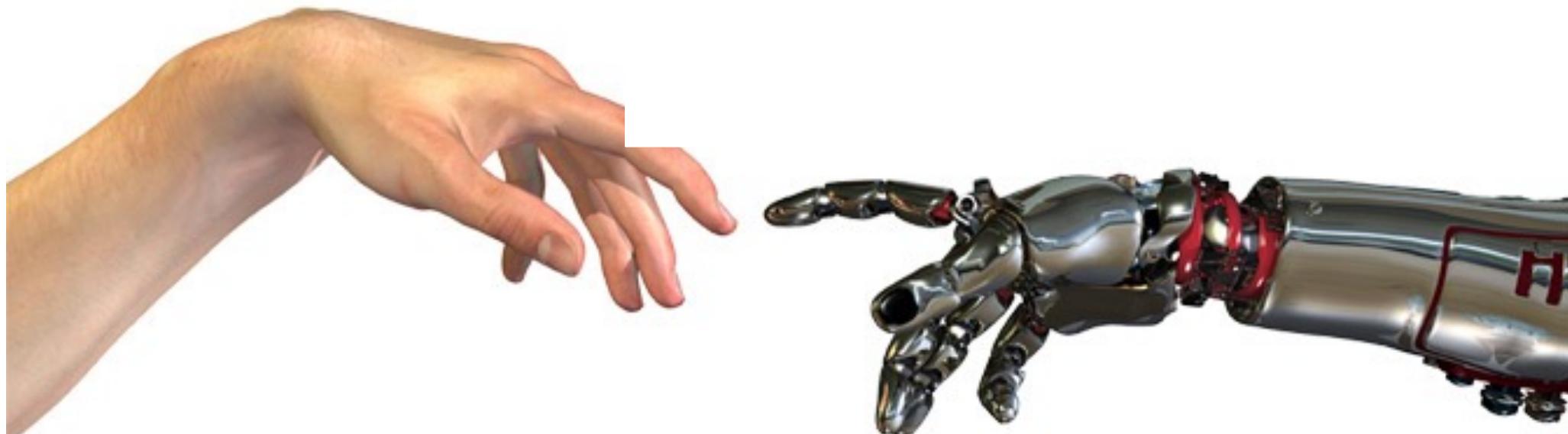


# HUMAN-COMPUTER INTERACTION

## UNIVERSAL PRINCIPLES OF HUMAN-COMPUTER INTERACTION DESIGN



### **OBJECTIVES**

- 1.) Why we might care about these principles?
- 2.) Universal Principles of HCI Design - *Accessibility*



# Universal Principles of HCI Design

*The principles provide ways to enhance usability, influence perception, increase appeal, make better design decisions, + teach through design.*

- Accessibility
- Aesthetic-Usability Effect
- Accelerators
- Affordance
- Alignment
- Anthropomorphism
- Chunking
- Color Psychology
- Common Fate
- Convergence/Biomimicry
- Consistency
- Familiar Language & Metaphors
- Flow
- Factor of Safety
- Flexibility-Usability Tradeoff
- Forgiveness
- Freeze, Flight, Fight, Forfeit
- Interference Effect
- Gamification (Persuasive Technology)
- Mental Model
- Nudge
- Ockham's Razor/KISS
- Performance versus Preference
- Rule of Thirds
- Signal to Noise Ratio
- Typography
- Uncanny Valley
- Visibility and Feedback
- Pareto Effect - 80/20 RULE

# WHY LEARN THE UNIVERSAL PRINCIPLES OF DESIGN ?

- HCI/HF is a systematic approach to guide the human interactions with ...say, a robot, nuclear control room, a space shuttle, car, plane, computer, smartphone, etc. to ensure that all functional aspects of human involvement are achievable without introducing opportunities for human error.
  - HCI/HF considers human...
    - Capabilities
    - Limitations
    - Characteristics
    - Behaviors
    - Motivations
- ...as they impact the design of computational systems, structures, and components.

**FYI -- IF YOU WANT TO READ  
MORE, CHECK OUT THIS BOOK!**

<http://universalprinciplesofdesign.com/>



UNIVERSAL  
PRINCIPLES  
OF DESIGN

150

# I AM GOING TO SPEND A BIT MORE TIME ON ACCESSIBILITY THAN THE OTHER UNIVERSAL PRINCIPLES OF DESIGN

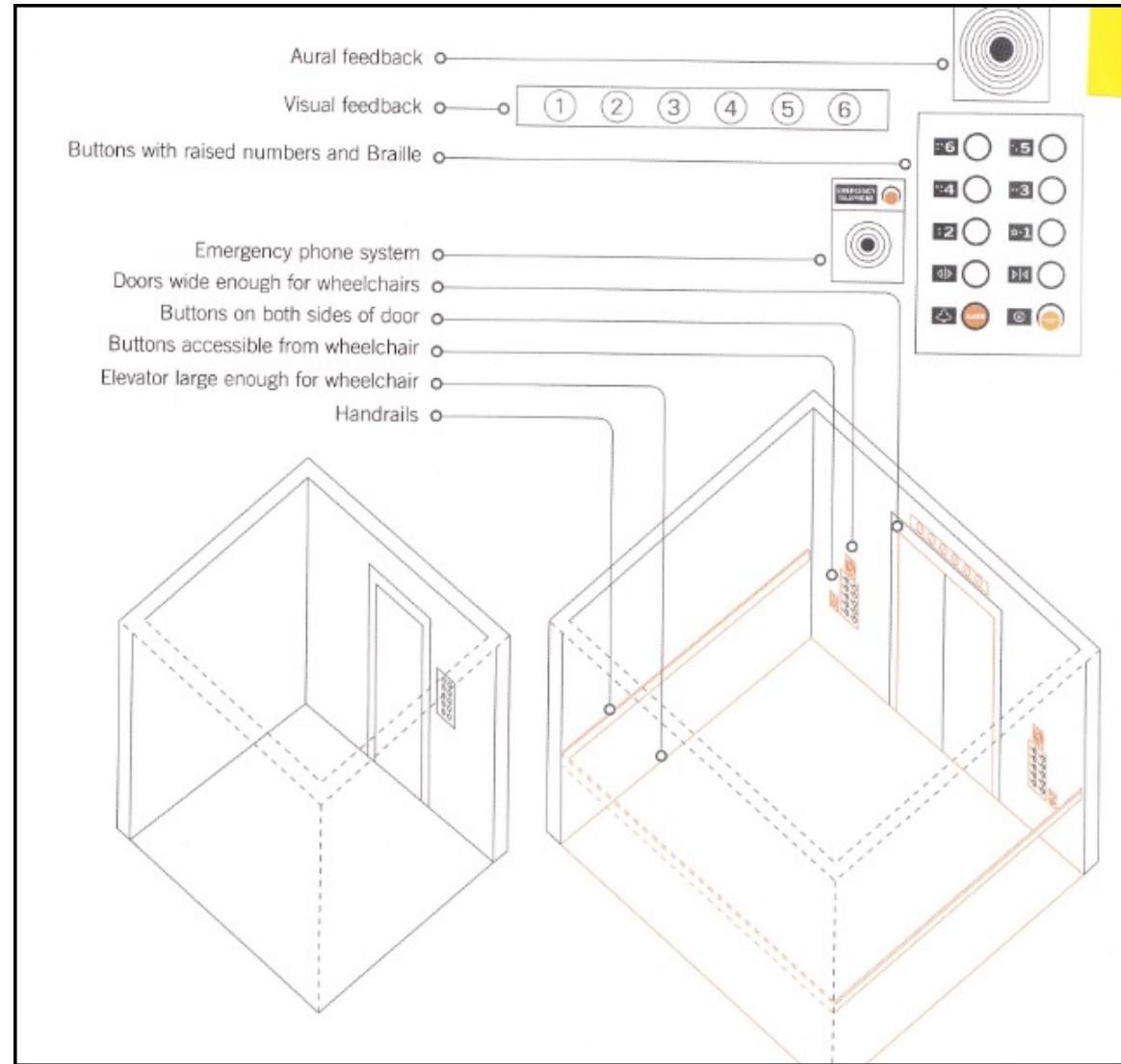
- Because it's important!

# Accessibility

- Objects and environments should be designed to be **usable by as many people as possible.**



Inventor Dean Kamen demonstrating the iBot, a Transformer-like wheelchair that makes a world designed for those who can stand and walk accessible to wheelchair users.



The large elevator has many features that make it more accessible than the small elevator: wide doors permit easy access; handrails help people maintain a standing position; two sets of controls are easily accessible from

a seated position; controls are redundantly coded with numbers, icons, and Braille; feedback is provided visually and aurally; and an emergency phone system offers access to special assistance.



# Accessible Design, aka Inclusive Design



The screenshot shows the Microsoft Fluent Design System website. At the top, there's a navigation bar with links: Design (highlighted in green), Fluent Design System, Inclusive Design (also highlighted in green), Careers, and Articles. Below the navigation, the word "Inclusive Design" is prominently displayed in a large, bold, white font. To the right of this title, a text block reads: "Inclusive Design is a methodology, born out of digital environments, that enables and draws on the full range of human diversity. Most importantly, this means including and learning from people with a range of perspectives." Further down the page, there's a section titled "Accessibility" with a sub-section "Everyone should be able to access and enjoy the web. We're committed to making that a reality." Below this text, there are three devices (a laptop, a smartphone, and a tablet) each displaying a different web-based application or content related to accessibility and design.

Accessible products and services offer people with disabilities to use things with the same level of **efficiency, usability and satisfaction** as for people without disabilities.



# USABILITY VS. ACCESSIBILITY – AREN'T THEY THE SAME THING?

- Since they have similarities, accessibility is sometimes confused with usability.
- Both overlap and are vital parts of user experience (UX) design, but there are also key distinctions between them.
  - Usability is concerned with whether designs are effective, efficient, and satisfying to use.
  - Accessibility, on the other hand, is concerned with whether all users are able to access an equivalent user experience, however they encounter a product or service (e.g., using assistive devices). Unlike usability, accessibility focuses on people with disabilities.



# BUT WHY SO IMPORTANT?

- **~1 billion people have a disability.** 15% of the world population has some type of disability that becomes a barrier to take all feels and colors of a life.
- **Better search results.** In case it's a website or web application, it becomes more SEO friendly. Your HTML backbone creates a good visibility for search engines.
- **Better code.** Accessibility approach encourages developers for a better coding practices because of semantic layout (when HTML5 tags really fit your goals- [https://www.w3schools.com/html/html5\\_semantic\\_elements.asp](https://www.w3schools.com/html/html5_semantic_elements.asp)).
- Laws and policies in some cases (<https://www.w3.org/WAI/policies/>). Yes, you can meet a jail in some countries in case of do not accomplish some level of WCAG guides on your website.



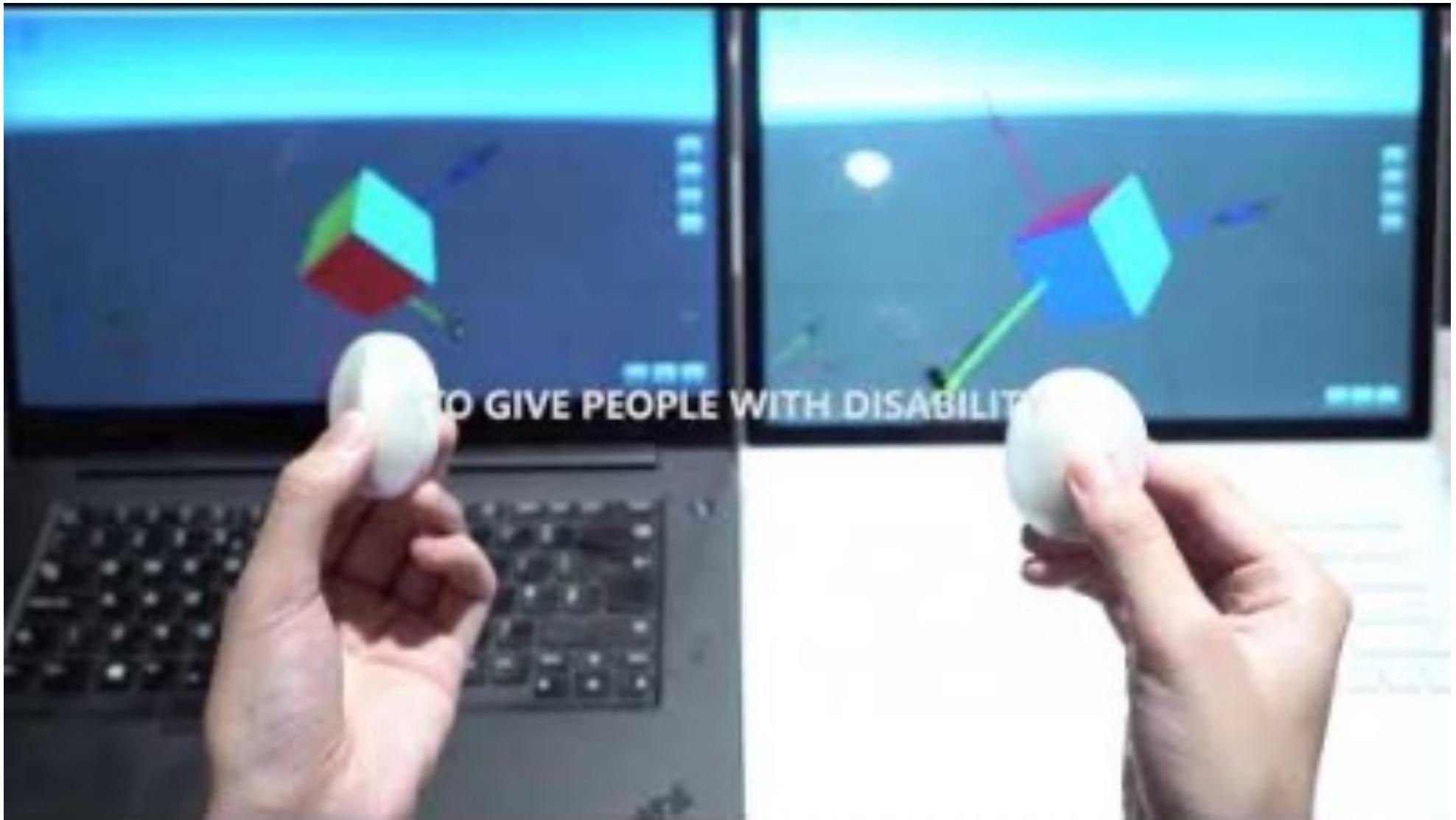
# WE CAN EXTRACT 5 CLASSES OF IMPAIRMENTS WITH THE BODY:

- To start talking about solutions we need to figure out what exact types of disabilities exist.
  1. **Visual** (e.g., color blindness)
  2. **Motor/mobility** (e.g., wheelchair-user concerns)
  3. **Auditory** (hearing difficulties)
  4. **Seizures** (especially photosensitive epilepsy)
  5. **Learning/cognitive** (e.g., dyslexia)



# A MORE INCLUSIVE FUTURE W/ DOTS

## A GESTURE-RECOGNITION SYSTEM FOR PEOPLE WITH DISABILITIES



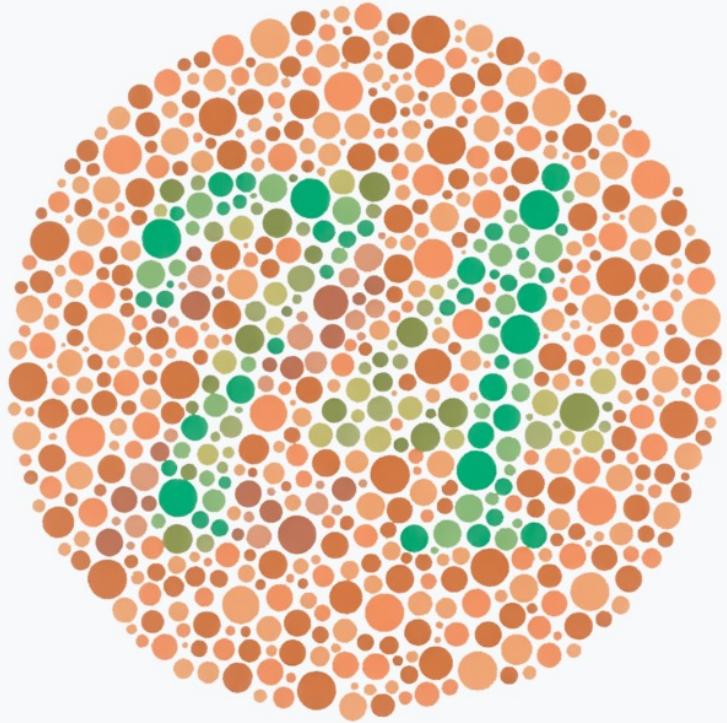
[https://www.youtube.com/watch?v=jfszSkgA-Vc&ab\\_channel=Dezeen](https://www.youtube.com/watch?v=jfszSkgA-Vc&ab_channel=Dezeen)



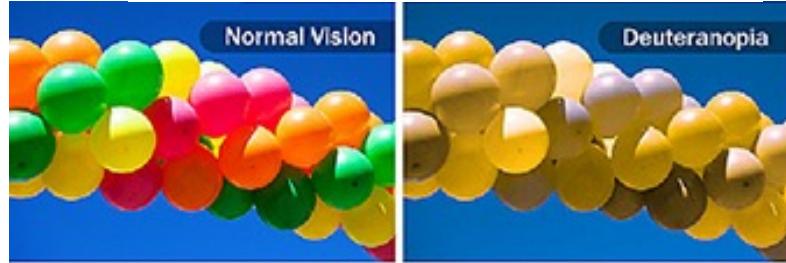
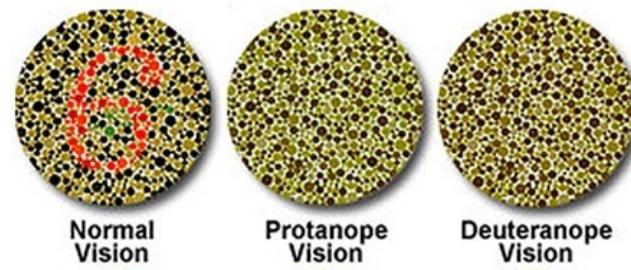
## Color blindness

### Other names

Colour blindness, color deficiency, impaired color vision<sup>[1]</sup>



An [Ishihara color test plate](#). With properly configured computer displays, people with normal vision should see the number "74". Viewers with [red-green color blindness](#) will read it as "21",<sup>[2]</sup> and those with [total color blindness](#) may not see any numbers.



# UI COLOR BLINDNESS DESIGN EXAMPLES

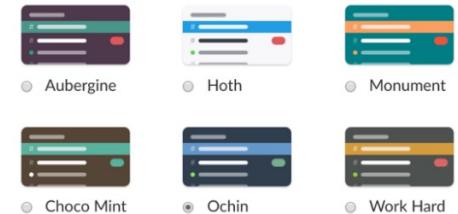


In [Messapps](#), we added dashed lines to pie chart in Vola app

The figure shows a screenshot of a web-based account creation form. The title is "Let's create your account." It includes three sections: "Just the basics", "No credit checks", and "Get your free magstripe reader". The "Just the basics" section contains fields for "Enter your email" (with a warning icon) and "Create a password" (with a warning icon). The "Confirm your email" field is also present. A "Country" dropdown is set to "United States". There's a checkbox for agreeing to terms and conditions, and a "CONTINUE" button. Below the form, a note states: "In addition to color, [Square](#) uses an icon to point out mistakes".

## Theme

Customize the look of the [Messapps](#) workspace. Only you will see this.



## Accessible Themes

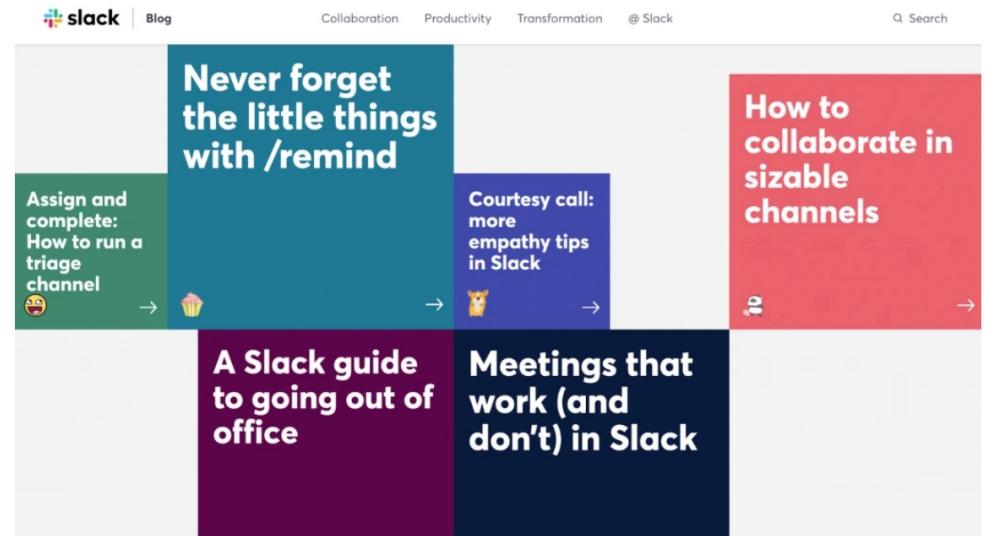


In [Slack](#), you can choose one of the preset accessible themes



# Accessibility – can help everyone!

- Remove obstacles from the design layout for problem-free navigation.
- Placing labels outside text entry fields instead of inside them.



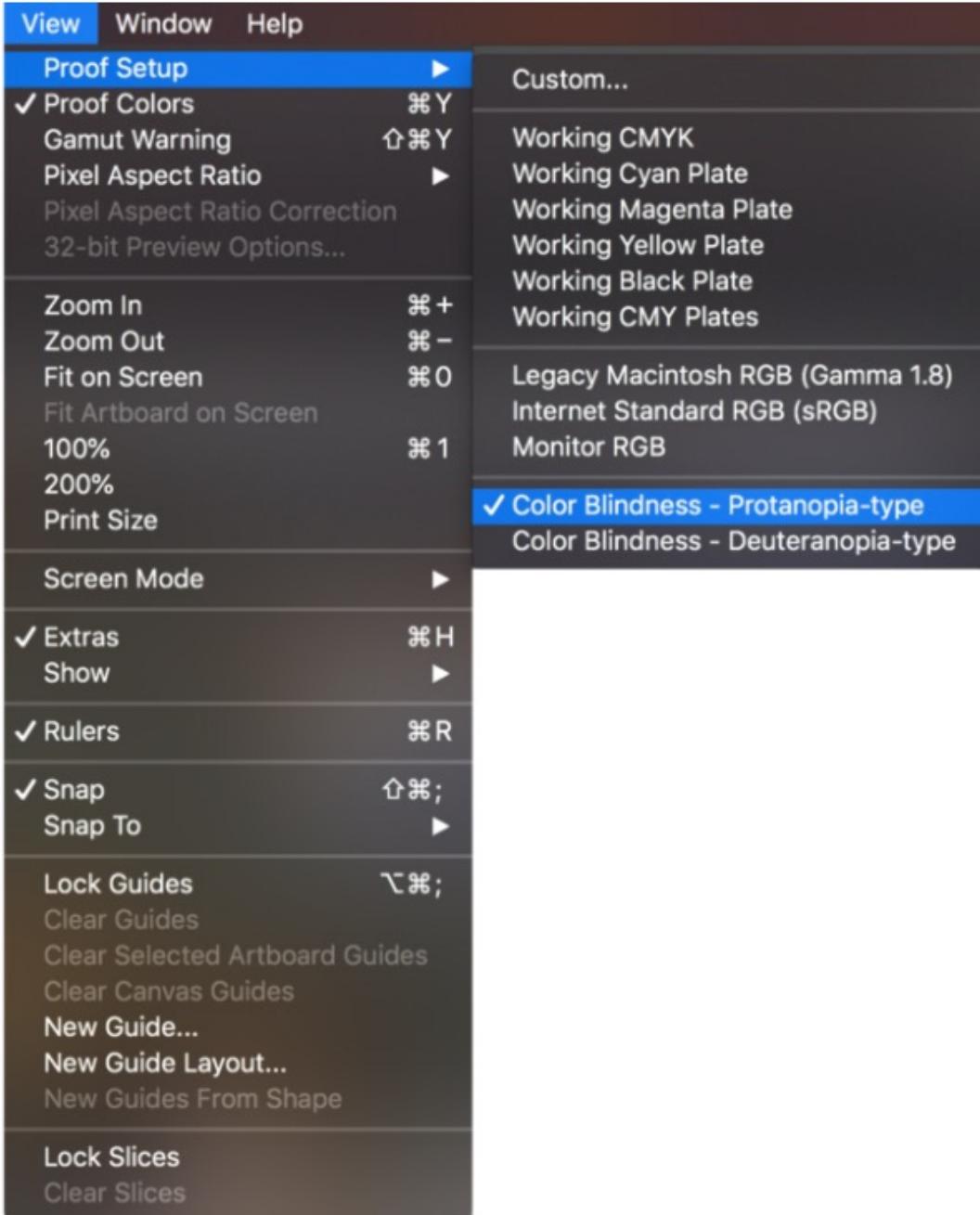
Squarespace

A screenshot of a credit card payment form from Squarespace. The form is titled 'CREDIT CARD' and includes fields for 'Full Name', 'Credit Card Number', 'Expiration' (with 'MM / YY' and 'CVC' sub-fields), 'Postal Code', and 'Country' (with a dropdown menu showing 'United States'). Above each input field is a label. There are 'SAVE' and 'CANCEL' buttons at the top left.

Amazon

A screenshot of a credit or debit card payment form from Amazon. The title is 'Credit or Debit Cards' with a sub-note 'Amazon accepts all major credit and debit cards.' It features a 'Add a card' button and a section for 'Enter your card information:' with fields for 'Name on card', 'Card number', and 'Expiration date' (with dropdown menus for month and year). Below these is a checkbox for 'Use this card across all of Amazon' with a 'What's this?' link. Logos for various payment methods like VISA, MasterCard, and American Express are displayed at the top right.

Both Squarespace and Amazon place labels above form fields so they're permanently visible and accessible to screen readers.



Adobe Photoshop accessibility sequence

