Designing Web Pages for Accessibility

HTML Accessibility Guidelines

Color Blindness

Mr. Lee

Color Blindness:
Meet Mr. Lee

- He has difficulty reading the text on many websites.

- Seems like text and images use poor color contrast – all using similar shades of brown.

- In some cases, the site instructions explained that discounted prices were indicated by red text, but all of the text looked brown to him.

- In other cases, the required fields on forms were indicated by red text, but again he could not tell which fields had red text.

Flower as seen by person with normal vision and by a person with Deuteranope

Color Blindness:
Solution?

- Use sufficient color contrast, and redundant information for color.
    - If you are going to show colors of clothing, include names of the colors of clothing as well as showing a sample of the color
    - Add text cues such as an asterisk to discounted prices in addition to showing them in a different color
    - Clearly indicate required fields on a form in addition to indicating them by color.

- A user can also define customized color combinations for text, links, and the background and/or utilize high color contrast settings in a web browser.
    - However, this approach does not work for all websites, such as those that are not coded to allow readers to override the default presentation of the website.

COLOR BLINDNESS:
IDEAS

- **Customized fonts and colors** : Use font types, sizes, colors, spacing to make text easier to read

- **Easy-to-read text:** Simplify summaries for passages of text to help make it easier to understand.

- **Document outline** : Represent content that to prominently show headings and relevant structures to help provide orientation and an overview of the contents.

Article | Talk   Read Edit View history   Search

Michigan Heritage Park

From Wikipedia, the free encyclopedia   Coordinates: 43°24'53"N 86°18'44"W

The **Michigan Heritage Park** is an open-air museum that spans 10,000 years of Michigan history. It consists of a half mile trail loop that starts with a pre-historic mastodon exhibit and ends at a Civilian Conservation Corps camp exhibit. The historical exhibits are recreations.[1] The park is operated by Muskegon's Lakeshore Museum Center.[A][1][4][5][6][7][8]

Michigan Heritage Park

Contents [hide]

1 History
2 The trail
   2.1 Mastodon Site
   2.2 Archeology site
   2.3 Native American Village
   2.4 French Fur Trader Cabin – 1760
   2.5 Settler's Cabin – 1830
   2.6 Civil War Camp – 1861–65
   2.7 Logging Shanty – 1880
   2.8 Michigan farmhouse
   2.9 Civilian Conservation Corps – 1933
3 Gallery
4 References

Location	8637 N. Durham Rd, Whitehall, MI
Coordinates	43°24'53"N 86°18'44"W
Area	19 acres (7.7 ha)
Governing body	Lakeshore Museum Center

COLOR BLINDNESS:
IDEAS

- **Progressive disclosure:** Design technique that involves showing only the least amount of information or functions necessary for a given task or purpose, to avoid overloading the user with information.

- **Reduced interface :** Represent the content that only shows most relevant info or more frequently used functions; for instance, by hiding other parts of the content that can distract users.

Asides help spotlight key information

USE OF <DETAILS> AND <SUMMARY>

```html
<details>
  <summary>
    The Patriot Act has resulted in a state where liberties have been traded for government intrusion.
  </summary>

  <h1>Here are some statistics:</h1>
  <ul>
    <li>3,984 federal, state, and local organizations take part in domestic counter-terrorism efforts</li>
    <li>The National Security Agency alone has about 30,000 people eavesdropping on Americans</li>
    <li>The NSA intercepts 1.7 billion e-mails and other communications every day.</li>
  </ul>
</details>
```

We have accepted less *privacy*

In an era of full body scans, shoe removal and "no-liquids, please" at airports around the nation, nearly two thirds of Americans agree to tolerate such personal impositions to prevent terrorism.
▶ The Patriot Act has resulted in a state where liberties have been traded for government intrusion.

We are less *tolerant* of Islam

In 2010, only 30% of Americans views the Muslim religion favorably, a statistically significantly drop from 2005 where the religion was deemed positive by 45% of Americans.

■ New HTML5 tags gaining browser support

▼ The Patriot Act has resulted in a state where liberties have been traded for government intrusion.

Here are some statistics:

- 3,984 federal, state, and local organizations take part in domestic counter-terrorism efforts
- The National Security Agency alone has about 30,000 people eavesdropping on Americans
- The NSA intercepts 1.7 billion e-mails and other communications every day.

Watch that Contrast

- The objective of this technique is to make sure that users can read text that is presented over a background.

4.5 : 1 — Minimum contrast for normal type

3 : 1 — Minimum contrast for large scale type (**18pt+** *or* **14pt+ bold**

- Which of these lines of text exhibit acceptable contrast for normal type?
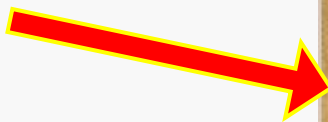 - None

Some color combinations cause a visual vibration

Based on the cognitive "after image" effect

A. Do you think this is readable?

B. Do you think this is readable?

C. Do you think this is readable?

D. Do you think this is readable?

CALCULATE THOSE CONTRASTS

- Use contrast calculators, e.g., http://www.msfw.com/Services /ContrastRatioCalculator

- How does this page fare?

    - The *lightest* background color compared to the *darkest* font color gets a 4.5 : 1 contrast ratio.

    - This is right on the borderline, but then consider the *average* background color compared to the *average* font color!
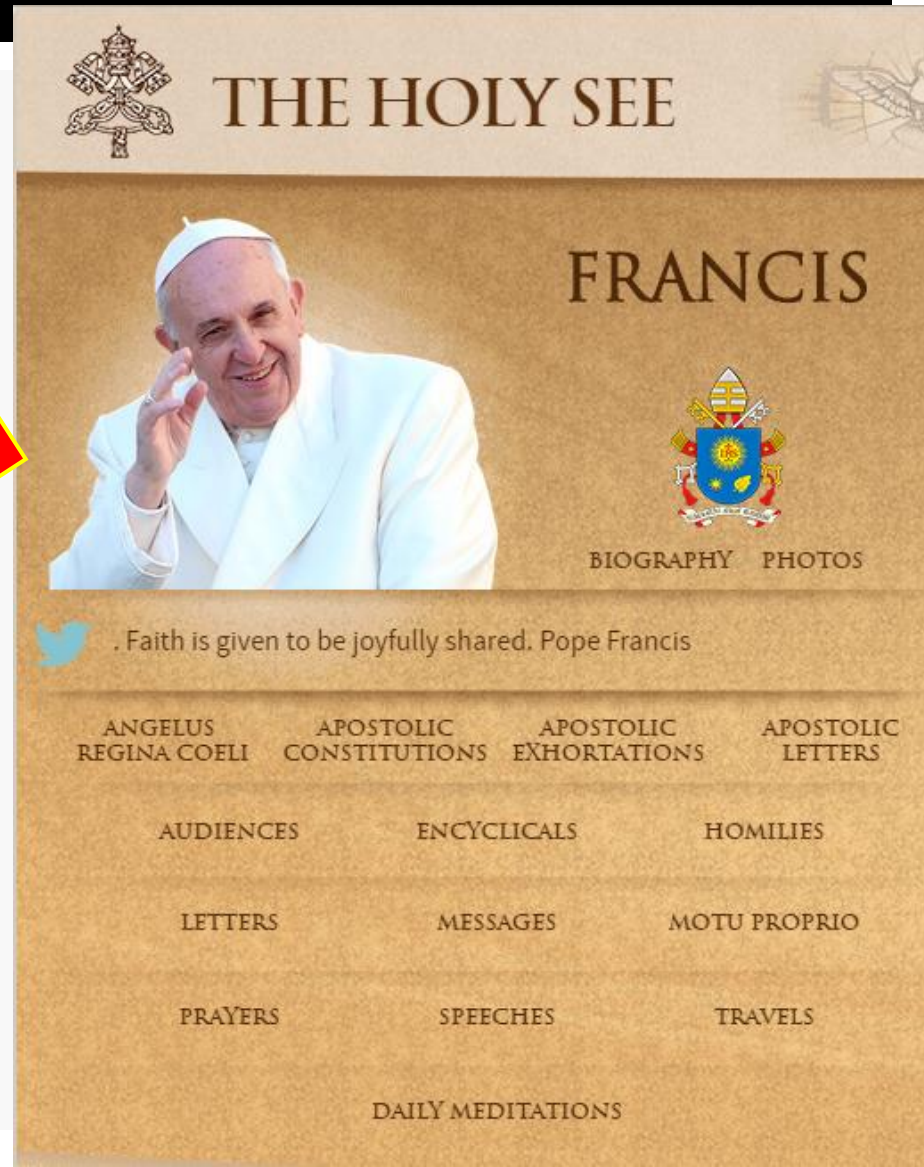
Getting Around in London
https://tfl.gov.uk/maps/track/tube
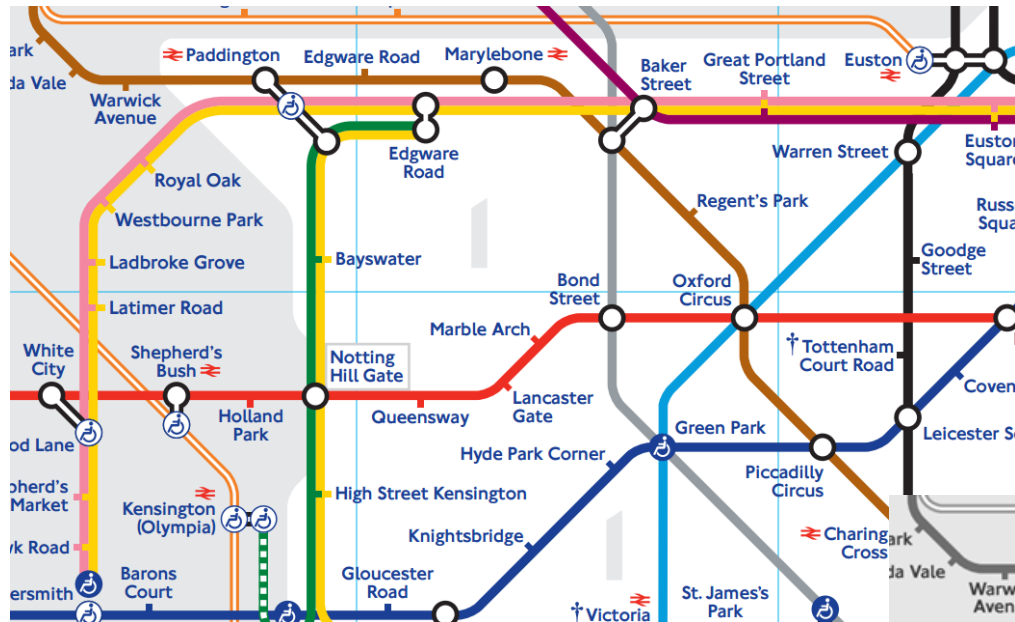
Key to lines

▬▬▬▬	Bakerloo
▬▬▬▬	Central
▬▬▬▬	Circle
▬▬▬▬	District
▪▪▪▪▪	District open weekend public holidays and some Olympia events
▬▬▬▬	Hammersmith & City
▬▬▬▬	Jubilee
▬▬▬▬	Metropolitan

- How would a color blind person know which line to take from Oxford Circus to Paddington?
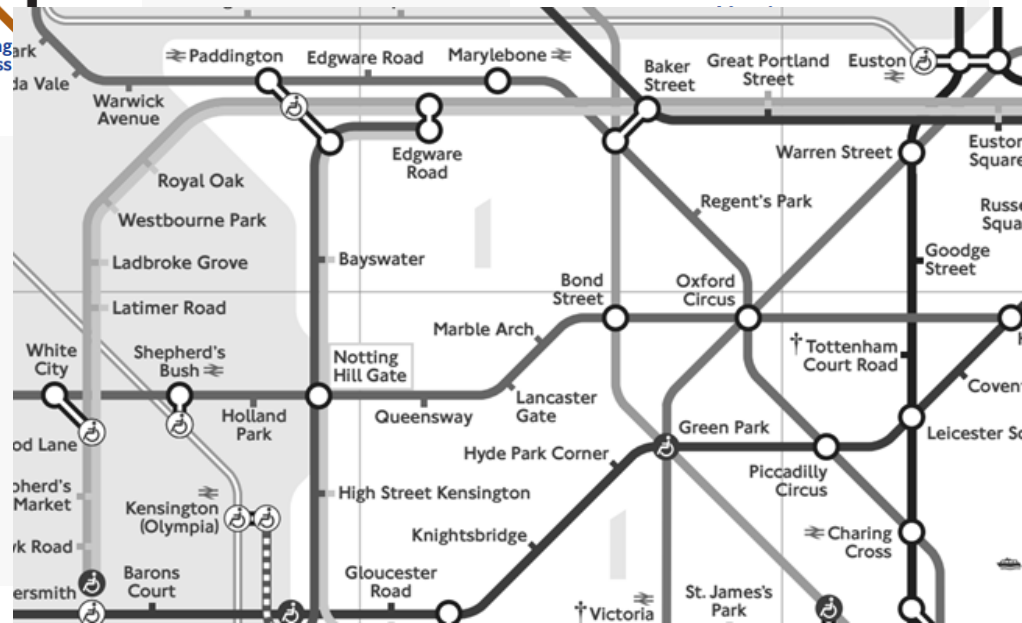
BLINDNESS

Mr. Gilbert

Blindness
Meet Mr. Gilbert

- To use his computer and the Web, Mr. Gilbert uses:

  - Screen reader software that interprets what is displayed on the screen and generates speech output

  - Web browser with keyboard support to help use websites without a mouse

- He uses the keyboard to navigate websites, often by jumping from heading to heading to get an overview of what is on a web page.

- His screen reader indicates the structural information on a web page such as headings, column and row headings in tables, list items, links, form controls, and more.

- However, when websites are not coded properly and do not include structural information, Mr. Gilbert would have to read every web page from top to bottom to find the information that he needs. This is unmanageable and she avoids such websites where she can, both for leisure and for business.

TEXT BROWSERS AS TEST ENVIRONMENT

- A text-only browser will give you a good idea about how a screen reader will read a web page.

Heading 3: Picture Information
Link: Image is loading
     Sauder-Edge-Water-Computer-Desk-Estate-Black-
Mouse over image to zoom
Link: javascript:;
Link: Sauder-Edge-Water-Computer-Desk-Estate-Black
Link: Sauder-Edge-Water-Computer-Desk-Estate-Black
Link: Sauder-Edge-Water-Computer-Desk-Estate-Black
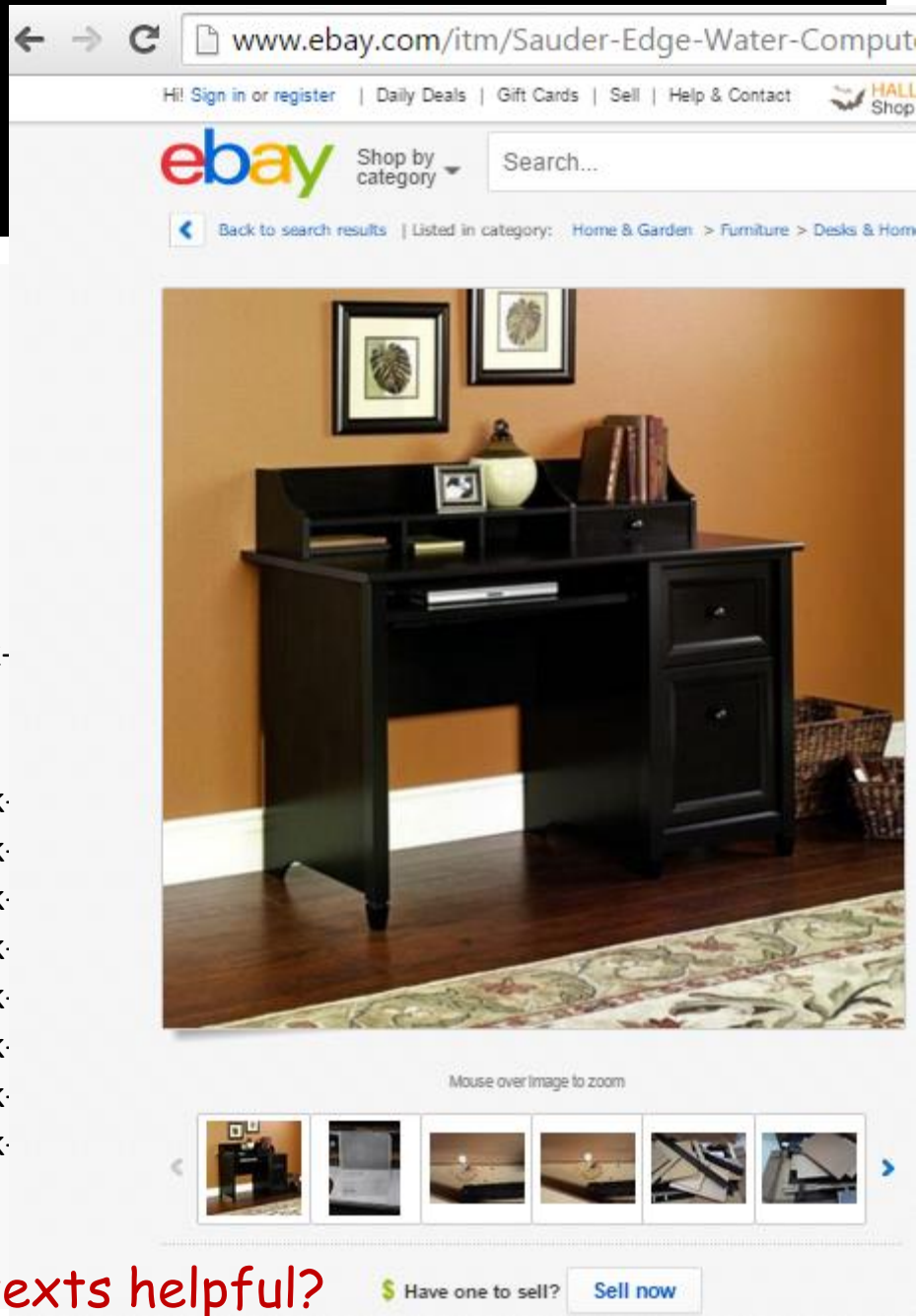Link: Sauder-Edge-Water-Computer-Desk-Estate-Black
Link: Sauder-Edge-Water-Computer-Desk-Estate-Black
Link: Sauder-Edge-Water-Computer-Desk-Estate-Black
Link: Sauder-Edge-Water-Computer-Desk-Estate-Black
Link: Sauder-Edge-Water-Computer-Desk-Estate-Black
Link: javascript:;
Have one to sell?
Link: Sell now

Are these alt texts helpful?

ALT TAGS

Payments: **PayPal** VISA MasterCard AMERICAN EXPRESS DISCOVER

Credit Cards processed by PayPal

```
<img

 src="http://ir.ebaystatic.com/
    pictures/aw/pics/logos/
    CC_icons.png"

 alt="Visa/MasterCard, Amex,
    Discover"

 title="Visa/MasterCard, Amex,
Discover"

 class="pd-pp-cc-container" />

<div class="vi-ppc-coffer-
txt">Credit Cards processed by
PayPal</div>
```

```
<img

 src="http://ir.ebaystatic.com/
    pictures/aw/pics/logos/
    CC_icons.png"

 alt="Credit Card icons"

 title="Visa/MasterCard, Amex,
Discover"

 class="pd-pp-cc-container" />

<div class="vi-ppc-coffer-
txt">Credit Cards processed by
PayPal</div>
```

file:///C:/Users/myersjac/adam.html

.html

MY SON, ADAM, PLAYING BASEBALL AT THE ARCTIC OCEAN
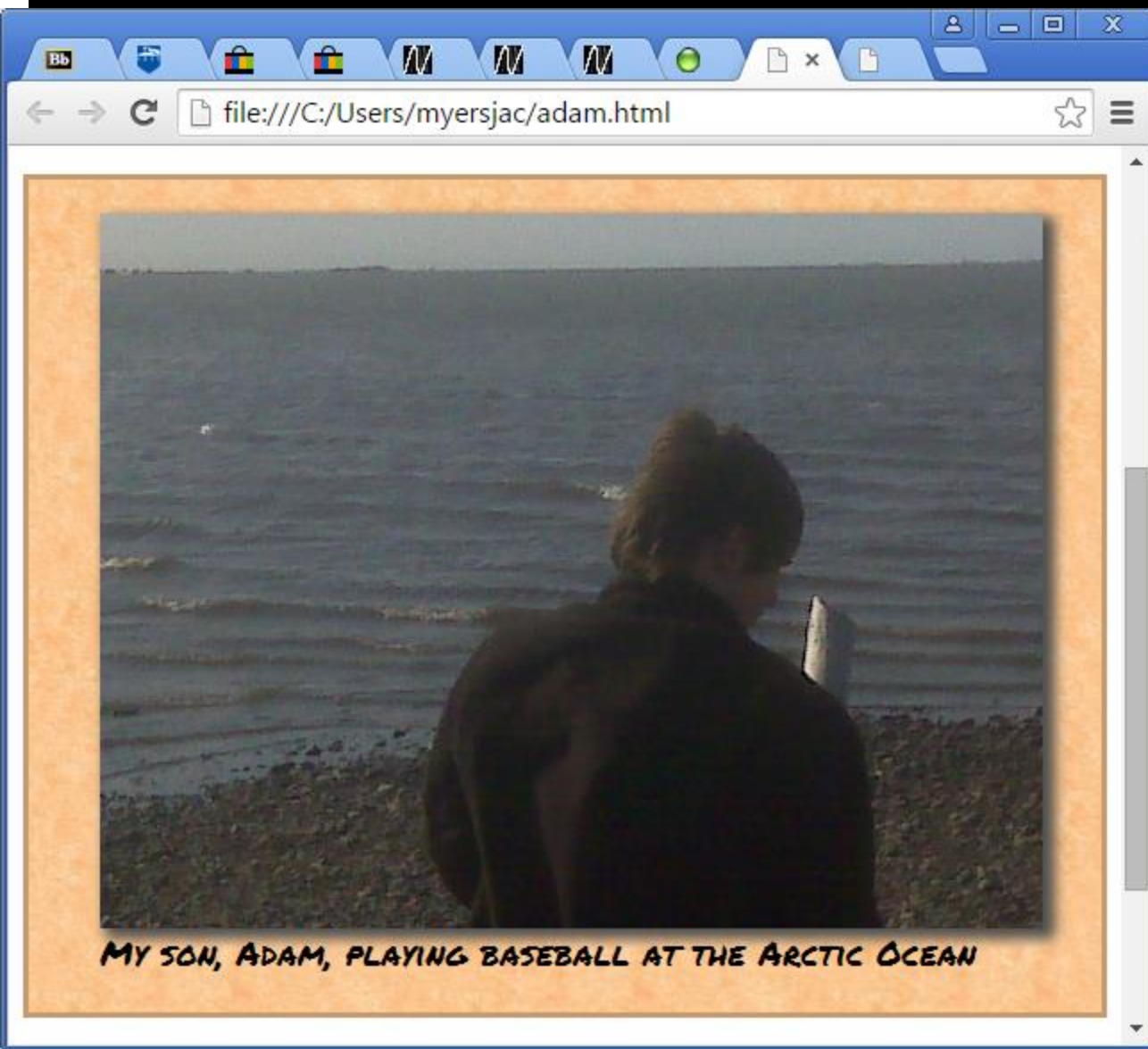
MY SON, ADAM, PLAYING BASEBALL AT THE ARCTIC OCEAN
WITH A PIECE OF DRIFTWOOD AS A BAT, AND PEBBLES AS
BASEBALLS

`<figcaption>`
tags are very useful

IDENTIFY THE LANGUAGE

```
<html lang="en-US">
<head>
    <title>Making Web Pages Accessible</title>
</head>
```

- The LANG attribute is designed to **signal screen readers pronunciation engines** to switch to another language.

- `<html lang="en-GB">` will adopt a British accent.

TABLES CAN BE DAUNTING

Using the headers attribute

Screen readers can get confused when there are multiple levels of column headings. Using the headers attribute will improve accessibility.

Example: Grading Guidelines for this Course

Homework	Exams			Projects		
	1	2	Final	1	2	Final
15%	15%	15%	20%	10%	10%	15%

- This kind of table can be quite confusing for the visually impaired

HEADERS ATTRIBUTE

- id="e" → Exams

- id="e1" → 1
  (Associated with "e", hence "Exam 1")

- Associated with "e e1", hence "Exam 1 15%")

Now it is easy for a screen reader to see what Exam 1 is worth.

```html
<table>
  <caption>Grading Rubric</caption>
  <tr>
    <th rowspan="2" id="h"> Homework </th>
    <th colspan="3" id="e"> Exams </th>
    <th colspan="3" id="p"> Projects </th>
  </tr>
  <tr>
    <th id="e1" headers="e"> 1 </th>
    <th id="e2" headers="e"> 2 </th>
    <th id="ef" headers="e"> Final </th>
    <th id="p1" headers="p"> 1 </th>
    <th id="p2" headers="p"> 2 </th>
    <th id="pf" headers="p"> Final </th>
  </tr>
  <tr>
    <td headers="h"> 15% </td>
    <td headers="e e1"> 15% </td>
    <td headers="e e2"> 15% </td>
    <td headers="e ef"> 20% </td>
    <td headers="p p1"> 10% </td>
    <td headers="p p2"> 10% </td>
    <td headers="p pf"> 15% </td>
  </tr>
</table>
```

‹CAPTION› TAG

- Captions are useful for people who use screen readers.

- The ‹caption› element must immediately follow the ‹table› element

```
<table>
<caption>Grading Rubric</caption>
<tr>
   <th rowspan="2" id="h"> Homework </th>
   <th colspan="3" id="e"> Exams </th>
   <th colspan="3" id="p"> Projects </th>
</tr>
<tr>
   <th id="e1" headers="e"> 1 </th>
   <th id="e2" headers="e"> 2 </th>
   <th id="ef" headers="e"> Final </th>
   <th id="p1" headers="p"> 1 </th>
   <th id="p2" headers="p"> 2 </th>
   <th id="pf" headers="p"> Final </th>
</tr>
<tr>
  <td headers="h"> 15% </td>
  <td headers="e e1"> 15% </td>
  <td headers="e e2"> 15% </td>
  <td headers="e ef"> 20% </td>
  <td headers="p p1"> 10% </td>
  <td headers="p p2"> 10% </td>
  <td headers="p pf"> 15% </td>
</tr>
</table>
```

`<SCOPE>` TAG

- **The <scope> tag can be used to identify rows and columns and their labels**

	Expenses	**Savings**
January	$835	$100
February	$855	$80

```
<table>
  <tr>
    <th></th>
    <th scope="col">Expenses</th>
    <th scope="col">Savings</th>
  </tr>
  <tr>
    <td scope="row">January</td>
    <td>$835</td>
    <td>$100</td>
  </tr>
  <tr>
    <td scope="row">February</td>
    <td>$855</td>
    <td>$80</td>
  </tr>
</table>
```

DIAGRAMS CAN BE MORE DAUNTING

- This diagram uses:
  - Color to link HCI domain to a textbook,
  - A hub and spoke model to show relationships,
  - Images in black circles to indicate lesson numbers

- While it conveys a lot of information visually, it is lost on Mr. Gilbert.

ACCESSIBLE DIAGRAMS

The Domains of HCI

- ▶ Psychology
- ▼ Ergonomics and Human Factors
Lesson 1
Lesson 2
Don't Make Me Think
Designing the Human Interface
The Design of Everyday Things
- ▶ Engineering
- ▶ Language
- ▼ Semiot | The study of signs, symbols, and signification. It is the study of how meaning is created, not what it is |
Lesson 2
Lesson 4
Don't Make Me Think
The Design of Everyday
- ▶ Ethnography
- ▼ Sociology
Lesson 3
Interaction Design
- ▶ Design
- ▶ Computer Science

```
27      <li>
28          <details>
29              <summary>Language</summary>
30              <span class="lesson">Lesson 3</span><br />
31              <span class="lesson">Lesson 7</span><br />
32              <cite>Don't Make Me Think</cite><br />
33              <cite>Designing the Human Interface</cite><br />
34          </details>
35      </li>
36      <li>
37          <details>
38              <summary><span title="The study of signs, symbols, and
        signification. It is the study of how meaning is created, not what it
        is">Semiotics</span> and Branding</summary>
39              <span class="lesson">Lesson 2</span><br />
```

USE THE SECTION ELEMENTS

With the exception of <h1>, <h2>..., all of these tags are new to HTML5

Element	Description
address	Contact information for a document or article
article	An independent block of content
aside	Content only tangentially related to the surrounding content
header	A header region
footer	A footer region
h1, h2, h3, h4, h5, h6	A heading. Begin with h1 and then h2 (sub heading), then h3 (sub sub heading), and so on.
hgroup	Used to group a set of <h1> to <h6> elements when a heading itself has mutliple levels. Hides all but the first set of headings from the document outline. Sometimes a sub heading needs to be grouped with its heading and treated as a single entity. We will come back to this when we do CSS, where this is most useful.
nav	Groups navigation elements
section	A significant concept or topic
details	A section which can be expanded to show more details
summary	The title and/or description for corresponding <details>

```
<math display="block" xmlns="http://www.w3.org/1998/Math/MathML">
 <mrow>
  <mi>m</mi><mo>=</mo><mfrac>
   <mrow>
    <msub>
     <mi>m</mi>
     <mn>0</mn>
    </msub>
   </mrow>
   <mrow>
    <msqrt>
     <mrow>
      <mn>1</mn><mo>&#x2212;</mo><mfrac>
       <mrow>
        <msup>
         <mi>v</mi>
         <mn>2</mn>
        </msup>
       </mrow>
       <mrow>
        <msup>
         <mi>c</mi>
         <mn>2</mn>
        </msup>
       </mrow>
      </mfrac>
     </mrow>
    </msqrt>
   </mrow>
  </mfrac>
 </mrow>
</math>
```

`<mi>` → identifier
`<mo>` → operator
`<mn>` → number

$$m = \frac{m_0}{\sqrt{1 - \dfrac{v^2}{c^2}}}$$

No Distractions
For Screen Readers

- "Distraction" – any of a number of Web page conventions which can interfere with a screen reader operation, keyboard operation or cause significant reading issues for people with multiple cognitive or neurological disorders.

- Distractions include the following:
  - Videos playing automatically
  - Continuous background audio
  - Continuous slideshows
  - Scrolling text or text that disappears/changes
  - Pop up ads
  - Blinking objects/flashing lights

PDF IS NOT THE MOST ACCESSIBLE FORMAT

- **Full version of Adobe Acrobat needed to insert and inspect ALT text and other accessibility accommodations in PDF files.**

- **Harder to make PDF forms accessible than HTML forms .**

- **PDFs consisting of scanned pages are really a series of images, and therefore inaccessible to screen readers.**

  Only an OCR (optical character reader) scanner can save a scanned document as a text file.

- **The interface between a browser and a PDF file is not consistent across platforms and browsers.**

Consider:

- **Posting in PDF <u>and</u> native formats like Word or PowerPoint**

- **Taking extra steps to make accessible PDFs**

Hearing Disability

Ms. Martinez

Accommodating the Hard of Hearing

- She had little trouble with the University curriculum until the university upgraded their online material to a multimedia approach, using an extensive collection of audio lectures.

- For classroom-based lectures the university provided sign language interpreters and CART writers (professionals typing what is being said verbatim).

- However, for web-based instruction, they initially did not realize that accessibility was an issue, then said they had no idea how to provide the material in accessible format.

ACCESSIBLE MULTIMEDIA

Videos can include text.

Videos can be closed captioned.

Steven Pinker: Linguistics as a Window to Understanding the Brain

SOME ADDITIONAL HTML/CSS BEST PRACTICES

HYPERLINK TEXT

■ The content of a link should be text that clearly indicates where the link is going.
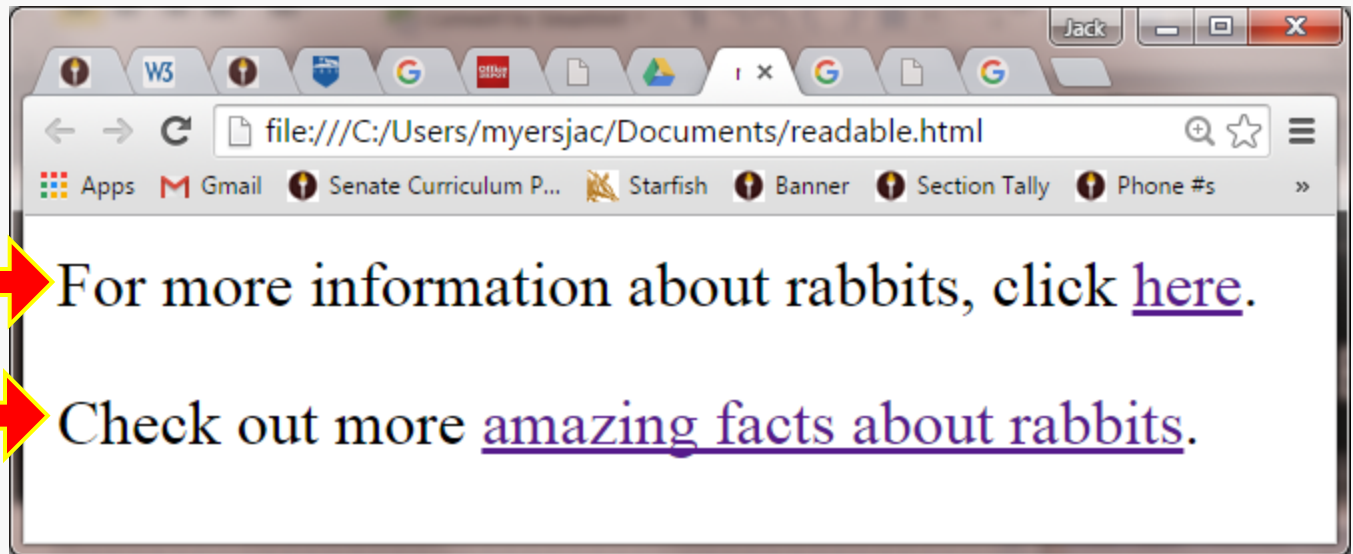
OTHER ACCESSIBILITY TIPS

<LABEL> TAGS
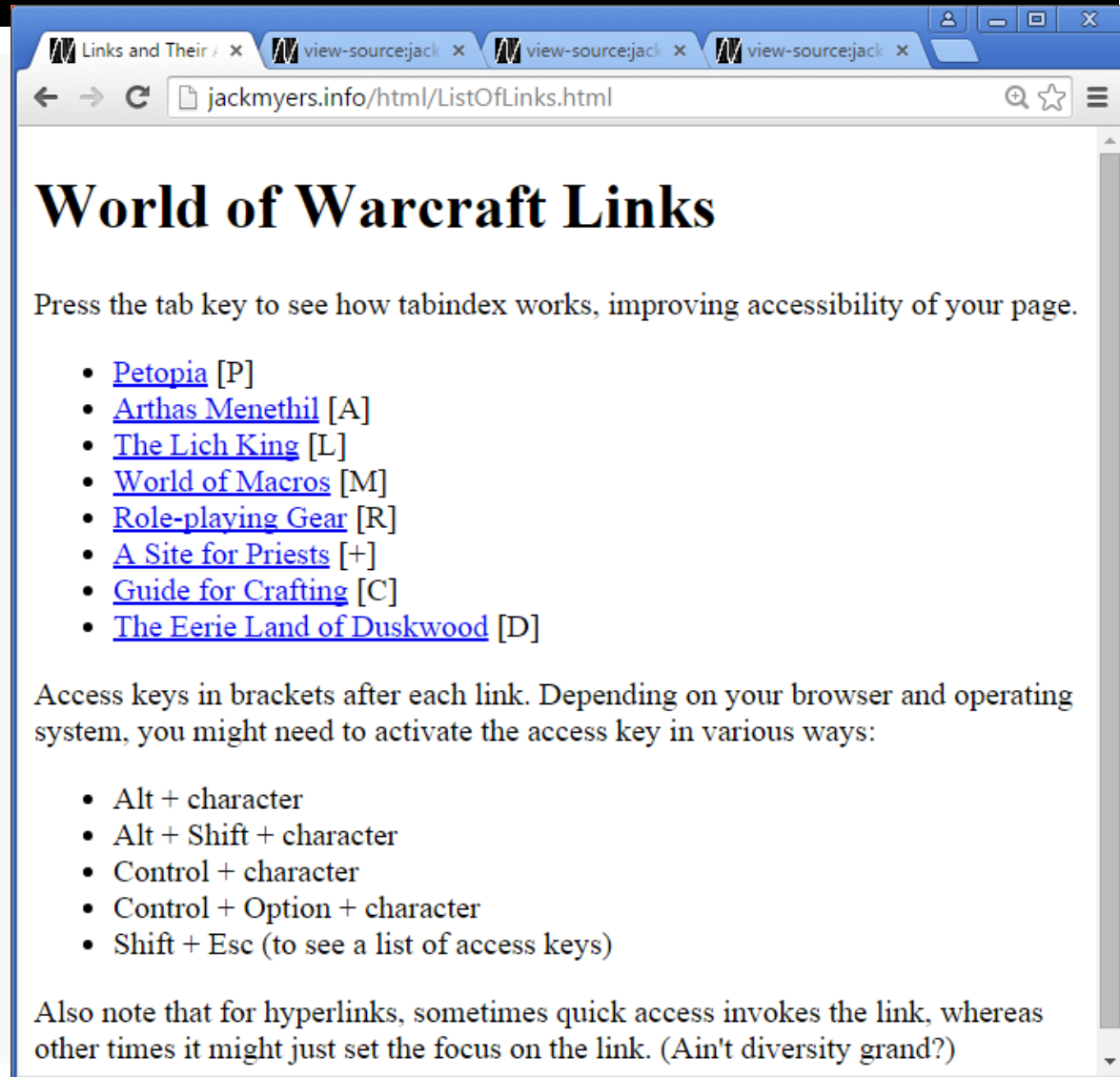
- **Accessibility guideline**
  - Use labels with radio buttons and check boxes and other controls so the user can click on the label text to select the control that the label is associated with. This also helps assistive devices.

```html
<form method="post" action="/php/FormVariables.php" autocomplete="on">
   <fieldset>
      <legend>Your information</legend>
      <p><label for="name">Name: <input type="text" id="name" name="name" required autofocus></label></p>
      <p><label for="email">Email: <input type="email" id="email" name="email" ></label></p>
         <p><label for="phone">Phone: <input type="tel" name="phone" id="phone"></label></p>
      <p><label for="site">Web site: <input type="url" id="site" name="site"></label></p>

      <p><label for="primRole">Primary role: </label>
      <select id="primRole" name="primRole">
            <option value="NoChoice">Please select one value from list</option>
         <optgroup label="Infrastructure">
            <option value="NW">Networks</option>
            <option value="Devices">Client Devices</option>
            <option value="Srv">Application Hosting (Servers, Storage...)</option>
            <option value="Sec-ID">Security and Identity Services</option>
         </optgroup>
```

<TABINDEX> AND <ACCESSKEY>

Setting a proper tab order and providing access keys improves the accessibility for users who can't use a mouse.

World of Warcraft Links

Press the tab key to see how tabindex works, improving accessibility of your page.

- Petopia [P]
- Arthas Menethil [A]
- The Lich King [L]
- World of Macros [M]
- Role-playing Gear [R]
- A Site for Priests [+]
- Guide for Crafting [C]
- The Eerie Land of Duskwood [D]

Access keys in brackets after each link. Depending on your browser and operating system, you might need to activate the access key in various ways:

- Alt + character
- Alt + Shift + character
- Control + character
- Control + Option + character
- Shift + Esc (to see a list of access keys)

Also note that for hyperlinks, sometimes quick access invokes the link, whereas other times it might just set the focus on the link. (Ain't diversity grand?)

<TABINDEX> AND <ACCESSKEY>

```html
<li><a tabindex="1" accesskey="p" title="Pets for Hunters" href="http://w
<li><a tabindex="2" accesskey="a" title="Before becoming Lich King" href=
<li><a tabindex="3" accesskey="l" title="Lich King background" href="http
<li><a tabindex="4" accesskey="m" title="Guide to building macros" href="
<li><a tabindex="5" accesskey="r" title="Cool clothes for RP" href="http
<li><a tabindex="6" accesskey="+" title="Info on the Priest class" href="
<li><a tabindex="7" accesskey="c" title="How to Make Stuff" href="http:/
<li><a tabindex="8" accesskey="d" title="Info on the Duskwood region" hre
```

- Setting a proper tab order and providing access keys improves the accessibility for users who can't use a mouse.

CSS: HOVER AND FOCUS

- **Accessibility guideline**
  - Apply the same formatting to the :hover and :focus pseudo-classes for an element.
  - That way, those who can't use the mouse will have the same experience as those who can.

```
<style>
    a:focus    { color: Red; }
    a:hover    { color: Red; }
</style>
```

SOME ACCESSIBILITY PLUGINS

Chrome Accessibility

Extensions to improve your Chrome experience

High Contrast
Google Accessibility

Change or invert the color scheme to make webpages easier to read.

★ RATE IT

Productivity

★★★☆☆ (2070)

G

Image Alt Text Viewer
Google Accessibility

Replace images with their alt text.

★ RATE IT

Accessibility

★★★★☆ (357)

G

Color Enhancer
Google Accessibility

A customizable color filter applied to webpages to improve color perception.

★ RATE IT

Accessibility

★★★★☆ (498)

G

Caret Browsing
Google Accessibility

Browse the text of web pages using arrow keys.

★ RATE IT

Accessibility

★★★★☆ (355)

G

Long Descriptions in Context Menu
Google Accessibility

Right-click on anything with a "longdesc" or "aria-describedat" attribute to access its long description.

★ RATE IT

Accessibility

★★★★☆ (452)

G

Used Desk for Sale on ebay

IMAGE ALT TEXT VIEWER

- As shown in previous slide, there is a lot of useful information represented in images.

- BUT.... each image and each thumbnail has the exact same ALT attribute

Sauder-Edge-Water-Computer-Desk-Estate-Black-Finish

Images have been replaced by their alt text. Undo

Color Enhancer
To Adjust RGB Values

High Contrast Tool

USER STYLESHEETS

- Users can create a custom stylesheet that can override CSS settings
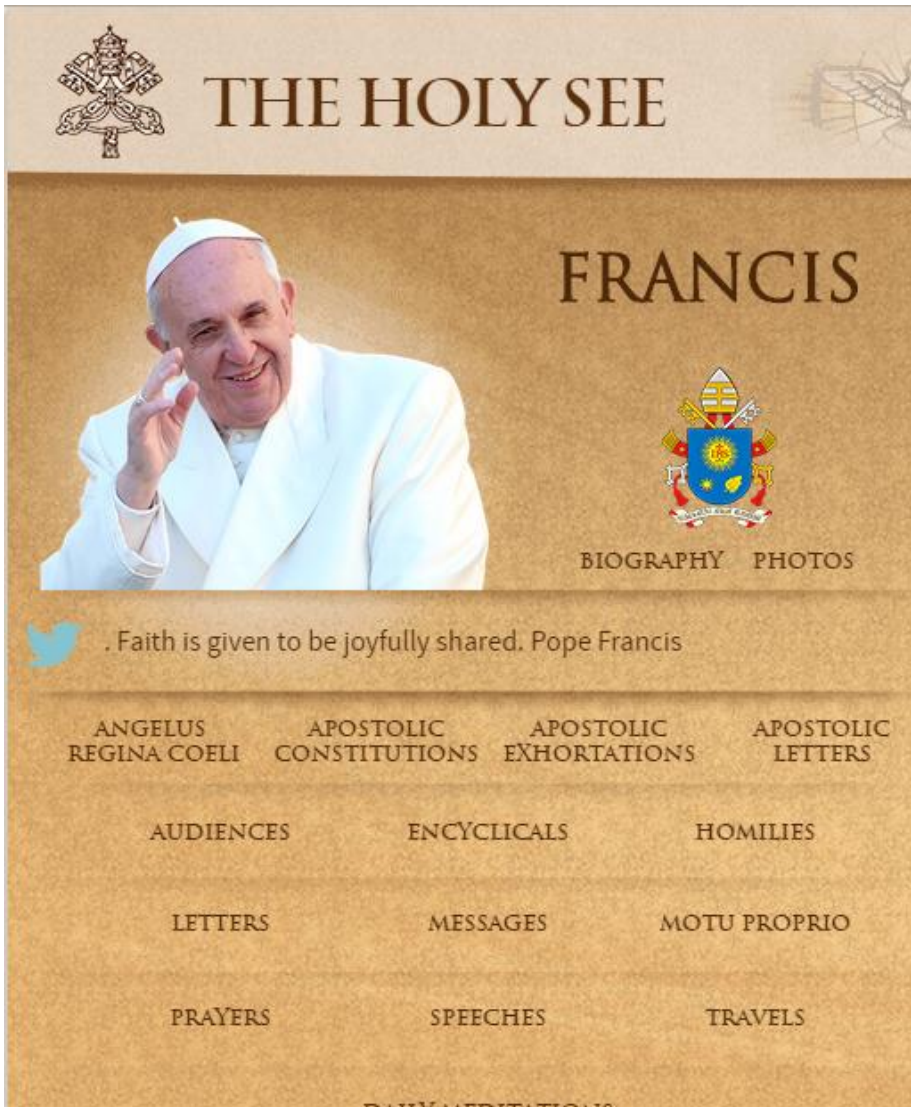
```
Code 1
1 ▾    * { background-color: white !important;
2         color: black !important;
3         font-family: Arial !important;
4         font-weight: bold !important; }
```

- Chrome extensions like "Stylish" can enforce user preferences
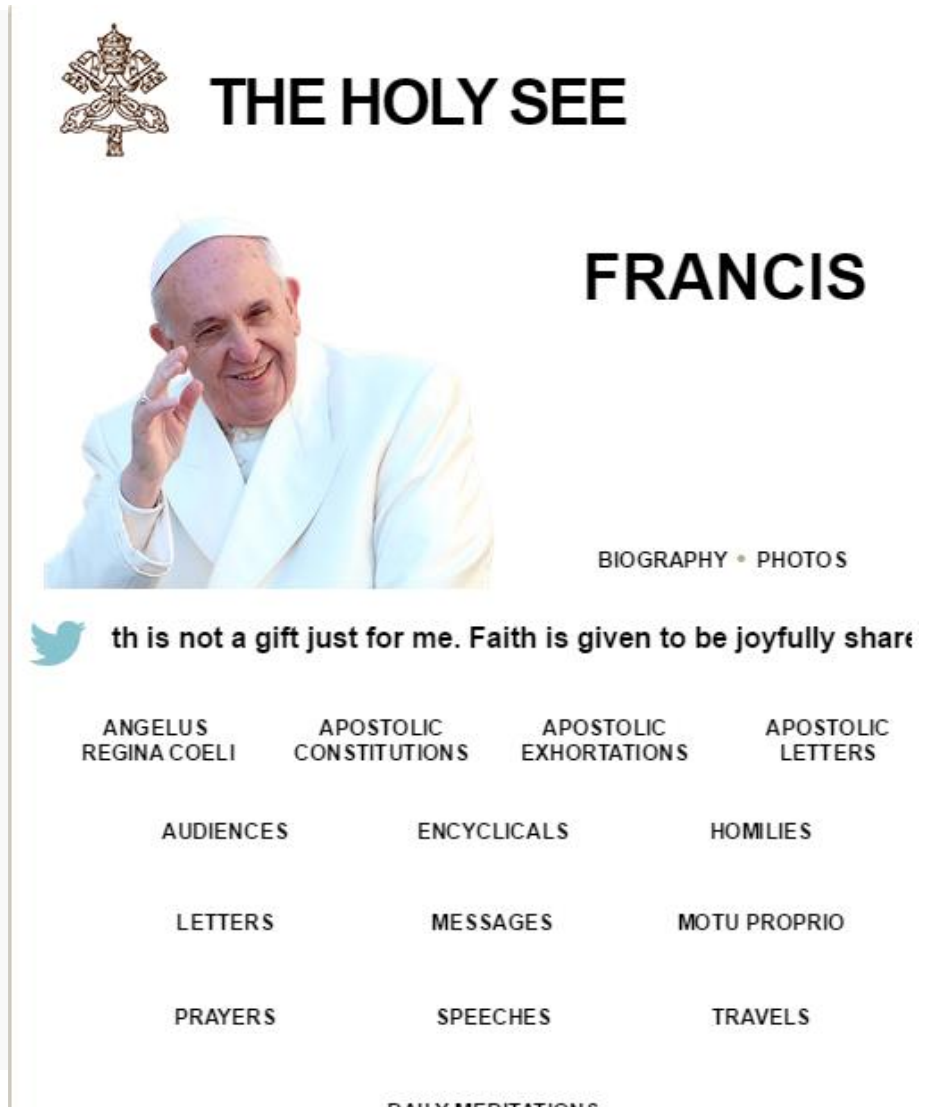
User Stylesheets

References

- Accessibility and Usability at Penn State
  http://accessibility.psu.edu/

- Web Design and Applications: Accessibility from W3C
  http://www.w3.org/standards/webdesign/accessibility

- Web Accessibility Initiative: How People with Disabilities Use the Web from W3C
  http://www.w3.org/WAI/intro/people-use-web/stories.html

- Chrome Web Store: Chrome Accessibility (Extensions)
  https://chrome.google.com/webstore/category/collection/accessibility

- The WebbIE Web Browser
  http://www.webbie.org.uk/webbrowser/index.htm

- Stylish (from the Chrome Web Store)

- Color Contrast Ratio Calculator
  http://www.msfw.com/Services/ContrastRatioCalculator

- Causes of Color: How do things look to people with colorblindness or cataracts?
  http://www.webexhibits.org/causesofcolor/2.html