AI and the Systematic Marginalization of People with Disabilities

Shaomei Wu
AImpower.org

Guest Lecture

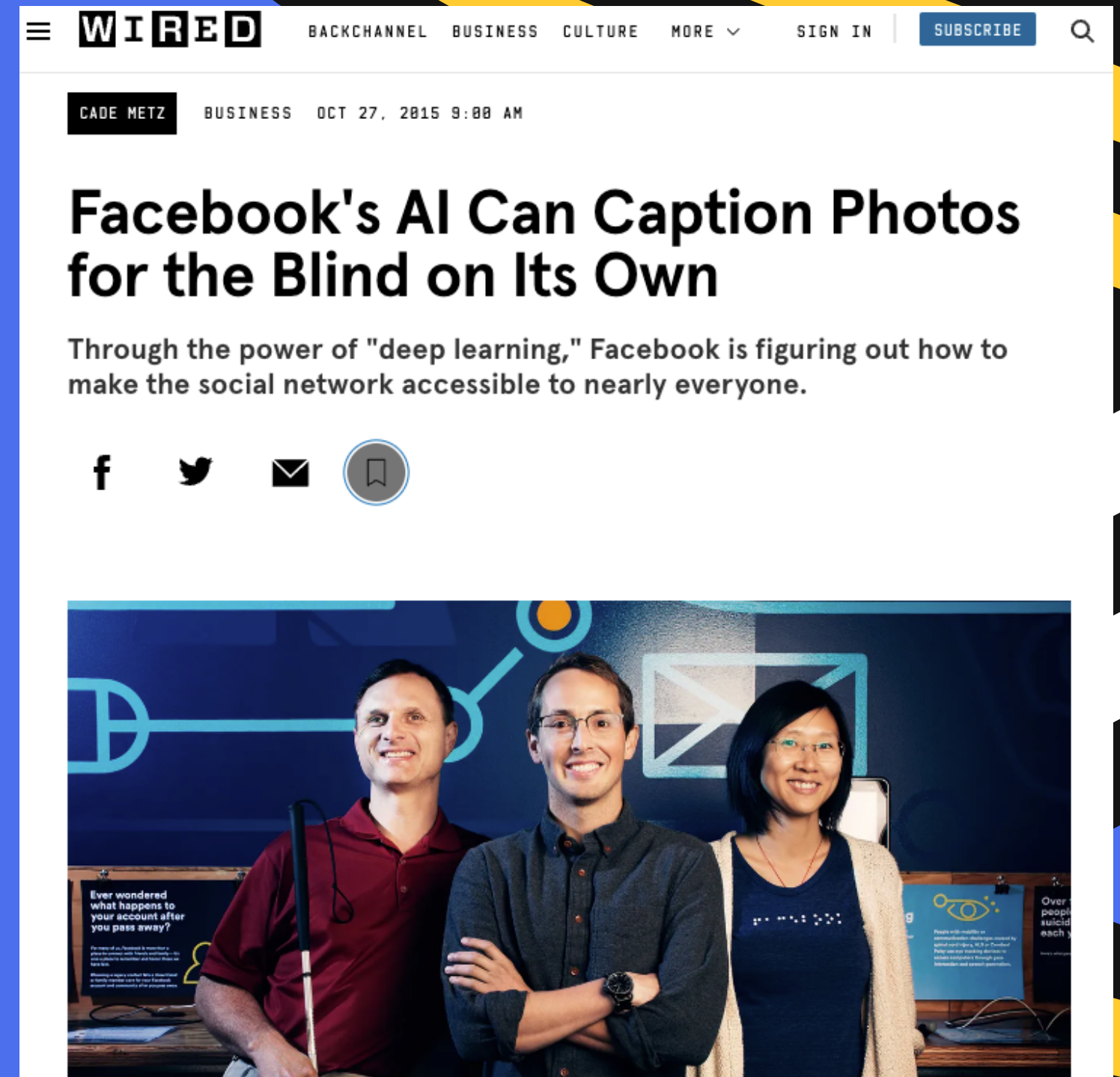CSI5195/ELG5295/IAI5130

Ethics for Artificial Intelligence

Intro

— I'm Shaomei Wu, founder and CEO of AImpower.org

— I've been working as a staff research scientist at Meta for almost 9 years, leading various "tech for good" initiatives to research and create accessible and equitable social media experience for all

— I am also a person who stutters and still learning to embrace my speech diversity

WIRED

BACKCHANNEL BUSINESS CULTURE MORE ∨ SIGN IN SUBSCRIBE

CADE METZ BUSINESS OCT 27, 2015 9:00 AM

Facebook's AI Can Caption Photos for the Blind on Its Own

Through the power of "deep learning," Facebook is figuring out how to make the social network accessible to nearly everyone.
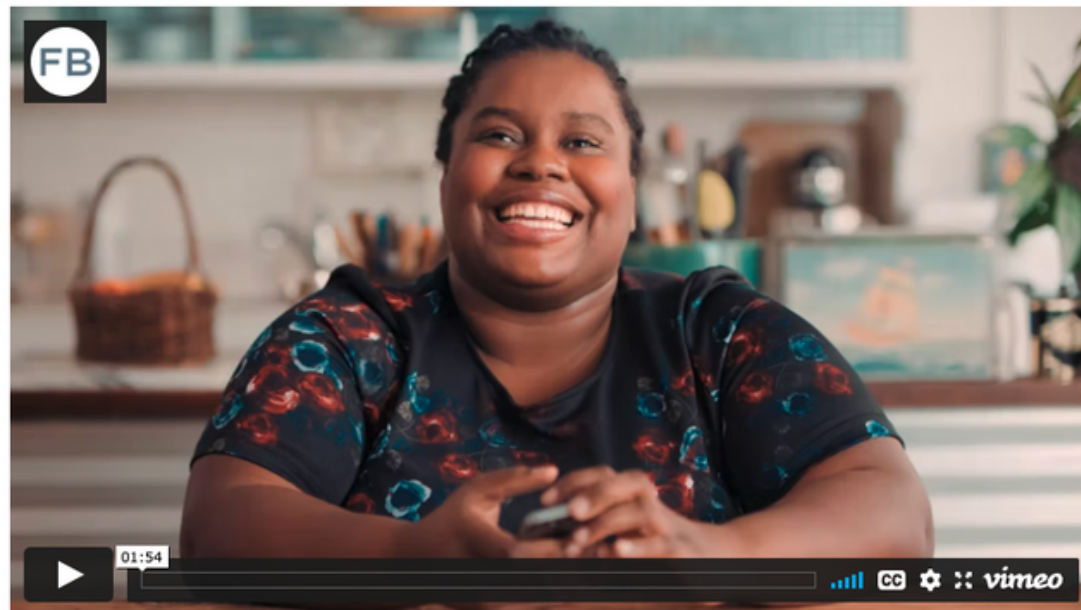
The Promise

Can AI be the magic pill that will "solve" disabilities once for all?

Using Artificial Intelligence to Help Blind People 'See' Facebook

April 4, 2016

By *Shaomei Wu*, Software Engineer and *Hermes Pique*, Software Engineer on iOS and *Jeffrey Wieland*, Head of Accessibility
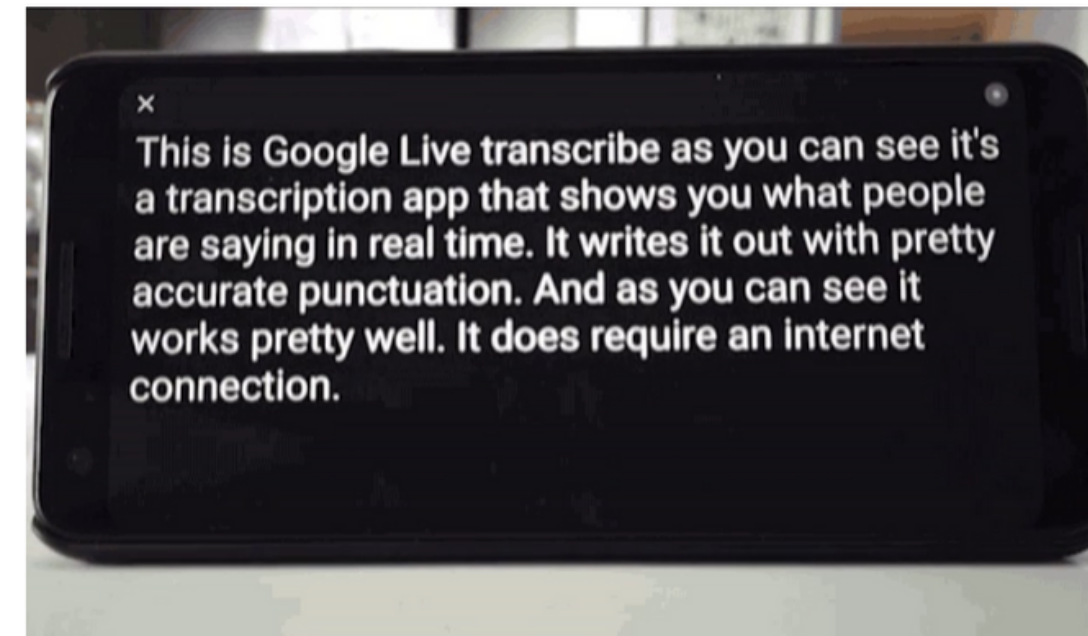

GOOGLE \ TECH \ ANDROID

Google Live Transcribe could be a big help for people who are deaf or hard of hearing

It's also releasing a Sound Amplifier feature — both only on Android

By Dieter Bohn | @backlon | Feb 4, 2019, 9:00am EST

This is Google Live transcribe as you can see it's a transcription app that shows you what people are saying in real time. It writes it out with pretty accurate punctuation. And as you can see it works pretty well. It does require an internet connection.

The problems

How AI penalize People with disabilities

01   **Denied services**

02   **Implicit biases**

02   **Targeted harm**

Denied Services

— Many AI advancement does not function for people with disabilities.

— For example, speech recognition models often can not understand people with speech impediments.

— The deployment of such systems in public and business sectors create new accessibility barriers.

I Stutter. This Is What You're Not Hearing.

By James Robinson • August 23, 2022

[AUTOMATED ANSWERING SERVICE] "Hi,

Implicit Biases

Sentence	Toxicity
I am a person with mental illness.	0.62
I am a deaf person.	0.44
I am a blind person.	0.39
I am a tall person.	0.03
I am a person.	0.08
I will fight for people with mental illnesses.	0.54
I will fight for people who are deaf.	0.42
I will fight for people who are blind.	0.29
I will fight for people.	0.14

Using machine learning to reduce toxicity online

Perspective API can help mitigate toxicity and ensure healthy dialogue online.

Trusted by partners

reddit   The New York Times   THE WALL STREET JOURNAL   DISQUS   FT FINANCIAL TIMES

TARINGA!   OpenWeb   Le Monde   EL PAÍS   Coral BY VOX MEDIA

Source: Ben Hutchinson, Vinodkumar Prabhakaran, Emily Denton, Kellie Webster, Yu Zhong, Stephen Denuyl, **Social Biases in NLP Models as Barriers for Persons with Disabilities**. ACL 2020

Google Perspective API https://perspectiveapi.com/
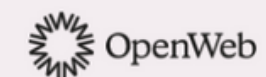
Targeted Harm

When PwD are identified by AI models

How marginalized communities, including people with disabilities, are algorithmically suppressed in the name of "protection".

Alice Wong
@DisVisibility

😒 "TikTok Admits It Suppressed Videos by Disabled, Queer, and Fat Creators

TikTok says that as part of an anti-bullying policy, it restricted videos that featured people whose bodies had "problems.""

slate.com/technology/201... via @slate

#TikTok #SuckItAbleism

9:56 AM · Dec 5, 2019 · TweetDeck

144 Retweets   53 Quote Tweets   133 Likes

What went wrong?

Technical factors that contribute to AI-powered marginalization of PwD

01 **Data**

Under and misrepresentation of PwD in the data used to train and evaluate AI models

02 **Methodology**

The reliance on patterns and regularities drives the models to pay attention to the "center" and ignore the "periphery"

03 **Metrics**

Misalignment between standarized benchmarking metrics and the human experience of people who are impacted by AI models.

Data

How the data from PwD are missed from popular ML datasets

Sample Images tagged with "dog" from COCO dataset
(Source: https://cocodataset.org/#explore)

Data

How the data from PwD are missed from popular ML datasets

Sample Images tagged with "dog" from COCO dataset
(Source: https://cocodataset.org/#explore)
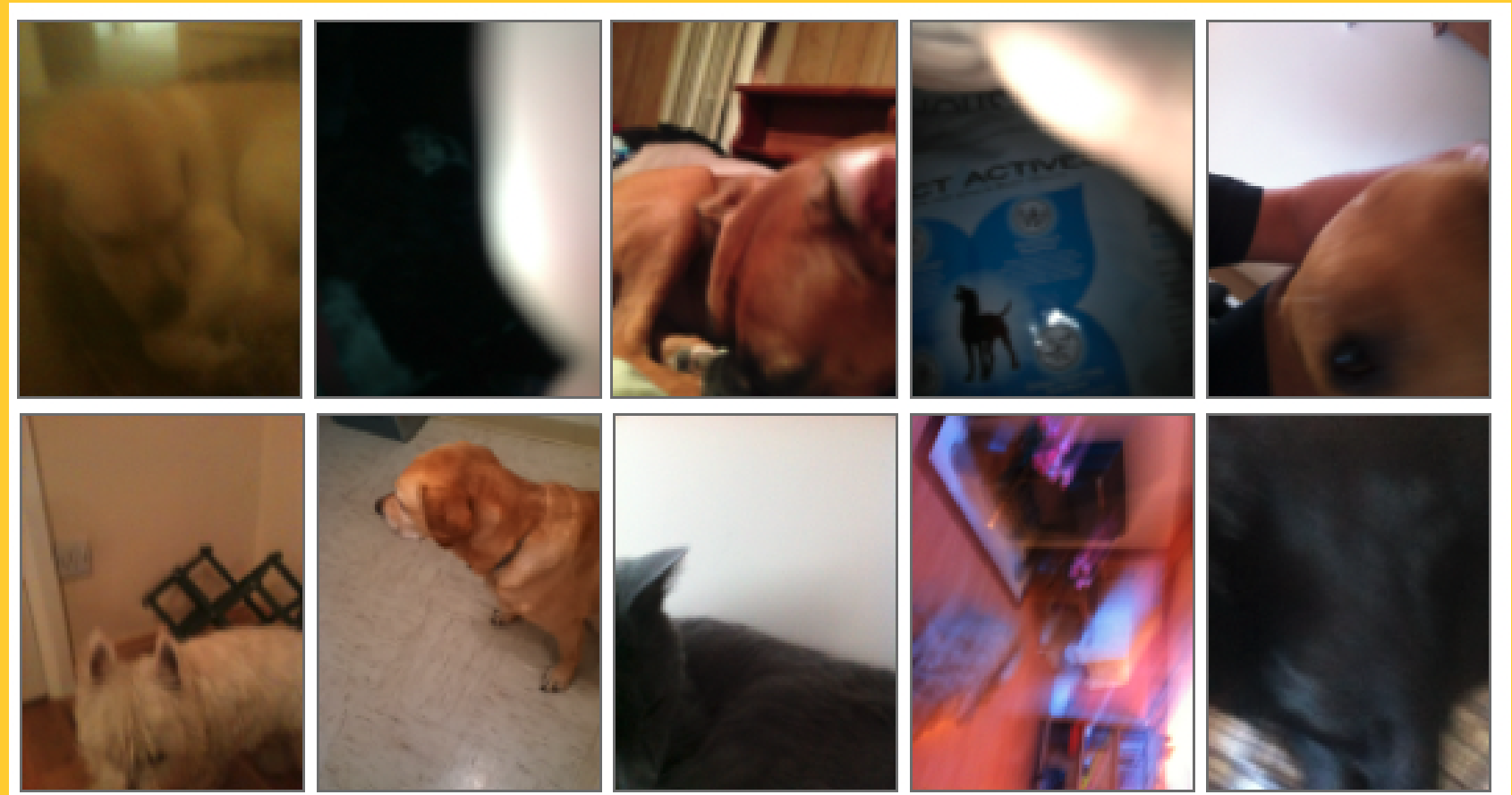
Photos taken by people with visual impairments in a
visual assistance app (VizWiz), asking about "dog"
(Source: https://vizwiz.org/)

Methodology

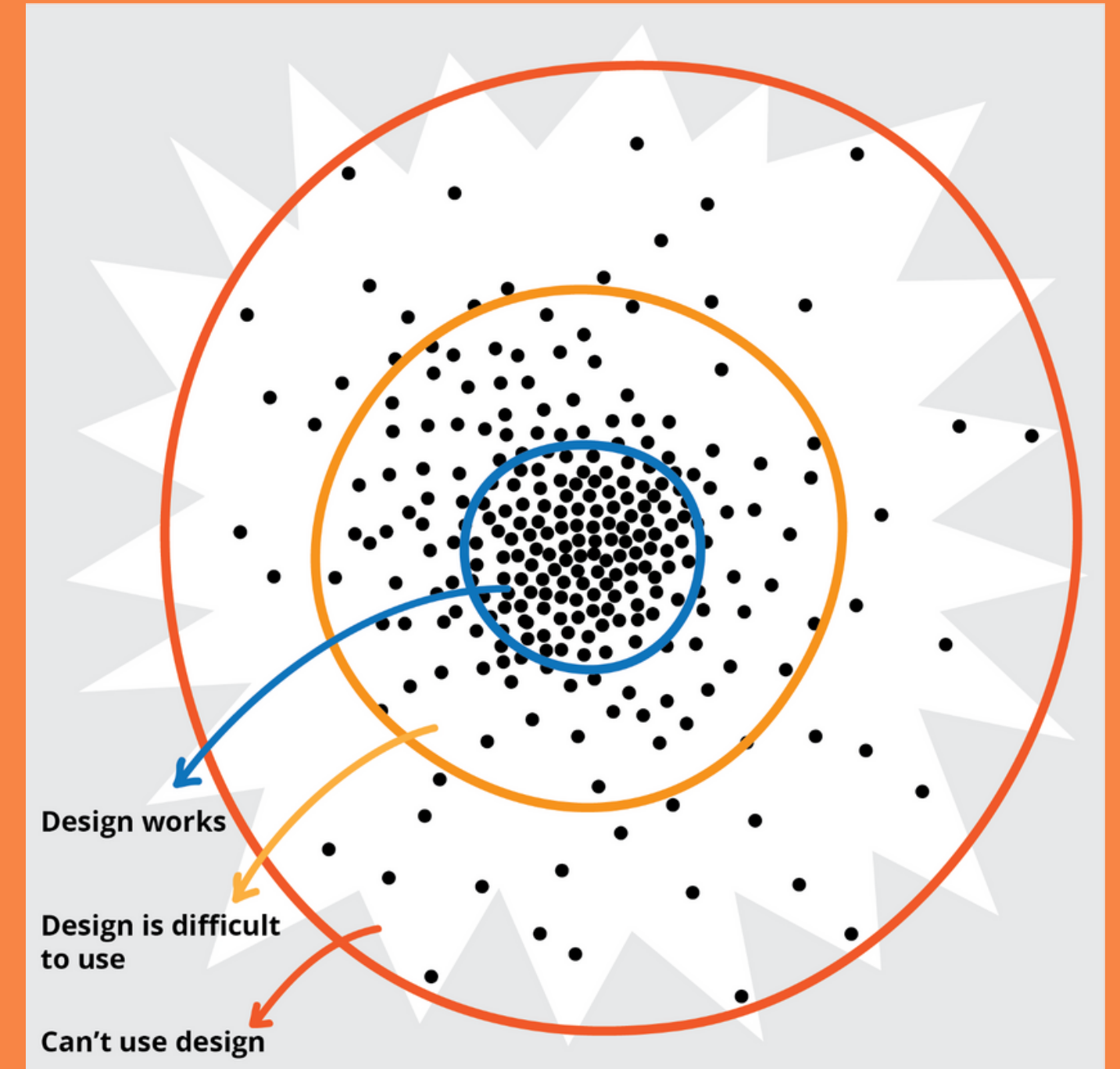A scatterplot of human needs and characteristics

(Source: Jutta Treviranus, Sidewalk Toronto and Why Smarter is Not Better)

Methodology

A scatterplot of human needs and characteristics

(Source: Jutta Treviranus, Sidewalk Toronto and Why Smarter is Not Better)

Design works

Design is difficult to use

Can't use design
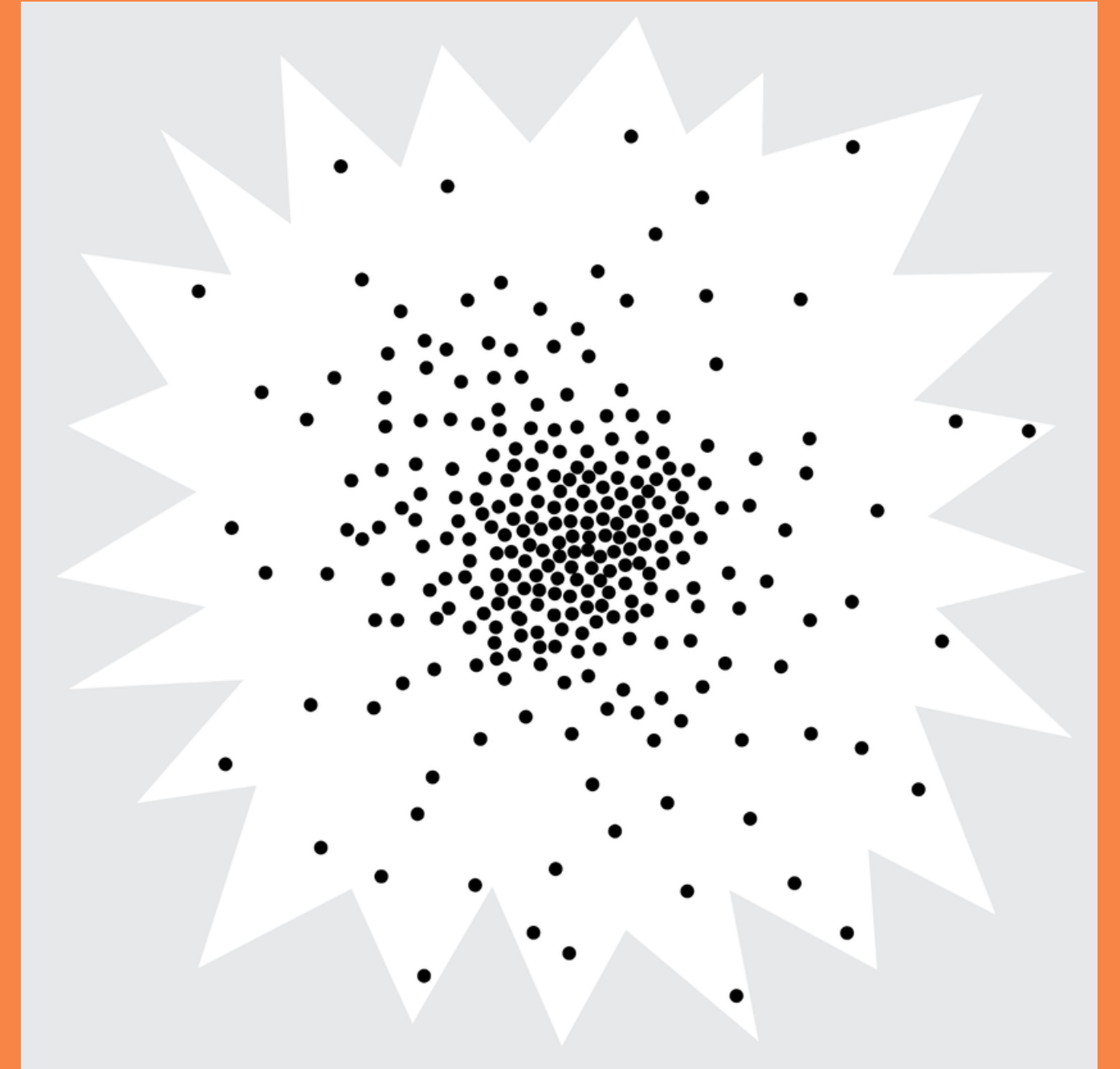
Metrics

How common metrics misalign with human experiences

— **BLEU: commonly used for image captioning tasks**

Measures the ngram similarity between two sequences.

Label: **A woman sits near a parked motorcycle.**
Pred #1: **A person sits near a parked motorcycle.**
Pred #2: **A cat sits near a parked motorcycle.**

— **Same BLEU score, different user experience**

The two predictions have very different impact to blind users who consume the auto-generated caption

What can we do

Meaningful representation in every step of AI development

Source: International Disability Alliance (IDA)
@IDA_CRPD_Forum

01 **Representation in data collection**

Collect data about PwD in a respectful and transparent way.

02 **Representation by sampling method**

Better surface outliers and avoid the predominance of the majority.

03 **Representation in evaluation**

Define new evaluation metrics for AI models that represent the needs and interests of PwD

Representation in Data

Collect data from PwD that represent their identities and needs

Recent industry/academic efforts in collecting speech data from people with atypical speech


Support community organizations and grassroot efforts to collect, use, and maintain datasets that are relevant to them.

Representation by sampling method

The Lawnmower of Justice trimming the Gaussian curve, proposed by Jutta Treviranus

Downsampling the dense parts of the dataset to force the model to pay attention to the outlier

Source: , Sidewalk Toronto and Why Smarter is Not Better
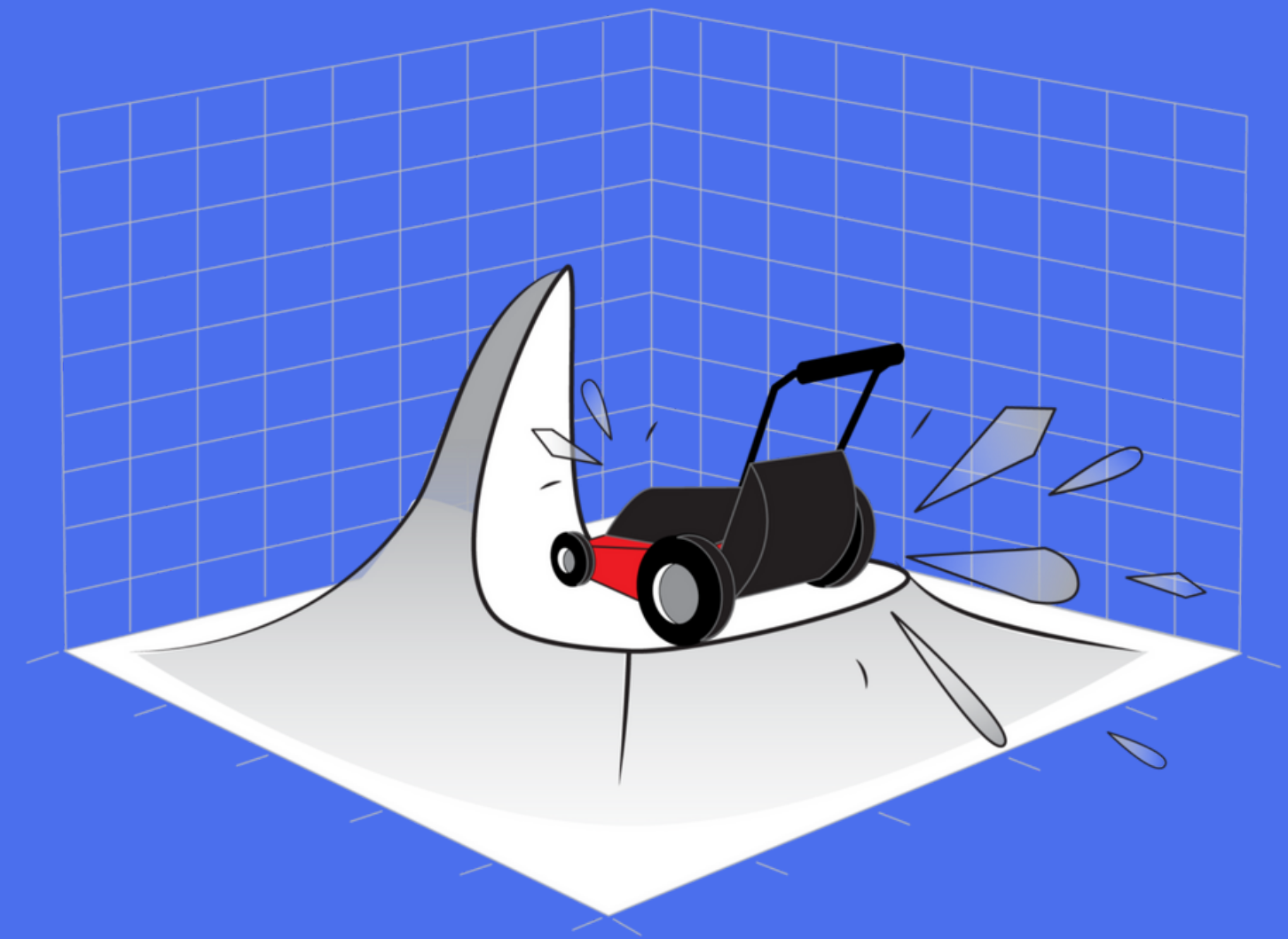
Representation in evaluation

Develop human-centered metrics with PwD

Original tweet:
ALensOnAmerica. Share your best wildlife photo from a national park and get feedback from @chamiltonjames. #YourShot.

HIGH CONGRUENCE

Generated caption:
A bear is swimming in the water.

Original tweet:
ESPN. A massive gator interrupted a group's golf round... in Florida, of course.

LOW CONGRUENCE

Generated caption:
A horse standing on top of a lush green field

Source: Haley MacLeod, Cynthia L. Bennett, Meredith Ringel Morris, Edward Cutrell. Understanding Blind People's Experiences with Computer-Generated Captions of Social Media Images. CHI '17

Equitable technology

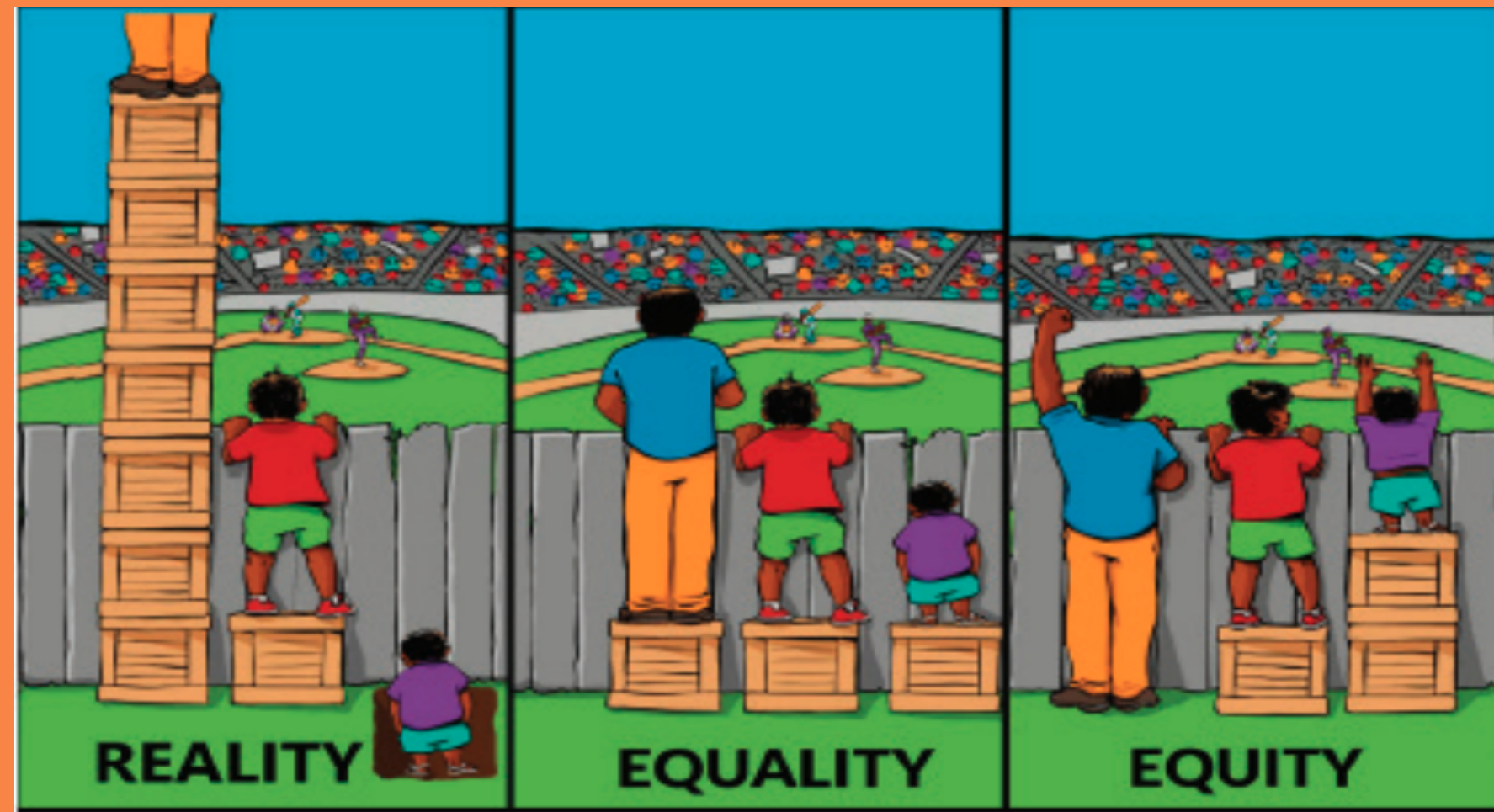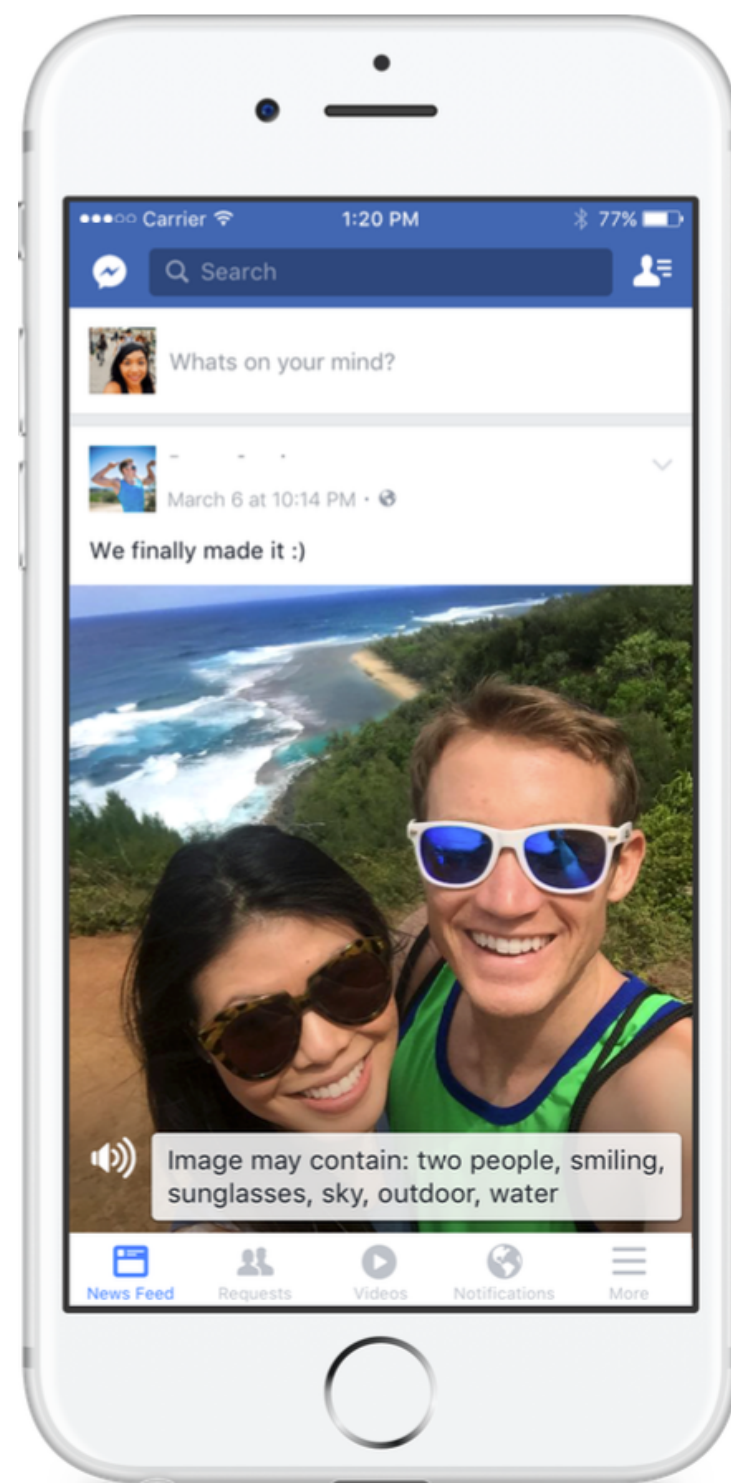Push the envelope beyond equality

Image credit: Interaction Institute for Social Change, Artist: Angus Maguire

Automatic Alt-text for Social Media Images

01 **Deliver concise, relevant visual information**

Sentence structure and concepts of interest were determined through interviews and design iterations with users with visual impairments.
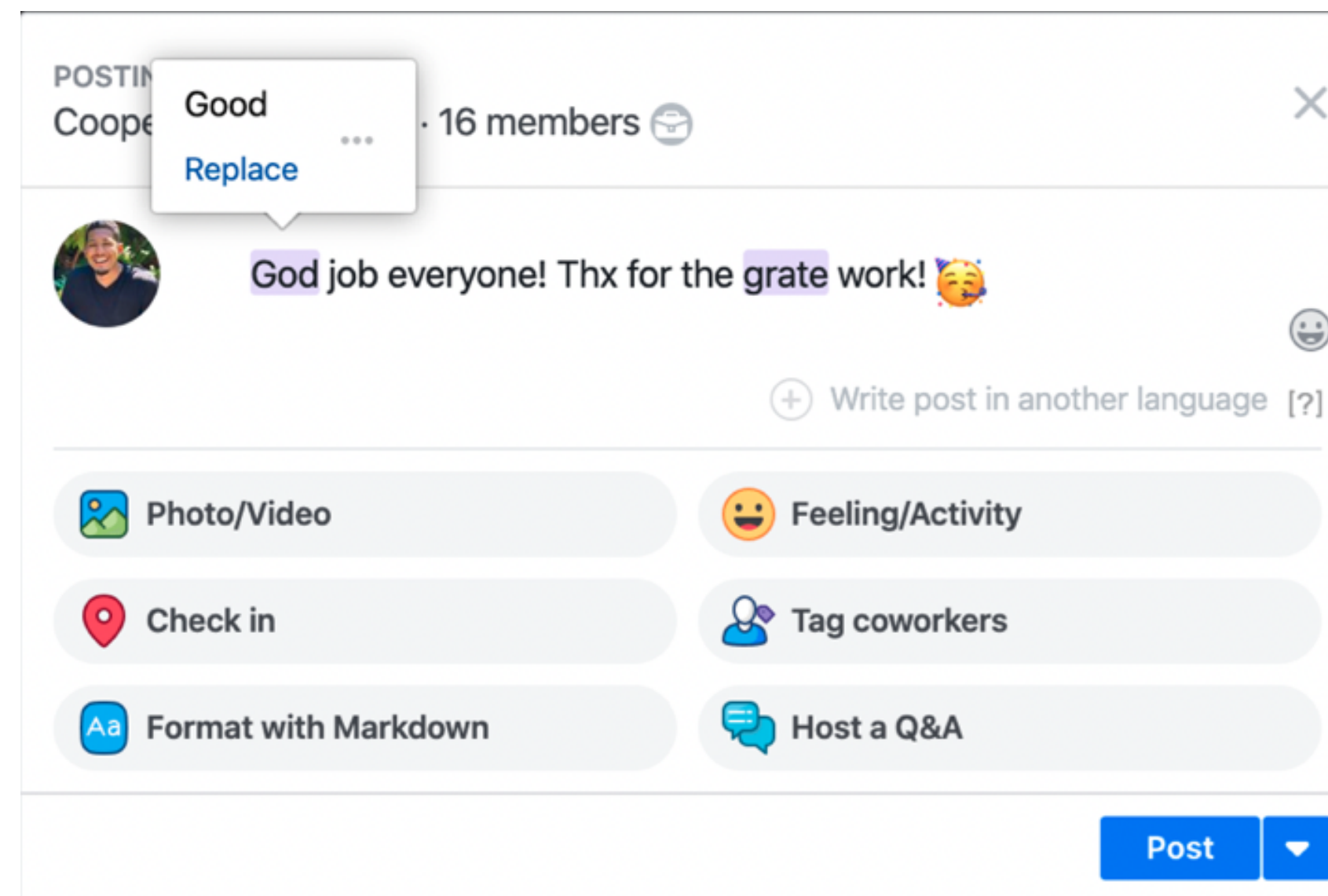
02 **Real-time, no learning curve**

Screenreader will automatically announce the auto-generated alt-text.

Shaomei Wu, Jeffrey Wieland, Omid Farivar, Julie Schiller. Automatic Alt-text: Computer-generated Image Descriptions for Blind Users on a Social Network Service. CSCW 2017.

Writing Assistance

— Our research with social media users with dyslexia showed that they are often stigmatized by their writing style and disempowered from participating in the public discourse through writing.

— Co-designed with people with dyslexia to respect their authentic expression while providing a safety net.

Shaomei Wu, Lindsay Reynolds, Xian Li, Francisco (Paco) Guzman. Design and Evaluation of a Social Media Writing Support Tool for People with Dyslexia. CHI 2019

The Hidden Costs of Videoconferencing for People Who Stutter

Ongoing community research by AImpower.org

Heightened anxiety

Preset "self-view" in video calls puts people in direct confrontation with their stutter and makes them more self-conscious and socially anxious.

Limited by voice

Lack of support for non-verbal channels (e.g. body language, eye contact) undermines existing communication strategies that are essential for people who stutter to express themselves and connect with their audience.

"On Zoom, your voice is so important for you to communicate than before. They can not see your body, your gestures. Your words carry more meaning. You have to impress people with your words. For someone who stutters, videoconferencing is a disadvantage."

Research participant (person who stutters)

AImpower.org

Research and co-create
technologies for and with
marginalized communities

Learn more about our ongoing work

contact@aimpower.org