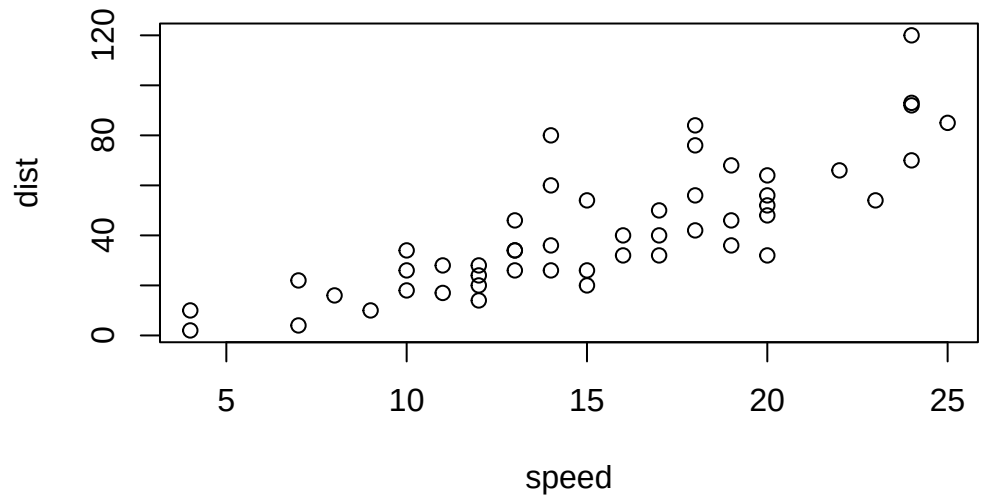
Class 5: Data Viz with ggplot

WBray PID# A69034838

R has many ways of plotting whatever crappy data you can throw at it. One that comes built-in is called **Base R** - the `plot()` function.

```
plot(cars)
```

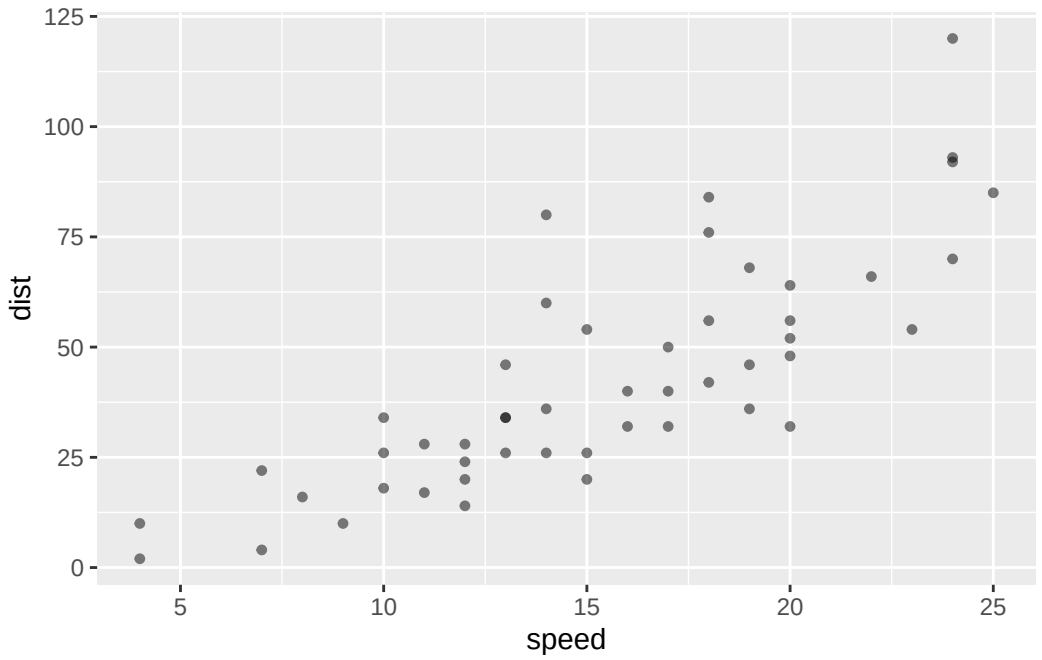


A very popular package in this particular avenue (haw!) is called **ggplot2**

Before using any add-on package it must be installed, you chowderhead! Using the `install.packages("ggplot2")` command/function. You can put this into the code, but it will reinstall it every time! So run it down in the console!

Then to use the package, it must be loaded up good with a `library(ggplot2)` call.

```
library(ggplot2)
ggplot(cars) + aes(x=speed, y=dist) + geom_point(shape = 20, size =2, alpha = 0.5)
```

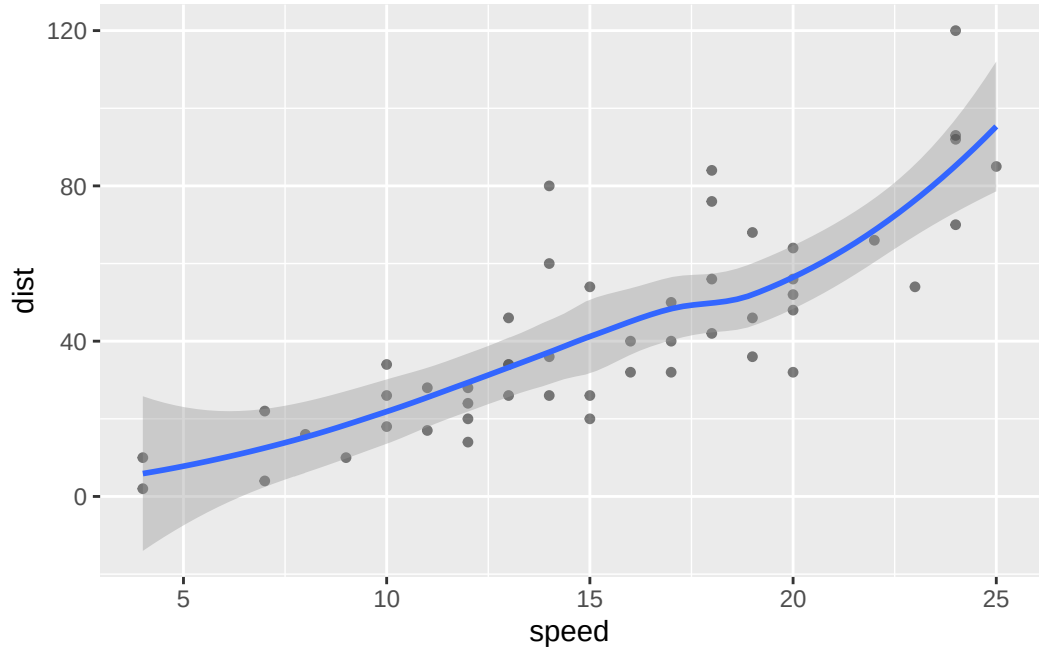


For "simple" plots like this one, base R code is fine, and in fact shorter, which in this case is great.

So to fit a model and show it on plot!

```
library(ggplot2)
ggplot(cars) + aes(x=speed, y=dist) + geom_point(shape = 20, size =2, alpha = 0.5) + geom_sm
```

```
`geom_smooth()` using method = 'loess' and formula = 'y ~ x'
```



Every ggplot has at least 3 layers

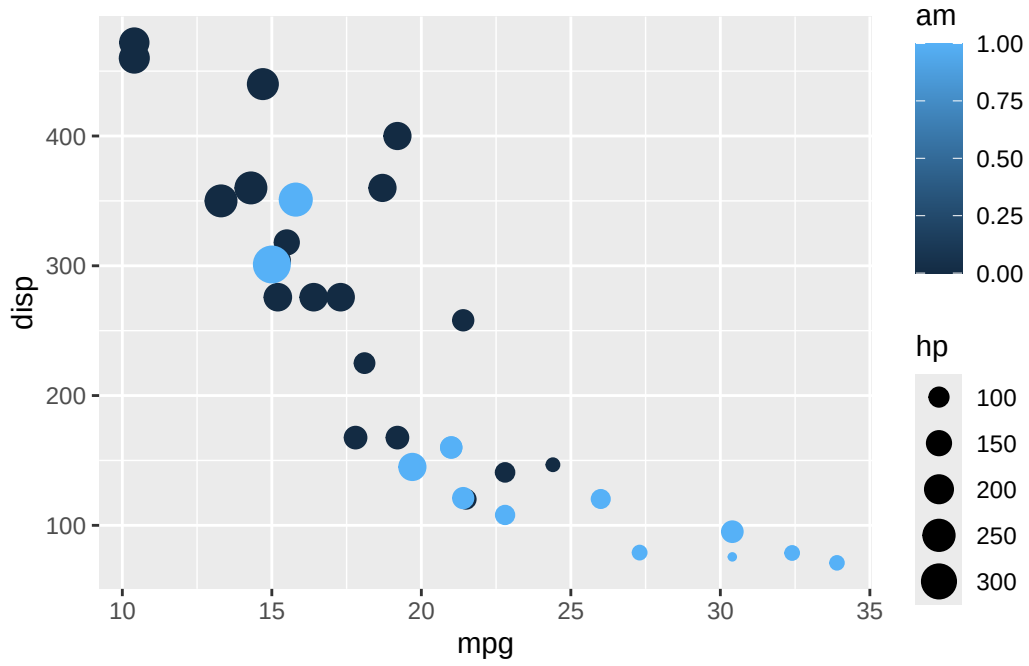
-**data** (data.frame with the numbers etc that you may possibly wish to plot) -**aes**thetics (mapping of your data columns to your plot) - geoms; there's a whole lot of these, (with basic types like `geom_point()`, `geom_line()`, `geom_col()`)

```
mtcars
```

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21.0	6	160.0	110	3.90	2.620	16.46	0	1	4	4
Mazda RX4 Wag	21.0	6	160.0	110	3.90	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108.0	93	3.85	2.320	18.61	1	1	4	1
Hornet 4 Drive	21.4	6	258.0	110	3.08	3.215	19.44	1	0	3	1
Hornet Sportabout	18.7	8	360.0	175	3.15	3.440	17.02	0	0	3	2
Valiant	18.1	6	225.0	105	2.76	3.460	20.22	1	0	3	1
Duster 360	14.3	8	360.0	245	3.21	3.570	15.84	0	0	3	4
Merc 240D	24.4	4	146.7	62	3.69	3.190	20.00	1	0	4	2
Merc 230	22.8	4	140.8	95	3.92	3.150	22.90	1	0	4	2
Merc 280	19.2	6	167.6	123	3.92	3.440	18.30	1	0	4	4
Merc 280C	17.8	6	167.6	123	3.92	3.440	18.90	1	0	4	4
Merc 450SE	16.4	8	275.8	180	3.07	4.070	17.40	0	0	3	3
Merc 450SL	17.3	8	275.8	180	3.07	3.730	17.60	0	0	3	3
Merc 450SLC	15.2	8	275.8	180	3.07	3.780	18.00	0	0	3	3
Cadillac Fleetwood	10.4	8	472.0	205	2.93	5.250	17.98	0	0	3	4

```
Lincoln Continental 10.4   8 460.0 215 3.00 5.424 17.82  0  0    3    4
Chrysler Imperial   14.7   8 440.0 230 3.23 5.345 17.42  0  0    3    4
Fiat 128            32.4   4  78.7  66 4.08 2.200 19.47  1  1    4    1
Honda Civic         30.4   4  75.7  52 4.93 1.615 18.52  1  1    4    2
Toyota Corolla      33.9   4  71.1  65 4.22 1.835 19.90  1  1    4    1
Toyota Corona       21.5   4 120.1  97 3.70 2.465 20.01  1  0    3    1
Dodge Challenger    15.5   8 318.0 150 2.76 3.520 16.87  0  0    3    2
AMC Javelin         15.2   8 304.0 150 3.15 3.435 17.30  0  0    3    2
Camaro Z28          13.3   8 350.0 245 3.73 3.840 15.41  0  0    3    4
Pontiac Firebird    19.2   8 400.0 175 3.08 3.845 17.05  0  0    3    2
Fiat X1-9           27.3   4  79.0  66 4.08 1.935 18.90  1  1    4    1
Porsche 914-2       26.0   4 120.3  91 4.43 2.140 16.70  0  1    5    2
Lotus Europa        30.4   4  95.1 113 3.77 1.513 16.90  1  1    5    2
Ford Pantera L      15.8   8 351.0 264 4.22 3.170 14.50  0  1    5    4
Ferrari Dino        19.7   6 145.0 175 3.62 2.770 15.50  0  1    5    6
Maserati Bora       15.0   8 301.0 335 3.54 3.570 14.60  0  1    5    8
Volvo 142E          21.4   4 121.0 109 4.11 2.780 18.60  1  1    4    2
```

```
library(ggplot2)
ggplot(mtcars) + aes(x=mpg, y=disp, size = hp, color = am) + geom_point()
```

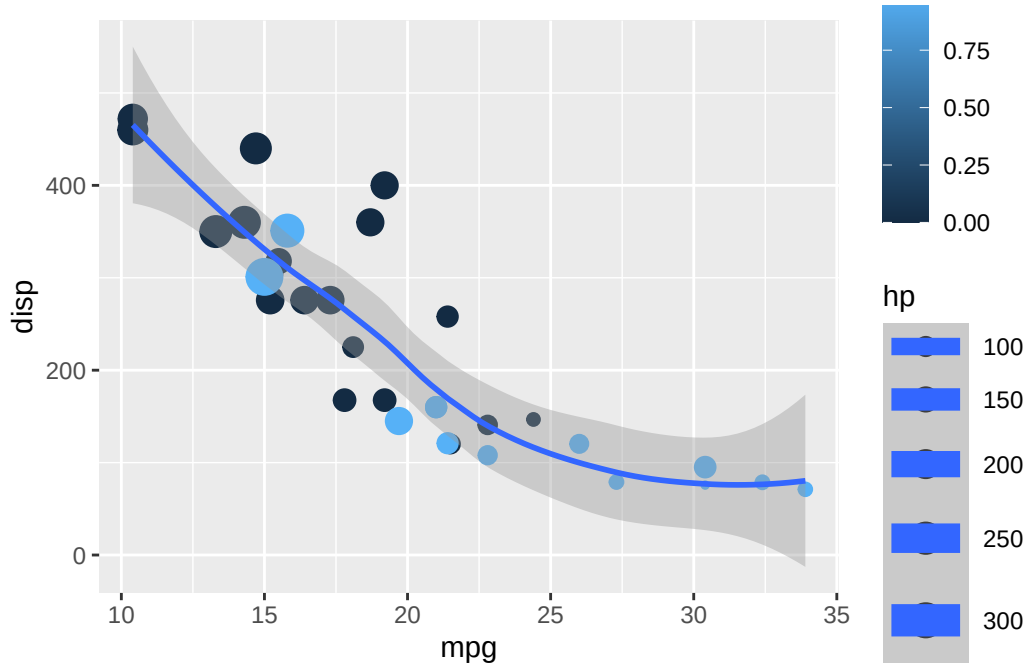


```
library(ggplot2)
ggplot(mtcars) + aes(x=mpg, y=disp, size = hp, color = am, label = rownames(mtcars)) +  geom_
```

```
Warning: Using `size` aesthetic for lines was deprecated in ggplot2 3.4.0.
i Please use `linewidth` instead.
```

```
`geom_smooth()` using method = 'loess' and formula = 'y ~ x'
```

```
Warning: The following aesthetics were dropped during statistical transformation: size,
colour, and label.
i This can happen when ggplot fails to infer the correct grouping structure in
  the data.
i Did you forget to specify a `group` aesthetic or to convert a numerical
  variable into a factor?
```




```
url <- "https://bioboot.github.io/bimm143_S20/class-material/up_down_expression.txt"
genes <- read.delim(url)

head(genes)
```

```
        Gene Condition1 Condition2      State
1      A4GNT -3.6808610 -3.4401355 unchanging
2       AAAS  4.5479580  4.3864126 unchanging
3      AASDH  3.7190695  3.4787276 unchanging
4       AATF  5.0784720  5.0151916 unchanging
5       AATK  0.4711421  0.5598642 unchanging
6 AB015752.4 -3.6808610 -3.5921390 unchanging
```

```
nrow(genes)
```

```
[1] 5196
```

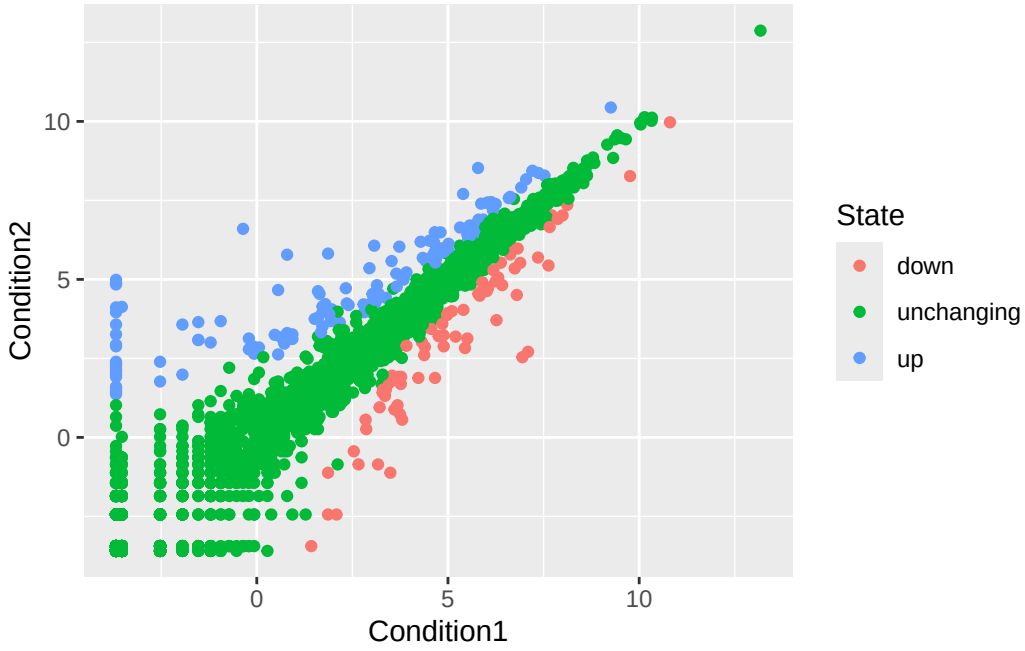
```
ncol(genes)
```

```
[1] 4
```

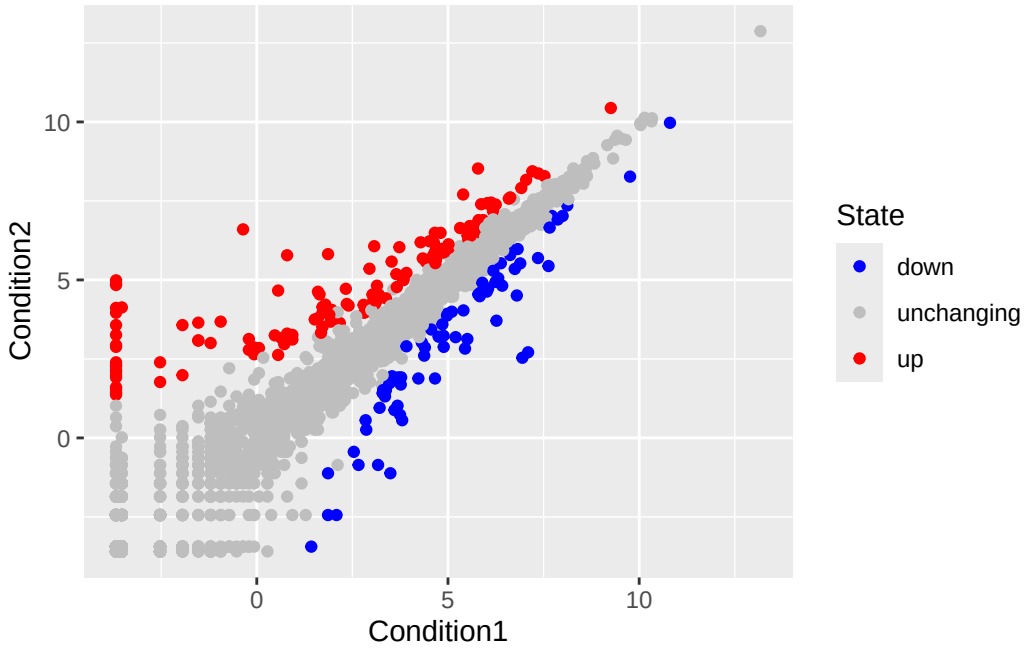
```
round(table(genes$State) / nrow(genes), 2)
```

```
      down unchanging         up
      0.01       0.96       0.02
```

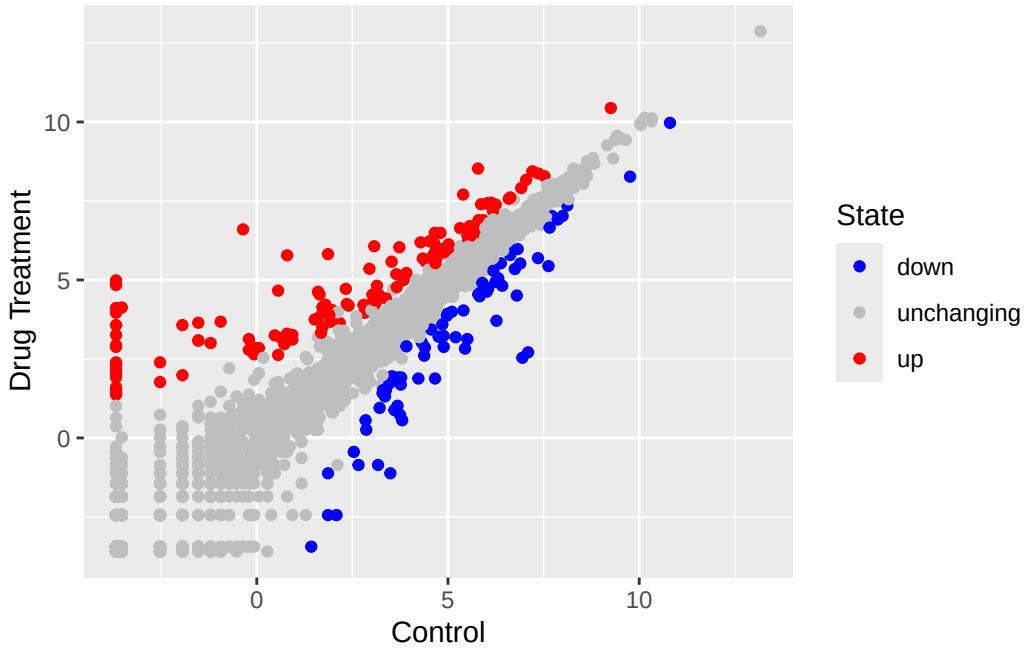
```
p <- ggplot(genes) + aes(Condition1, Condition2, color = State) + geom_point()
p
```




```
p + scale_color_manual( values = c("blue", "gray", "red"))
```



```
p + scale_color_manual( values = c("blue", "gray", "red")) + labs(x = "Control", y = "Drug Tr
```




```
ggsave("druggeneredblue.pdf")
```

```
Saving 5.5 x 3.5 in image
```

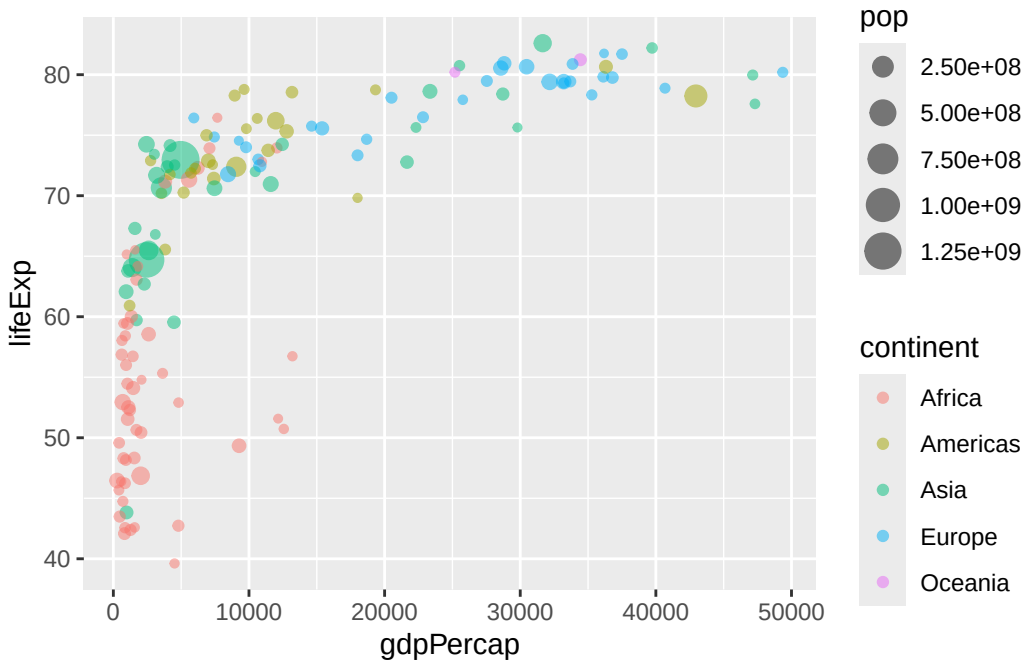
```
url <- "https://raw.githubusercontent.com/jennybc/gapminder/master/inst/extdata/gapminder.tsv

gapminder <- read.delim(url)
library(dplyr)
```

```
Attaching package: 'dplyr'

The following objects are masked from 'package:stats':

    filter, lag

The following objects are masked from 'package:base':

    intersect, setdiff, setequal, union
```

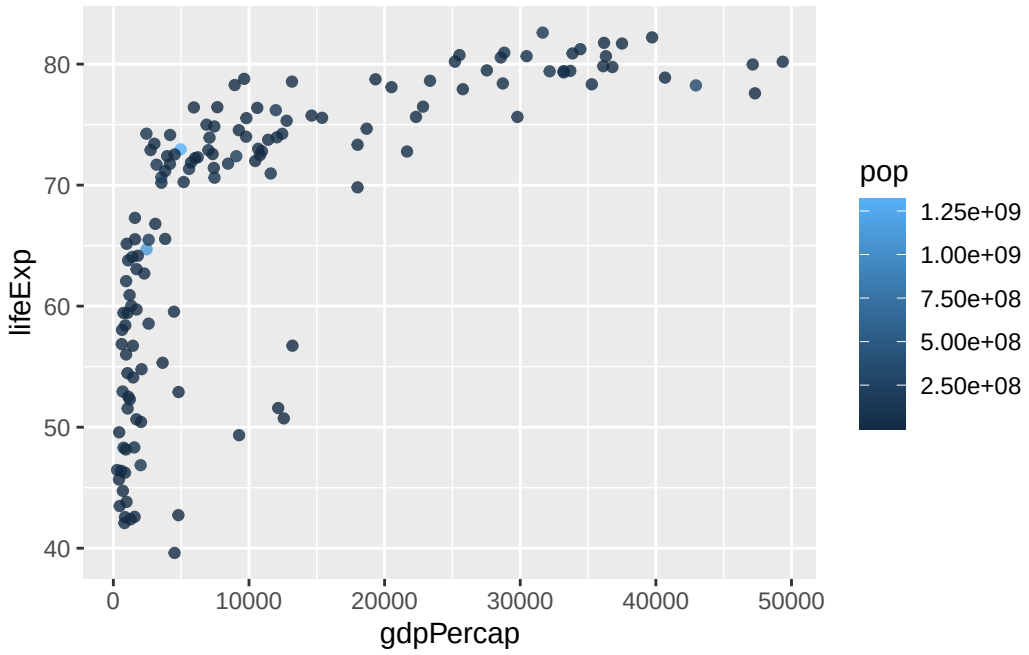
```
gapminder_2007 <- gapminder %>% filter(year==2007)
head(gapminder_2007)
```

```
      country continent year lifeExp      pop  gdpPercap
1 Afghanistan      Asia 2007  43.828 31889923   974.5803
2     Albania    Europe 2007  76.423  3600523  5937.0295
3     Algeria    Africa 2007  72.301 33333216  6223.3675
4      Angola    Africa 2007  42.731 12420476  4797.2313
5   Argentina  Americas 2007  75.320 40301927 12779.3796
6   Australia   Oceania 2007  81.235 20434176 34435.3674
```

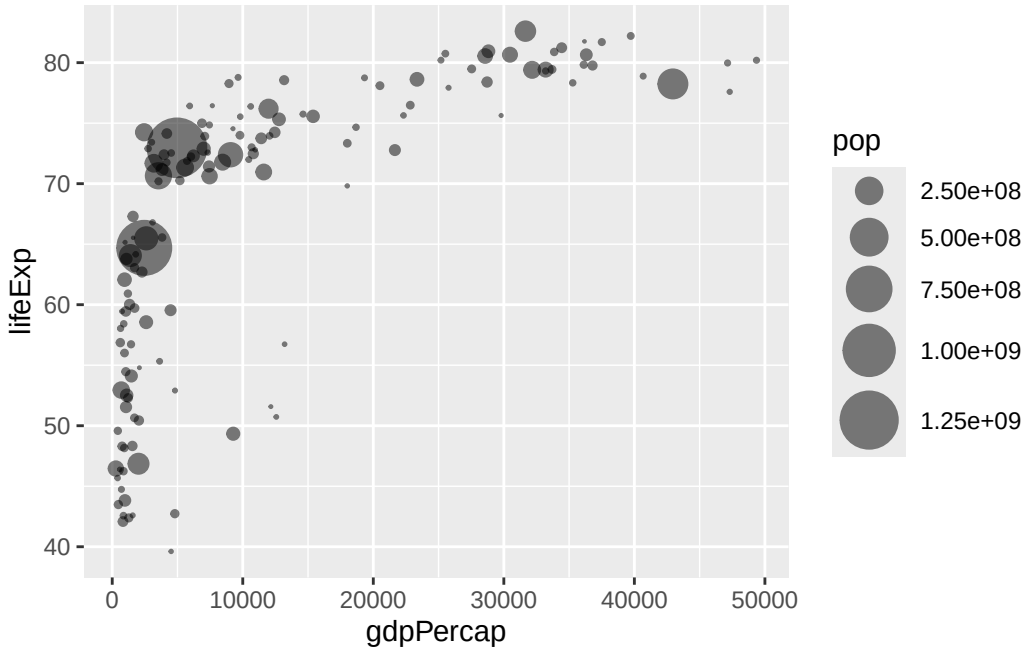
```
ggplot(gapminder_2007) + aes(x= gdpPercap, y= lifeExp, color = continent, size = pop) + geom_
```




```
ggplot(gapminder_2007) + aes(x= gdpPercap, y= lifeExp, color = pop) + geom_point(alpha = 0.8)
```

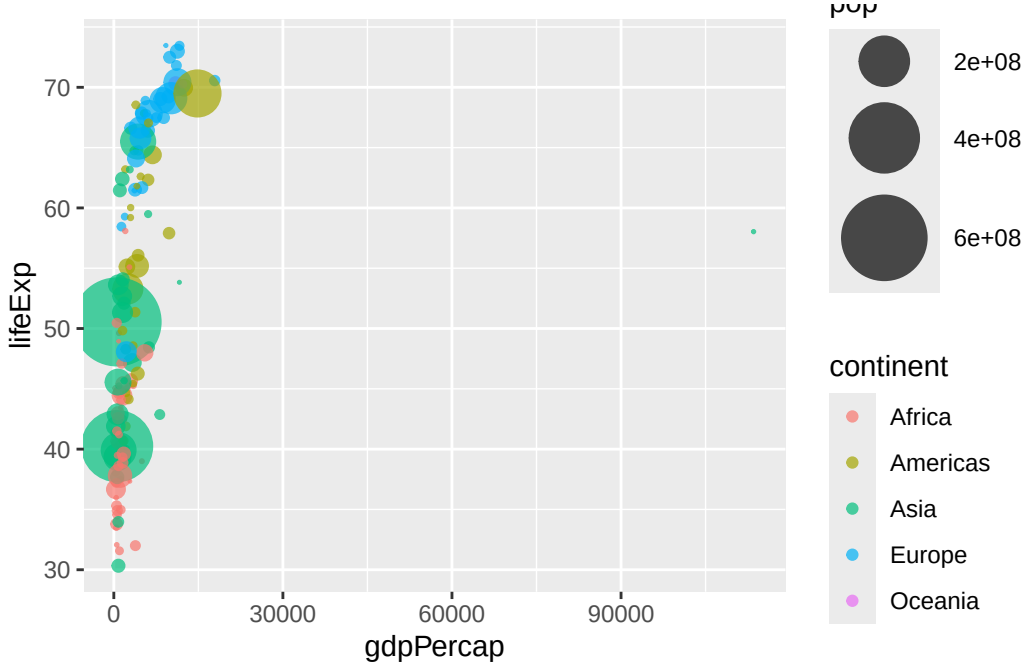



```
ggplot(gapminder_2007) + aes(x= gdpPercap, y= lifeExp, size = pop) + geom_point(alpha = 0.5)
```

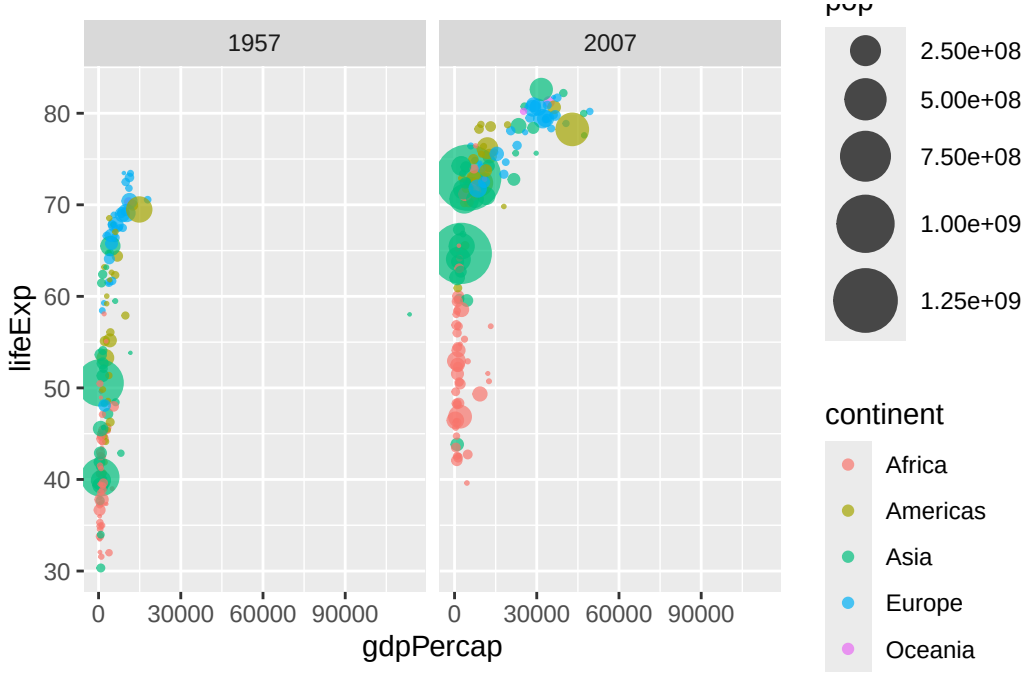


The lab text is wrong here, places alpha outside central parentheticals.

```
gapminder_1957 <- gapminder %>% filter(year==1957)
ggplot(gapminder_1957) + aes(x= gdpPercap, y= lifeExp, size = pop, color = continent) + geom
```



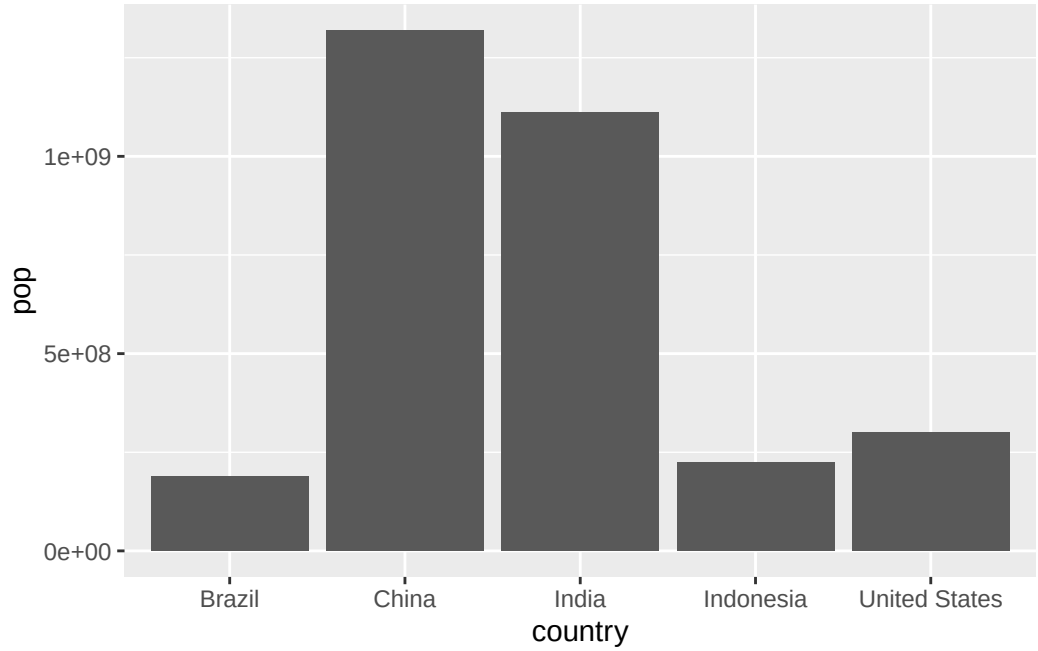

```
nottwodiffeentyearsforunclearreasons <- gapminder %>% filter(year==1957 | year==2007)
ggplot(nottwodiffeentyearsforunclearreasons) + aes(x= gdpPercap, y= lifeExp, size = pop, colo
```



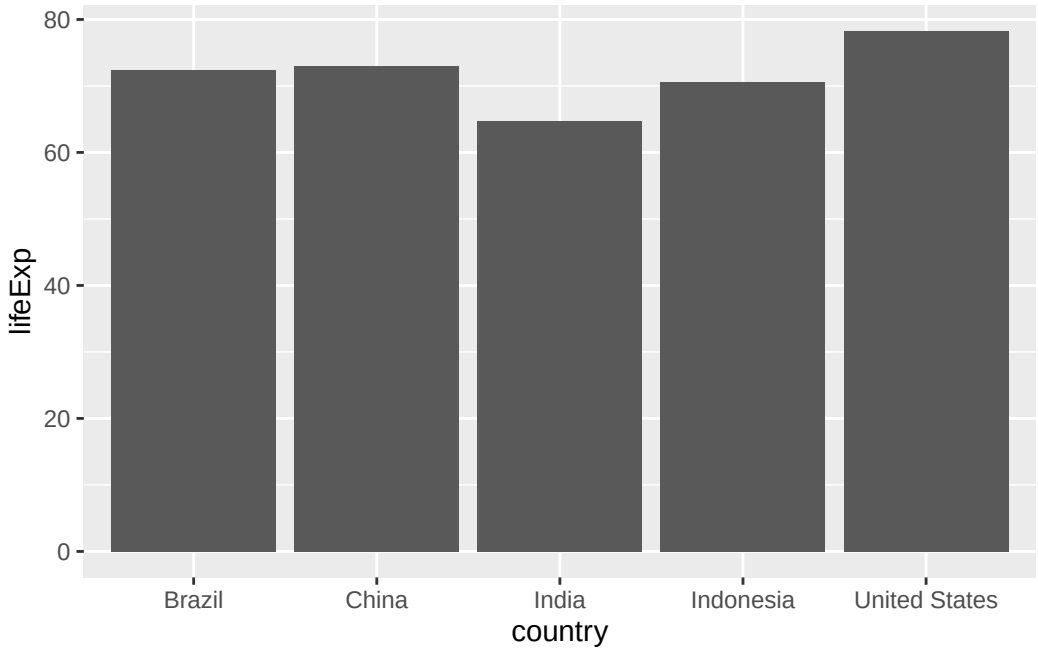

```
gapminder_top5 <- gapminder %>%
  filter(year==2007) %>%
  arrange(desc(pop)) %>%
  top_n(5, pop)

gapminder_top5
```

```
        country continent year lifeExp        pop gdpPercap
1         China      Asia 2007  72.961 1318683096  4959.115
2         India      Asia 2007  64.698 1110396331  2452.210
3 United States  Americas 2007  78.242  301139947 42951.653
4     Indonesia      Asia 2007  70.650  223547000  3540.652
5        Brazil  Americas 2007  72.390  190010647  9065.801
```

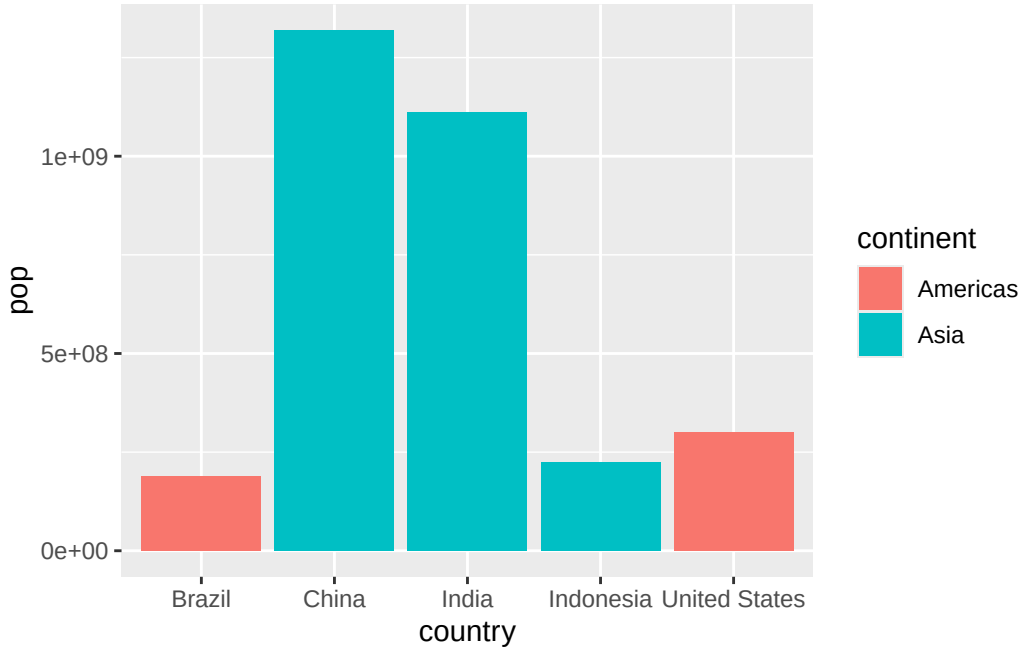
```
ggplot(gapminder_top5) + geom_col(aes(x= country, y = pop))
```



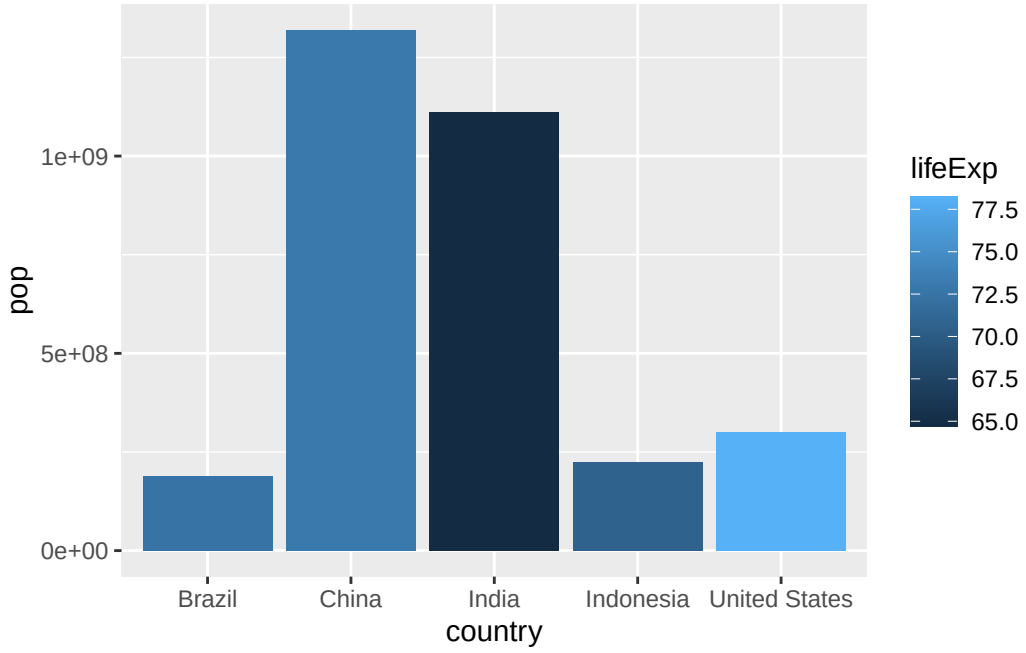

```
ggplot(gapminder_top5) + geom_col(aes(x= country, y = lifeExp))
```



```
ggplot(gapminder_top5) + geom_col(aes(x= country, y = pop, fill = continent))
```




```
ggplot(gapminder_top5) + geom_col(aes(x= country, y = pop, fill = lifeExp))
```



```
ggplot(gapminder_top5) + aes(x=reorder(country, -pop), y = pop, fill = gdpPercap) + geom_col
```