

Designing for Universal Access

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INF 231 - User Interface Design & Evaluation

11-14-19

Have you ever thought about how a blind person uses this?



Have you ever thought about how a blind person uses this?

NO.

(usually)



Guilty, until 2014



BS, Computer Science

PhD, Human-Computer Interaction

Postdoc/Lecturer, Information Systems

Assistant Professor, Informatics

note: this is a systemic problem:

CS4All 2018 - made Accessibility Pledge

SIGCSE 2019 - Teaching Accessibility workshop

My expertise: designing assistive tech



recent & ongoing research collaborations with Toyota
on wearable navigation aids for people who are blind

My expertise: designing assistive tech



ongoing research collaboration with TRX, Inc. on
turn-by-turn indoor navigation for people who are blind

My expertise: designing assistive tech



a few of the diverse students I have recently worked with

Imagine life without screens



Access to digital technology matters

Everyday living

Education

Employment

Equity

Accessibility for whom? People with...

vision

- blind
- low-vision
- color blind

hearing

- d/Deaf
- hard of hearing

speech

- ability to speak
- speech impediments

mobility

- ability to walk
- dexterity of limbs

cognitive

- memory loss
- learning disabilities

behavioral

- anxiety
- bipolar

People with disabilities in the US

% US population with disability?
(2010 Census)

People with disabilities in the US

% US population with disability? **19%**
(2010 Census)

People with disabilities in the US

% US population with disability? **19%**
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% age 64+ with disability?
(2010 Census)

People with disabilities in the US

% US population with disability? **19%**
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% age 64+ with disability? **35%**
(2010 Census)

People with disabilities in the US

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% age 64+ with disability? **35%**
(2010 Census)

“ You all are only just temporarily abled.
You become us in the end.

Have you ever used one of these?



Temporary & situational impairments

	Permanent	Temporary	Situational
Touch	 One arm	 Arm injury	 New parent
See	 Blind	 Cataract	 Distracted driver

Accessibility for whom? All of us.

people who *(will)* have permanent disabilities

people who *(will)* have temporary disabilities

people who *(will)* have situational disabilities

Universal Design / Usability

design for everyone, regardless of age, disability, etc.

in search of “digital curb cuts”



Federal laws regulating accessibility

Section 508 of the Rehabilitation Act—covers all U.S. federal technology (web, sfw, hdw, public and internal)

Americans with Disabilities Act—covers state and local government, and the 12 categories of public accommodations (including universities, libraries, museums, stores, and hotels)

... and more

Litigation on the rise

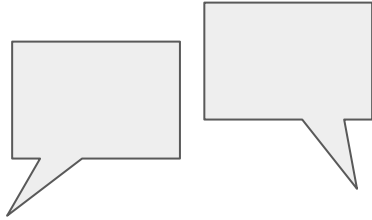


“...1,053 [ADA website lawsuits] filed in the first half of last year compared to 814 in all of 2017.”

<https://www.fastcompany.com/90293399/ninth-circuit-court-dominos-pizza-website-is-bound-by-ada>

<https://www.theguardian.com/music/2019/jan/04/beyonce-parkwood-entertainment-sued-over-website-accessibility>

Reading: Retrofitting Accessibility (2011)



Brian Wentz
Shippensburg
University



Paul T. Jaeger
University of
Maryland.
College Park



Jonathan Lazar
University of
Maryland.
College Park

What are the main takeaways?
Questions / problematizations / commentary?
(How) is this article useful?

So, how do we design accessible / universally usable systems?

BIG question

Let's start small: blind users, mobile devices+apps

Goal: spark curiosity, provide starter links

Accessibility for whom? People with...

vision

blind

low-vision

color blind

hearing

d/Deaf

hard of hearing

speech

ability to speak

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ability to walk

dexterity of limbs

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memory loss

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bipolar

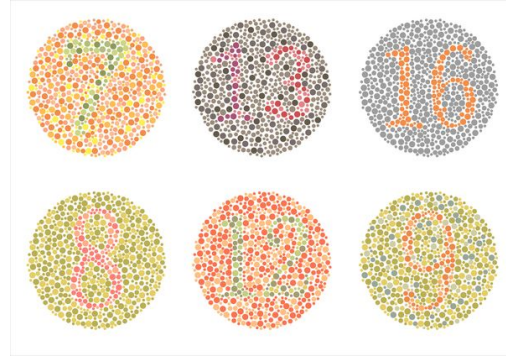
Visually-impaired users are diverse

Partial vision

Low vision

Color blindness

Deteriorating vision



Focus today: “screen reader users”

A brief intro to screen readers

Generate synthesized speech of text on the screen
(or back-end equivalents, including ALT text, form labels, and table headers)

Controlled with keyboard shortcuts or touch screen gestures

Major vendors: JAWS, NVDA, VoiceOver, Talkback, Narrator



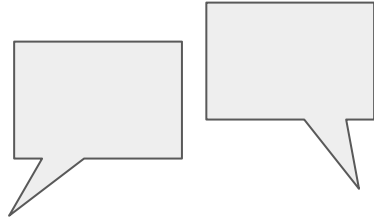
ACTIVITY: find your screen reader (5min)

Enable your phone's screen reader

- iOS: Settings > General > Accessibility > VoiceOver
- Android: Settings > Accessibility > Talkback

Input works differently now. For example, tap now reads the screen and double-tap selects. Use two or three fingers to scroll by page. Play with it for a minute.

ACTIVITY: turn on your screen reader



How does it work?

What can you do with it / pros?

What can't you do with it / cons?

How might it be useful to *you*?

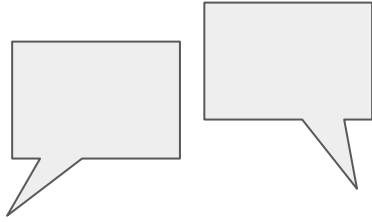
Other thoughts / observations?

ACTIVITY: read the weather forecast (5min)

Using your phone's screen reader turn on the
"screen curtain" / "dark screen"

See if you can navigate to your weather app and
read the forecast for today.

ACTIVITY: read the weather forecast



What problems did you have?

What worked well?

Other thoughts / observations?

How Ali reads the weather forecast



Blind users' screen reader behavior

Tend not to listen to the entire page or even label

Blind users tend to use active strategies:

- Browse through headings

- Listen to the links list

- Use keyword searching

Listen at very high rates of speed (up to 500 wpm!)

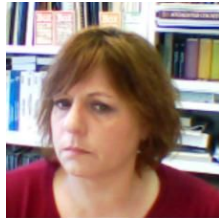
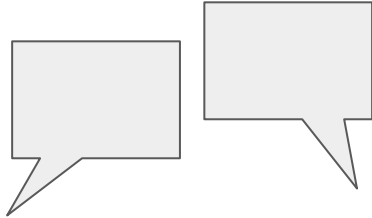
Tend to stick with sites they know are accessible

Ways to evaluate a11y / elicit req'ts

teach yourselves to do accessibility audits & set up automated unit tests

user studies / testing

Reading: User Requirements Elicitation for Universal Access (2009)



Margherita Antona
FORTH



Stavroula Ntoa
FORTH



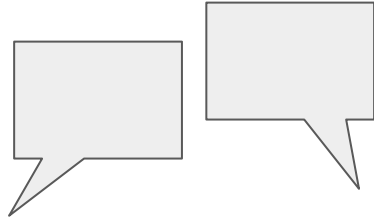
Ilia Adami
FORTH



Constantine Stephanidis
University of
Crete + FORTH

let's apply what we learned in an activity!

ACTIVITY: develop a study plan (20 min)



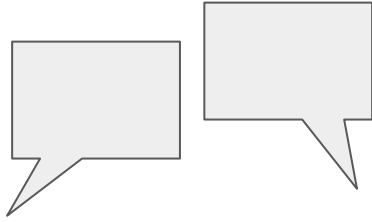
Form groups of 2-3 people

Read the worksheet

Develop a study plan

Be prepared to report back

ACTIVITY: develop a study plan



What methods did we choose? Why?

Challenges / adaptations?

Skills you need to gain?

Ethical considerations?

Tips for doing user testing well

No blindfolds, please

Compensate (\$)

Provide accessible travel / directions

Read up on etiquette

Ways to evaluate a11y / elicit req'ts

teach yourselves to do accessibility audits; set up automated unit tests

user testing

hiring diverse/specialized engineers and designers

Universal Design / Usability

design for everyone, regardless of age, disability, etc.

in search of “digital curb cuts”



“the original life hackers”

Ed Roberts, father ILM

Ron Mace, coined UD

Takeaways

accessibility matters (software, everything else)

you probably didn't learn this in school

it's complicated, but start small and iterate

you don't have to (shouldn't!) do it alone

Have you ever thought about how a blind person uses this?

YES.



Thanks, Q&A?

Resources: Disability etiquette 101



Resources: Assessing Software A11y

- Rob Dodson's How to do an Accessibility Review:
<https://developers.google.com/web/fundamentals/accessibility/how-to-review>
- A11y Project's Resources:
<https://a11yproject.com/resources>
- Digital A11y's Testing Resources:
<https://www.digitala11y.com/accessibility-bookmarklets-testing/>
- GHC 2018 Workshop on Web Accessibility:
<https://ghc-2018-web-a11y.github.io>

Resources: Videos on Disability & Tech

- Disability Sensitivity:
https://www.youtube.com/watch?time_continue=1&v=Gv1aDEFIXq8
- Social Model:
<https://www.youtube.com/watch?v=9s3NZaLhcc4>
- Blind Mom:
<https://www.youtube.com/watch?v=-MUIDGmpZ8s>
- FB “See Pictures”:
<https://www.facebook.com/accessibility/videos/vb.443376095706121/1082033931840331/?type=2&theater>
- Apple accessibility:
https://images.apple.com/media/us/accessibility/2016/2c27194c_cf72_4f59_bbdb_9b87728c0082/films/feature/accessibility-feature-cc-us-20161018_1280x720h.mp4
- Microsoft Inclusivity:
<https://youtu.be/MQztMZQXMO8>
- Blind Software Engineer:
<https://www.youtube.com/watch?v=EjKuY7ql4Uq>
- Mark Brown’s Accessibility for Video Games Series:
https://www.youtube.com/watch?v=4NGe4dzlukc&list=PLc38fcMFcV_vvWOhMDriBlVocTZ8mKQzR

Resources: Disability, Tech, & Work

- Disability, Human Rights, and Information Technology. Edited by Jonathan Lazar and Michael Ashley Stein
- United Nations Convention on the Rights of Persons with Disabilities:
<https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html>
- Disability & Innovation Presentation to WWDC by Haben Girma:
https://www.youtube.com/watch?v=_bC7Mvy7Vn4
- What is Disability to Me?
https://www.youtube.com/watch?v=_bC7Mvy7Vn4
- How Walgreens includes workers with disabilities:
https://www.youtube.com/watch?v=_bC7Mvy7Vn4

Resources: Checking Color

- Colorblind web page filter:
<http://colorfilter.wickline.org/>
- Color contrast analyzer (native app):
<https://developer.paciellogroup.com/resources/contrastanalyser/>
- Luminosity contrast hex. Analyzer: <http://juicystudio.com/services/luminositycontrastratio.php>
- Color blindness simulator:
<https://www.color-blindness.com/coblis-color-blindness-simulator/>

Resources: Accessible Docs

- How to talk/write about disability in an inclusive way:
<http://www.sigaccess.org/welcome-to-sigaccess/resources/accessible-writing-guide/>
- How to generate an accessible PDF file:
https://assets18.sigaccess.org/creating_accessible_pdfs.html
- How to give an accessible presentation:
https://assets18.sigaccess.org/making_accessible_presentations.html