CS377Q
Designing for Accessibility
Spring Quarter 2019

John Tang, Microsoft Research

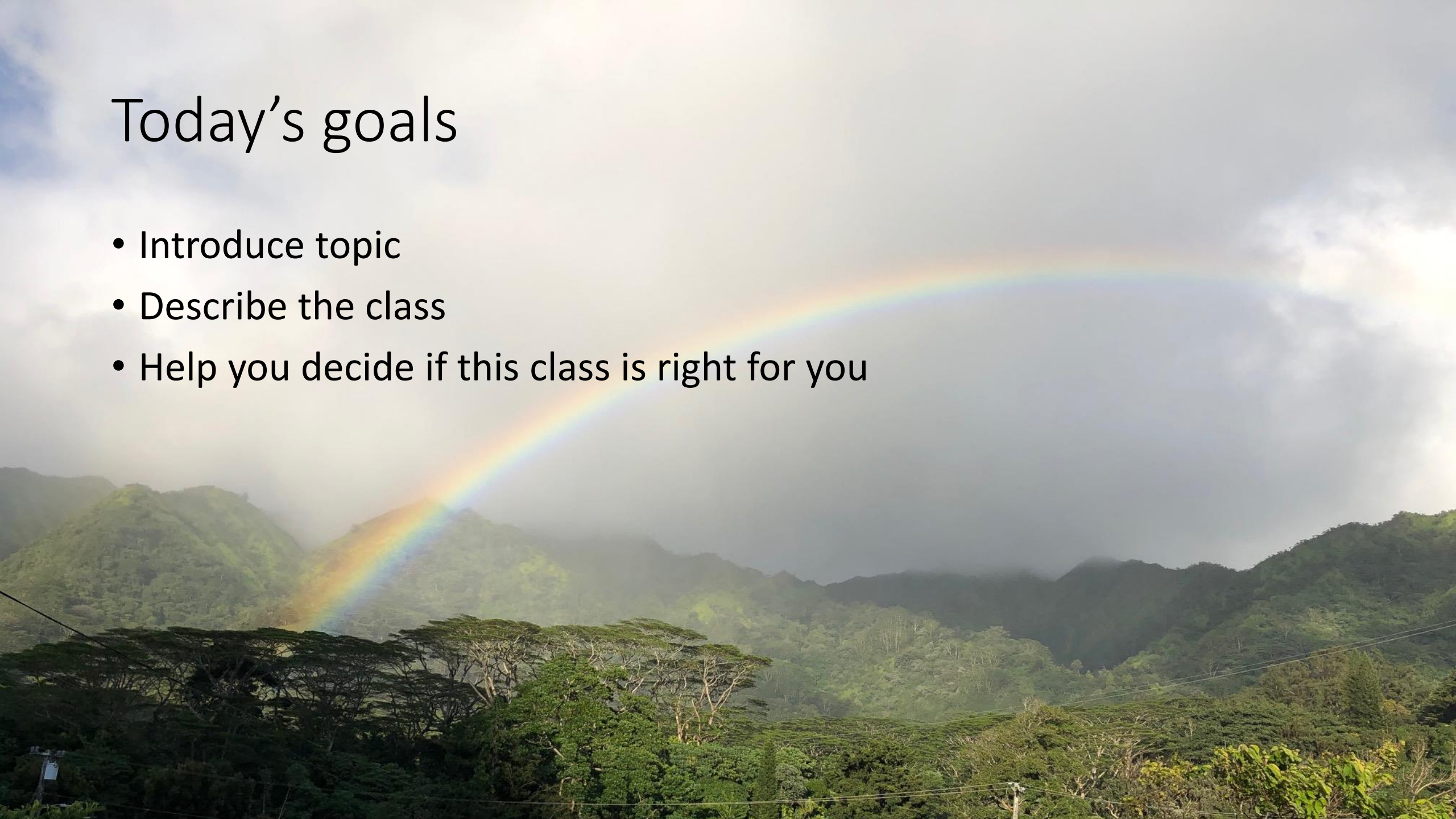
Tuesdays/Thursdays: 4:30-5:50, STLC105

CA: Trijeet Mukhopadhyay

https://canvas.stanford.edu/courses/101502

Today’s goals

- Introduce topic
- Describe the class
- Help you decide if this class is right for you



Why Design for Accessibility?

Accessibility Opportunity

- Worldwide, more than 1 billion people experience some form of disability
  - WHO World report on disability, 2011 https://www.who.int/disabilities/world_report/2011/en/
- 19% of the US population is disabled
  - US Census, 2012 https://www.census.gov/newsroom/releases/archives/miscellaneous/cb12-134.html
- Visual disability affects 4.6% of the adult US population
  - CDC, 2016 https://www.cdc.gov/ncbddd/disabilityandhealth/infographic-disability-impacts-all.html

Accessibility helps include users, reach larger customer base

Situational Impairment

Temporary Disability

Acquired Disability

Congenital Disability

Short-term

Long-term

Example: Curb Cuts

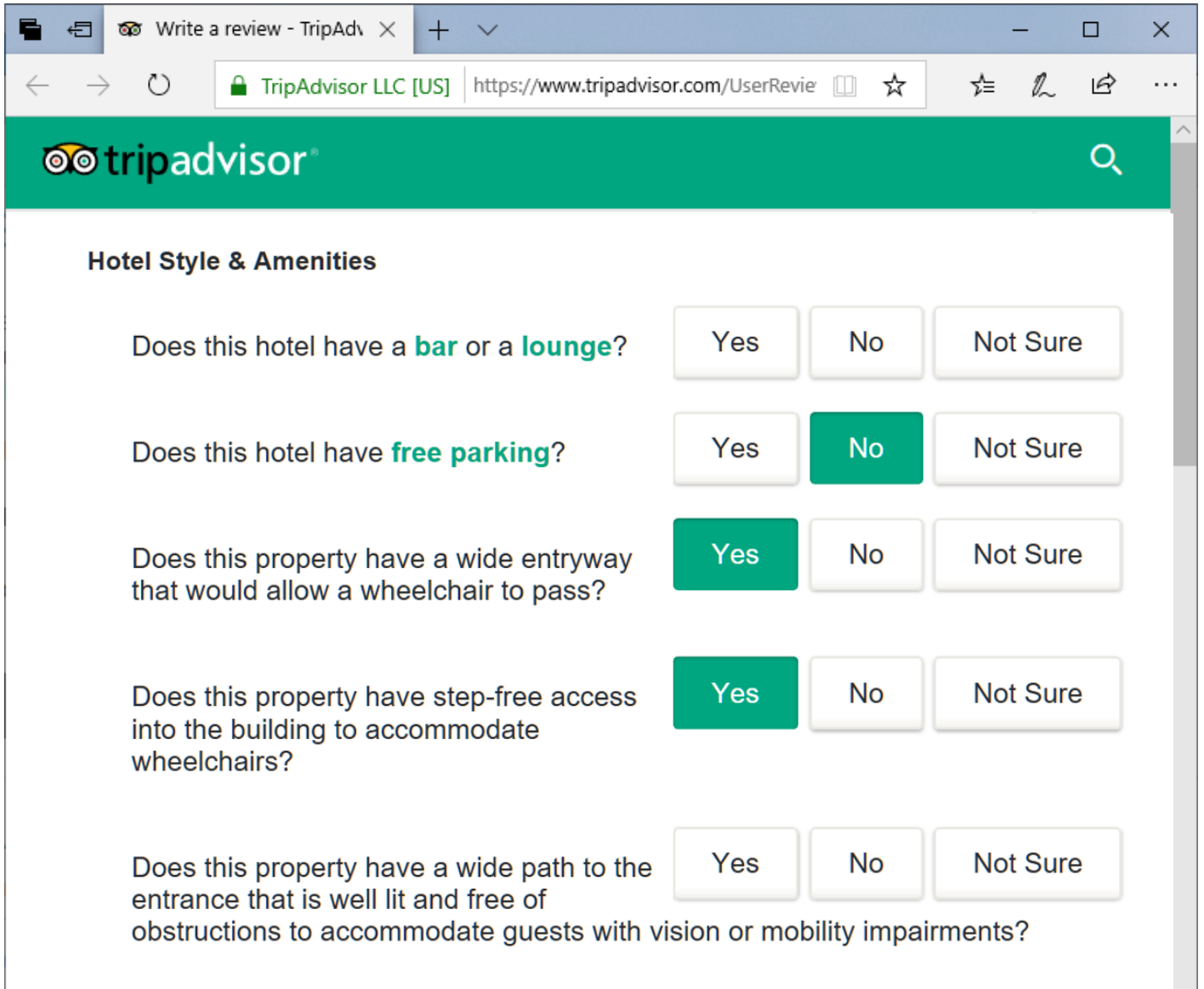
"As I think about living our mission, top of mind for me heading into 2016 is how we **must make Microsoft products accessible** to the more than 1 billion people globally of all abilities… **Universal design is central** to how we realize our mission and will make all our products better… I will continue to devote my time and passion to this priority."

Microsoft CEO Satya Nadella, December 2015

Accessibility in commercial products

- https://www.google.com/accessibility/
  - https://www.google.com/accessibility/products-features/
- https://www.facebook.com/help/273947702950567/?helpref=hc_fnav
- https://www.amazon.com/b?node=15701038011
- https://www.microsoft.com/en-us/accessibility
- https://www.apple.com/accessibility/
- https://www.meetup.com/a11ybay/

Accessibility concerns in the world



Design Opportunity

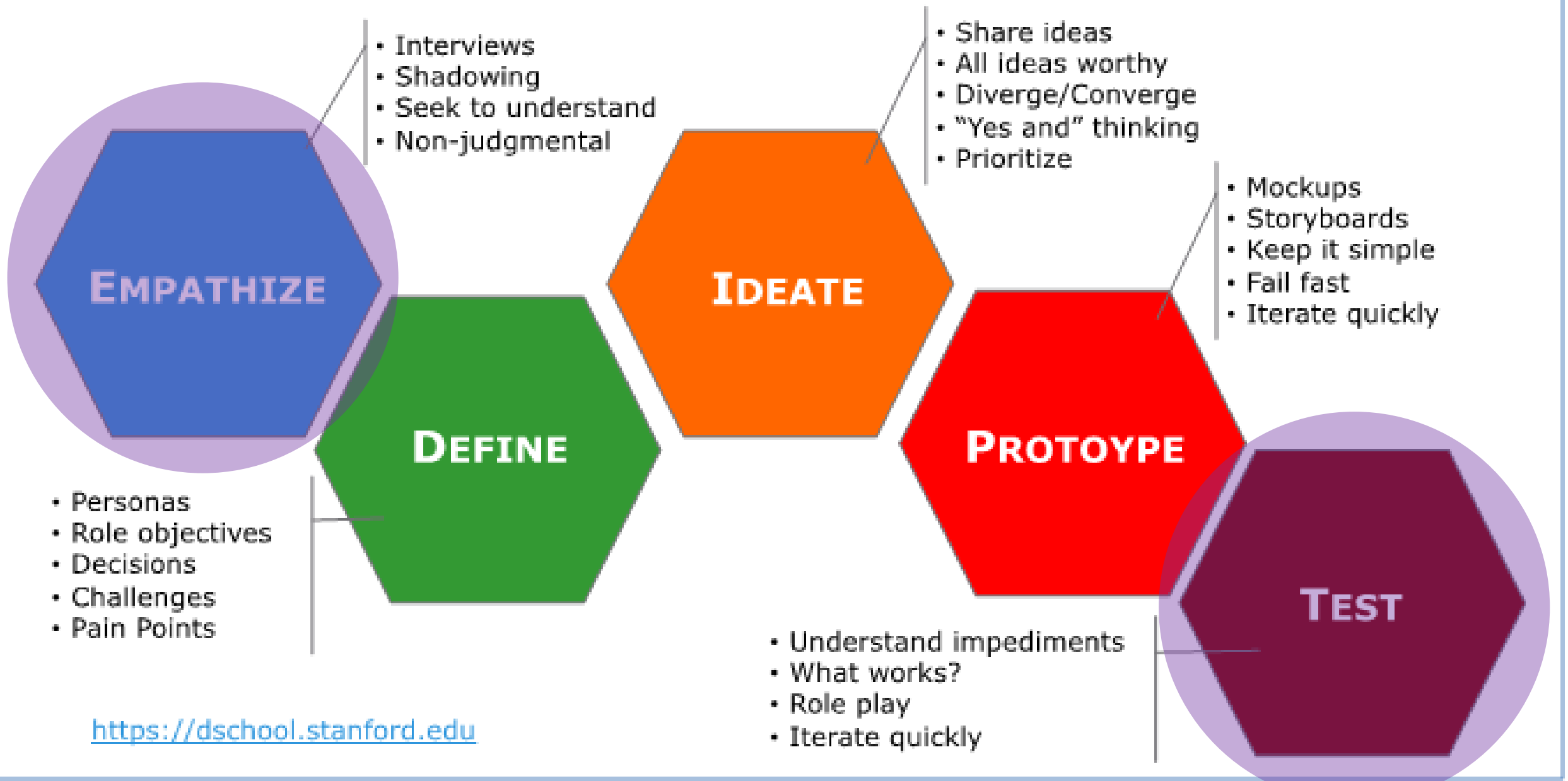
- Requires need-finding and designing for someone not like yourself
- Exposes that there is nothing “typical”
- Universal Design
- “When designing for people **without** disabilities, I felt like I was designing something for **myself** or for a friend. I had more of an **immediate** idea of what direction to take… When designing for the blind, I felt like I **needed direction** from our expert user; who would come up with **very good ideas** that I most likely would have never thought of.”

Shinohara et al., Tenets for Social Accessibility… https://dl.acm.org/citation.cfm?doid=3194310.3178855

CS377Q: Designing for Accessibility

- Understanding disability through empathy
- HCI principles for making technology accessible
- Prototype project
  - Need-finding
  - Prototyping
  - User study
- Exposure to a variety of perspectives on accessibility
  - I don’t agree with all of them

Stanford d.school Design Thinking Process



https://dschool.stanford.edu

Empathy vs. sympathy

Sympathy sets up a fairly untenable power imbalance. [Sympathy] is too close to pity.

Jutta Treviranus
Founder of the Inclusive Design Research Centre
Ontario College of Art and Design (OCAD) University

Empathy vs. awareness

WE HAVE YOUR SON. WE ARE DESTROYING HIS ABILITY FOR SOCIAL INTERACTION AND DRIVING HIM INTO A LIFE OF COMPLETE ISOLATION.

IT'S UP TO YOU NOW.

ASPERGER SYNDROME

Don't let a psychiatric disorder take your child.
The NYU Child Study Center is dedicated to giving children back their childhood by preventing, identifying, and treating psychiatric and learning disorders.
To learn more, call (888)7-NYU-MED or visit AboutOurKids.org.

NYU Medical Center
NEW YORK UNIVERSITY CHILD STUDY CENTER

We have your son.

We will make sure he will no longer be able to care for himself or interact socially as long as he lives.

This is only the beginning.

Autism

Don't let a psychiatric disorder take your child.
The NYU Child Study Center is dedicated to giving children back their childhood by preventing, identifying, and treating psychiatric and learning disorders.
To learn more, call (888)7-NYU-MED or visit AboutOurKids.org.

NYU Medical Center
NEW YORK UNIVERSITY CHILD STUDY CENTER

TO NYU CHILD STUDY CENTER --

WE HAVE YOUR DISDAIN

WE HAVE YOUR PITY

WE HAVE YOUR DISRESPECT

WE HAVE HAD ENOUGH

OF THESE ALREADY

END THE RANSOM NOTES CAMPAIGN

RESPECT AUTISTIC VOICES NOW

http://therunman.blogspot.com/2007_12_01_archive.html

Disability History

- Situating disability as part of, not separate from, history and society
- Introducing Disability Studies as scholarship that can inform technology design

Cynthia Bennett, Ph.D. student
University of Washington

HCDE Human Centered Design & Engineering

What is Disability?

- ADA: a person who has a physical or mental impairment that substantially limits one or more major life activities. Includes people with record of disability diagnosis even if not displaying symptoms at the time.
- Social Security: A person with a medical or psychiatric impairment preventing them from doing a substantial amount of work.

What is Disability?

- World Health Organization: Disabilities is an umbrella term, covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action; while a participation restriction is a problem experienced by an individual in involvement in life situations.

Arises from interactions among people and environments

History of Disability in the US

- Understanding disability requires understanding normalcy

"The problem is not the person with disabilities; the problem is the way that normalcy is constructed to create the 'problem' of the disabled person."

Leonard Davis: Constructing Normalcy

What does “normal” mean?

- Prior to ~1840: perpendicular
- Post ~1840: constituting, conforming to, not deviating or different from, the common type or standard, regular, usual

Statistics: Arithmetic to define normal

- Positive: develop standards
- Negative: undermines individuality, eugenics rationale

Statistical measurement idealizes norms

- Idealizes being close to the average for some qualities (weight, height) and ranked desired ones (intelligence)
- Justified middle way of life
- Attractive for industrial revolutionists in generalizing labor equipment and labor expectations

“Statistics is bound up with eugenics because the central insight of statistics is the idea that a population can be normed. An important consequence of the idea of the norm is that it divides the total population into standard and nonstandard subpopulations. The next step in conceiving of the population as norm and non-norm is for the state to attempt to norm the nonstandard—the aim of eugenics. Of course such an activity is profoundly paradoxical since the inviolable rule of statistics is that all phenomena will always conform to a bell curve.”

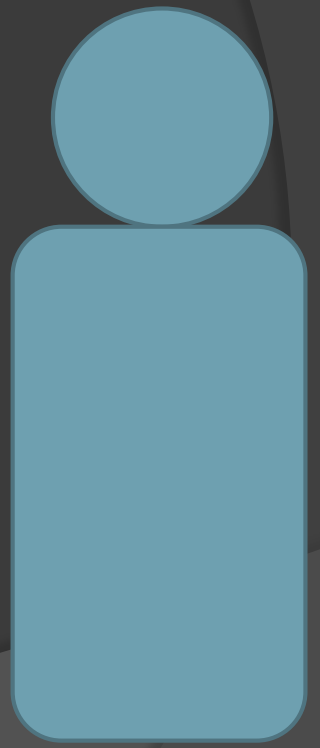
Leonard Davis: Constructing Normalcy

Disability Studies

- Studies the meaning, nature, and consequences of disability
- Challenges view that disability is a deficit for remedying by experts
- Prioritizes lived experiences of people with disabilities

Models | Individual/Medical

- Disability is inside the body
- It is a deficit that should be remedied by experts
- It is the individual's responsibility to adapt to society

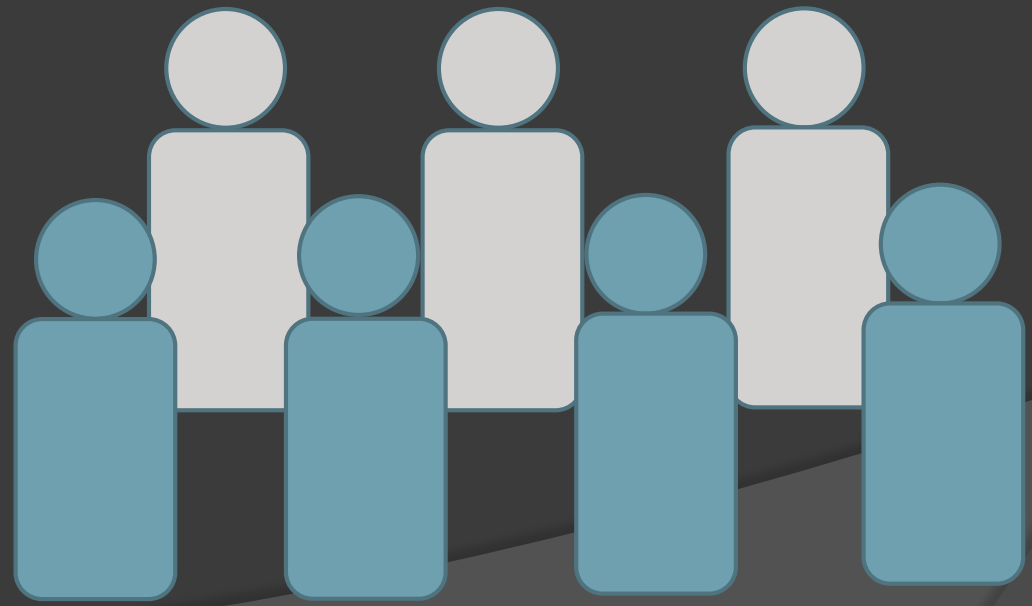


Models | Individual/Medical

- Accessibility Research: technology for people with disabilities is separate

Models | Social

- Disability is in society, not the body
- Access is our collective responsibility



“Disability is thus not just a health problem. It is a complex phenomenon, reflecting the interaction between features of a person’s body and features of the society in which he or she lives. Overcoming the difficulties faced by people with disabilities requires interventions to remove environmental and social barriers.”

World Health Organization

https://www.who.int/topics/disabilities/en/

Models | Legal

- Vocational Rehabilitation Act 1973
- Individuals with Disabilities Education Act 1975, 1990
- Americans with Disabilities Act 1991
- UN Convention on Rights of People with Disabilities 2006

Disability Studies

- Studies meaning, nature, and consequences of disability
  - Disability not necessarily negative
  - Focus on lived experiences of people with disabilities
- Avoiding the “design savior” narrative
- Disability studies as a source of critical inquiry for the field of assistive technology, ASSETS 2010 https://dl.acm.org/citation.cfm?id=1878807

Break

Disability segments

Visual

Ray Charles

- Colorblind
- Low vision
- Blind

Hearing

Marlee Matlin

- Hearing loss
- Deaf

Cognitive

Temple Grandin

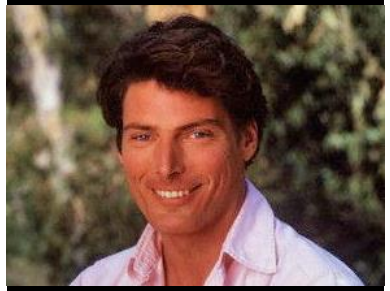
- Dyslexia
- Seizure
- Learning Disabilities
- Autism

Speech

James Earl Jones

- Speech impediment
- Refused to speak

Mobility



Christopher Reeve

- Spinal cord injury
- Quadriplegia

Neural

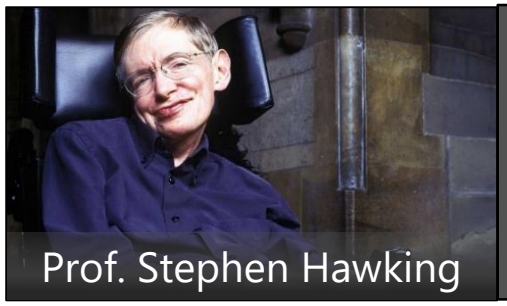
Catherine Zeta-Jones

- Bipolar
- Depression

Diseases can span disability segments:

Parkinson's Disease

Parkinson's affects cognition, speech and mobility



ALS

ALS affects mobility and speech

Slide credit: Jenny Lay-Flurrie, Microsoft Chief Accessibility Officer

Understanding disability functionally

- Sensory
- Movement
- Cognitive

Sensory disabilities

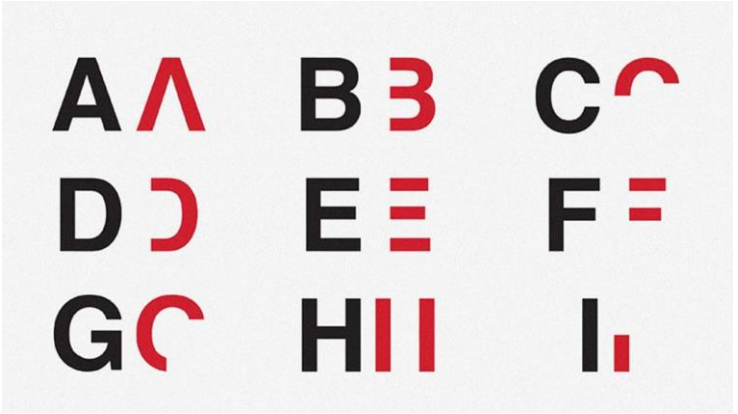
- Vision (blindness & low vision)
- Hearing (deaf & hard of hearing)
- Touch
- Taste
- Smell

Movement

- Mobility
- Paraplegia / quadraplegia
- Motor control (ALS, Parkinsons, Muscular Dystrophy)

Cognitive

- Dyslexia
- Autism Spectrum Disorder
  - Related to sensory sensitivity
- Dementia



Understanding disability temporally

Situational Impairment

Temporary Disability

Acquired/ Progressive Disability

Congenital/ Permanent Disability

Short-term

Long-term

Smartphones and situational disability

- Visual
- Auditory
- One-handed
- Mobility
- Cognitive

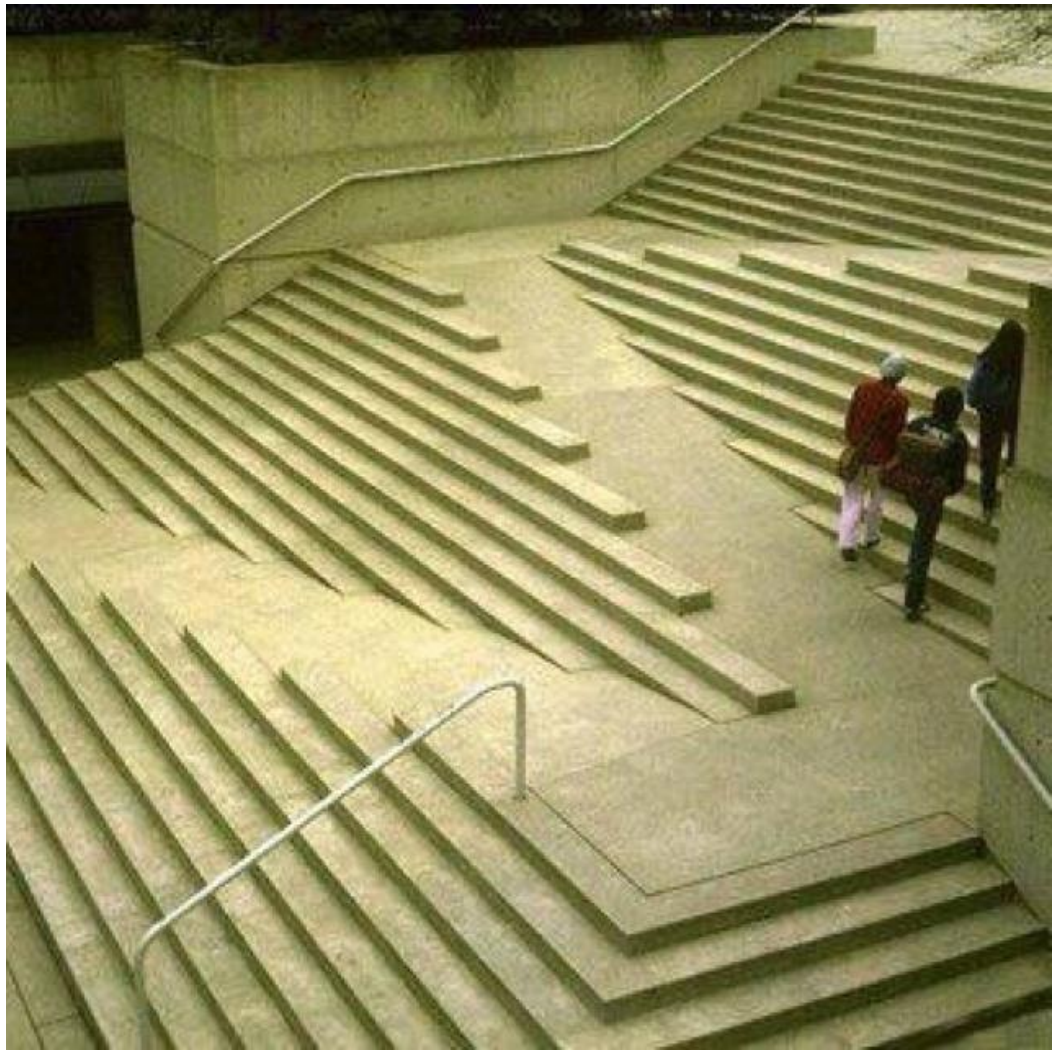
Whoever first designs a smartphone without these disabilities will win!

Design approaches

- Universal Design: Usable by all people, to the greatest extent possible, without the need for adaptation or specialized design
  - https://universaldesign.org/definition
- Ability-based Design: Tailored for the abilities of each user, system is responsible for maximizing the interaction with those abilities
  - https://dl.acm.org/citation.cfm?doid=3229066.3148051

Universal design

- Inclusive of a variety of abilities
- May require some customization



OXO Good Grips

Popular Kitchen Tools Inspired by Disability

“More than 25 years ago, Sam Farber noticed his wife Betsey was having trouble comfortably holding her peeler due to arthritis. … Sam saw an opportunity to create more thoughtful cooking tools that would benefit all users and promised Betsey that he would create a better peeler.”

https://www.oxouk.com/our-roots

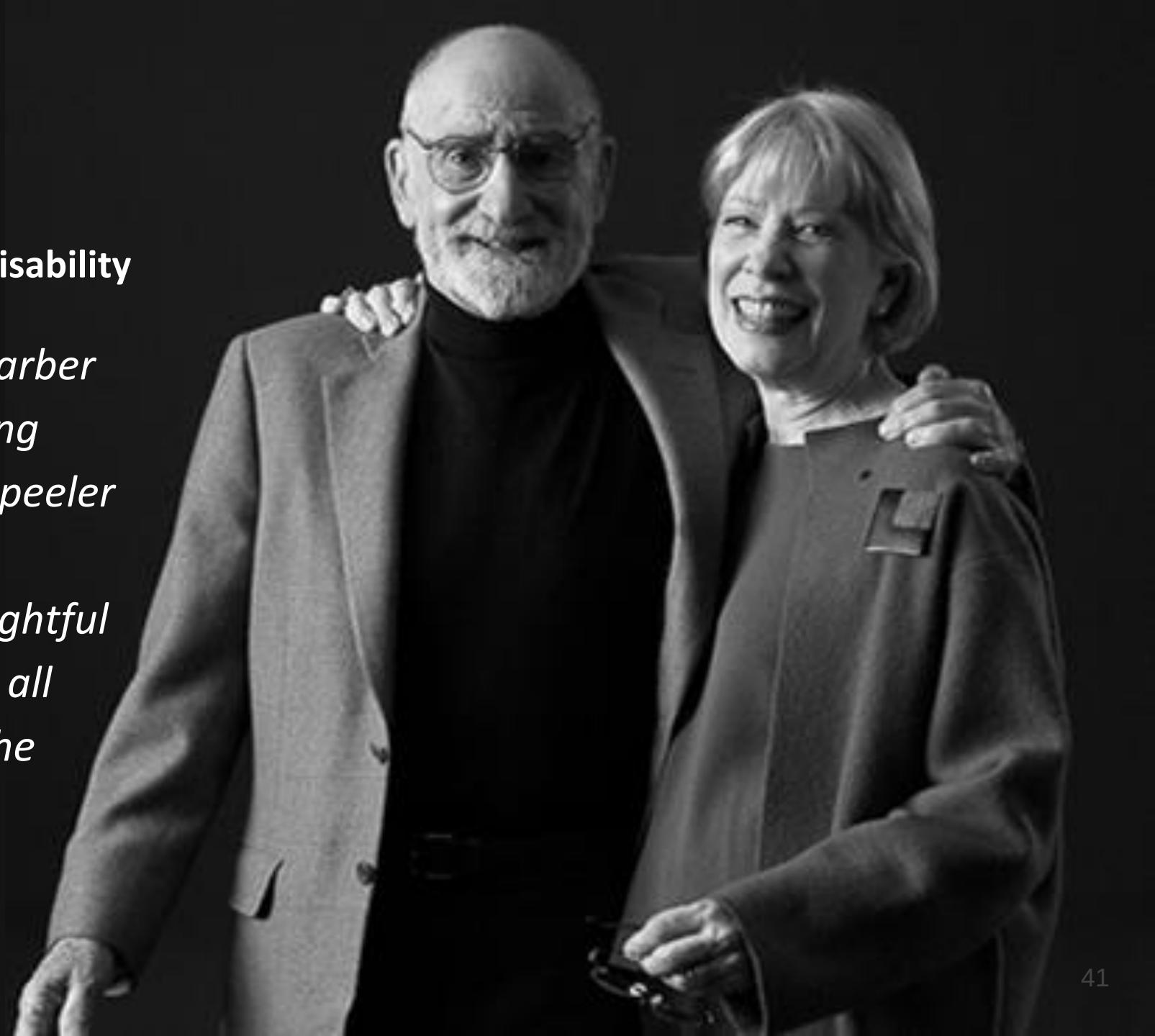


Photo credit: Oxo Good Grips

Interview with Betsey Farber

"The general understanding," Betsey told me, "was of the brilliance and kindness of Sam who made these tools for his poor crippled wife so she could function in the kitchen. ***I will probably go down in history as having arthritis*** *rather than having the* ***conceptual idea*** *of making these comfortable for your hand."*

[Jackson 2018]
https://www.nytimes.com/2018/05/30/opinion/disability-design-lifehacks.html

Photo credit: OXO

Ability-based design

- Focuses on people's abilities in context, on what people can do, rather than on what they cannot do.
- Scrutinizes the "ability assumptions" behind the design of interactive systems, shifting the responsibility of enabling access from users to the system.
- People's abilities may be affected not just by disabilities but by disabling situations; designing for abilities in context leads to more usable, accessible systems for all people

Terminology is important

- Handicapped
- Crippled
- Physically-challenged
- Disabled
- Person with a disability
- Neurodiverse
- Differently-abled
- Wheelchair victim
- Impaired
- People who are blind or have low vision

ableism noun

able·ism | \ ˈā-bə-ˌli-zəm \

Definition of *ableism*

: discrimination or prejudice against individuals with disabilities

: discrimination in favor of able-bodied people

Terminology

- Person first: person with a disability; advocated by education and rehabilitation professionals
  - Person with paraplegia
  - Person with low vision
  - Person with Autism Spectrum Disorder
- Identity First: disabled person; advocated by some disability groups
  - Paraplegic
  - Blind community
  - Autistic
- Allow participants to describe themselves: disability-related adjectives

Terminology in this class

- Mix of traditional and more recent terms
- Concerns?

What does this mean?

http://accessibleicon.org

Design Activism

- Sara Hendren (icon designer)
- Brian Glenney (graffiti background)
- Street art campaign (2011)
- Finalized icon in the public domain

Global usage today

DISABILITY ACCESS

DISABILITY-RELATED RESOURCES

Access, Mobility and Transportation Resources

Deaf and Hard of Hearing Resources

Blind and Visually Impaired Resources

Repetitive Strain Injury Resources

Adaptive Technology Resources

Mental Health Resources

CAMPUS ACCESS GUIDE

SERVICE AND SUPPORT ANIMALS AT STANFORD

Access, Mobility and Transportation Resources

- Wheelchair Rental
- Golf Cart Rental
- Wheelchair Accessible Car/Van Rental
- Personal Mobility Devices
- On Campus Public Transportation
- Off Campus Public Transportation
- Airport Transportation
- Parking and Enforcement Information
- Wheelchair Accessible Hotels
- Short-Term Housing
- Stanford University Medical Center: Disability Services & Aids

BUSH PRISBY

Wheelchair & Other Mobility Device Rental

Below are local vendors who rent wheelchairs, scooters, other mobility devices and medical equipment. The prices and length of rentals vary and rentals may need to be picked up from the vendor. Please call the vendor directly to ensure accurate pricing and rental information.

Engaging with accessibility

- Direct need-finding with people with a disability
- Appeal to experts in the community
- People with disability in user studies
- Include people with disabilities in the design/brainstorming process (in career)
- Cindy Bennett refers to this as “interdependence”
  - “Independence” is misleading
  - We all “interdepend” on each other through social connections

Class Logistics

- Website: https://canvas.stanford.edu/courses/101502
- Adjunct Lecturer: John Tang (male pronouns)
  - https://www.microsoft.com/en-us/research/people/johntang/
  - Research interests: accessibility, using rich media to connect people over distance

- CA: Trijeet Mukhopadhyay (he/him)
  - Second year co-term student in HCI
  - Research interests: Interaction design, Design theory and praxis, Computer music

Grading

- 40% Weekly Assignments
- 45% Final Project (Team)
- 15% Class Participation

- No Final
- Final presentation event: June 3rd **Monday evening, 6:00-8:00pm** with CS377U Understanding Users (check for conflicts!)

Grading criteria

- This is a subjective design class
- I don’t have samples from prior classes
- Two purposes for grading
  - Giving students feedback on work
  - Differentiating among levels of student effort
- Assignments
  - ✓ fulfills assignment requirements
  - ✓+ exceeds assignment requirements
  - ✓- falls short of assignment requirements (needs improvement)
- We will try to be transparent, open to discussion along the way

Prerequisites

- Design class: CS147, CS247, d.school class
  - Skills for need-finding, brainstorming, prototyping, user study expected
  - This class will focus on how to empower populations with disabilities
- Develop working concept prototypes
  - Enough to get user study feedback
  - Experience with web-based programming is a plus, not required (team skill)

Workload

- First 6 Assignments (A1-A6) will be individual, pairs, team of 3 (40%)
- Final Project, teams of 3, topic of your choice, 5 milestone assignments (P1-P5) (45%)
- Assignments are due **before class** on date
- Aiming for 4-5 hours of work/week
- Review and critique feedback in class
  - No late work
- **You** need to recruit participants in user population with disability
  - I have some contacts with the low vision community

Class participation is important!

- Class time will be used for **experiences**
- Studio-style class for sharing info, getting critique
- Participation during grading/feedback sessions mandatory (noted in syllabus)—affords giving timely feedback to build on
- Missing class will handicap your experience
- Let us know **in advance** of any individual absences
- More than two absences or any unexplained absences detract from class participation grade
- Class participation is 15% of grade

What this class is and isn’t

- New class! (experimental, feedback welcome along the way)
- Design, not programming
  - Design, user study of conceptual prototype
- Not introductory design, expecting prior design skills (CS147, d.school)
- Engaging with people with disabilities
  - Need finding
  - User study
- Essay assignments—don’t freak out!
  - Reflect on what you experienced, read
  - Grading based on depth of expression

Focus

- Getting through the design process with attention to accessibility
- Introduction to issues around accessibility (sampler)
- Working through a design project (depth)
- Project ideas come from you
- Recruiting participants come from you
- Introducing diverse opinions so you can discover your own perspective

Bias

- Focus on sensory accessibility issues (resources)
  - Low vision
  - Open to projects on cognitive issues
- Tools in Microsoft Office
  - https://products.office.com/en-us/student/office-in-education?rtc=1
  - A2 uses features from Microsoft Office—download and install by next class period

Other options

- CS247, Human-Computer Interaction Design Studio
  - Julie Stanford, Christina Wodtke
- CS377U, Understanding Users
  - Frank Bentley
  - Mondays & Wednesdays 4:30-5:50pm, Lathrop 282
- CS377E, Designing Solutions to Global Grand Challenges, Human-Centered AI
  - James Landay
  - Mondays & Wednesdays 11:30-12:50pm, Lathrop 282
- Psyc223B, Topics in Neurodiversity: Design Thinking Approaches,
  - Lawrence Fung, Mary Hurlbut, Nicole Ofiesh
  - Mondays 9:30-11:20am, 200-013
- CS547, Stanford Human-Computer Interaction Seminar
  - Fridays 11:30-12:30, Gates B01

Design Resources

- Design class
  - Sketching
  - Ideating
  - Field notes
- Recommend sketchbook, pens

Resources and contacting teaching staff

- Canvas as web site: https://canvas.stanford.edu/courses/101502
- Questions about course material, assignments (do not email directly)

  Piazza: https://piazza.com/stanford/spring2019/cs377q/home
  Other students will benefit from an answer to public questions
  - If it's personal, use email
  - **Piazza** will be used to communicate updates
  - Sign up!
- Grades and Assignments via Canvas

Office Hours

- John: by appointment: W, F 3:00-5:00
  - Use Calendly: https://calendly.com/johntang
  - Request at least 12 hours in advance
  - https://tinyurl.com/CS377QOfficeHours (over Google Hangouts)
  - Encourage scheduling 15-minute appointment by April 19
  - Other times available via email
- Trijeet:
  - Use Calendly: https://calendly.com/trijeetm

Questions?

A1: Documenting using an accessibility aid

1. Read “In the Shadow of Misperception: Assistive Technology Use and Social Interactions” https://faculty.washington.edu/wobbrock/pubs/chi-11.03.pdf

2. Document the use of an accessibility aid to accomplish a task that you've personally witnessed
   - Picture (sketch if vivid personal memory)
   - What was the accessibility aid and how was the person using it to support their activity?
   - What was the context of use?
   - How effective was the aid in supporting the person’s functional needs?
   - What could be improved about the aid?
   - Did people interacting with the person notice or interact with the aid device?

3. Comment on social acceptability of the aid you observed

4. Include a recent picture to help us become familiar with you

Submit on Canvas

A1: Places to observe

- Magical Bridge playground, Palo Alto http://magicalbridge.org/palo-alto/
- Palo Alto transit center
- Hospital/health clinic
- Senior center
- High volume public places (shopping center, public squares, etc.)

A1: Submit

- Part 1: PDF file
- Part 2: Separate JPEG file
- Grading: 5 points (out of 40 for *Assignments*)
  - Reflect and communicate
  - Exercise your observation skills by detecting how accessibility aids are used out in the real world
  - Picture file
- Due before class, April 4
- Turn in via Canvas

Looking ahead

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		2 A1 assigned	3	4 A1 due A2 assigned A3 training in class	5	6
7	8	9 A2 due A3 exercise in class	10	11 A3 due A4 assigned	12	13
14	15	16 A4 due	17	18	19	20

- A2: Making work accessible (individual)
- A3: Disability Simulation—pairs: low vision or wheelchair (open to alternatives)

Course Application

- Max 30 students
- Application: **https://tinyurl.com/CS377QApplication**
- Due by 11:00pm tonight!
- Do it ASAP!
- If we don’t receive one, we won’t plan for you in the class
- We will notify accepted students by email by 12 noon tomorrow


to use the best
of artificial intelligence.

https://www.youtube.com/watch?v=Nl4CdnLue-k&

Distribution of visual acuity

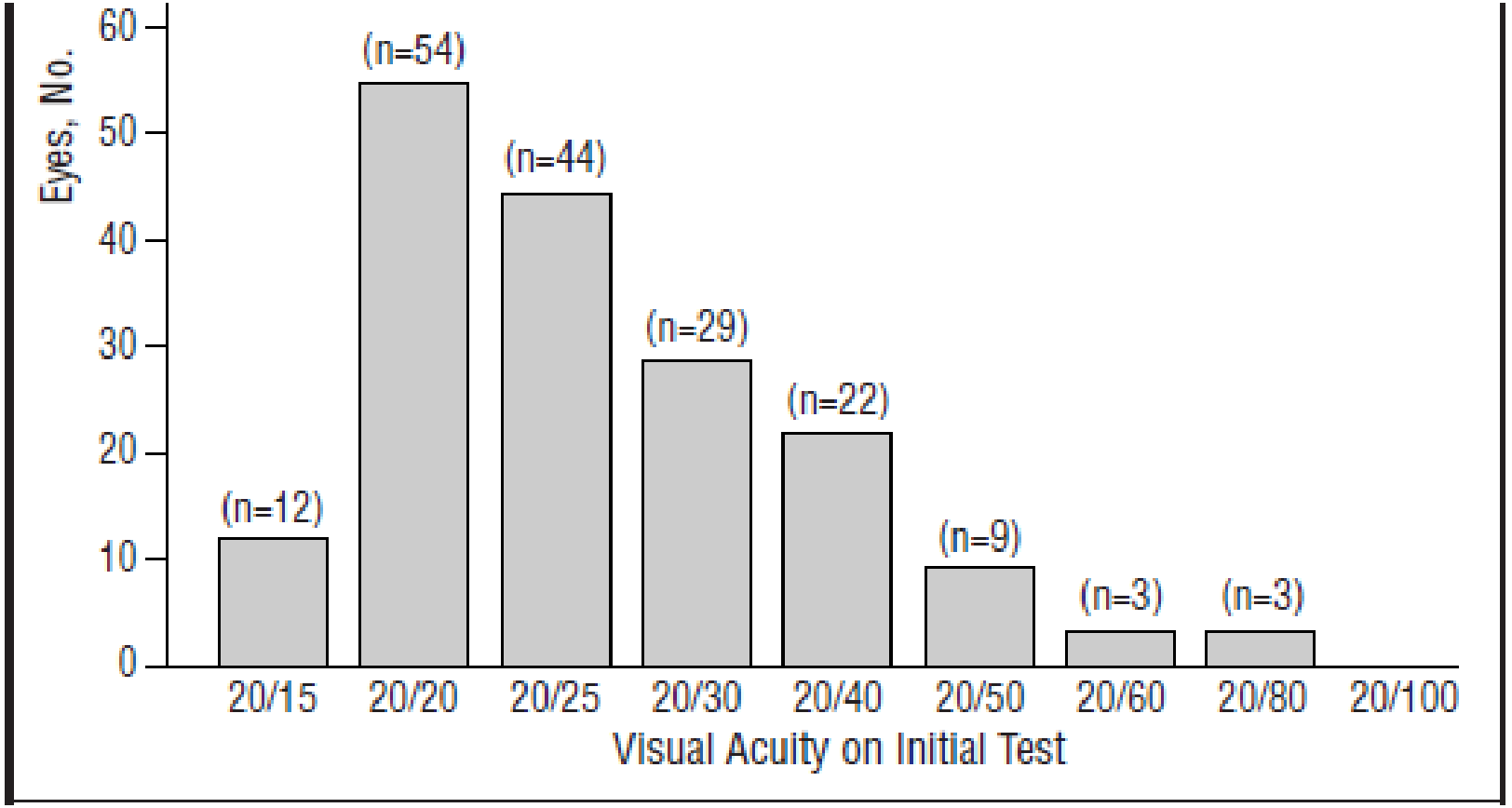


Figure 4. Distribution of visual acuity scores on the initial examination using the final protocol in 176 eyes of 88 children.

https://jamanetwork.com/journals/jamaophthalmology/fullarticle/267839