

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 13:
Designing for Diverse Needs

James Fogarty
Alex Fiannaca
Lauren Milne
Saba Kawas
Kelsey Munsell

Tuesday/Thursday
12:00 to 1:20



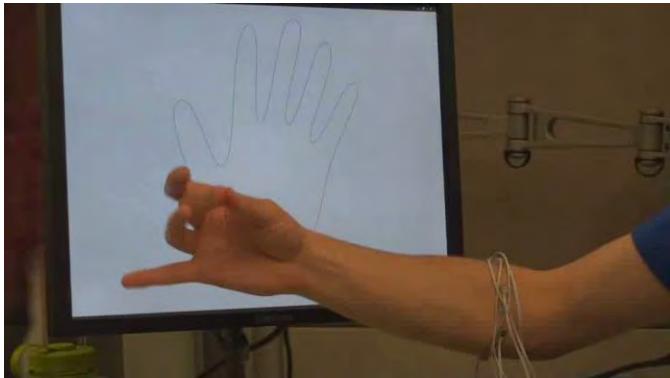
Today

Usability Testing Check-Ins Tomorrow

UIST Report

Designing for Diverse Needs

Wearable Electromyography (EMG)



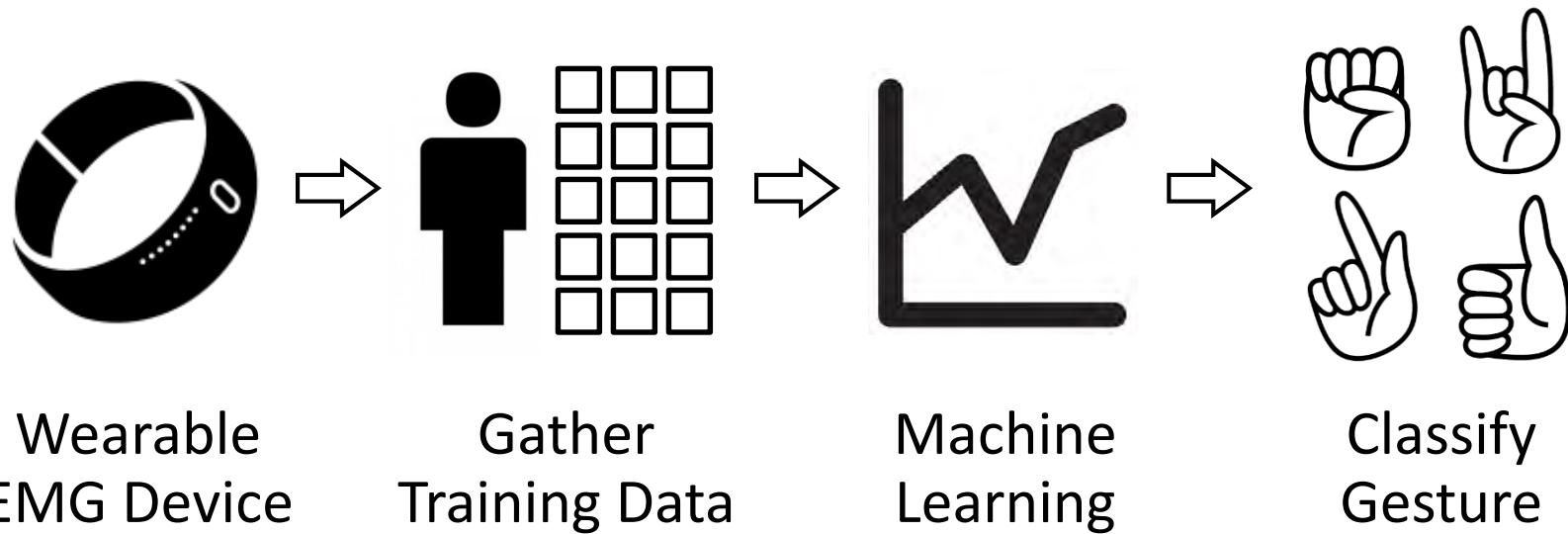
Saponas, et al., UIST '09



Myo Armband



Classic Gesture Classification

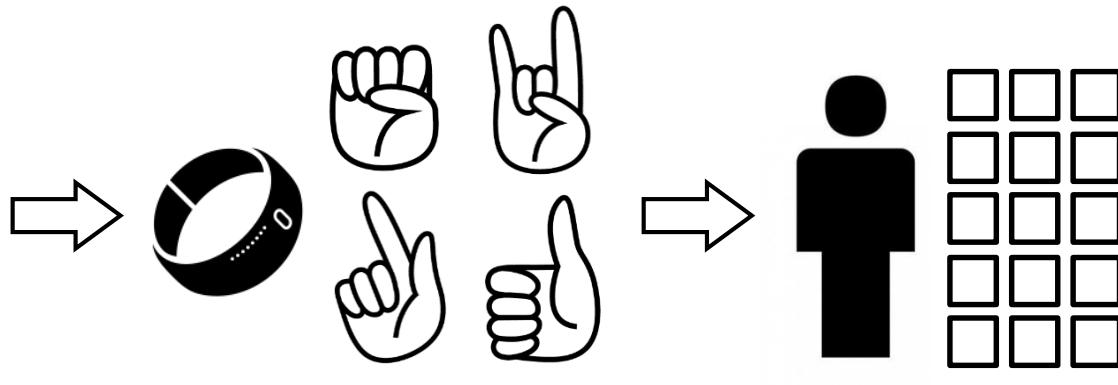


Dual-Observable Input

Enables a large amount of person specific training data to be gathered through existing interactions



Interactions With
Existing Devices



Corresponding
Gestures

Generate
Training Data

ThumbsUp: A Wearable EMG Input Device



ThumbsUp: A Wearable EMG Input Device



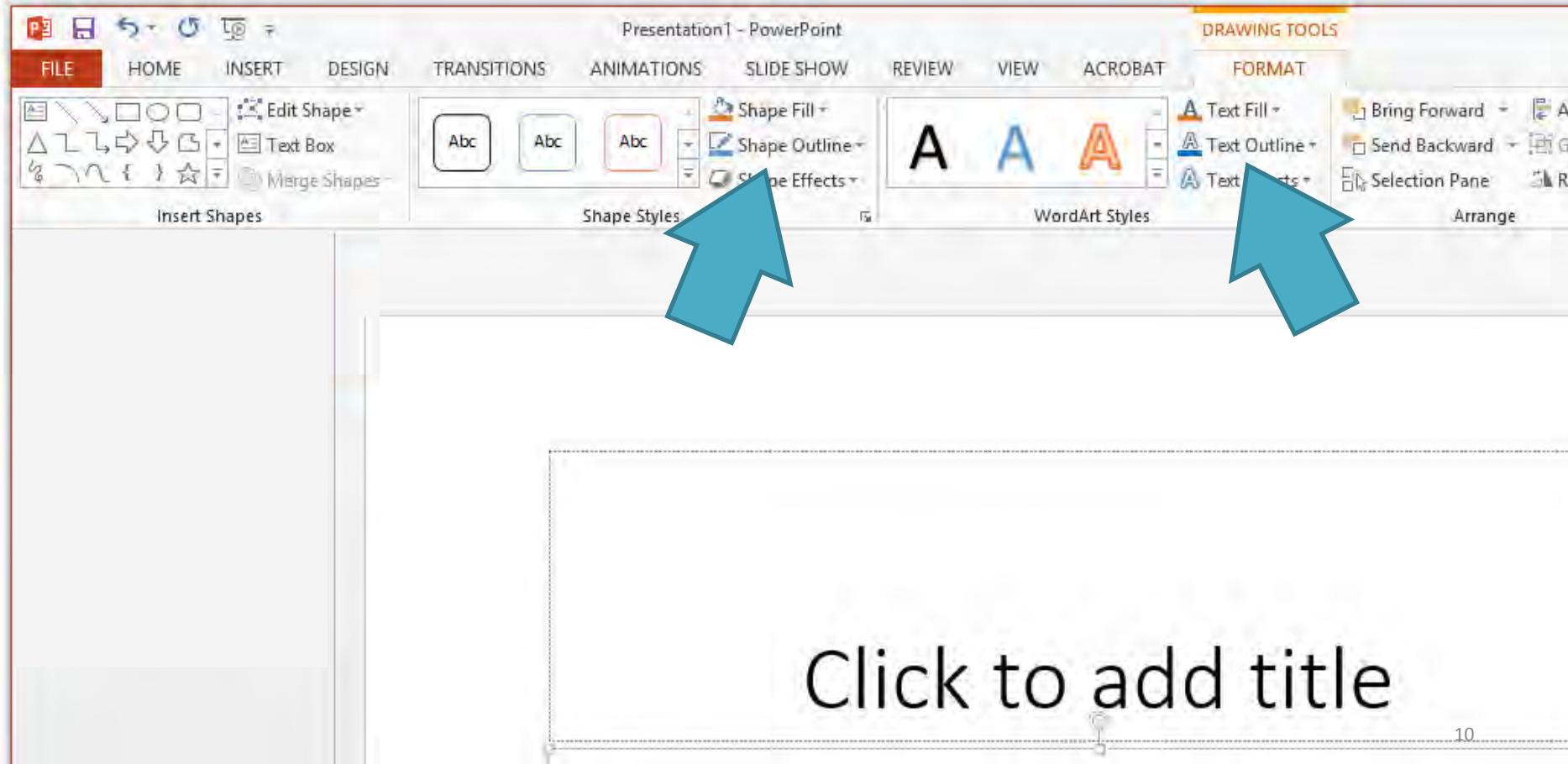
These Aren't the Commands You're Looking For

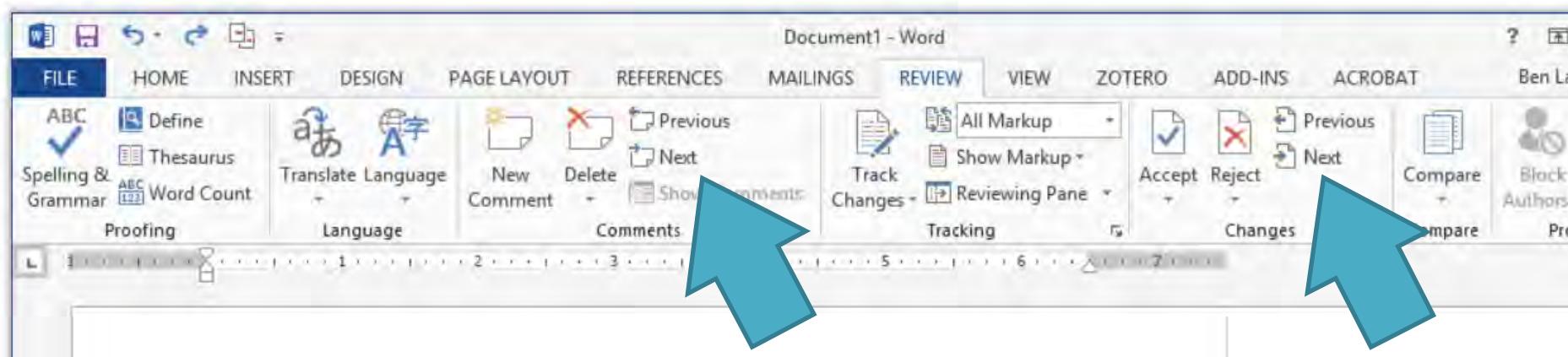
Addressing False Feedforward in Feature-Rich Software

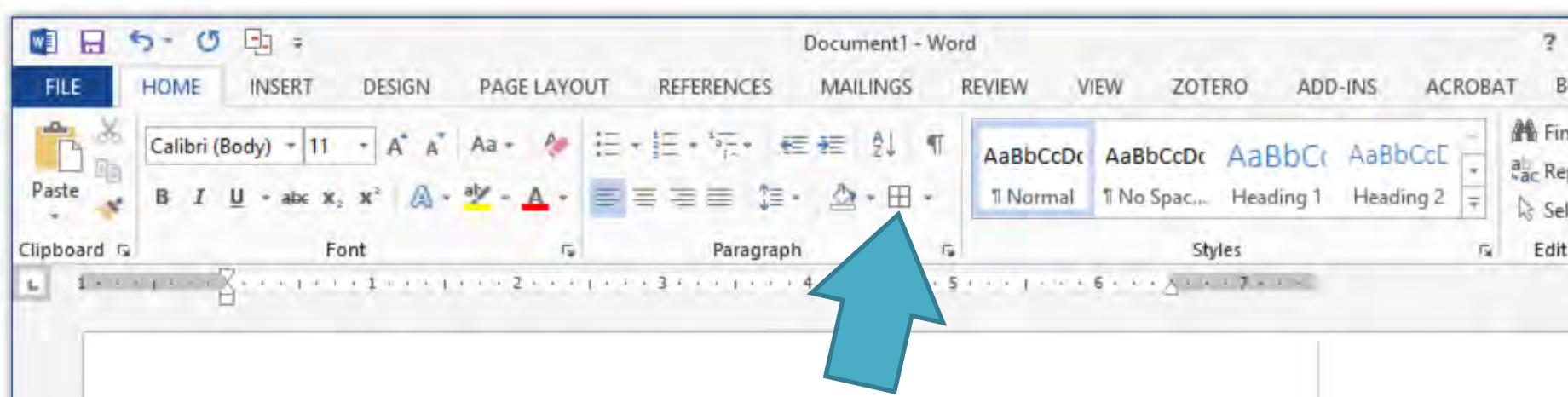
Benjamin Lafreniere,
Parmit Chilana,
Adam Fourney,
Michael Terry

WATERLOO HCI

 **AUTODESK.**
RESEARCH







“False-Feedforward Errors”

Occur when cues in the interface suggest to the user that an action will yield a particular result, when in fact it will not.

Image Layer Colors Tools Filters Windows Help

Duplicate Ctrl+D

Mode

Transform

Canvas Size...

Fit Canvas to Layers

Fit Canvas to Selection

Print Size...

Scale Image...

Crop to Selection

Autocrop Image

Zealous Crop

Merge Visible Layers... Ctrl+M

Flatten Image

Align Visible Layers...

Guides

Configure Grid...

Image Properties Alt+Return

- Flip Horizontally
- **Flip Vertically**
- Rotate 90° clockwise
- Rotate 90° counter-clockwise
- Rotate 180°
- Guillotine

Image > Transform >
Flip Vertically

Flip image vertically

Are you looking for...

Layer > Transform >
Flip Vertically

Flip layer vertically

Toolbox >
Flip Tool

Reverse the layer, selection or path
horizontally or vertically

Text
Text



Mode: Normal

Opacity

100.0

Lock:

- Text (Copy)
- Text
- Background

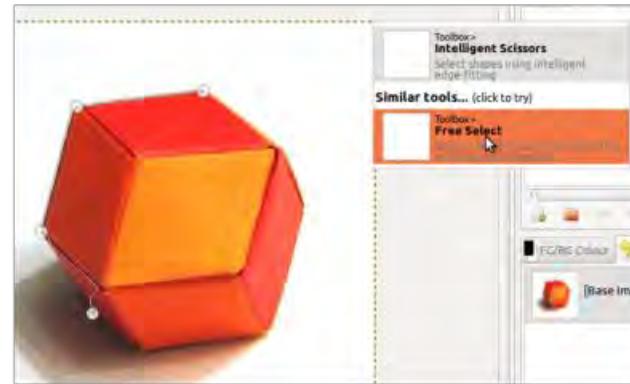
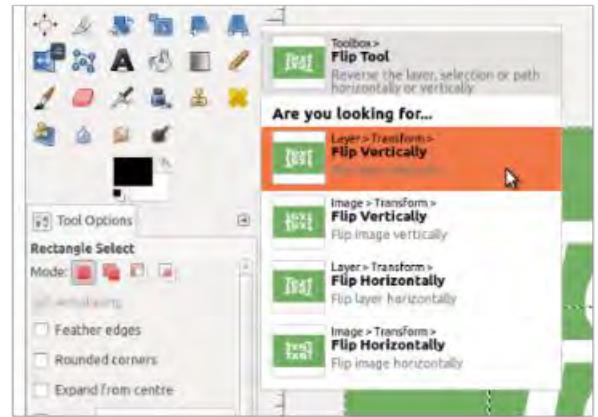
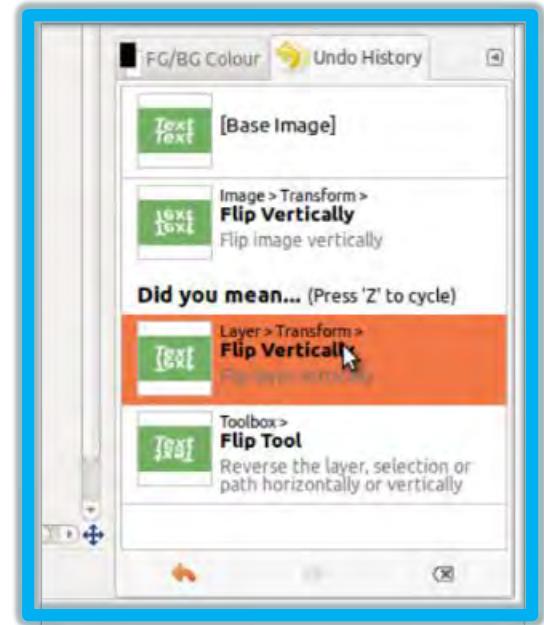
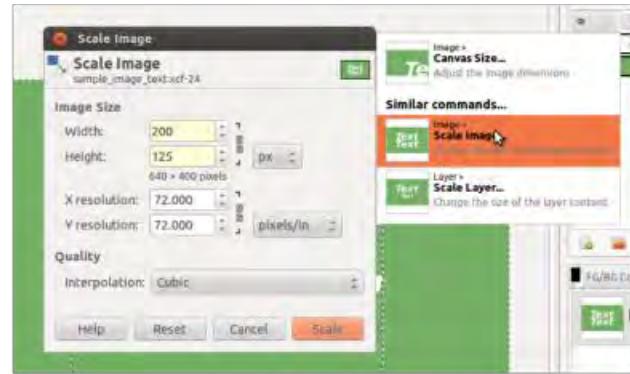


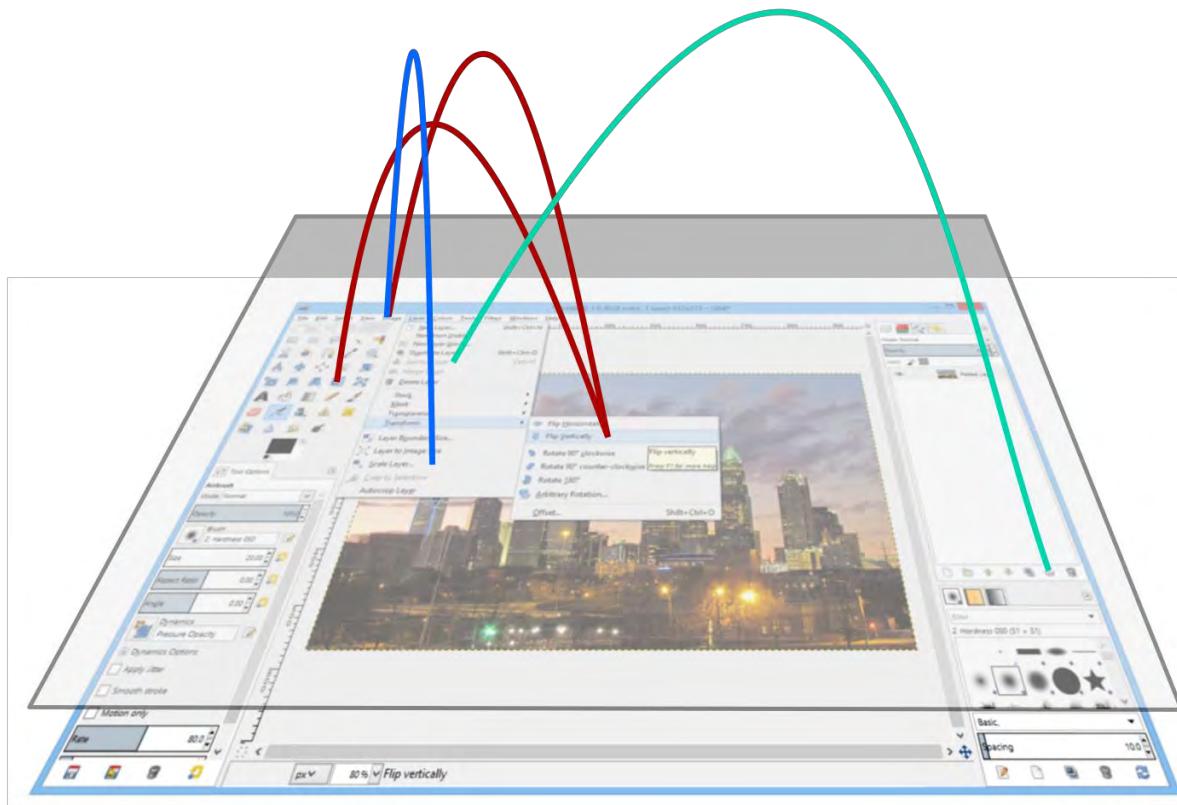
FG/BG Colour

Undo History

Text

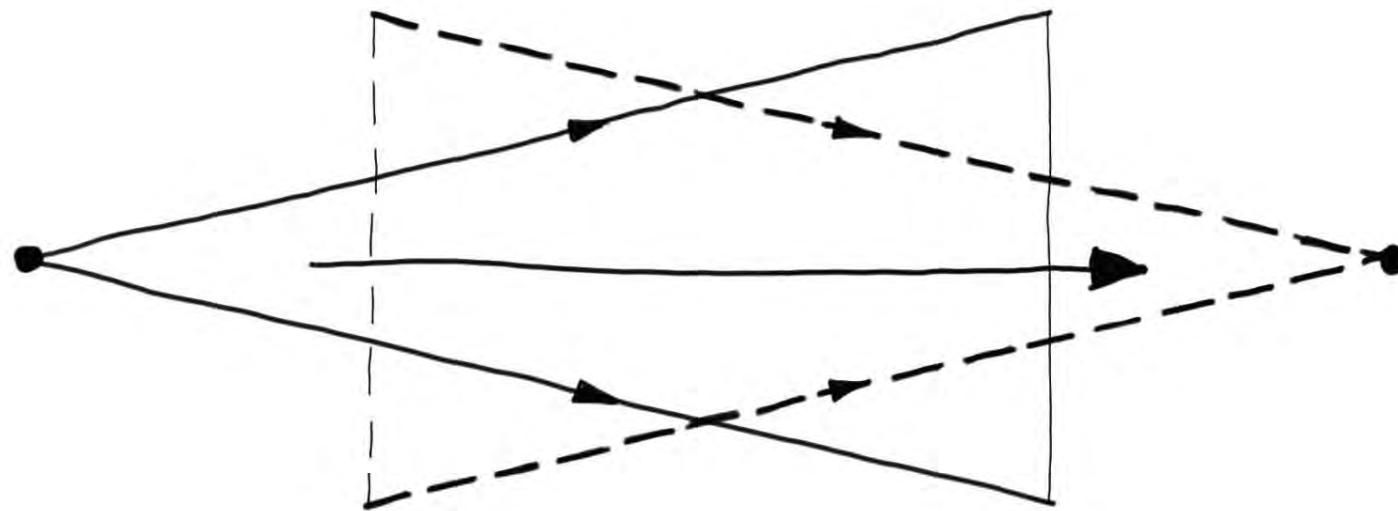
[Base Image]





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

From CI Terminology:
Entering Focus

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That background is your asset

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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



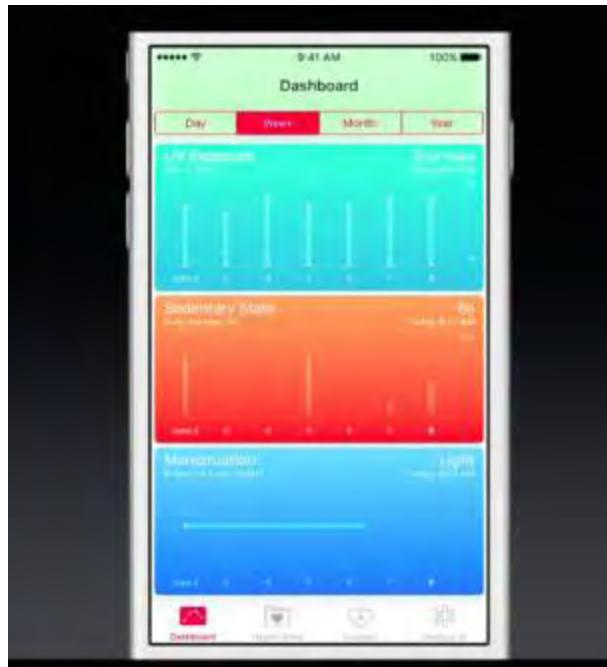
Finally! For years I've had to rely on pencils, or at worst, a twig and some drops of my feminine blood to write down recipes (the only thing a lady should be writing ever). I had despaired of ever being able to write down said recipes in a permanent manner, though my men-folk assured me that I "shouldn't 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!

Bic for Her



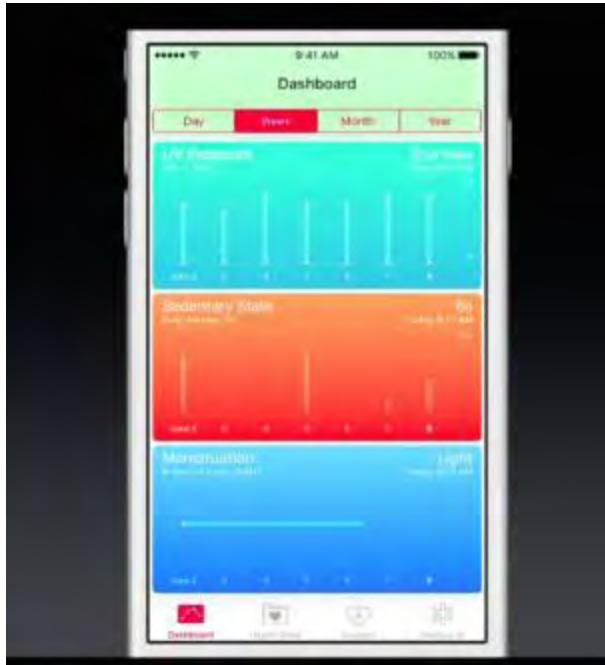
It is very, very hard to imagine that the people who made the decision to launch “Bic for Her” were the same women expected to buy them.

Apple HealthKit Launch



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

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”

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 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

Walter Downin 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

Walter Downin Teague
Vanity Kodak (1928)



Jonathan Ive
Apple iPod Mini (2004)



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

Search Toronto.com for information on local restaurants, movies and events...

SEARCH

[Home](#) / [Guides](#) / Bars Guide

Bars Guide

100 Places to Pick Up in Toronto

100 places to pick up all around Toronto. [More...](#)



1 2 3 4



Best Bars Near the Rogers Centre

Posted: May 31, 2013

By Kevin Scott

These bars around the Rogers Centre are great spots before or after the game.

READ MORE



Best Karaoke Bars with Private Rooms

Posted: March 08, 2013

By Samantha Edwards

Check out these karaoke bars with private rooms in Toronto.

READ MORE



Best Bars for Live Music in Toronto

Posted: September 20, 2012

By Stephen Baldwin

Here are the top venues in Toronto to enjoy some live music with your drink.

READ MORE



Bars with the Best Late-Night Menus

Posted: November 15, 2012

By Samantha Edwards

Here are five bars with a great late-night menu.

READ MORE

Restaurant Finder

Search by Cuisine

Search by Neighbourhood

Search by User Rating

OR

Search by Name

Show Me

BRUNCH | TAKEOUT | STEAKHOUSES

Event Finder

Search by Event Type

From: _____ To: _____

Search by User Rating

OR

Search by Event Name

Show Me

WHATS ON | CALENDAR

Movie Finder

Search by Movie Title

OR

Search by Theatre

OR

Search by Neighbourhood

OR

Search by Genre

Show Me

REVIEWS | TRAILERS | COMING SOON

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

very
unappealing



very
appealing

tapir design



classic design for today.

Tapir Design specialises in producing attractive, stylish websites that are accessible to all Internet users, regardless of the web browser or computer operating system that they use.

[Contact the webmaster](#)

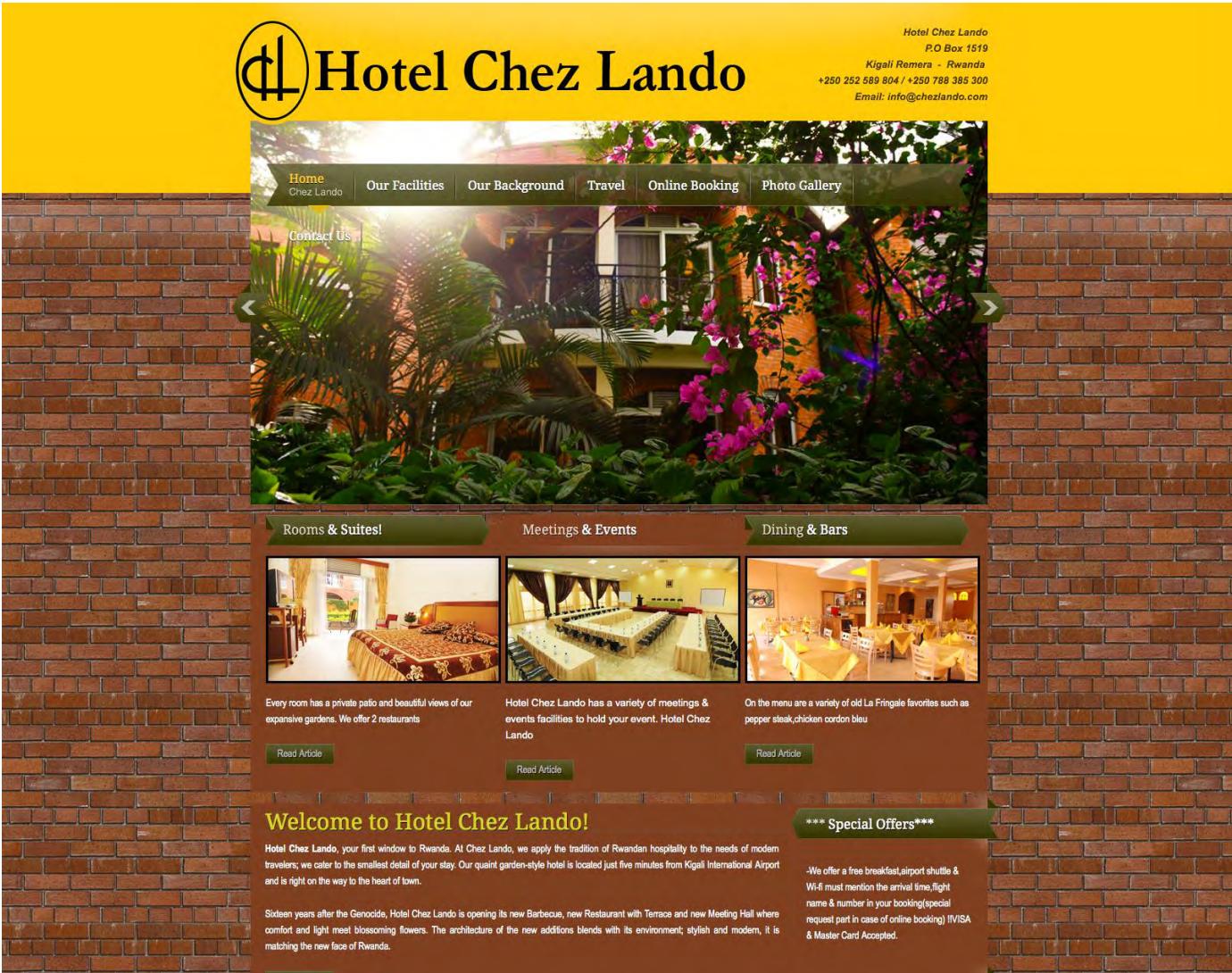
[Click here for the Tapir Blog](#) for all of your tapir news from around the globe

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

very
unappealing



very
appealing



Hotel Chez Lando

Hotel Chez Lando
P.O Box 1519
Kigali Remera - Rwanda
+250 252 589 804 / +250 788 385 300
Email: info@chezlando.com

Contact Us

Home Chez Lando Our Facilities Our Background Travel Online Booking Photo Gallery

Rooms & Suites! Meetings & Events Dining & Bars

 Every room has a private patio and beautiful views of our expansive gardens. We offer 2 restaurants

 Hotel Chez Lando has a variety of meetings & events facilities to hold your event. Hotel Chez Lando

 On the menu are a variety of old La Fringale favorites such as pepper steak, chicken cordon bleu

[Read Article](#) [Read Article](#) [Read Article](#)

Welcome to Hotel Chez Lando!

Hotel Chez Lando, your first window to Rwanda. At Chez Lando, we apply the tradition of Rwandan hospitality to the needs of modern travelers; we cater to the smallest detail of your stay. Our quaint garden-style hotel is located just five minutes from Kigali International Airport and is right on the way to the heart of town.

Sixteen years after the Genocide, Hotel Chez Lando is opening its new Barbecue, new Restaurant with Terrace and new Meeting Hall where comfort and light meet blossoming flowers. The architecture of the new additions blends with its environment; stylish and modern, it is matching the new face of Rwanda.

*** Special Offers***

We offer a free breakfast, airport shuttle & Wi-Fi must mention the arrival time, flight name & number in your booking (special request part in case of online booking) IVISA & Master Card Accepted.

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

very
unappealing



very
appealing

 THE PEOPLE'S BANK
Banki yacu, Hafi yacu.

RETAIL BANKING BUSINESS BANKING RURAL BANKING SERVICES ABOUT BPR CONTACT US

Enter keyword here... 

KEEP TRACK OF YOUR ACCOUNT ON THE GO.
WITH SMS & EMAIL ALERTS



You want to acquire your first drive? 

Carry your bank with you 24/7 

Simple things that make life easier.
SEND iZi CASH 

LATEST NEWS

On the 18th of June, 2013 Banque Populaire du Rwanda scooped an Award as the Best Agri Business... 

Banque Populaire du Rwanda on Friday of the 26th April, 2013, held a commemoration ceremony to... 

EXCHANGE RATES

Currency	Selling	Buying
USD	696.824572	679.824572
EURO	984.813009	925.006257
GBP	1161.400411	1132.103058
CAD	619.531308	603.393408
CHF	777.24316	757.423256

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

very
unappealing



very
appealing

Popular Rwandan Website

The screenshot shows the homepage of THE PEOPLE'S BANK (BPR) website. The header features the bank's logo and name "THE PEOPLE'S BANK" in English and Kinyarwanda ("Banki yacu, Hafi yacu"). Navigation links include RETAIL BANKING, BUSINESS BANKING, RURAL BANKING, SERVICES, ABOUT BPR, and CONTACT US. A search bar with placeholder text "Enter keyword here..." and a magnifying glass icon is also present. The main banner has a yellow background with the text "KEEP TRACK OF YOUR ACCOUNT ON THE GO. WITH SMS & EMAIL ALERTS" and an image of hands using a laptop keyboard. Below the banner are three promotional boxes: one showing a couple with a car key, another showing a hand holding a smartphone displaying the bank's mobile app, and a third showing two people using ATMs with the text "SEND iZiCASH". The footer contains sections for LATEST NEWS (with articles about awards and commemorations), a Tariff Guide, and EXCHANGE RATES (listing rates for USD, EURO, GBP, CAD, and CHF). The "EXCHANGE RATES" table is as follows:

Currency	Selling	Buying
USD	696.824572	679.824572
EURO	984.813009	925.006257
GBP	1161.400411	1132.103058
CAD	619.531308	603.393408
CHF	777.24316	757.423256

2068991
total participants

Trust us; you will love this test!

Take this test to see how well you can spot (un)trustworthy websites. This experiment takes around 12 minutes.

[Participate now!](#)

How fast is your memory?

See how quickly you can retrieve information you have just memorized. This experiment takes around 10 minutes.

[Participate now!](#)

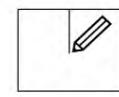
What is your website aesthetic?

Compare your visual preferences to people around the world. This experiment takes around 10 minutes.

[Participate now!](#)

Test your social intelligence!

Test how well you can read emotions of others just by looking at their eyes. This experiment takes around 10 minutes.

[Participate now!](#)

Are you more Eastern or Western?

In this test, you will learn whether you are more sensitive to a focal object (as most Americans) or more attuned to the context (as many Japanese). This experiment takes around 8 minutes.

[Participate now!](#)

Looking for more studies?

We have joined forces with [TestMyBrain](#) and [GamesWithWords!](#) Learn about your brain, test your language sense, and participate in other studies on [LessWeird.org](#).

News From The Wild

April 25, 2014

During the summer, we launched an experiment to examine graph prediction tendencies amongst different cultures, particularly the contrast be...

[Read more](#)

March 20, 2014

How do you feel about Naver.

[Read more](#)

Why Participate?

LabintheWild provides you with personalized feedback, letting you compare yourself to people of other countries.

By participating, you contribute to research on people's similarities and differences around the world when interacting with technology.

Join the Wilderness



Enter your email to find out about new studies and breakthrough results:

[Notify me!](#)

Large Scale Data Collection

The screenshot shows the homepage of the Lab in the Wild website. At the top right, it displays "2068991 total participants". Below this, there are several experiment cards with "Participate now!" buttons. One card, titled "What is your website aesthetic?", is circled in red. The footer contains news from the wild, a participation section, and a newsletter sign-up.

Our Experiments About Us Blog English ▾

LAB IN THE WILD

2068991 total participants

Trust us; you will love this test!
Take this test to see how well you can spot (un)trustworthy websites. This experiment takes around 12 minutes.

Participate now!

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Enter your email to find out about new studies and breakthrough results:

Notify me!

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2.4 million ratings
39,975 participants
430 websites

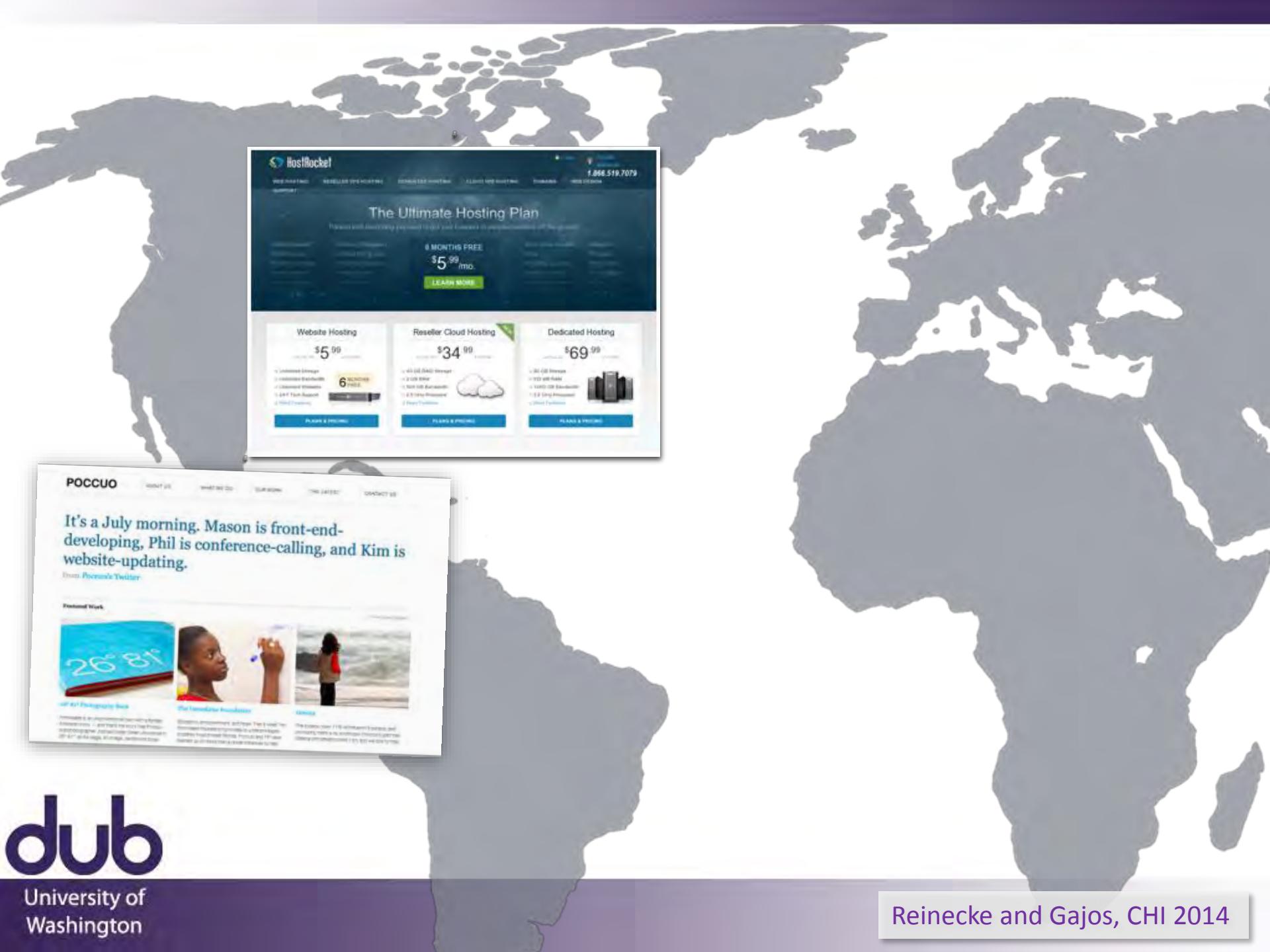
Visual Feature Analysis



2.4 million ratings
39,975 participants
430 websites

39 image metrics
describing website
perceived colorfulness
and complexity

Age, country,
gender, education



POCCUO

ABOUT US

WHAT WE DO

OUR WORK

THE TEAM

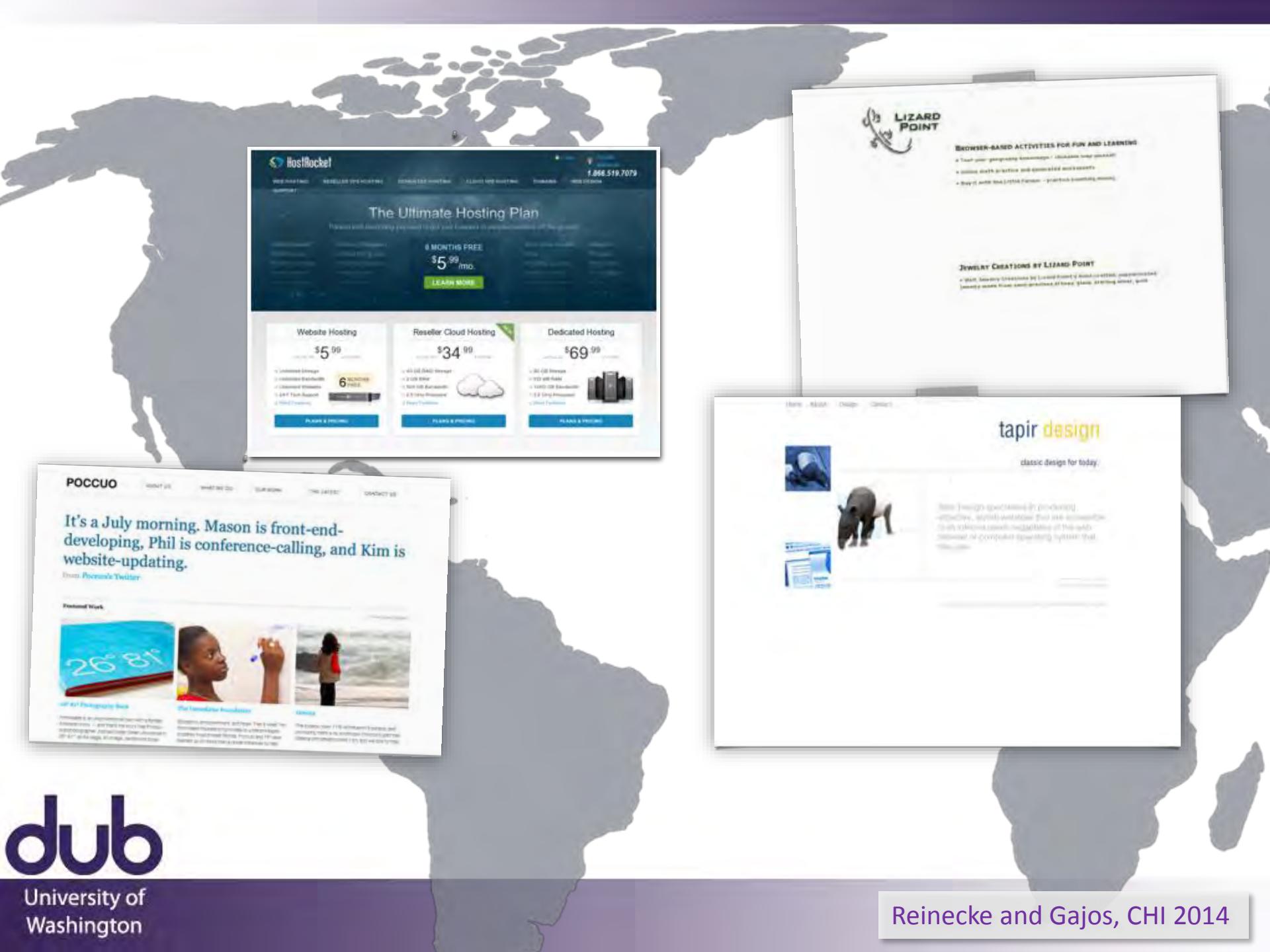
CONTACT US

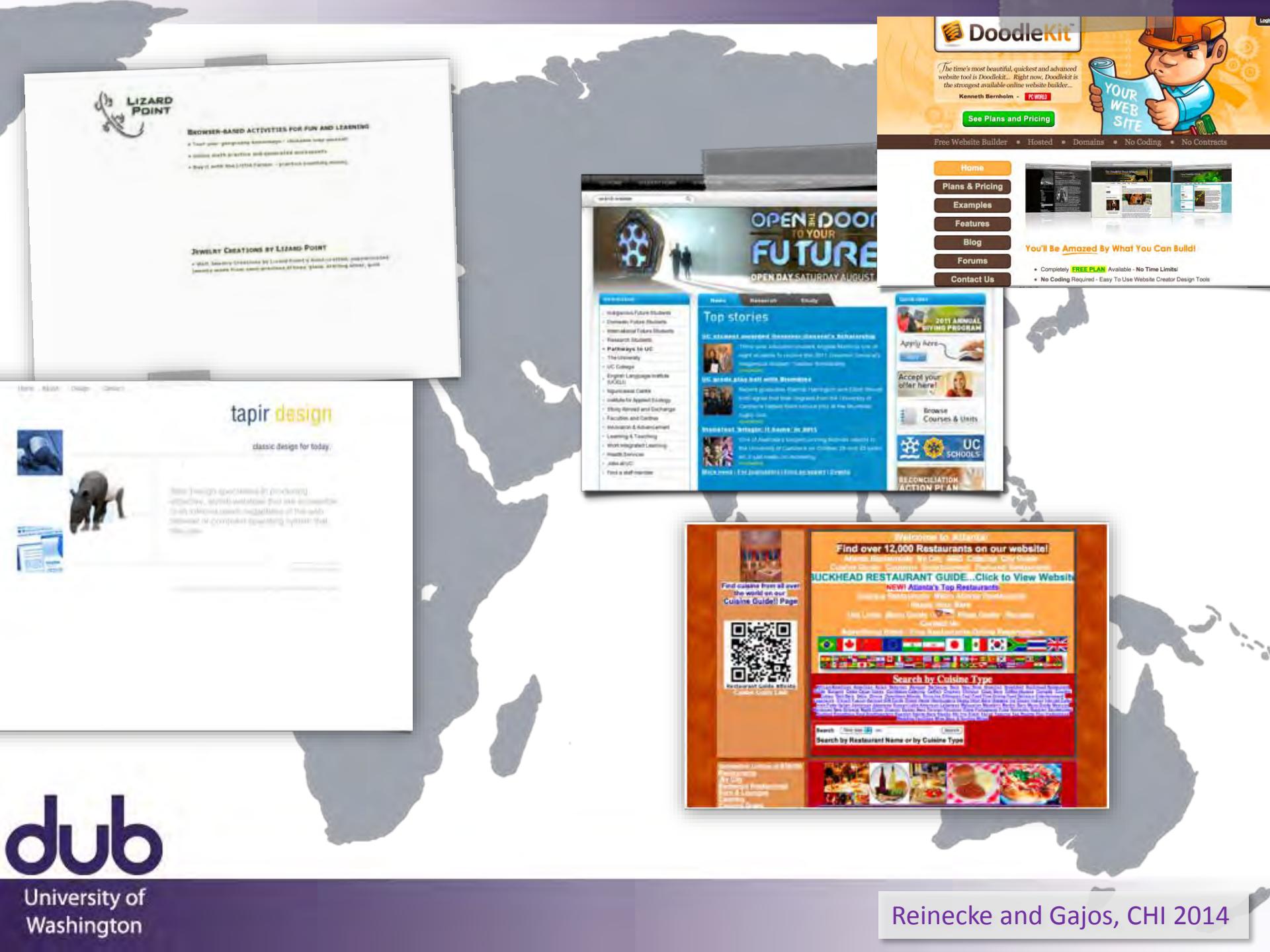
It's a July morning. Mason is front-end-developing, Phil is conference-calling, and Kim is website-updating.

From [Peymane's Twitter](#)

Featured Work:

[View more](#)

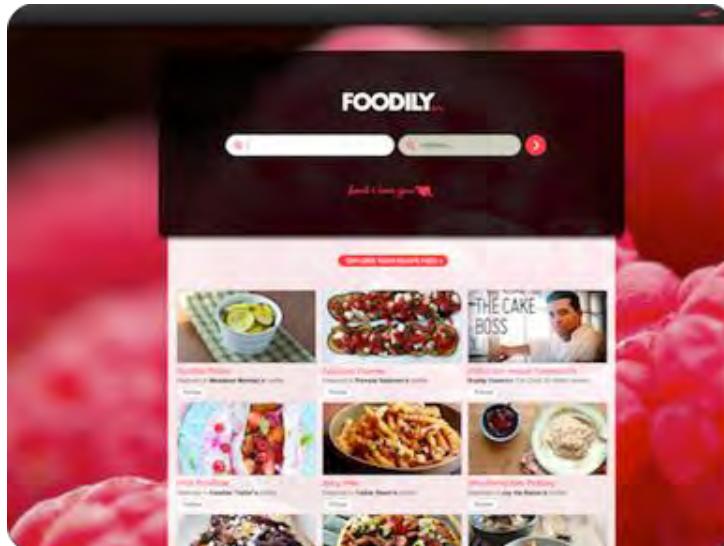




> 50
years



< 20
years



dub
University of
Washington



Reinecke and Gajos, CHI 2014

female

The Tree of Life web project (TOL) is a collaborative effort of thousands and nature enthusiasts from around the world. On more than 40,000 World Tree pages, the project provides information about biodiversity, the relationships of different groups of organisms, and their evolutionary history. (Phylogeny).

This page contains information about a particular group, e.g., *P. Admetus*, segmented worms, *Physco*, flowers, *P. heterocercus*, *P. suspicida*, *P. helminthoides*, *P. strobli*, fungi, or the *P. vampire liquid*. TOL pages are linked here by common names, scientific names, and phylogenetic relationships. The Tree of Life is a tree showing that every living creature is related to all other creatures, but the structure of the TOL project thus distinguishes the general connection between all living things.

Read more about the Tree of Life Web Project.

THIS ARTIST'S LIFE
BY JENNIFER LEE

Visit my website [www.jenniferalee.com](#)

I made \$555 in making pottery... you can too!

If you've read this blog for a while, you all know I've mentioned the [\\$555 in making pottery](#). The problem with the (poorly worded) email is that the person who you are targeting is usually something of an internet marketer, someone that they have just lost all sort of trust in, or someone who is sending them the whether you just compromised and probably just confuse them and wonder why you are worth so many dollars.

That's why I think you guys, "You understand my feeling like buttons. And you know why I am angry, and you know it's funny when I get mad, until some people, who just had me either write myself or just posted."

Dear Whitney,

I'm the owner of a new website called [www.financialfreedomforwriters.com](#)! I'm developing a series of products and services to help people accomplish their financial freedom goals. I'm currently working on getting into a money-making business. I was wondering if you would be kind enough to do an interview for me, answering questions about how you started and grew your business to what it is today. The benefits of working with us are that we will be producing a product you can use in your own business, and before the interview we will present you and your accomplishments. Thank you!

Upcoming Events:

- Inductee
- Author of 2013
- Book Award
- Selected and
- Inductee to Author

Visit my website [Link](#)

Any self-respecting creative entrepreneur should consider doing some networking and online marketing.

Photo:

[Sign Up](#)

male

treehouse

What do you want to learn today?

Treehouse is the best way to learn how to design and develop for the web and iOS.

Web Design [View Details](#)

Web Development [View Details](#)

iOS Development [View Details](#)

anobii

Search local meetups, Learn for bookworms

Shelfie Find Share

What are you reading now? Search

Recent Activity

- ASLR added Entertainment Category to shelf
- Armenia P. added The Man of the House just to shelf
- CarrieBee added 2014 Book Awards from Goodreads
- Permaculture (User) added

anobii Apps

iPhone Android

Join the network in over 100 countries

Plotting Appeal by Complexity



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ABOUT US

WHAT WE DO

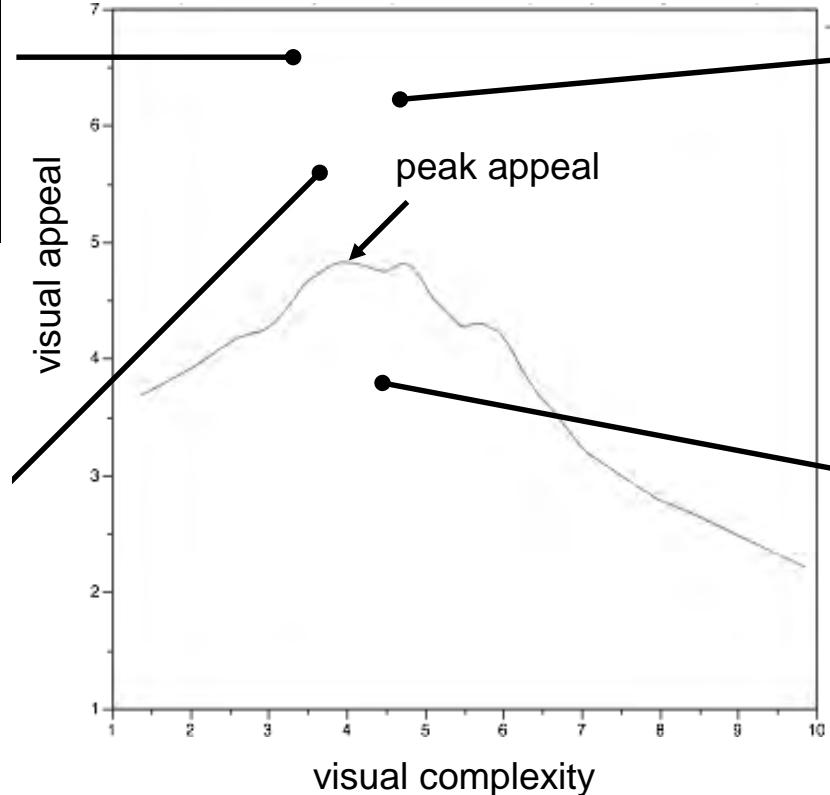
OUR WORK

THE LATEST

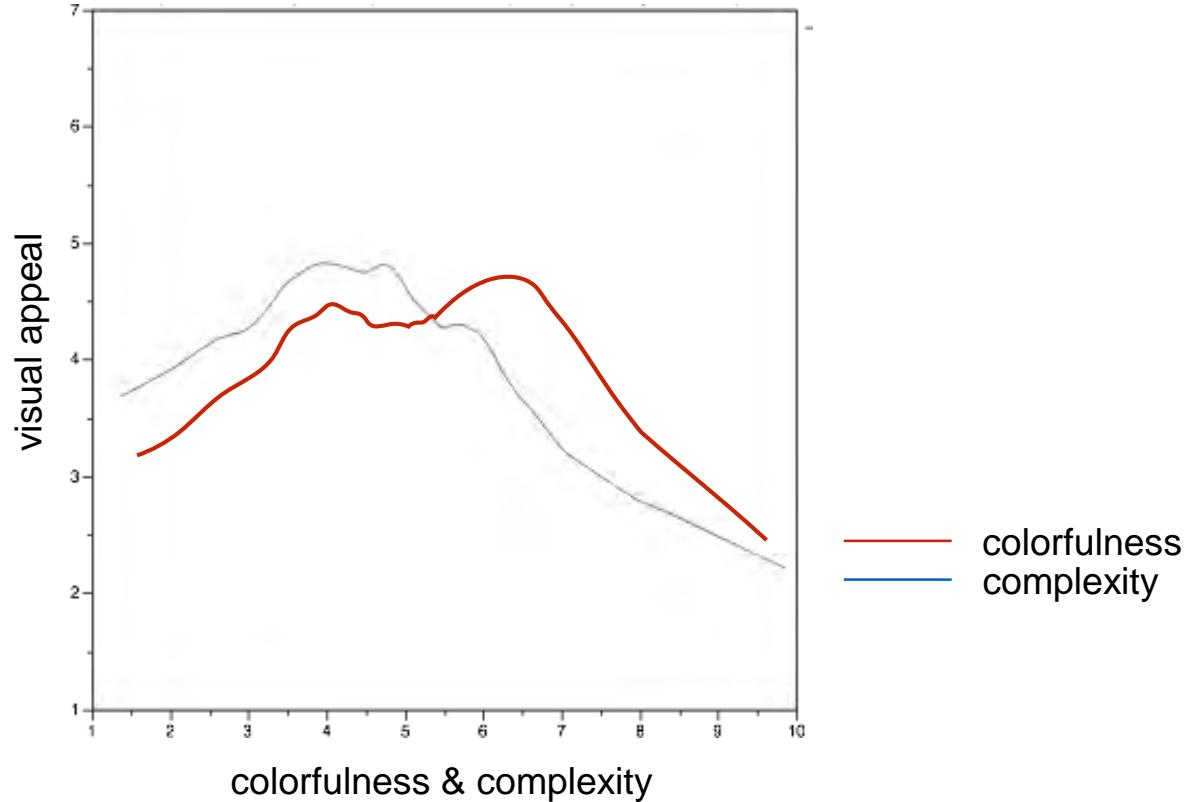
CONTACT US

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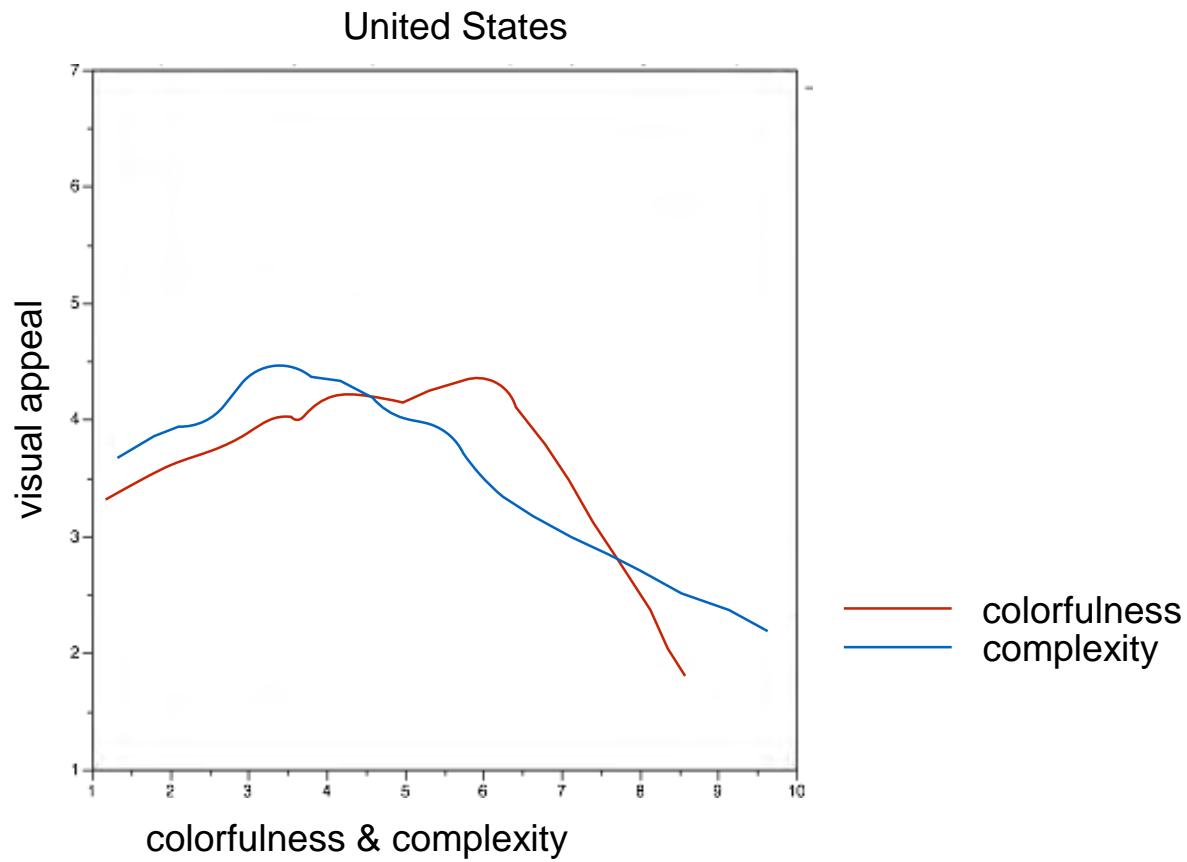
from Poccuo's Twitter



Plotting Appeal by Colorfulness



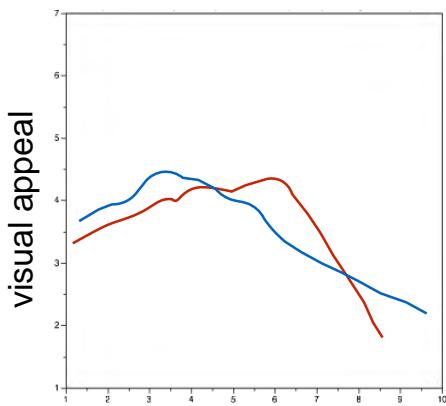
United States



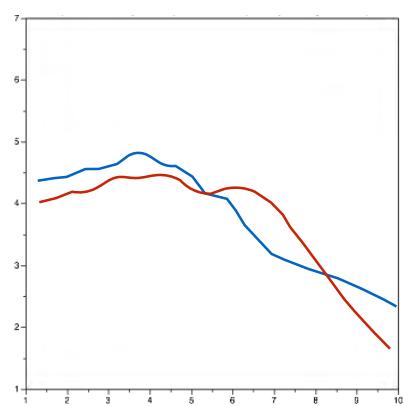
Other Countries

— colorfulness
— complexity

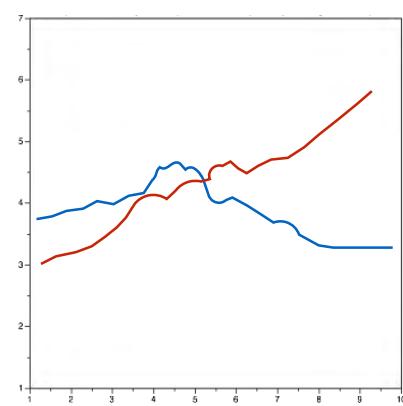
United States



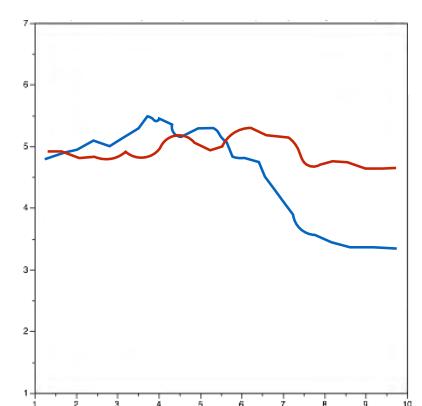
Germany



Macedonia



Hong Kong



colorfulness & complexity

Abandoning “One Best Design”

People have different preferences

We can study these preferences

We can even predict these preferences

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

16% of people in the US

10% of workforce

5% of STEM workforce

1% of PhDs in STEM

Including yourself if you
are fortunate to live to
develop disabilities

Current State of Devices



Current State of Devices



Equal Access to Information

Is this access equal?

Equal Access to Information

Is this access equal?

Some dimensions to consider

Cost

Speed

Accuracy

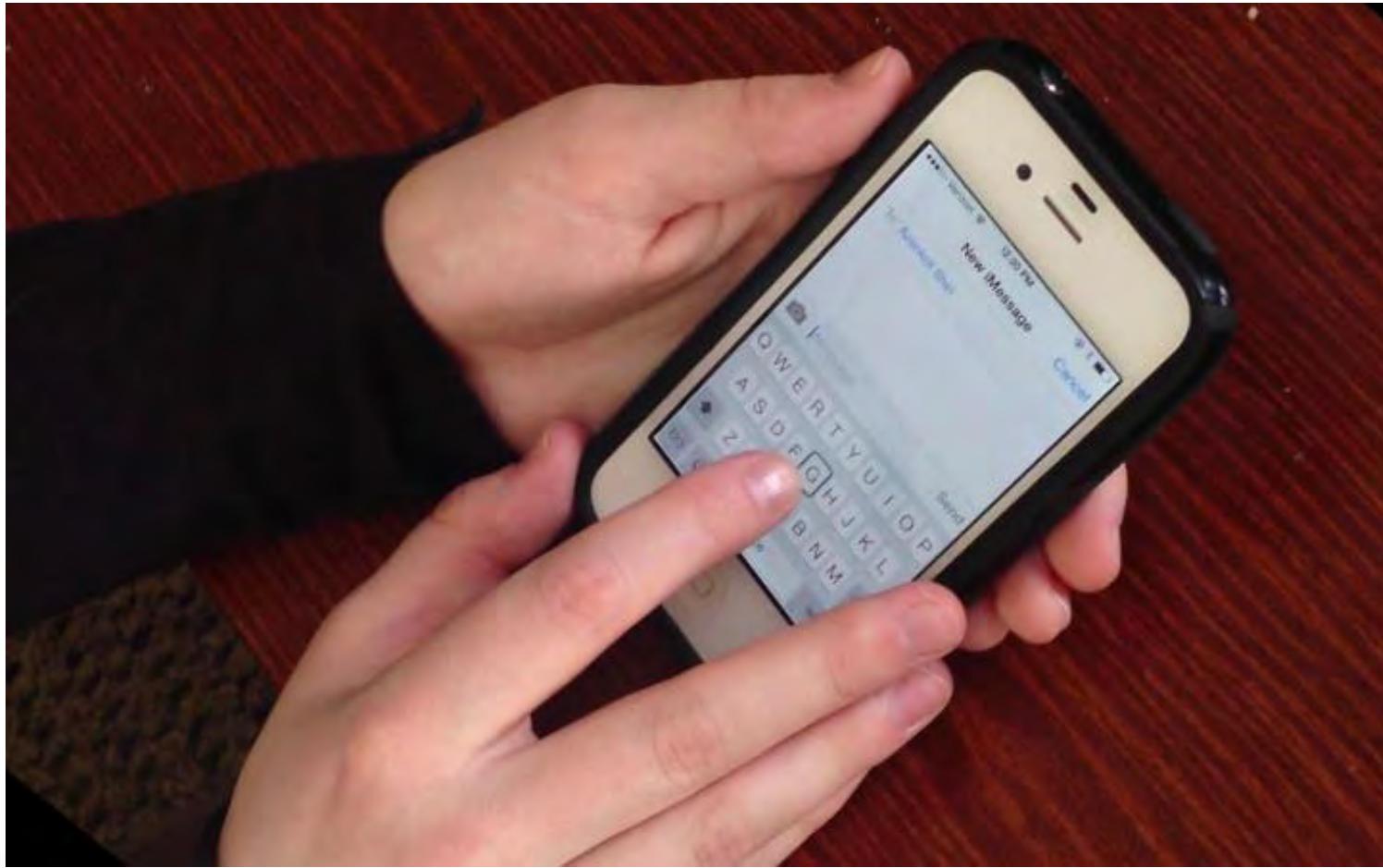
Ease

It simply being possible is not enough

A Closer Look at Text Entry



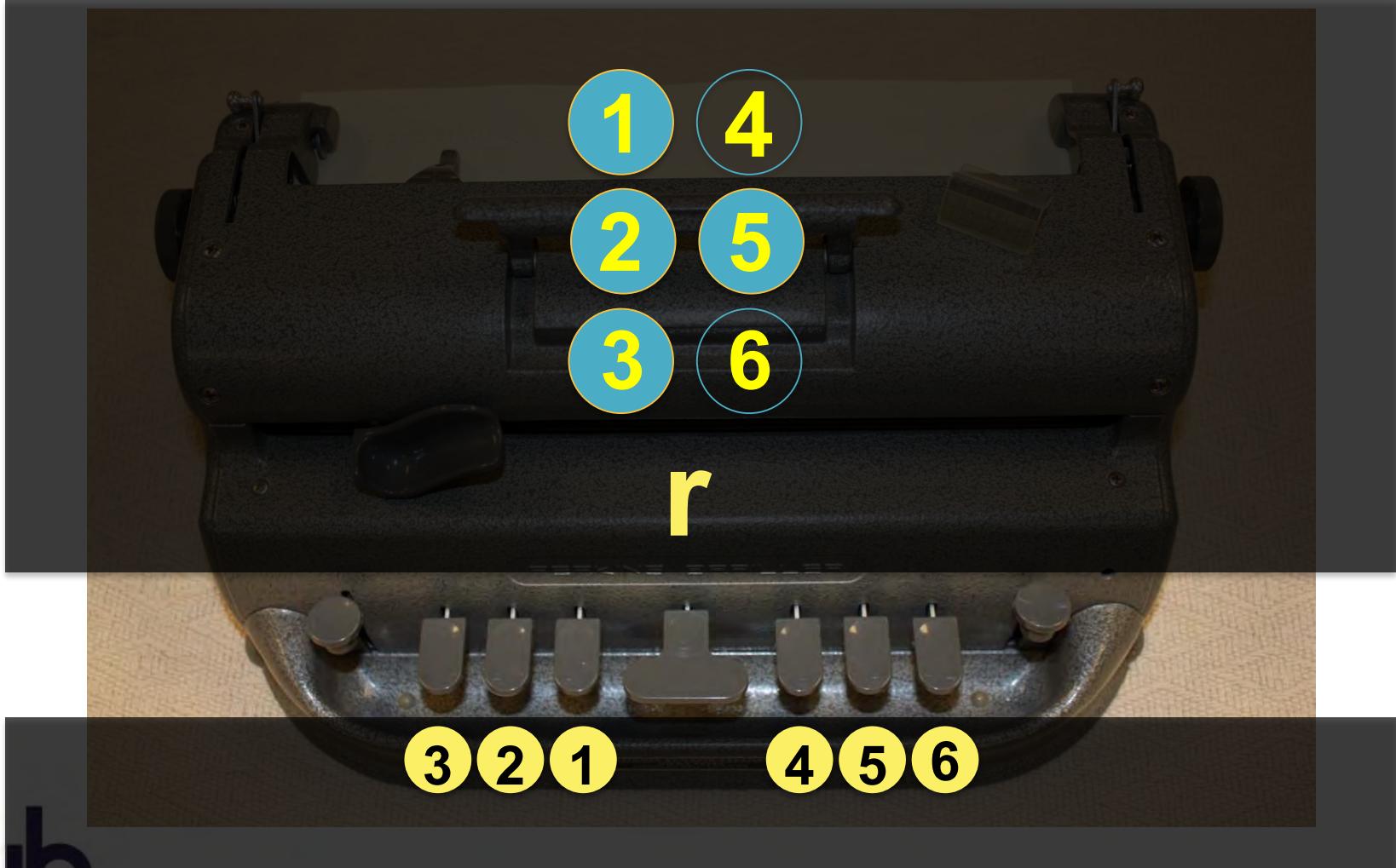
A Closer Look at Text Entry



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

Perkinput



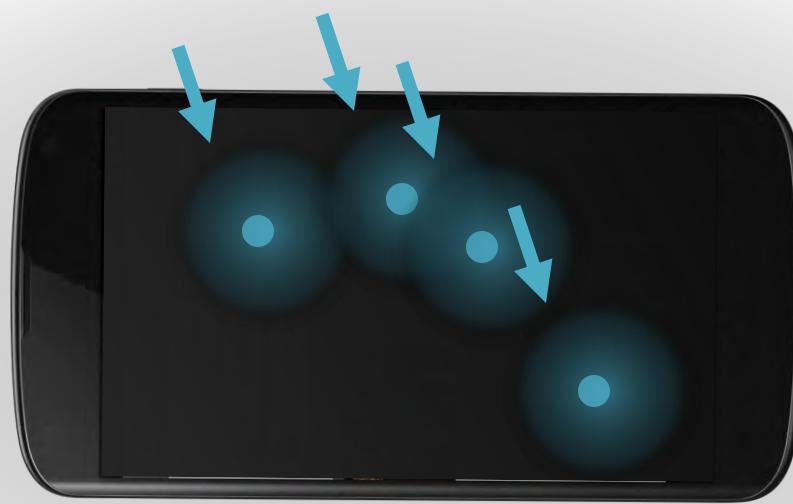
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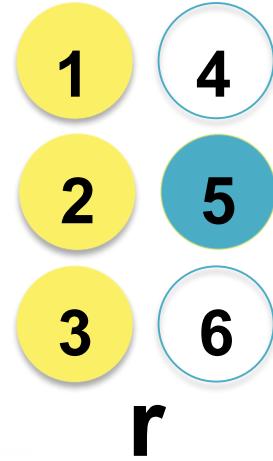
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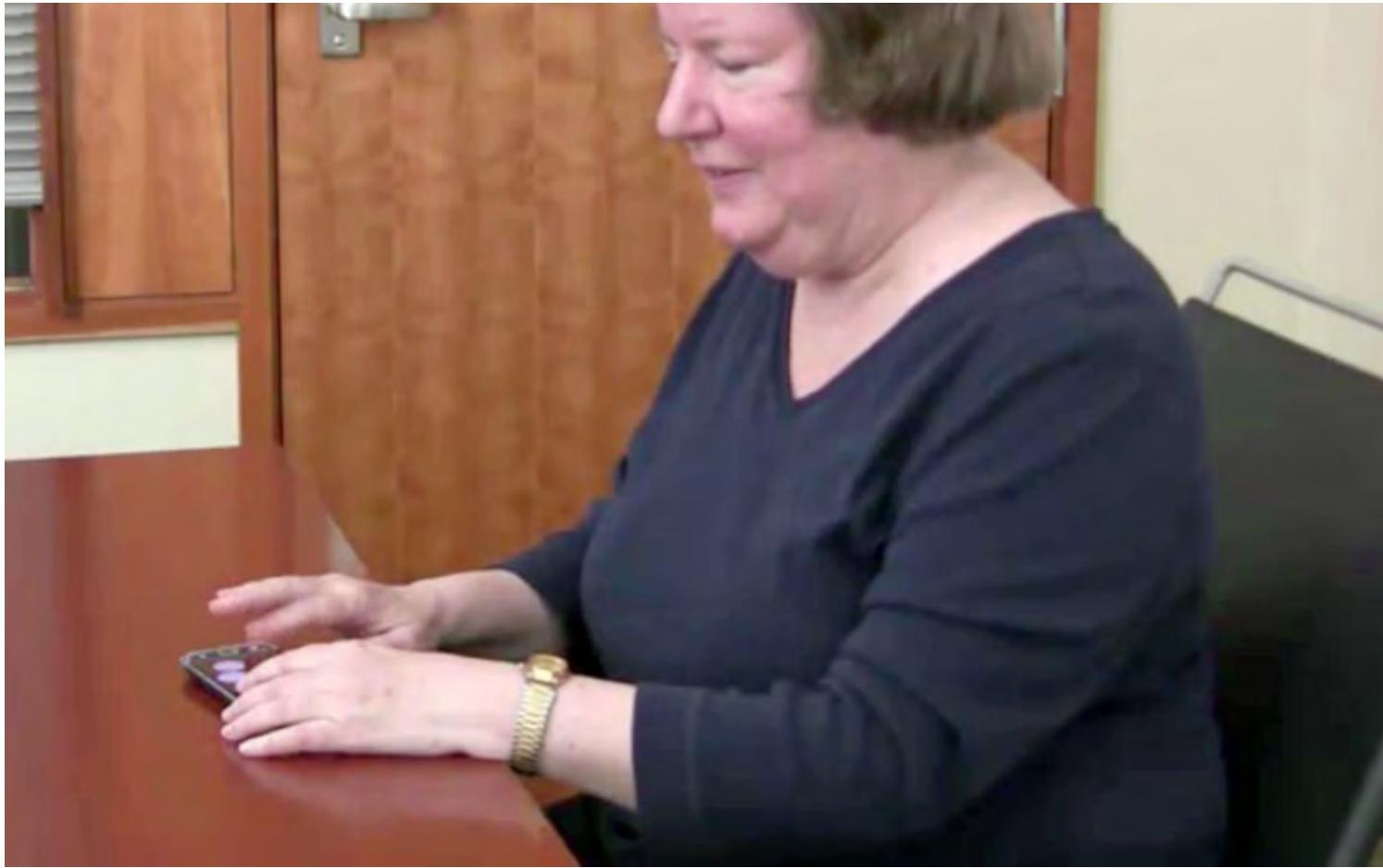
Perkinput



Perkinput



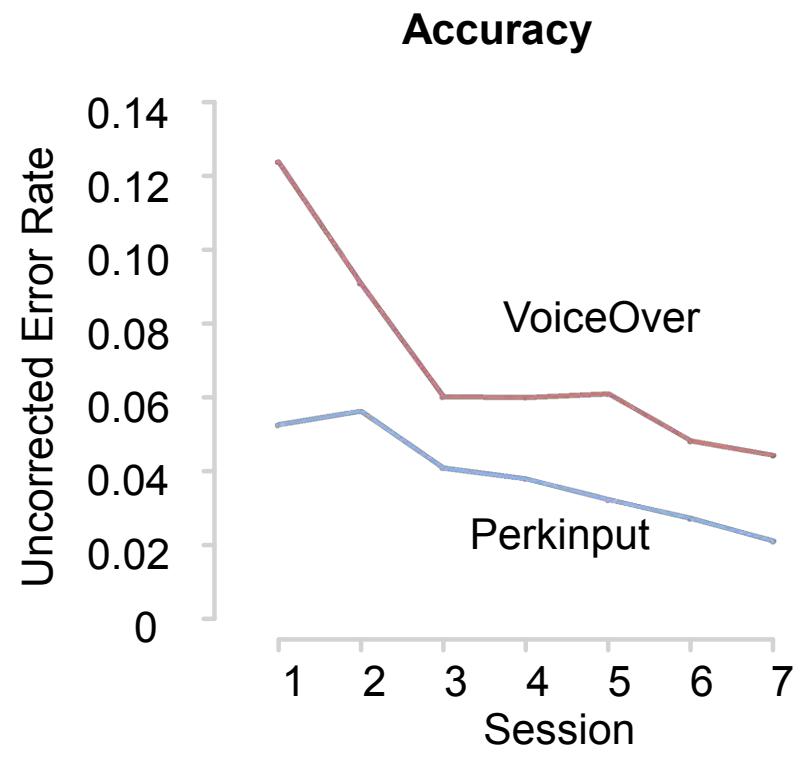
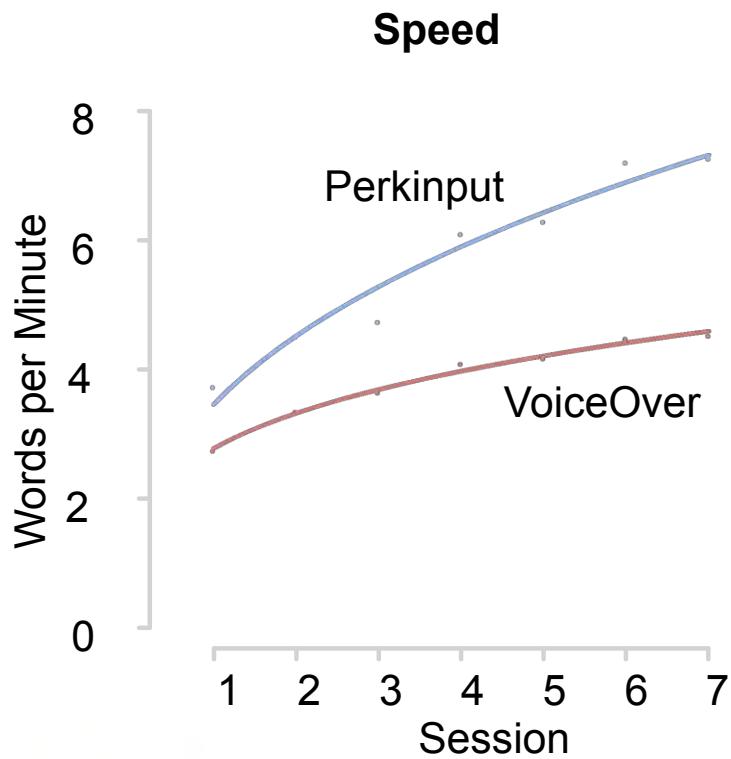
Perkinput



Perkinput



Speed and Accuracy



Another Problem



Another Problem



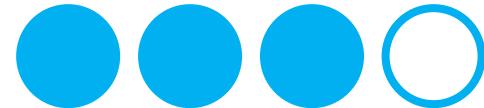
PassChords



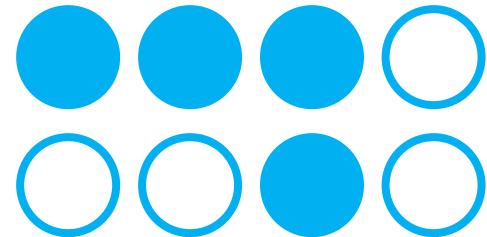
PassChords



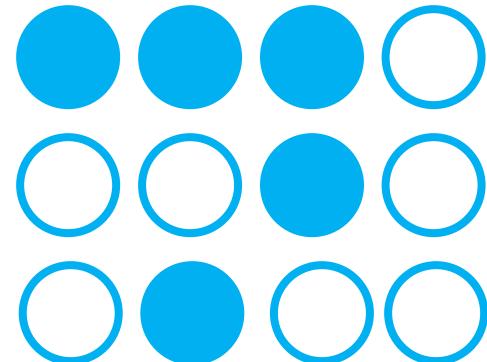
PassChords



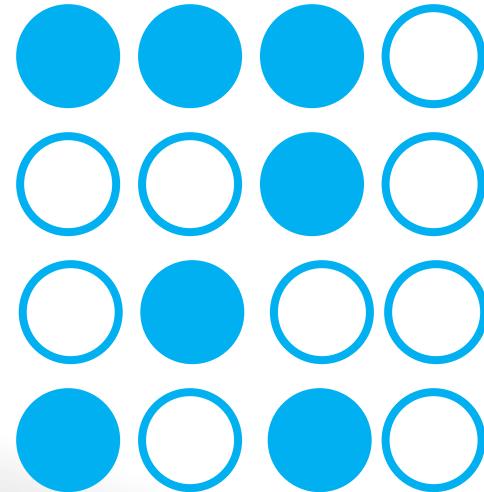
PassChords



PassChords



PassChords



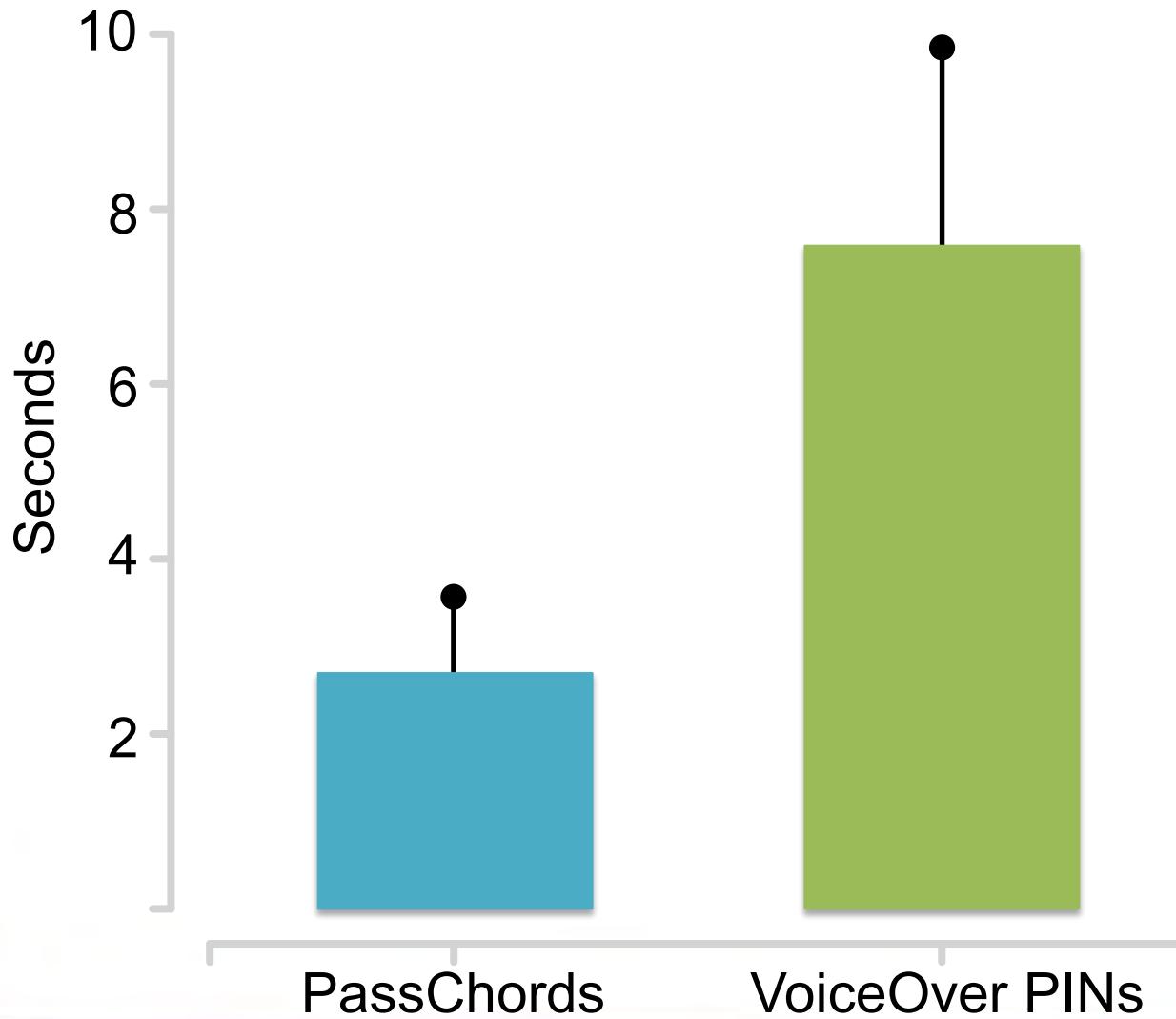
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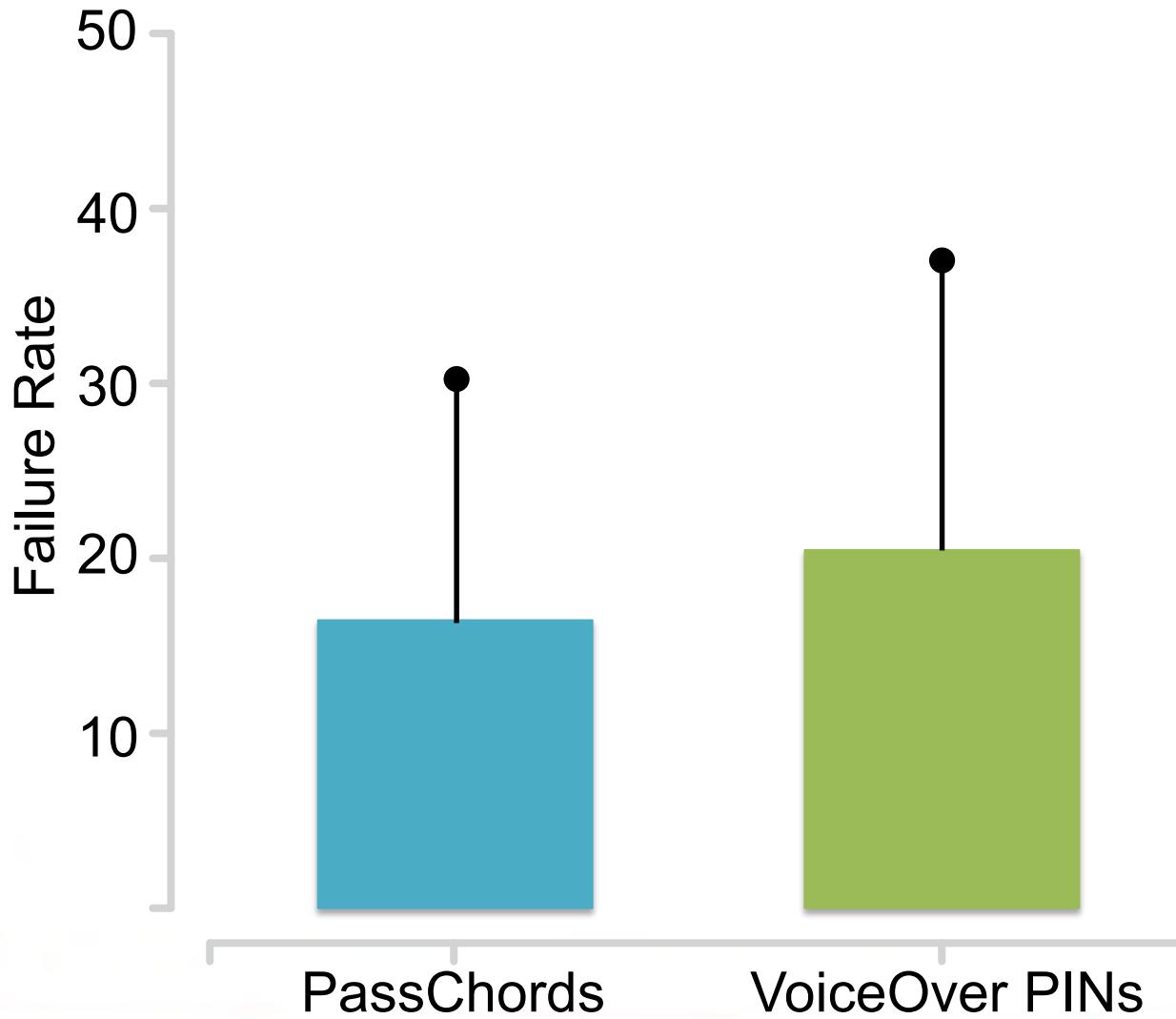
PassChords



Time to Authenticate



Accuracy



What About Security?

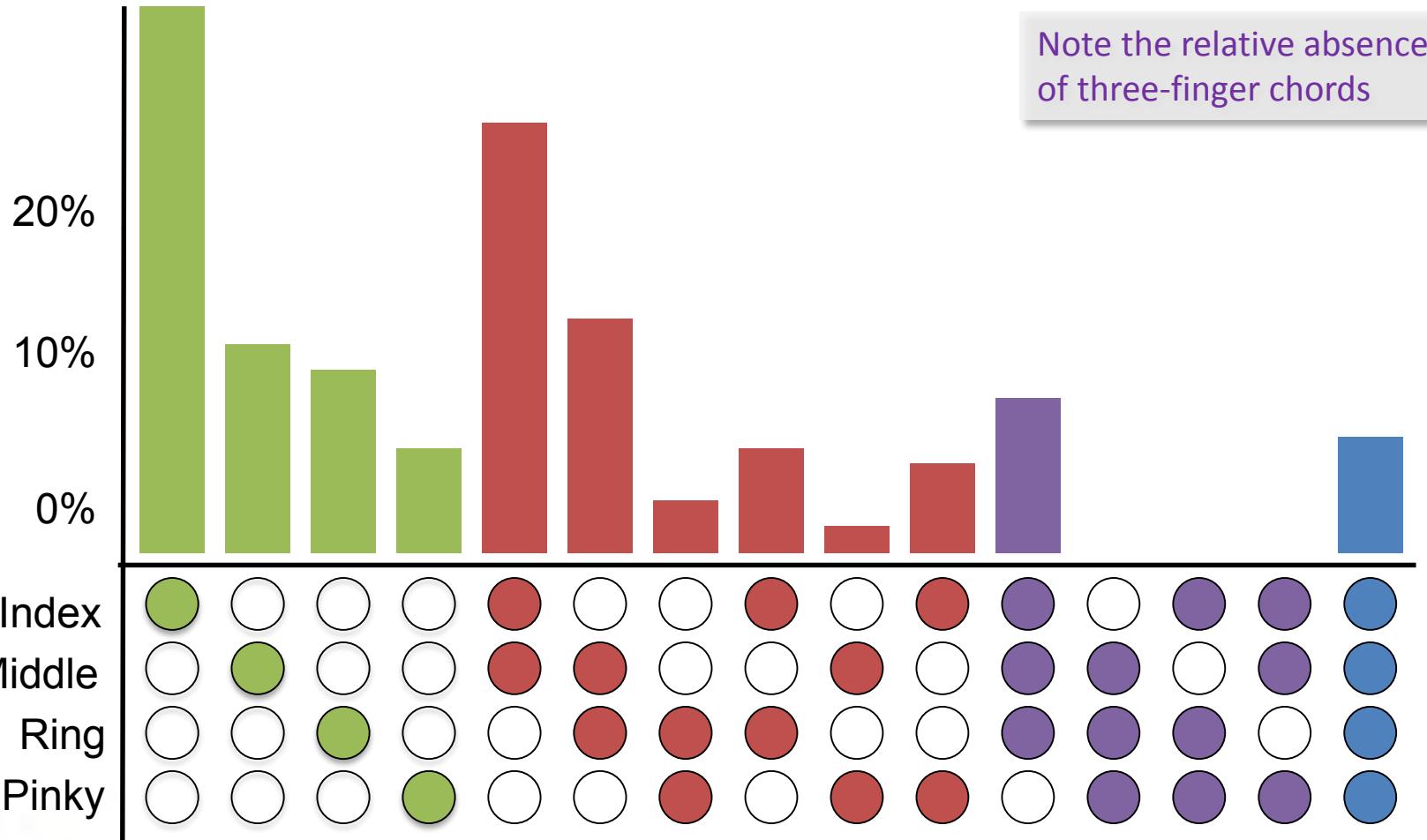
What About Security?

One measure is Guessing Entropy

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

4-digit PINS: 12.7 bits

Finger Pattern Frequency



What About Security?

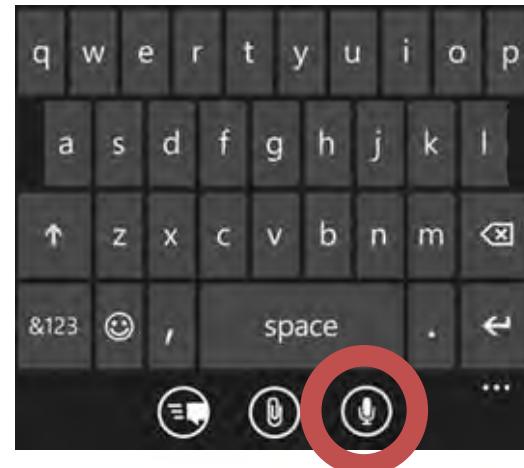
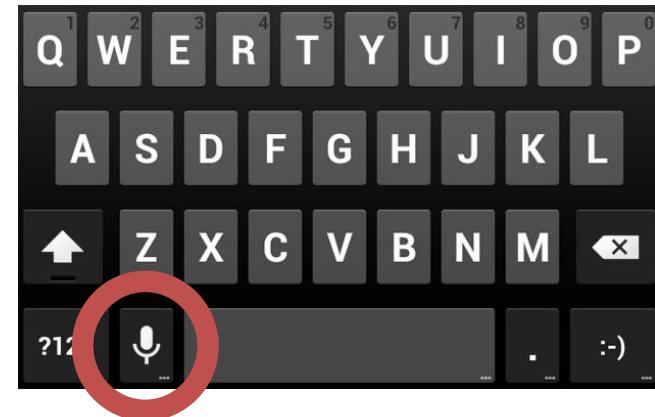
One measure is Guessing Entropy

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

4-digit PINS: 12.7 bits

4-tap PassChords: 12.6 bits

Speech Input



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.

Serial Access in Reviewing Transcript

When

Serial Access in Reviewing Transcript

of

Serial Access in Reviewing Transcript

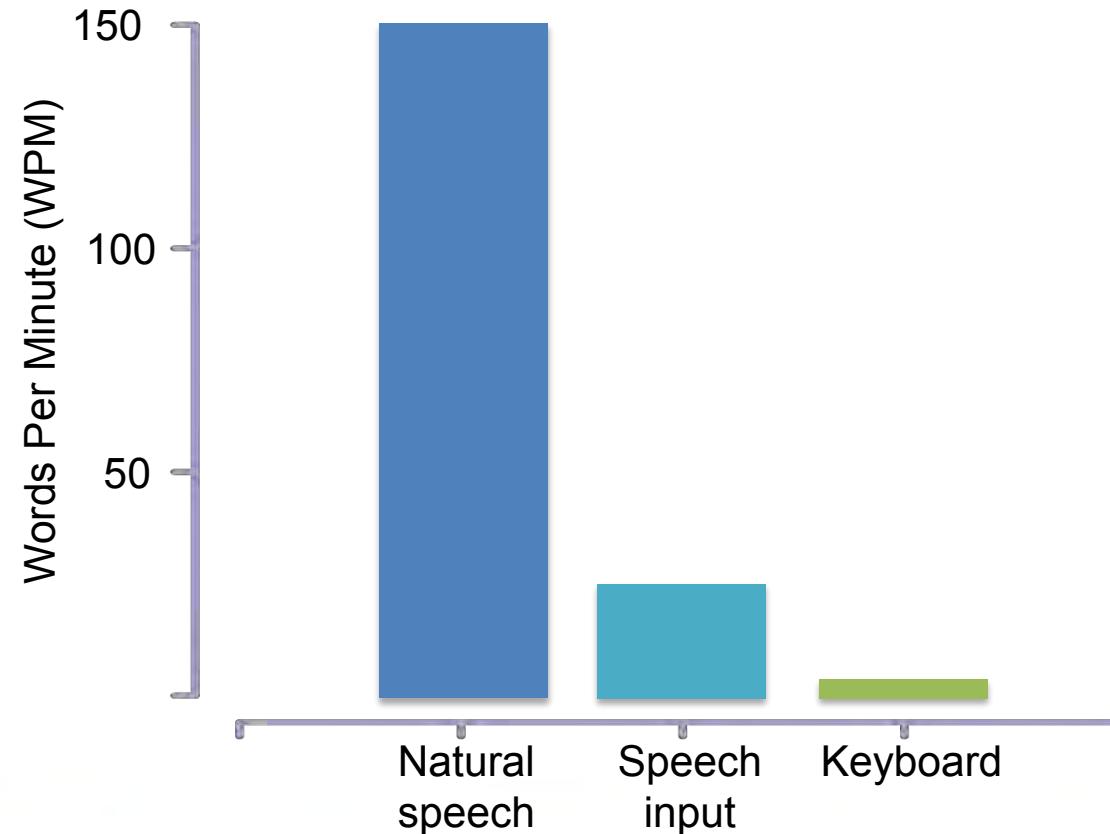
my

Serial Access in Reviewing Transcript

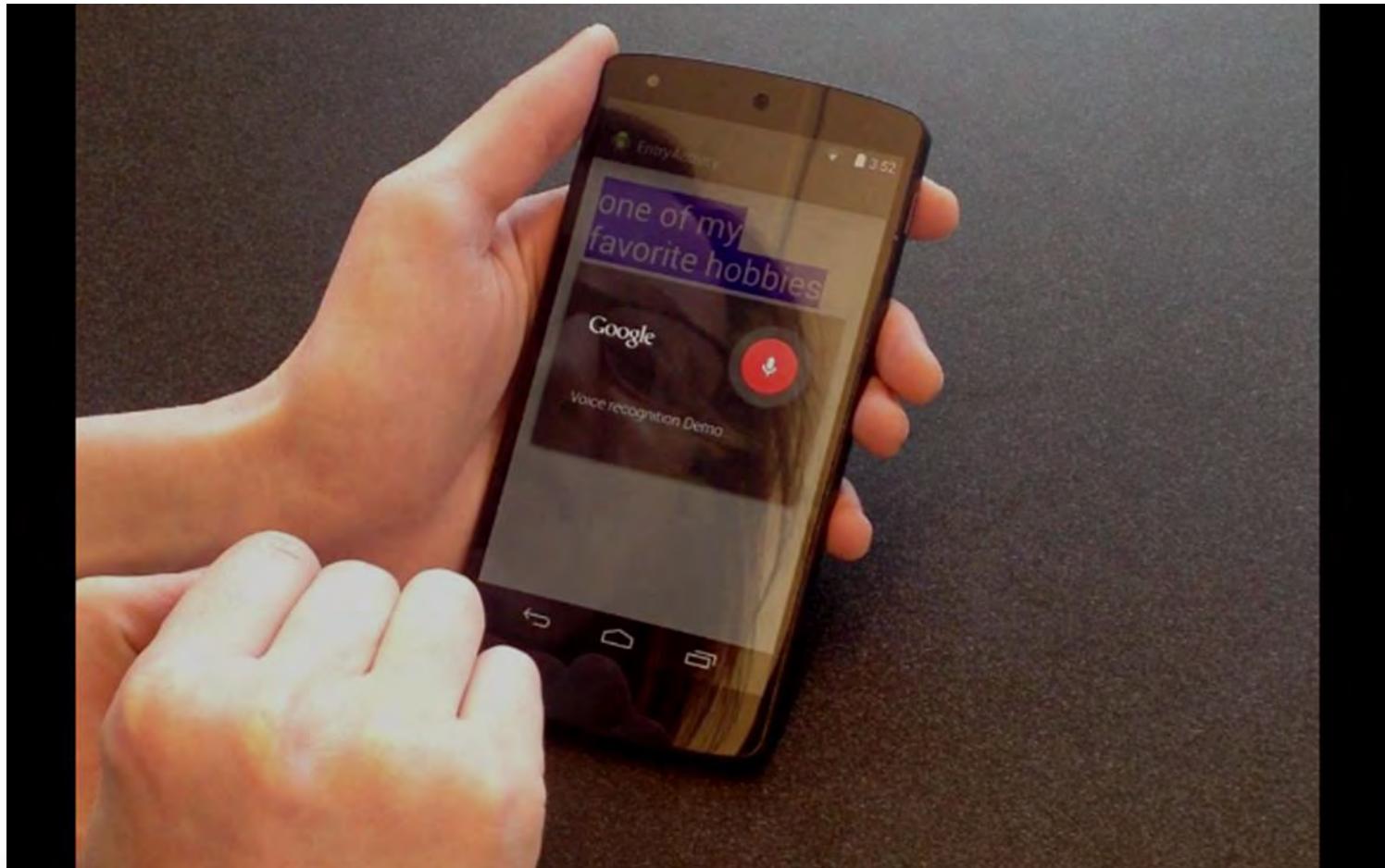
hobbies

Reviews and Edits

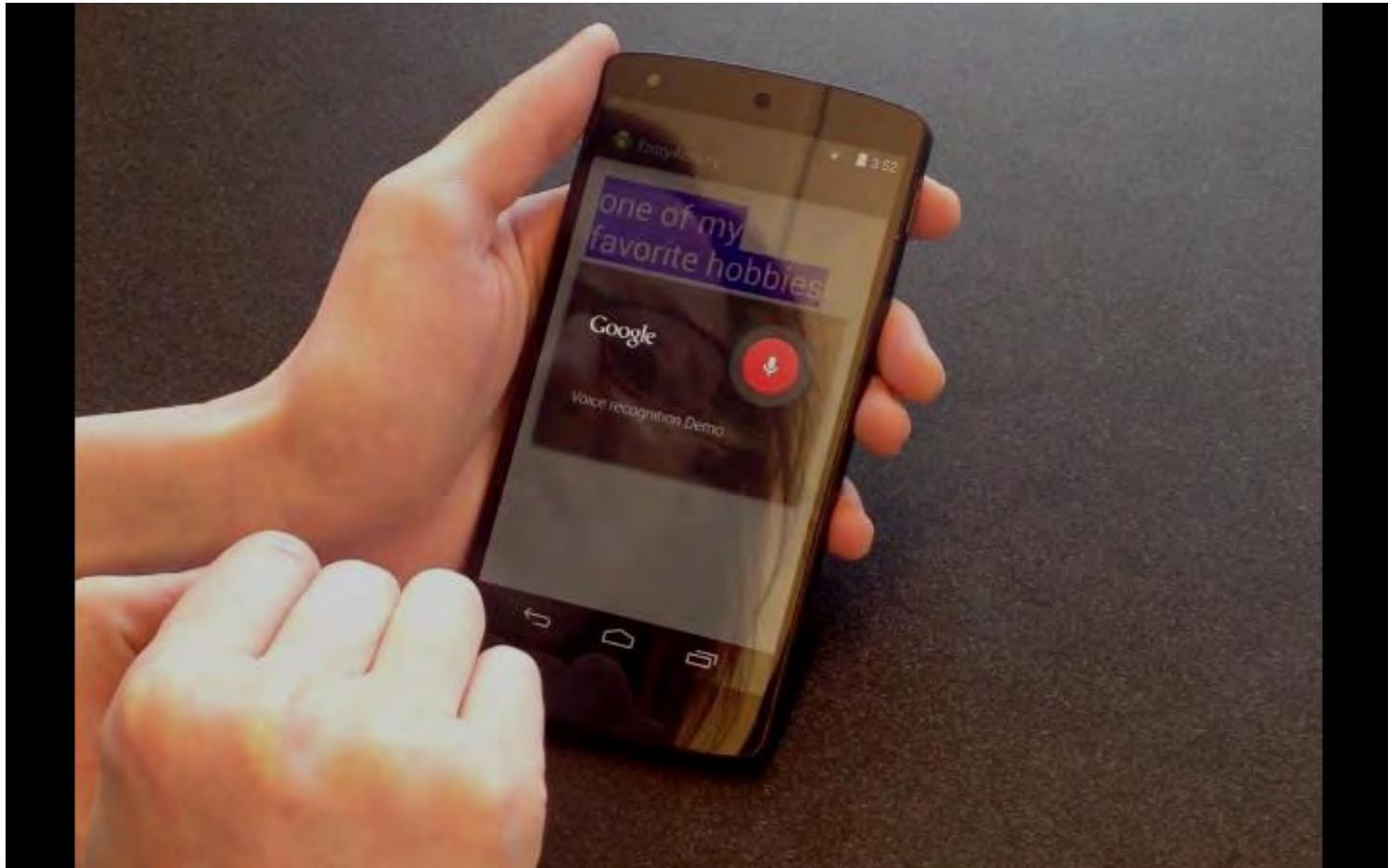
80% of composition time in review and edits



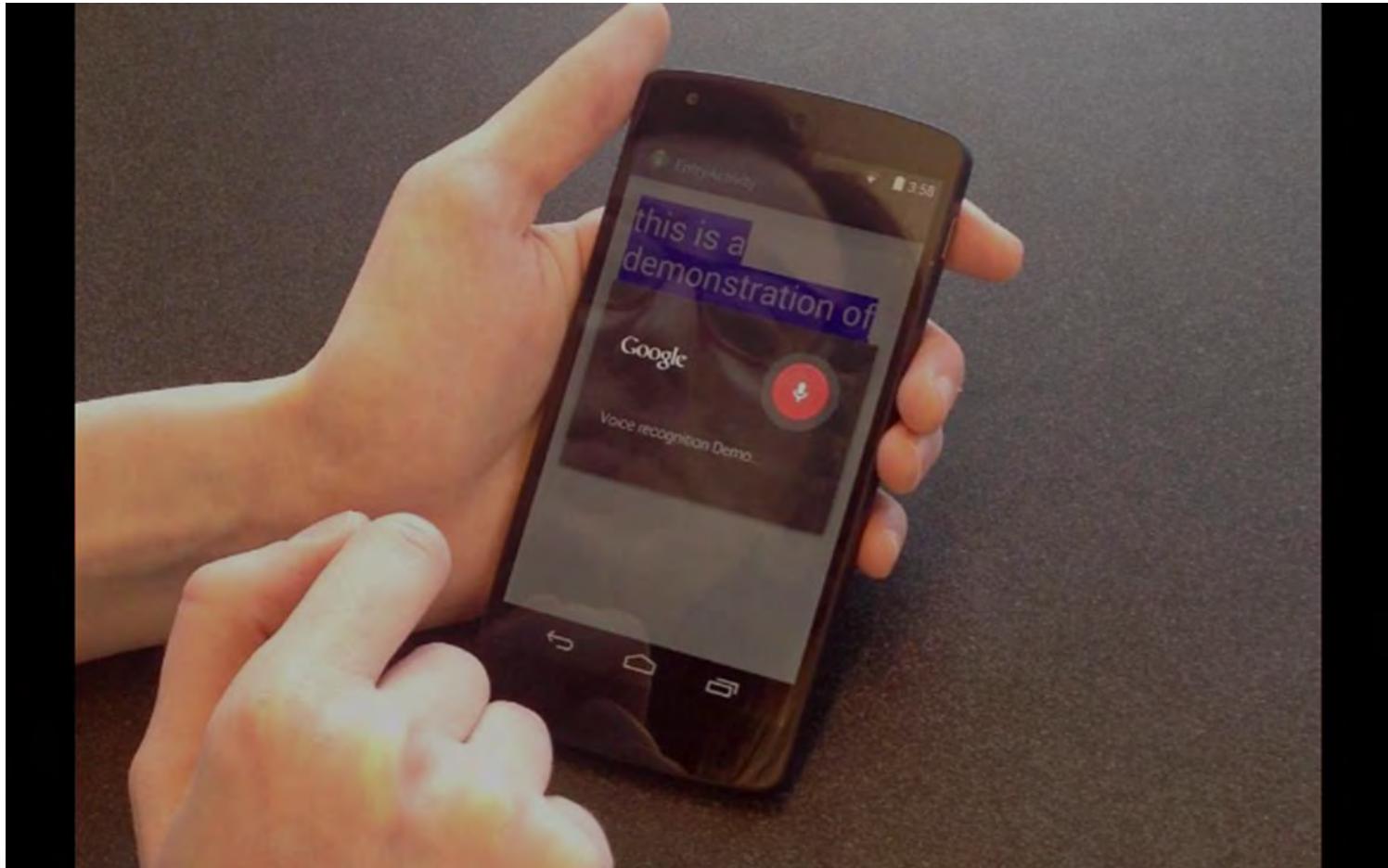
Spifi



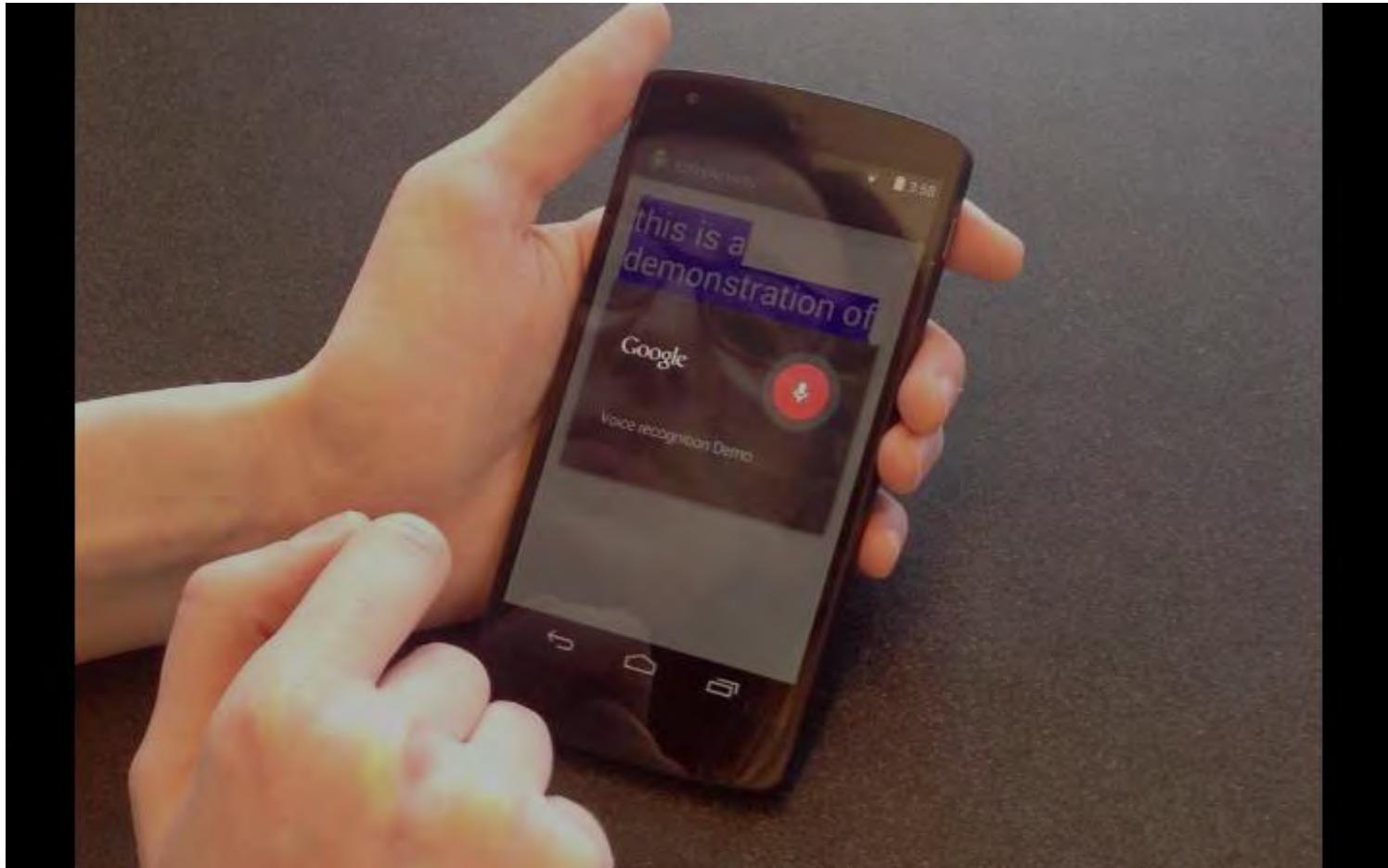
Spifi



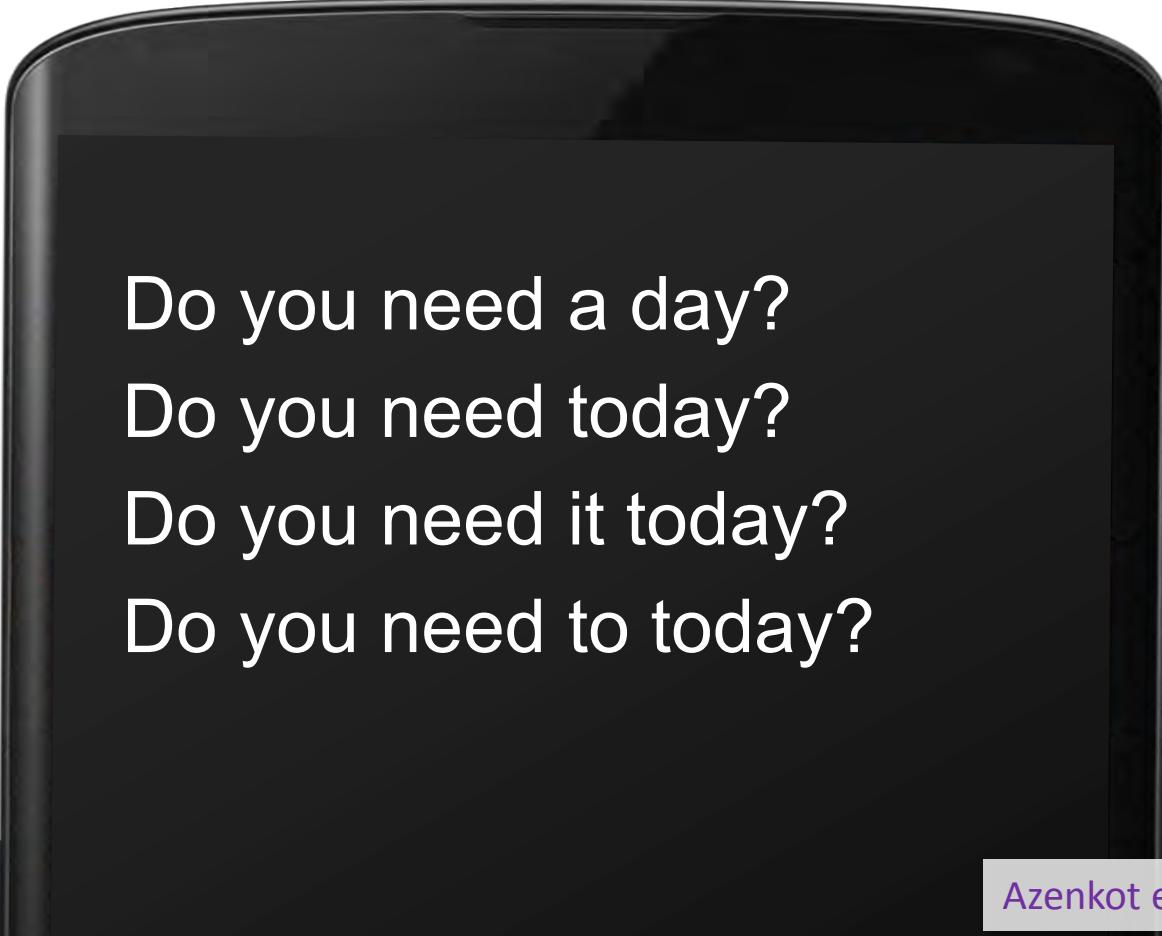
Spifi



Spifi



Recognize Speech as N-best List

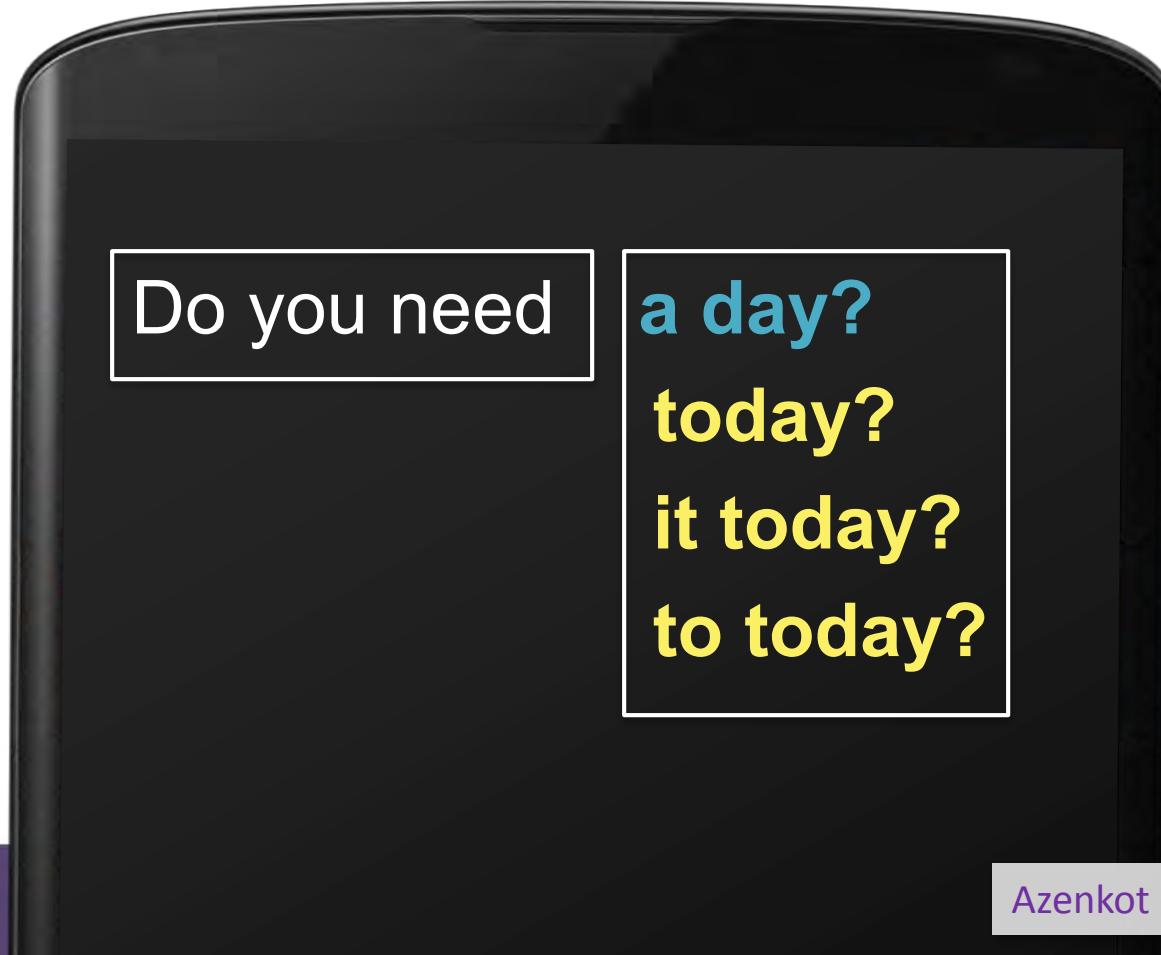


Do you need a day?
Do you need today?
Do you need it today?
Do you need to today?

Find Uncertain Words

Do you need **a day**?
Do you need **today**?
Do you need **it today**?
Do you need **to today**?
Do you need ** *****

Split Into Phrases and Align Alternatives



Accessibility is More than Text Entry

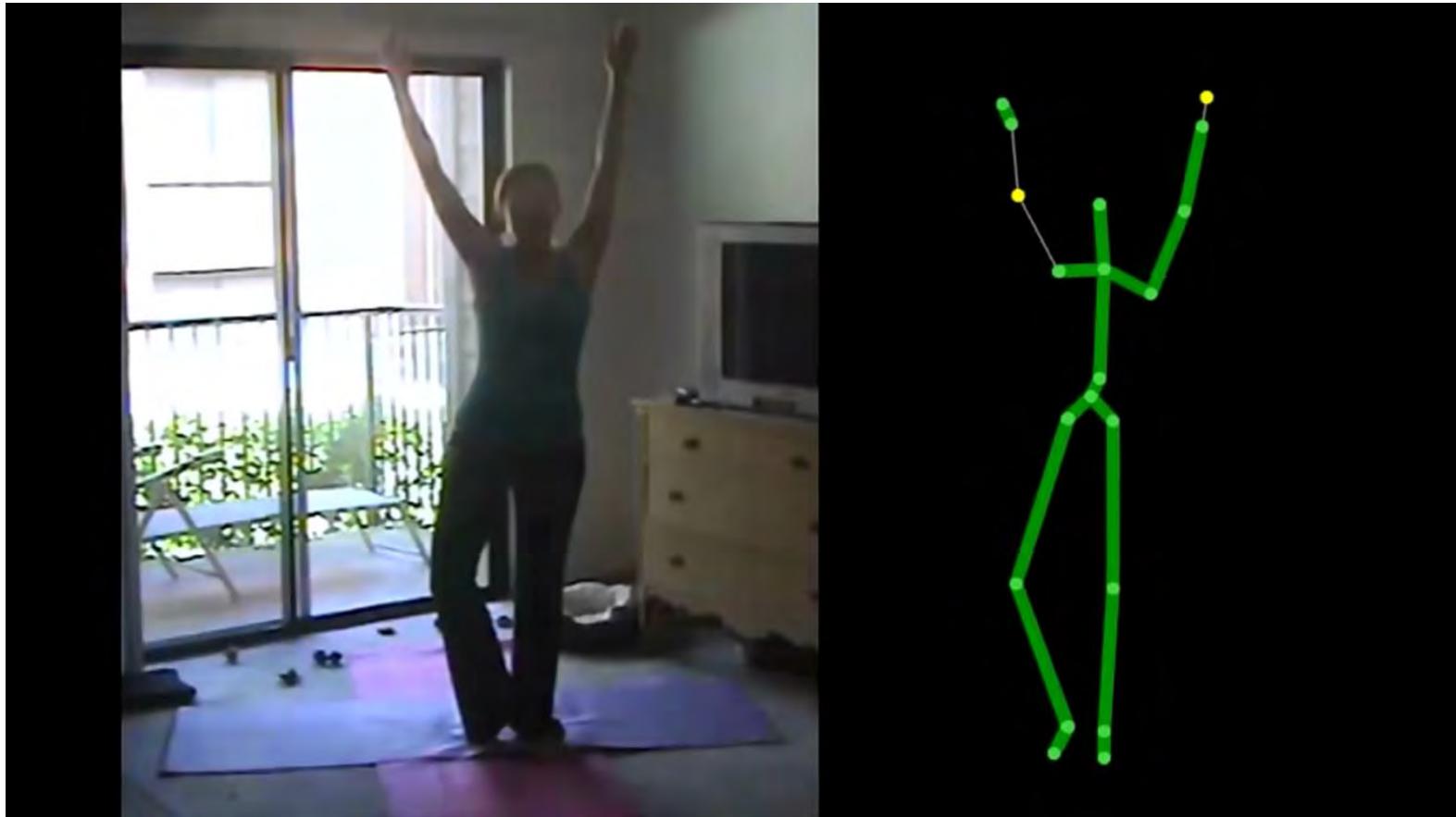


“Sometimes you don’t follow along as well unless [you are] one on one.”

Accessibility is More than Text Entry



Accessibility is More than Text Entry



Accessibility is More than Text Entry



OneBusAway

Home Tools Research Contact Us Settings

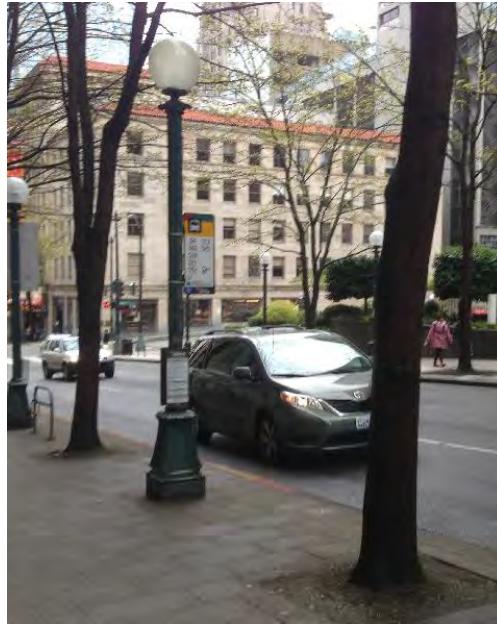
NW MARKET ST & BALLARD AVE NW

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

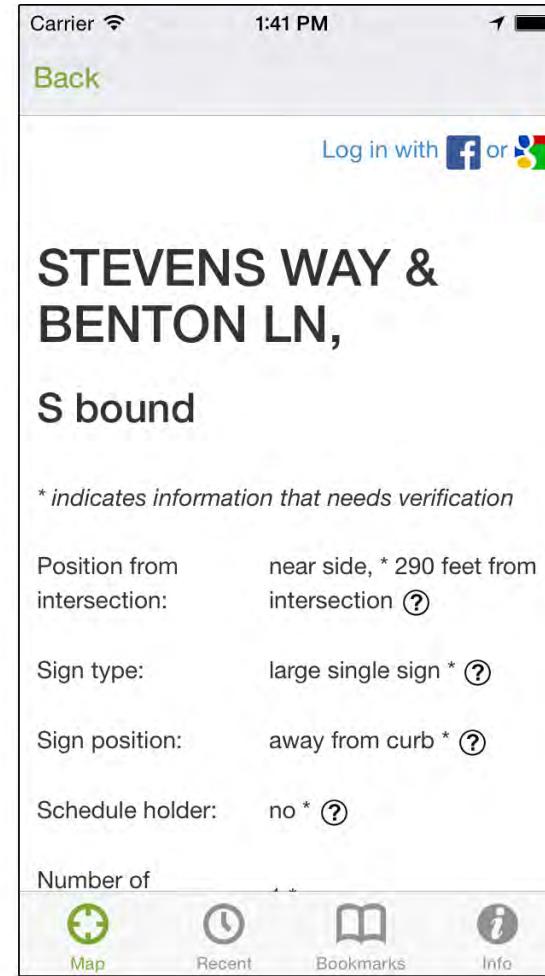
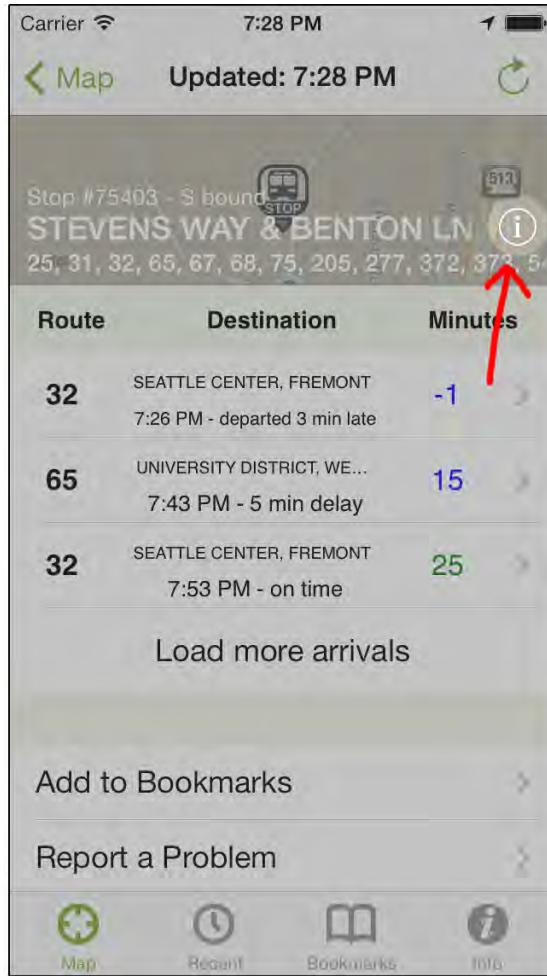
Last Update: 03:57 PM

Accessibility is More than Text Entry



How do you find a bus stop?

Accessibility is More than Text Entry



What is Disability?

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

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

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.

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.

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

CSE 440: Introduction to HCI

User Interface Design, Prototyping, and Evaluation

Lecture 13:
Designing for Diverse Needs

James Fogarty
Alex Fiannaca
Lauren Milne
Saba Kawas
Kelsey Munsell

Tuesday/Thursday
12:00 to 1:20

