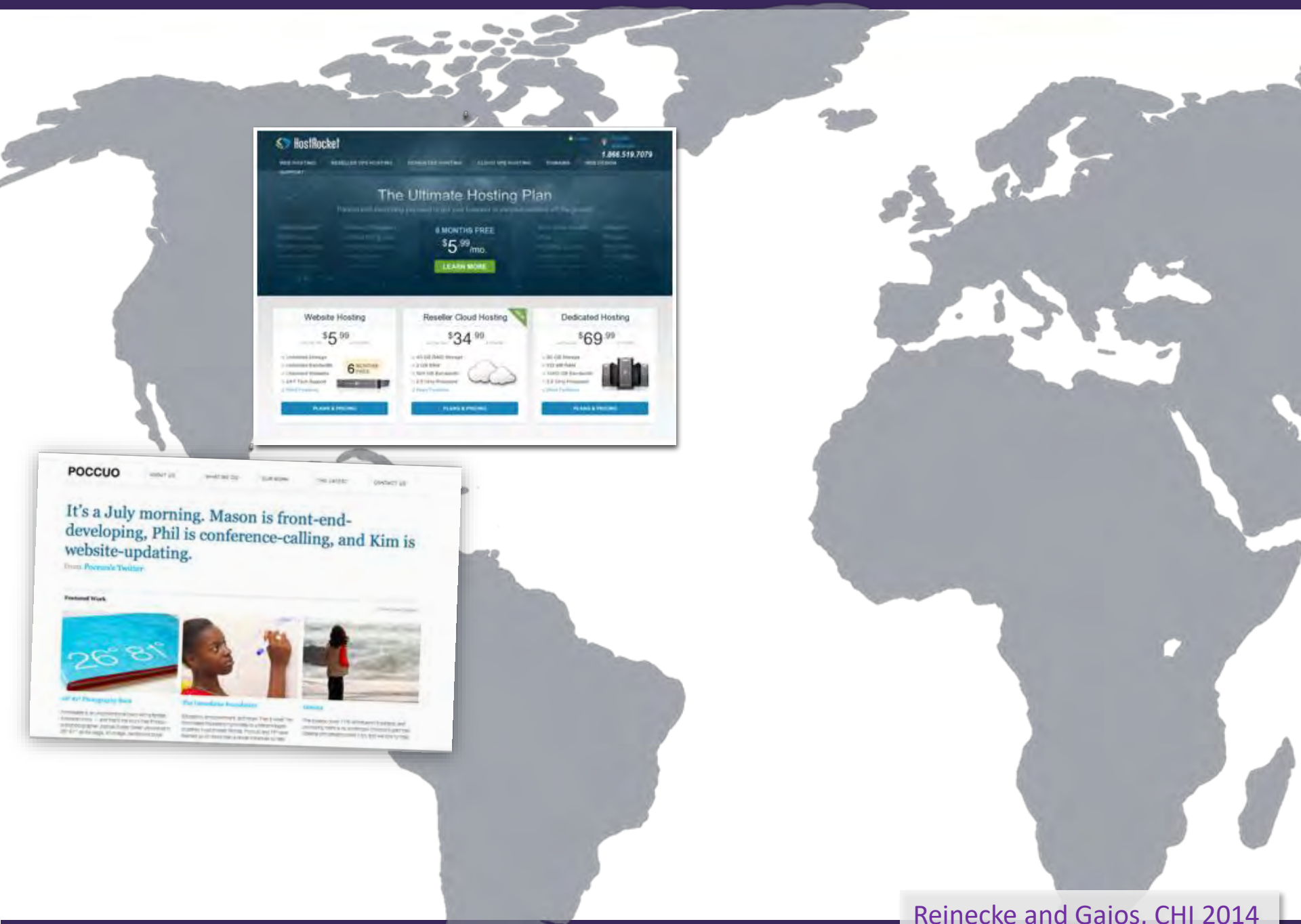
Hong Kong



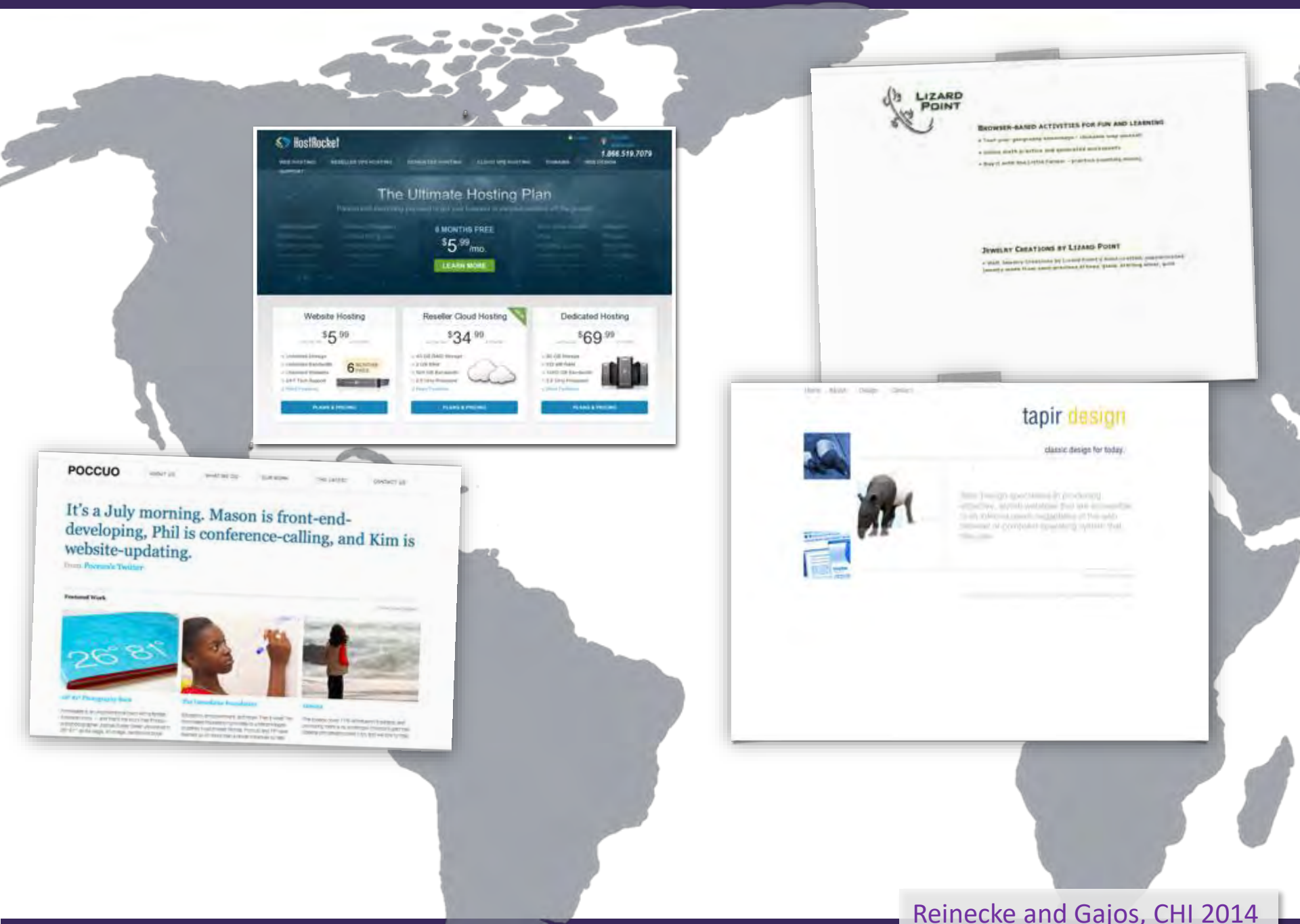
visual appeal

colorfulness & complexity

Reinecke and Gajos, CHI 2014



Reinecke and Gajos, CHI 2014

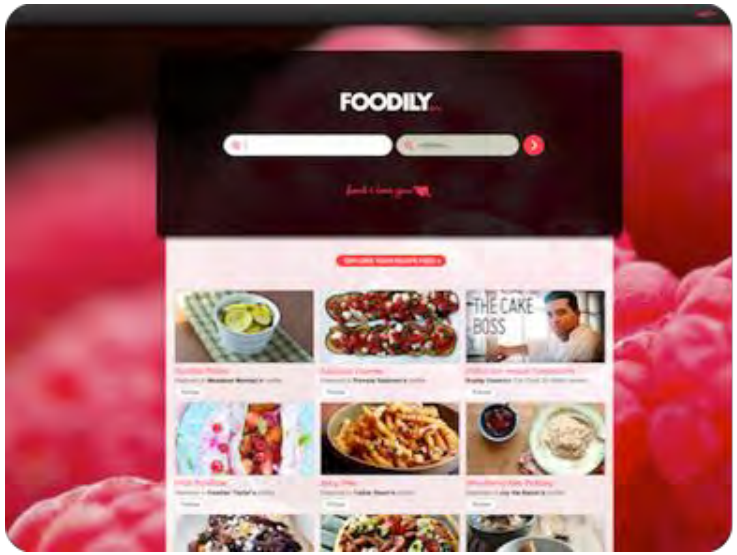


Reinecke and Gajos, CHI 2014

Reinecke and Gajos, CHI 2014

> 50 years

< 20 years



Reinecke and Gajos, CHI 2014

female

male

Reinecke and Gajos, CHI 2014

Abandoning “One Best Design”

People have different preferences

- We can study these preferences
- We can even predict these preferences

A design that emphasizes one preference will generally disadvantage some other preference

- Not always, because software is malleable

How should we think about differences

- One powerful viewpoint is social justice

Accessibility is the Law

National Federation of the Blind vs. Target, 2006

Americans with Disabilities Act, 1990

- Requires accessibility in employment, public entities and public transportation, public accommodations and commercial facilities

Rehabilitation Act, 1973

- Section 508, 1998
- Mandates federal procurement of accessible electronic and information technologies

Universal Design vs. Assistive Technology

Personal Texting by Deaf People

Teletypewriter (TTY)
used by deaf people
in their homes circa 1970

1990s TTY with
built-in acoustic modem

SMS texting

People with Disabilities

1 billion people worldwide

- 15% of the population

50 million people in US

Including yourself if you are fortunate to live to develop disabilities

A Social Justice Problem

1 billion people worldwide

15% of the population

50 million people in US

Including yourself if you are fortunate to live to develop disabilities

16% of people in the US
10% of workforce
5% of STEM workforce
1% of PhDs in STEM

Current State of Devices

Slide Rule, Kane et al, ASSETS 2008

Apple VoiceOver

Equal Access to Information

Is this access equal?

Equal Access to Information

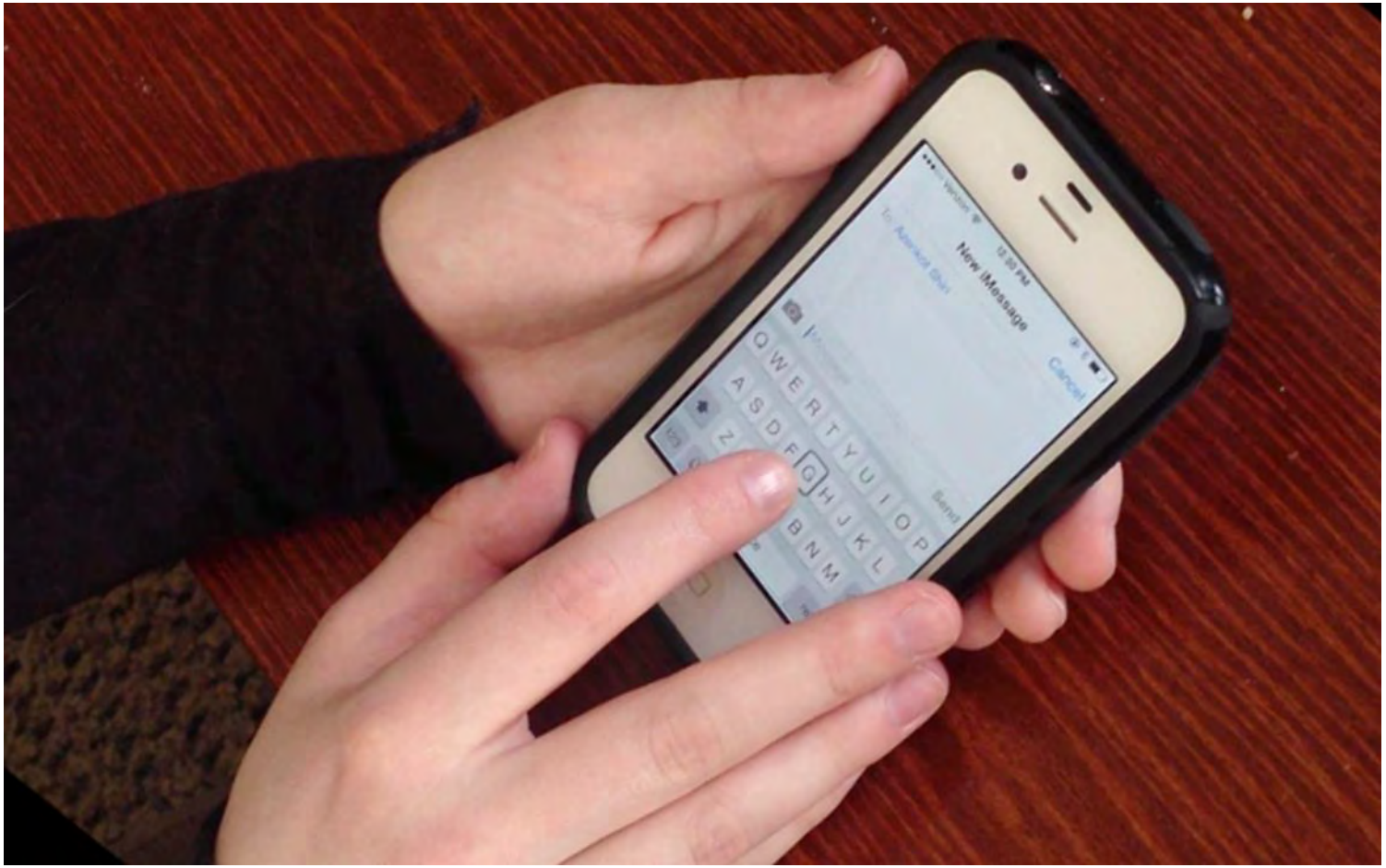
Is this access equal?

Some dimensions to consider

- Cost
- Speed
- Accuracy
- Ease

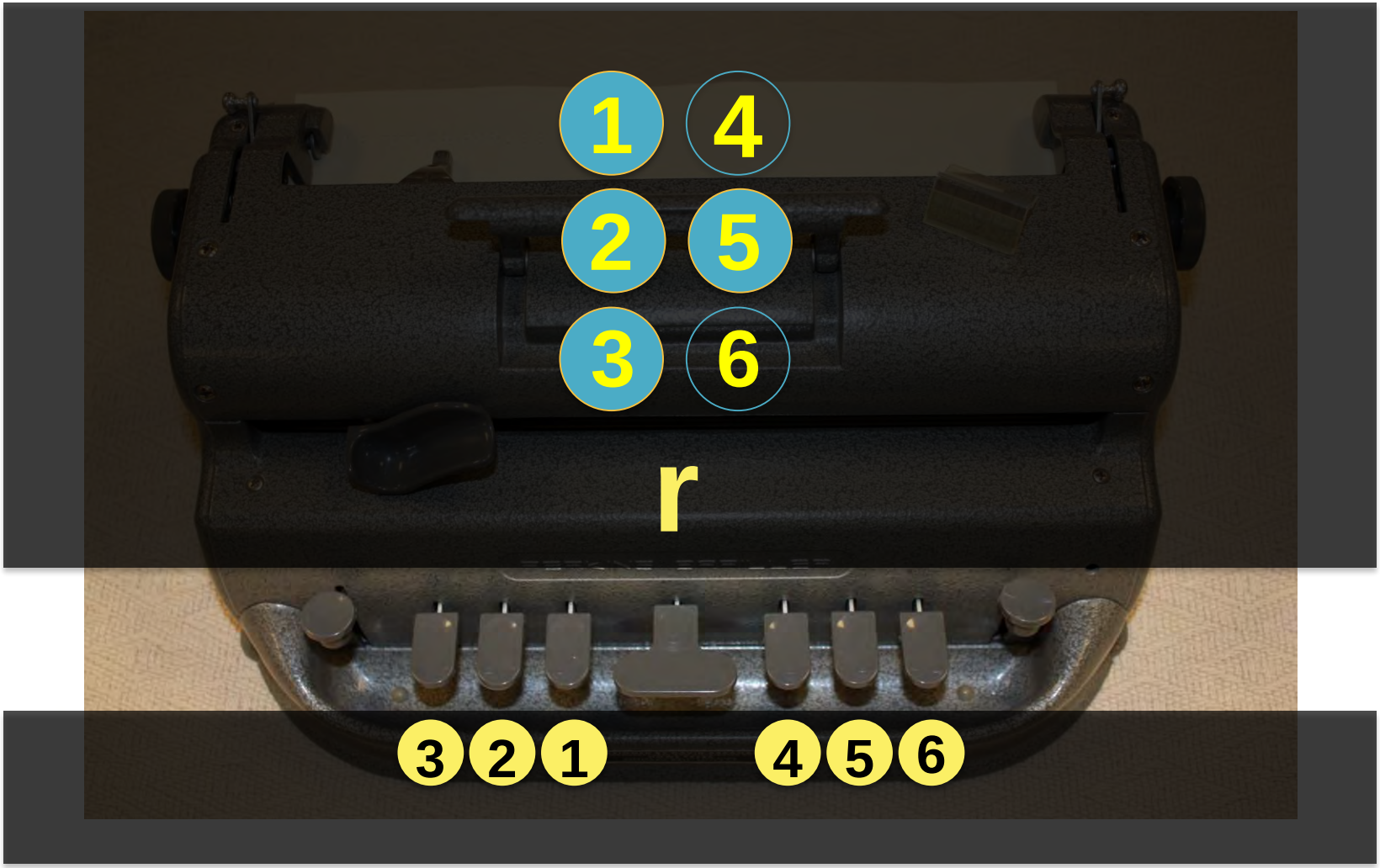
It simply being possible is not enough

A Closer Look at Text Entry



Contrast with Braille Input

Contrast with Braille Input



Ability-Based Design

States that all interfaces make assumptions about the abilities needed to use them

Any one-size-fits-all design is therefore inaccessible to many people

Instead of asking people to struggle to adapt, asks that interfaces adapt or be adaptable to match the abilities of each person

Wobbrock, TACCESS, 2011

Perkinput

Azenkot et al, GI 2012

Perkinput

Azenkot et al, GI 2012

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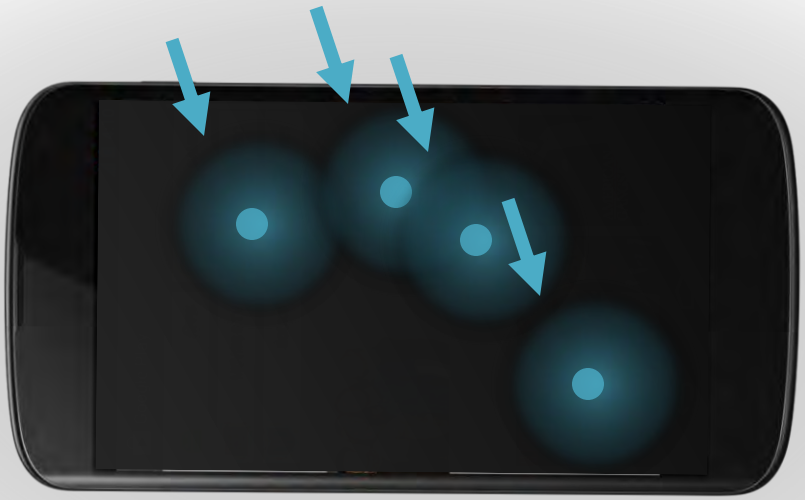
Azenkot et al, GI 2012

Perkinput



Azenkot et al, GI 2012

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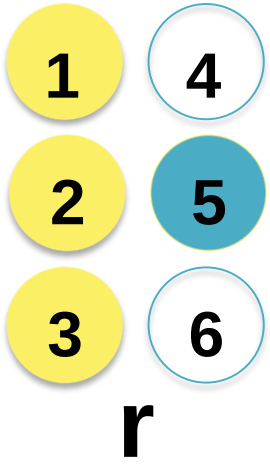

Azenkot et al, GI 2012

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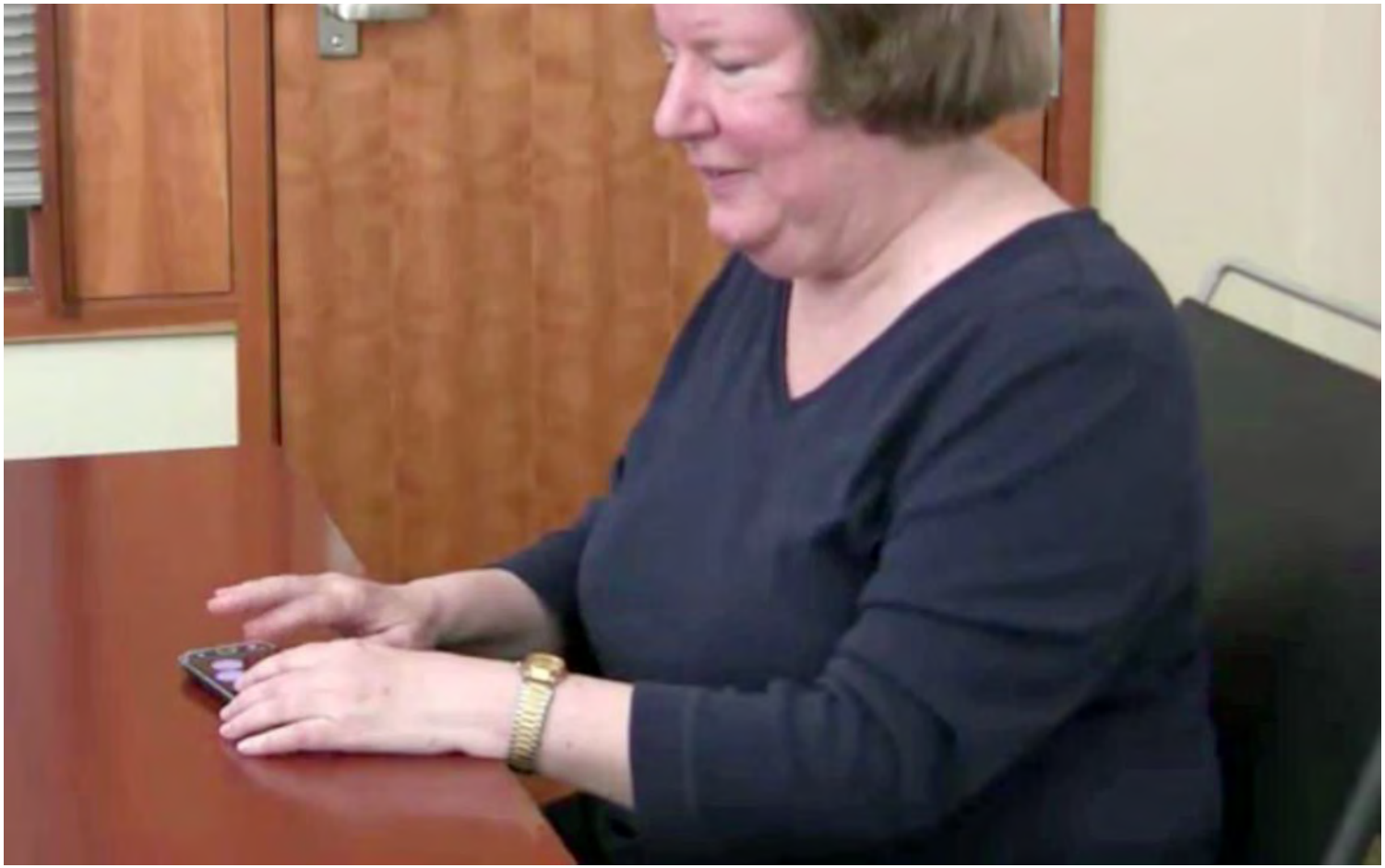
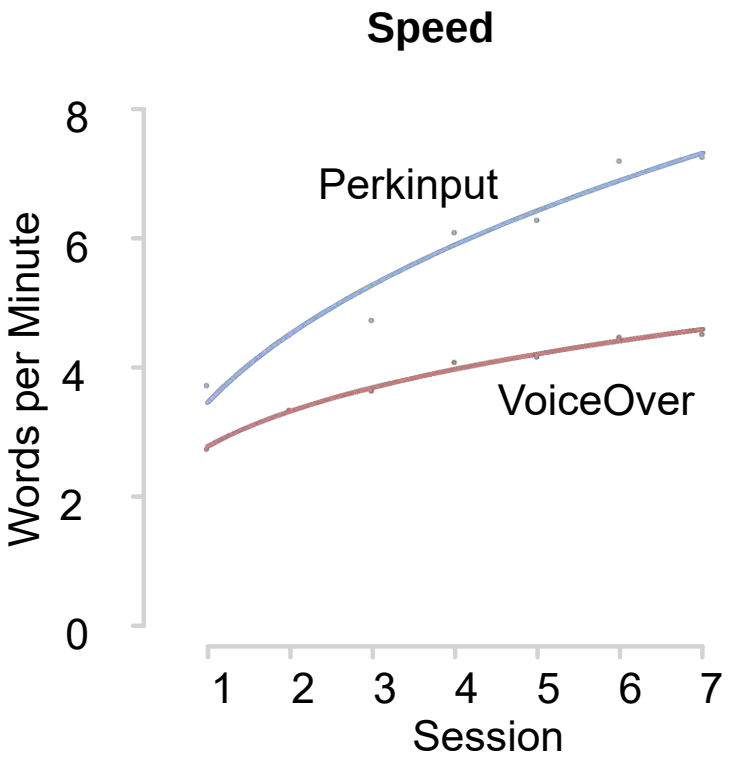
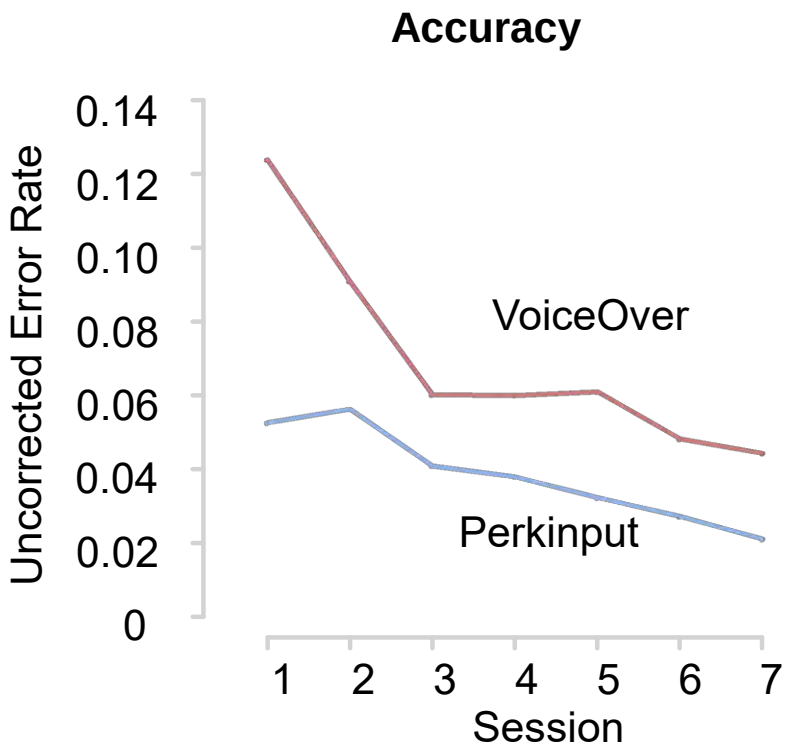


Azenkot et al, GI 2012

Speed and Accuracy





Azenkot et al, GI 2012

Another Problem

Azenkot et al, ASSETS 2012

PassChords

Azenkot et al, ASSETS 2012

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Azenkot et al, ASSETS 2012

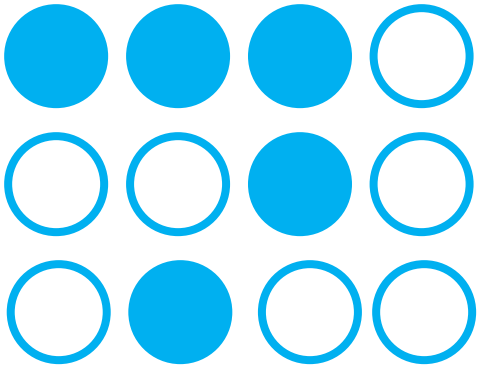
PassChords

Azenkot et al, ASSETS 2012

PassChords

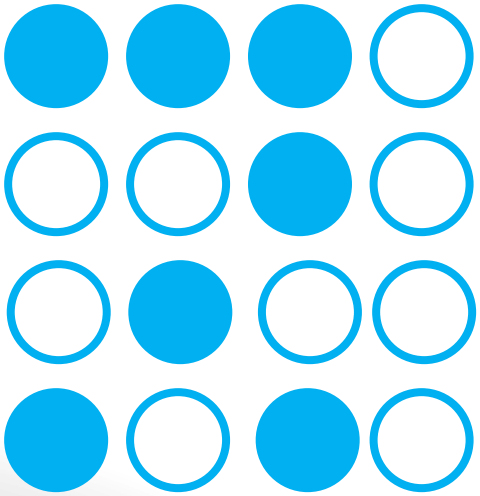
Azenkot et al, ASSETS 2012

PassChords



Azenkot et al, ASSETS 2012

PassChords

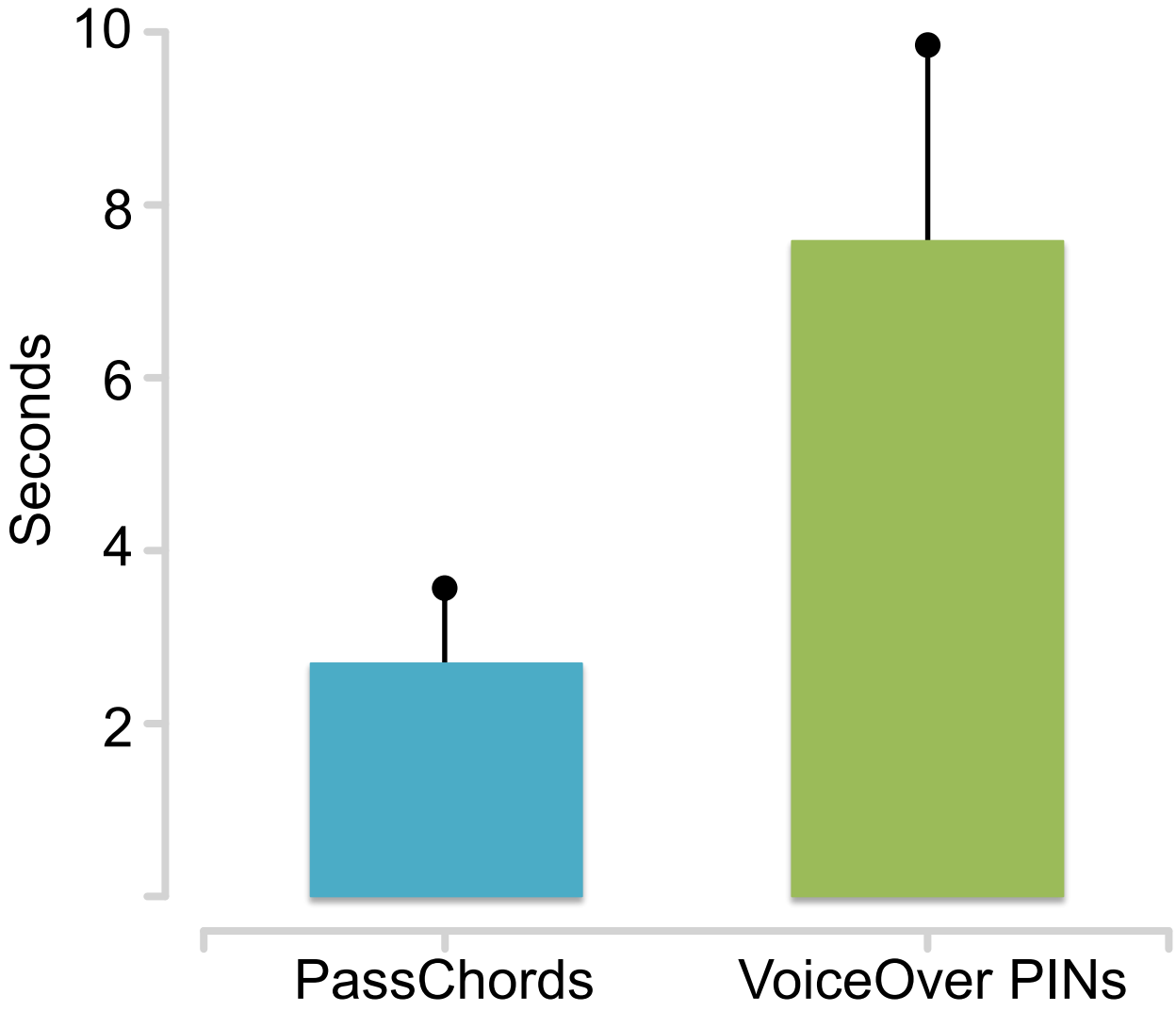


Azenkot et al, ASSETS 2012

PassChords

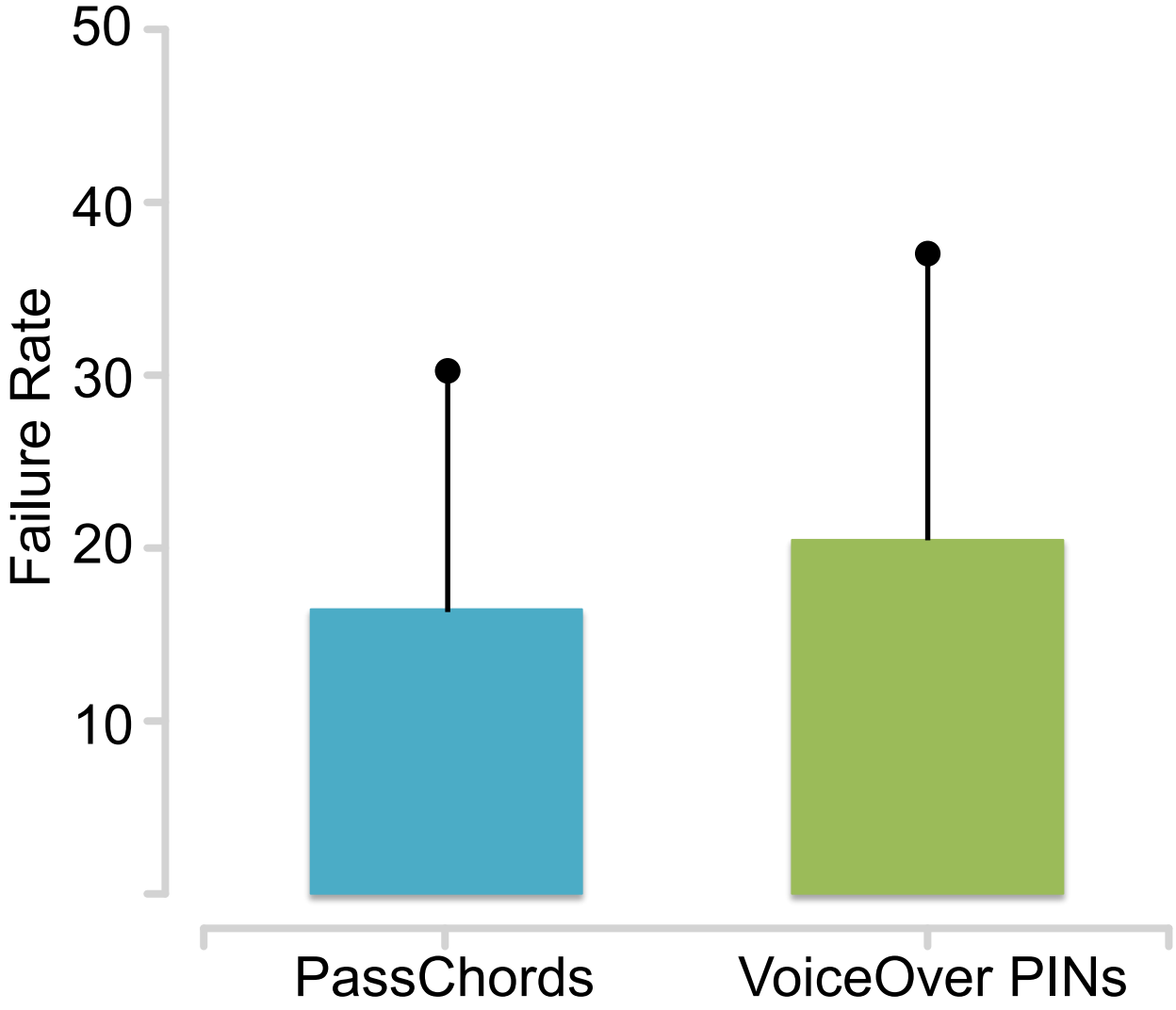
Azenkot et al, ASSETS 2012

Time to Authenticate



Azenkot et al, ASSETS 2012

Accuracy



Azenkot et al, ASSETS 2012

What About Security?

Azenkot et al, ASSETS 2012

What About Security?

One measure is Entropy

> The minimum number of bits needed to encode the set of all possible passwords

4-digit PINS: 13.3 bits

Azenkot et al, ASSETS 2012

What About Security?

A better measure is Guessing Entropy

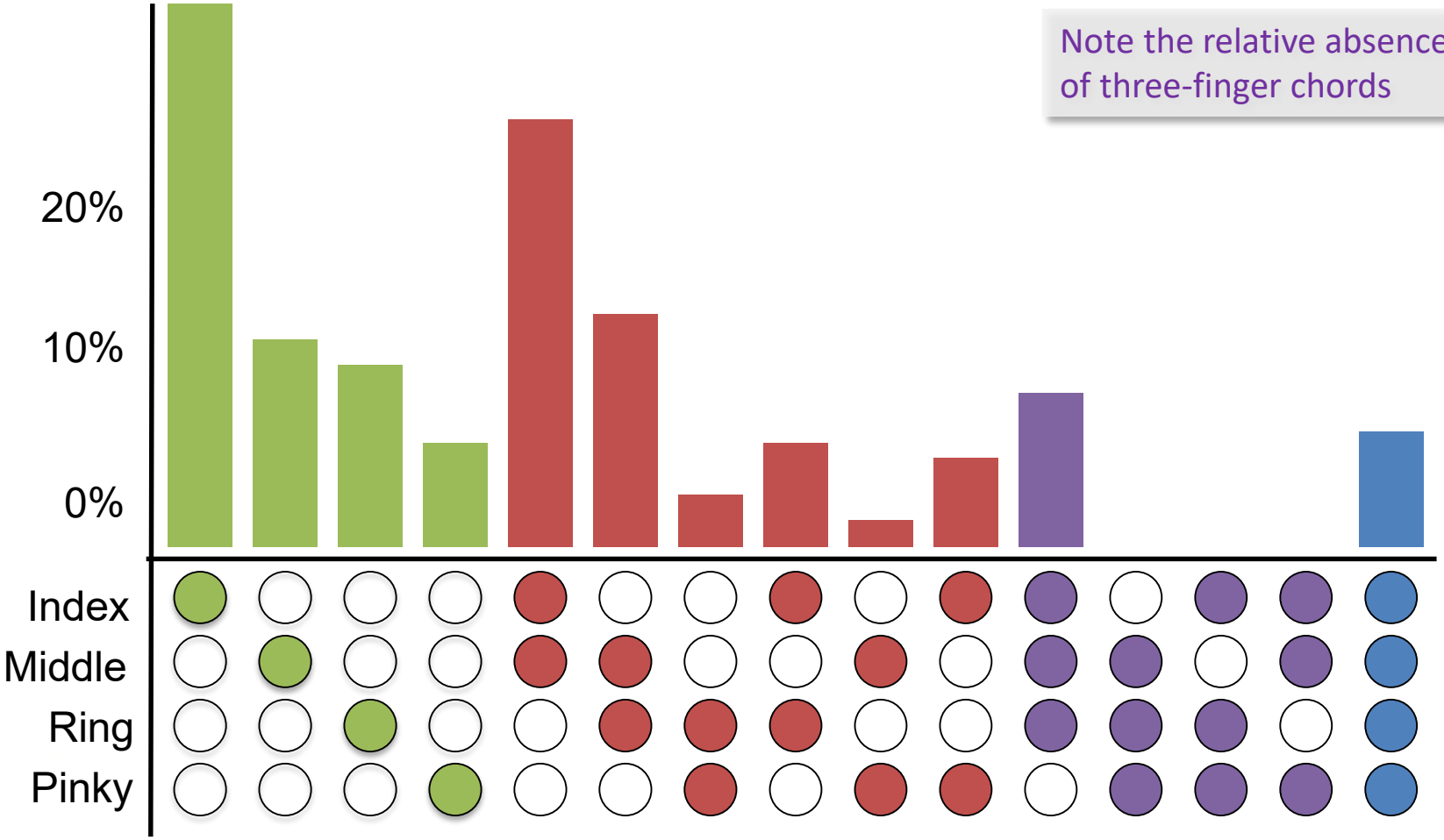
The minimum number of bits needed to encode the number of guesses given distribution

4-digit PINS: 12.7 bits

Not all PINS are equally likely

Azenkot et al, ASSETS 2012

Finger Pattern Frequency



Note the relative absence of three-finger chords

Azenkot et al, ASSETS 2012

What About Security?

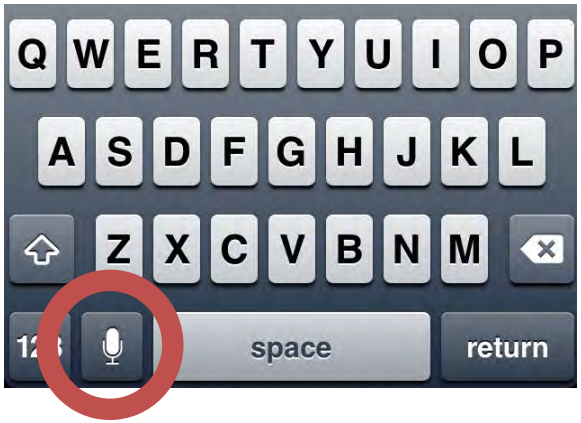
A better measure is Guessing Entropy

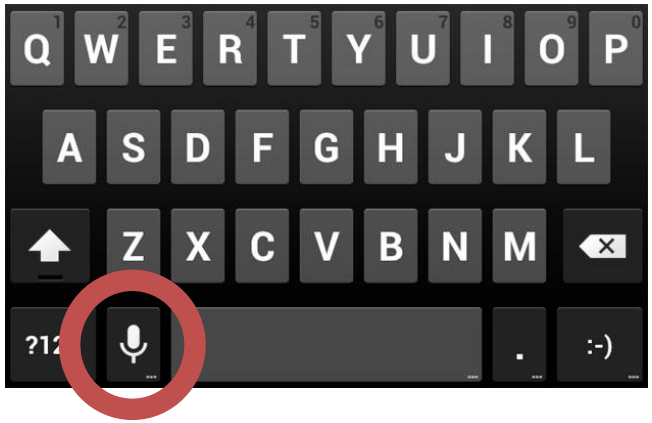
> The minimum number of bits needed to encode the number of guesses given distribution

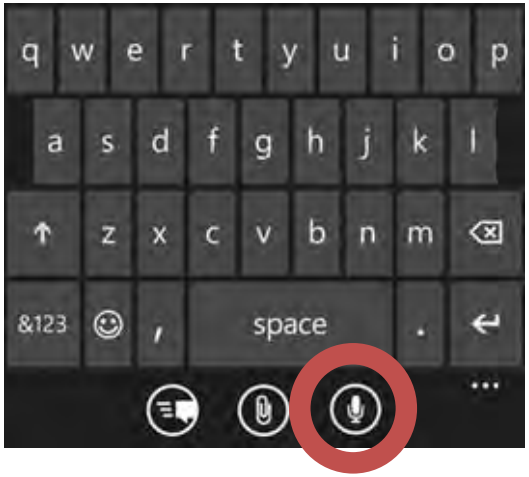
4-digit PINS:	12.7 bits
4-tap PassChords:	12.6 bits

Azenkot et al, ASSETS 2012

Speech Input







Azenkot et al, ASSETS 2013

Reviewing Errors and Edits

When of my hobbies is hiking.
I really **enjoyed** getting away…

The triangle **consist** of a **2 mile** hike to the beach, **I three-mile** hike along the beach, and a **2 mile** hike back.

It is a very common hike, but **I knew** to the **northwestern if you** like I need to do it.

Azenkot et al, ASSETS 2013

Serial Access in Reviewing Transcript

When

Serial Access in Reviewing Transcript

of

Azenkot et al, ASSETS 2013

Serial Access in Reviewing Transcript

my

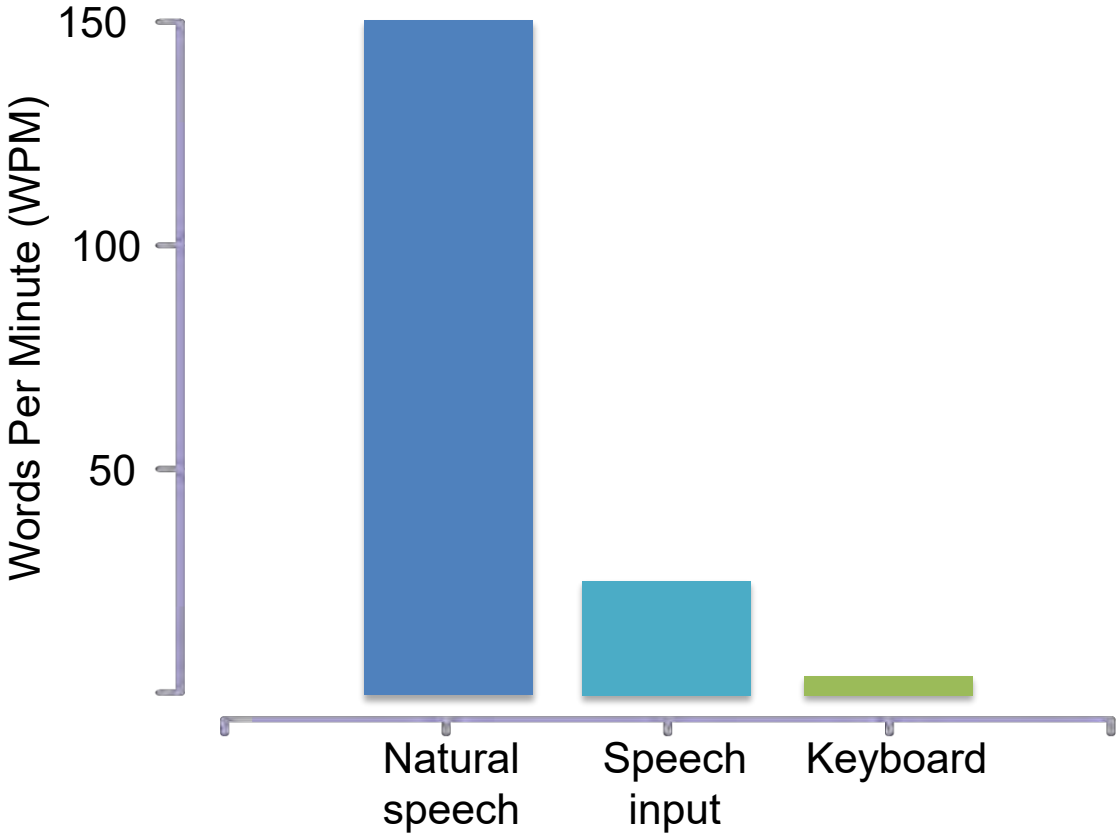
Serial Access in Reviewing Transcript

hobbies

Azenkot et al, ASSETS 2013

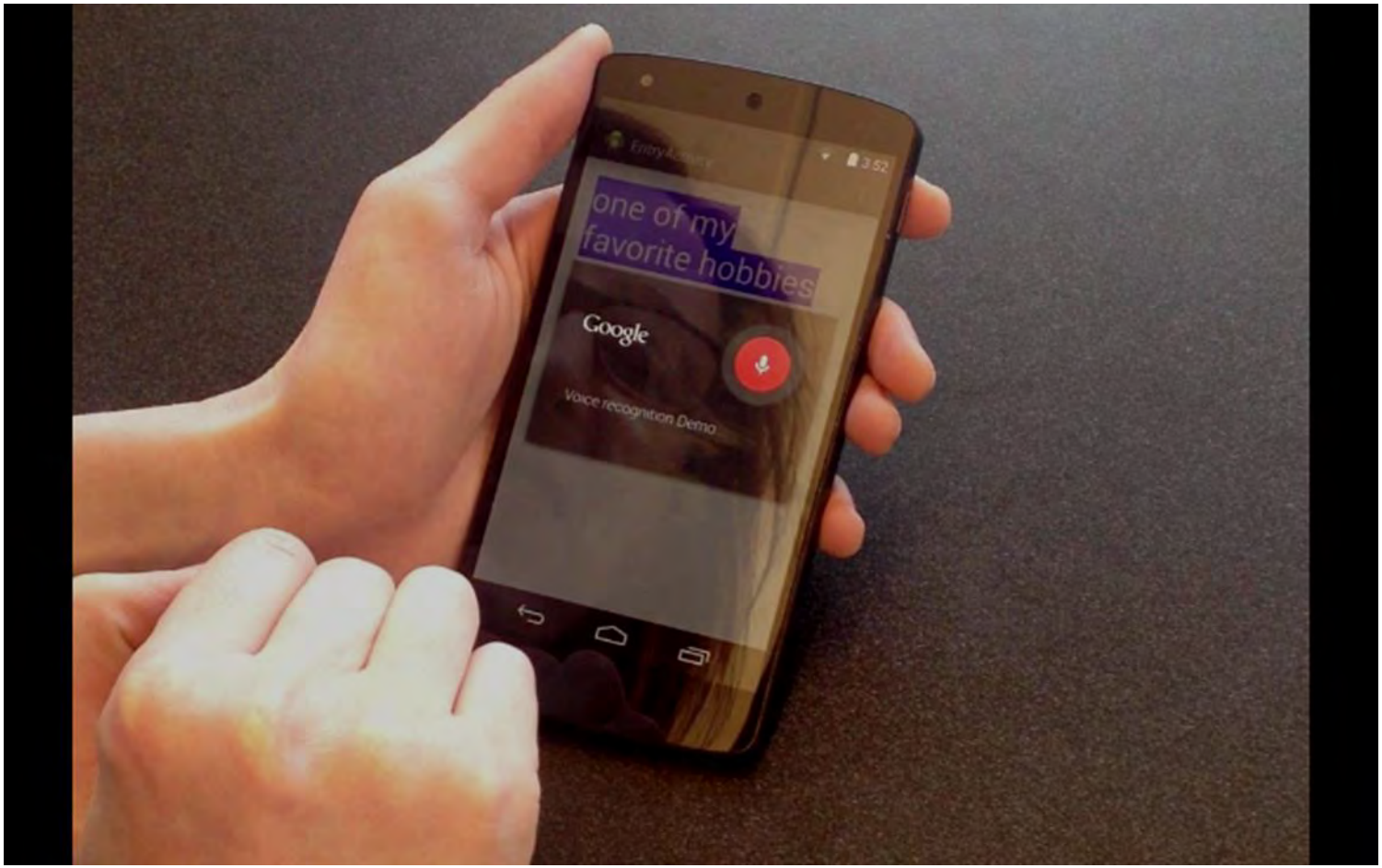
Reviews and Edits

80% of composition time in review and edits



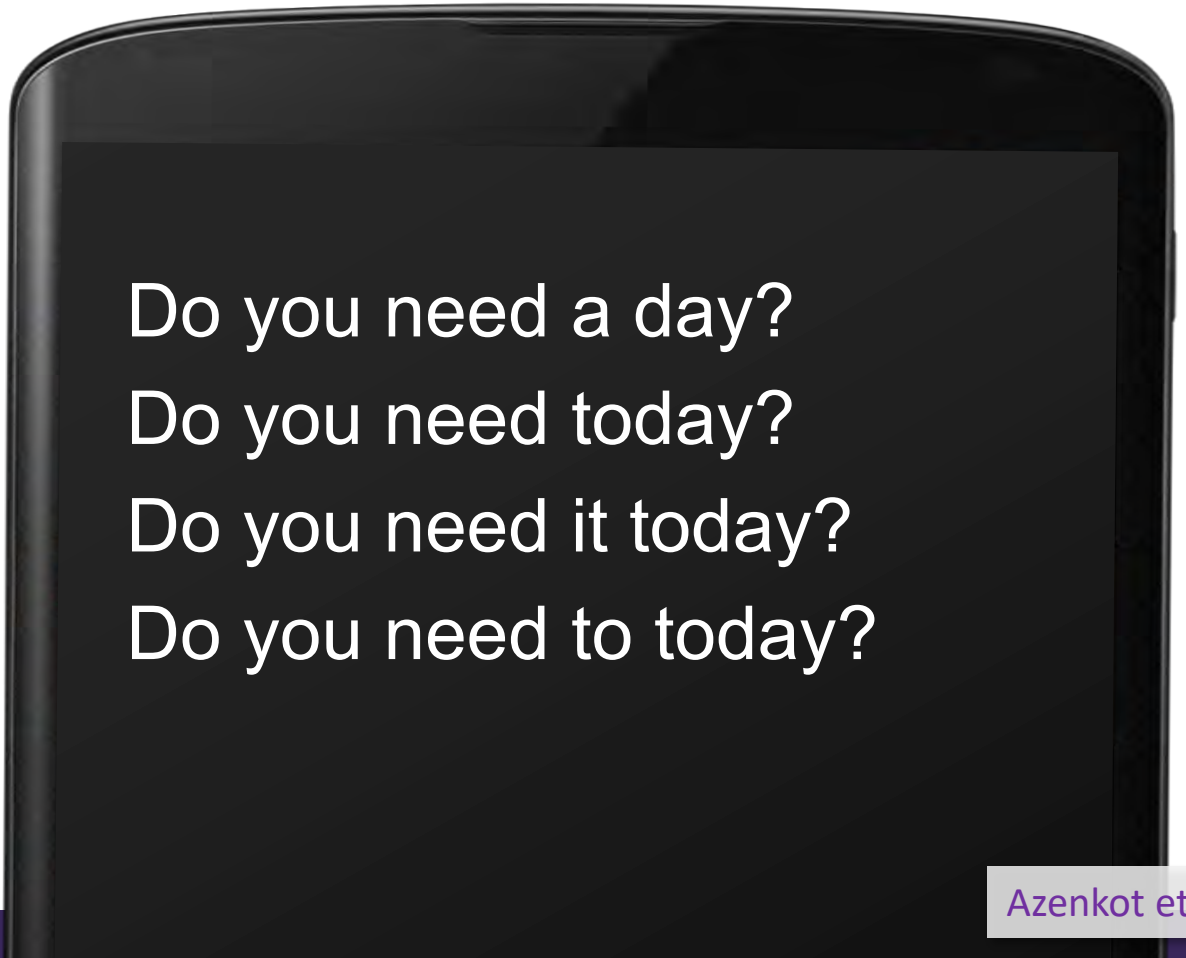
Azenkot et al, ASSETS 2013

Spifi



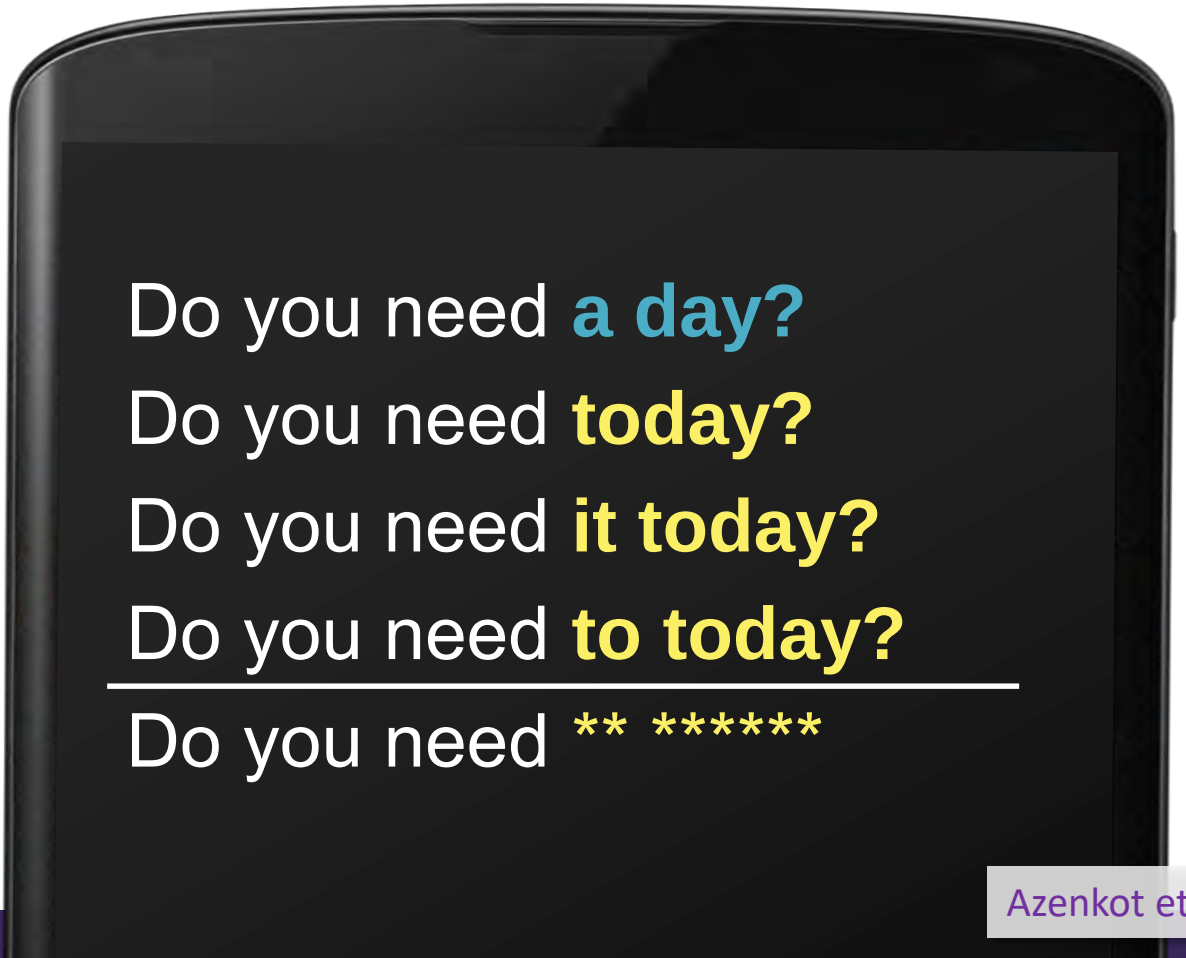
Azenkot et al, ASSETS 2013

Recognize Speech as N-best List



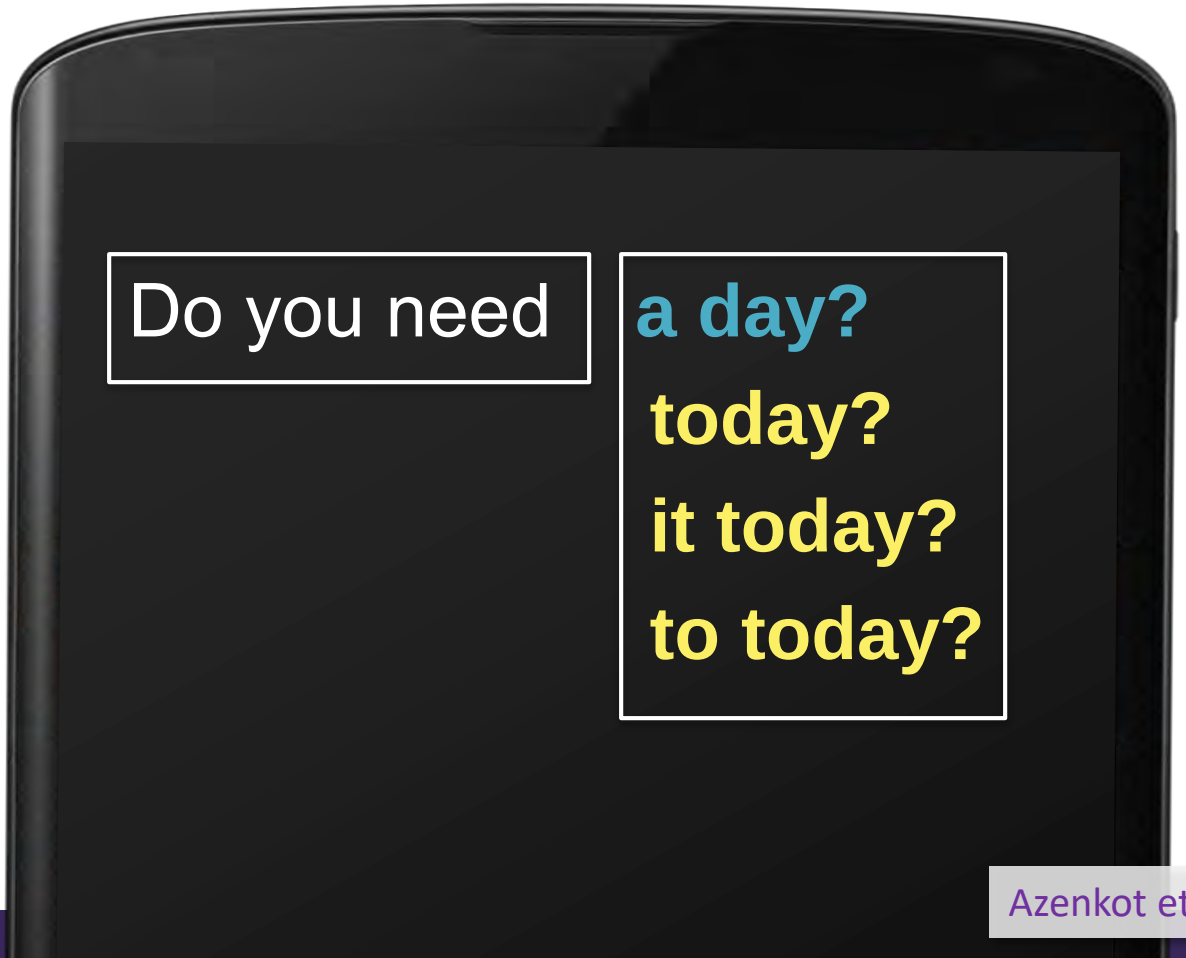
Azenkot et al, ASSETS 2013

Find Uncertain Words



Azenkot et al, ASSETS 2013

Split Into Phrases and Align Alternatives



Azenkot et al, ASSETS 2013

Accessibility is More than Text Entry

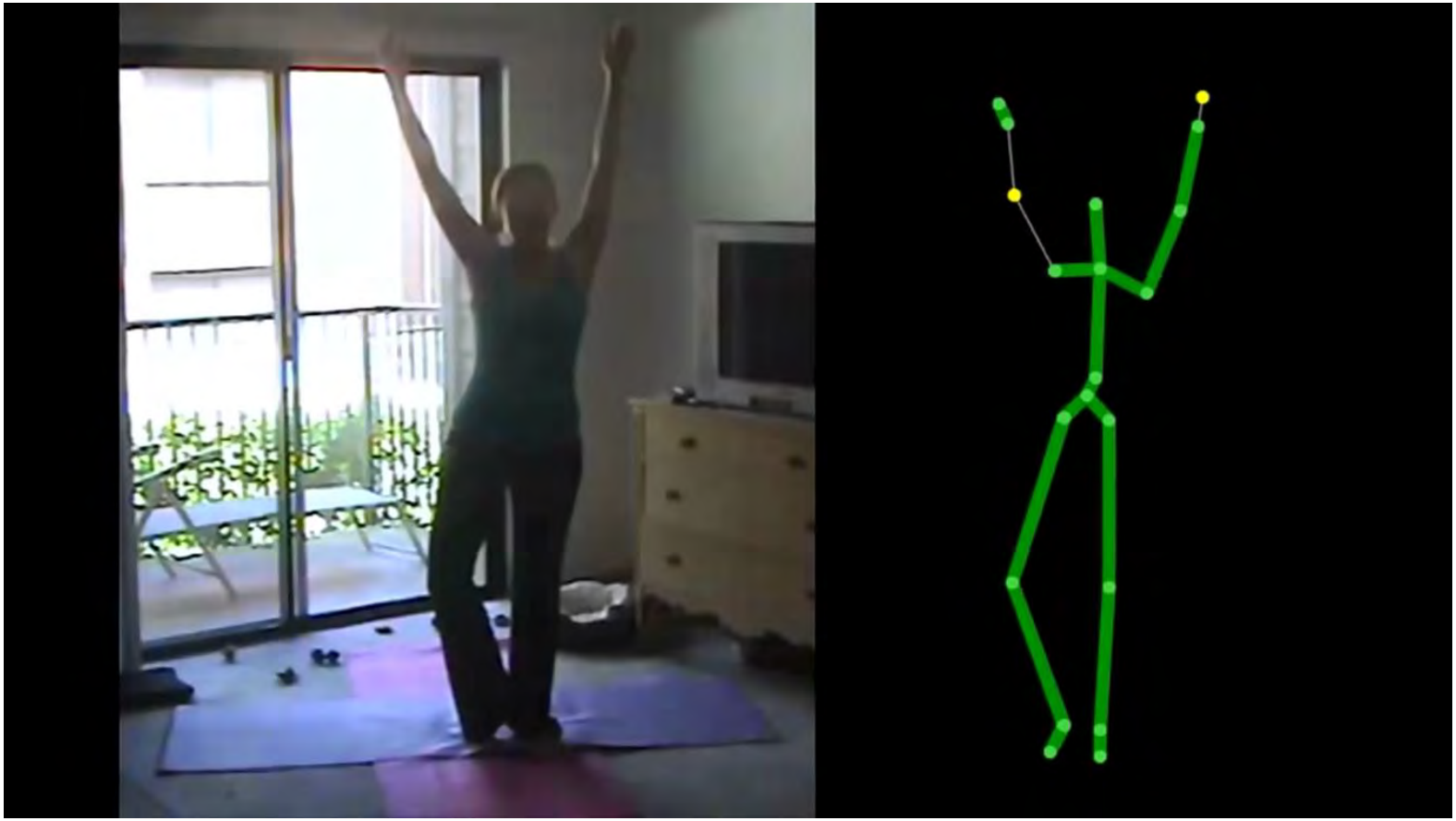
"Sometimes you don't follow along as well unless [you are] one on one."

Eyes-Free Yoga, Rector et al, ASSETS 2013

Accessibility is More than Text Entry

Eyes-Free Yoga, Rector et al, ASSETS 2013

Accessibility is More than Text Entry



Eyes-Free Yoga, Rector et al, ASSETS 2013

Accessibility is More than Text Entry

OneBusAway

Home | Tools | Research | Contact Us | Settings

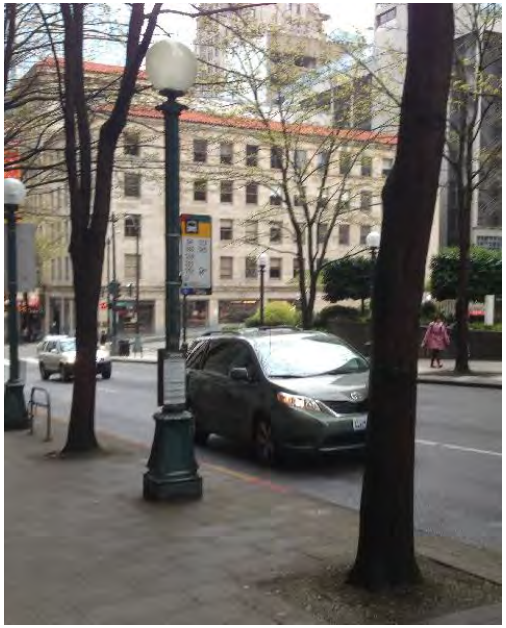
NW MARKET ST & BALLARD AVE NW
Stop # 18120 - E bound

route	destination	minutes
18	DOWNTOWN SEATTLE 03:54 - departed 2 mins late	-3
44	UNIVERSITY OF WASHINGTON MEDICAL CENTER 03:55 - scheduled departure	-3
17	DOWNTOWN SEATTLE 03:57 - departed 6 mins late	NOW
75	BALLARD 04:06 - 2 min delay	8
44	UNIVERSITY OF WASHINGTON MEDICAL CENTER 04:07 - on time	9
18	DOWNTOWN SEATTLE 04:13 - on time	15
44	UNIVERSITY OF WASHINGTON MEDICAL CENTER 04:19 - on time	21
17	DOWNTOWN SEATTLE 04:20 - on time	22
44	UNIVERSITY OF WASHINGTON MEDICAL CENTER WALLINGFORD 04:37 - 3 mins early	35

Last Update: 03:57 PM

Ferris et al, 2010

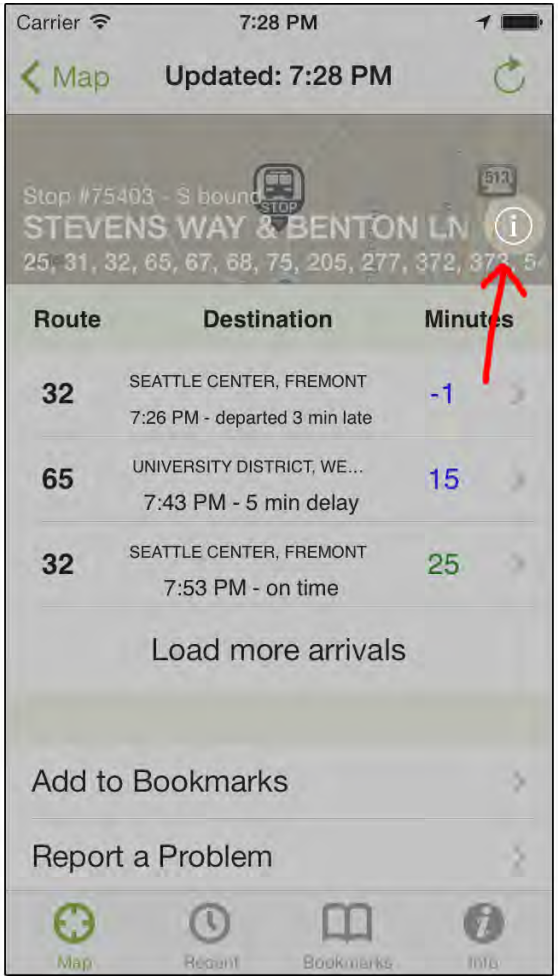
Accessibility is More than Text Entry

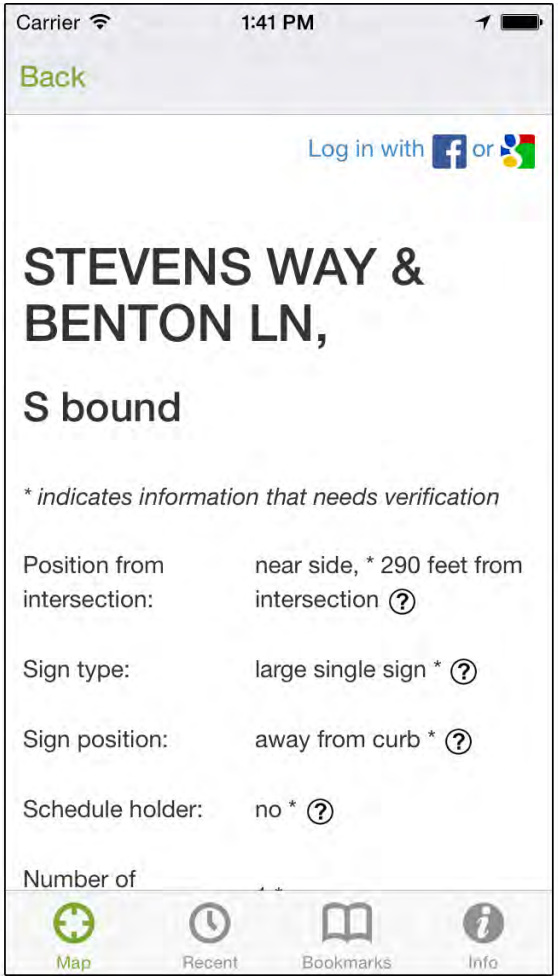


How do you find a bus stop?

Azenkot et al, CHI 2011

Accessibility is More than Text Entry





StopInfo, Campbell et al, ASSETS 2014

What is Disability?

The old model is medical, focused on the individual with a mindset of “fixing” an impairment

Current model understands disability is imposed by society and design not accounting for diversity

> “Disability is thus not just a health problem.
>
> …the interaction between features of a person’s body and features of the society in which he or she lives.
>
> Overcoming the difficulties…requires interventions to remove environmental and social barriers.”

What is Disability?

Impairment

a problem in body function or structure

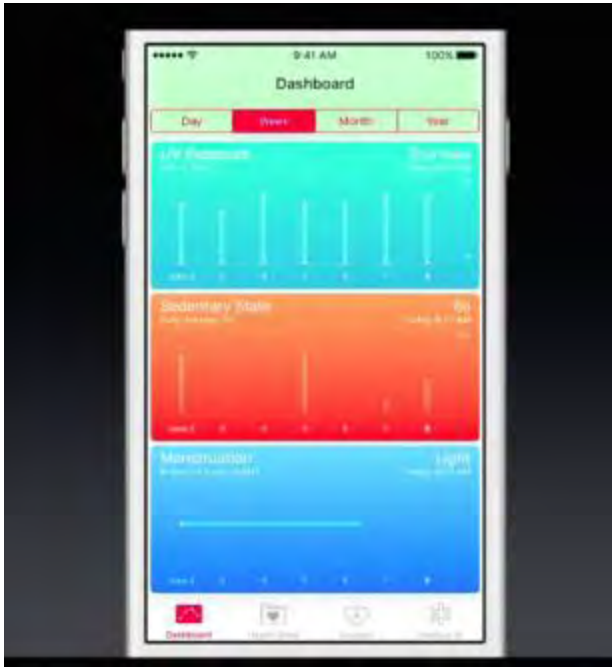
Activity Limitation

a difficulty encountered by a person in executing a task or action

Participation Restriction

a problem experienced by a person in involvement in life situations

Apple HealthKit Launch



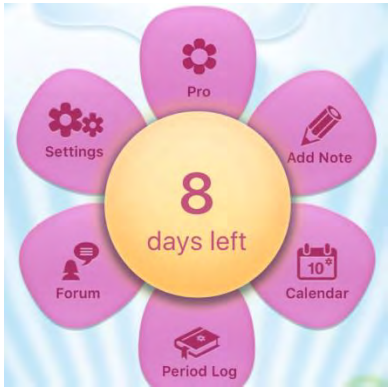
"with Health, you can monitor all of your metrics that you're most interested in" Apple Software executive Craig Federighi

"If you're a human who menstruates, you're shit out luck"

"The fact that it's a women's issue isn't grounds for dismissal"

http://www.theverge.com/2014/9/25/6844021/apple-promised-an-expansive-health-app-so-why-cant-i-track

Pinkification and Menstruation



Period Diary

P. Tracker Lite

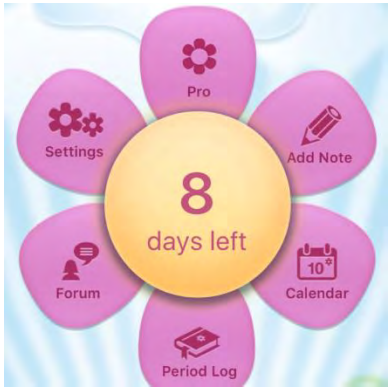
Other apps already exist for tracking menstrual cycles

Most employ feminine, pink, flowery aesthetics

If you only focus on the pink, you can also miss important design needs

Epstein et al, CHI 2017

Pinkification and Menstruation



Period Diary

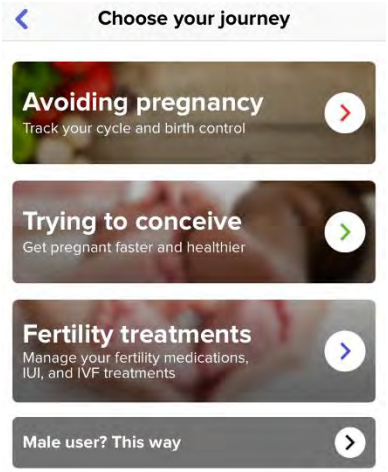
P. Tracker Lite

"they have tried to make it 'feminine' by adding flowers… It makes me feel like you are trying to 'dumb it down' for me. Why can't keeping track of my menstruation be a professional and organized task?"

"a lot of them just felt kind of condescending or like they were designed by dudes who were designing what they thought a woman would like."

Epstein et al, CHI 2017

Diverse Needs and Menstruation



Glow

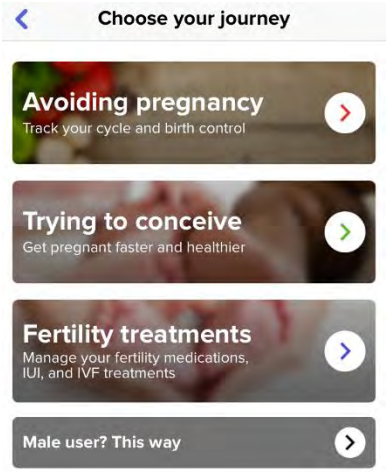
Clue

Designs implicitly assumed gender or sexual orientation

Assumptions can be subtle, like in iconography or how text is phrased

Epstein et al, CHI 2017

Diverse Needs and Menstruation



Glow

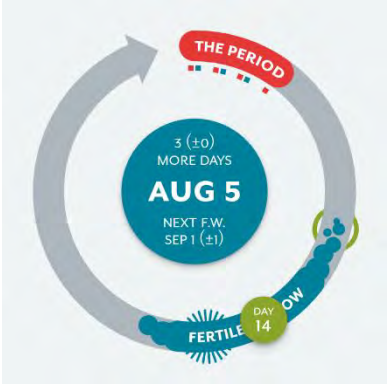
Clue

"it's hard to find tools that work for me! [Clue] uses gender neutral language… it's also not focused on pregnancy, which I'm not interested in at all."

"sex options assume sex with a man, and reminder of ovulation cycle both remind me I am not a 'normal' woman whenever I use the app… but it's not overly pink so I deal."

Epstein et al, CHI 2017

Diverse Needs and Menstruation



Clue

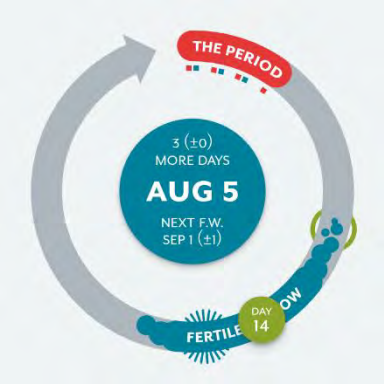
Life

Designs often highlight ovulation information alongside the period

Such content aligns with some people's needs for tracking while de-emphasizing or ignoring the needs of others

Epstein et al, CHI 2017

Diverse Needs and Menstruation



Clue

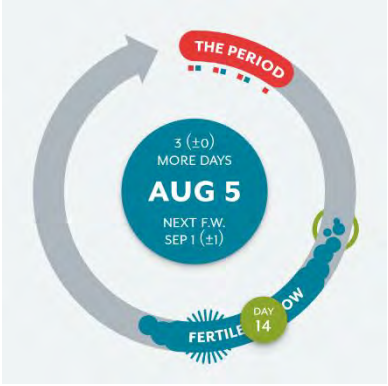
Life

"when I was younger I used to just remember. When I started trying for a baby, it became important to know my fertile times."

"I would like it if they made a kid's version because idc [I don't care] about fertile!! I'm too young!!"

Epstein et al, CHI 2017

Diverse Needs and Menstruation



Clue

Life

"my app shows predicted ovulation. I wish it didn't. We dealt with infertility and extensive treatments for 6 years. I am no longer trying to get pregnant and I don't like the reminder of TTC [trying to conceive] or the tiny glimmer of hope that maybe by magic this will be the month when a miracle happens."

"a constant reminder of trying to conceive and not succeeding"

Epstein et al, CHI 2017

Back to Bic for Her

It is very, very hard to imagine that the people who made the decision to launch “Bic for Her” were the same women expected to buy them.

http://www.forbes.com/sites/davidvinjamuri/2012/08/30/bic-for-her-what-they-were-actually-thinking-as-told-by-a-man-who-worked-on-tampons/

Back to Bic for Her

It is very, very hard to imagine that the people who made the decision to launch "Bic for Her" were the same women expected to buy them.

There are lots of ways to make an awful mistake, but some of the worst could be avoided if consumer companies were staffed by actual consumers. Entrepreneurs rarely make this kind of mistake because they tend to start businesses to solve their own problem. That's why they rarely look as silly as Bic does right now.

http://www.forbes.com/sites/davidvinjamuri/2012/08/30/bic-for-her-what-they-were-actually-thinking-as-told-by-a-man-who-worked-on-tampons/

A Social Justice Problem

1 billion people worldwide

15% of the population

50 million people in US

Including yourself if you are fortunate to live to develop disabilities

16% of people in the US
10% of workforce
5% of STEM workforce
1% of PhDs in STEM

"Entrepreneurs … tend to start businesses to solve their own problem"

Diverse participation is critical in effective design

A Basic Tenet of Design

You are not designing for yourself

You need to understand the context of your design and the people who will use it

We need diversity in who is doing design

- As a field, our work suffers because of this failing

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 14:
Designing for Diverse Needs

James Fogarty
Eunice Jun
David Wang
Elisabeth Chin
Ravi Karkar

Tuesday / Thursday
10:30 to 11:50