CSE440: Introduction to HCI

Methods for Design, Prototyping and Evaluating User Interaction

Lecture 13:
Accessibility

Nigini Oliveira
Abhinav Yadav
Liang He
Angel Vuong
Jeremy Viny

DESIGN
USE
BUILD

PAUL G. ALLEN SCHOOL
OF COMPUTER SCIENCE & ENGINEERING

Project Status

Framing the problem
- User research
- Competitive analysis
- Data analysis and summary

Exploring the solution space
- Brainstorming
- Ideation through sketching

Finding a good solution
- Scoping
- Consideration of constraints
- Scenarios, storyboards, personas
- Design rationale

Refining the solution
- wireframes
- lo-fi prototypes
- early evaluations
- mockups/mid-fi prototypes
- additional evaluations

This Week

May 13	May 14	May 15	May 16	May 17
3a - Paper Protoype	Accessibility	3b - Heuristic Evaluation	Patterns	Section
	10:00 - 11:20 | OUG 136	Nigini's office hours	10:00 - 11:20 | OUG 136	10:30 - 11:20 | MGH 058
		10:00 - 12:00		11:30 - 12:20 | MGH 058
		Allen Center 338		1:30 - 2:20 | MGH 058
				2:30 - 3:20 | MGH 058
				Reading 3: Usability Testing
				3c - Usability Testing Check-In

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

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 your 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 calluses 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.

(Bic for Her)

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**

Kodak, 1926

Kodak Vest Pocket Series lll
(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 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

NEED: **design a model that would appeal to women**

Their solution was a selling the iPod in 5 new different colors

Jonathan Ive
Apple iPod Mini
(2004)

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

Observations by Buxton

"That is simply good, intelligent design in action. It is also a **very good lesson**: an obsession with the new and original, without a **deep literacy and appreciation for the past**, leads to a path of missed opportunities."

Design, preferences and choice

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

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

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    15% of the population

50 million people in US

Including yourself if you
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16% of people in the US
10% of workforce
5% of STEM workforce
1% of PhDs in STEM

A Social Justice Problem

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Are we reinforcing this or are we working against this?

Accessibility

Designing products/services that are accessible to people with disabilities

Different types of accessibility
- Web / Mobile (aka Digital)
- Physical

Accessibility is the Law

Americans with Disabilities Act (ADA), 1990

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

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Rehabilitation Act, 1973 (Section 508, 1998)

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National Federation of the Blind vs. Target, 2006

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

	Permanent	Temporary	Situational
Touch	One arm	Arm injury	New parent
See	Blind	Cataract	Distracted driver
Hear	Deaf	Ear infection	Bartender
Speak	Non-verbal	Laryngitis	Heavy accent

Inclusive
A Microsoft Design Toolkit

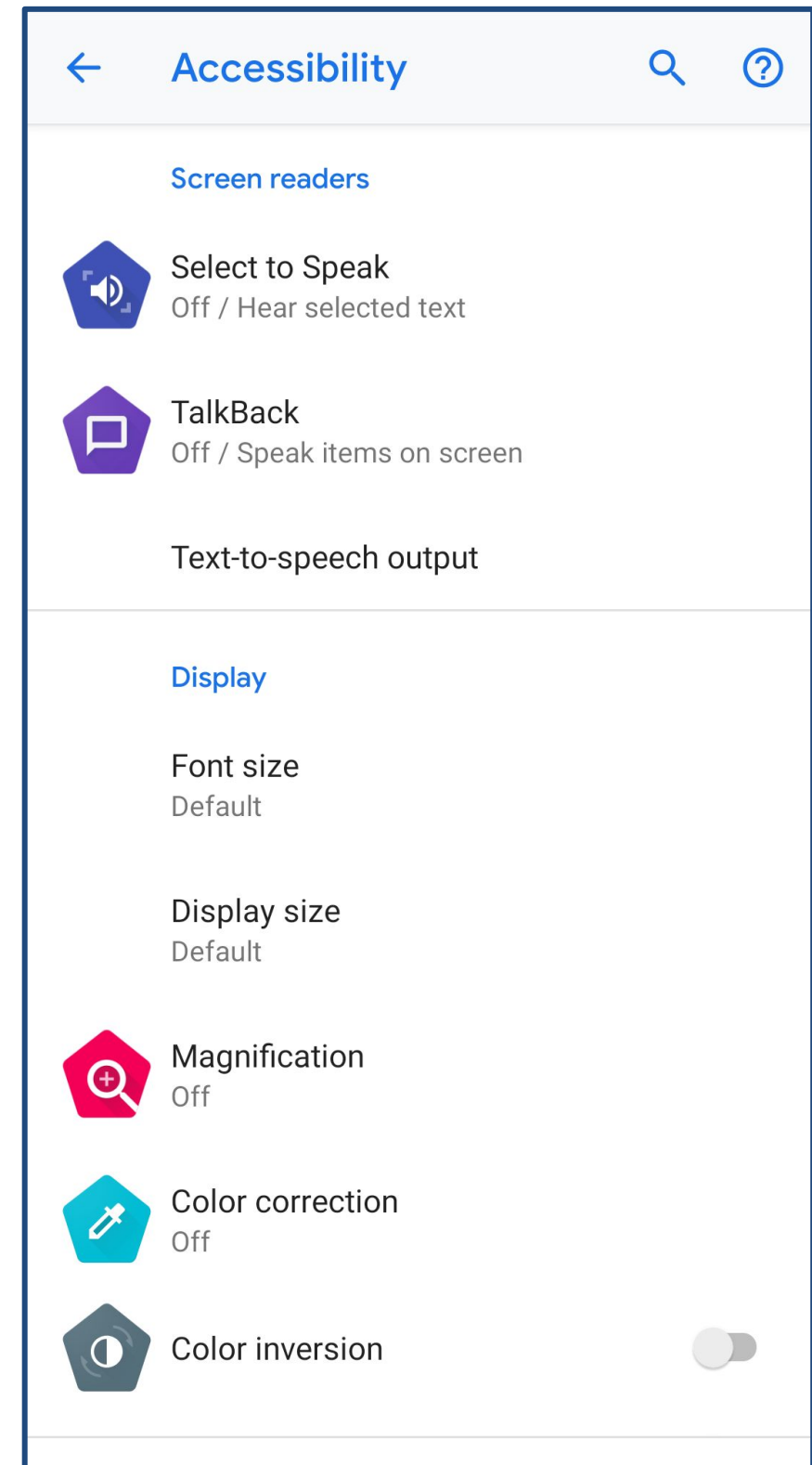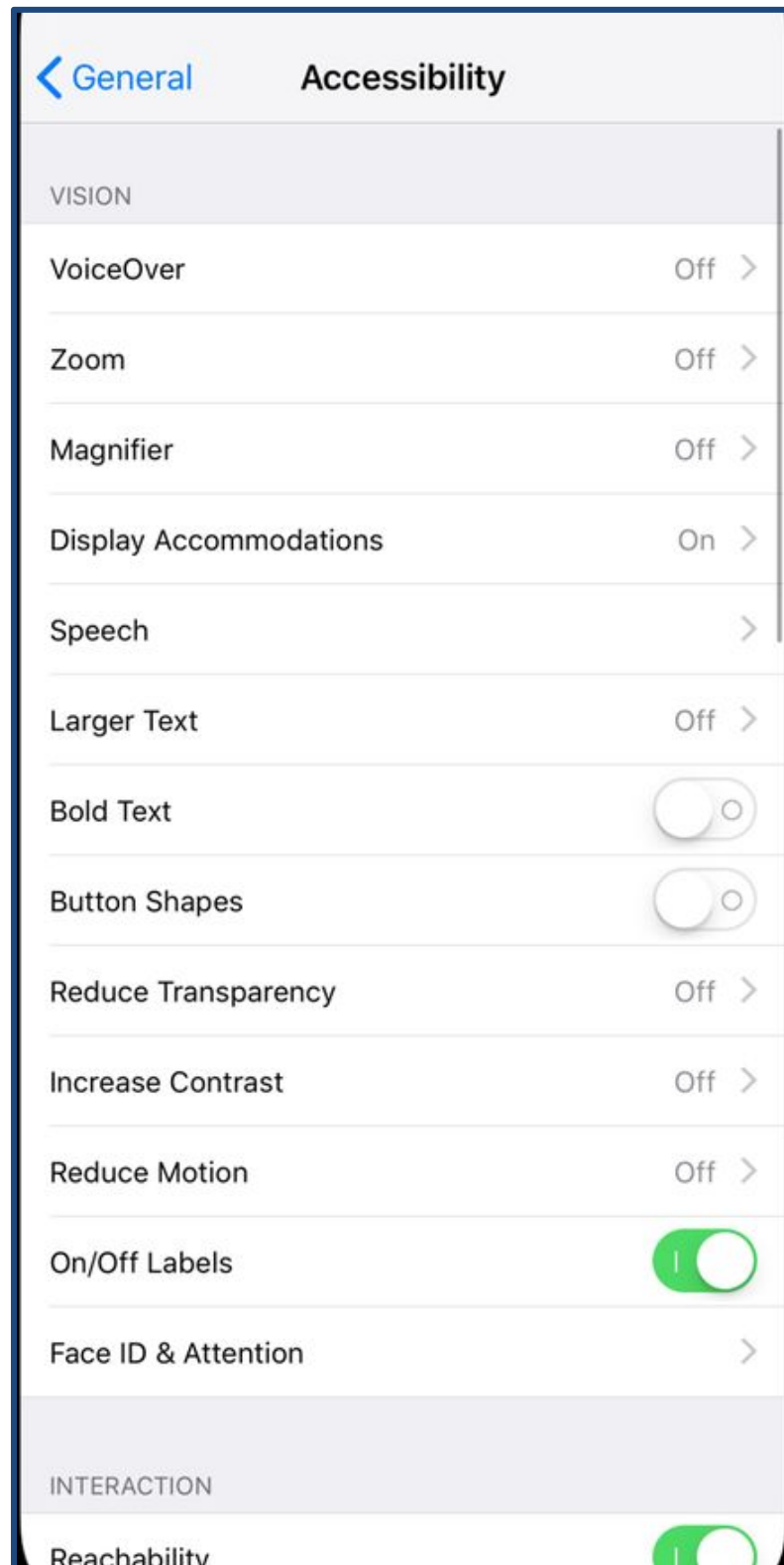Microsoft, 2016

What have the tech industry done?

MS Word Accessibility checker ([video](#))

Chrome Console/Audit Tools ([video](#))

Accessible Graphics by SAS ([DUB seminar](#))

Apple promotes 2017 capabilities ([video](#))

Current State of Devices

iOS Accessibility screen (left):

< General   **Accessibility**

VISION

VoiceOver	Off >
Zoom	Off >
Magnifier	Off >
Display Accommodations	On >
Speech	>
Larger Text	Off >
Bold Text	(off toggle)
Button Shapes	(off toggle)
Reduce Transparency	Off >
Increase Contrast	Off >
Reduce Motion	Off >
On/Off Labels	(on toggle)
Face ID & Attention	>

INTERACTION

Reachability

Android Accessibility screen (right):

←   **Accessibility**   🔍   ？

Screen readers

Select to Speak
Off / Hear selected text

TalkBack
Off / Speak items on screen

Text-to-speech output

Display

Font size
Default

Display size
Default

Magnification
Off

Color correction
Off

Color inversion   (off toggle)

Equal Access to Information

Is this design promoting equal access?

Equal Access to Information

Is this design promoting equal access?

Some dimensions to consider

Cost

Speed

Accuracy

Ease

Simply being possible is not enough
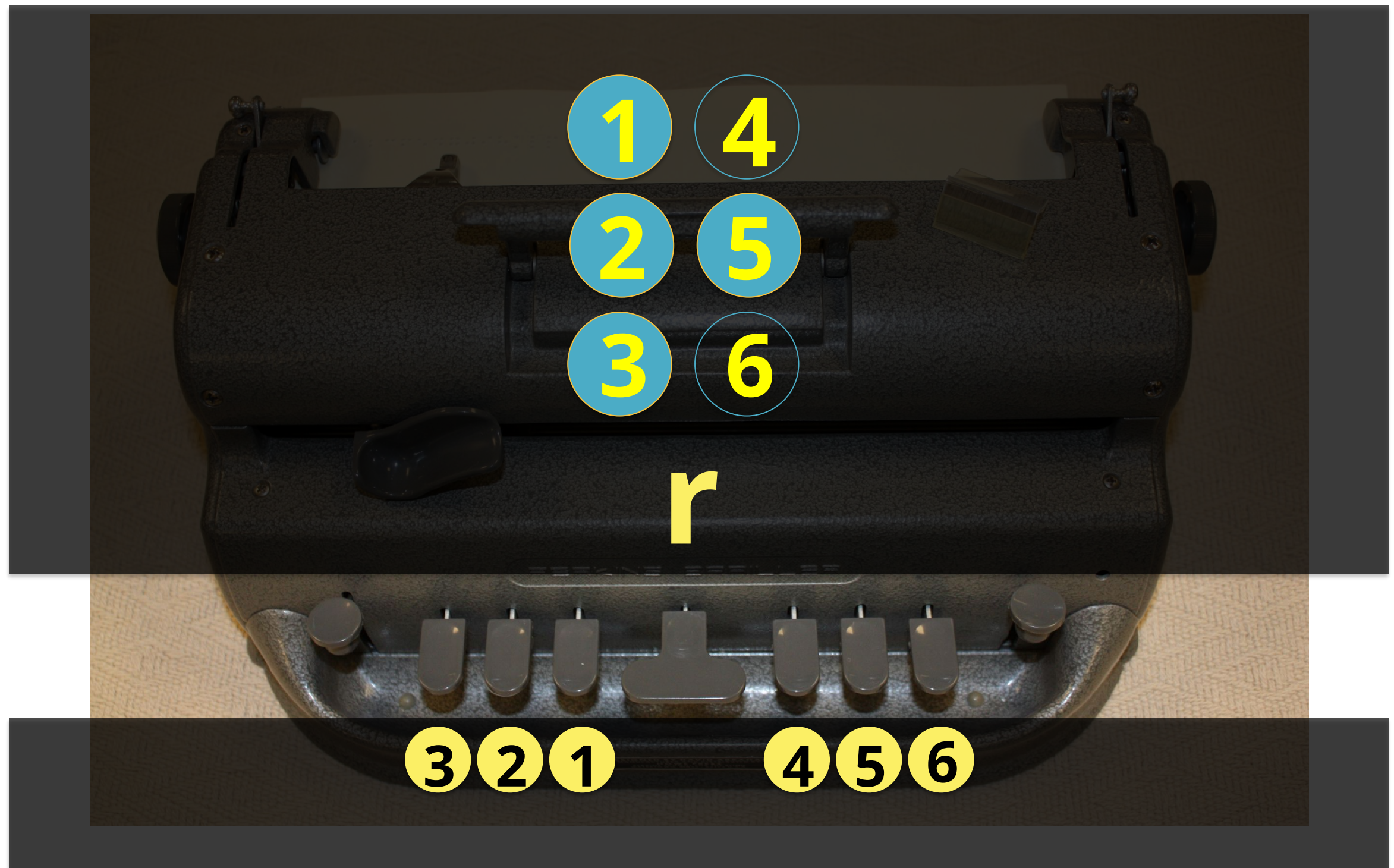
A Closer Look at Text Entry

Azenkot

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
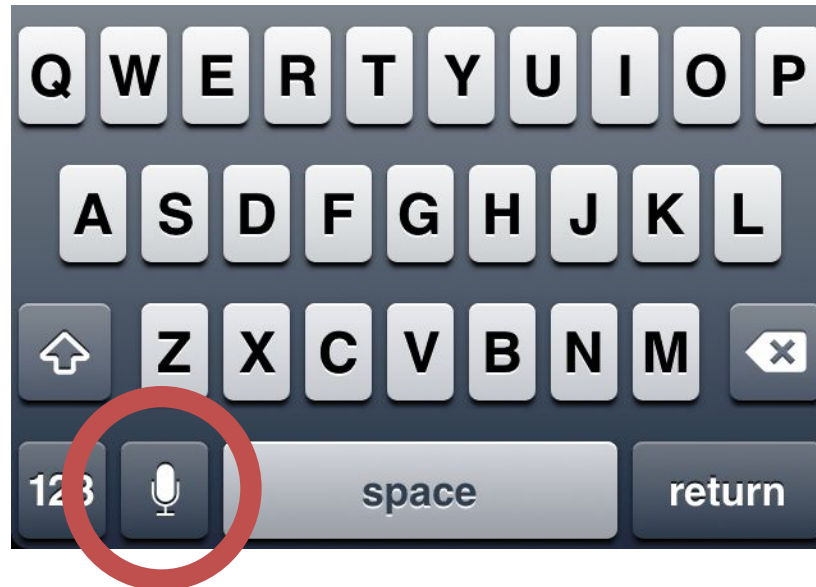
Wobbrock, TACCESS, 2011

Perkinput

Azenkot et al, GI 2012

Perkinput

i can use two phones to go f

Speech Input
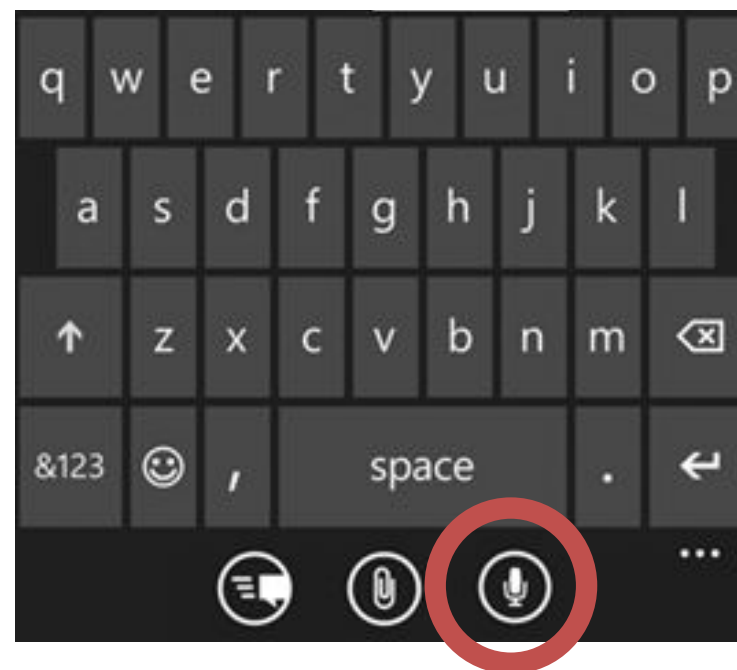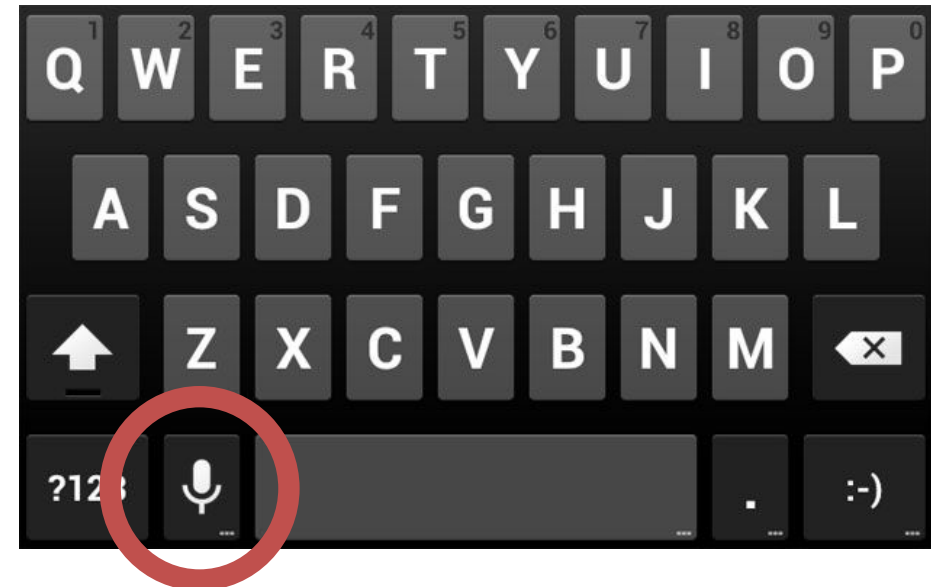
Accessibility is More than Text Entry

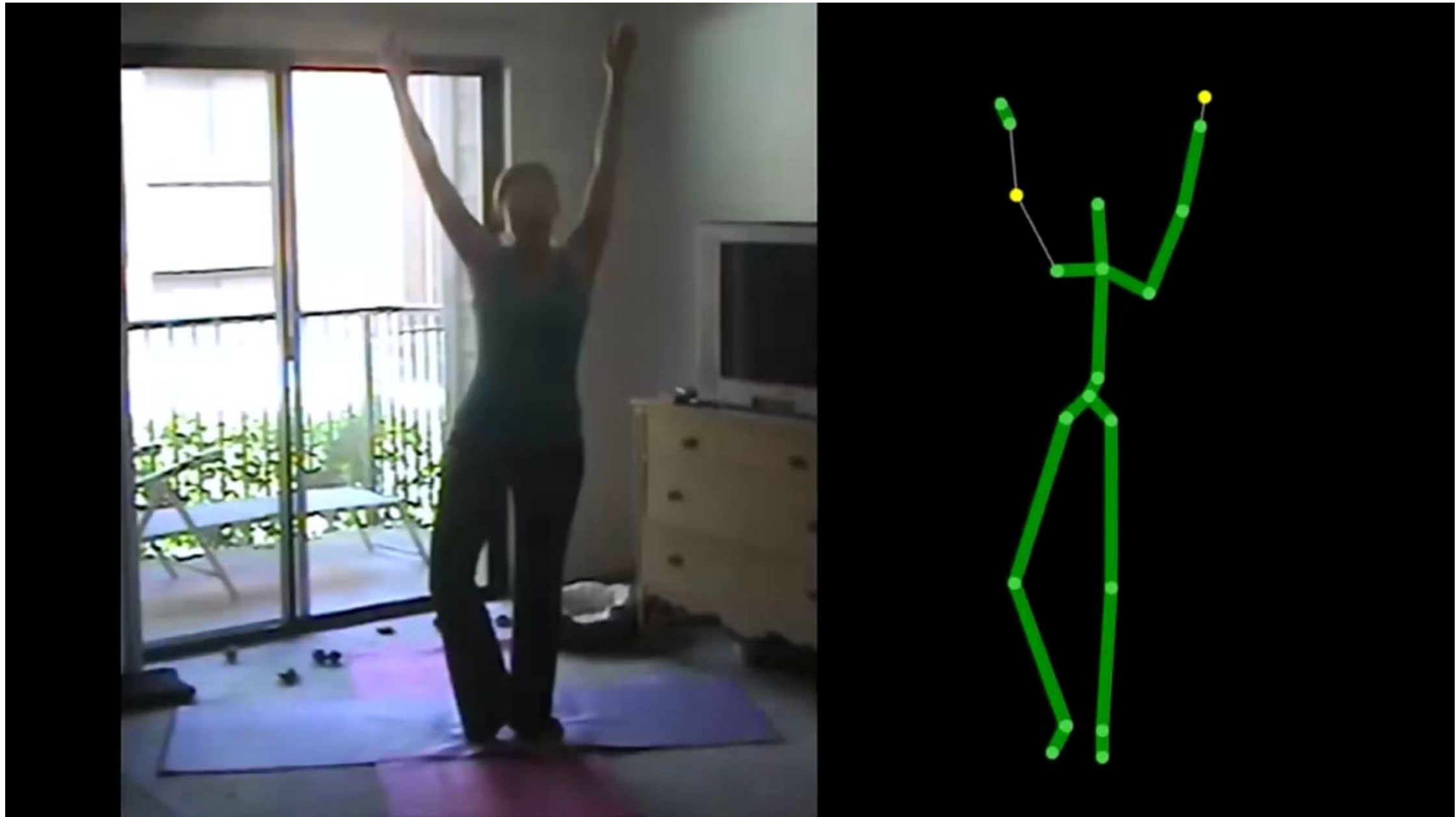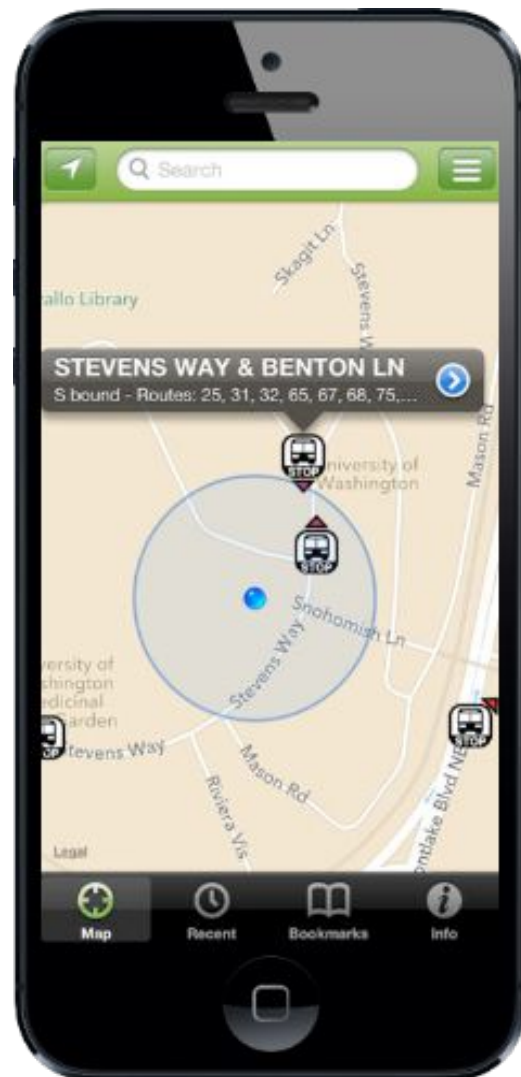"Sometimes you don't follow along as well unless [you are] one on one."

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

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

"I have to ask people for information a lot. Sometimes I call Metro to figure out where the stop is [located] approximately, but they still can't exactly tell you (...)"
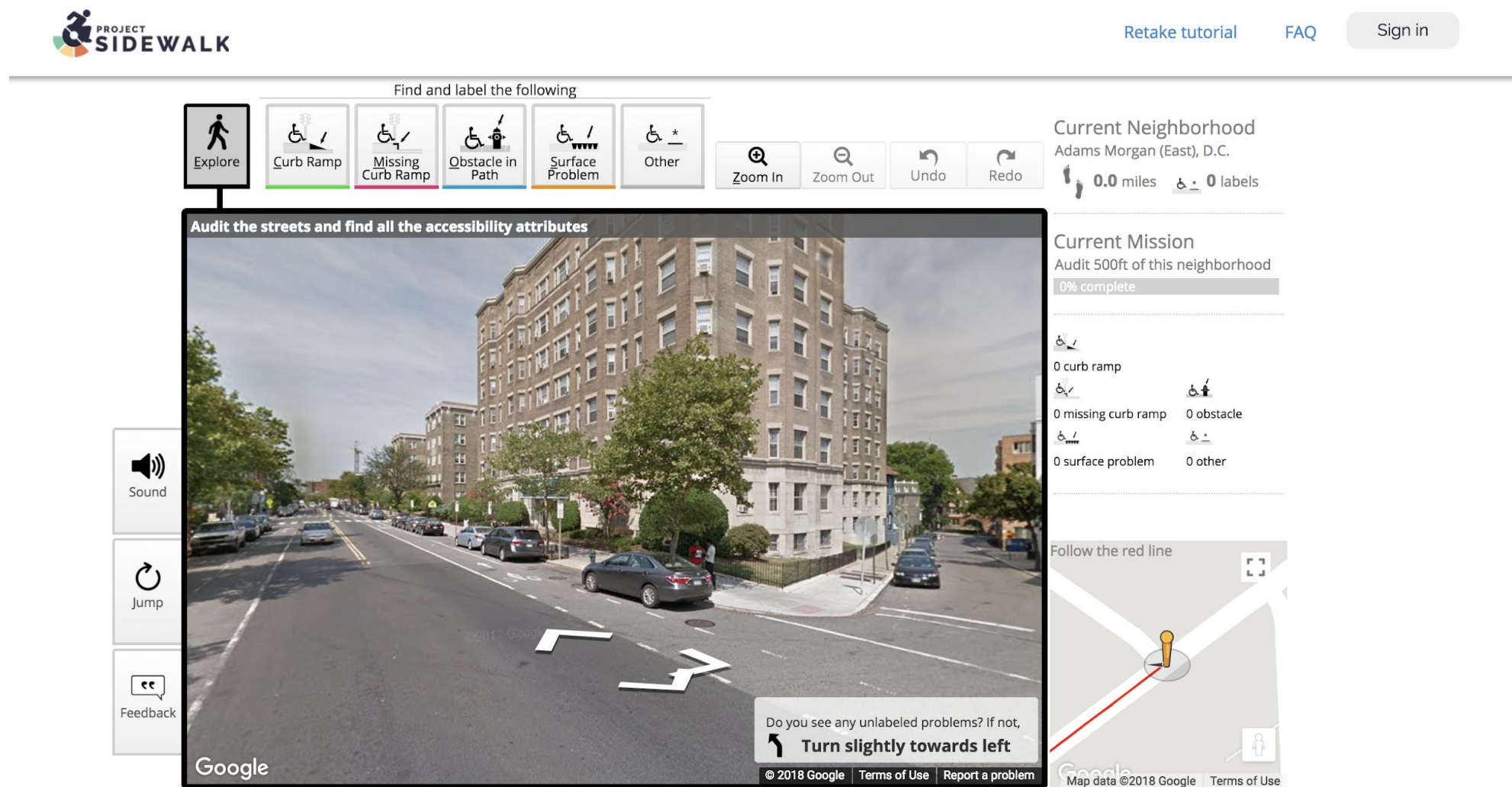
Azenkot et al, CHI 2011

Accessibility is More than Text Entry

Project Sidewalk - projectsidewalk.io

Saha et al, ASSETS 2017

Accessibility is More than Text Entry

Project Sidewalk - projectsidewalk.io

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 (...) [it is] 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 Social Justice Problem

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    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
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Diverse participation is critical in effective design!

Ask me something!