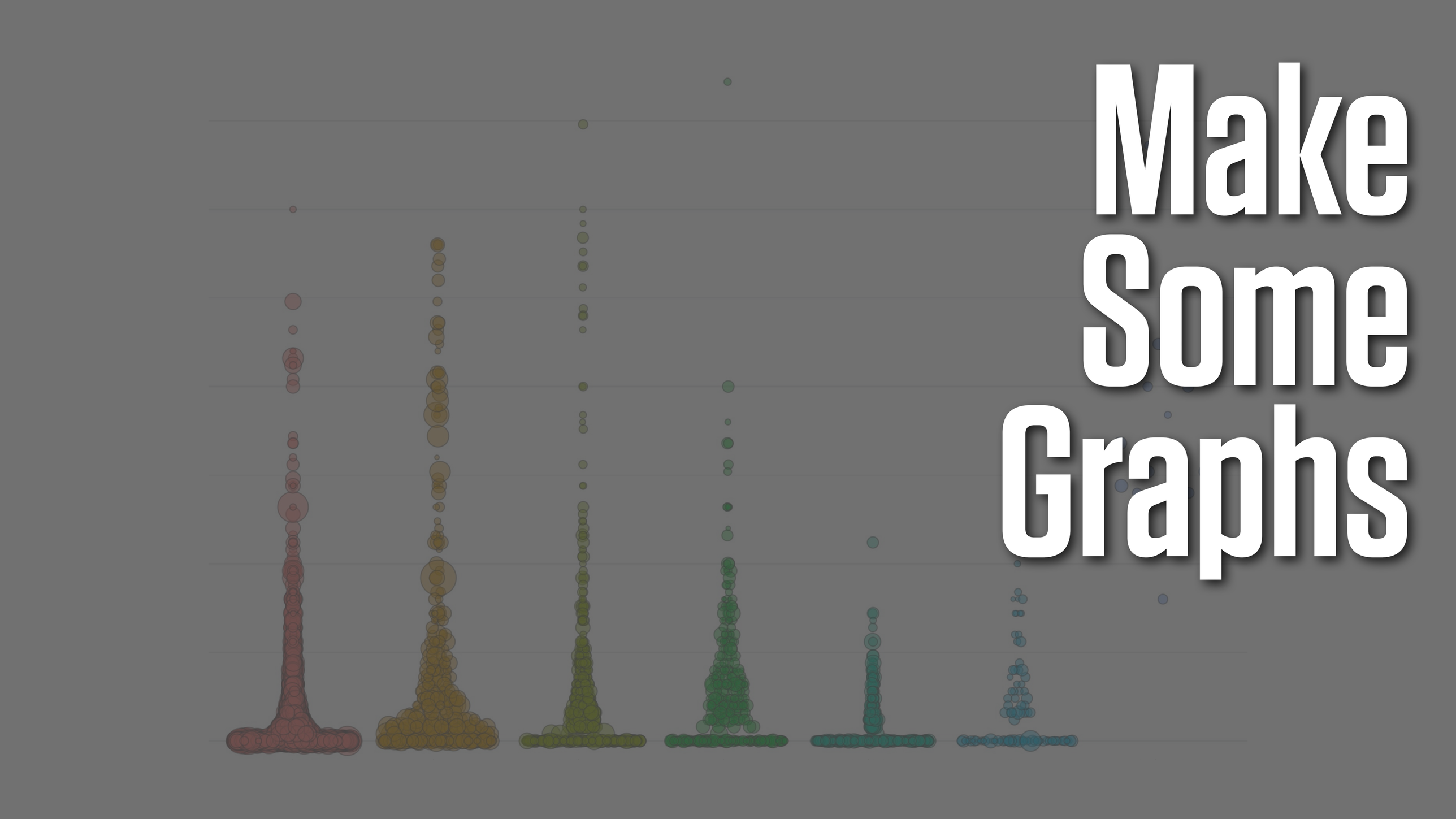
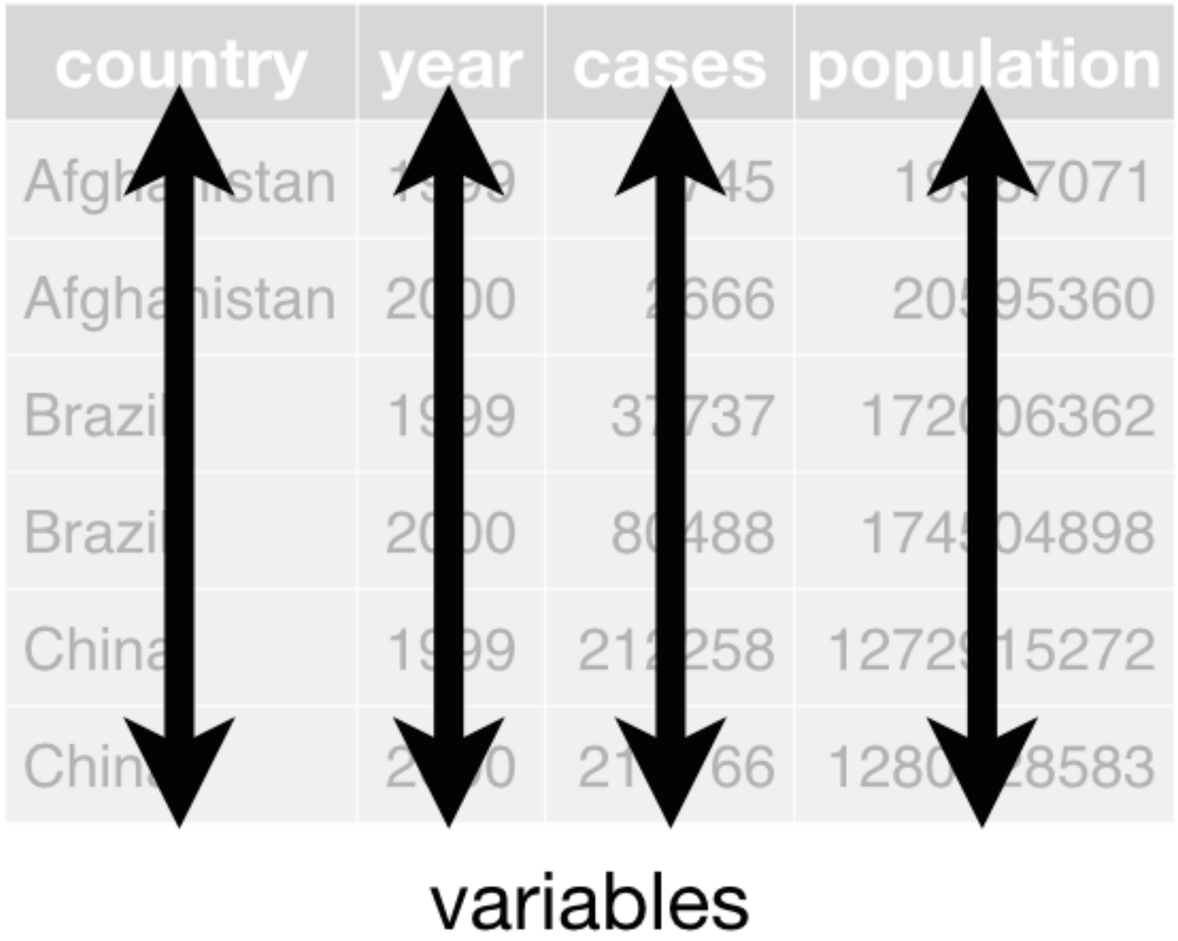
Data Visualization

rstudio::conf


Make
Some
Graphs


ggplot wants you
to feed it TIDY DATA
FEED ME

gdp	lifexp	pop	continent
340	65	31	Euro
227	51	200	Amer
909	81	80	Euro
126	40	20	Asia



Grolemund & Wickham (2017)

observations

country	year	cases	population
Afghanistan	1999	745	19987071
Afghanistan	2000	2666	20595360
Brazil	1999	37737	172006362
Brazil	2000	80488	174504898
China	1999	212258	1272915272
China	2000	213766	1280428583

values

Table A-1. Years of School Completed by People 25 Years and Over, by Age and Sex: Selected Years 1940 to 2016

(Numbers in thousands. Noninstitutionalized population except where otherwise specified.)

Age, sex, and years	Total	Years of School Completed						
		Elementary		High school		College		
		0 to 4 years	5 to 8 years	1 to 3 years	4 years	1 to 3 years	4 years or more	Median
25 YEARS AND OLDER								
Male								
2016	103,372	1,183	3,513	7,144	30,780	26,468	34,283	(NA)
2015	101,887	1,243	3,669	7,278	30,997	25,778	32,923	(NA)
2014	100,592	1,184	3,761	7,403	30,718	25,430	32,095	(NA)
2013	99,305	1,127	3,836	7,314	30,014	25,283	31,731	(NA)
2012	98,119	1,237	3,879	7,388	30,216	24,632	30,766	(NA)
2011	97,220	1,234	3,883	7,443	30,370	24,319	29,971	(NA)
2010	96,325	1,279	3,931	7,705	30,682	23,570	29,158	(NA)
2009	95,518	1,372	4,027	7,754	30,025	23,634	28,706	(NA)
2008	94,470	1,310	4,136	7,853	29,491	23,247	28,433	(NA)
2007	93,421	1,458	4,249	8,294	29,604	22,219	27,596	(NA)
2006	92,233	1,472	4,395	7,940	29,380	22,136	26,910	(NA)
2005	90,899	1,505	4,402	7,787	29,151	21,794	26,259	(NA)

readxl part of the tidyverse

```
library(readxl)
```

State

A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	Q
State	**CD#**	**2018 Cook PVI Score**	**2018 Winner**	**Party**	**Dem Votes**	**GOP Votes**	**Other Votes**	**Dem %**	**GOP %**	**Other %**	**Dem Margin**	**2016 Clinton Margin**	**Swing vs. 2016 Prez**	**Raw Votes vs. 2016**	**Final?**
New House Breakdown: 235D, 199R, 1 Not Certified				**D**	**60,619,428**	**50,896,244**	**1,978,795**	**53.4%**	**44.8%**	**1.7%**	**8.6%**	**2.1%**	**6.5%**	**83.3%**	
Compiled by: David Wasserman & Ally Flinn, Cook Political Report. @Redistrict/@CookPolitical. *Italics* denotes freshman, **Bold** denotes party change.															
Alabama	1	R+15	Bradley Byrne	R	89,226	153,228	163	36.8%	63.2%	0.1%	-26.4%	-29.2%	2.8%	79.3%	x
Alabama	2	R+16	Martha Roby	R	86,931	138,879	420	38.4%	61.4%	0.2%	-23.0%	-31.7%	8.7%	78.7%	x
Alabama	3	R+16	Mike Rogers	R	83,996	147,770	149	36.2%	63.7%	0.1%	-27.5%	-33.0%	5.5%	79.6%	x
Alabama	4	R+30	Robert Aderholt	R	46,492	184,255	222	20.1%	79.8%	0.1%	-59.6%	-62.5%	2.9%	78.9%	x
Alabama	5	R+18	Mo Brooks	R	101,388	159,063	222	38.9%	61.0%	0.1%	-22.1%	-32.9%	10.8%	82.8%	x
Alabama	6	R+26	Gary Palmer	R	85,644	192,542	142	30.8%	69.2%	0.1%	-38.4%	-43.8%	5.4%	82.8%	x
Alabama	7	D+20	Terri Sewell	D	185,010	0	4,153	97.8%	0.0%	2.2%	97.8%	41.2%	N/A	64.2%	x
Alaska	AL	R+9	Don Young	R	131,199	149,779	1,188	46.5%	53.1%	0.4%	-6.6%	-14.7%	8.1%	88.6%	x
Arizona	1	R+2	Tom O'Halleran	D	143,240	122,784	65	53.8%	46.1%	0.0%	7.7%	-1.1%	8.8%	92.0%	x
Arizona	2	R+1	***Ann Kirkpatrick***	***D***	161,000	133,102	50	54.7%	45.2%	0.0%	9.5%	4.8%	4.7%	91.5%	x
Arizona	3	D+13	Raul Grijalva	D	114,650	64,868	0	63.9%	36.1%	0.0%	27.7%	29.5%	-1.8%	84.8%	x
Arizona	4	R+21	Paul Gosar	R	84,521	188,842	3,672	30.5%	68.2%	1.3%	-37.7%	-39.4%	1.7%	91.1%	x
Arizona	5	R+15	Andy Biggs	R	127,027	186,037	0	40.6%	59.4%	0.0%	-18.8%	-20.5%	1.7%	91.7%	x
Arizona	6	R+9	David Schweikert	R	140,559	173,140	0	44.8%	55.2%	0.0%	-10.4%	-9.8%	-0.6%	91.2%	x
Arizona	7	D+23	Ruben Gallego	D	113,044	301	18,706	85.6%	0.2%	14.2%	85.4%	48.3%	N/A	79.0%	x
Arizona	8	R+13	Debbie Lesko	R	135,569	168,835	13	44.5%	55.5%	0.0%	-10.9%	-20.8%	9.9%	91.5%	x
Arizona	9	D+4	*Greg Stanton*	*D*	159,583	101,662	0	61.1%	38.9%	0.0%	22.2%	15.9%	6.3%	90.0%	x
Arkansas	1	R+17	Rick Crawford	R	57,907	138,757	4,581	28.8%	68.9%	2.3%	-40.2%	-34.8%	-5.4%	77.2%	x
Arkansas	2	R+7	French Hill	R	116,135	132,125	5,193	45.8%	52.1%	2.0%	-6.3%	-10.7%	4.4%	82.6%	x
Arkansas	3	R+19	Steve Womack	R	74,952	148,717	6,039	32.6%	64.7%	2.6%	-32.1%	-31.4%	-0.7%	78.6%	x
Arkansas	4	R+17	Bruce Westerman	R	63,984	136,740	4,168	31.2%	66.7%	2.0%	-35.5%	-32.8%	-2.7%	75.7%	x
California	1	R+11	Doug LaMalfa	R	131,506	160,006	0	45.1%	54.9%	0.0%	-9.8%	-19.4%	9.6%	91.6%	
California	2	D+22	Jared Huffman	D	243,051	72,541	0	77.0%	23.0%	0.0%	54.0%	45.2%	8.8%	90.5%	
California	3	D+5	John Garamendi	D	132,983	96,106	0	58.0%	42.0%	0.0%	16.1%	12.5%	3.6%	86.8%	
California	4	R+10	Tom McClintock	R	156,253	184,401	0	45.9%	54.1%	0.0%	-8.3%	-14.5%	6.2%	94.6%	
California	5	D+21	Mike Thompson	D	203,012	0	53,836	79.0%	0.0%	21.0%	79.0%	44.6%	N/A	83.8%	
California	6	D+21	Doris Matsui	D	201,939	0	0	100.0%	0.0%	0.0%	100.0%	44.0%	N/A	81.4%	
California	7	D+3	Ami Bera	D	155,016	126,601	0	55.0%	45.0%	0.0%	10.1%	11.2%	-1.1%	91.0%	
California	8	R+9	Paul Cook	R	0	170,785	0	0.0%	100.0%	0.0%	-100.0%	-15.1%	N/A	73.3%	
California	9	D+8	Jerry McNerney	D	113,240	87,263	0	56.5%	43.5%	0.0%	13.0%	18.2%	-5.2%	82.4%	

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readxl part of the tidyverse

```
library(readxl)
```

```
edu
```

```
## # A tibble: 366 x 11
##    age   sex    year total elem4 elem8   hs3   hs4 coll3 coll4 median
##    <chr> <chr> <int> <int> <int> <int> <dbl> <dbl> <dbl> <dbl>  <dbl>
##  1 25-34 Male   2016 21845   116   468  1427  6386  6015  7432     NA
##  2 25-34 Male   2015 21427   166   488  1584  6198  5920  7071     NA
##  3 25-34 Male   2014 21217   151   512  1611  6323  5910  6710     NA
##  4 25-34 Male   2013 20816   161   582  1747  6058  5749  6519     NA
##  5 25-34 Male   2012 20464   161   579  1707  6127  5619  6270     NA
##  6 25-34 Male   2011 20985   190   657  1791  6444  5750  6151     NA
##  7 25-34 Male   2010 20689   186   641  1866  6458  5587  5951     NA
##  8 25-34 Male   2009 20440   184   695  1806  6495  5508  5752     NA
##  9 25-34 Male   2008 20210   172   714  1874  6356  5277  5816     NA
## 10 25-34 Male   2007 20024   246   757  1930  6361  5137  5593     NA
## # … with 356 more rows
```

```r
edu %>%
  pivot_longer(cols = elem4:coll4, names_to = "educ")
```

```
## # A tibble: 2,196 x 7
##    age   sex    year total median educ  value
##    <chr> <chr> <int> <int>  <dbl> <chr> <dbl>
##  1 25-34 Male   2016 21845     NA elem4   116
##  2 25-34 Male   2016 21845     NA elem8   468
##  3 25-34 Male   2016 21845     NA hs3    1427
##  4 25-34 Male   2016 21845     NA hs4    6386
##  5 25-34 Male   2016 21845     NA coll3  6015
##  6 25-34 Male   2016 21845     NA coll4  7432
##  7 25-34 Male   2015 21427     NA elem4   166
##  8 25-34 Male   2015 21427     NA elem8   488
##  9 25-34 Male   2015 21427     NA hs3    1584
## 10 25-34 Male   2015 21427     NA hs4    6198
## # … with 2,186 more rows
```

```r
gapminder %>%
  select(country, continent, year, lifeExp) %>%
  pivot_wider(names_from = year, values_from = lifeExp)
```

```
## # A tibble: 142 x 14
##    country continent `1952` `1957` `1962` `1967` `1972` `1977` `1982` `1987`
##    <fct>   <fct>      <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>  <dbl>
##  1 Afghan… Asia        28.8   30.3   32.0   34.0   36.1   38.4   39.9   40.8
##  2 Albania Europe      55.2   59.3   64.8   66.2   67.7   68.9   70.4   72
##  3 Algeria Africa      43.1   45.7   48.3   51.4   54.5   58.0   61.4   65.8
##  4 Angola  Africa      30.0   32.0   34     36.0   37.9   39.5   39.9   39.9
##  5 Argent… Americas    62.5   64.4   65.1   65.6   67.1   68.5   69.9   70.8
##  6 Austra… Oceania     69.1   70.3   70.9   71.1   71.9   73.5   74.7   76.3
##  7 Austria Europe      66.8   67.5   69.5   70.1   70.6   72.2   73.2   74.9
##  8 Bahrain Asia        50.9   53.8   56.9   59.9   63.3   65.6   69.1   70.8
##  9 Bangla… Asia        37.5   39.3   41.2   43.5   45.3   46.9   50.0   52.8
## 10 Belgium Europe      68     69.2   70.2   70.9   71.4   72.8   73.9   75.4
## # … with 132 more rows, and 4 more variables: `1992` <dbl>, `1997` <dbl>,
## #   `2002` <dbl>, `2007` <dbl>
```

GETTING YOUR DATA INTO R

```
my_data <- read_csv(file = "data/organdonation.csv")
```

Field delimiter is ,

```
read_csv2(file = "data/my_csv_file.csv")
```

Field delimiter is ;

```
read_dta(file = "data/my_stata_file.dta")

read_spss(file = "data/my_spss_file.sav")

read_sas(data_file = "<NAME>",
         catalog_file = "<NAME>")

read_table(file = "<NAME>")
```

Structured but not delimited

Local File Path

```
organs <- read_csv(file = "data/organdonation.csv")
```

Remote URL

```
url <- "https://cdn.rawgit.com/kjhealy/viz-organdata/master/organdonation.csv"

organs <- read_csv(file = url)
```

```
England and Wales, Total Population, Death rates (period 1x1),  Last modified: 02 Apr
2018;  Methods Protocol: v6 (2017)

  Year          Age             Female             Male            Total
  1841            0           0.136067         0.169189         0.152777
  1841            1           0.059577         0.063208         0.061386
  1841            2           0.036406         0.036976         0.036689
  1841            3           0.024913         0.026055         0.025480
  1841            4           0.018457         0.019089         0.018772
  1841            5           0.013967         0.014279         0.014123
  1841            6           0.010870         0.011210         0.011040
  1841            7           0.008591         0.008985         0.008788
  1841            8           0.006860         0.007246         0.007053
  1841            9           0.005772         0.006050         0.005911
  1841           10           0.005303         0.005382         0.005343
  1841           11           0.005114         0.005002         0.005057
  1841           12           0.005145         0.004856         0.004999
  1841           13           0.005455         0.004955         0.005202
  1841          105           0.576967         1.727848         0.700373
  1841          106           0.677711         6.000000         0.795287
  1841          107           0.900000                .         0.900000
  1841          108           1.388430                .         1.388430
  1841          109                  .                .                .
  1841         110+                  .                .                .
  1842            0           0.148491         0.184007         0.166481
  1842            1           0.063038         0.066596         0.064818
  1842            2           0.035203         0.035854         0.035527
```

```
engmort <- read_table(file = "data/mortality.txt",
                      skip = 2, na = ".")
```

HOW ggplot WORKS

ggplot's FLOW OF ACTION

1. Tidy Data

gdp	lifexp	pop	continent
340	65	31	Euro
227	51	200	Amer
909	81	80	Euro
126	40	20	Asia

```
ggplot(data = gapminder,
```

2. Mapping

x=gdp

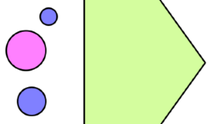
y=lifexp

color=continent

size=pop

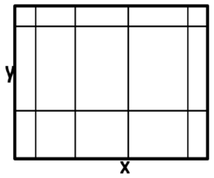
```
mapping =
aes(x = gdp,
y = lifespan,
color = continent,
size = pop))
```

3. Geom



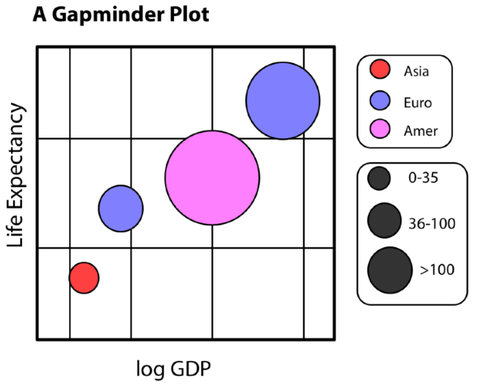
```
geom_point()
```

4. Co-Ordinates, Scales



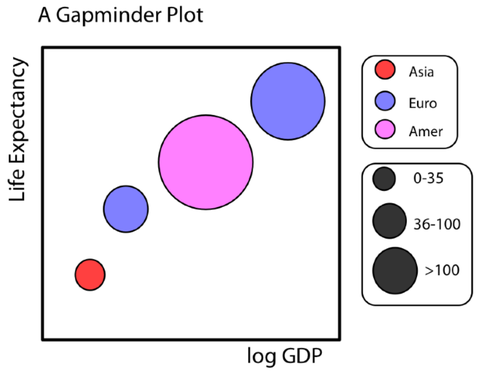

```
coord_cartesian()
scale_x_log10()
```

5. Labels & Guides




```
labs()
guides()
```

6. Themes



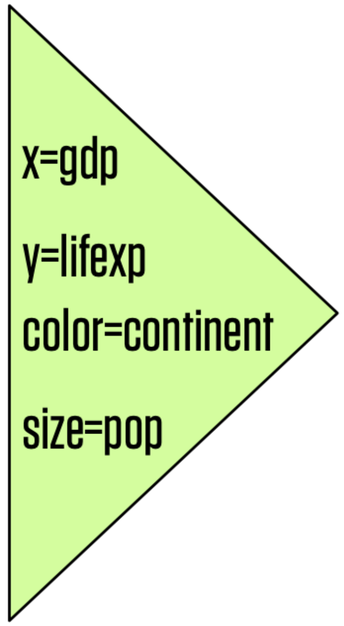

```
theme_minimal()
```

1. Tidy Data

gdp	lifexp	pop	continent
340	65	31	Euro
227	51	200	Amer
909	81	80	Euro
126	40	20	Asia

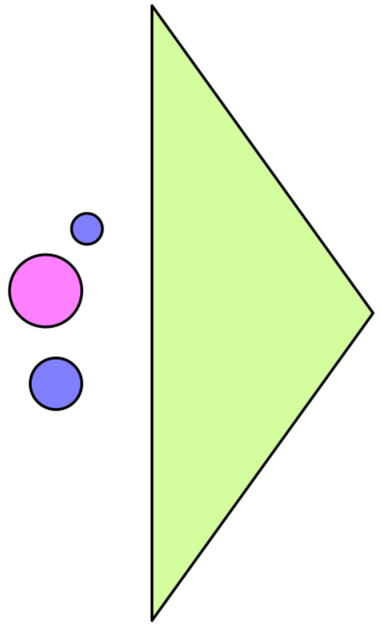
```
ggplot(data = gapminder,
```

2. Mapping



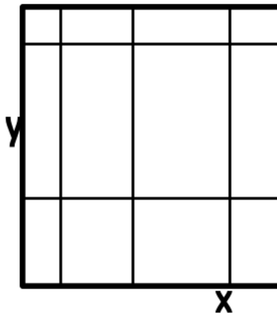

```
mapping =
aes(x = gdp,
y = lifespan,
color = continent,
size = pop))
```

3. Geom



```
geom_point()
```

4. Co-Ordin
Scales




```
coord_cartes
 scale_x_log
```

2. Mapping

3. Geom

4. Co-Ordinates, Scales

5. Labels & Guides

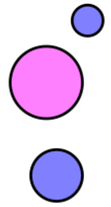
	continent
	Euro
	Amer
	Euro
	Asia

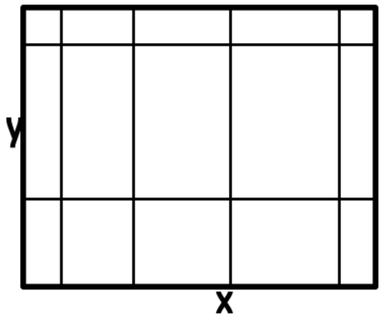
x=gdp

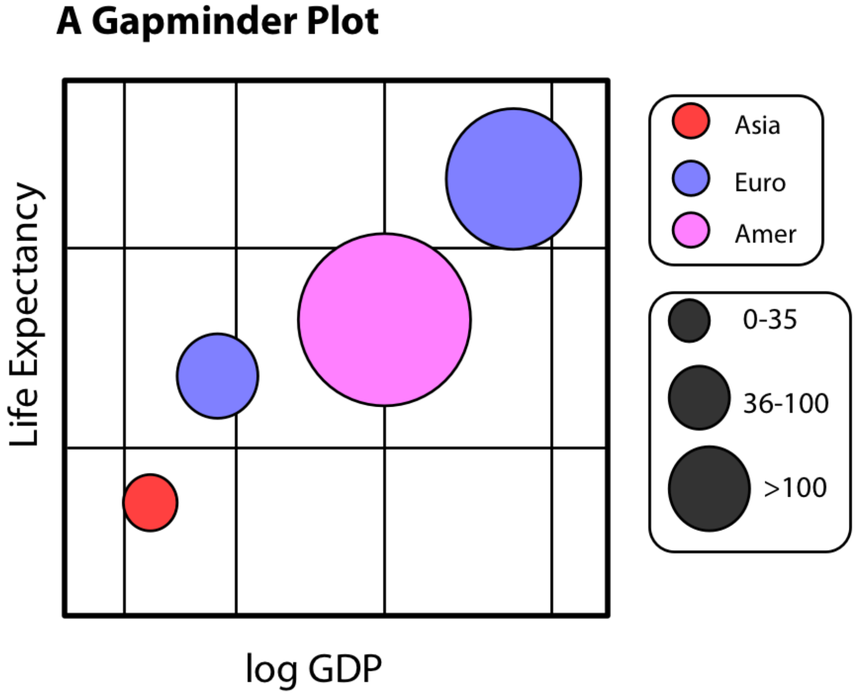
y=lifexp

color=continent

size=pop







a = gapminder,

mapping =
aes(x = gdp,
y = lifespan,
color = continent,
size = pop))

geom_point()

coord_cartesian()
scale_x_log10()

labs()

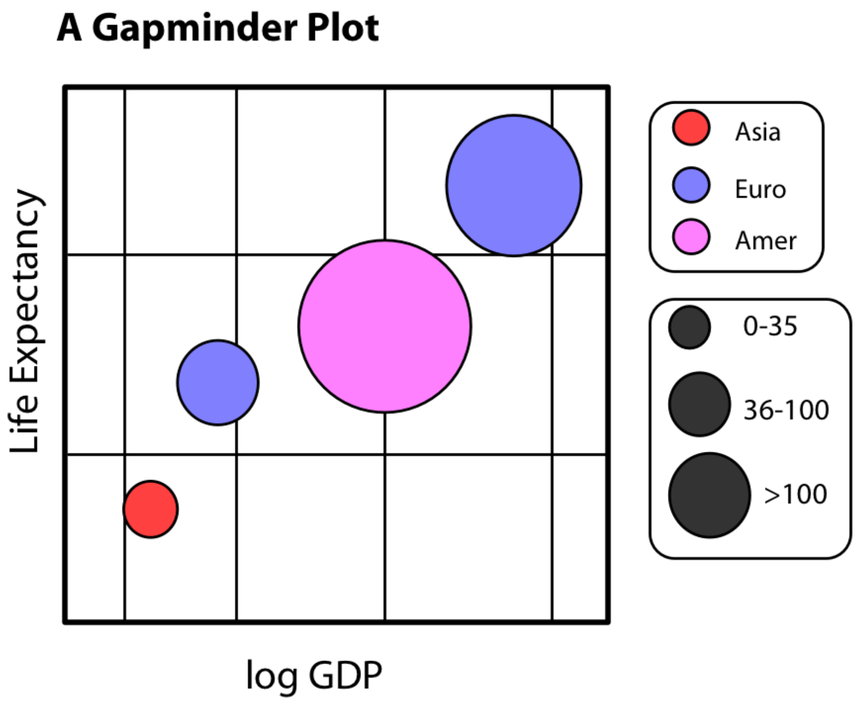
guides()

ates,

ian()

10()

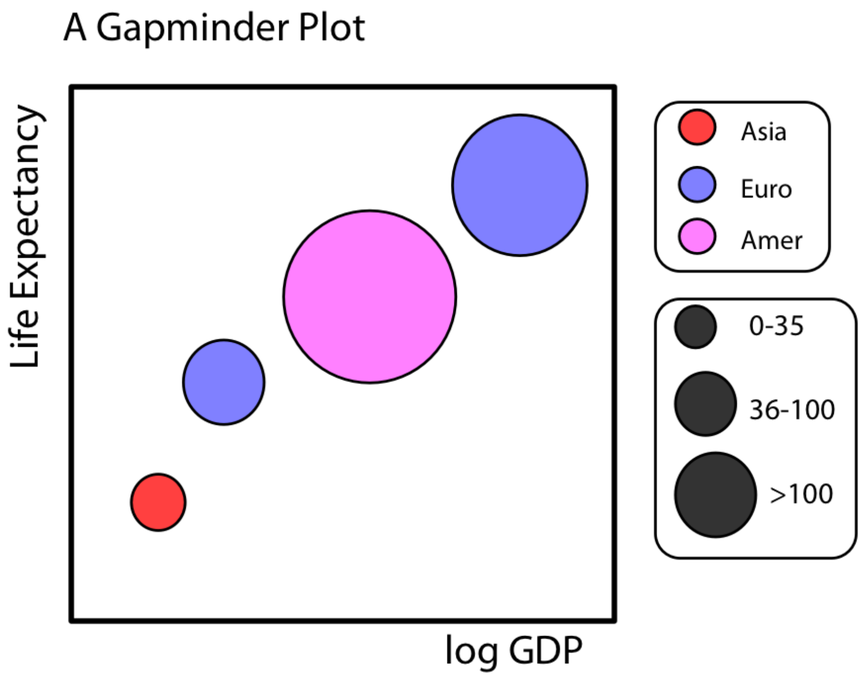
5. Labels & Guides



labs()

guides()

6. Themes

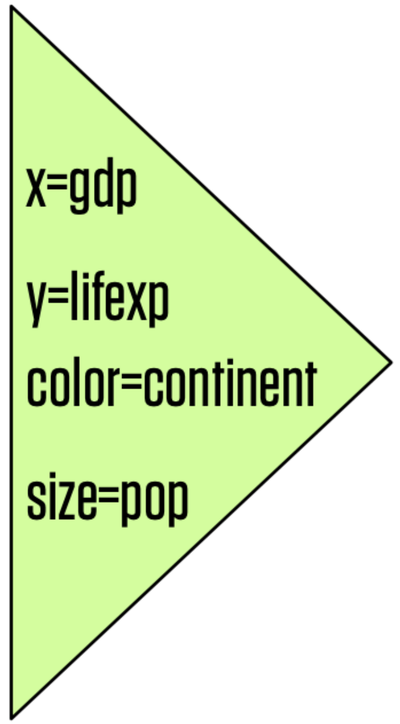


theme_minimal()

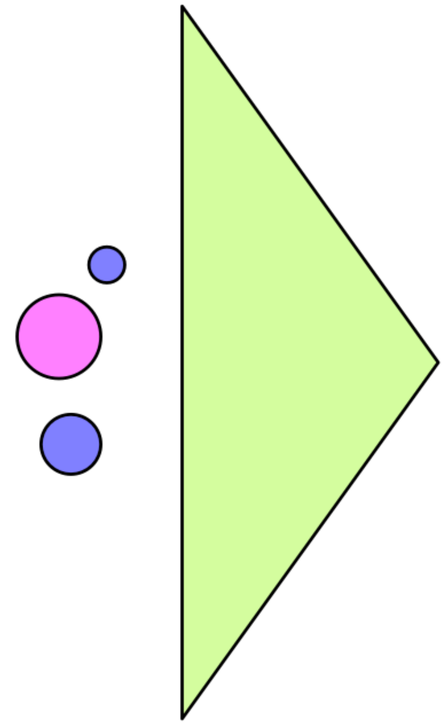
1. Tidy Data

gdp	lifexp	pop	continent
340	65	31	Euro
227	51	200	Amer
909	81	80	Euro
126	40	20	Asia

2. Mapping



3. Geom

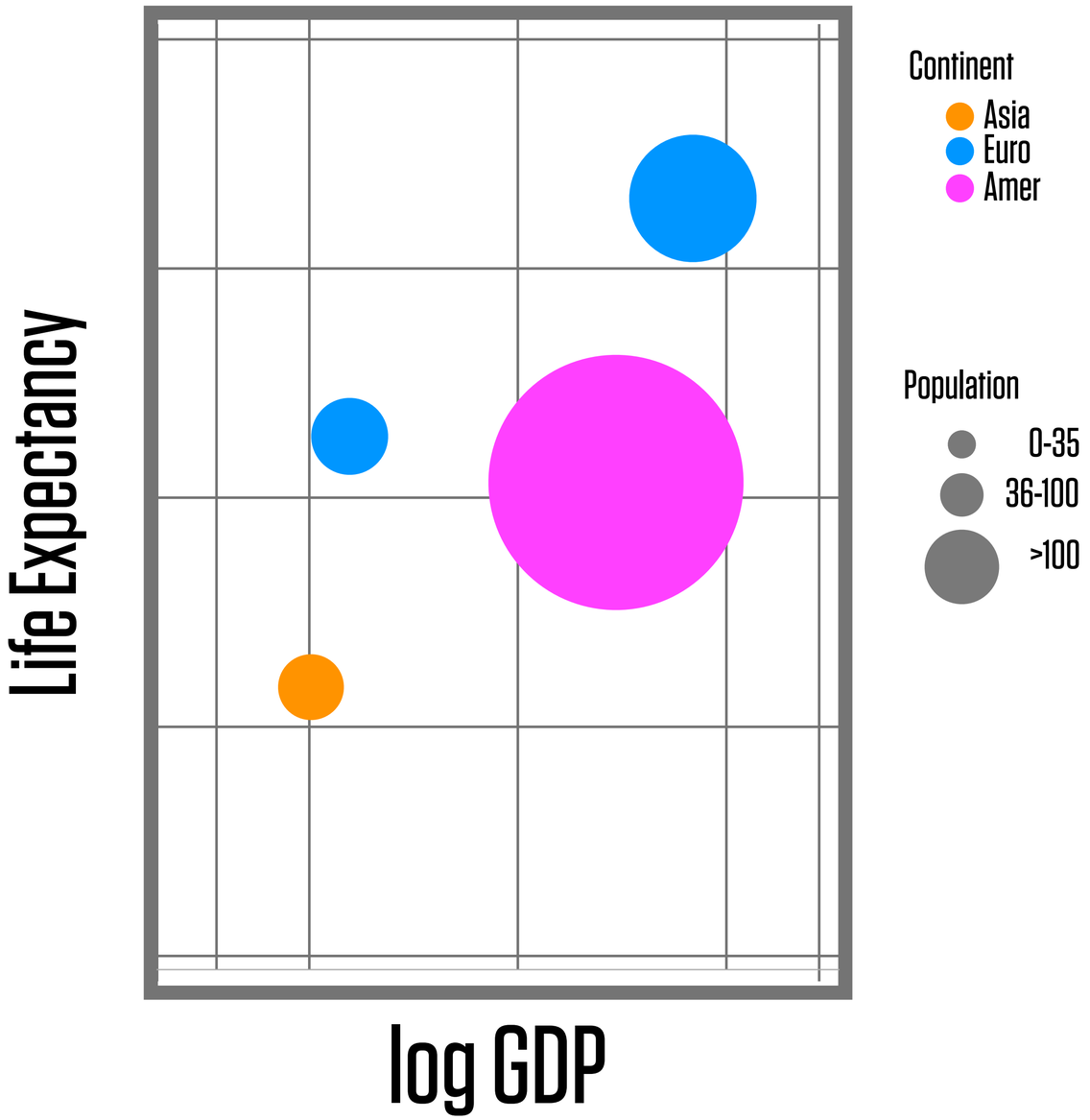


```
ggplot(data = gapminder,
       mapping =
       aes(x = gdp,
```

```
geom_point()
```

gdp	lifexp	pop	continent
340	65	31	Euro
227	51	200	Amer
909	81	80	Euro
126	40	20	Asia

A Gapminder Plot



1. Tidy Data

ggplot(data = gapminder)

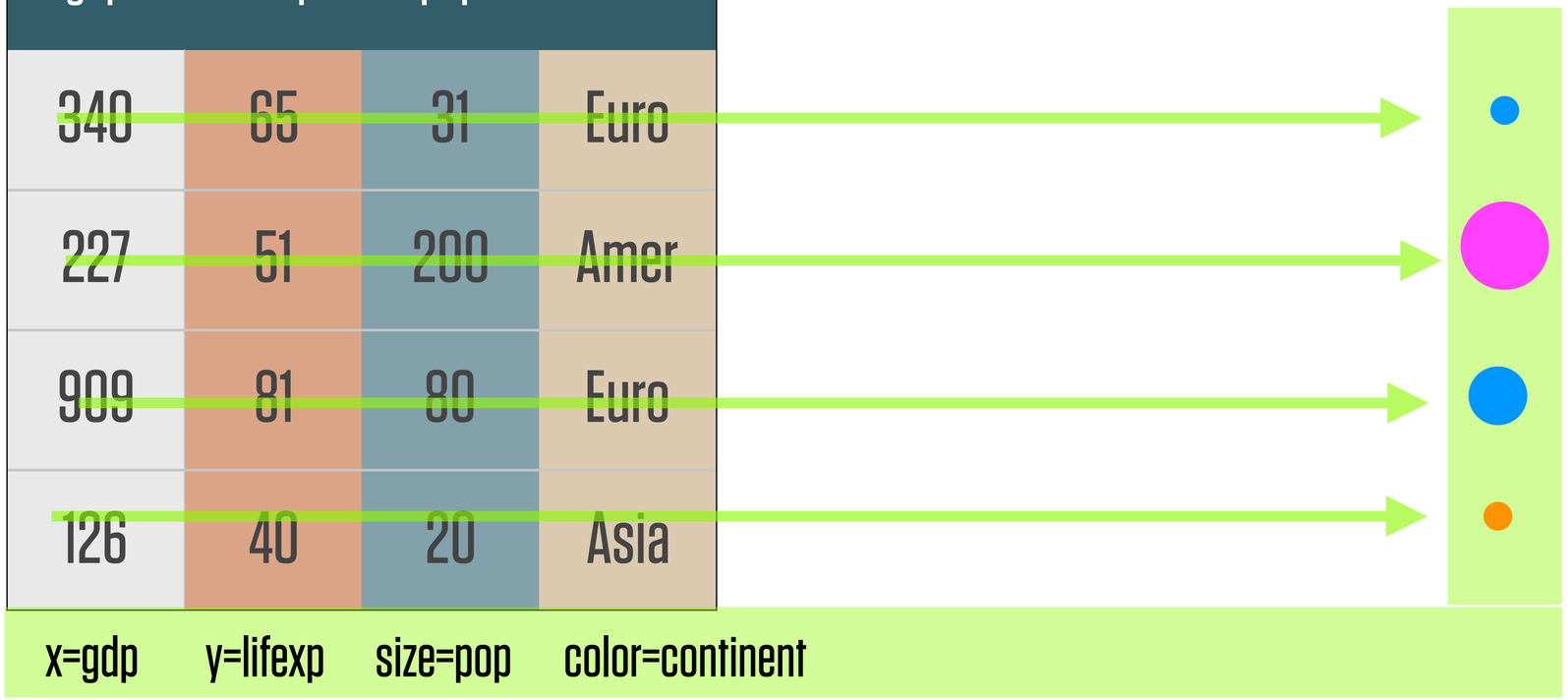
2. Mapping

ggplot(mapping = aes(x = ...))

3. Geom

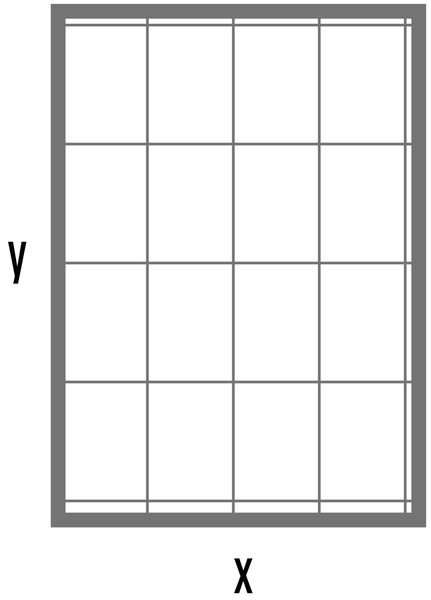
geom_point()

gdp	lifexp	pop	continent
340	65	31	Euro
227	51	200	Amer
909	81	80	Euro
126	40	20	Asia

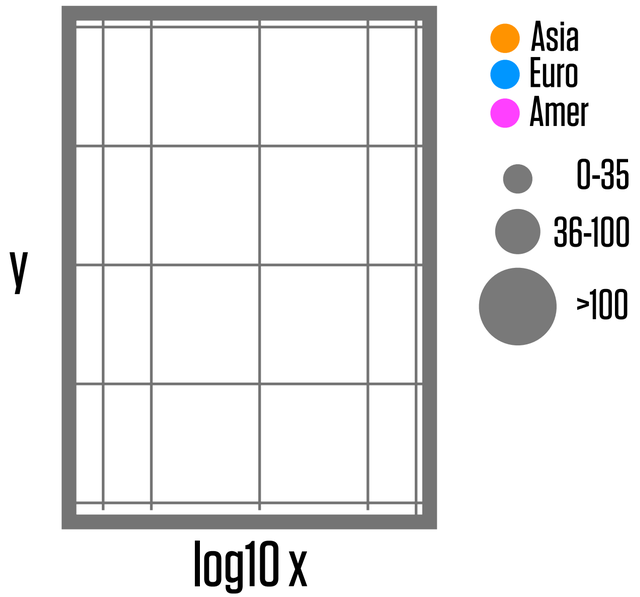


Required

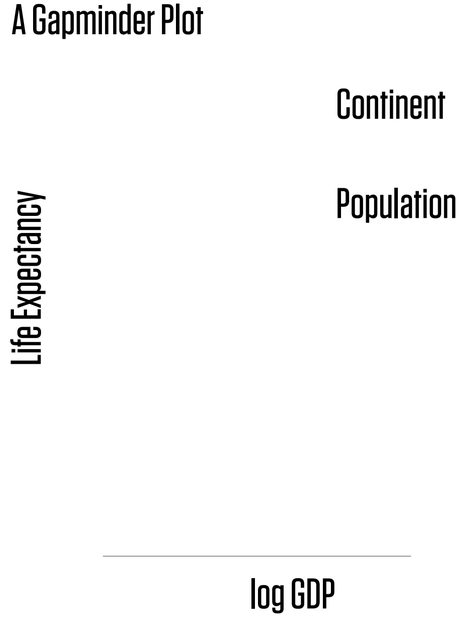
4. Coordinate System



5. Scales

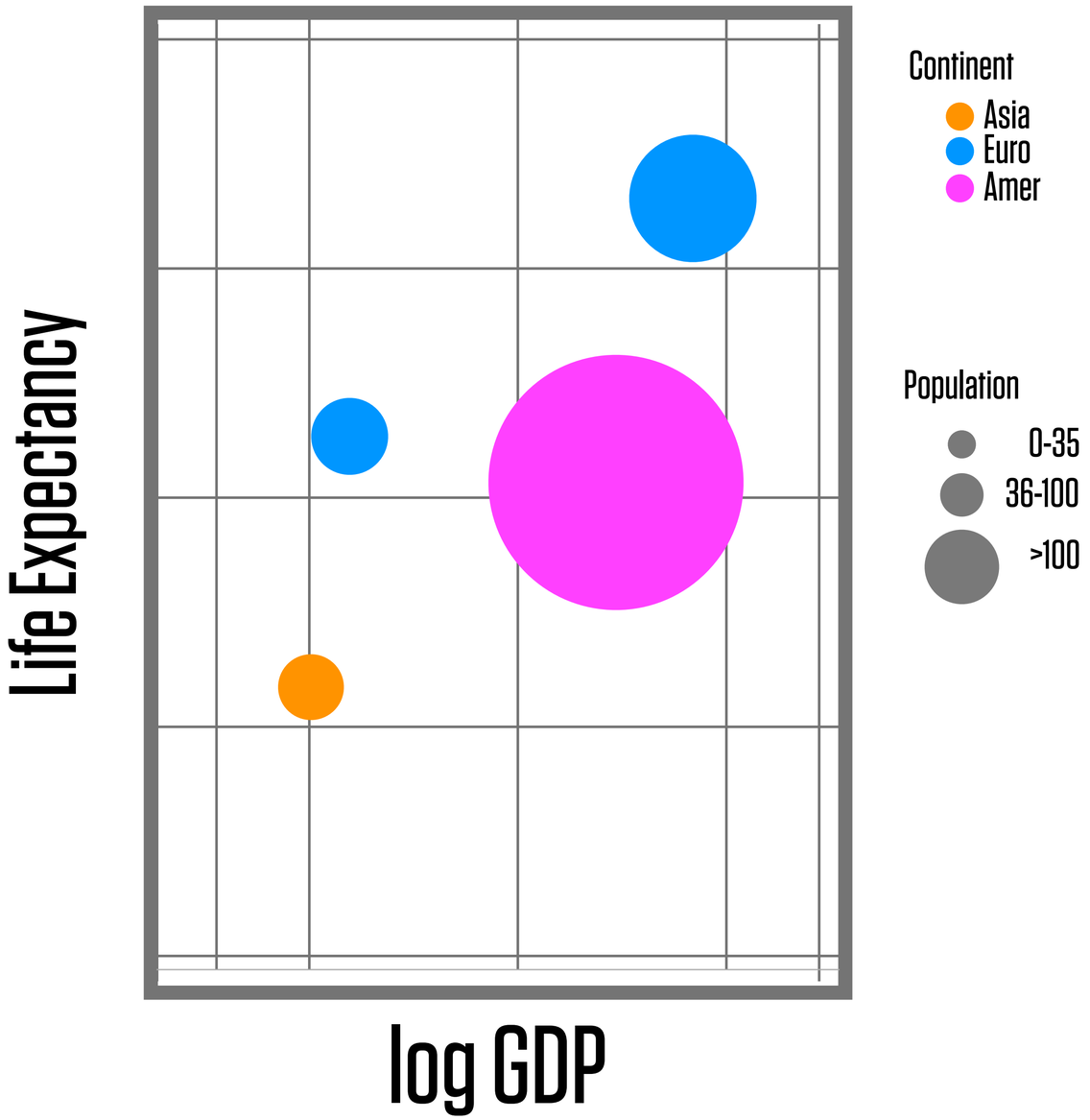


6. Labels & Guides



Initially Implicit

A Gapminder Plot



PIECE BY PIECE

```
head(gapminder)
```

```
## # A tibble: 6 × 6
##       country continent  year lifeExp      pop gdpPercap
##        <fctr>    <fctr> <int>   <dbl>    <int>     <dbl>
## 1 Afghanistan      Asia  1952  28.801  8425333  779.4453
## 2 Afghanistan      Asia  1957  30.332  9240934  820.8530
## 3 Afghanistan      Asia  1962  31.997 10267083  853.1007
## 4 Afghanistan      Asia  1967  34.020 11537966  836.1971
## 5 Afghanistan      Asia  1972  36.088 13079460  739.9811
## 6 Afghanistan      Asia  1977  38.438 14880372  786.1134
```

```
dim(gapminder)
```

```
## [1] 1704    6
```

```
p <- ggplot(data = gapminder)
```

Create a ggplot object
Data is gapminder table

```
p <- ggplot(data = gapminder,
            mapping = aes(x = gdpPercap,
                          y = lifeExp))
```

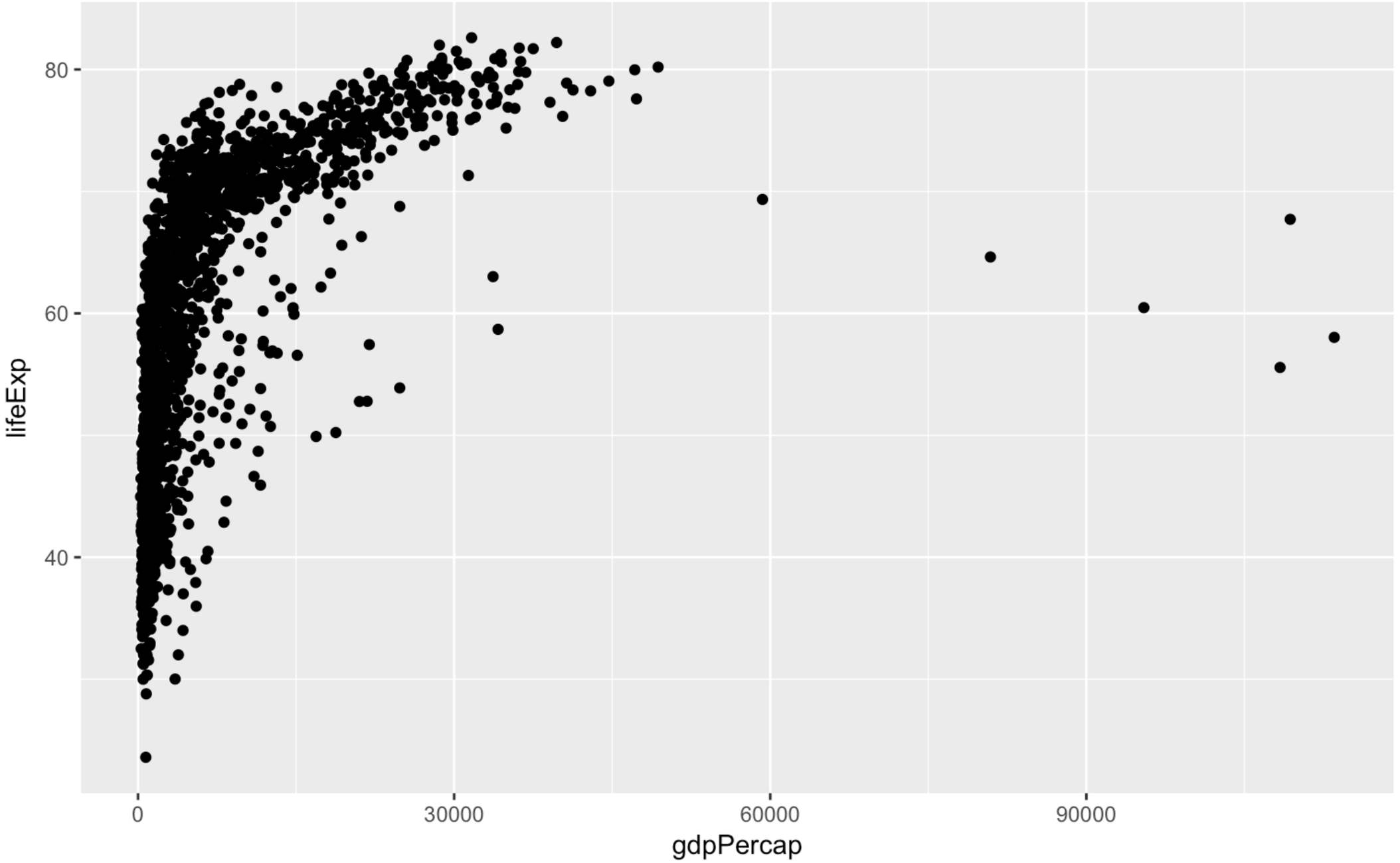
mapping: tell ggplot the **variables** you want **represented** by elements of the plot

- The `mapping = aes(...)` instruction **links variables to things you will see** on the plot.
- The `x` and `y` values are the most obvious ones.
- Other aesthetic mappings can include, e.g., `color`, `shape`, and `size`.

Mappings do **not** directly specify the **particular**, e.g., colors, shapes, or line styles that will appear on the plot. Rather they establish which variables in the data will be represented by which visible elements of the plot.

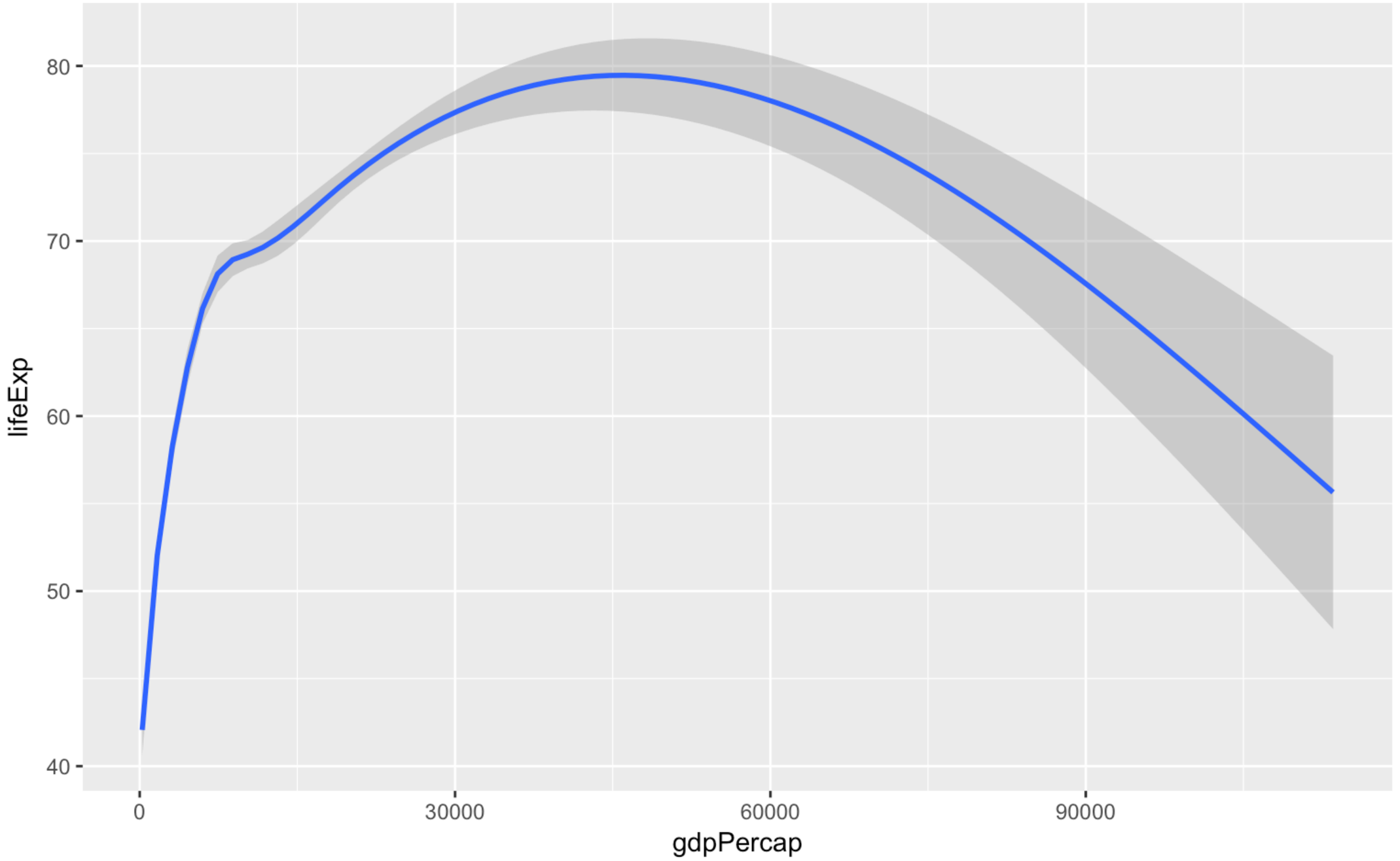
```
p + geom_point()
```

Add a geom layer to the plot


80
60
40
lifeExp
0
30000
60000
90000
gdpPercap

```
p + geom_smooth()
```

Try a different geom

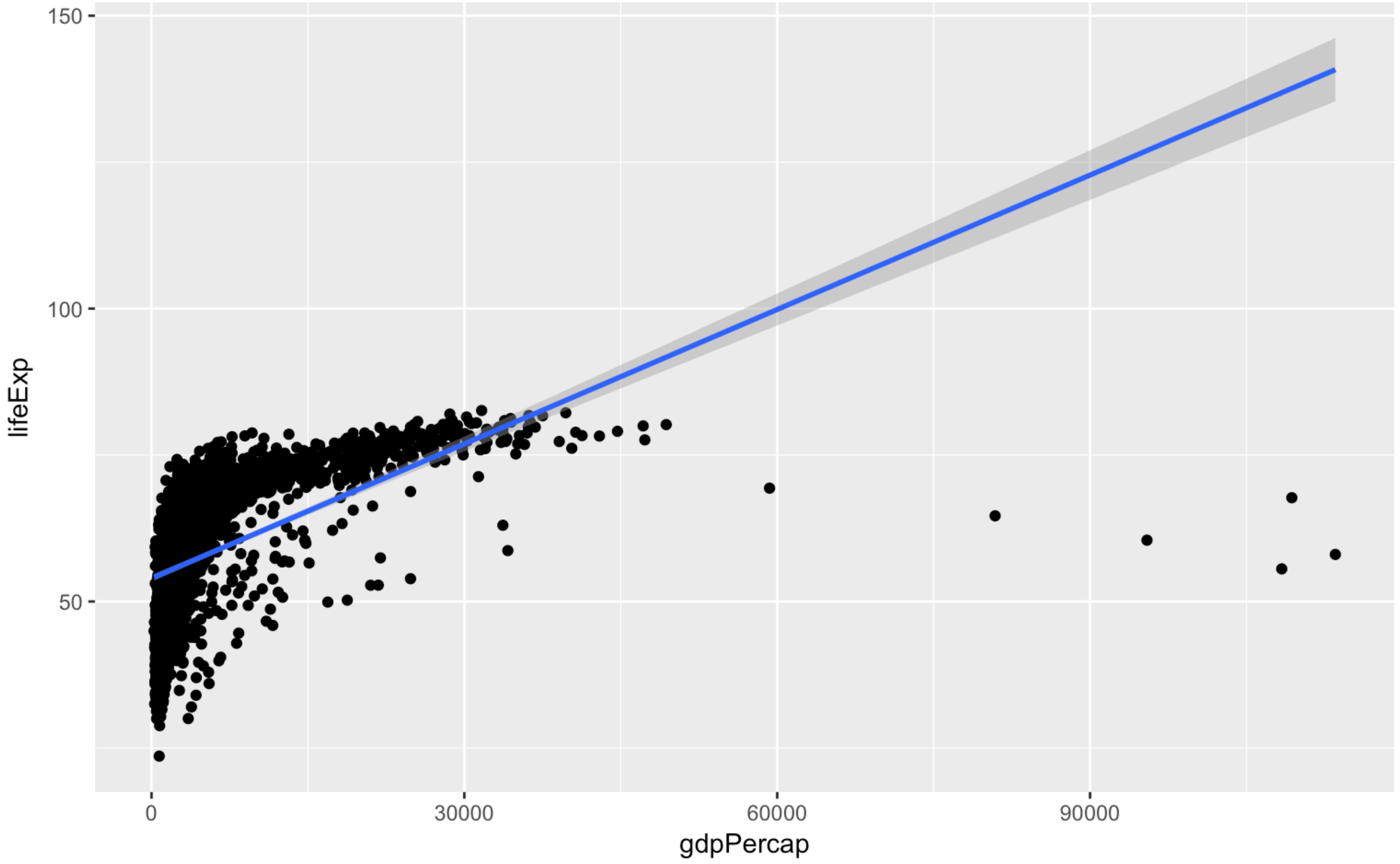

80
70
60
50
40
lifeExp
0
30000
60000
90000
gdpPercap

```
p + geom_point() +
    geom_smooth() +
    scale_x_log10(labels = scales::dollar)
```

This process is additive

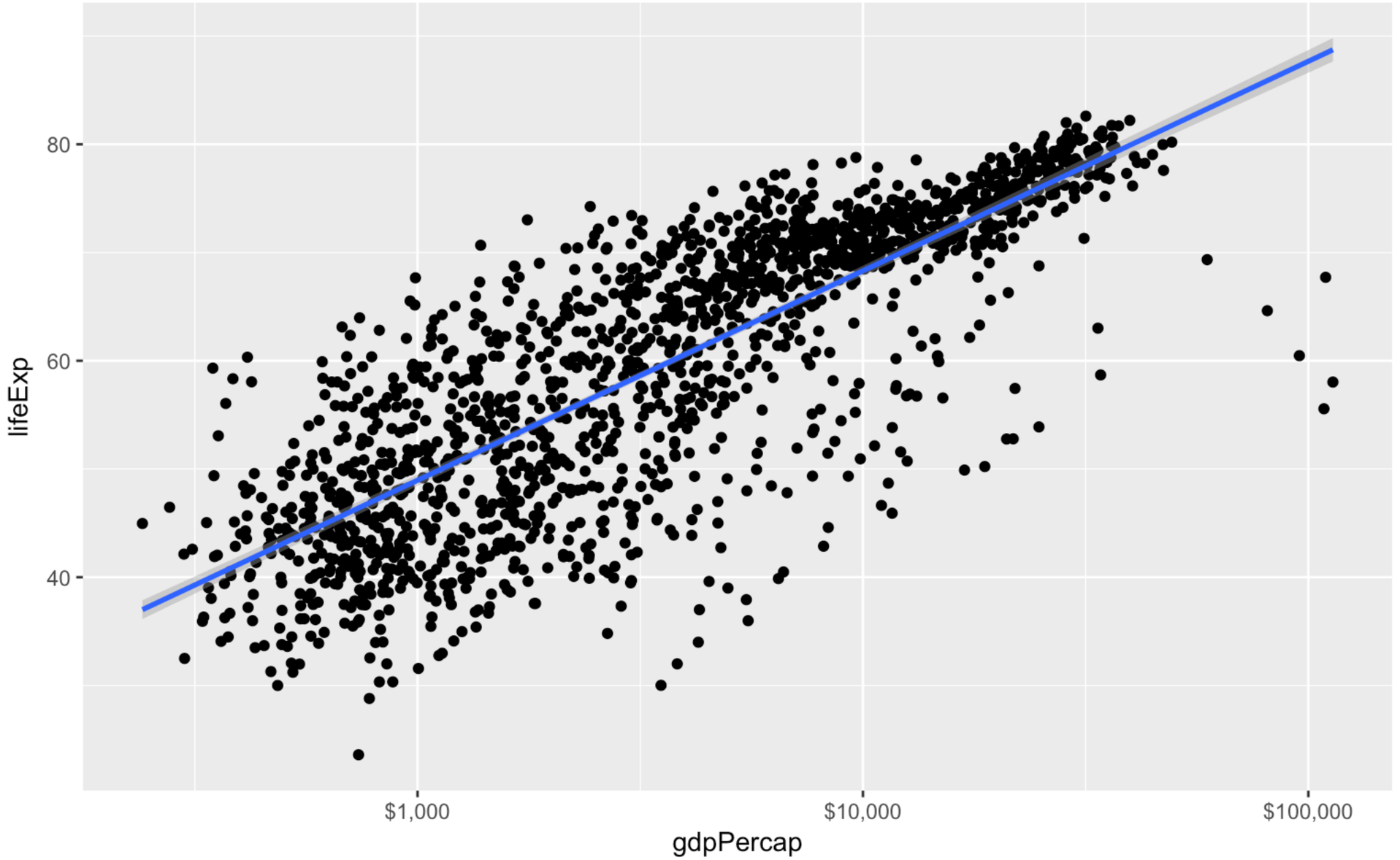
```
p + geom_point() +
    geom_smooth(method = "lm")
```

Every geom is a function.
Remember, functions take arguments.

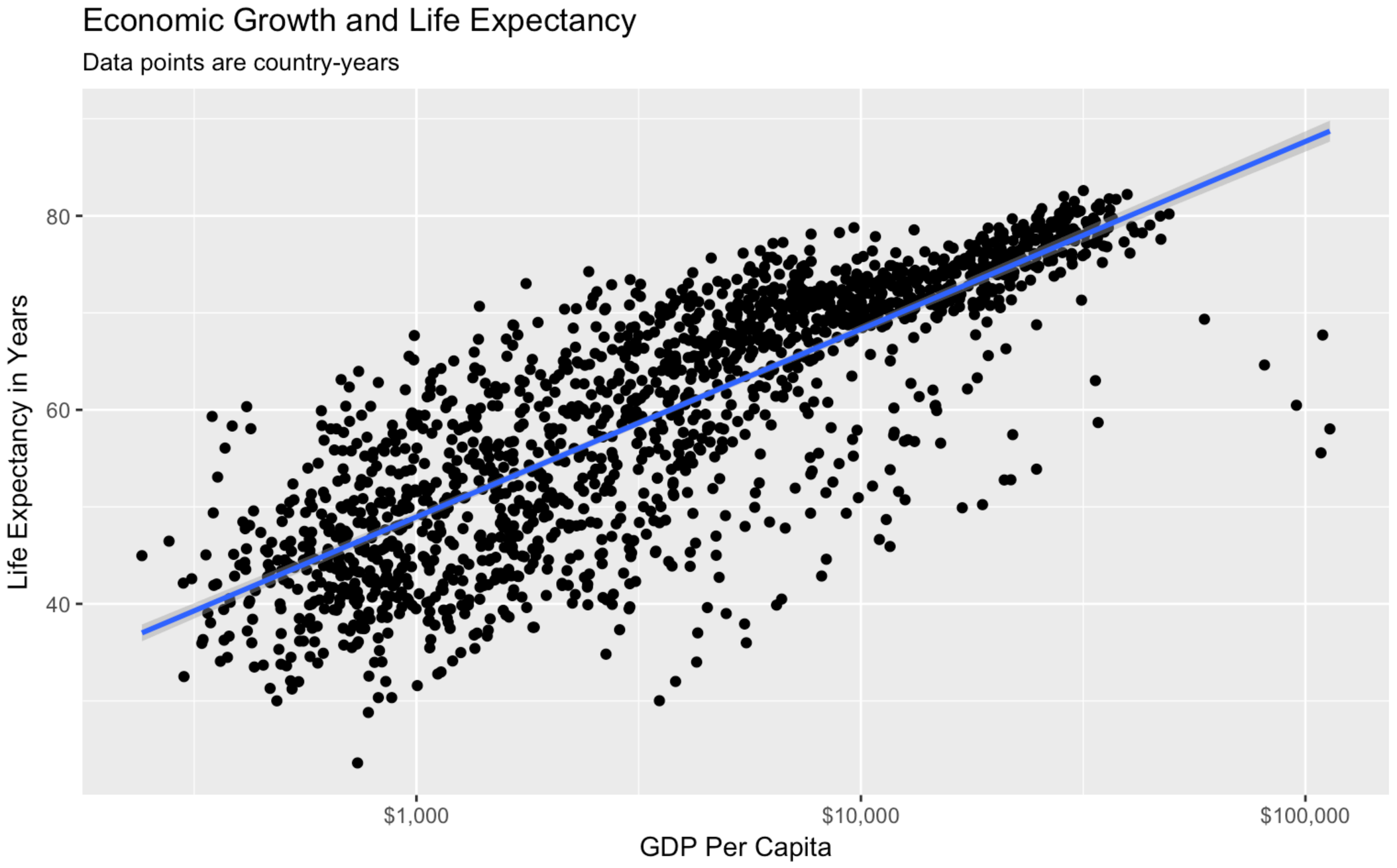

150
100
50
lifeExp
0
30000
60000
90000
gdpPercap

```
p <- ggplot(data = gapminder,
            mapping = aes(x = gdpPercap,
                          y = lifeExp))
p + geom_point() +
    geom_smooth(method = "lm") +
    scale_x_log10(label = scales::dollar)
```

Keep Layering

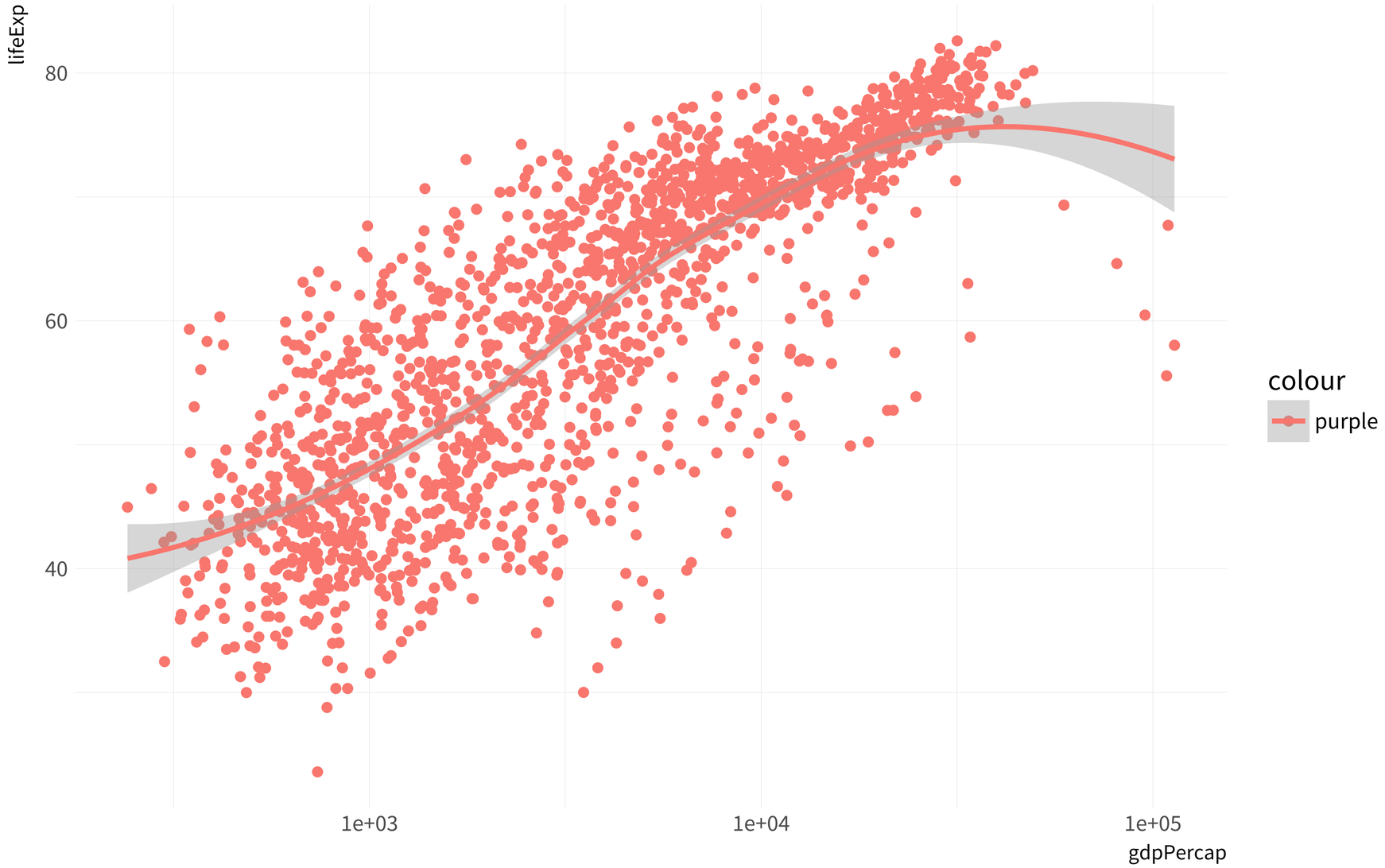

80
60
40
lifeExp
$1,000
$10,000
$100,000
gdpPercap

```
p + geom_point() +
    geom_smooth(method = "gam") +
    scale_x_log10(labels = scales::dollar) +
    labs(x = "GDP Per Capita",
         y = "Life Expectancy in Years",
         title = "Economic Growth and Life Expectancy",
         subtitle = "Data points are country-years",
         caption = "Data source: Gapminder")
```


Economic Growth and Life Expectancy
Data points are country-years
Life Expectancy in Years
80
60
40
$1,000
$10,000
$100,000
GDP Per Capita

MAPPING VS SETTING AESTHETICS

```r
p <- ggplot(data = gapminder,
            mapping = aes(x = gdpPercap,
                          y = lifeExp,
                          color = "purple"))
p + geom_point() +
    geom_smooth(method = "loess") +
    scale_x_log10()
```



What has gone wrong here?

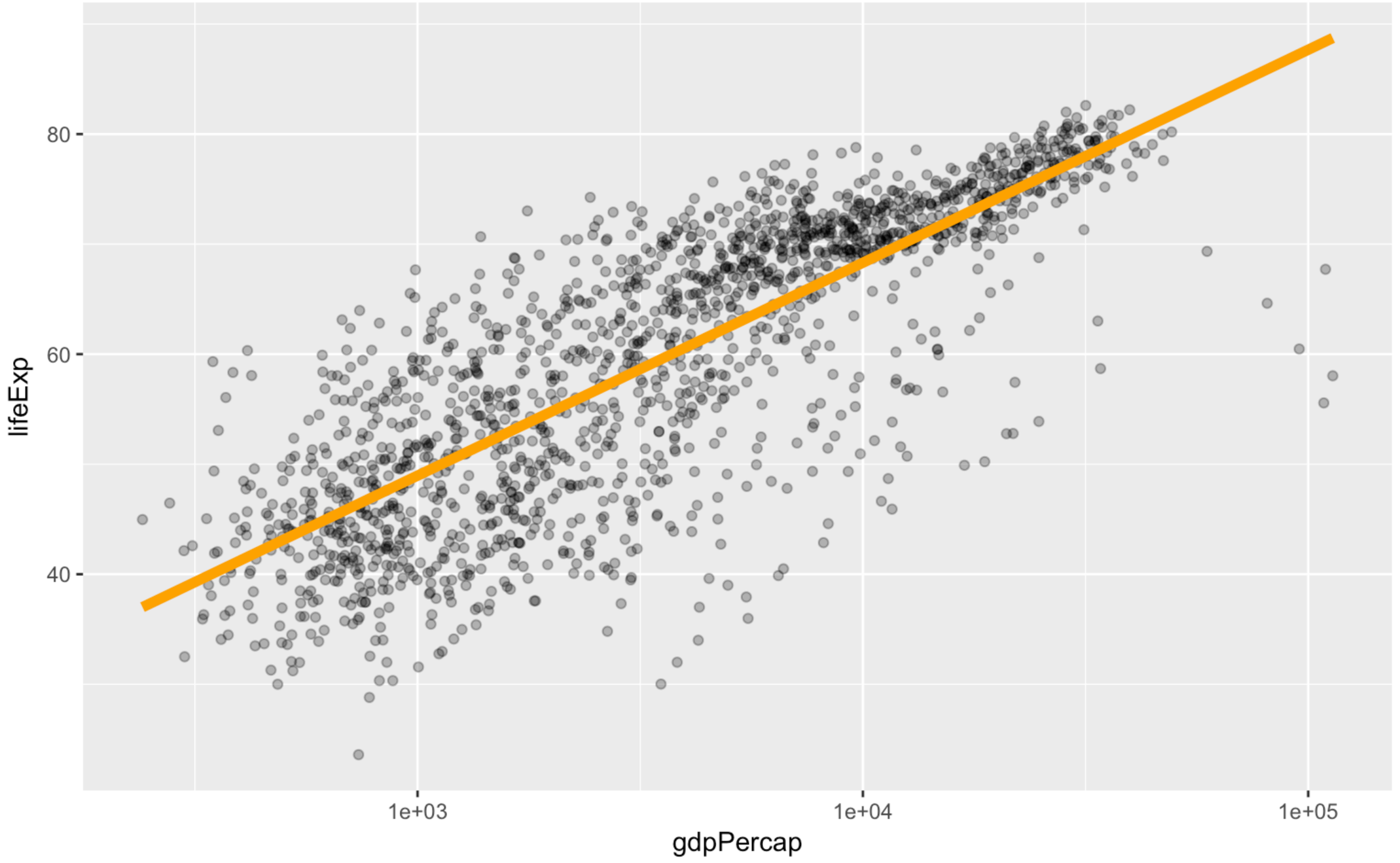
```
p <- ggplot(data = gapminder,
            mapping = aes(x = gdpPercap,
                          y = lifeExp)
p + geom_point(color = "purple") +
    geom_smooth(method = "loess")) +
    scale_x_log10()
```


80
60
40
lifeExp
1e+03
1e+04
1e+05
gdpPercap

geom functions can take many different arguments

```
p <- ggplot(data = gapminder,
            mapping = aes(x = gdpPercap,
                          y = lifeExp))
p + geom_point(alpha = 0.3) +
    geom_smooth(color = "orange",
        se = FALSE, size = 2, method = "lm") +
    scale_x_log10()
```

Here, some elements are mapped to variables, while others are set to values

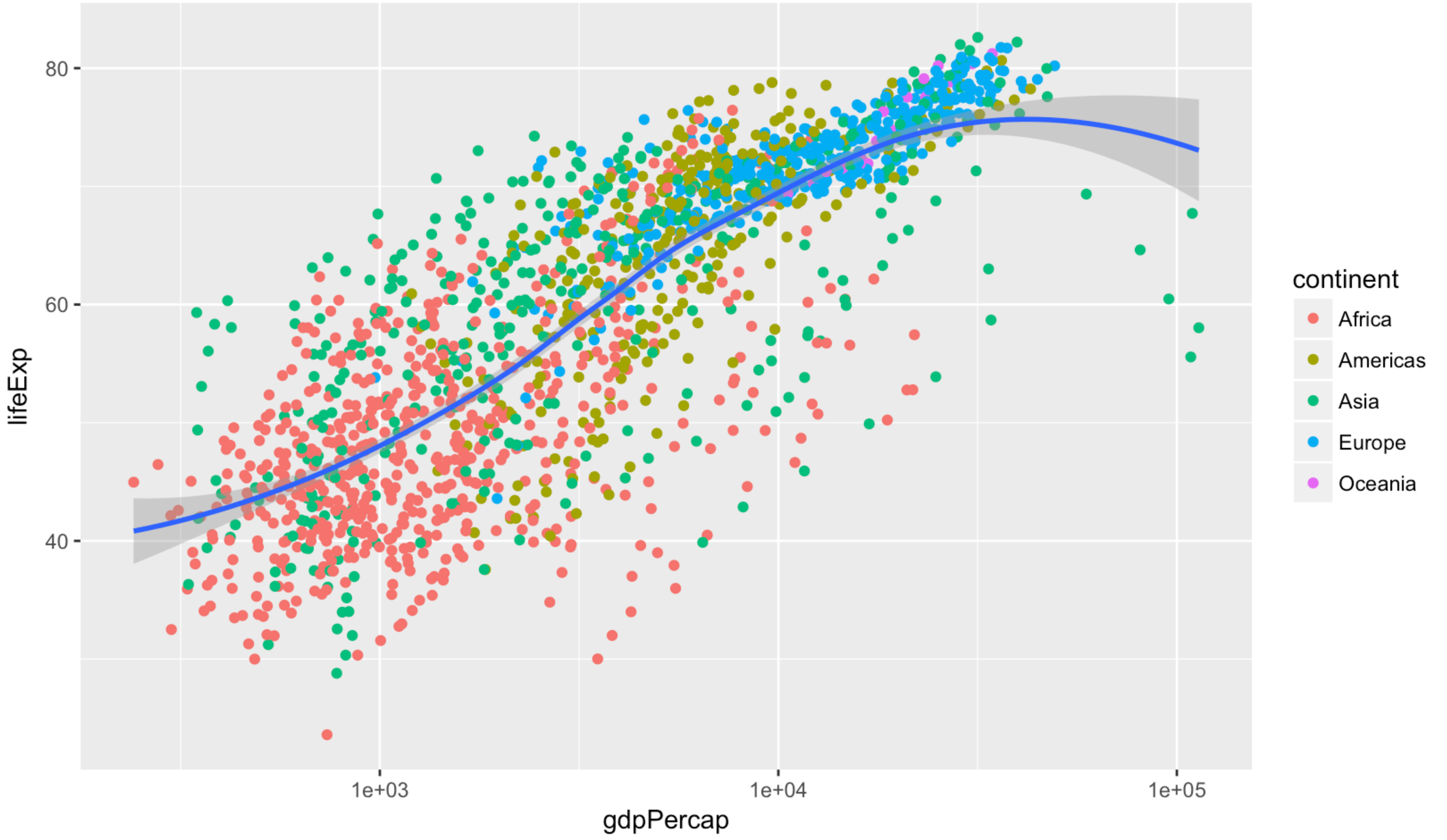

lifeExp
80
60
40
1e+03
1e+04
1e+05
gdpPercap

```r
p <- ggplot(data = gapminder,
            mapping = aes(x = gdpPercap,
                          y = lifeExp,
                          color = continent,
                          fill = continent))
p + geom_point() +
    geom_smooth(method = "loess") +
    scale_x_log10()
```


80
60
40
lifeExp
1e+03
1e+04
1e+05
gdpPercap
continent
Africa
Americas
Asia
Europe
Oceania

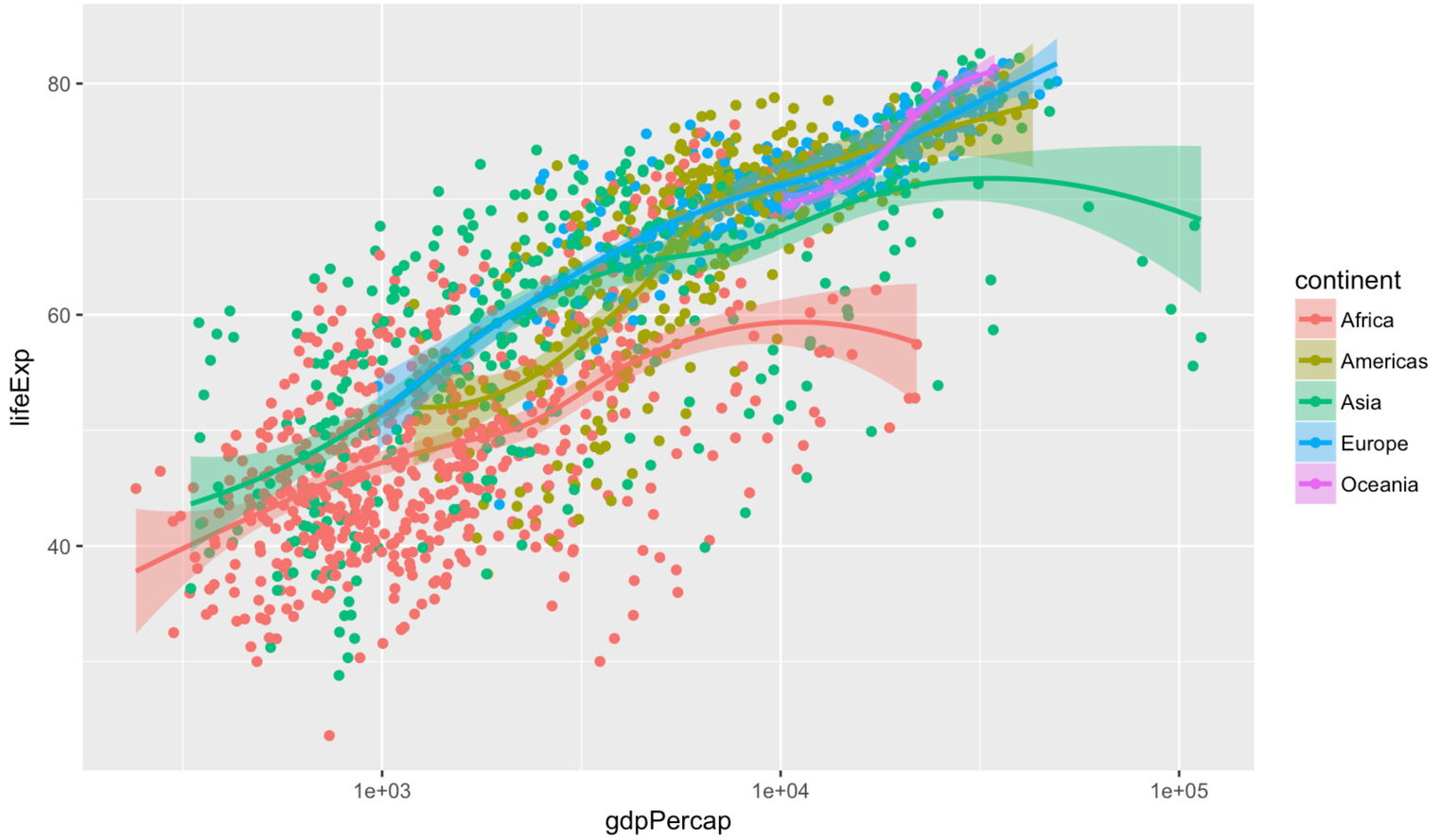
MAP or SET AESTHETICS per geom

```
p <- ggplot(data = gapminder,
            mapping = aes(x = gdpPercap,
                          y = lifeExp))
p + geom_point(mapping = aes(color = continent)) +
    geom_smooth(method = "loess") +
    scale_x_log10()
```

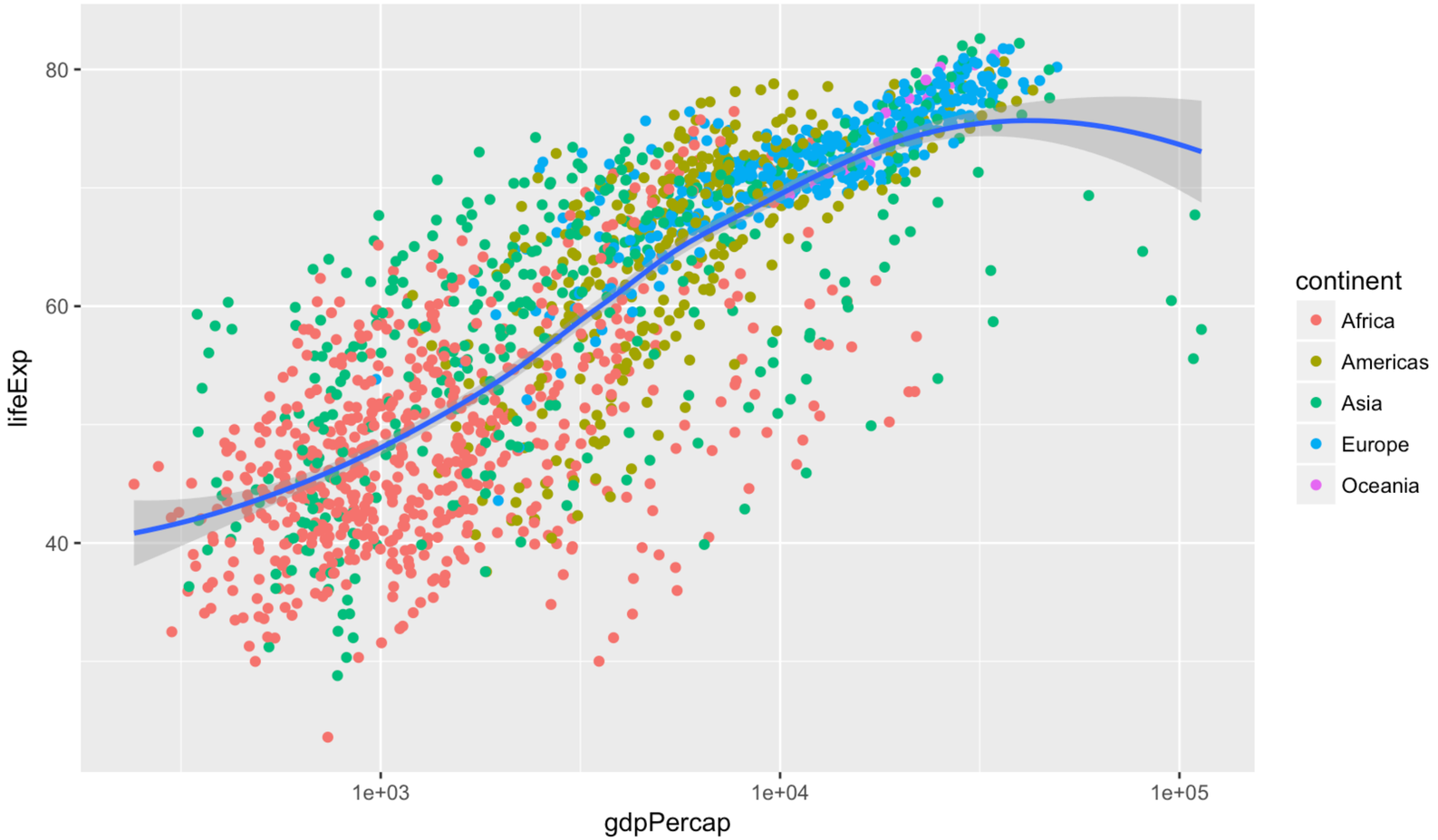

80
60
40
lifeExp
1e+03
1e+04
1e+05
gdpPercap
continent
Africa
Americas
Asia
Europe
Oceania

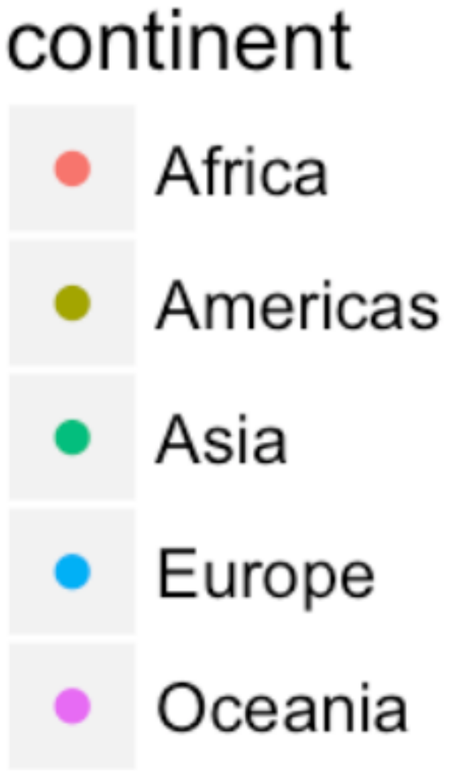
PAY CLOSE ATTENTION TO WHICH SCALES AND GUIDES ARE DRAWN, AND WHY

```
p <- ggplot(data = gapminder,
            mapping =
              aes(x = gdpPercap, y = lifeExp,
                  color = continent, fill = continent))
p + geom_point() +
    geom_smooth(method = "loess") +
    scale_x_log10()
```



```
p <- ggplot(data = gapminder,
            mapping =
              aes(x = gdpPercap, y = lifeExp))
p + geom_point(mapping = aes(color = continent)) +
    geom_smooth(method = "loess") +
    scale_x_log10()
```





REMEMBER:
EVERY MAPPED VARIABLE HAS A SCALE

Saving Your Work

With ggsave

```
ggsave()

ggsave("figures/my_figure.png")

ggsave("my_figure.pdf")

ggsave("my_figure.pdf",
       plot = p5,
       scale = 1.2)

ggsave("figures/my-figure.pdf",
       plot = p5,
       width = 8,
       height = 5)
```

With pdf() or other graphics devices

```
pdf(file = "plot.pdf", height = 5in,
    width = 5in)
print(p4)

dev.off()
```

Open device ...

... and close when done

Getting Help

The name of the function, and the library it is in.

mean {base} R Documentation

Arithmetic Mean

Description

What it does.

Generic function for the (trimmed) arithmetic mean.

Usage

```
mean(x, ...)

## Default S3 method:
mean(x, trim = 0, na.rm = FALSE, ...)
```

The function's name, and in the parentheses the named arguments it expects, in the order it expects them. If an argument has a default value, it is shown. Arguments without default values (e.g. x) must be provided by you.

Arguments

More details on each named argument. This will tell you what class of thing each argument has to be—an object, a number, a data frame, a logical value, etc.

`x`	An R object. Currently there are methods for numeric/logical vectors and date, date-time and time interval objects. Complex vectors are allowed for `trim = 0`, only.
`trim`	the fraction (0 to 0.5) of observations to be trimmed from each end of `x` before the mean is computed. Values of trim outside that range are taken as the nearest endpoint.
`na.rm`	a logical value indicating whether `NA` values should be stripped before the computation proceeds.
`...`	further arguments passed to or from other methods.

The ellipsis allows other arguments to be passed to and from the function.

What the function returns—i.e., the result of whatever operation or calculation it performs. This can be a single number, as here, or a multi-part object such as a list, a data frame, a plot, or a model.

Value

If `trim` is zero (the default), the arithmetic mean of the values in `x` is computed, as a numeric or complex vector of length one. If x is not logical (coerced to numeric), numeric (including integer) or complex, `NA_real_` is returned, with a warning.
If `trim` is non-zero, a symmetrically trimmed mean is computed with a fraction of `trim` observations deleted from each end before the mean is computed.

References

Becker, R. A., Chambers, J. M. and Wilks, A. R. (1988) *The New S Language*. Wadsworth & Brooks/Cole.

See Also

`weighted.mean`, `mean.POSIXct`, `colMeans` for row and column means.

Other related functions

Examples

```
x <- c(0:10, 50)
xm <- mean(x)
c(xm, mean(x, trim = 0.10))
```

Self-contained examples that you can run at the console. These may use built-in datasets or other R functions.

Visit the package's Index page to look for Demos and Vignettes detailing how it works.

The name of the function, and the library it is in.

What it does.

More details on each

mean {base} R Documentation

Arithmetic Mean

Description

Generic function for the (trimmed) arithmetic mean.

Usage

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mean(x, ...)

## Default S3 method:
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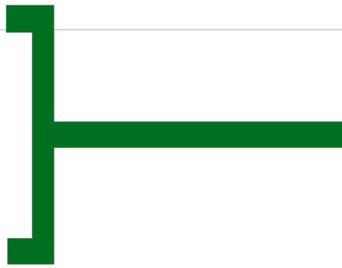
```



Arguments

mean {base} R Documentation

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The ellipsis allows other arguments to be passed to and from the function.

Value

What the function returns—i.e., the result of whatever operation or calculation it performs. This can be

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If `trim` is non-zero, a symmetrically trimmed mean is computed with a fraction of `trim` observations

has to be—an object, a number, a data frame, a logical value, etc.

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The ellipsis allows other argume be passed to and from the funct

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References

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See Also

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Other related functions

Examples

```
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xm <- mean(x)
c(xm, mean(x, trim = 0.10))
```

Self-contained examples that you can run at the console. These may use built-in datasets or other R functions.

as
part
list, a
t, or a

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