The Path to a Visually Accessible Web

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https://docs.google.com/presentation/d/1urKkexeBavP1QdLgXWb1PkcBboUMoSLhM8gvDrJIJ84/edit?usp=sharing

We can improve web access for the visually impaired.

People with visual impairment suffer reduced access to the Web because of design choices that don't account for their needs.

A combination of accessible web design and user-operated tech tools can improve the visual accessibility of the Web.

A padlock and a chain locked across a pair of weathered, green wooden doors.

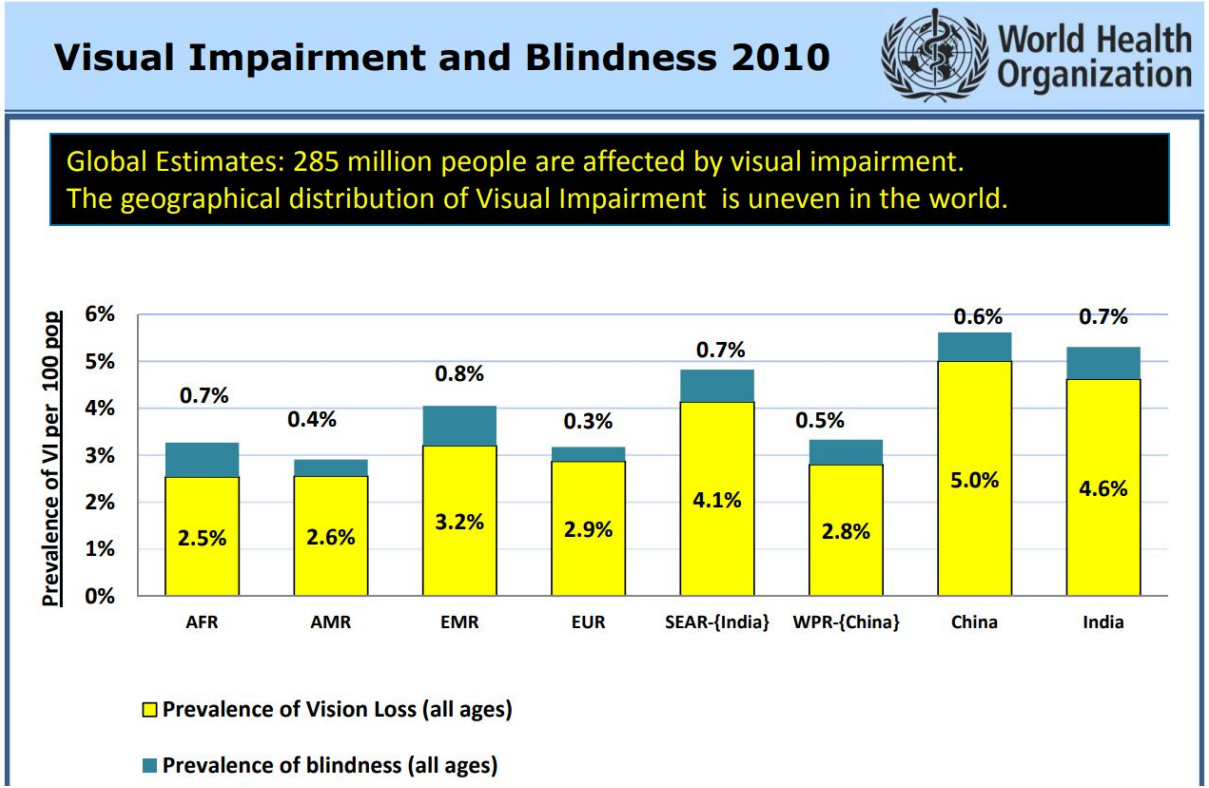
Agenda

- Visual impairment affects many people.
- Visual impairment entails serious consequences.
- People with visual impairment use technology in some ways that others don’t.
- WCAG can help make content more accessible to both humans and tech.
- Some sites do WCAG right, and others… not so much.
- Tech tools can improve accessibility.
- Adjusting color can make graphics more visually accessible.

Visual impairment is widespread.

- In 2010, about 285 million people were visually impaired.
- About 39 million people were blind (WHO).
- Visual impairment is distributed unevenly, because most is the result of correctable causes, such as refractive errors and cataracts (together, about 76% of all visual impairment).
- In the US, more than 40 million people over age 40 are blind.

Visual impairment is distributed unevenly.



A bar graph showing the prevalence of visual impairment and blindness for all ages across WHO regions for 2010. Africa: 3.2% (blindness 0.7%); Americas: 3.0% (blindness 0.4%); Eastern Mediterranean: 4.0% (blindness 0.8%); Europe: 3.2% (blindness 0.3%); Southeast Asia excluding India: 4.8% (blindness 0.7%); Western Pacific excluding China: 3.3% (blindness 0.5%); China: 5.6% (blindness 0.6%); India 5.3% (blindness 0.7%).

Visual impairment in the US is increasing.

- Diabetic retinopathy and other eye diseases associated with diabetes are increasing.
- The number of people over age 65 is increasing.
- The number of visually impaired people in the US is on track to double from 2003 to 2030 (CDC).

Visual impairment in the US is increasing.

	2010	2014	2032	2050
Prevalence of Visual Impairment Excluding Blindness	12.9%	13.1%	17.3%	19.6%
Prevalence of Blindness	0.4%	0.4%	0.6%	0.8%
Total Prevalence	13.3%	13.5%	17.9%	20.4%
Total US Population (millions)	309.3	318.4	359.1	388.9

Visual impairment has serious consequences.

“People with vision loss are more likely to report depression, diabetes, hearing impairment, stroke, falls, cognitive decline, and premature death. Decreased ability to see often leads to the inability to drive, read, keep accounts, and travel in unfamiliar places, thus substantially compromising quality of life” (Rein, Zhang, Wirth, et al, 2006, qtd. In CDC).

Because visual impairment is widespread, increasingly prevalent, and entails serious consequences for those affected, it presents an ethical issue. Improving access to technology and web content is one way that we can do what’s right for visually impaired people.

People with visual impairment use tech in some ways that others don't.

- Walking navigation
- Access to healthcare and gov services
- Magnifiers / visual effects in daily life
- People with visual impairment tend to be early adopters of mobile technology, esp. Apple products (AppleVis).

Web Content Accessibility Guidelines (WCAG)

How can we make web content

More easily **perceived**?

More easily **operated**?

More easily **understood**?

More **robust**, so that it can be manipulated by other technologies?

WCAG Standards are

Specific

Testable

Gradeable

And are broadly applicable (to adapting content to mobile devices, e.g.)

Universal Design for Learning Guidelines

Provide multiple means of
Engagement

Affective Networks
The "WHY" of learning

Provide multiple means of
Representation

Recognition Networks
The "WHAT" of learning

Provide multiple means of
Action & Expression

Strategic Networks
The "HOW" of learning

Web Content Accessibility Guidelines (WCAG) 2.1

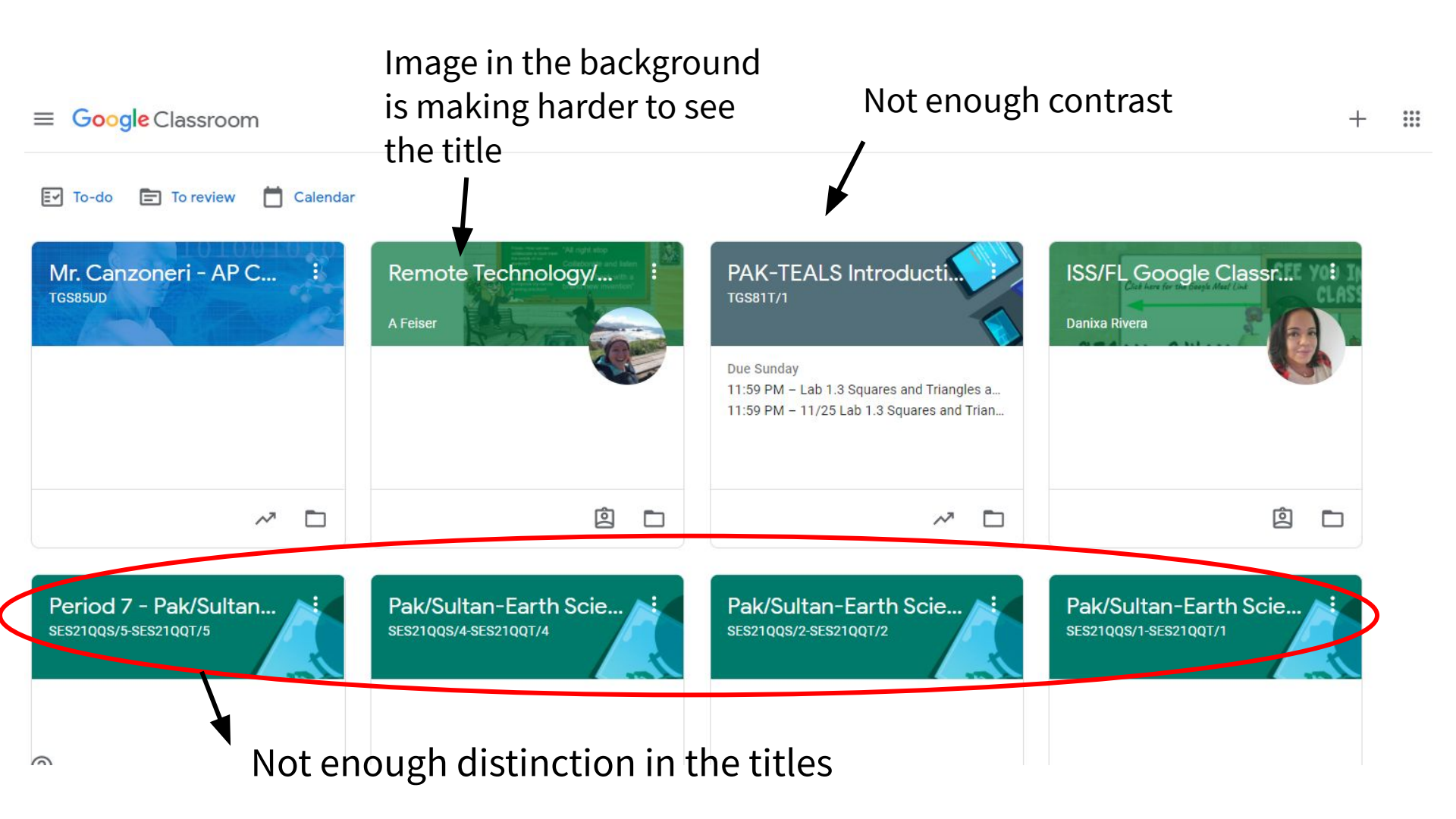
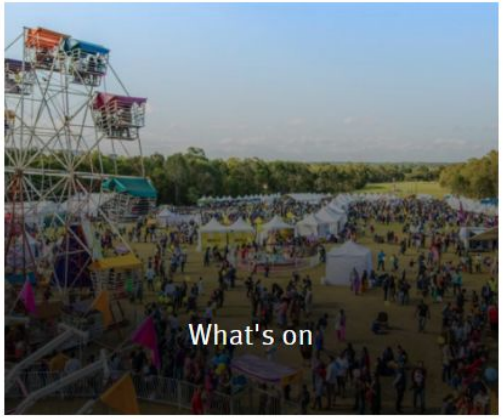


Image in the background is making harder to see the title
Not enough contrast
Google Classroom
To-do
To review
Calendar
Mr. Canzoneri - AP C...
TGS85UD
Remote Technology/...
A Feiser
PAK-TEALS Introducti...
TGS81T/1
Due Sunday
11:59 PM – Lab 1.3 Squares and Triangles a...
11:59 PM – 11/25 Lab 1.3 Squares and Trian...
ISS/FL Google Classr...
Danixa Rivera
Period 7 - Pak/Sultan...
SES21QQS/5-SES21QQT/5
Pak/Sultan-Earth Scie...
SES21QQS/4-SES21QQT/4
Pak/Sultan-Earth Scie...
SES21QQS/2-SES21QQT/2
Pak/Sultan-Earth Scie...
SES21QQS/1-SES21QQT/1
Not enough distinction in the titles

Things to do

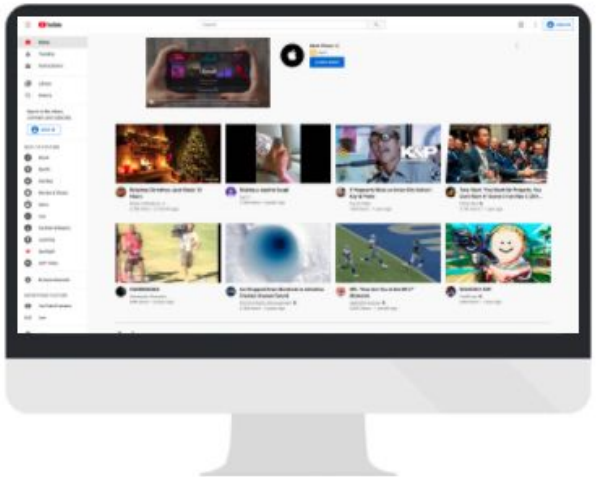


Examples of horrible non-conforming websites

Results

http://youtube.com/

Tested: 12/10/2020 1:00:25 PM

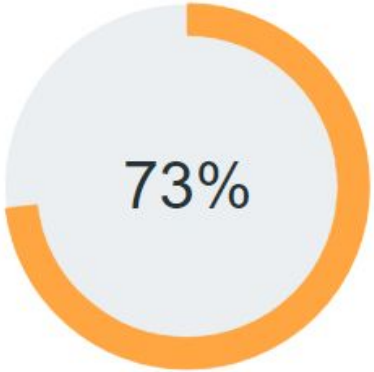


2042 violations identified

266 automated tests run

78 additional tests available

Get a Free Premium Test



Compliance Score

Source: webaccessibility.com

Examples of horrible non-conforming websites

Provide a valid label for form fields

10

Severity: 10

When on-screen labels are present, they must be programmatically associated with form fields. When on-screen labels are not present, form fields must be given an accessible label.

When form fields do not have a programmatic (accessible) label, assistive technologies may incorrectly render the label or provide no label at all to users. When labels are not present or are incorrect, users of assistive technologies may not be able to complete a form.

The HTML5 specification has a new form field attribute called placeholder. This represents a label or hint, such as a word or short phrase, that is assigned to a form field such as an input field. The label or hint appears within the form field and goes away when users start typing. When the placeholder attribute is used, the label or hint may not be detected by assistive technologies. Therefore, developers should provide off-screen text in the label element of the form field or provide a title

Examples of horrible non-conforming websites

Provide alternative text for images

10

Severity: 10

All images within a page must be given an alternate text equivalent. Text equivalents for non-text elements communicate the meaning of images to users who cannot perceive the image such as users of screen readers. Proper equivalents provide text which contributes the same level of understanding to the content of the page as the image itself. In instances where the image does not contribute to the understanding of the content and is purely decorative, it needs to be marked in a way to indicate its purely decorative purpose.

Violations Identified (37)

Examples of horrible non-conforming websites

Provide a descriptive dialog title

7

Severity: 7

Dialogs such as modal dialogs represent a state of a web page and typically have a discrete purpose. These dialogs usually have a visual title and convey a purpose such as soliciting a response from the user. Because the dialogs title is often visually apparent but may be difficult to locate using assistive technology such as screen readers, a title must be provided through an accessible manner to ensure that the purpose of the page's current state (with the modal dialog) is understood.

Violations Identified (1)

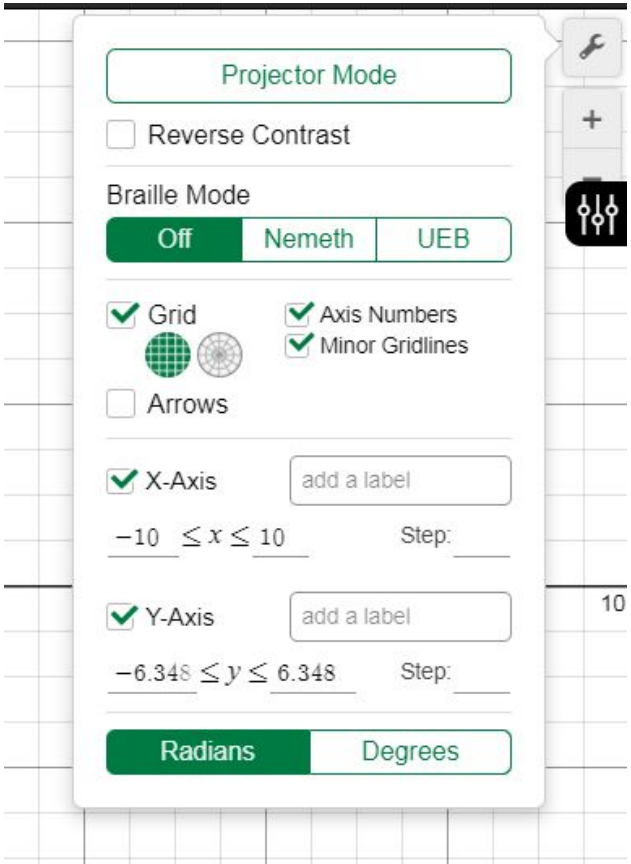
Examples of awesome WCAG-conforming websites and tools

- List of web accessibility evaluation tools: https://www.w3.org/WAI/ER/tools/
- Webaccessibility.com → checks to see if website is WCAG compliant
- Other developer tools available as Chrome Extension
- *More tools available for the web designer/developers, not actual users!

A wishlist of tech tools

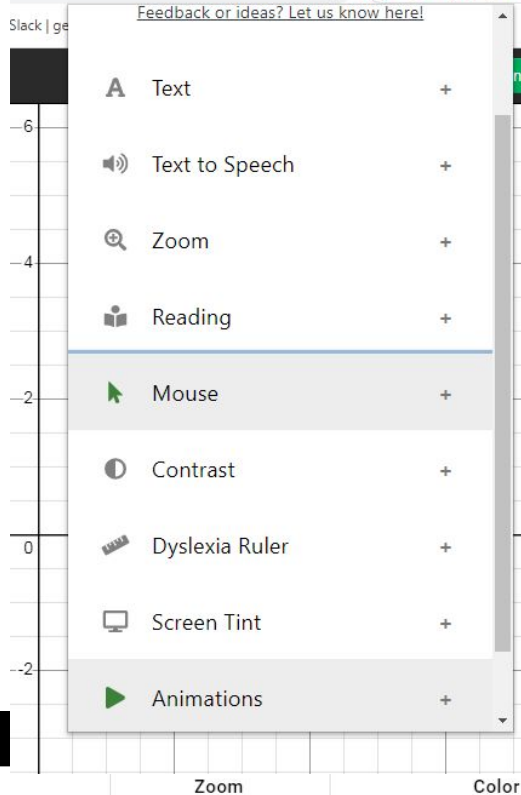
A wishlist of tech tools

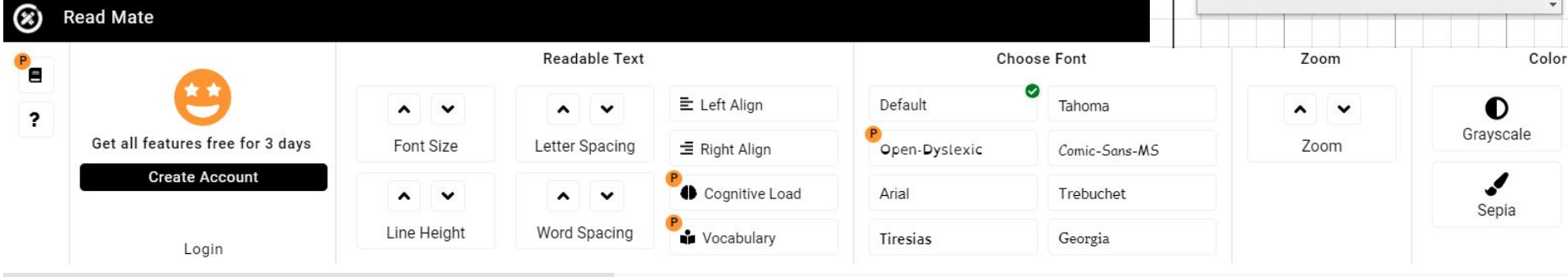
- Already existing:
  - Desmos!!!



A wishlist of tech tools

- Already existing:
  - Chrome extensions
    - [Accessibility - Your Powerful Web Assistant]
    - [ReadMate]

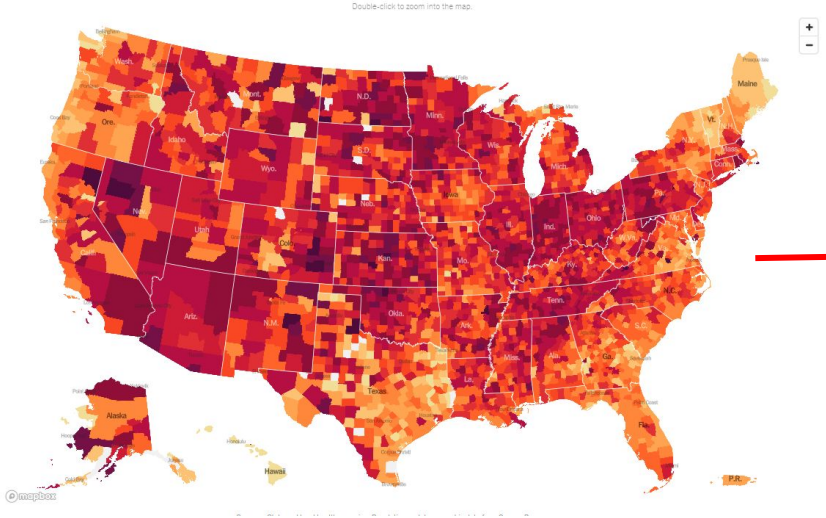




A wishlist of tech tools

- Haven't found:
  - Chrome extensions or software that can manipulate data representation

EX: From color-based data visualization to text-based data



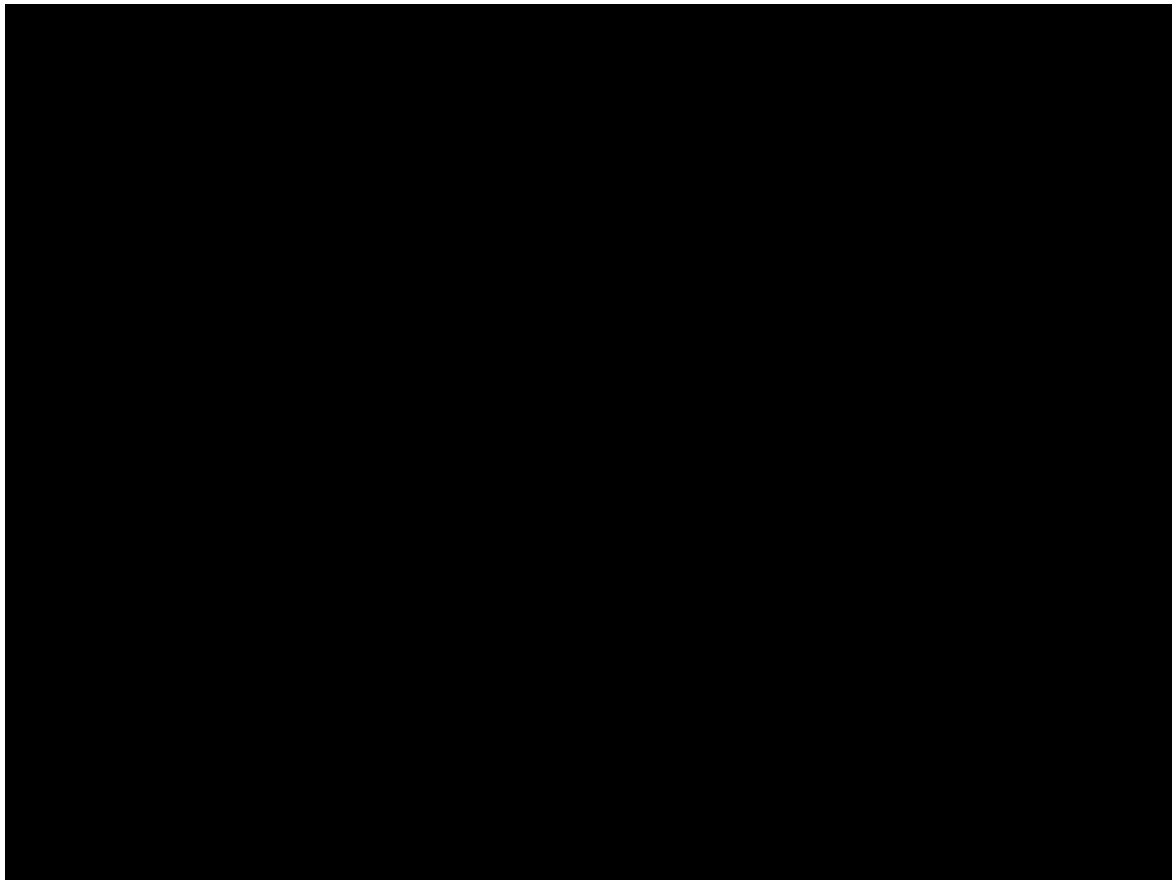
COUNTY	TOTAL CASES	PER 100,000	DAILY AVG. IN LAST 7 DAYS	PER 100,000
Bent, Colo.	578	10,364	48	860.7
Montour, Pa.	1,285	7,049	88.7	486.6
Ellsworth, Kan.	916	15,011	26.9	440.1
Alfalfa, Okla.	573	10,049	24.4	428.4
Pershing, Nev.	297	4,416	28	416.4
Bowman, N.D.	275	9,094	12.1	401.5
Collingsworth, Texas	131	4,486	11.6	396.3
Childress, Texas	1,018	13,934	26.8	367.3
Lincoln, Colo.	649	11,384	20.1	353.3
Lassen, Calif.	2,972	9,721	102.6	335.5

source

A wishlist of tech tools

Isn’t text-to-speech or screen reader enough?!

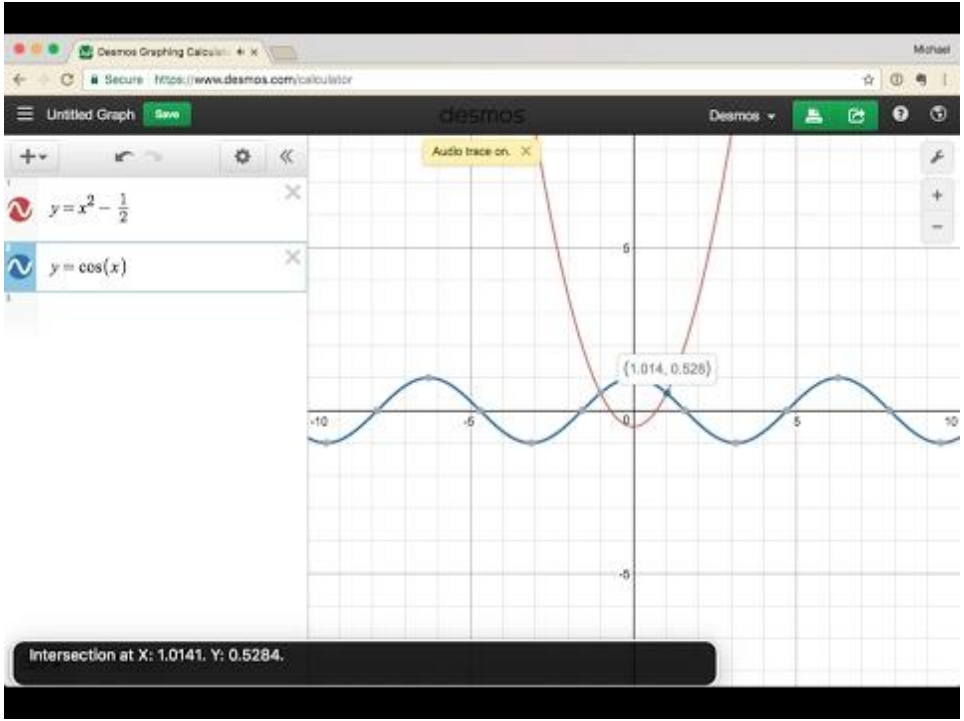
A wishlist of tech tools



source

A wishlist of tech tools

Desmos' audio trace tool



Web Accessibility and Color Blindness

The Science Behind Color Vision and Color Deficiencies...

Reference: *https://www.youtube.com/watch?v=VUq_Y3sUYO4&feature=emb_logo*

Web Accessibility and Color Blindness

Common Types of Color Blindness:

Red/Green

Deuteranomaly ("...green looks more red")

Protanomaly ("...red looks more green and less bright")

Blue/Yellow:

Tritanomaly ("...hard to tell the difference between blue and green, and between yellow and red")

Tritanopia ("...unable to tell the difference between blue and green, purple and red, and yellow and pink [and] colors look less bright.")

Reference:

https://www.nei.nih.gov/learn-about-eye-health/eye-conditions-and-diseases/color-blindness/types-color-blindness

Web Accessibility and Color Blindness

Microsoft Color Filters:

Types of color filters

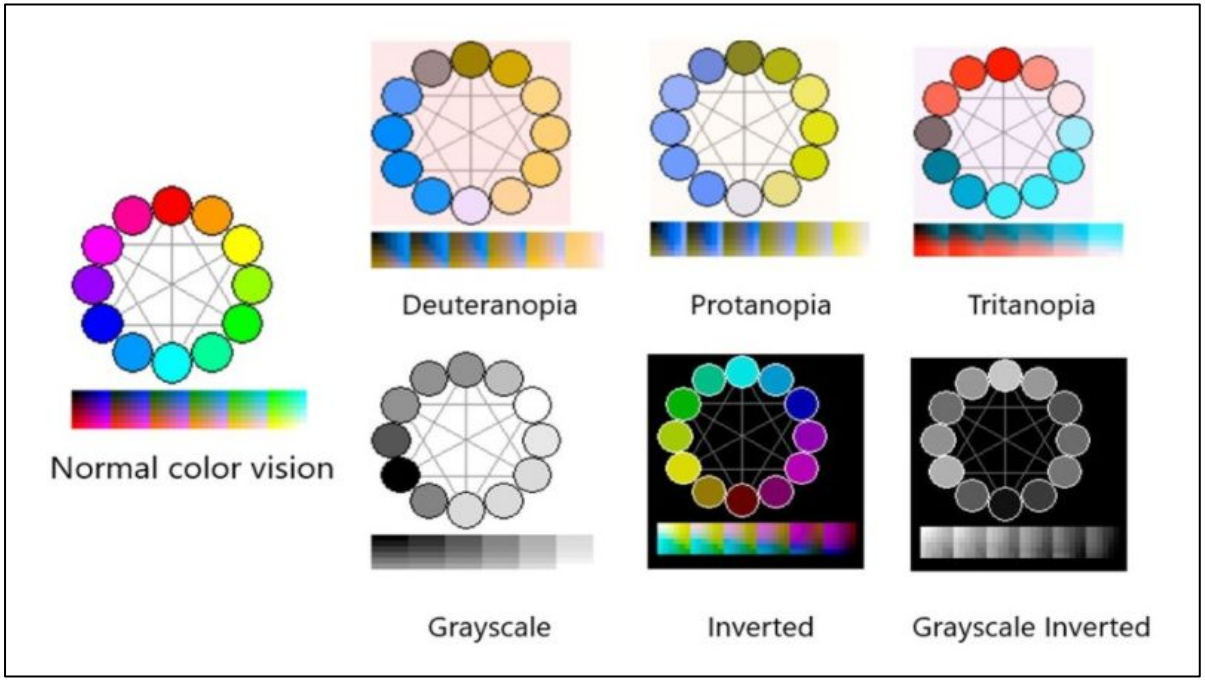
The settings for color filters in Windows change how your computer displays colors, to accommodate the different color blindness types and individual needs. It offers six filters:

- **Deuteranopia** – For red-green color blindness, adds focus on green hues
- **Protanopia** – For red-green color blindness, brightens the red hues
- **Tritanopia** – For blue-yellow color blindness, enhancing blue hues
- **Grayscale** – Converts colors to black/white/gray shades
- **Inverted** – Converts colors to their color wheel "opposites" (red becomes aqua, blue becomes yellow, green becomes magenta, etc.)
- **Grayscale Inverted** – Like grayscale but reversed, as with a photo negative

Source: *https://community.windows.com/en-us/stories/color-filter*

Web Accessibility and Color Blindness

Microsoft Color Filters:



Source: *https://community.windows.com/en-us/stories/color-filter*

Web Accessibility and Color Blindness

It's not all about the images!...

In "How to Design for Color Blindness", blogger, Usabilla, makes the following recommendations:

- **"Use both colors and symbols."**
- **"Keep it minimal."**
- **"Use both colors and textures to show contrast."**
- **"Be careful with contrasting colors and hues"**
- **"Avoid bad color combos"**

Reference:

https://medium.theuxblog.com/how-to-design-for-color-blindness-a6f083b08e12

References

- World Health Organization (WHO). https://www.who.int/blindness/publications/globaldata/en/.
- US Centers for Disease Control (CDC). https://www.cdc.gov/visionhealth/basic_information/vision_loss.htm.
- CAST (2018). Universal Design for Learning Guidelines version 2.2. Retrieved from http://udlguidelines.cast.org.
- W3C. “Web Content Accessibility Guidelines (WCAG) Overview.” https://www.w3.org/WAI/standards-guidelines/wcag/