CSE 440: Introduction to HCI
User Interface Design, Prototyping, and Evaluation

Lecture 13: Designing for Diverse Needs

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Alex Fiannaca
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Tuesday/Thursday
12:00 to 1:20
Today

Usability Testing Check-Ins Tomorrow
UIST Report

Designing for Diverse Needs
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

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From CI Terminology: Entering Focus
Pinkification

This is a really complicated issue

But it is not new

We will start here

Then work through more obvious problems
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!
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

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“with Health, you can monitor all of your metrics that you’re most interested in”
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“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 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

Kodak Vest Pocket Series III (1926)
Walter Dowrin Teague
Vanity Kodak (1928)
Apple, 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
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.
An Activity

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

very unappealing

very appealing
<table>
<thead>
<tr>
<th>#</th>
<th>Bars Guide</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Best Bars Near the Rogers Centre</td>
<td>Posted: May 31, 2013  By Kevin Scott  These bars around the Rogers Centre are great spots before or after the game.</td>
</tr>
<tr>
<td>2</td>
<td>Best Karaoke Bars with Private Rooms</td>
<td>Posted: March 08, 2013  By Samartina Edwards  Check out these karaoke bars with private rooms in Toronto.</td>
</tr>
<tr>
<td>3</td>
<td>Best Bars for Live Music in Toronto</td>
<td>Posted: September 26, 2012  By Stephan Baldwin  Here are the top venues in Toronto to enjoy some live music with your drink.</td>
</tr>
<tr>
<td>4</td>
<td>Bars with the Best Late-Night Menus</td>
<td>Posted: November 15, 2012  By Samartina Edwards  Here are five bars with a great late-night menu.</td>
</tr>
</tbody>
</table>
Please rate the website you have just seen based on visual appeal.

very unappealing

[ ] [ ] [ ] [ ] [ ] [ ]

very appealing
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.

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
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 utmost detail of your stay. Our quality garden-style hotel is located just five minutes from Kigali International Airport and is right on the way to the heart of Kigali.

Sixteen years after the Genocide, Hotel Chez Lando is opening its new Barbeque, new Restaurant with Terrace and new Meeting Hall where comfort and light meet breathtaking views. 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 requests are subject to availability. Visa & Master Card Accepted.
Please rate the website you have just seen based on visual appeal.

very unappealing

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

very unappealing  

very appealing
Popular Rwandan Website
What is your website aesthetic?
Compare your visual preferences to people around the world. This experiment takes around 10 minutes.
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

High Quality Media Content That Gets Our Clients Results.

Visual complexity vs visual appeal graph showing peak appeal.

12 Reasons Why Teachers Love Engrade

Sell More. Market, sell, and buy digital goods and services around the world, online, and on mobile.

POCCU

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

26 RW

Election enforcement access, that's what. The people can't do it, but we sure can.

Reinecke and Gajos, CHI 2014
Plotting Appeal by Colorfulnessness

![Graph showing relationship between visual appeal and colorfulness complexity](image-url)
United States

United States

visual appeal

colorfulness & complexity

colorfulness
complexity

Reinecke and Gajos, CHI 2014
Other Countries

- Colorfulness
- Complexity

United States

Germany

Macedonia

Hong Kong
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

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
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

Wobbrock, TACCESS, 2011
Perkinput
Perkininput
Perkinput

Detect maximum likelihood to decide which finger input each touch.
Update shift the hit distributions towards the input points.

Azenkot et al, GI 2012
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Perkinput

Azenkot et al, GI 2012
Perkinput
Perkinput
Speed and Accuracy

Speed

Words per Minute

Session

Perkininput

VoiceOver

Accuracy

Uncorrected Error Rate

Session

VoiceOver

Perkininput

Azenkot et al, GI 2012
Another Problem
Another Problem
PassChords
PassChords
PassChords
PassChords
PassChords
PassChords
PassChords
Time to Authenticate

Seconds

PassChords  VoiceOver PINs

Azenkot et al, ASSETS 2012
Accuracy

Failure Rate

PassChords

VoiceOver PINs

Azenkot et al, ASSETS 2012
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

Note the relative absence of three-finger chords.

Azenkot et al, ASSETS 2012
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

Azenkot et al, ASSETS 2013
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.
When

Serial Access in Reviewing Transcript

Azenkov et al, ASSETS 2013
When one of my hobbies is hiking. I really enjoyed getting away… The triangle consists of a 2 mile hike to the beach, a 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

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

The triangle consists 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

hobbies
Reviews and Edits

80% of composition time in review and edits

- Natural speech: 150 WPM
- Speech input: 100 WPM
- Keyboard: 50 WPM

Azenkot et al, ASSETS 2013
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?

Azenkot et al, ASSETS 2013
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 ** ********

Azenkot et al, ASSETS 2013
Split Into Phrases and Align Alternatives

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

Azenkot et al, ASSETS 2013
“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

Eyes-Free Yoga, Rector et al, ASSETS 2013
Accessibility is More than Text Entry
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?

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.

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/
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
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