INTRODUCTION P5

PETRA ISENBERG

INFOVIS

CODING ENVIRONMENT

p5js.org/

English Español 简体中

p5.js

Processing community times JavaScript community

Home

Editor

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Get Started

Reference

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Books

Community

Forum

GitHub

Twitter

Hello!

Search p5js.org

p5.js is a JavaScript library for creative coding, with a focus on making coding accessible and inclusive for artists, designers, educators, beginners, and anyone else! p5.js is free and open-source because we believe software, and the tools to learn it, should be accessible to everyone.

Using the metaphor of a sketch, p5.js has a full set of drawing functionality. However, you're not limited to your drawing canvas. You can think of your whole browser page as your sketch, including HTML5 objects for text, input, video, webcam, and sound.

Start creating with the p5 Editor!

Community

We are a community of, and in solidarity with, people from every gender

Processing

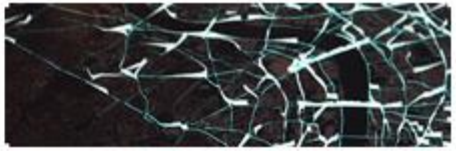
Welcome to Processing 3! Dan explains the new features and changes; the links Dan mentions are on the Vimeo page.

» Download Processing
» Browse Tutorials
» Visit the Reference

Processing is a flexible software sketchbook and a language for learning how to code within the context of the visual arts. Since 2001, Processing has promoted software literacy within the visual arts and

» Exhibition

Fluid Leaves
by Reinoud van Laar



cf.city flows
by Till Nagel and Christopher Pietsch

SOME EXAMPLES OF PAST STUDENT PROJECTS WITH THE DATA & P5

MEMBER HUNTER --- FIND THE NEXT COMMITTEE BOARD

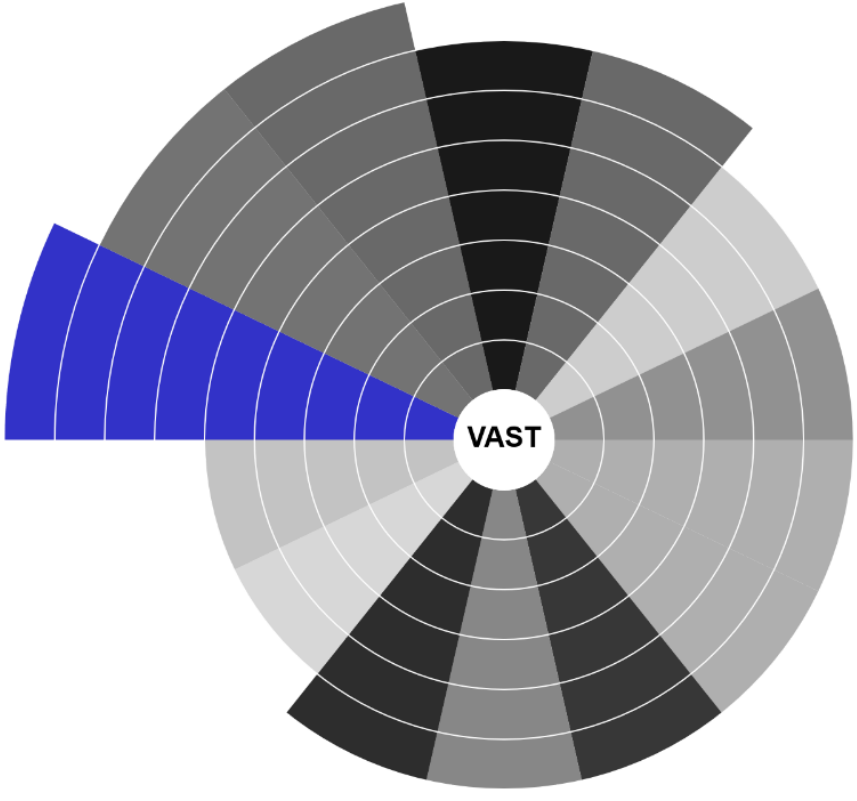
by ranking past experience and publications

Vis	VAST	InfoVis	SciVis

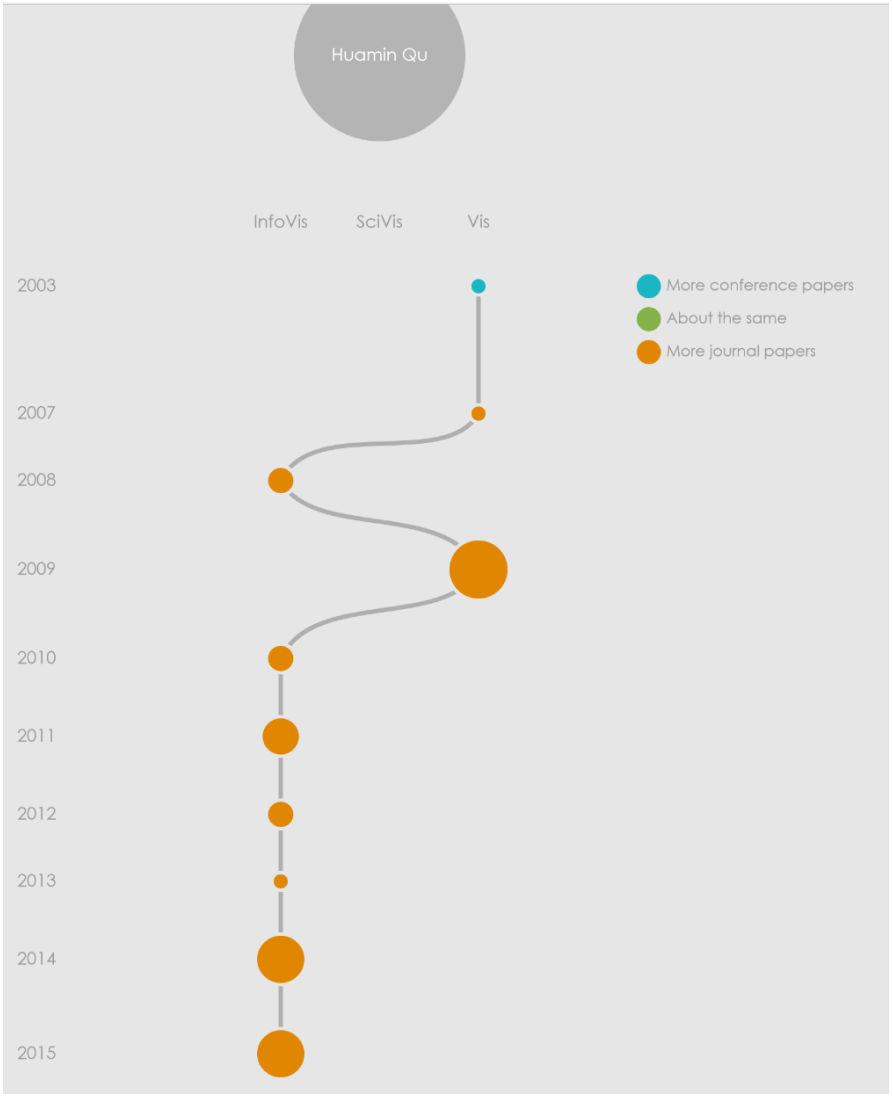
Recommened Authors for Next Committe

0 30

North, C. 9 papers
Ribarsky, W.
Huamin Qu
Maciejewski, R.
Koch, S.
Xiaoyu Wang
Silva, C.T.
Shixia Liu
Schreck, T.
Ertl, T.
Endert, A.
Ebert, D.S.
Wenwen Dou
Perer, A.



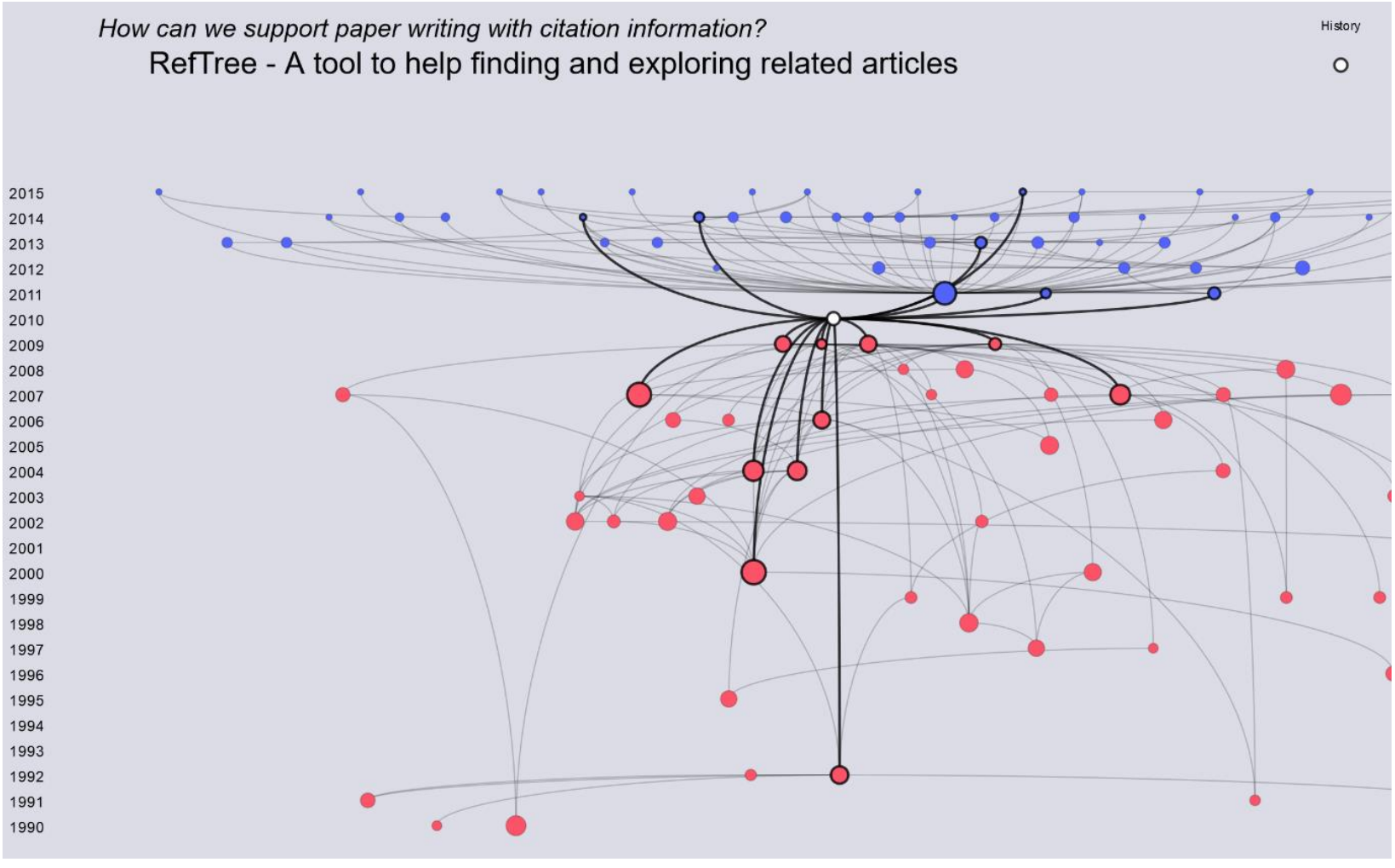
Lai


Huamin Qu
InfoVis
SciVis
Vis
2003
2007
2008
2009
2010
2011
2012
2013
2014
2015
More conference papers
About the same
More journal papers

Von Freyend

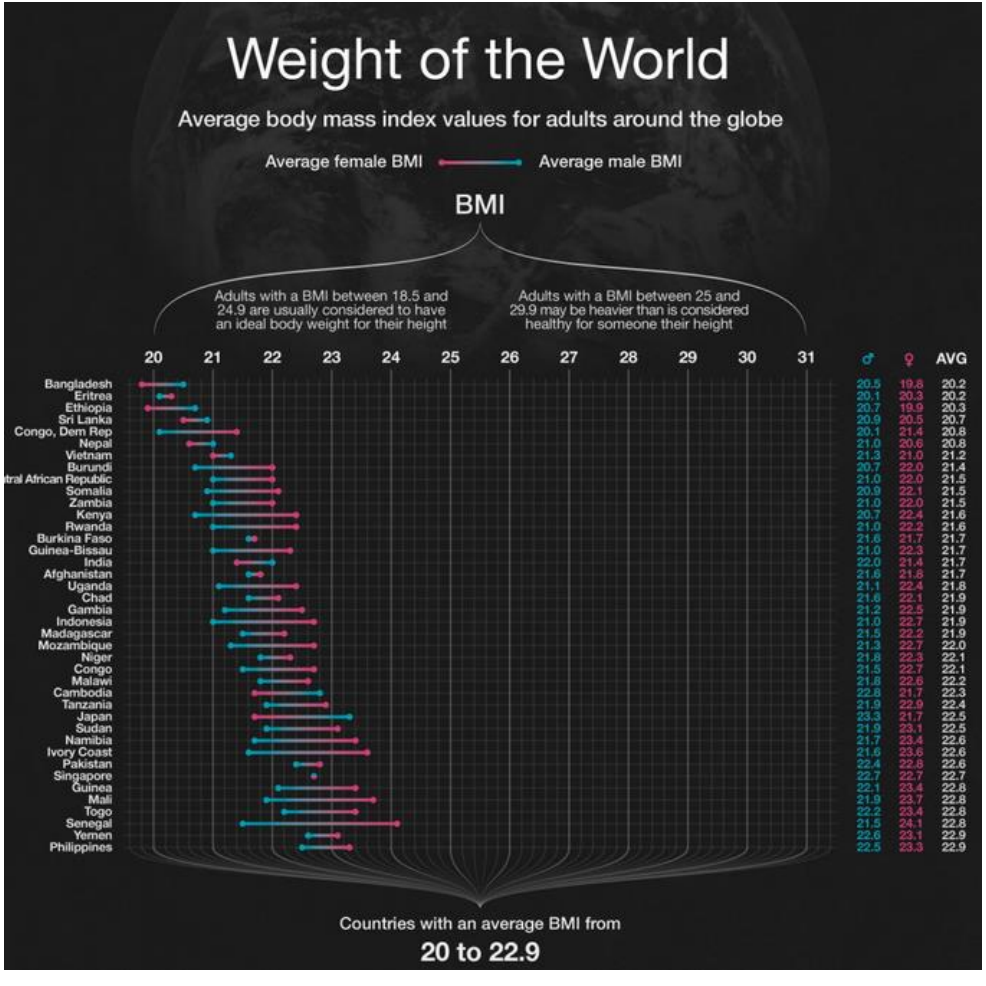
How can we support paper writing with citation information?

RefTree - A tool to help finding and exploring related articles



He

WHAT WE WILL BE BUILDING TODAY



https://www.indexmundi.com/blog/index.php/2013/04/11/body-mass-index-bmi-by-country/

DOWNLOAD

Get your favorite text editor

On windows, e.g. Notepad++

Start coding using the p5.js Editor, no setup required!

Twitter

Complete Library

This is a download containing the p5.js library file, the p5.sound addon, and an example project. It does not contain an editor. See Get Started to learn how to setup a p5.js project.

p5.js complete

Includes:
p5.js, p5.sound.js, and an example project
Version 0.10.2 (October 14, 2019)

Single Files

These are downloads or links to the p5.js library file. No additional contents are included.

p5.js

Single file:
Full uncompressed version

p5.min.js

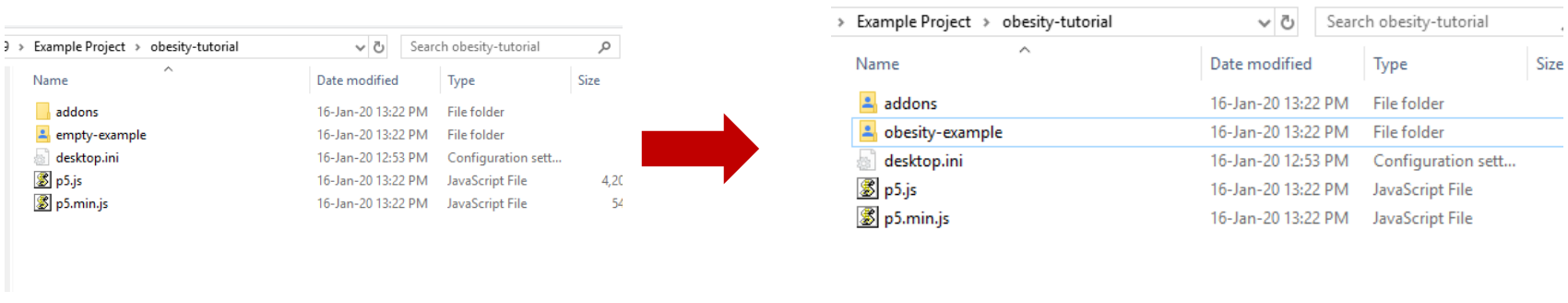
Single file:
Compressed version

CDN

Link:
Statically hosted file

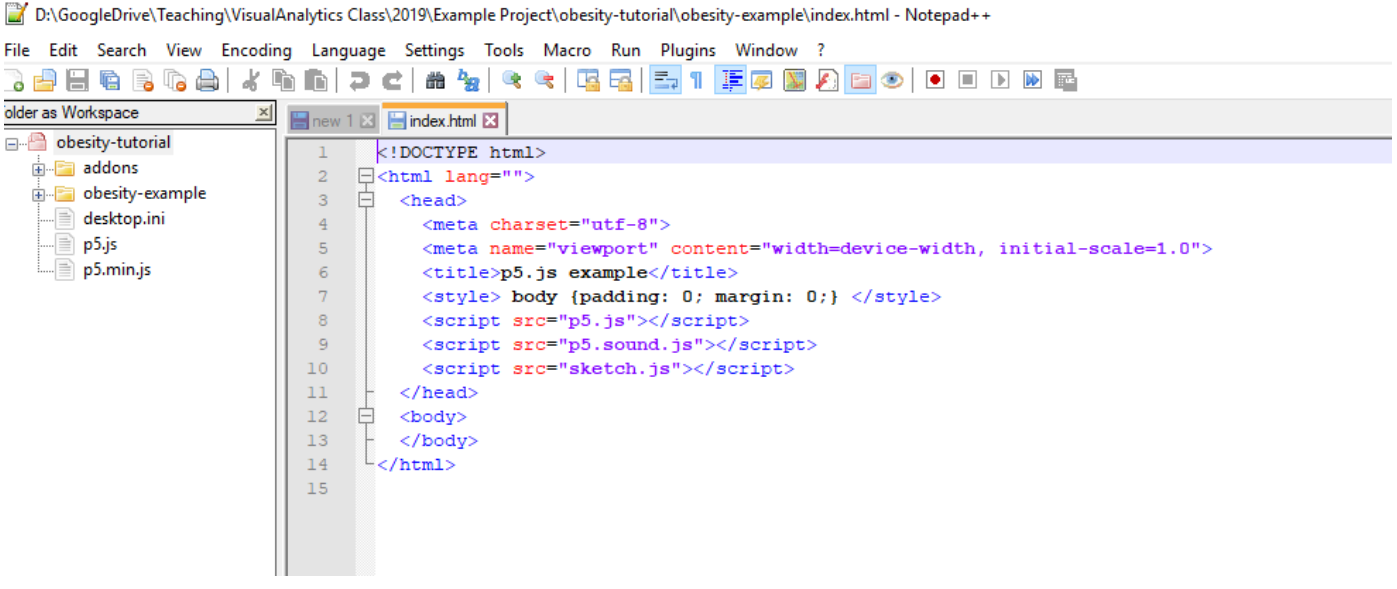
P5 COMPLETE

- Extract into a folder
- Rename the empty example to something useful, e.g. “obesity-example”

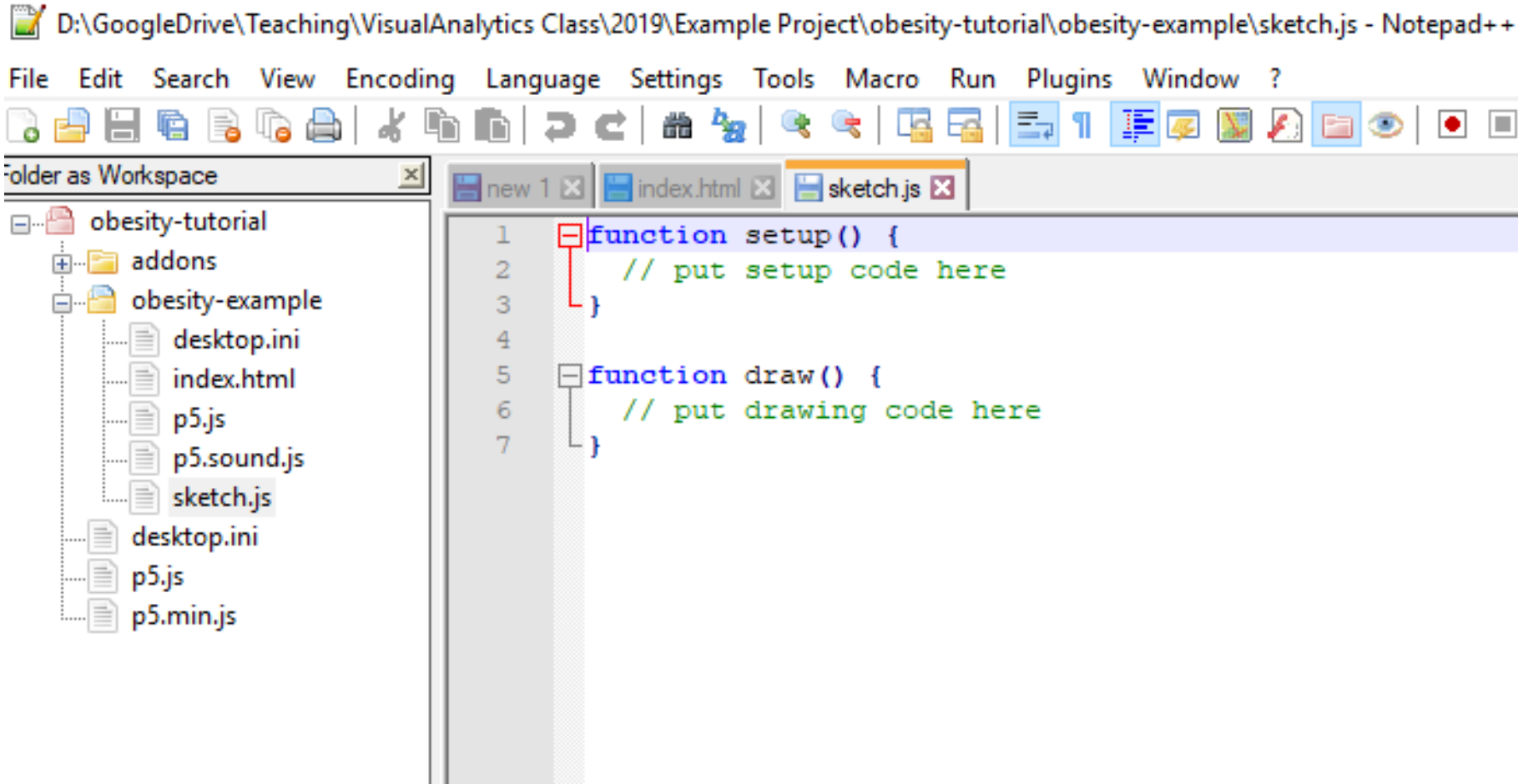


OPTIONAL - NOTEPAD++

- File -> Open folder as workspace



START


D:\GoogleDrive\Teaching\VisualAnalytics Class\2019\Example Project\obesity-tutorial\obesity-example\sketch.js - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
Folder as Workspace
obesity-tutorial
addons
obesity-example
desktop.ini
index.html
p5.js
p5.sound.js
sketch.js
desktop.ini
p5.js
p5.min.js
new 1
index.html
sketch.js
1 function setup() {
2 // put setup code here
3 }
4
5 function draw() {
6 // put drawing code here
7 }

DOWNLOAD THE DATA FILE

10 min *Break* --> move to D104

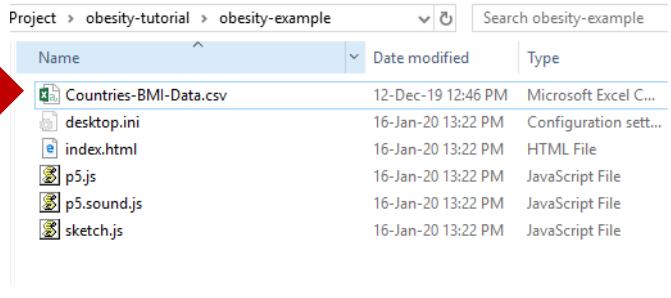
85 min Introduction to Tableau Isenberg)

16/01 - 13h30 (E212)

85 min Lecture: Multi-Dimensional Data and Time Δ (cc) BY-SA (Bezerianos)

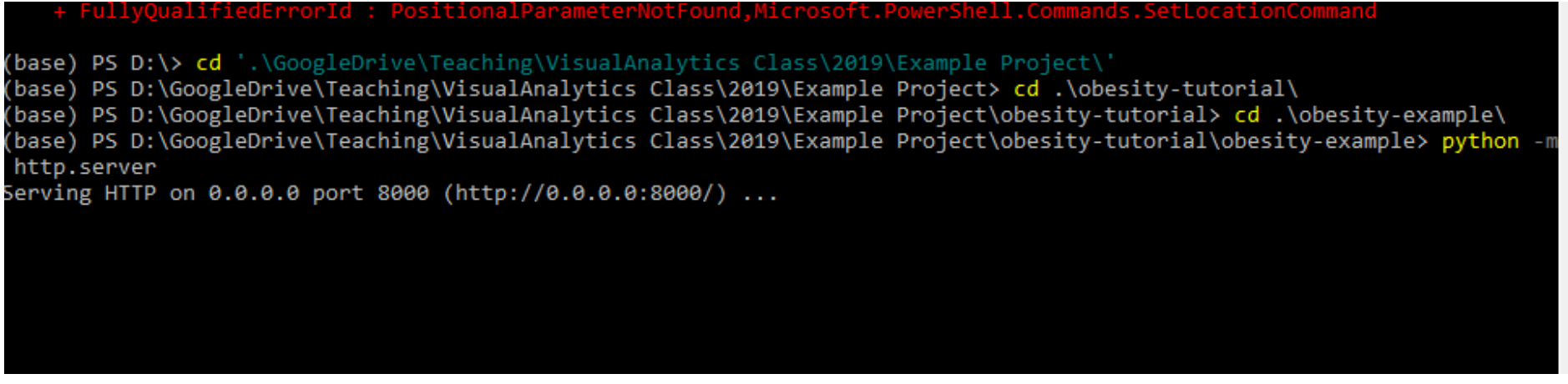
10 min *Break* --> move to D104

Tutorial: Introduction to P5 (Isenberg)

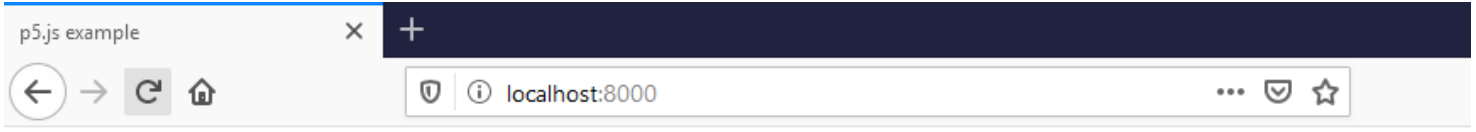


START A WEBSERVER

- Start webserver in your p5 sketch folder
- E.g. python -m http.server
  (python 3)

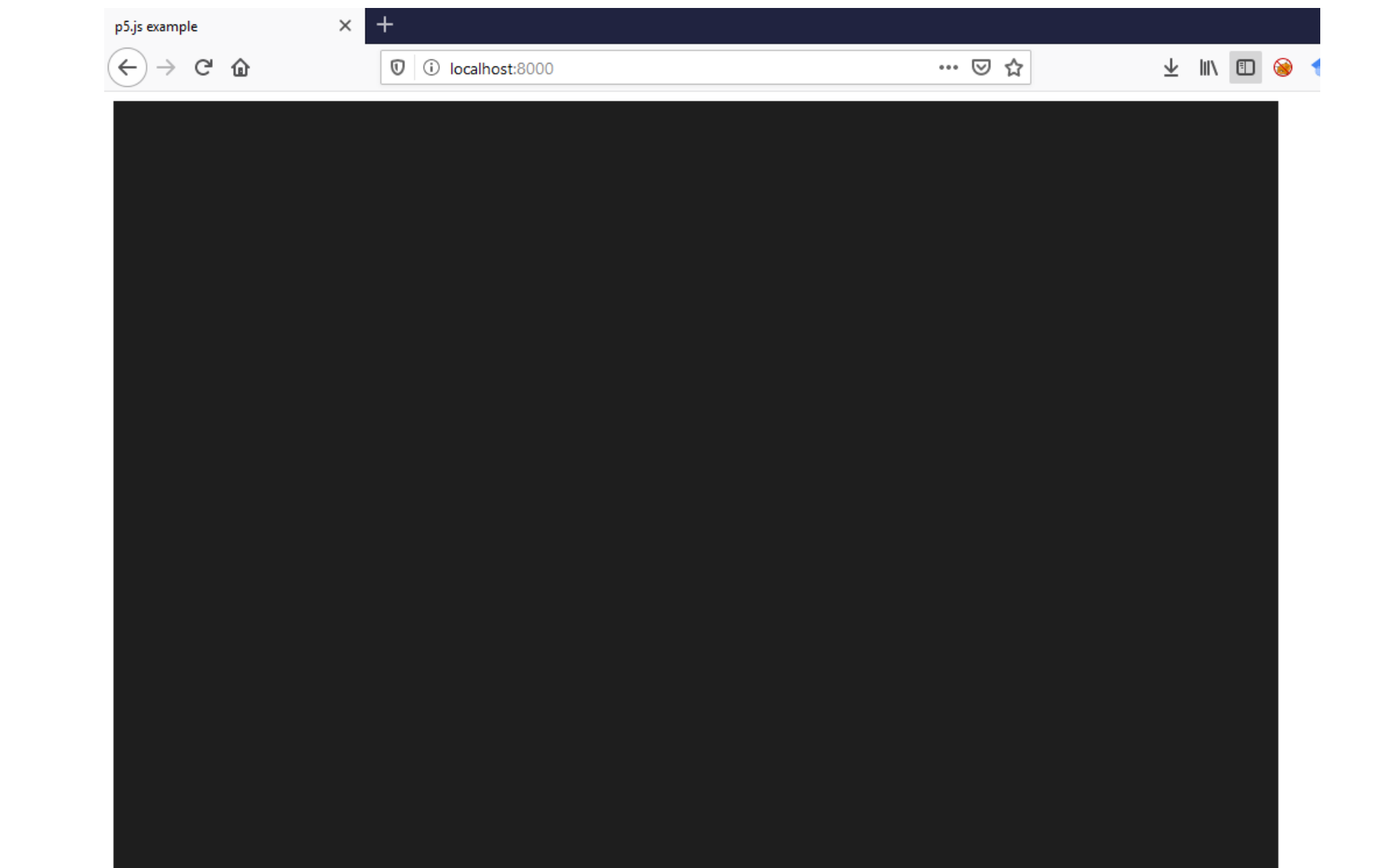


TRY OPENING...



```
1  var w = 1000;
2  var h = 3300;
3
4  function setup() {
5    createCanvas(w,h);
6
7  }
8
9  function draw() {
10   // put drawing code here
11   background(30);
12 }
```

Ctrl+Shift+R for reloading a refreshed js


p5.js example
localhost:8000

IF YOU WANT YOUR SKETCH

```
<!DOCTYPE html>
<html lang="">
  <head>
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width,
    initial-scale=1.0">
    <title>p5.js example</title>
    <style> body {text-align:center;padding: 0; margin: 0;} </style>
    <script src="p5.js"></script>
    <script src="p5.sound.js"></script>
    <script src="sketch.js"></script>
  </head>
  <body>
  </body>
</html>
```

```
1  var w = 1000;
2  var h = 3300;
3
4  function preload()
5  {
6      table = loadTable("Countries-BMI-Data.csv","csv","header");
7  }
8
9  function setup() {
10   createCanvas(w,h);
11
12 }
13
14 function draw() {
15   // put drawing code here
16   background(30);
17 }
```

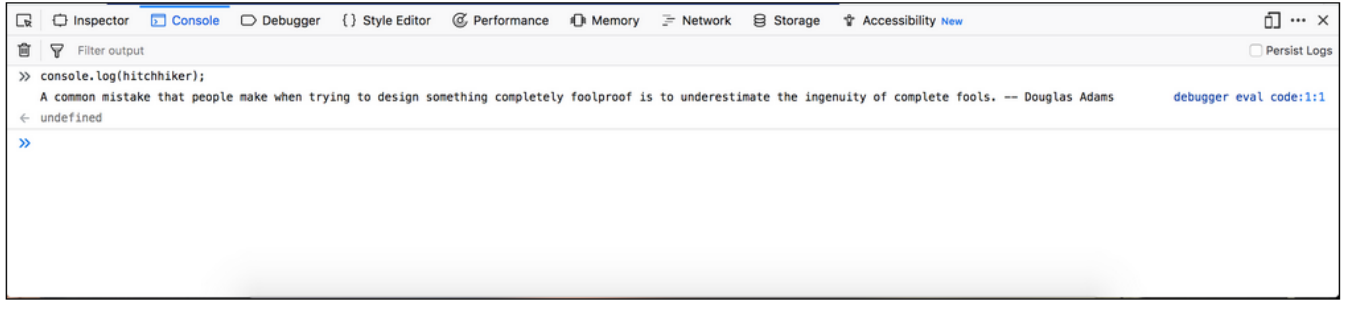
HOW CAN WE SEE THAT EVERYTHING IS OK?

Firefox

To open the Web Console:

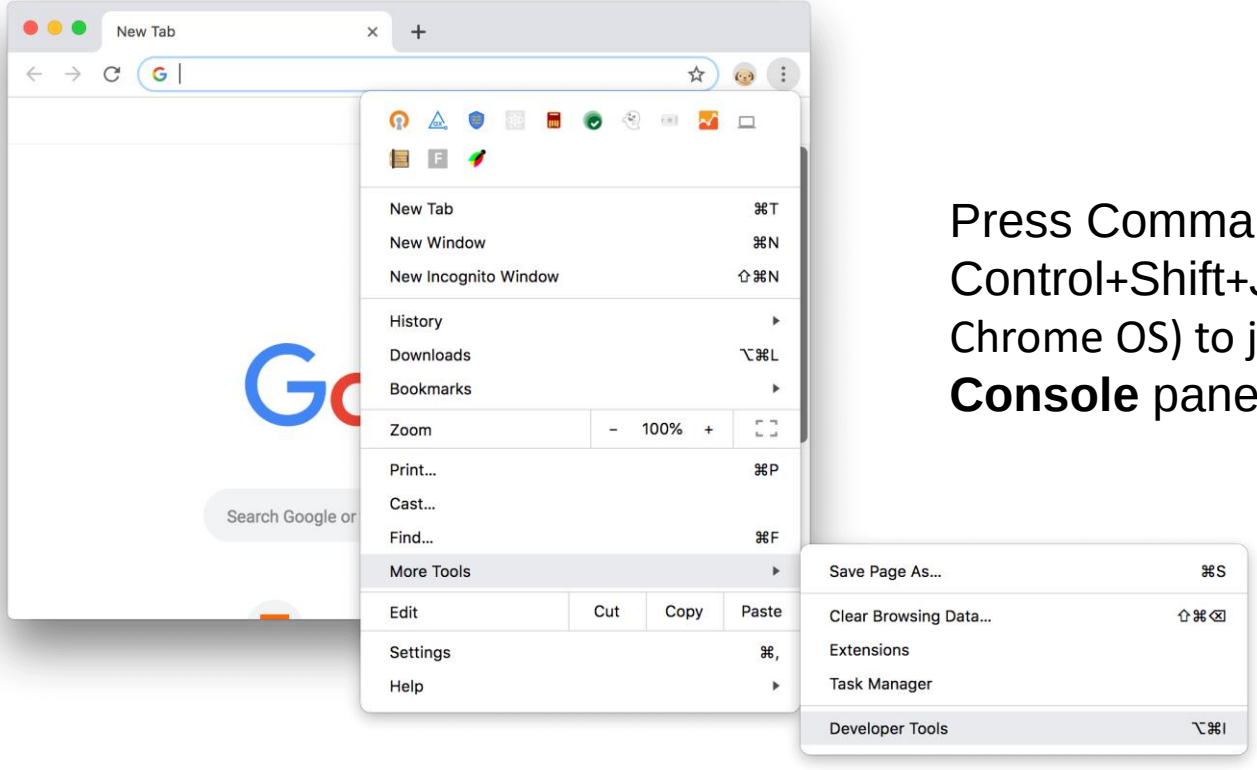
- either select "Web Console" from the Web Developer submenu in the Firefox Menu (or Tools menu if you display the menu bar or are on Mac OS X)
- or press the `Ctrl` `Shift` `K` (`Command` `Option` `K` on OS X) keyboard shortcut.

The Toolbox will appear at the bottom of the browser window, with the Web Console activated (it's just called "Console" in the DevTools toolbar):



HOW CAN WE SEE THAT EVERYTHING IS OK?

Chrome

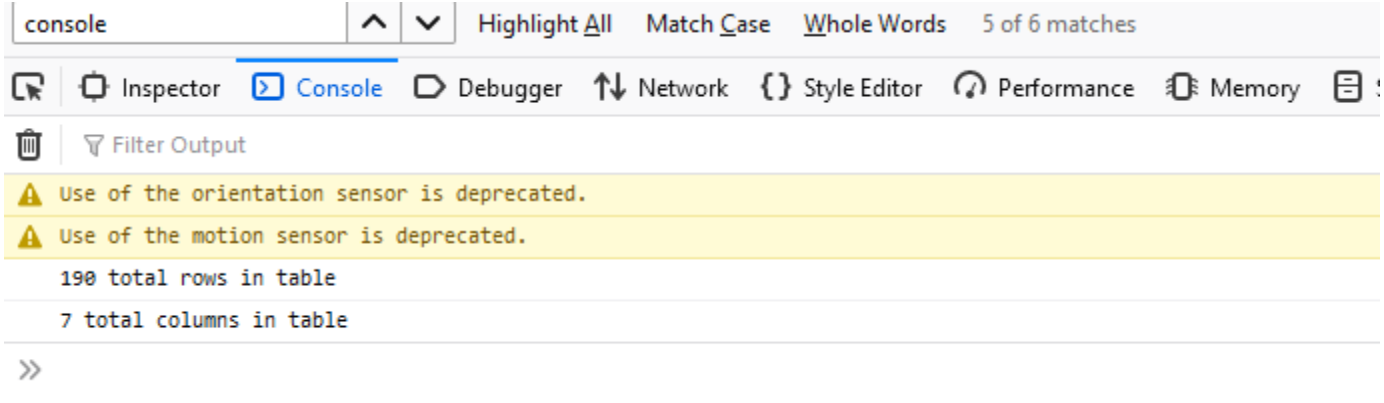


Press Command+Option+J (Mac) or Control+Shift+J (Windows, Linux, Chrome OS) to jump straight into the **Console** panel.

CHECK THE DATA LOADED OK

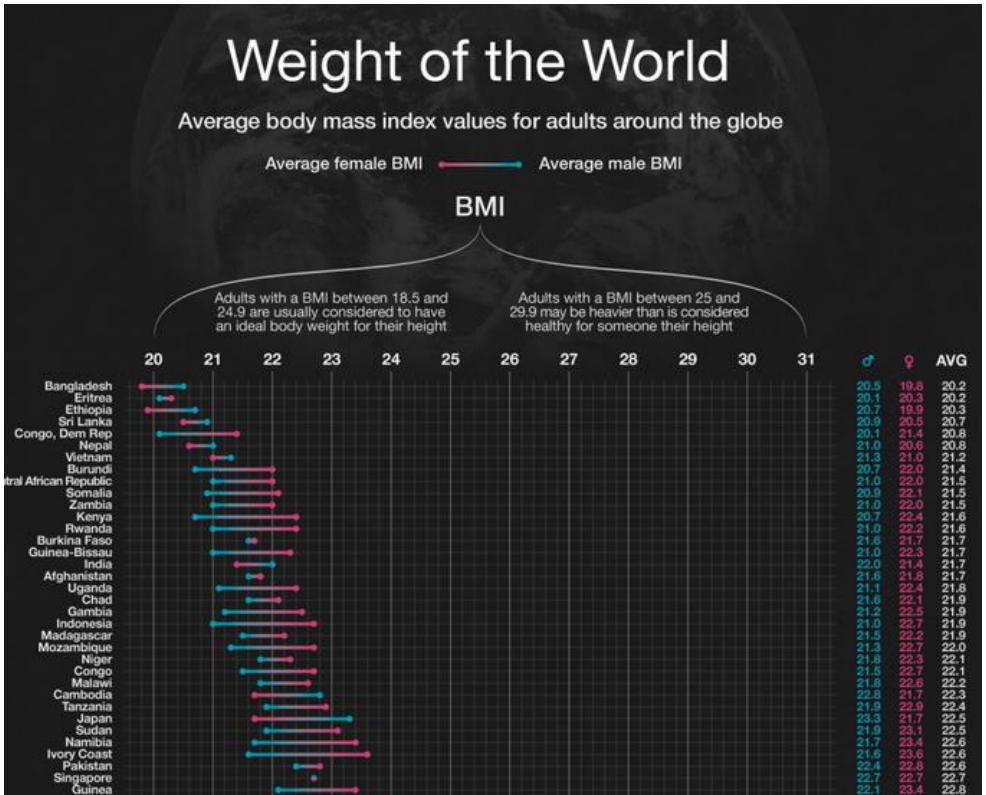
Add in setup() & check output in console by reloading index.html on your browser

```
console.log(table.getRowCount() + " total rows in table");
console.log(table.getColumnCount() + " total columns in table");
```


console
Highlight All
Match Case
Whole Words
5 of 6 matches
Inspector
Console
Debugger
Network
Style Editor
Performance
Memory
Filter Output
Use of the orientation sensor is deprecated.
Use of the motion sensor is deprecated.
190 total rows in table
7 total columns in table

SUBSET THE DATA

What data do we need?



```
function setup() {
  createCanvas(w,h);
  console.log(table.getRowCount() + " total rows in table");
  console.log(table.getColumnCount() + " total columns in table");

  countries = table.getColumn("Country");
  meanBMI = table.getColumn("Overall mean BMI (kg/m2)").map(Number);
  femaleBMI = table.getColumn("Female mean BMI (kg/m2)").map(Number);
  maleBMI = table.getColumn("Male mean BMI (kg/m2)").map(Number);

}
```

NEXT: LIST ALL COUNTRIES

Bangladesh
Eritrea
Ethiopia
Sri Lanka
Congo, Dem Rep
Nepal
Vietnam
Burundi
Central African Republic
Somalia
Zambia
Kenya
Rwanda
Burkina Faso
Guinea-Bissau
India
Afghanistan
Uganda
Chad
Gambia
Indonesia
Madagascar
Mozambique
Niger
Congo
Malawi
Cambodia
Tanzania
Japan
Sudan
Namibia
Ivory Coast
Pakistan
Singapore
Guinea
Mali
Togo
Senegal
Yemen
Philippines

```
  //define some drawing parameters
  textFont('Arial'); //we want to use Arial everywhere
  fontHeight = 14;   //for the country names at least
  rowheight = 30;    //height of the row for each country
  rightMargin = 200; //how much space to keep free on the right (for later)
}

function draw() {
  background(30);

  //where we start drawing the country names
  y = 2*rowheight;

  //font parameters
  textSize(fontHeight);

  for(var i = 0; i < countries.length; i++)
  {
      fill(255);
      noStroke();
      text(countries[i], 0, y);

      y = y + rowheight;
  }
}
```

Press reload on the website and check the result

Cook Islands

Tonga

Samoa

Kuwait

Saint Kitts and Nevis

Saint Lucia

Kiribati

Palau

Federated States of Micronesia

Tuvalu

Qatar

Marshall Islands

Egypt

United Arab Emirates

Jordan

Belize

United States of America

Bahamas

Trinidad and Tobago

Barbados

Saudi Arabia

Libya

Bahrain

Not great, why?

CALCULATE LABEL LENGTH

```
function calculateLongestLabelLength(labels){

  //this function uses currently set font parameters
  longestLabelLength = 0;
  for(var i = 0; i < labels.length; i++)
  {
      tw = textWidth(labels[i]);
      if (tw > longestLabelLength) longestLabelLength = tw;
  }
  return longestLabelLength;
}
```

Beware: just counting # of characters would not be enough!

AUGMENT DRAW FUNCTION

```
39  function draw() {
40    background(30);
41
42    //where we start drawing the country names
43    y = 2*rowheight;
44
45    //font parameters
46    textSize(fontHeight);
47    longestLabelLength = calculateLongestLabelLength(countries);
48
49    for(var i = 0; i < countries.length; i++)
50    {
51        fill(255);
52        noStroke();
53
54        textAlign(RIGHT, CENTER);
55        text(countries[i], longestLabelLength, y);
56
57        y = y + rowheight;
58    }
59  }
```

Lebanon

Uruguay

Turkey

Argentina

Ireland

Andorra

Kazakhstan

El Salvador

Azerbaijan

Suriname

Jamaica

United Kingdom

Greece

Saint Vincent and the Grenadines

South Africa

Australia

Canada

LETS DRAW THE GRID

p5.js

Processing community times JavaScript community

Reference

Search reference

Can't find what you're looking for? You may want to check out p5.sound.
You can also download an offline version of the reference.

Color

Creating & Reading

alpha()
blue()
brightness()
color()
green()
hue()
lerpColor()
lightness()
red()
saturation()
p5.Color

Setting

background()
clear()
colorMode()
fill()
noFill()
noStroke()
stroke()
erase()
noErase()

Shape

2D Primitives

arc()
ellipse()
circle()
line()

Attributes

ellipseMode()
noSmooth()
rectMode()
smooth()

Curves

bezier()
bezierDetail()
bezierPoint()
bezierTangent()

p5.js

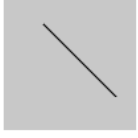
Processing community times JavaScript community

Reference

Search reference

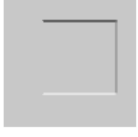
line()

Examples



```
line(30, 20, 85, 75);
```

edit reset copy

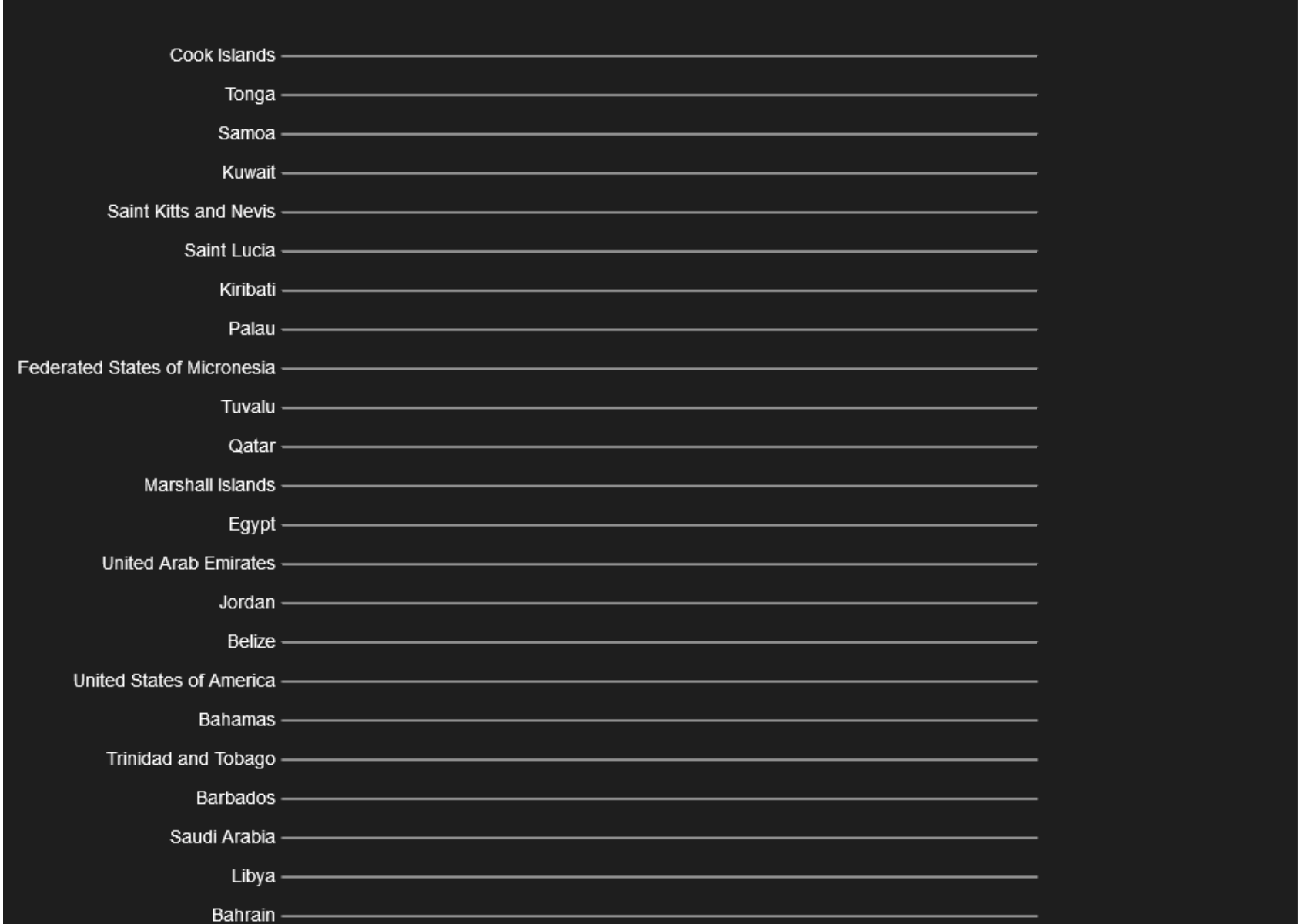


```
line(30, 20, 85, 20);
stroke(126);
line(85, 20, 85, 75);
stroke(255);
line(85, 75, 30, 75);
```

edit reset copy

Description

Draws a line (a direct path between two points) to the screen. The version of `line()` with four parameters draws the line in 2D. To color a line, use the `stroke()` function. A line cannot be filled, therefore the `fill()`

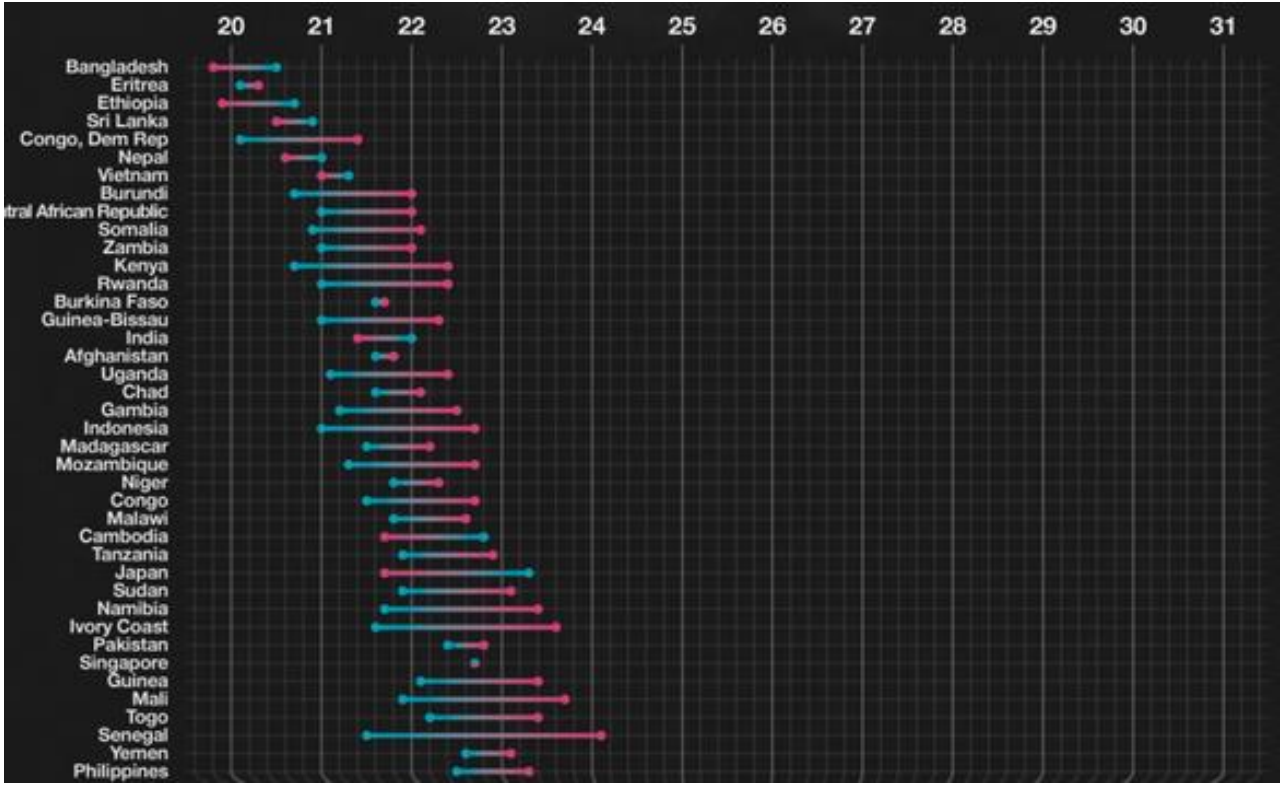

Cook Islands
Tonga
Samoa
Kuwait
Saint Kitts and Nevis
Saint Lucia
Kiribati
Palau
Federated States of Micronesia
Tuvalu
Qatar
Marshall Islands
Egypt
United Arab Emirates
Jordan
Belize
United States of America
Bahamas
Trinidad and Tobago
Barbados
Saudi Arabia
Libya
Bahrain

```
for(var i = 0; i < countries.length; i++)
{
    fill(255);
    noStroke();

    textAlign(RIGHT, CENTER);
    text(countries[i], longestLabelLength, y);

    //draw the line
    stroke(255);
    line(longestLabelLength + 5,y,w-rightMargin,y);


    y = y + rowheight;
}
```

Define your x1 and x2 as variables. We need them again later:

```
var linex1 = longestLabelLength + 5;
var linex2 = w-rightMargin;
```

WHAT DO WE NEED NOW?

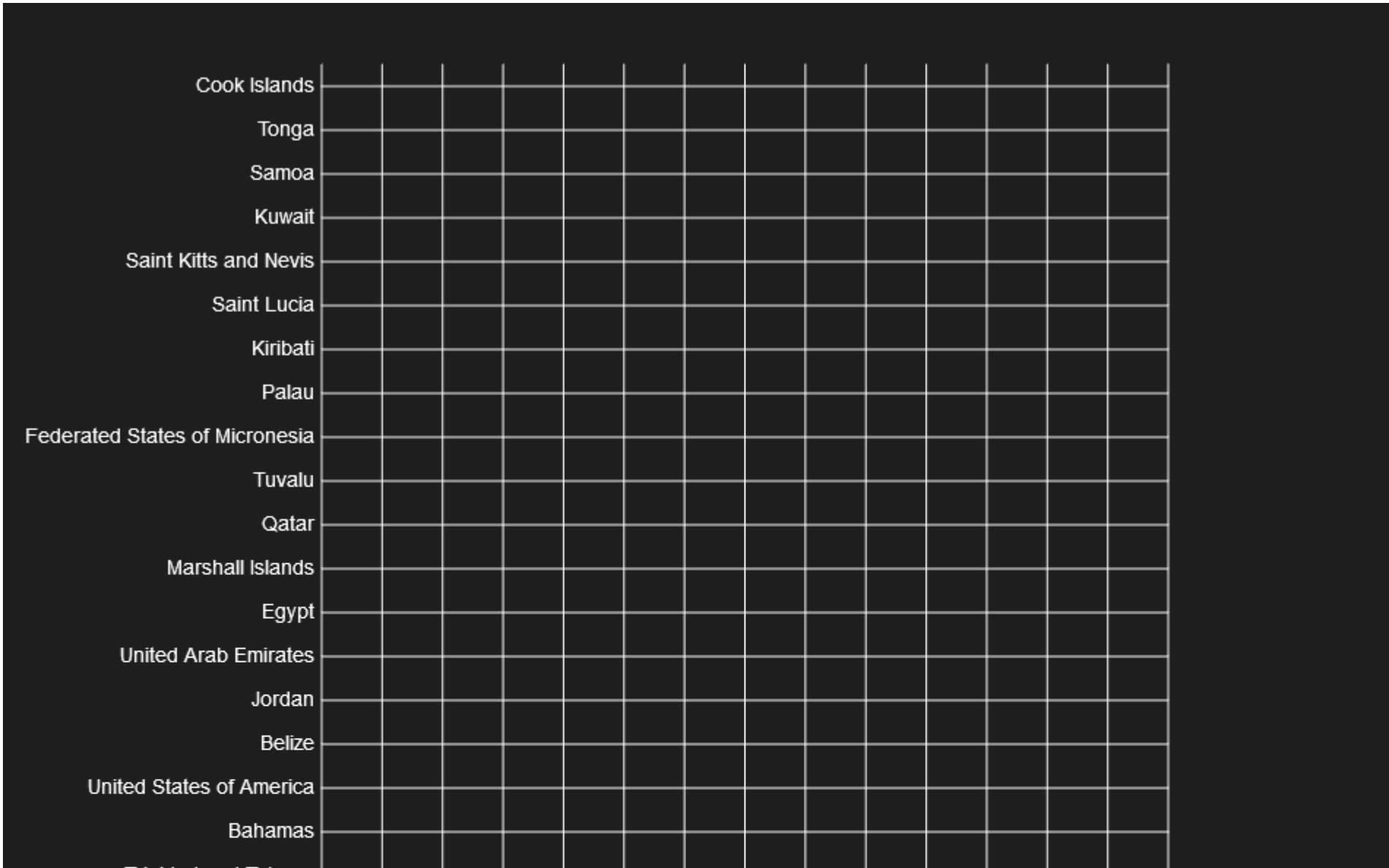


LETS CALCULATE THE RANGE OF OUR DATA

```
10  function setup() {
11    createCanvas(w,h);
12    console.log(table.getRowCount() + " total rows in table");
13    console.log(table.getColumnCount() + " total columns in table");
14
15    countries = table.getColumn("Country");
16    meanBMI = table.getColumn("Overall mean BMI (kg/m2)").map(Number);
17    femaleBMI = table.getColumn("Female mean BMI (kg/m2)").map(Number);
18    maleBMI = table.getColumn("Male mean BMI (kg/m2)").map(Number);
19
20    minBMI = min(min(femaleBMI),min(maleBMI));
21    maxBMI = max(max(femaleBMI),max(maleBMI));
22
23    //define some drawing parameters
24    textFont('Arial'); //we want to use Arial everywhere
25    fontHeight = 14;   //for the country names at least
26    rowheight = 30;    //height of the row for each country
27    rightMargin = 200; //how much space to keep free on the right (for later)
28  }
```

DRAWING THE GRID

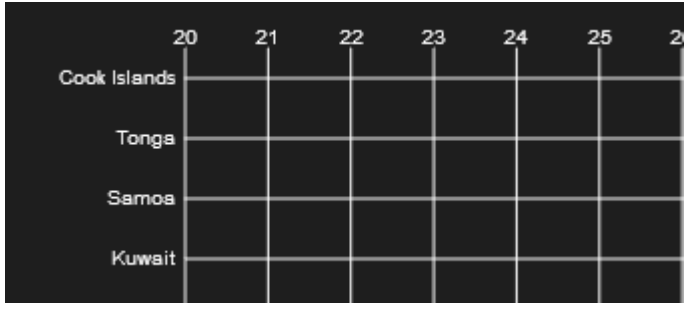
```
54    var linex1 = longestLabelLength + 5;
55    var linex2 = w-rightMargin;
56
57    while(i <= ceil(maxBMI)){
58        x = map(i,floor(minBMI),ceil(maxBMI),linex1,linex2);
59        stroke(255);
60        line(x,y-rowheight*0.5,x,y+rowheight * countries.length);
61
62        i = i + 1;
63    }
64
```


Cook Islands
Tonga
Samoa
Kuwait
Saint Kitts and Nevis
Saint Lucia
Kiribati
Palau
Federated States of Micronesia
Tuvalu
Qatar
Marshall Islands
Egypt
United Arab Emirates
Jordan
Belize
United States of America
Bahamas

ADDING SOME LABELS

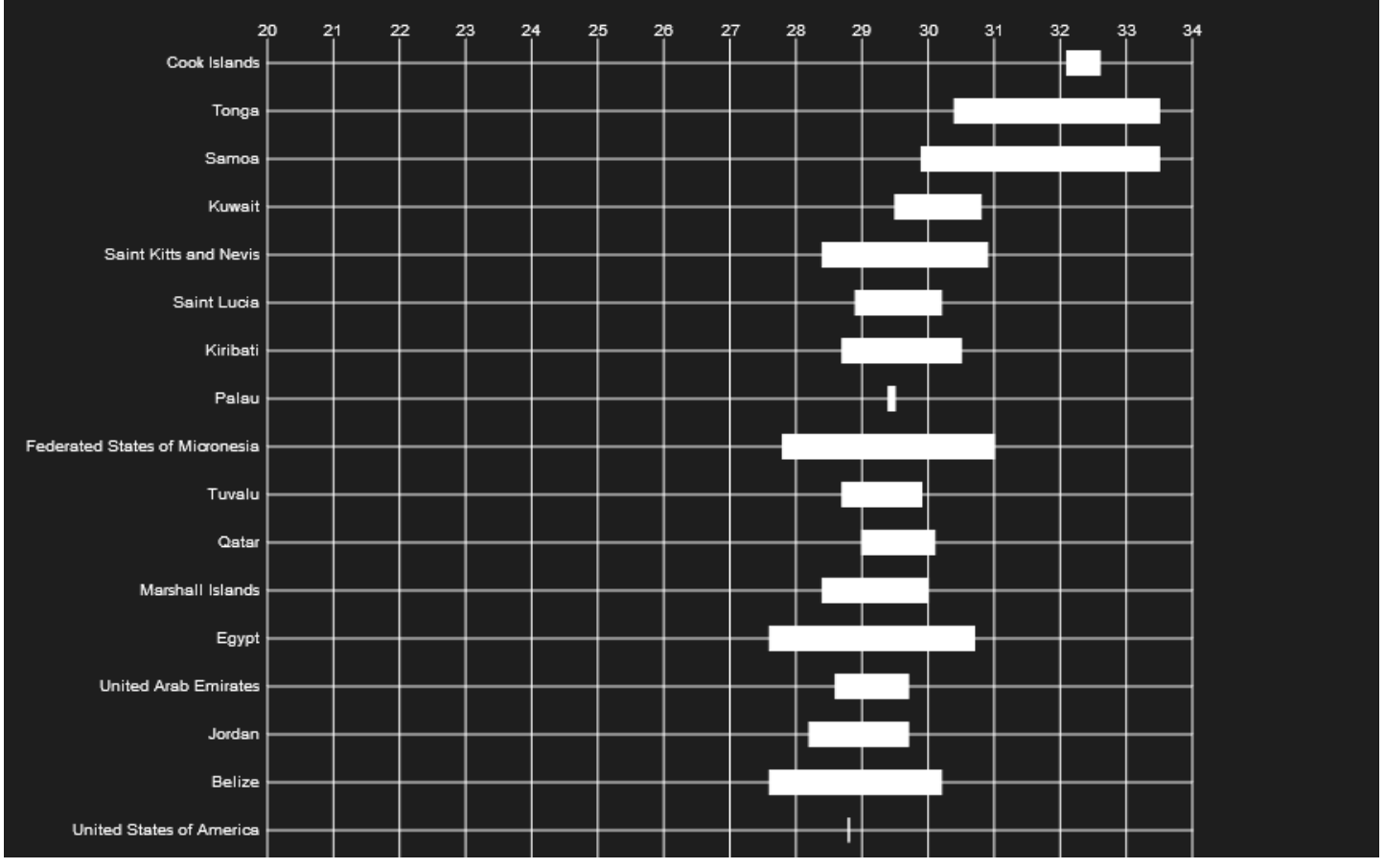
```
while(i <= ceil(maxBMI)){
    x = map(i,floor(minBMI),ceil(maxBMI),linex1,linex2);
    stroke(255);
    line(x,y-rowheight*0.5,x,y+rowheight * countries.length);

    fill(255);
    noStroke();
    textSize(fontHeight * 0.7);
    text(i,x,y-rowheight*0.5);

    i = i + 1;
}
```

YOU: fix the textAlign so that the labels are correctly aligned



WOHOO. NOW WE CAN DRAW DATA

```
73  for(var i = 0; i < countries.length; i++)
74  {
75      fill(255);
76      noStroke();
77
78      textAlign(RIGHT, CENTER);
79      text(countries[i], longestLabelLength, y);
80
81      //draw the line
82      stroke(255);
83      line(linex1,y,linex2,y);
84
85      //draw the data
86      fbmi = femaleBMI[i];
87      mbmi = maleBMI[i];
88      //draw the rectangle
89      x1 = map(fbmi,floor(minBMI),ceil(maxBMI),linex1,linex2);
90      x2 = map(mbmi,floor(minBMI),ceil(maxBMI),linex1,linex2);
91
92      rectMode(CORNERS);
93      rectangleHeight = rowheight * 0.5;
94      rect(x1,y-rectangleHeight*0.5,x2,y+rectangleHeight*0.5);
95
```


20
21
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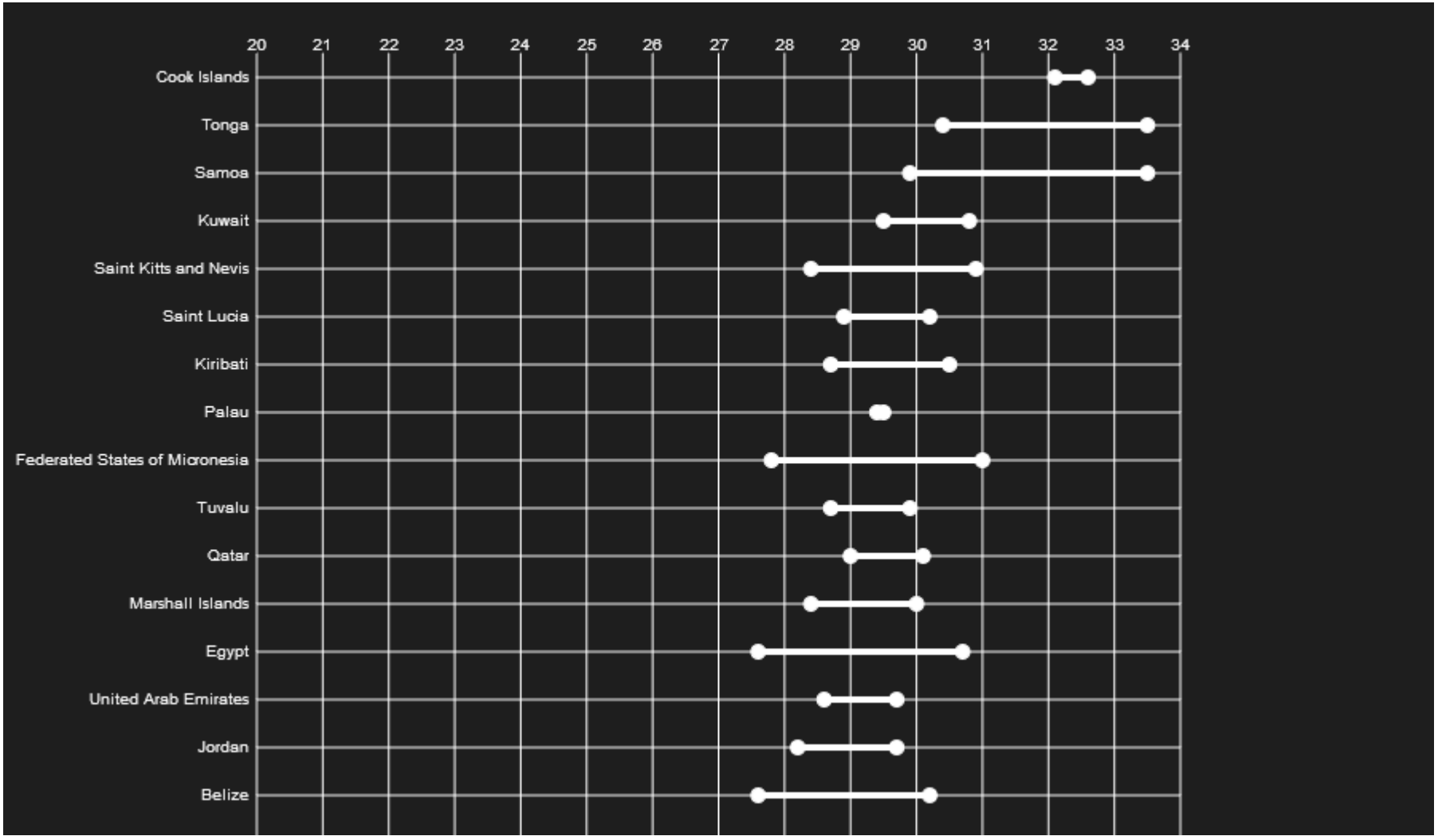
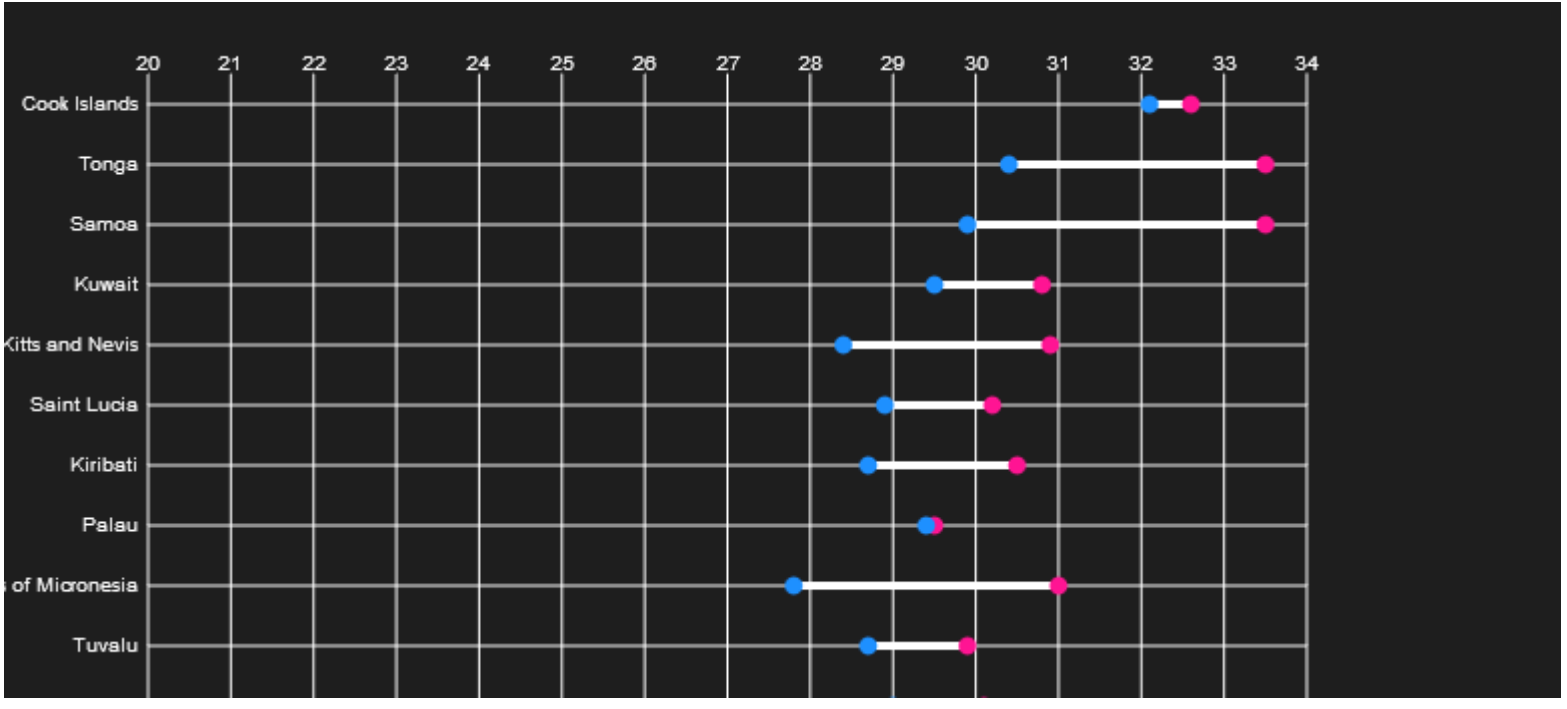
31
32
33
34
Cook Islands
Tonga
Samoa
Kuwait
Saint Kitts and Nevis
Saint Lucia
Kiribati
Palau
Federated States of Micronesia
Tuvalu
Qatar
Marshall Islands
Egypt
United Arab Emirates
Jordan
Belize
United States of America



You: make the rectangles less high and add circles at the two ends



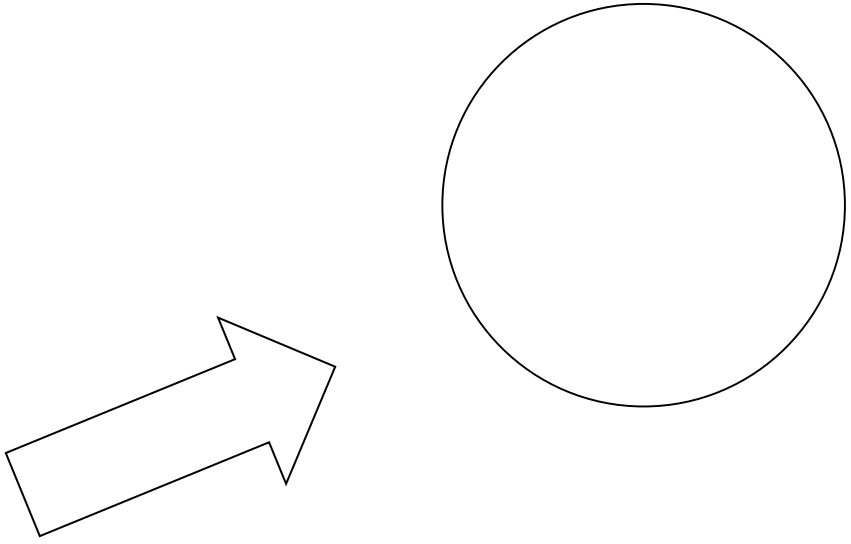
You: color the circle according to gender (pink/blue is NOT necessarily the best choice)

HOW CAN WE GET ACTUAL DETAILS?

Lets add some interaction…

First we need to test if a mouse is over a publication

How can we do that?



```
function testMouseOver(x, y, circleRadius){
        //we test if the mouse is within the radius of the circle
        if(dist(mouseX,mouseY,x,y) < circleRadius){
            return true;
        }
        return false;
}
```

In drawPublication:

```
function drawPublication(x,y,size,label,pubIndex){
  size = max(textWidth("InfoVis") ,textWidth("VAST"),textWidth("SciVis"))+ 5;

  var mouseOver = testMouseOver(x,y,size * 0.5);

  //this will draw the representation of one publication
  stroke (255);

  if(mouseOver){
    fill(110);
  }
  else{
    fill(210);
  }

  ellipse(x,y,size);
```

YOU:

To practice more:

- Show a text label on mouse-over that shows the title of the publication
- Color the circle based on the conference
- Add additional lines that represent data