
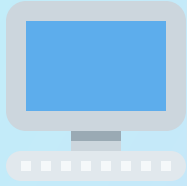






Your heart 
is in the right place, but...
the DOM 
is not

Our journey today

Common Questions

-  What does it mean to be *accessible*?
-  What is screen reader?
-  What is my role as a developer/designer/XM?
-  What resources are there to help me build accessibly?

Accessibility

11 Characters

A-11-y

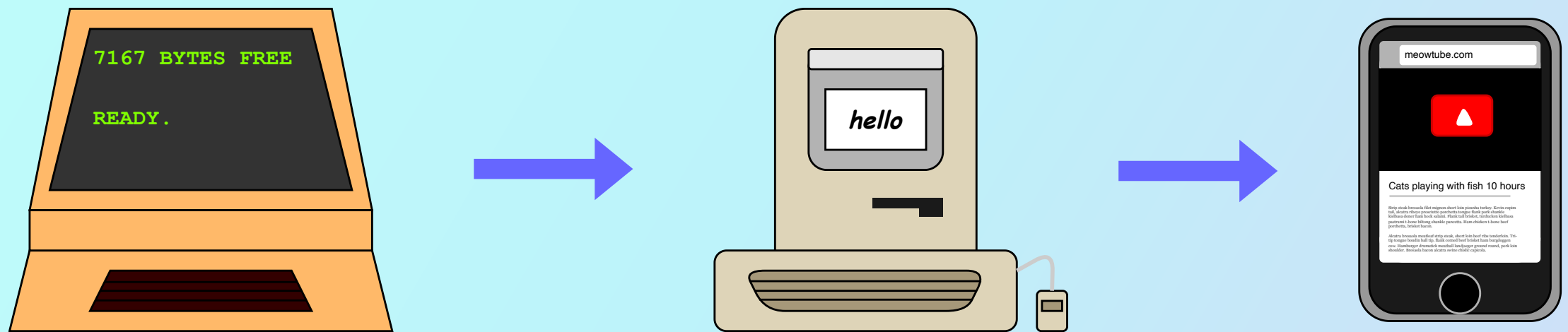
A11y

What makes something *accessible*?





What makes something *accessible*?



1977

The year of personal computing



TRS-80 **\$600**



PET **\$800**



Apple II **\$1300**

Text-based interface

```
COMMODORE BASIC V7.0 122365 BYTES FREE
(C)1986 COMMODORE ELECTRONICS, LTD.
(C)1977 MICROSOFT CORP.
ALL RIGHTS RESERVED

READY.
```

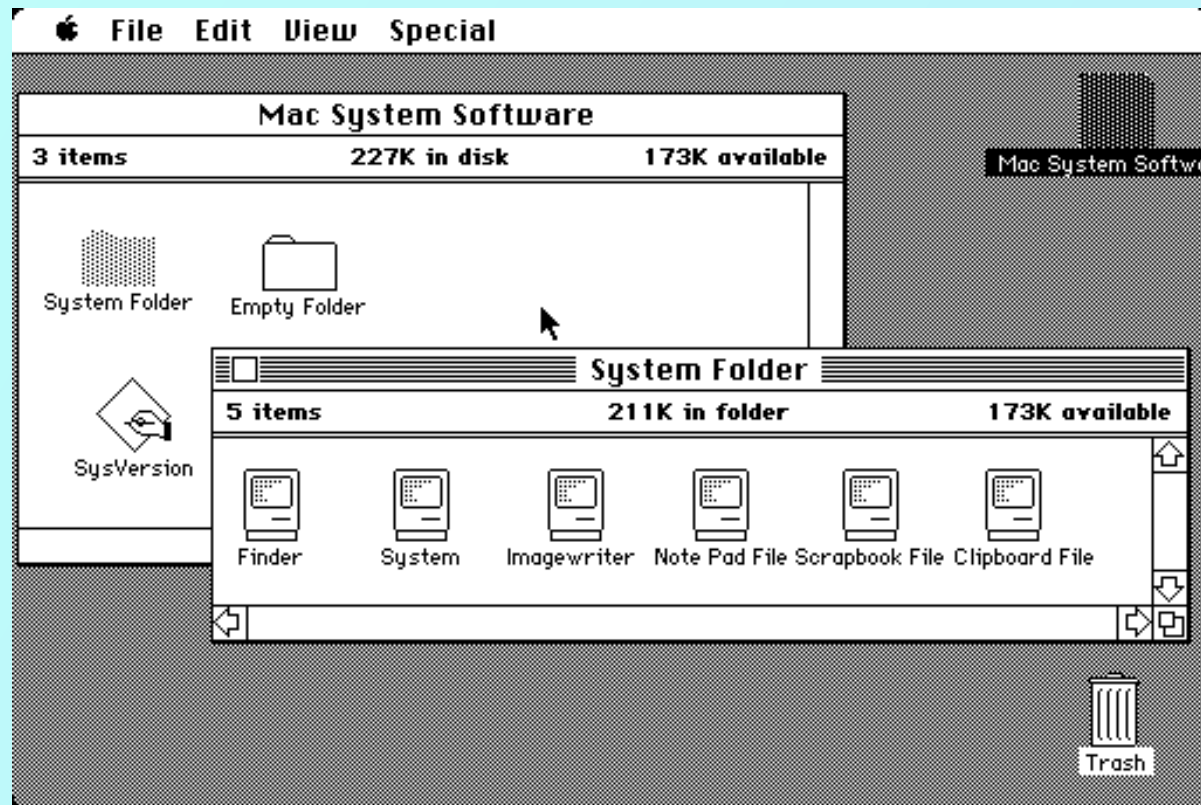
1982 - 1986

The first assistive (digital) technologies began to emerge



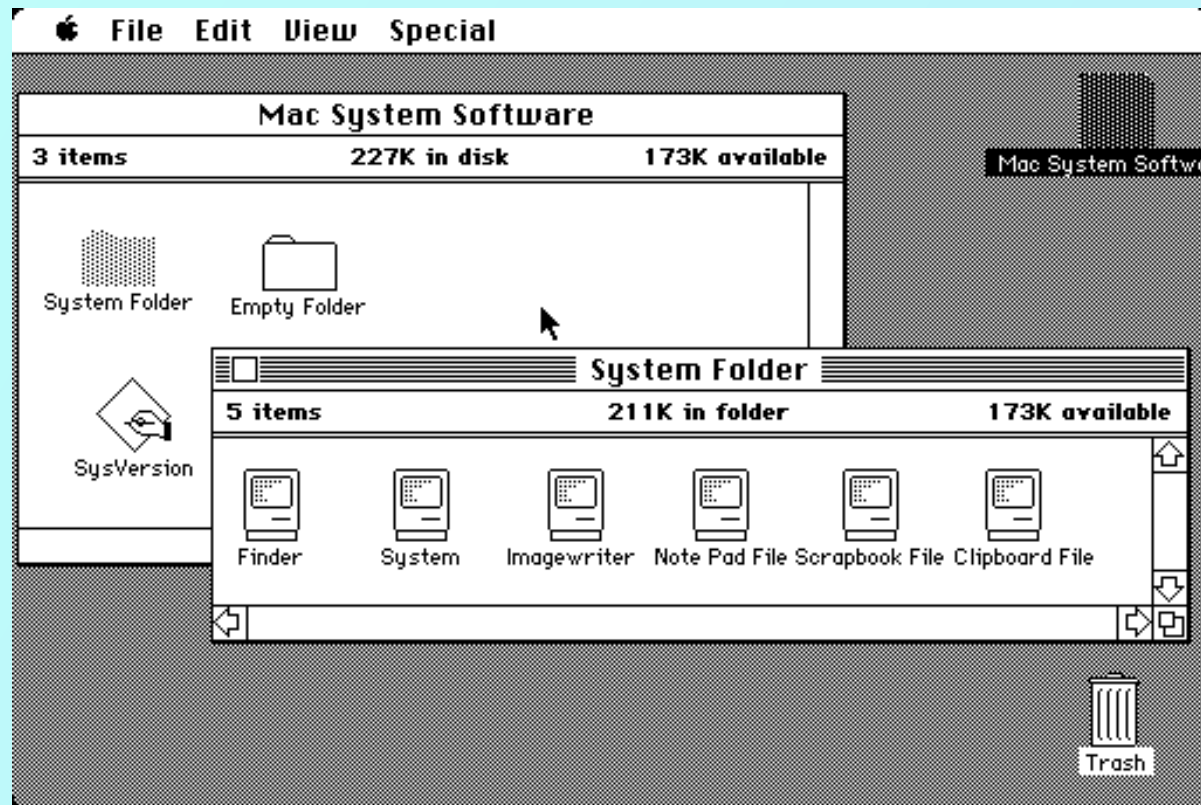
1983 - 1984

Graphical Interfaces



1983 - 1984

Graphical Interfaces === 🚫 Not 1:1 with a11y hardware



1985-2005

A need for standards and regulation emerged

- 1990: The Americans with Disabilities Act (ADA)
- 1994: Birth of the Internet and mainstream adoption of HyperText
- 1995: Windows 95 was the first OS to come with built in accessibility features
- 1996: pwWebSpeak by Productivity Works **first web browser with built in text to speech**
- 1998: Rehabilitation Act Section 508 passed, requiring all government services to be accessible
- 1999: World Wide Web Consortium (W3C) released **Web Content Accessibility Guidelines**.
- 2000: Microsoft Windows 2000 released, with an on screen keyboard option and the ability to translate text to speech for illiterate or blind users (5).
- 2005: OSX 10.4 (Tiger) released with VoiceOver included, though Windows SR was still much better until around 2008

2007-2011

Smart Phones and gesture based interactions



2016 to present

Many companies begin to make a commit toward a11y

Google

- TalkBack
- Voice Access
- Switch Access
- Live Transcribe
- Live Caption
- Lookout

Facebook

- Automatic alt text

Apple

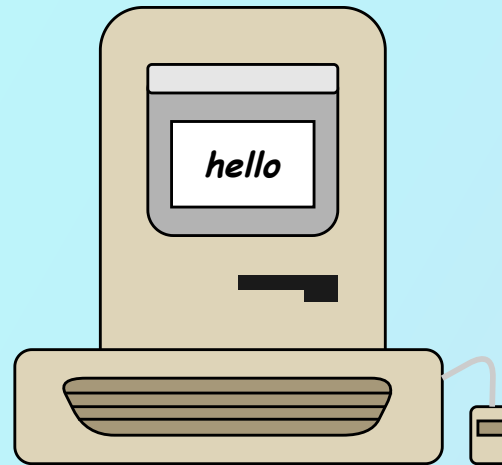
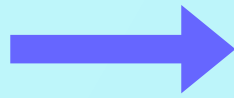
- VoiceOver built into all products
- Magnifier (with Lidar)
- LiveCaptions iOS 16 (Beta)
- (877) 204-3930

Microsoft

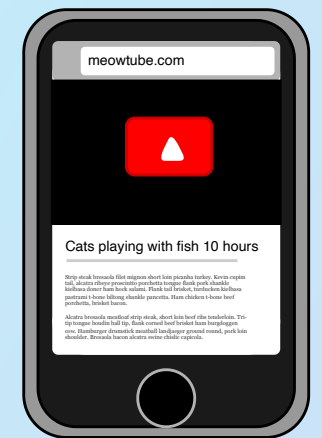
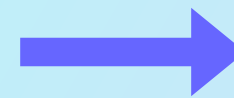
- Live Caption on MS Teams
- Immersive reader



Text



Graphical



Touch

What does it mean to be *accessible*?

It means that your users, *regardless of ability*,
can use your product to fulfill their goals



Ability

Experience

Visual Experiences

Blurred



Visual Experiences

Cloudy



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From Wikipedia, the free encyclopedia

For other uses, see [Color wheel \(disambiguation\)](#).

A **color wheel** or **color circle**^[1] is an abstract illustrative organization of [color hues](#) around a circle, which shows the relationships between [primary colors](#), [secondary colors](#), [tertiary colors](#) etc.

Some sources use the terms *color wheel* & *color circle* interchangeably;^{[2][3]} however, one term or the other may be



Linear color wheel.



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Linear color wheel.

Visual Experiences

Ghosting



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Linear color wheel.



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Linear color wheel.

Visual Experiences

Snowy (static)



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Linear color wheel.



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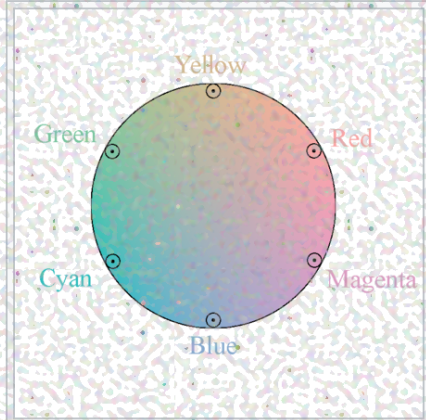
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Linear color wheel.

Visual Experiences

Contrast Loss



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Linear color wheel.

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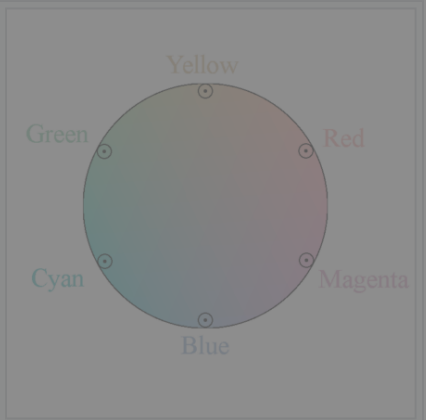
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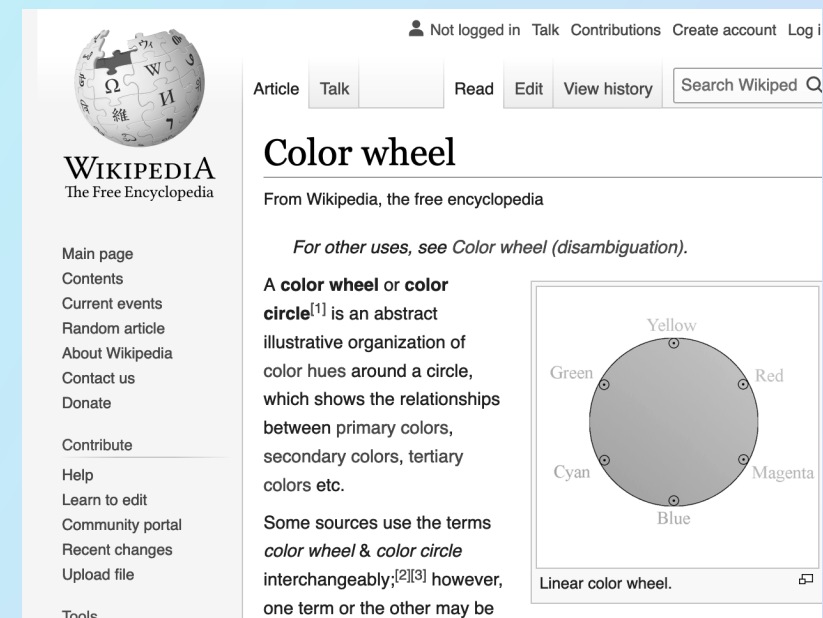
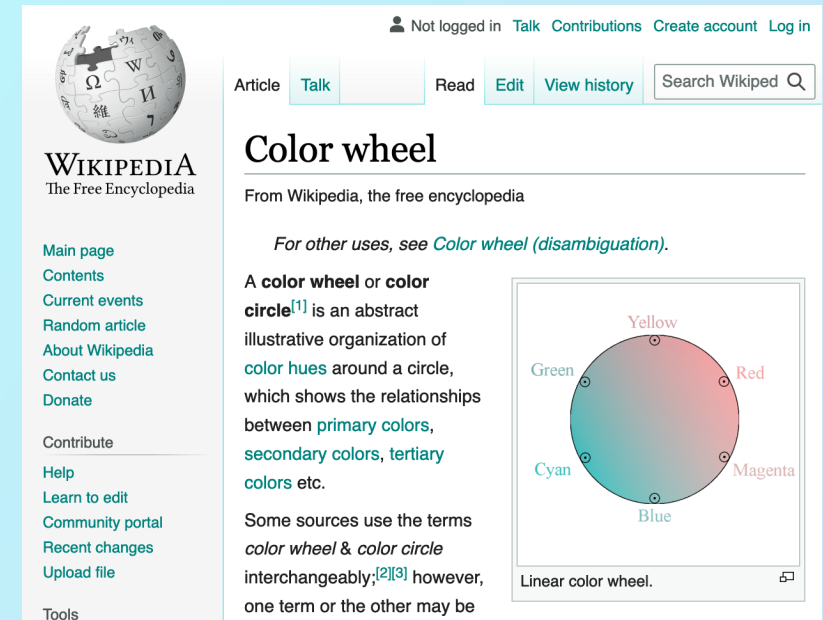
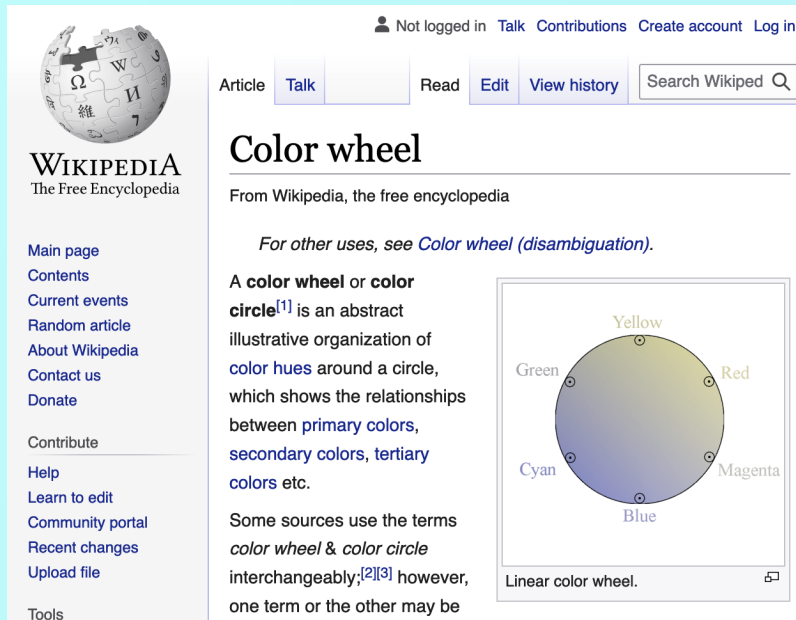


Linear color wheel.

Some sources use the terms *color wheel* & *color circle* interchangeably;^{[2][3]} however, one term or the other may be

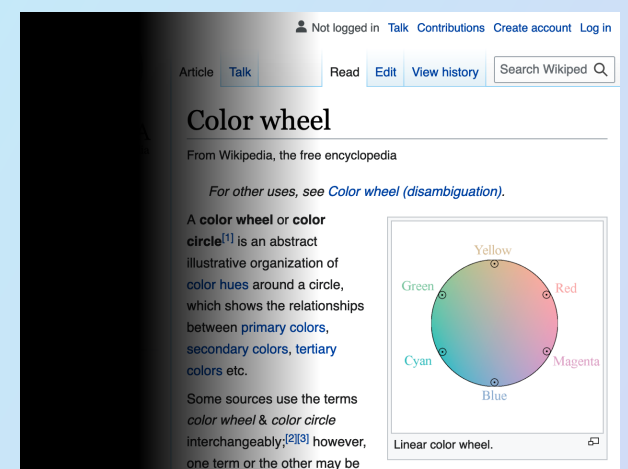
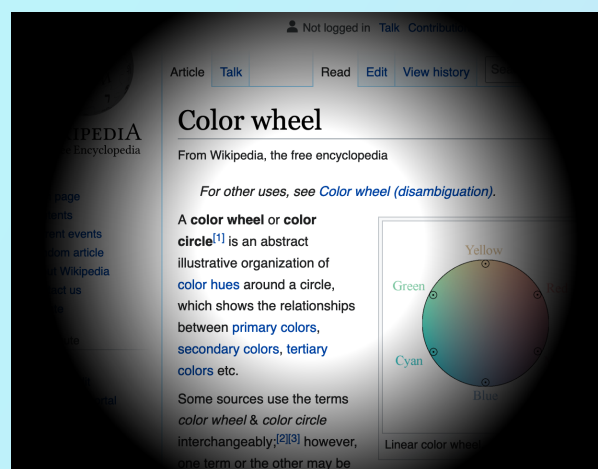
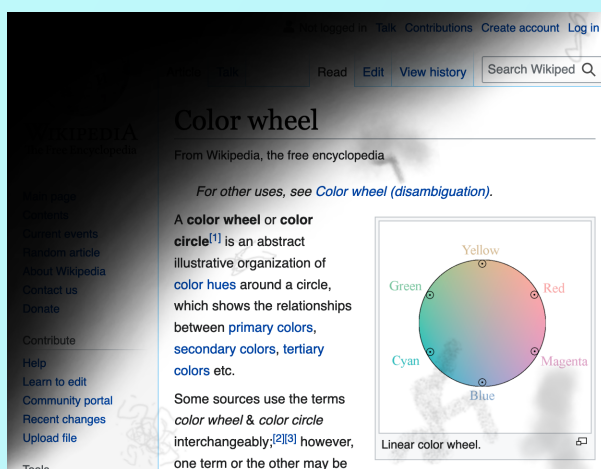
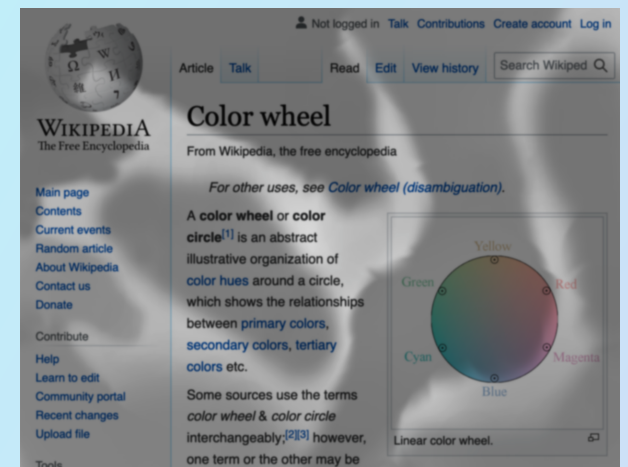
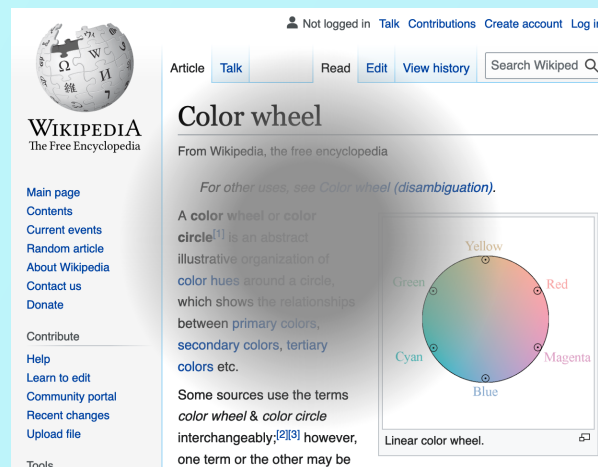
Visual Experiences

Color loss




Visual Experiences

Partial Sight Loss



Visual Experiences

Total Sight Loss



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Color wheel


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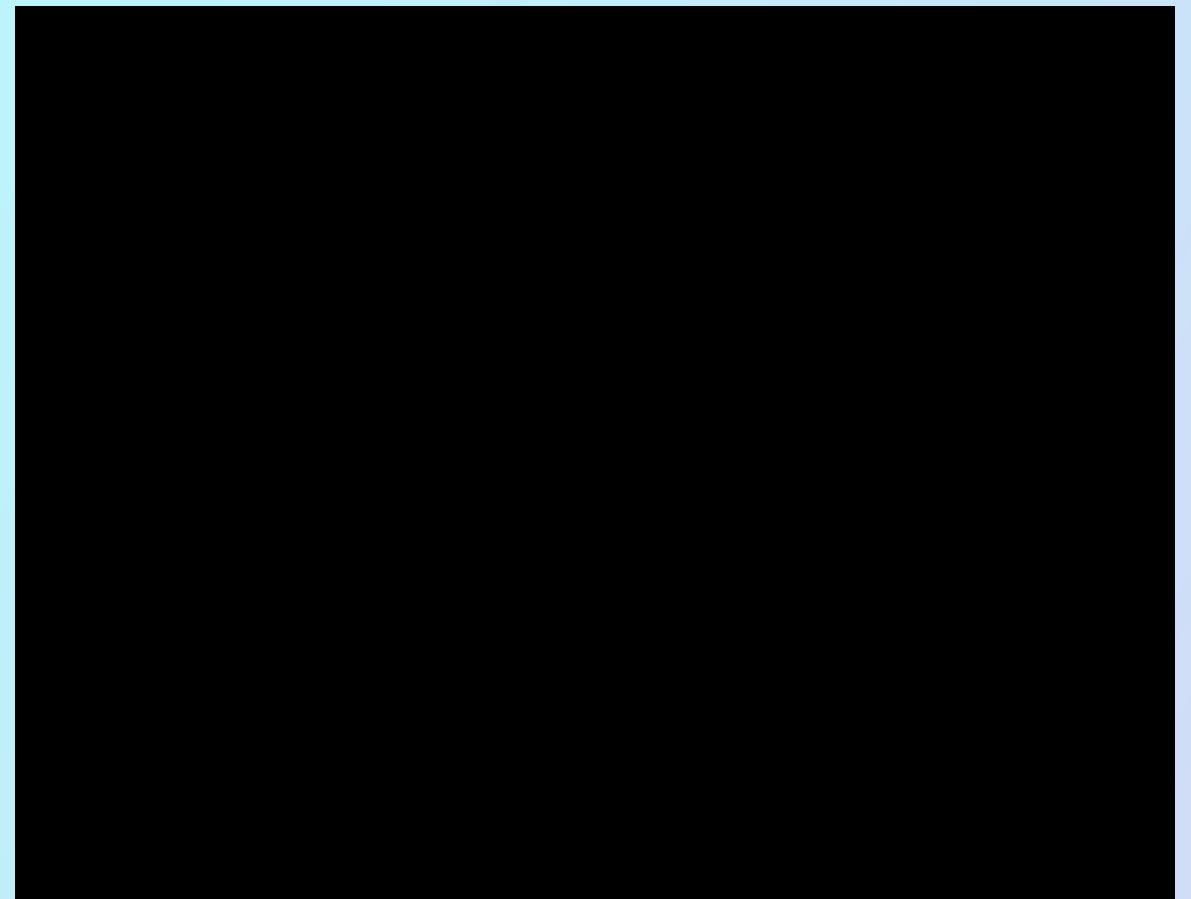
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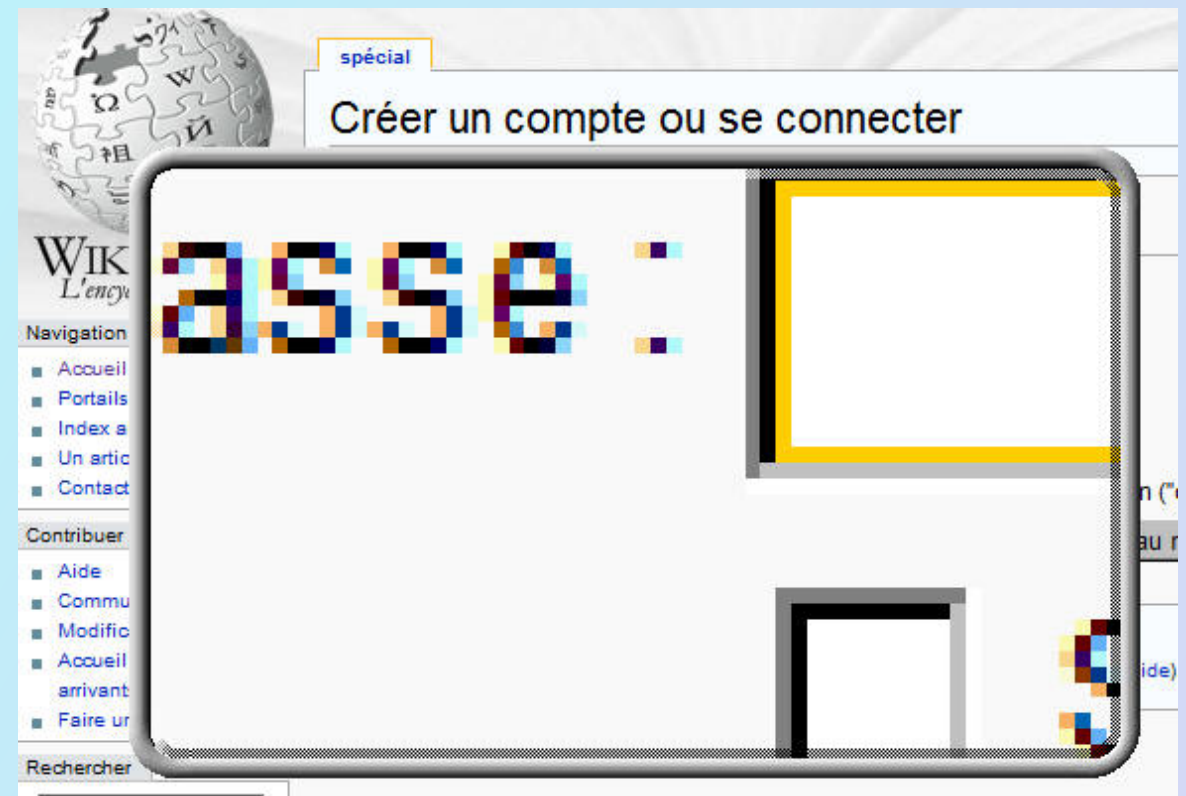
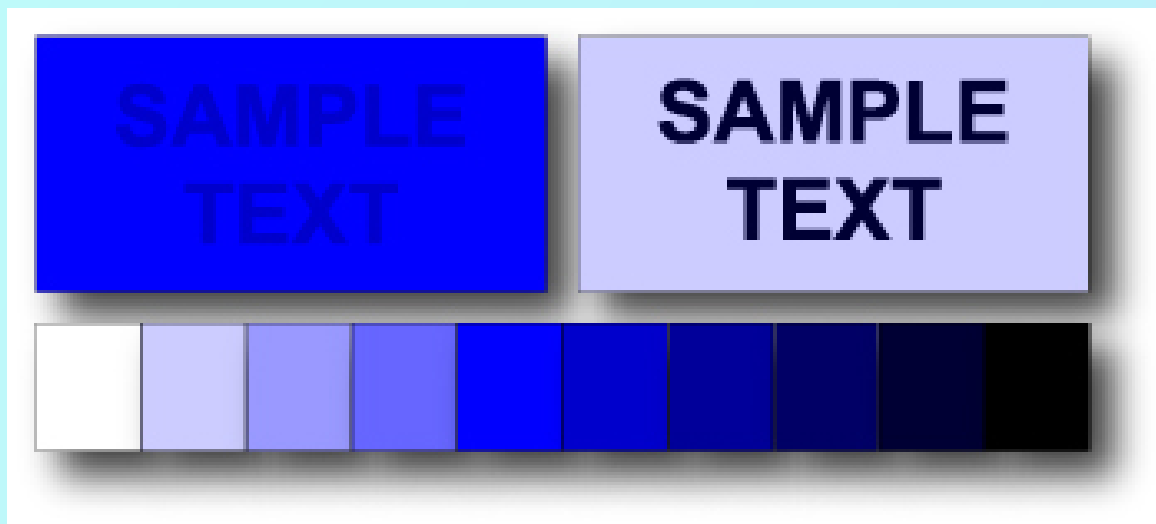
Linear color wheel. 



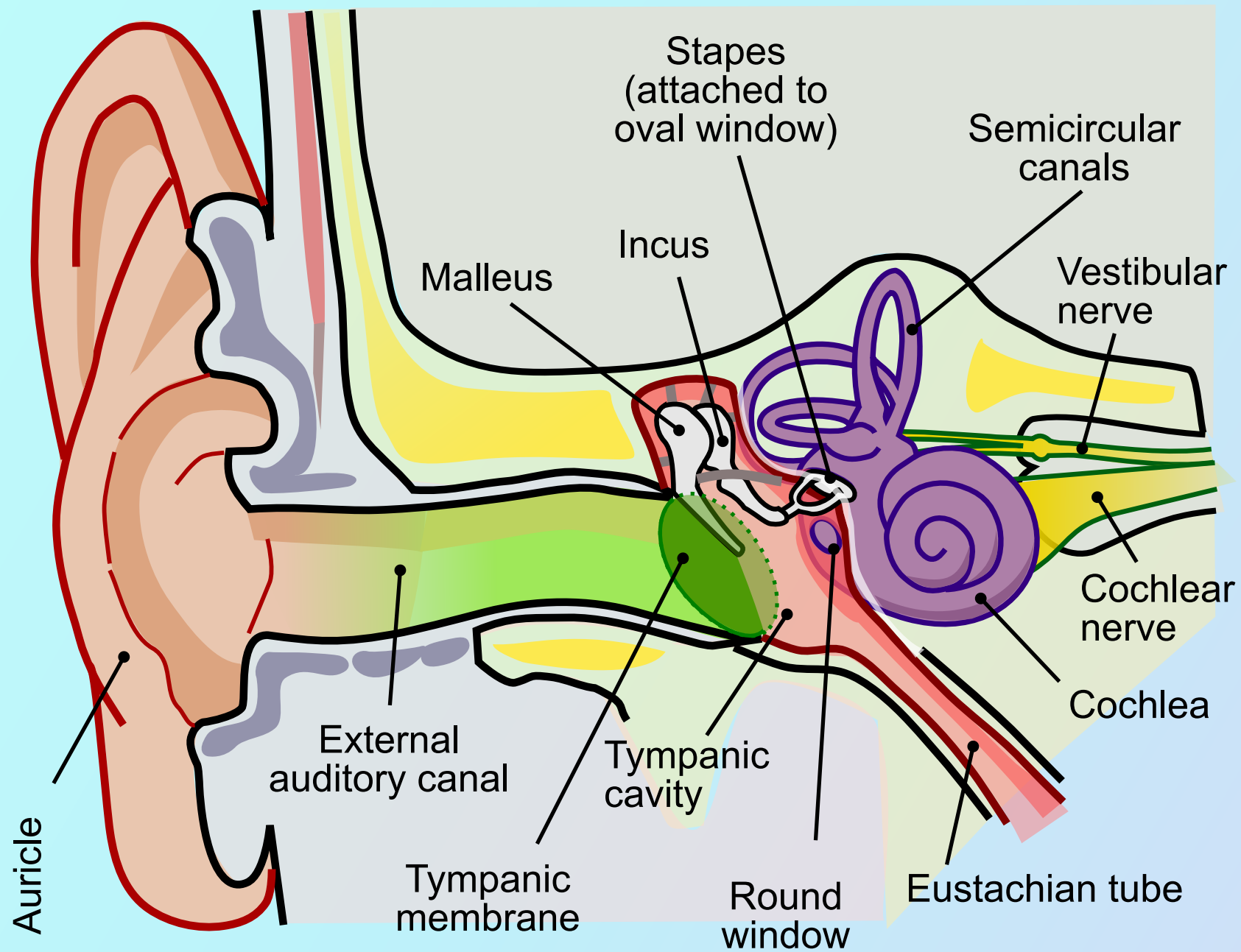
Visual Experiences

What should we support as we design and build our apps?

- Contrast and Customizable Colors
- Screen Magnifiers and Zoom
- Screen Reader Compatible



Auditory Experiences



Motor Experiences

Your users might...

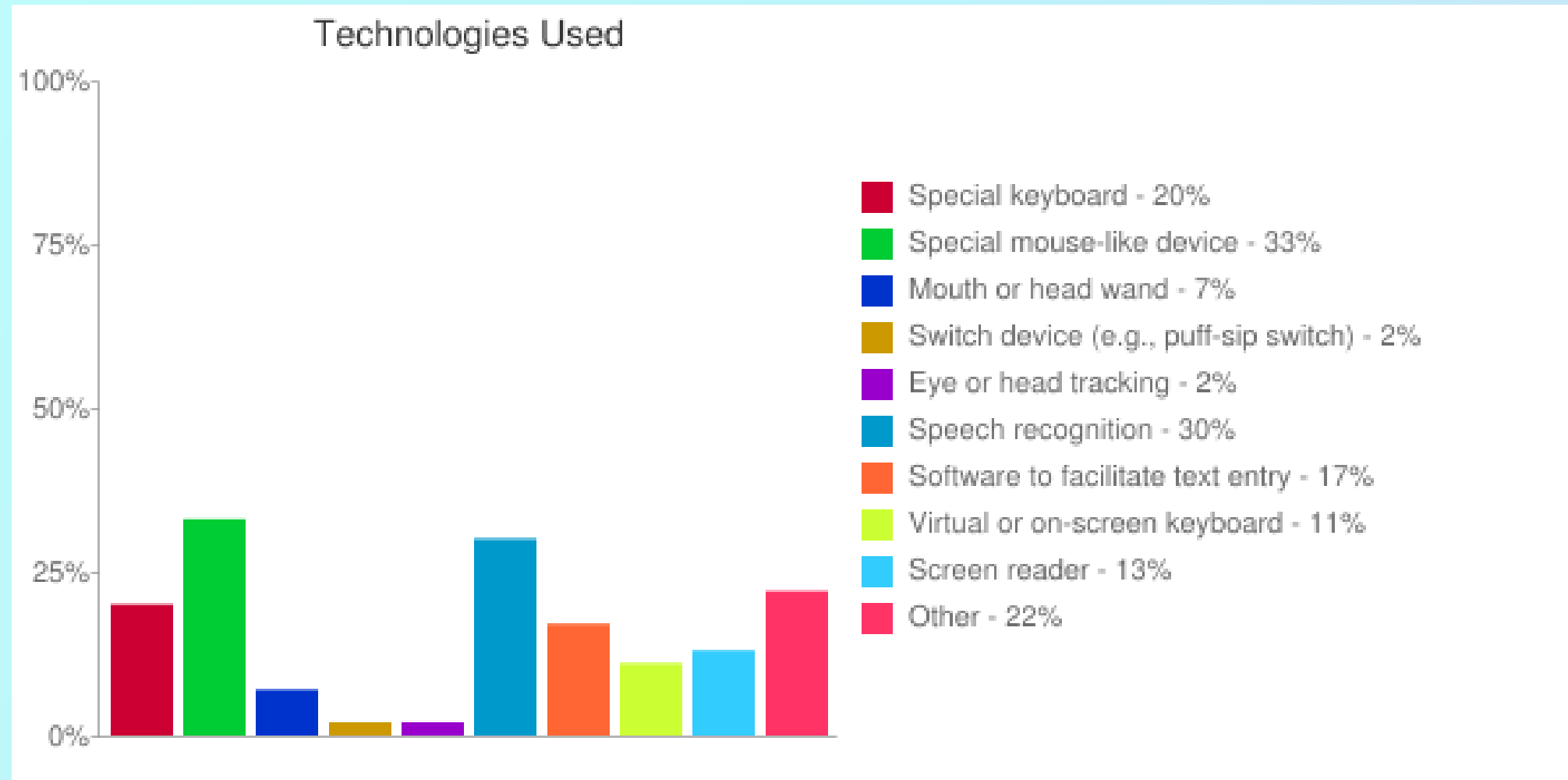
- avoid using the mouse
- find it hard to use a typical keyboard
- use voice-controlled software instead of physical interaction
- grow fatigued while using technology
- may not physically interact with their devices directly



Not only do I type with a headstick, but I drive my power wheelchair with my face. Having a strong neck is crucial to my daily function, particularly as a blogger.

— Debbielynne Kespert, Christian blogger

Motor Experiences



Other Experiences

Physical Challenges:

- Photosensitivity
- Vestibular (inner ear) sensitivity



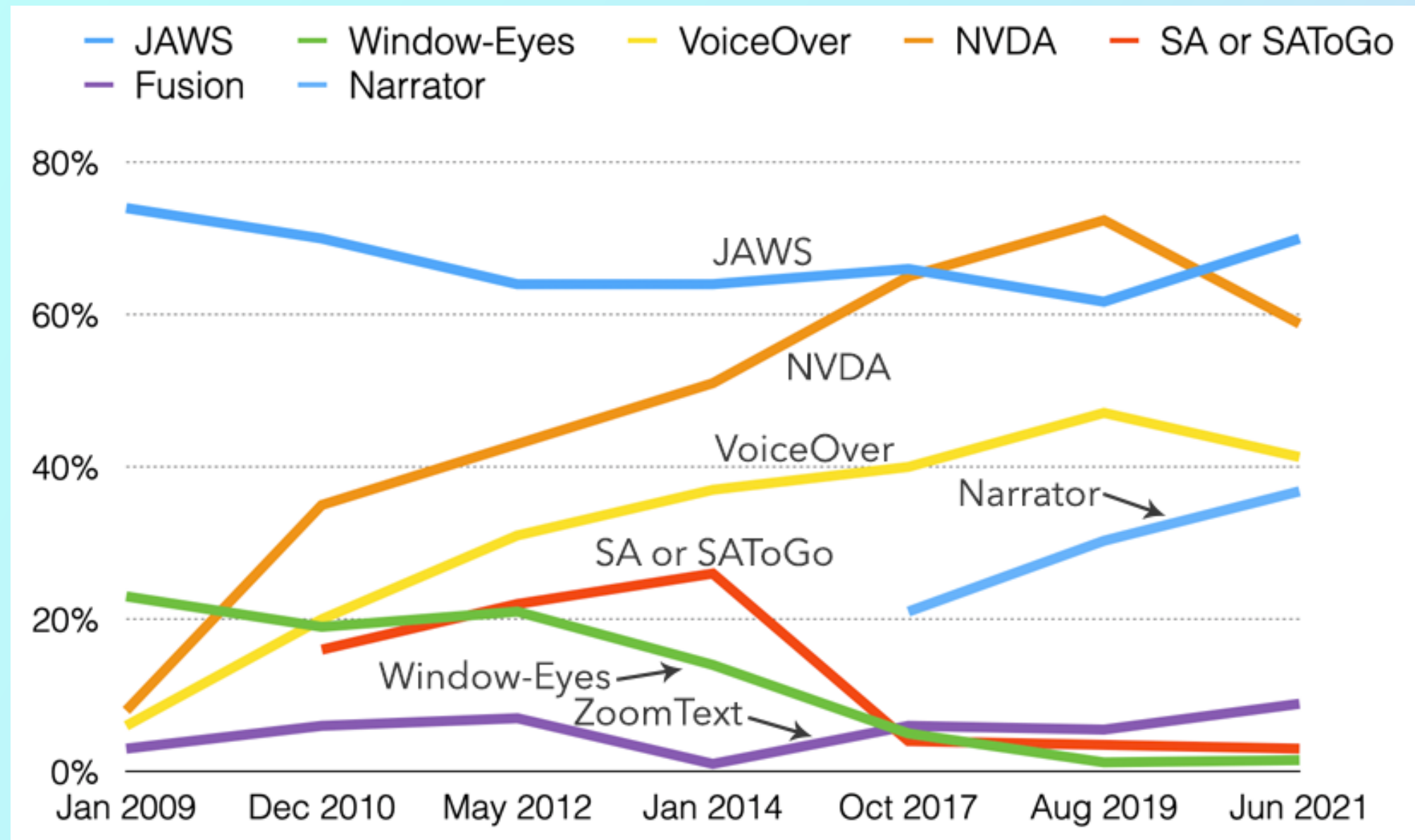
Cognitive Challenges:

- Memory limitations
- Attention
- Problem-solving
- Comprehension:
 - Visual
 - Reading, linguistic, and verbal
 - Math

The Mighty Screen Reader

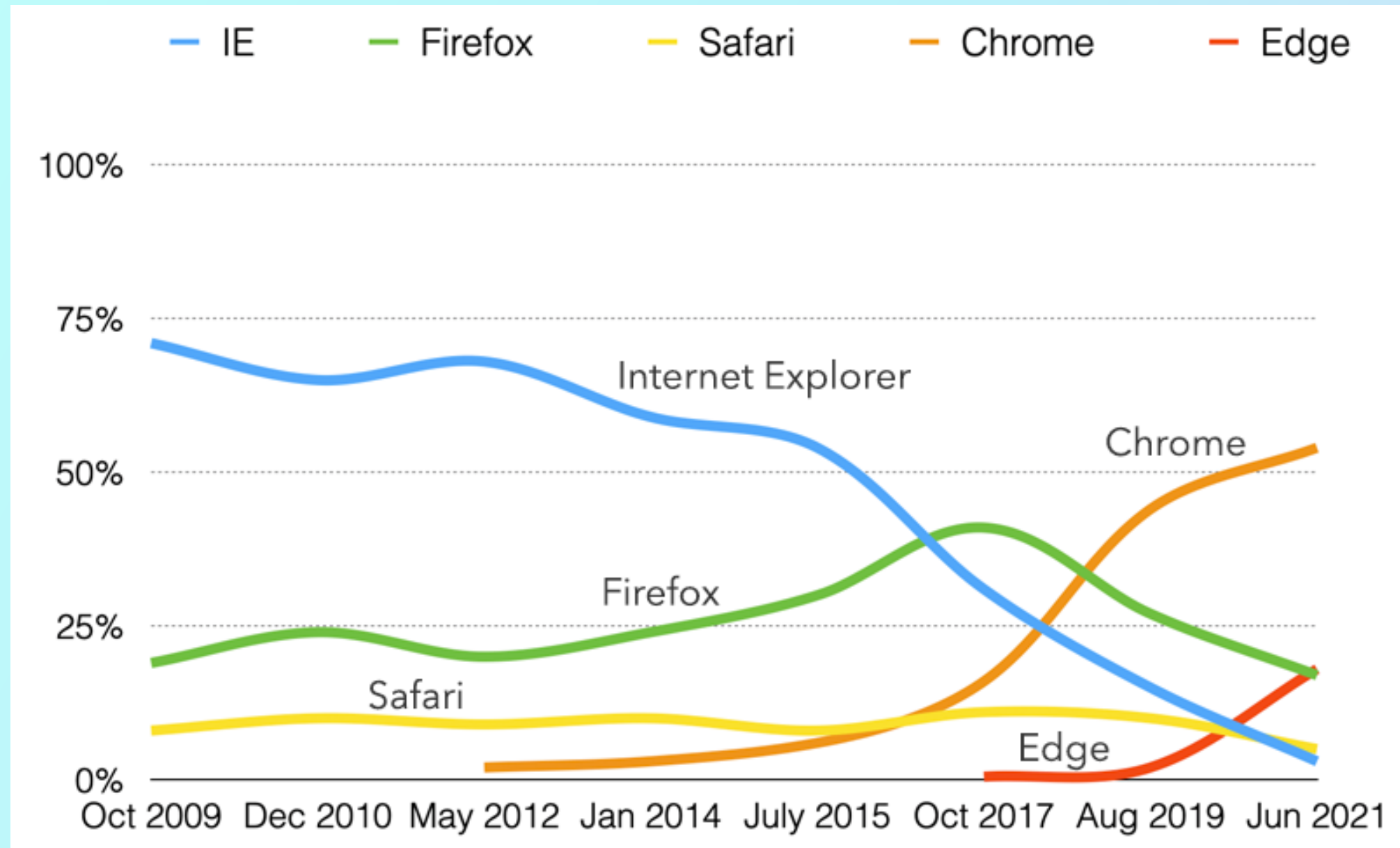


Primary Screen Reader



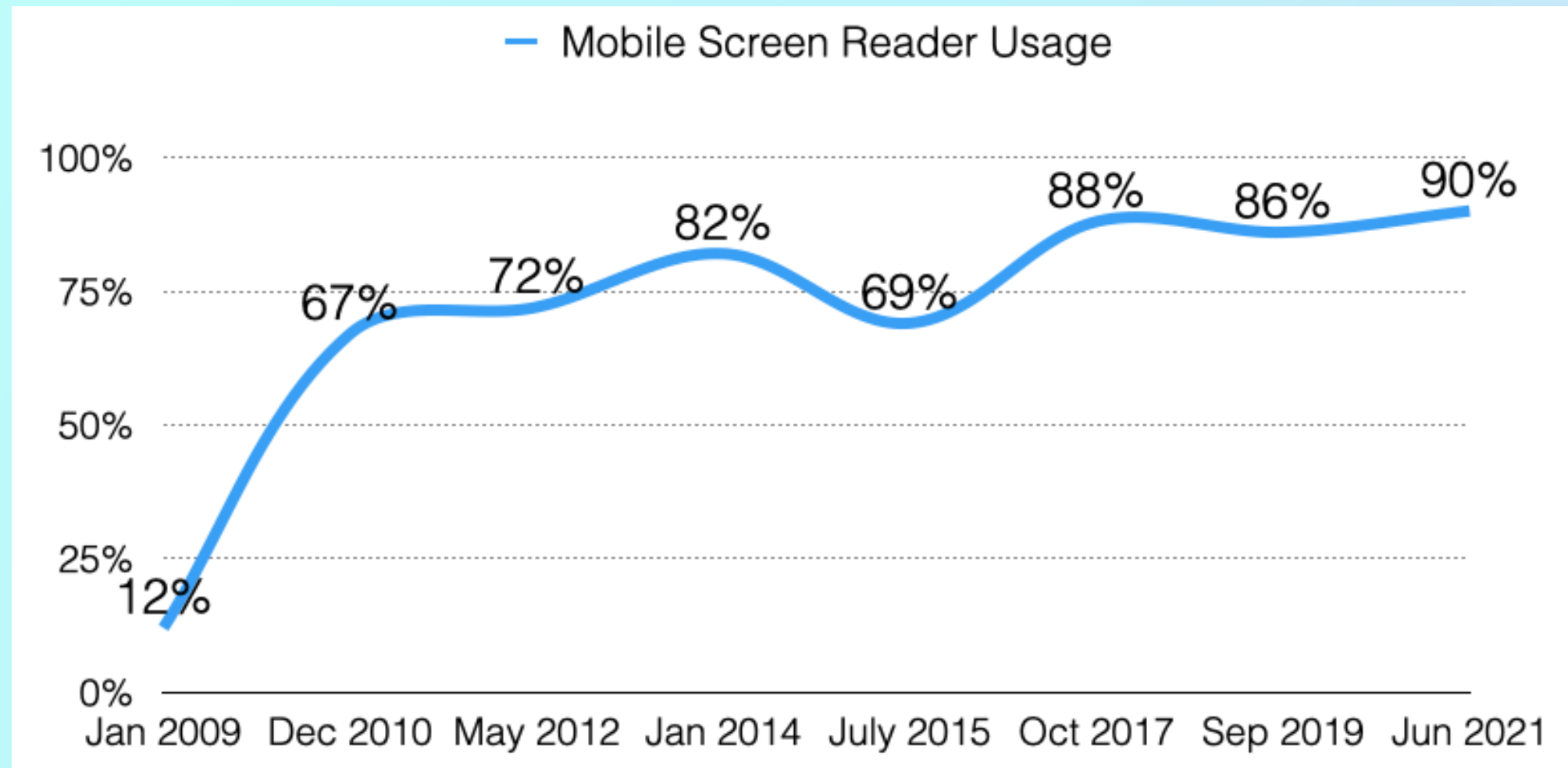
Most SR users own Windows devices

Browser (Desktop)



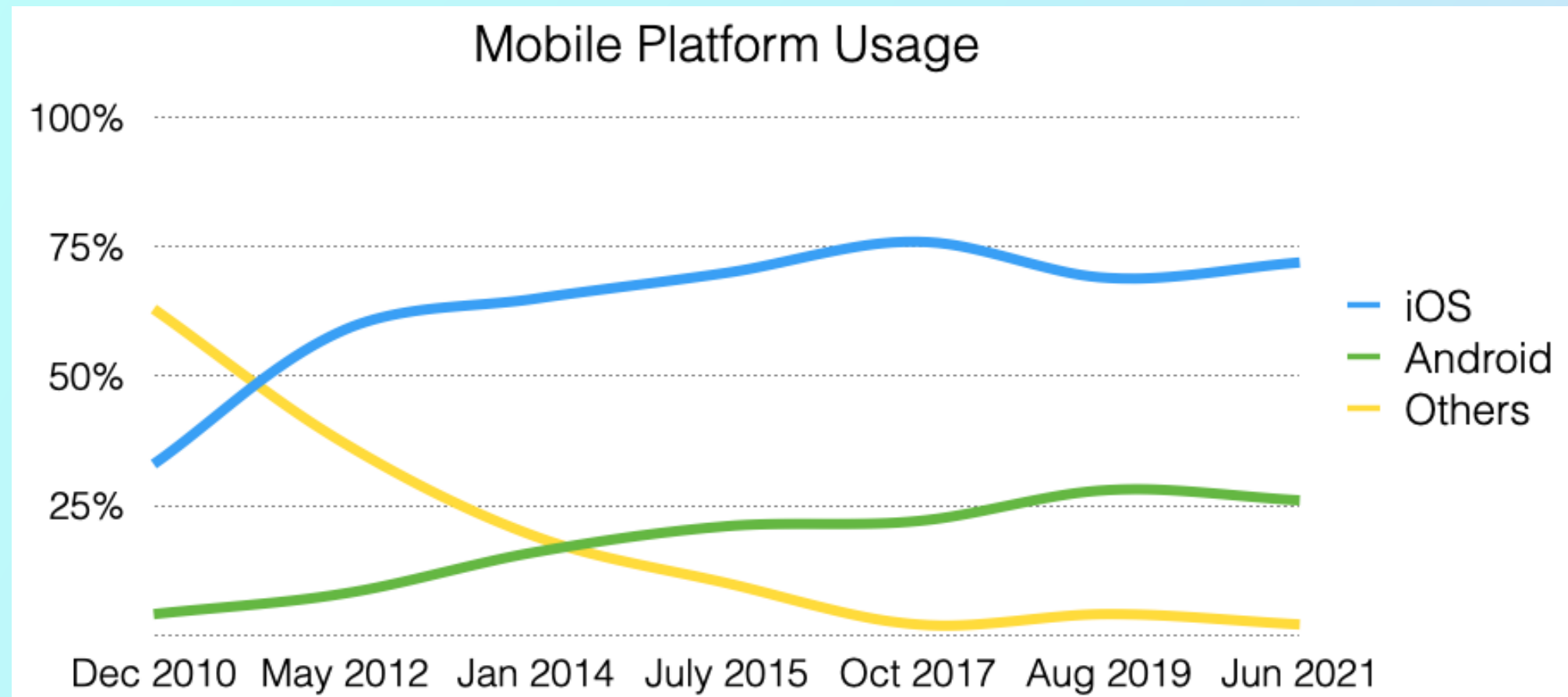
Windows users favor Chromium based browsers

Mobile Screen Reader Usage



Mobile screen reader usage can not be "ignored"

Mobile OS



VoiceOver is the screen reader of choice on mobile devices

“ **My team doesn't have resources to cover all of these. What should I do?** ”

- Pick a screen reader, and know it well
- Audit your product
- Become familiar with current standards and practices

“ **Which is the *best* screen reader for me to start with?** ”

- If your application is desktop focused: JAWS (Windows)
- If your application is mobile-first: VoiceOver (Mac)

Standards, Practices & Patterns

Standards, Practices & Patterns

- Web Content Accessibility Guidelines (WCAG)
- Accessible Rich Internet Applications (ARIA)
- Web Accessibility in Mind (WebAIM)



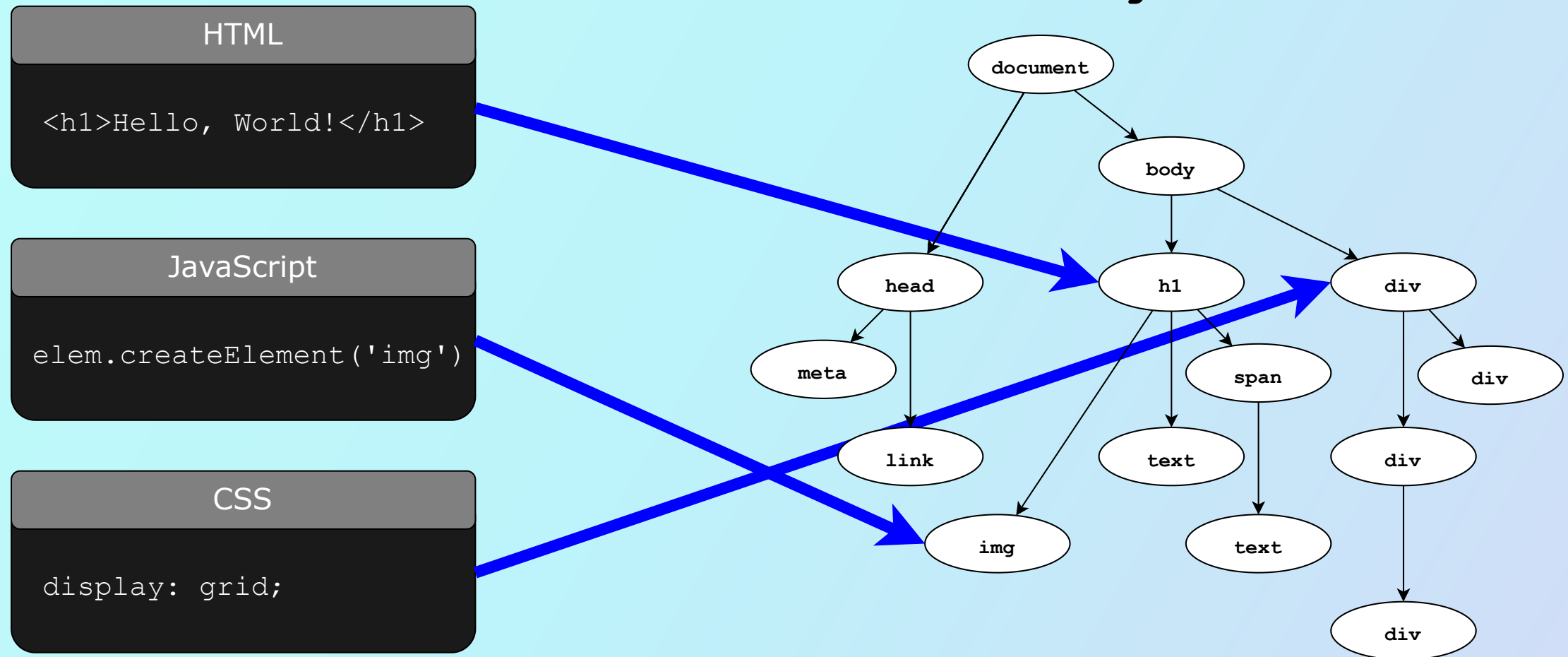
Contrast Checker



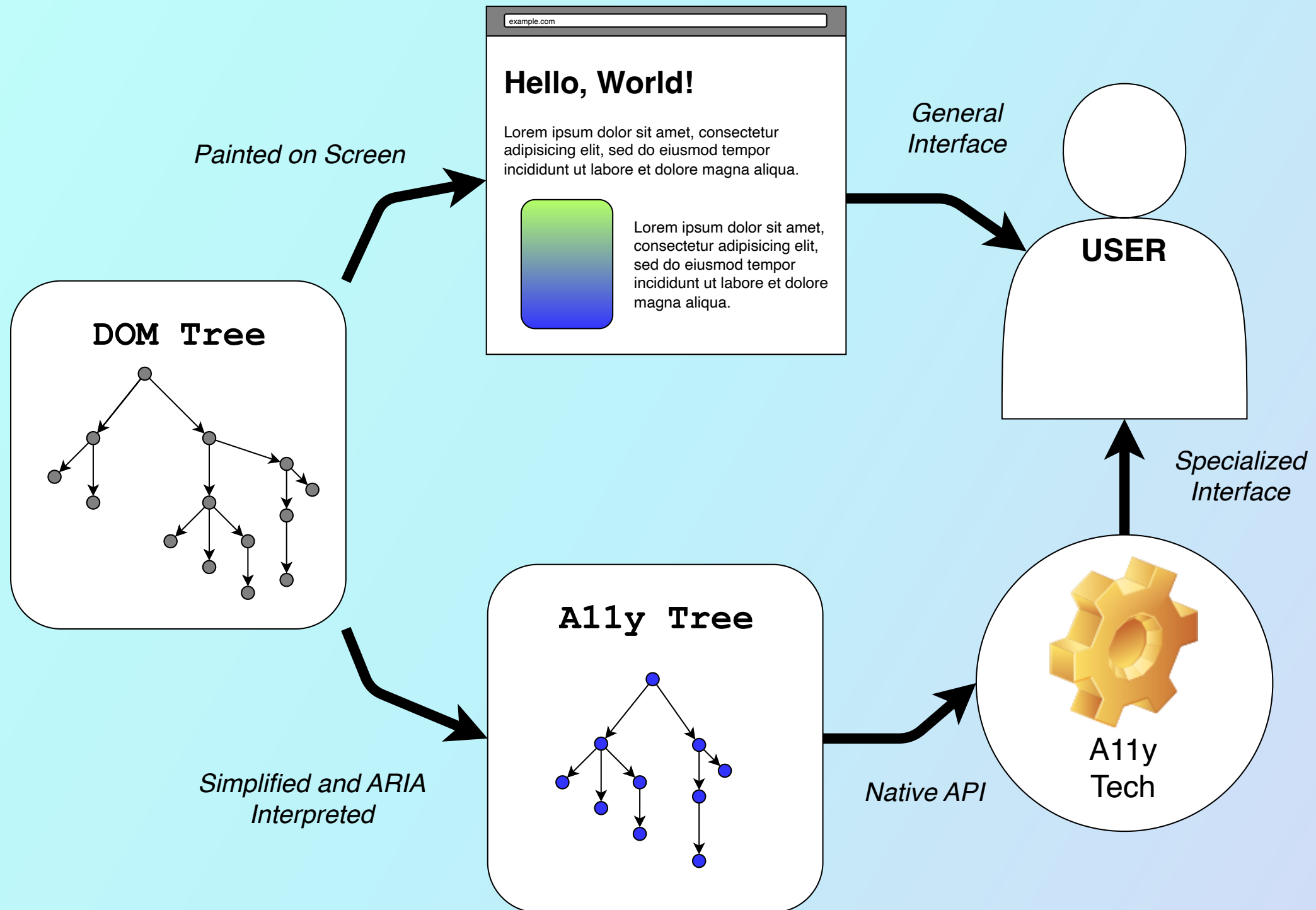
<https://webaim.org/resources/contrastchecker/>

Let's talk about the DOM

Document Object Model



Let's talk about the DOM



```
<div />
```

Syntax and Semantics

Syntax (or *structure*) comes from the language

```
<tag attribute="value">  
  <child attribute1="value" attribute2="value" />  
  Content  
</tag>
```

Semantics (or *meaning*) comes from the vocabulary we choose

```
<button onclick="openSettingsDialog">  
    
  Settings  
</button>
```

Everybody loves `div`

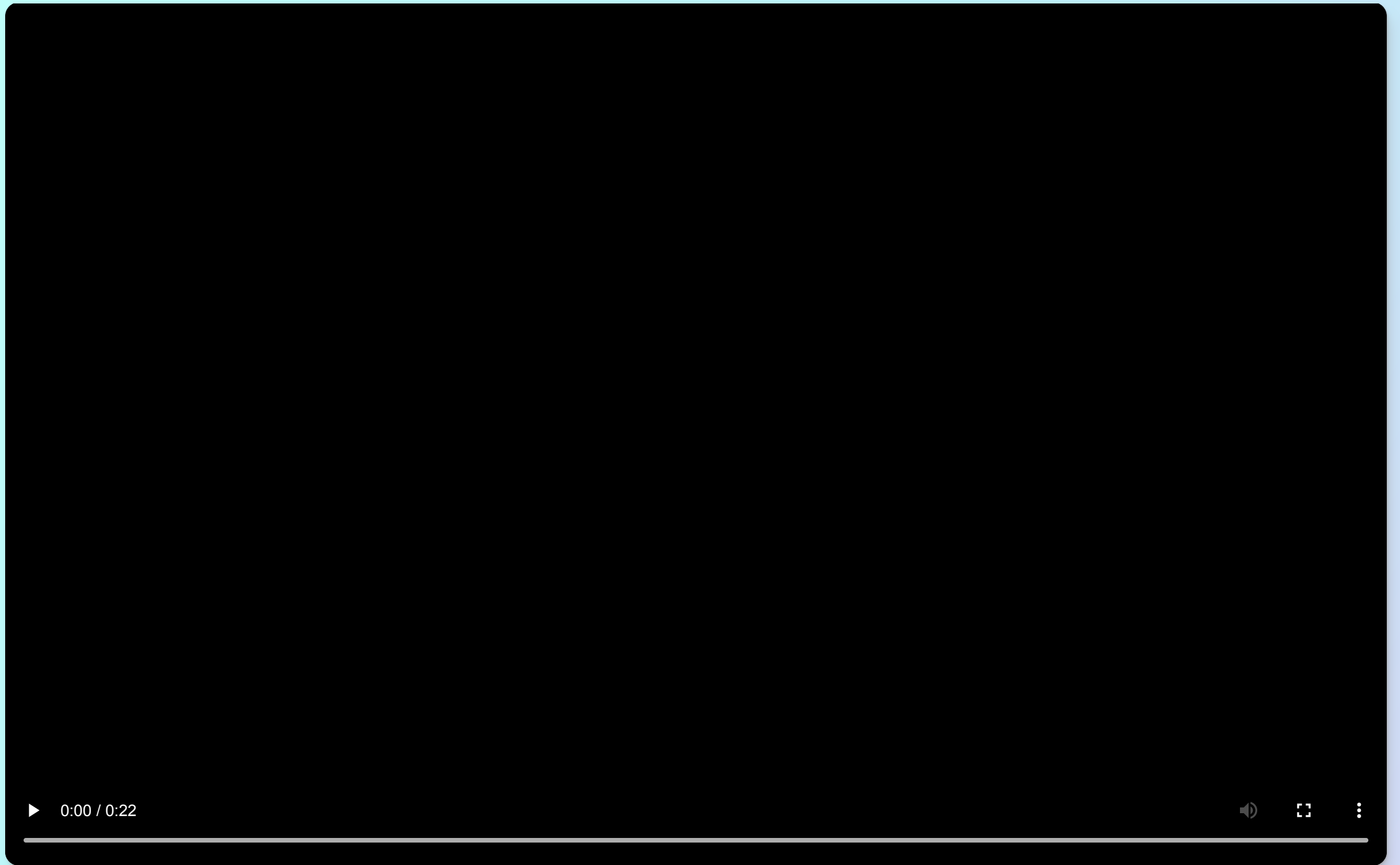
```
<div class="sidebar">
  <div class="option-group">
    <div class="bold">Price</div>
    <div class="option">
      <input type="radio" name="price" value="-25"/>
      Up to $25<br/>
    </div>
    <div class="option">
      <input type="radio" name="price" value="25-100"/>
      $25 to $100<br/>
    </div>
    <div class="option">
      <input type="radio" name="price" value="100+"/>
      $100 & above<br/>
    </div>
  </div>
  <!-- ... [other filter options] ... -->
  <button type="submit">Search</button>
</div>
```


Everybody should love *all* HTML

```
<aside>
  <form>
    <fieldset>
      <legend>Price</legend>
      <input type="radio" id="below25" name="price" value="-25"/>
      <label for="below25">Up to $25</label><br/>

      <input type="radio" id="below100" name="price" value="25-100"/>
      <label for="below100">$25 to $100</label><br/>

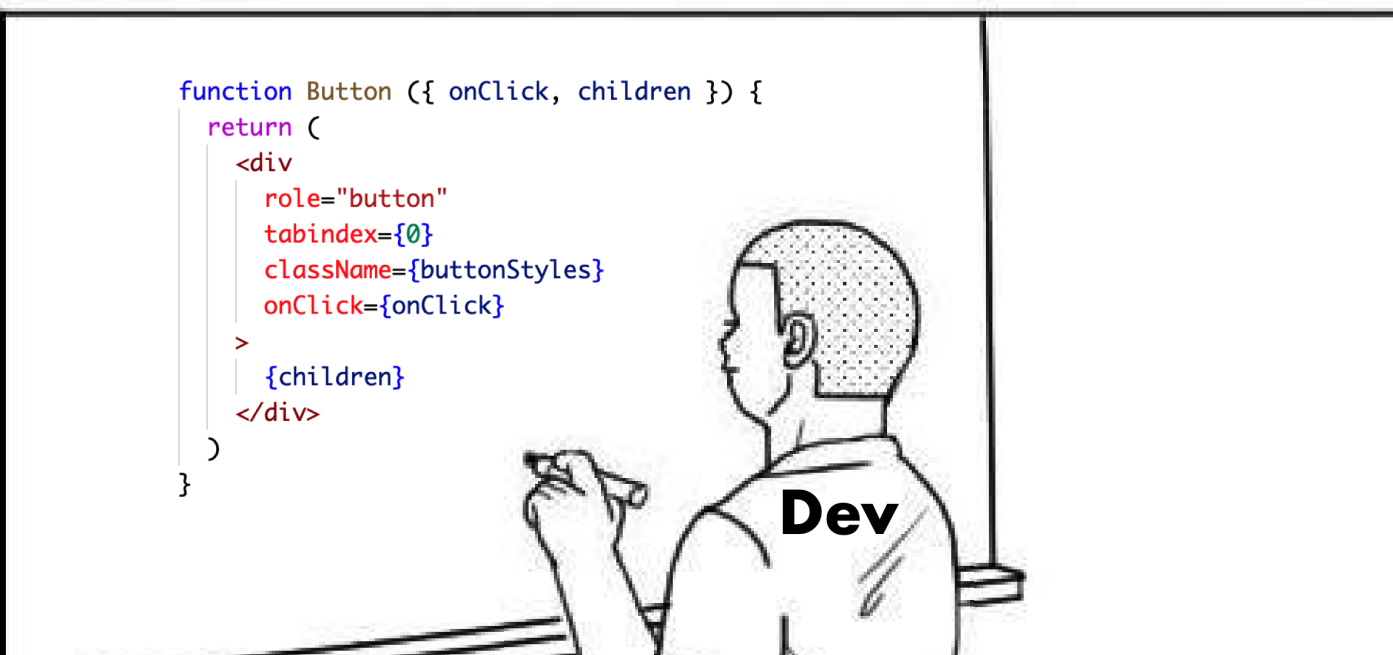
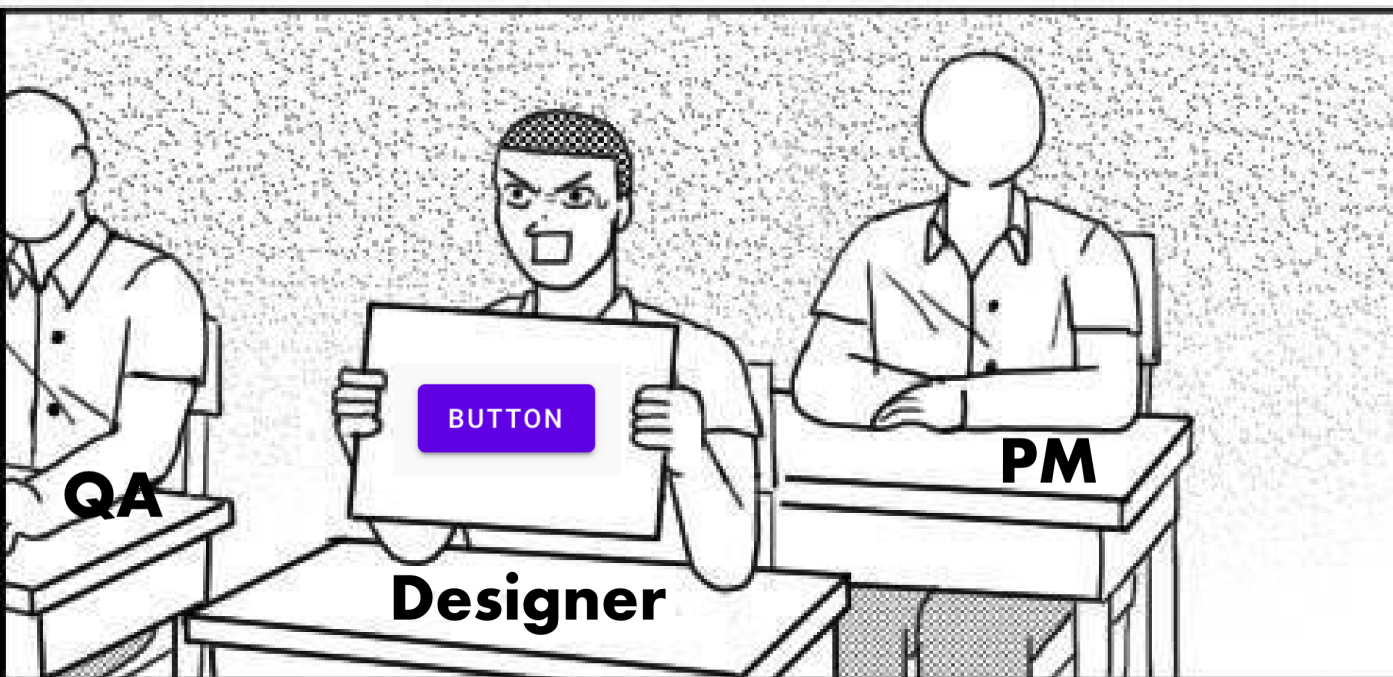
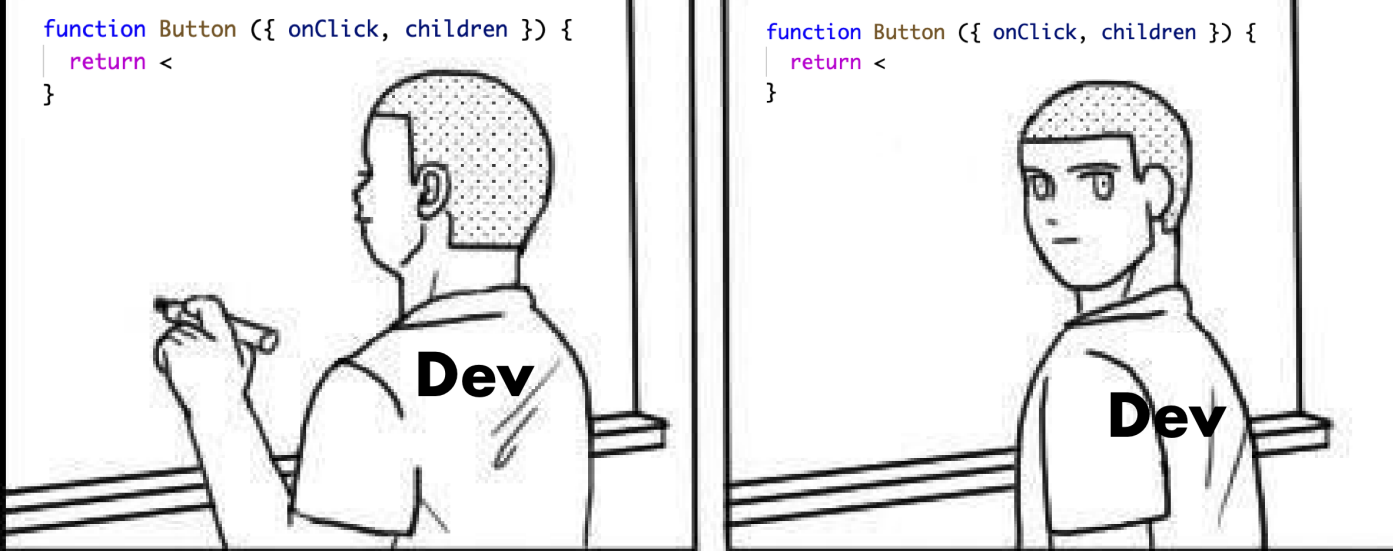
      <input type="radio" id="over100" name="price" value="200+"/>
      <label for="over100">$100 & above</label><br/>
    </fieldset>
    <!-- ... [other filter options] ... -->
    <button type="submit">Search</button>
  </form>
</aside>
```



Naive HTML (Try it out: kylewest.dev/cp/rNvqVZW)



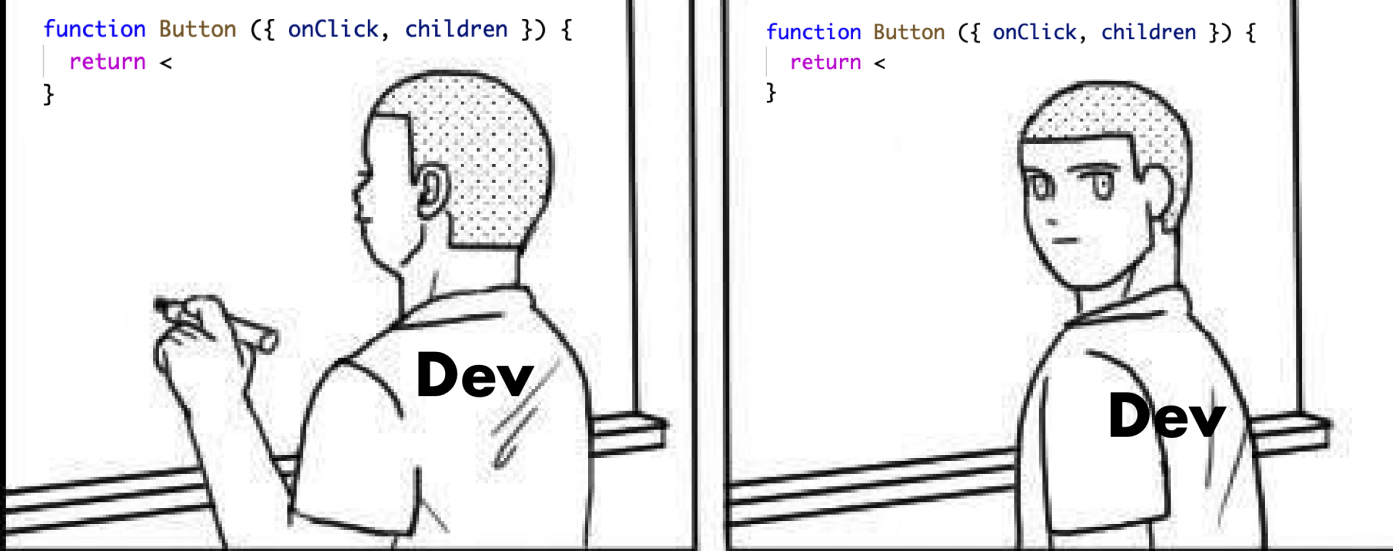
Semantic HTML (Try it out: kylewest.dev/cp/rNvqVZW)



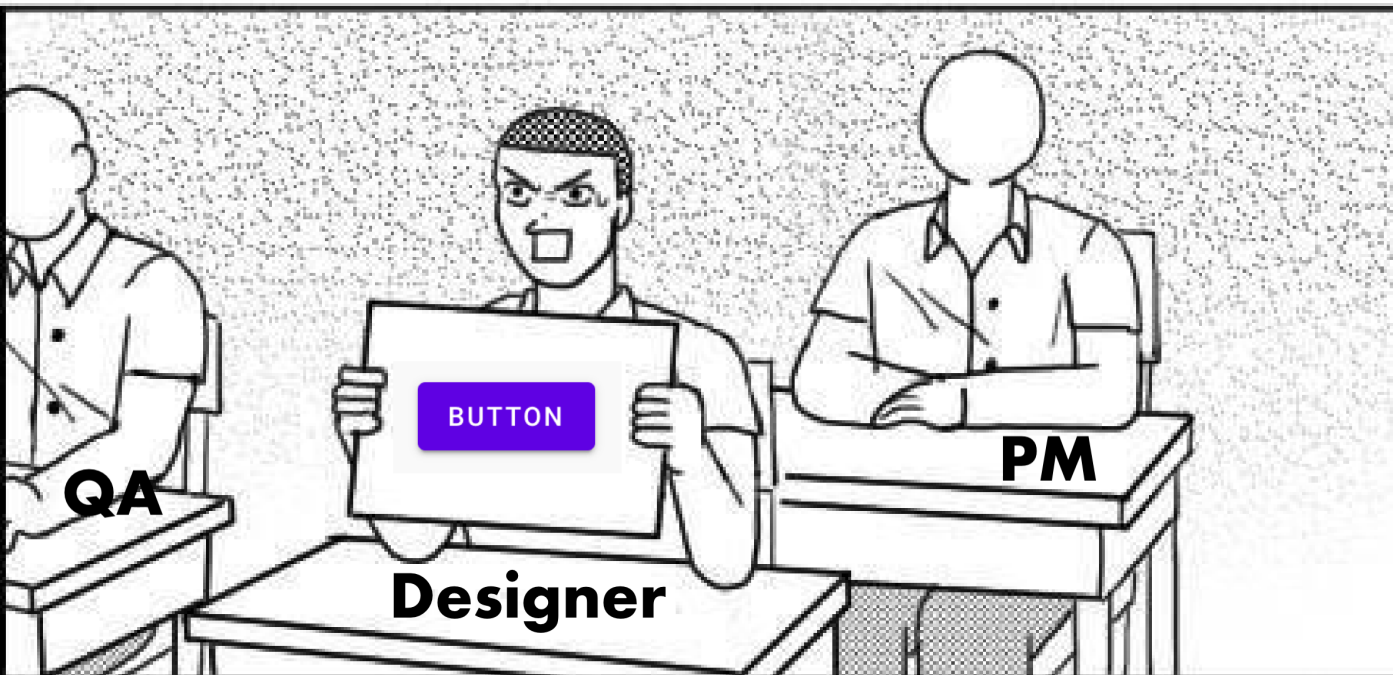
```
function Button ({ onClick, children }) {  
  return <
```

...

```
function Button ({ onClick, children }) {  
  return (  
    <div  
      role="button"  
      tabindex={0}  
      className={buttonStyles}  
      onClick={onClick}  
    >  
      {children}  
    </div>  
  )  
}
```

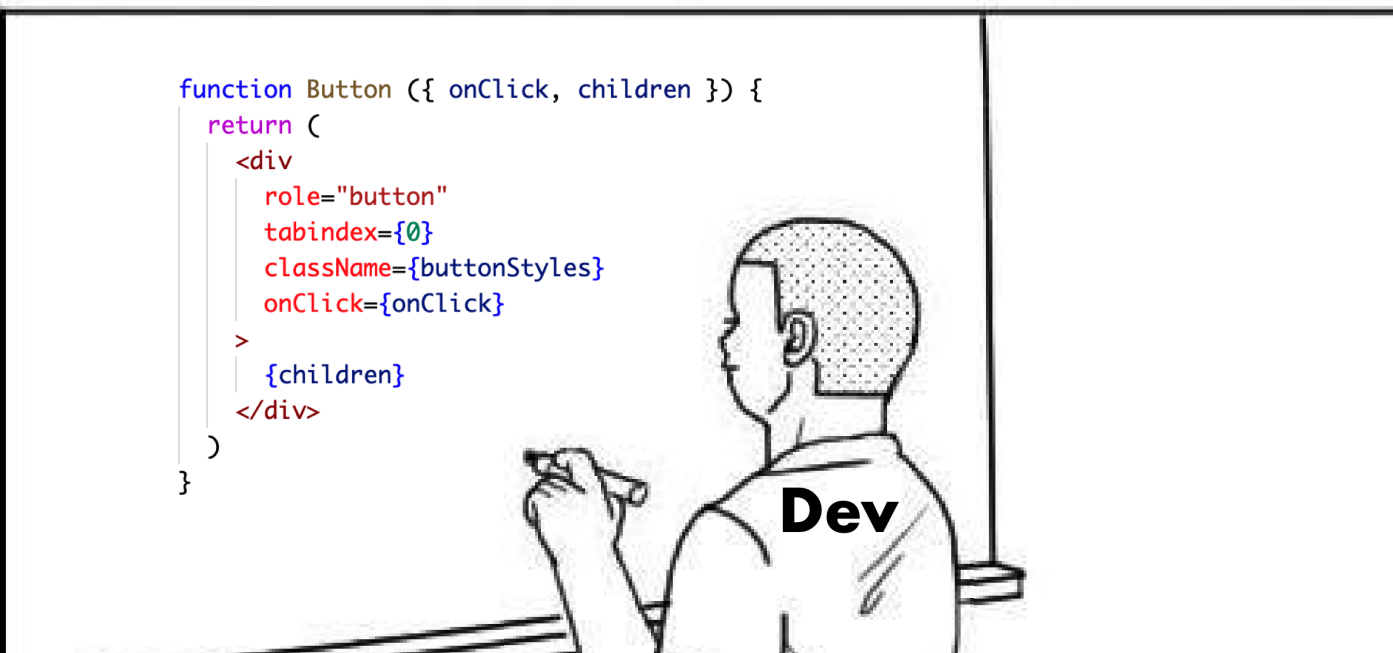


He should have just used a native `<button>`



```
function Button ({ onClick, children }) {  
  return (  
    <button  
      className={buttonStyles}  
      onClick={onClick}  
    >  
      {children}  
    </button>  
  )  
}
```

His solution works, but it is incomplete



No ARIA is better than Bad ARIA

“ Functionally, ARIA roles, states, and properties are analogous to **CSS for assistive technologies**. For screen reader users, ARIA controls the rendering of their non-visual experience.

Incorrect ARIA misrepresents visual experiences, with potentially devastating effects on their corresponding non-visual experiences. ”

— *ARIA Authoring Practices Guide*
(emphasis added)

role

as in

```
<div role="feed">
```

Two important principles

1. A role is a promise to the screen reader

```
<div role="button">Click Me</div>
```

2. ARIA can both cloak & enhance, creating both power & danger

```
<ul role="navigation">  
  <li><a href="uri1">nav link 1</a></li>  
  <li><a href="uri2">nav link 2</a></li>  
</ul>
```

```
<nav>  
  <ul>  
    <li><a href="uri1">nav link 1</a></li>  
    <li><a href="uri2">nav link 2</a></li>  
  </ul>  
</nav>
```

The accessibility tree will error on this:

```
ERROR! Previous list items are not in a list!
```

Expressing semantics

The following are equivalents

```
<table>
```

```
<div role="table">
```

```
<button role="table">
```

Even CSS effects the Accessibility Tree

```
<style>
```

```
  .table {
```

```
    display: table;
```

```
  }
```

```
</style>
```

```
<button class="table">
```

When in doubt, `role` always wins

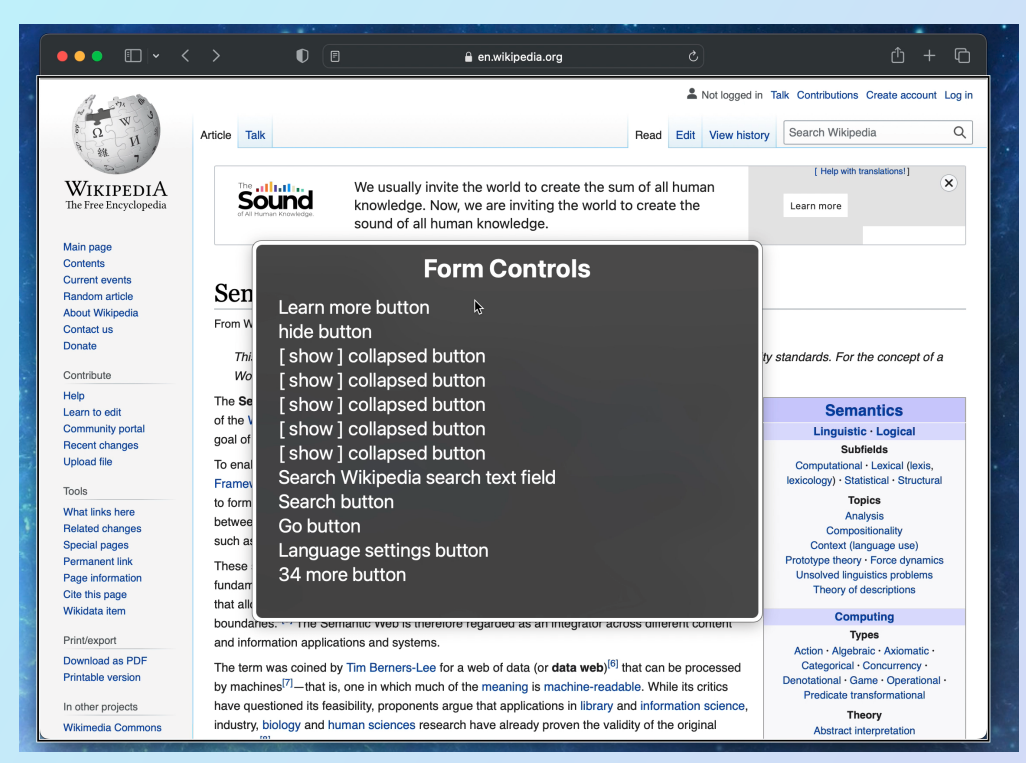
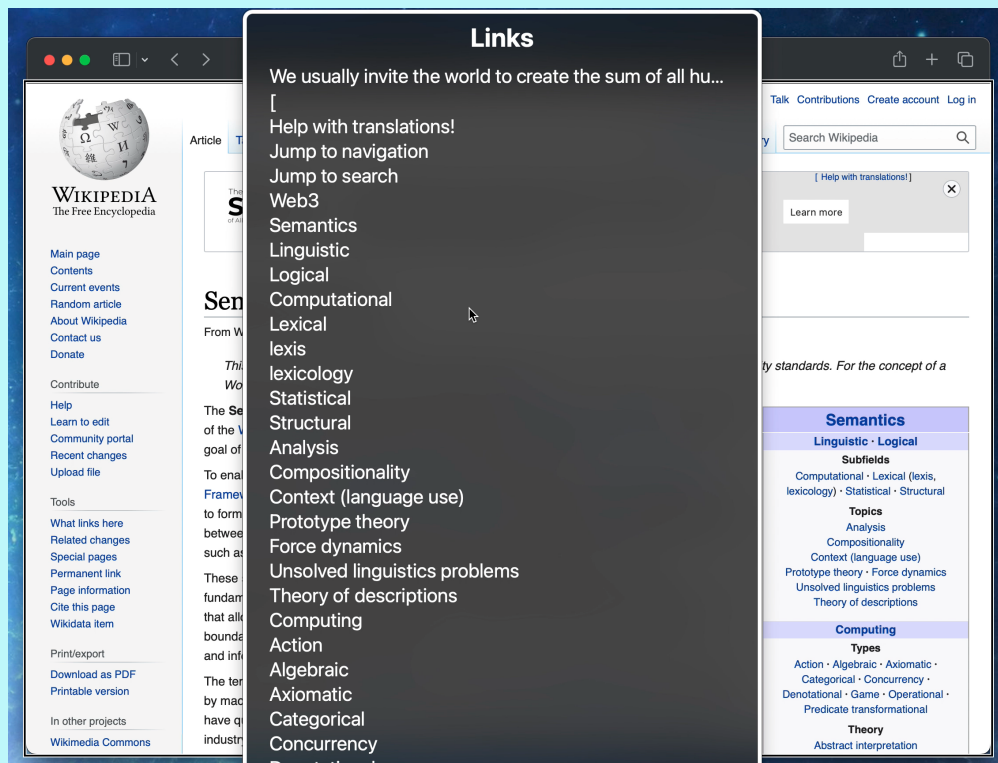
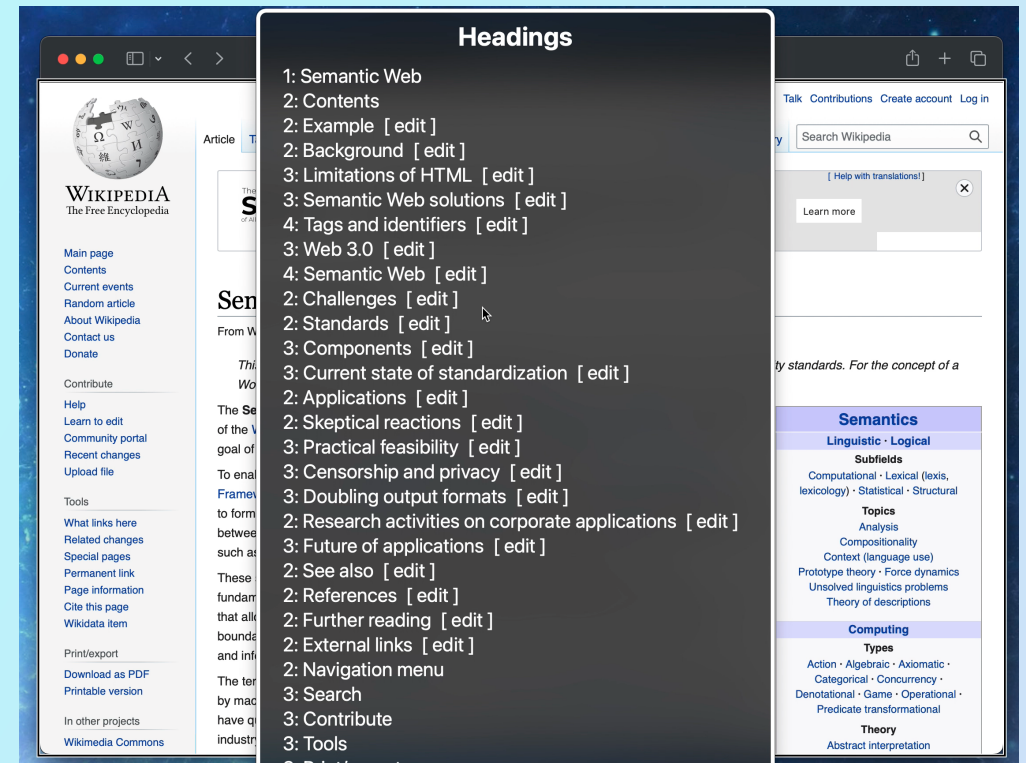
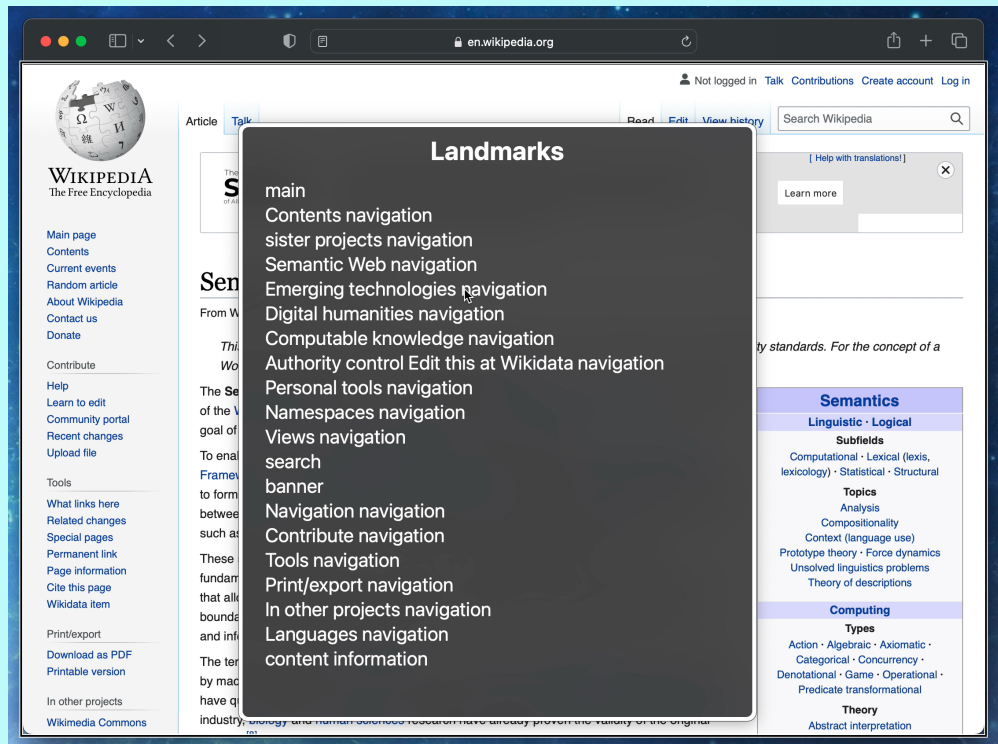


<https://codepen.io/kylewestrrrr/pen/abWMWZX>

Landmarks



Traversable Semantics



Naming and describing content

- name with child content
- name with a string attribute via `aria-label`
- name by referencing content with `aria-labelledby`
- name form controls with the `<label>` element
- name `<fieldset>` with the `<legend>` element
- name or describe `<table>` and `<figure>` with `<caption>`
- fallback names are derived from `title` and `placeholder` attributes
- describe images by providing an `alt` attribute
- describe content by referencing content with `aria-describedby`

When to hide

Do this (when it makes semantic sense):

```
<img role="presentation" />  
  
<svg aria-hidden>  
  <!-- ... -->  
</svg>
```

DO NOT do this:

```
<button aria-hidden>Settings</button>
```

What's wrong with this?

Here is some real code I once saw:

```
<body>  
  <div id="root" aria-hidden></div>  
  <div id="screen-reader-root" class="visually-hidden"></div>  
</body>
```


Resources

ARIA Authoring Practices Guide (APG)



<https://www.w3.org/WAI/ARIA/apg/patterns/>

Web Accessibility in Mind (WebAIM)



<https://webaim.org>

Web Content Accessibility Guidelines (WCAG)



<https://www.w3.org/WAI/standards-guidelines/wcag/>

Recap

- WCAG is the legal standard for Designing
 - ARIA is the applicable standard for Developing
 - WebAIM is a great resource for learning about real user experiences
-
- Make sure you have correct heading levels
 - Label your inputs and images
 - You should probably learn to a screen reader

Accessibility
=
Usability



Kyle West

Slides can be found at

kylewest.dev/slides

Feel free to reach out on
Twitter with questions

[@KyleWestCS](https://twitter.com/KyleWestCS)

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