ADOBE INCLUSIVE DESIGN WORKSHOP

Greater Inclusion

MODULE 2

Adobe

VERSION 0.9

Note: This is a prerelease version of the second module of Adobe's Inclusive Design Workshop. We will release all of the workshop materials, including documents, slides, and workshop materials, on July 13, 2020, at this address:

https://github.com/adobe-inclusive-design/id-workshop

- Introduction to Inclusive Design
- Greater Inclusion (this module)
- Disability

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Acknowledgements
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Production and Support
Clade Design: Sara Stewart, Logan Faerber, Alexander Lefler, Brenton Murrell
Adobe: Jamie Myrold, Shawn Cheris, Andrew Kirkpatrick, Angelie Herreria, Cassarie Soungpanya, Bailey Sharrocks, Rob Gianino

Workshop Source Materials
https://github.com/adobe-inclusive-design/id-workshop

Inclusive Design at Adobe
https://adobe.design/inclusive

Inclusive design is a lens that can be applied to any aspect of design.

It requires us constantly asking who is being left out of a design and whether it's unintentional, intentional, or structural. It means having to reach out to those excluded, and it requires their full participation in the process, including the rewards that come with it.

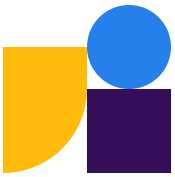
Including people in the design process who have been marginalized, and working together to address their experiences of exclusion, leads to a more creative atmosphere, and a more complete product. Co creation combines each participant's problem-solving skills to build common solutions to some problems, and useful alternatives in others. The result is a product that is more responsive to the needs of a larger

audience, one that is more capable of predicting and avoiding errors, or at least making it easier to recover from them.

People often think that inclusive design consists simply of listening to a broader base of users and considering their wants and needs in the final product. But this is only one step. The guidance those voices provide has value, and that value needs to be recognized. Rather than approaching these contributors as test subjects or commenters, consider them your co designers, understanding also that credit is due for the perspectives they bring.

This extends beyond the design process into the structure of an organization. A product which is shaped by a heterogeneous set of voices, but whose rewards accrue to a homogeneous few, is not operating in a true spirit of inclusion. Far too often, people who are qualified to lead design teams of their own are undervalued and marginalized as role players simply for focusing on underinvested groups. If an organization is not compensating testers or focus group participants, or hiring and promoting inclusively, or doesn't compensate its employees equitably, it is time to evaluate exactly how that organization's values intersect with inclusion in a broader sense.

This is a lot to take in. Inclusion is something that never has a perfect endpoint. But this doesn't mean we shouldn't engage or improve upon the ways we have practiced design up to this point. If our goal is for everyone to have equal access to the work we do, we need to be designers - but also researchers, advocates, and historians. Here is a small sample of that history.



History of Inclusive Design

The term “inclusive design” and many of its pioneers come from the disability community. The products of their labor, including their own self-advocacy, are essentially everywhere we look, from the curb cuts in our streets to the captions on our televisions.

The late Ron Mace, an architecture professor at North Carolina State University, coined the term “Universal Design” in the 1980s to describe a more inclusive style of architecture. Mace, who used a wheelchair, helped create the first building code for accessibility and started what is now the Center for Universal Design in 1989. In 1987, a group including Mace defined Universal Design as:

> *The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.*

The British Standards Institute (BSI) offered a similar definition for inclusive design in 2005:

> *The design of mainstream products and/or services that are accessible to, and usable by, as many people as reasonably possible, without the need for special adaptation or specialised design.*

Both of these are explicitly linked to disability. The term "adaptation" referred to what we might now call "bolted-on" efforts at accessibility; for example, separate entrances, lifts, or other architectural features meant only for disabled users. The BSI definition, part of a national design standard, changed the name and expanded the scope beyond architecture to include products and services. The leap to technology wasn't far behind. Here, we use the definition offered by the Inclusive Design Research Centre (IDRC) at OCAD University in Toronto, Canada:

> *Design that considers the full range of human diversity with respect to ability, language, culture, gender, age and other forms of human difference.*

We cannot call any design process or artifact "inclusive design" if it discards inclusive design's legacy of disability leadership. Token gestures do not count; adding a model of a different skin color or gender may be perceived to be more inclusive to one group of people, but it is not inclusive design. We must consider disability in all aspects of our work—iteratively, with a broad base of stakeholders having equity in the system—in order to be considered an inclusive design practice.

Human Difference

While still clearly focusing on ability, the IDRC definition also introduces the term "human difference" along with a number of these differences. Here, we will break down these structures and others, and give some examples of how each one entails exclusion. Finally, we will go deeper into disability identity, exclusion, and assistive technology.

NOTE ON LABELS

Below are a number of labels used to divide people into groups. In the previous essay, we deconstructed several similar attempts to classify people by certain properties. So why are we doing it ourselves?

Like describing water without saying it's wet, we can't really describe the ways in which people have been left out without talking broadly in constructs or terms that people can understand. Labels are important to this discussion because they entail exclusion.

As we talk along different axes, keep in mind:

- Not all people who share a certain identity share the same problems;
- Not all people who have a certain property (like height or skin color) have the same identity; and
- We must always look to the extremes of each generalization to find the most valuable information.

Personal identities also overlap or intersect. Kimberlé Crenshaw, a law professor at Columbia and the University of California, coined the term "intersectionality" to refer not just to the totality of a given person's identities, but how their overlapping magnifies the discrimination they experience. In Crenshaw's words:

> *"Intersectionality is a lens through which you can see where power comes and collides, where it interlocks and intersects. It's not simply that there's a race problem here, a gender problem here, and a class or LBGTQ(sic) problem there.* ***Many times that framework erases what happens to people who are subject to all of these things.****"*
> *(Columbia Law School, 2017)*

Intersectionality is commonly misunderstood. We don't want to contribute to the confusion. We recommend further reading and discussion beyond the scope of this workshop in order to understand it more deeply.

Finally, it's worth noting that these labels change in meaning and importance around the world. For example, when this workshop took place in India, the discussion of gender took on a different shape. When we had a slide talking about nonbinary gender, this was not at all novel to the participants. India has recognized a "third sex" legally since 1994, and religiously for much longer. Indian participants were more interested in North American transgender, nonbinary and gender-nonconforming communities in comparison to their own.

Race and Skin Tone

How can a film be biased? It just captures light. But advances in color photography were geared for a specific type of face. Kodak, a film manufacturer that once had photo processing labs around the world, hired a studio model named Shirley Page in the 1950s to pose for a photo which was to be used as the color reference for all printed photos. All Kodak labs developed “Shirley cards” regularly to ensure that the right color balance was coming through.

Other reference models came along over the years. All were young, attractive, and—to a Shirley—white. In fact, it wasn't until the 1970s that black models were used in photo tests at Kodak, and even longer before they released a multiracial calibration photo.

The result of this chronic underrepresentation was that dark-skinned faces were often underdeveloped, especially if they appeared next to to white faces. Untold numbers of family photos were affected, their subjects forever obscured. This carried over into professional still and

motion photography; director Jean-Luc Godard in 1977 refused to use Kodak film on a shoot in Mozambique, calling it "racist."[1]

The effects of Kodak's exclusion were felt by all people with darker skin, but particularly in Kodak's home country by African Americans. The same patterns of exclusion can be seen today in products like soap dispensers and hand dryers that fail to register a dark-skinned hand. Errors related to recognizing a skin by its color can be resolved technically; failing to address such issues for years or decades is best explained by structural racism.[3]

Design that's inclusive of race goes beyond the appearance of models in stock photos. To address racial equity in our designs, we must also address racial equity in the field of design.

Rather than referring to communities of color as being "underrepresented" in design, Antionette Carroll, founder, president, and CEO of Creative Reaction Lab, uses the term "historically underinvested." In other words, the lack of equal representation in design is the product of a long history of money and opportunity flowing unequally along racial lines.

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[1] Ruha Benjamin, Race After Technology: Abolitionist Tools for the New Jim Code, Ch. 3

[2] A Vox report on the subject states that Kodak made changes in how it processes brown tones in response to complaints not by Black customers, but wood furniture manufacturers and chocolatiers. https://www.vox.com/2015/9/18/9348821/photography-race-bias

It should go without saying that hiring and empowering Black people, Indigenous people, and people of color (BIPOC) is critical to identifying and resolving racial inequities in our products. But it is just as important to know that inequality is baked into every aspect of our lives, and that many of these systems are still waiting to be deconstructed.

Artificial Intelligence Bias

One of these systems is the field of artificial intelligence and machine learning (AI/ML). New breakthroughs in AI/ML seem to come on a daily basis, promising breathtaking capabilities. But in the real world, these apps can have devastating consequences without careful consideration of how they may be applied to marginalized people.

For example, in 2016, ProPublica analyzed COMPAS, an algorithm designed by Northpointe to rate criminal defendants' likelihood to reoffend, on a scale of 1 to 10. This is used by courts in the United States in sentencing and probation proceedings. ProPublica found a case where a 41-year-old white man with a record including felony convictions was given a COMPAS score of 3 (low risk) after being picked up for shoplifting. By contrast, an 18-year-old Black woman caught joyriding a child's scooter received a score of 8 (high risk). In the end, the man was later charged with 30 felony counts; as of 2019, the woman never re-offended.

How can these algorithms get it so wrong? It's easy to think there

must be a problem with the data. But in this case, the problem is more likely that it's correct. Black Americans are more likely to be stopped by police, more likely to be charged with a crime as a result of a stop, more likely to be sentenced to prison, and receive on average harsher sentences than white Americans for the same charge.[3] It stands to reason that criminal data would reflect that disparity. COMPAS also considers factors such as "residential stability" and "employment status," which also statistically advantage white people.

If we look at prior arrests or convictions simply as data points that only reflect one individual's conduct, we are likely to believe in the fairness of these scores. But crime data does not just reflect individuals' criminal records; it also reflects the criminal justice system that delivers judgment. When one group of people is more likely to be arrested, tried and convicted, even in similar situations, a score like this doesn't just reinforce that disparity, but it could lead to even more convictions and longer sentences, further magnifying the injustice overall.

A more recent example is an algorithm called PULSE, which takes low-resolution (e.g. 32x32 pixels) images of faces and attempts to reconstruct high-quality versions from them, using an image generator

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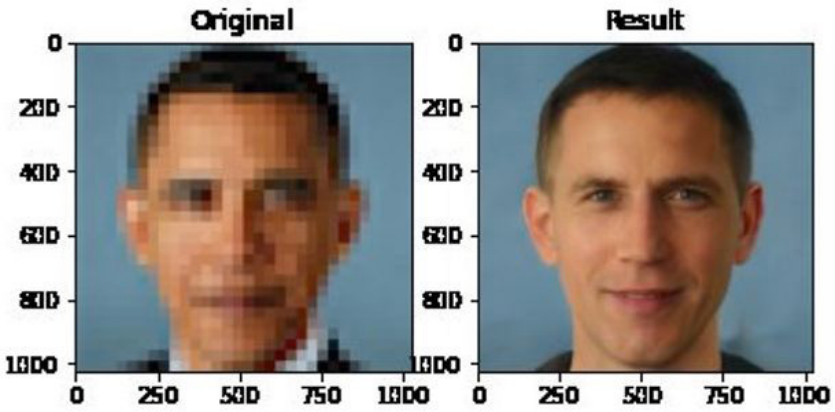
[3] Nellis, A: "The Color of Justice: Racial and Ethnic Disparity in State Prisons," The Sentencing Project, 2016. https://www.sentencingproject.org/publications/color-of-justice-racial-and-ethnic-disparity-in-state-prisons/#II.%20Overall%20Findings

[4] Menon, S; Damian, A; Hu, S; Ravi, N; Rudin, C: "PULSE: Self-Supervised Photo Upsampling via Latent Space Exploration of Generative Models," CVPR 2020. https://arxiv.org/abs/2003.03808

called StyleGAN. When users tried this system on their own, they found that the facial features that were generated tended to make photos that look like white people, regardless of the original subject's appearance. For example, feeding PULSE a low-res version of President Obama's official photo resulted in a generated image that looks less like the president, and more like a crew-cut white man.[5]



The images used to train StyleGAN are 72.6% white, 13.8% Asian, and 10.1% Black. As PULSE looks for facial features that fit the image well, the network is flooded with highly-ranked features common to one race, crowding out the outliers, even when they look more similar overall.

As an experiment alone, this is problematic, but the real risk is in how this is applied. A photography app using this to enhance old family photos could erase non-white features in the process. In the hands

[5] https://twitter.com/Chicken3gg/status/1274314622447820801

of law enforcement, where it might be trained on mug shots that underrepresent white faces, a “zoom in and enhance” app that guesses at facial features could generate portraits of Black-appearing suspects from photos of white faces.

Artificial intelligence is not neutral. Biases can be introduced to AI/ML with nearly every decision made:

- How data is sourced, and in what quantity;
- Where the data comes from, including who gathered it, for what reason, and in what time and place;
  How the data is interpreted;
- How (or whether) results can be inspected or evaluated for impact in the real world; and
- How results are applied to people.

AI/ML bias issues extend beyond race, and the risk almost always falls disproportionately on marginalized groups. Designers must be aware of the consequences of different applications of AI/ML, rather than plowing ahead in the belief that any problem they find can be solved with more data or deeper networks.

Gender and Relationships

For the purposes of this course, we define one's sex as the reproductive properties of one's body, which can be male, female, or a combination (known as *intersex*); and *gender* as a psychological and social identity which can be male, female, a combination, a separate identity, or none of the above.

Gender *identity* is how one applies gender to oneself. Gender *expression* is how one expresses one's gender to others.

We refer to people whose gender identity or expression differs from their sex as *transgender*; people whose gender identity, expression and sex are the same as *cisgender*; people who fall outside male or female gender roles as *non-binary* or *gender nonconforming*; and people who identify with no gender as *agender*. People whose gender identity and/or expression change at different times or in different situations are defined as *genderfluid*.

These definitions can vary widely from person to person. If in doubt, ask.

Women

In the first module, we discussed Adolphe Quetelet and the "average man." The average man has been researched, measured, and modeled in nearly every domain he touches: physiologically, intellectually, and economically. The majority of what we buy and use today, from cars to the air conditioning in office buildings, is designed with the average man and his preferences in mind.

The same cannot be said for the "average woman." Statistically (though of course there are outliers), women are shorter than men, and their weight is distributed differently through their body. When crash testing cars, the U.S. National Transportation Safety Board (NTSB) had standardized on a dummy driver that was 5 feet, 9 inches tall and weighed 172 pounds—the measurements of a 50th -percentile man. The average woman is 5 inches shorter and 7 pounds lighter.[6] Until 2011, smaller dummies had been tested—but only the average male dummy was placed in the driver's seat.

Failing to test women dummies as drivers has a cost measured in lives. When a 4-foot, 11-inch dummy was placed in the driver's seat and run through a test that had registered a 15% fatality rate, the rate shot

[6] The U.S. Centers for Disease Control and Prevention now places the average American man's weight at 198lbs., not 172.

up to 20 to 40%.[7] A 2011 study showed that women drivers in crashes were 71% more likely to be injured in crashes, 47% more likely to have serious injuries, and about 14% more likely to sustain a fatal injury.[8]

The factors that add to women's risks are not just from the size of the dummy. Vehicles were designed to pass a crash test that only modeled male drivers. As a result, vehicle designers made decisions that ended up increasing men's safety at the cost of women.

This is just one extreme instance of a broader institutionalized bias against women; more subtle ones are pervasive. For instance, air conditioning systems are centered around the comfort of the average man—in this case, a 40-year-old, 155-pound man.[9] Women, however, tend not only to prefer higher temperatures (77 degrees to 71 among men), but they perform tasks better as well. For each degree Celsius (1.8 degrees Fahrenheit) increase, a study found that women's rate of correct answers on math problems rose by 1.76%; men's scores declined about 3% per degree on the same experiment.[10]

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[7] This size represents a 5th -percentile woman. The article notes that, due to its small size, the dummy "also mimics a 12-year-old child." https://www.washingtonpost.com/local/trafficandcommuting/female-dummy-makes-her-mark-on-male-dominated-crash-tests/2012/03/07/gIQANBLjaS_story.html

[8] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3222446/

[9] https://www.scientificamerican.com/article/your-thermostat-may-be-sexist1/

[10] https://www.washingtonpost.com/business/2019/05/24/stop-office-ac-overload-study-shows-women-are-more-productive-when-its-warmer/

The practice of inclusive design requires us to understand how the products of today have been shaped by the past. Without that understanding, even designers who strive to make equitable products can unknowingly carry forward both intentional decisions and unexamined issues that reinforce the status quo.

Of course, women are not alone in experiencing exclusion on the basis of gender. Let's take a deeper look at issues of gender identity and expression.

Beyond The Gender Binary

In 2014, Facebook expanded its gender options from "male" and "female" to a more expansive option. Users could type their gender in and match it against what is now 71 different options including "trans woman," "pangender," "gender variant," and "neutrois."[11] Identities outside the male/female gender binary have increased in number and visibility; a 2018 survey of teens in the state of Minnesota found that 2.8% of them identify as trans, non-binary, or gender non-conforming.

While these dozens of gender identities are new to a large number of people in the United States, many identities have deep roots.

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[11] https://www.telegraph.co.uk/technology/facebook/10930654/Facebooks-71-gender-options-come-to-UK-users.html

For example, "two-spirit," which is on Facebook's gender list, was adopted in 1990 by Indigenous people in North America as a term encompassing LGBTQIA+[12] identities within their respective tribes and communities.[13]

An inclusive approach to gender and relationships requires more than new form fields. Here are a few starting points for exploration:

- Many forms collect gender information without ever needing to, forcing people who identify as neither "male" nor "female" to have to choose an incorrect gender just to register.
- Some forms incorrectly list "transgender" as a gender itself, when it is a property of a person's gender identity or expression. Trans women are women. Trans men are men.
- Some account management systems don't allow individuals to change their names or gender markers after an account has been created. In the case of social networks, this can put trans or genderfluid users in the situation of having to leave all their followers behind and create a new account just to have their identity reflected.
- Each gender has pronouns—conventionally, she/her for women, he/him for men—but in English, others exist, including: they/them,

[12] Lesbian, gay, bisexual, transgender, (queer/questioning), intersex, (asexual/agender). The "+" indicates space for other related identities.

[13] In Canada, the abbreviation LGBTQ2S+, incorporating "two-spirit," is used in place of LGBTQIA+.

ze/zir, and xe/xem.[14] In the Spanish language, some people use -x in place of the gendered -o and -a endings for various usages outside the gender binary. It's important to know whether to ask for a user's pronouns, and then how to use them in the context of each language you serve.

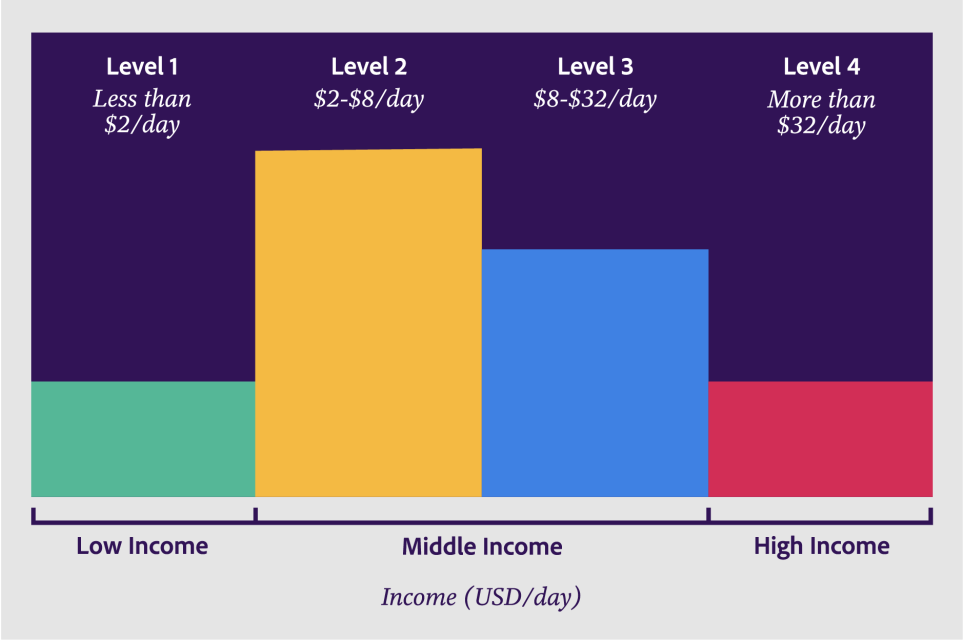
- Honorific titles (e.g., "Mr./Mrs./Miss") are fixed not only to the gender binary, but also, for women only, to marital status.[15] Alternatives such as "Mx." for non-binary people have been put forward, but are not universally used. Like pronouns, unless you need to use them, there is no need to collect them.
- There are many cases in user experiences where family relations must be taken into consideration. These can range from legal or medical services, to wedding registries and florists. It's important to remember that any user can have a partner or spouse of any gender, or no partners, or more than one. The same is true of children, siblings, or any other relation that's relevant to a given user experience.

[14] See https://pronoun.is/all-pronouns for a more comprehensive list.

[15] The title "Ms." was proposed as an alternative that didn't rely on whether or not one was married. https://www.nytimes.com/2009/10/25/magazine/25FOB-onlanguage-t.html

Economic Status

In the 2018 book *Factfulness*, statistician Hans Rosling divides the world's population into four income levels:



It is worth noting how often we talk about "reaching everyone in the world" in technology. And yet, here we see that if we consider "the

average user" as making US$1000 a month, we have excluded 6/7 of the people on the planet. Rosling argues adamantly in his book that companies are overlooking massive economic growth in places like Africa, where countries are rapidly moving through levels 2 and 3 to more widespread economic stability.[16]

At an individual level, how much money we have at our disposal determines a lot about how (or whether) we interact with technology. For example:

- Ability to update hardware, operating systems, and software regularly;
- Access to smartphones and a mobile phone plan, offering Internet connectivity at home or away;
- Control over data storage and settings, for example on shared devices at a library, computer lab or coffee shop;
- Peripherals like displays, mice, touchscreens, cameras, etc.;
  Access to assistive technology like screen readers, magnifiers, or braille displays; and
- Access to banking services, including credit and debit cards or other ways of paying online.

The last bullet is often overlooked. It's frequently taken for granted that customers have access to a credit or debit card. The U.S. Federal

[16] Rosling, H.; Rosling, O.; Rosling Rönnlund, A. (2018). Factfulness. Flatiron Books.

Deposit Insurance Company (FDIC) estimated in 2017 that 14.1 million adults in America were "unbanked," meaning no one in their household had a checking or savings account. Black and Latinx Americans are between four and six times more likely to be unbanked than white Americans; disabled people are over three times as likely to be unbanked as their abled peers.[17] Credit and debit cards are also often used to establish a person's identity, meaning that some potential customers may not even be able to create an account with some services, even if they are only using features that are free.

[17] https://www.fdic.gov/householdsurvey/

Language and Literacy

Imagine you're an English-speaking traveler. After hours and hours of flying, you've landed in an airport somewhere in the Middle East. As you head toward customs, you see a sign in front of you that's covered in writing. None of the scripts look very familiar to you except for one, which reads, simply: EMOCLEW. At first, you don't quite know what to make of this sign. But then, through the jet lag, it occurs to you what the designer of the sign meant for you to read: "WELCOME."

It's possible that a sign like this doesn't actually exist. But if you turn the tables, and you're a speaker of a right-to-left language such as Arabic, Farsi or Hebrew, signs like this are surprisingly common; they can even be found in some of the busiest airports in the world. Sometimes, the ways we welcome people are not all that welcoming.

In this case, it's clear that designers have the right intention: to communicate with people who speak a language they don't. So they go to Wikipedia, copy a phrase or two, and paste it into their image. What they don't notice is that now, instead of running right-to-left, it now runs left-to-right. And for languages like Arabic, where adjacent letters often

connect, those connections are often broken as well.

The point of this isn't that you should learn Arabic to be a designer (though if you take the time, you'll certainly learn a lot about design); it's that all communication has a sender and a receiver, and if you don't involve the receiver in the process of crafting a message, it is less likely to be understood.

Speakers of a common language can have trouble communicating, too. Writers often assume that adults can read at a relatively high level, but the statistics disagree. In the United States, it's estimated that the average adult reads at an 8th-grade level (that is, the level at which 14-year-olds are taught). There are also people who don't understand English as well as they do their primary language, people with cognitive and intellectual disabilities that may complicate their understanding, and, of course, millions of young people who haven't reached 8th grade yet.

In 2015, Shane Snow of Contently.com looked into the reading levels of some common books and estimated how many people could read each of them. He found that Hemingway's *The Old Man and the Sea* was readable by almost 80% of American adults. The *Harry Potter* series, which aims for a 5th-grade reading level, can be read by about 2 in 3 adults. By contrast, only 15% can read the business book *Good to Great* by James C. Collins. (Malcolm Gladwell's *The Tipping Point*, fittingly, is about 50/50.)[18]

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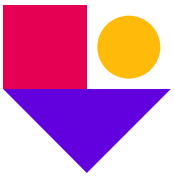
[18] https://www.shanesnow.com/article/2015/1/17/just-how-much-does-reading-level-matter

One's ability to read depends on more than how many syllables are in a word or how many sentences are in a paragraph; the content also makes a difference. Words can mean different things depending on where you live (e.g., "boot"), or when you're alive ("coach"). We use figures of speech, or idiomatic language, to make things clearer, but not everyone can understand them.

As this workshop was being held in Hamburg, Germany, a participant raised her hand. She asked, "What does 'this goes to 11' mean?" The participant had been given a piece of marketing text to translate, about "turning your creativity up to 11."

She's effortlessly fluent in English and translates a lot of content written by other English speakers for the German market. But she had never seen the 1984 movie *This Is Spinal Tap*, an American film from 1984. It features a scene where the fictional band's ridiculous guitarist shows off an amplifier whose dials are all marked from 1 to 11.[19]

[19] https://www.youtube.com/watch?v=s9F5fhJQo34#t=78



Age

Here's a quick exercise: take out a piece of paper or open up a text file. Now, fill it in with the age you will be when you will no longer use technology. No smartphones, no computers, no websites, no email, no apps, no cars, no kiosks. Not even Netflix.

Can you come up with an answer?

The reality is that, more than ever, we can expect to be active users of technology well into our senior years. We'll use it for information and entertainment, but also access to government services, banking and retirement planning, and to keep in touch with friends and family.

Technology will also be a critical factor in how long we're able to stay in our jobs. A person who can no longer use the products they've spent a career learning and using is at risk of an untimely end to their career. Ageism is notoriously common in tech fields already; 68% of Baby Boomers (people born between 1946 and 1964) and 40% of Generation X (1965-1980) are discouraged from applying for jobs due to age

discrimination.[20] A majority of workers who are 30 and over are worried that they will lose their jobs because of their age.[21]

It can be terrifying to believe that our careers have an expiration date. How much worse would it be if it's our own exclusive work that brings it about? The Royal College of Art in the U.K. held an annual competition from 2000 to 2008 called "Design For Our Future Selves."[22] Thinking about how age affects how we use products is a rare opportunity for us to be truly selfish in our design work, because the work that's for our own benefit later can help others now.

Aging And Disability

Age is also strongly correlated with disability. In fact, with some luck, we should each live long enough to experience some type of disability in our lifetimes.

As we get older, our bodies begin to change. People in their 40s often begin to have problems with their near vision, requiring bifocals or progressive lenses. This is known as presbyopia (literally from the Greek words for "old" and "eye"). People experience similar declines in their

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[20] https://insights.dice.com/2018/06/12/ageism-tech-major-problem-survey/

[21] https://thenewstack.io/ageism-tech-good-news-really-ugly-news/

[22] https://www.rca.ac.uk/research-innovation/research-centres/helen-hamlyn-centre/helen_hamlyn_student_programme/helen_hamlyn_design_awards/

hearing, as well as issues with memory, joint flexibility, and chronic pain.

Our final module covers disability, the forms it can take, how disability and disabled people interact with the products we design, and how to create more equitable user experiences with disability in mind.