Язык R
лекция 6

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reshape2

reshape2

```
>install.packages("reshape2")
>library(reshape2)

>a=data.frame(name=c('John', 'Mary', 'Peter', 'Susan'),
                sex=c('m','f','m','f'),
                age=c(26,21,19,29),
                weight=c(82, 56, 79, 60),
                height=c(182, 171, 179, 175))
```

name	sex	age	weight	height
John	m	26	82	182
Mary	f	21	56	171
Peter	m	19	79	179
Susan	f	29	60	175

«Расплавление» данных

```
> a_melt <- melt(a, id.vars = c('name','sex'), variable.name = c('a_variable'),
                    value.name = 'a_name')
```

name	sex	age	weight	height
John	m	26	82	182
Mary	f	21	56	171
Peter	m	19	79	179
Susan	f	29	60	175

name	sex	a_variable	a_name
John	m	age	26
Mary	f	age	21
Peter	m	age	19
Susan	f	age	29
John	m	weight	82
Mary	f	weight	56
Peter	m	weight	79
Susan	f	weight	60
John	m	height	182
Mary	f	height	171
Peter	m	height	179
Susan	f	height	175

Формирование данных

name	sex	a_variable	a_name
John	m	age	26
Mary	f	age	21
Peter	m	age	19
Susan	f	age	29
John	m	weight	82
Mary	f	weight	56
Peter	m	weight	79
Susan	f	weight	60
John	m	height	182
Mary	f	height	171
Peter	m	height	179
Susan	f	height	175

```
> dcast(a_melt,
name ~ a_variable)
```

name	age	weight	height
John	26	82	182
Mary	21	56	171
Peter	19	79	179
Susan	29	60	175

```
> dcast(a_melt,
name + sex ~ a_variable)
```

name	sex	age	weight	height
John	m	26	82	182
Mary	f	21	56	171
Peter	m	19	79	179
Susan	f	29	60	175

ggplot2

ggplot2

Author

ggplot2 was developed by Hadley Wickham, assistant professor of statistics at Rice University, Houston. In July 2010 the latest stable release (Version 0.8.8) was published.

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2002 B.Sc. (Statistics, Computer Science), First Class Honours, The University of Auckland, Auckland, New Zealand.

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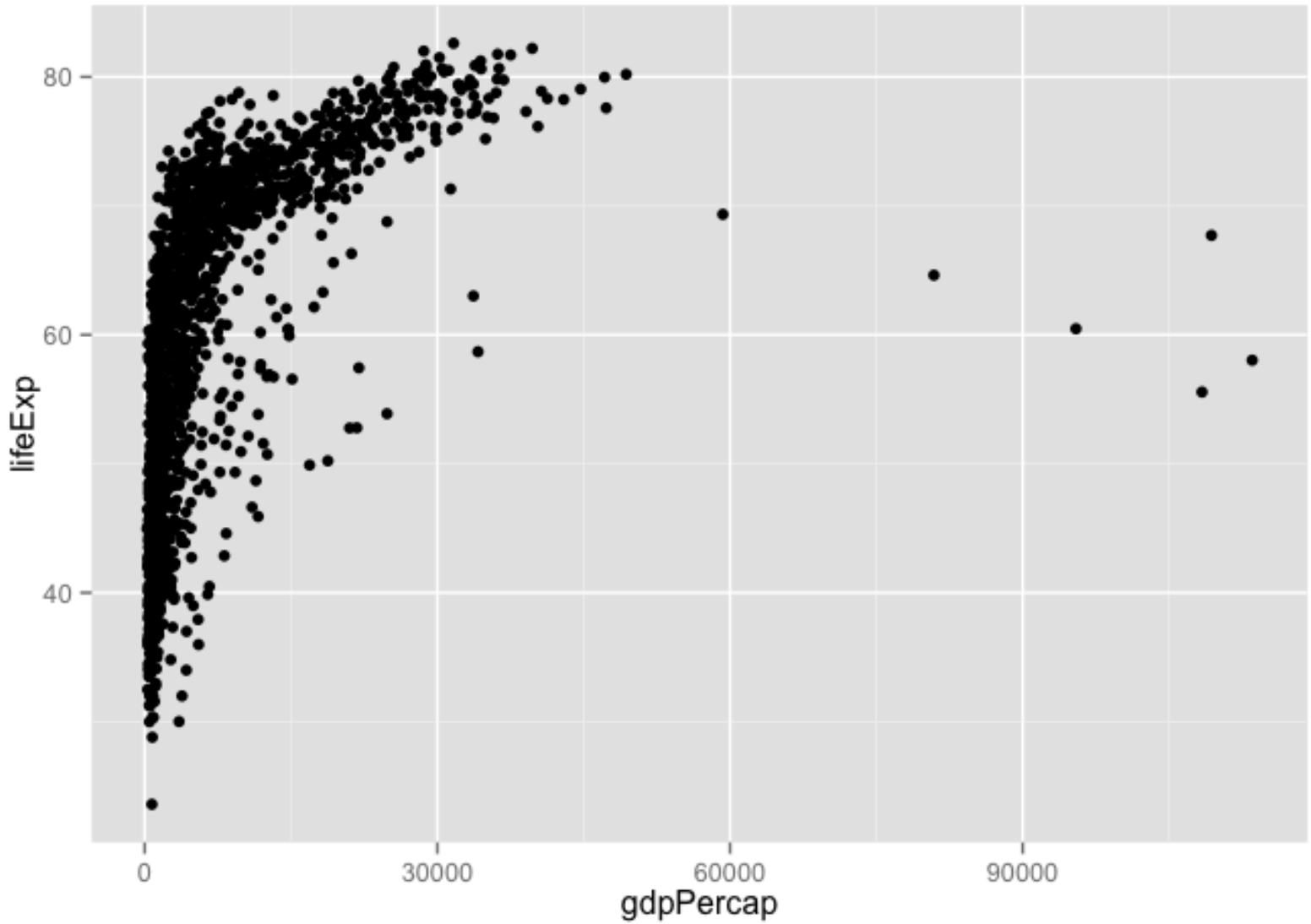
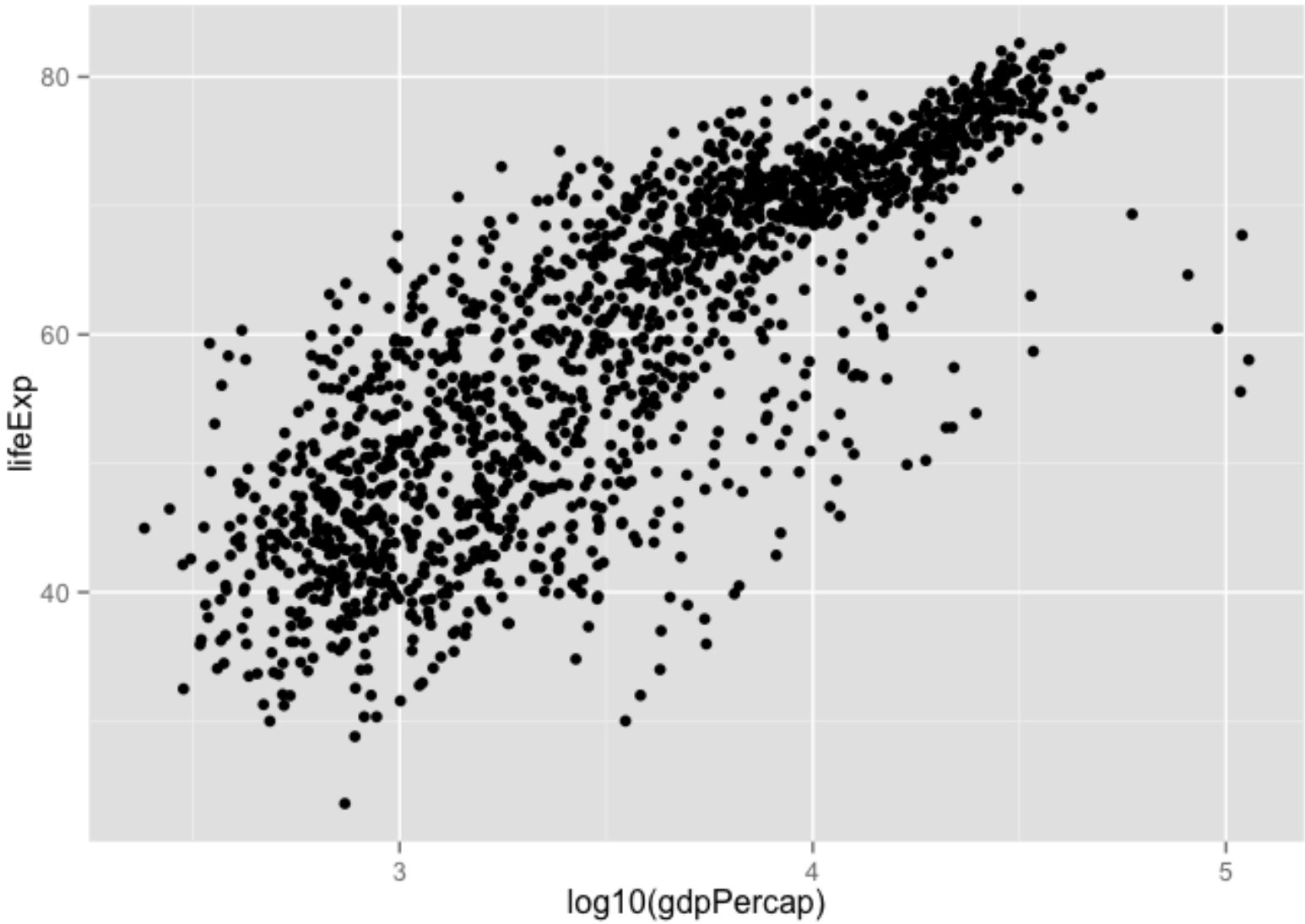
http://www.ceb-institute.org/bbs/wp-content/uploads/2011/09/handout_ggplot2.pdf

Установка и загрузка пакета:

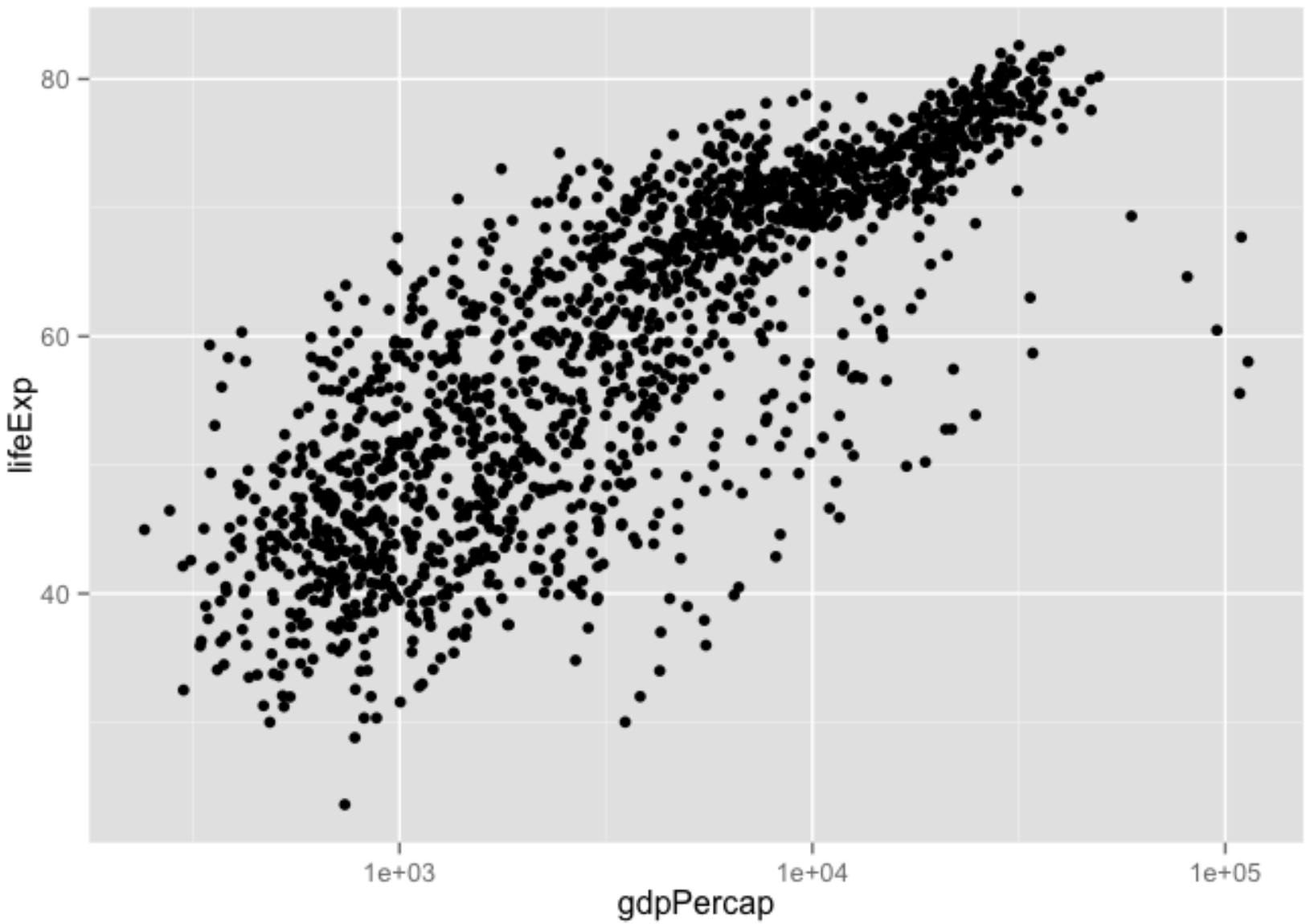
```
> install.packages("ggplot2")
> library("ggplot2")
```



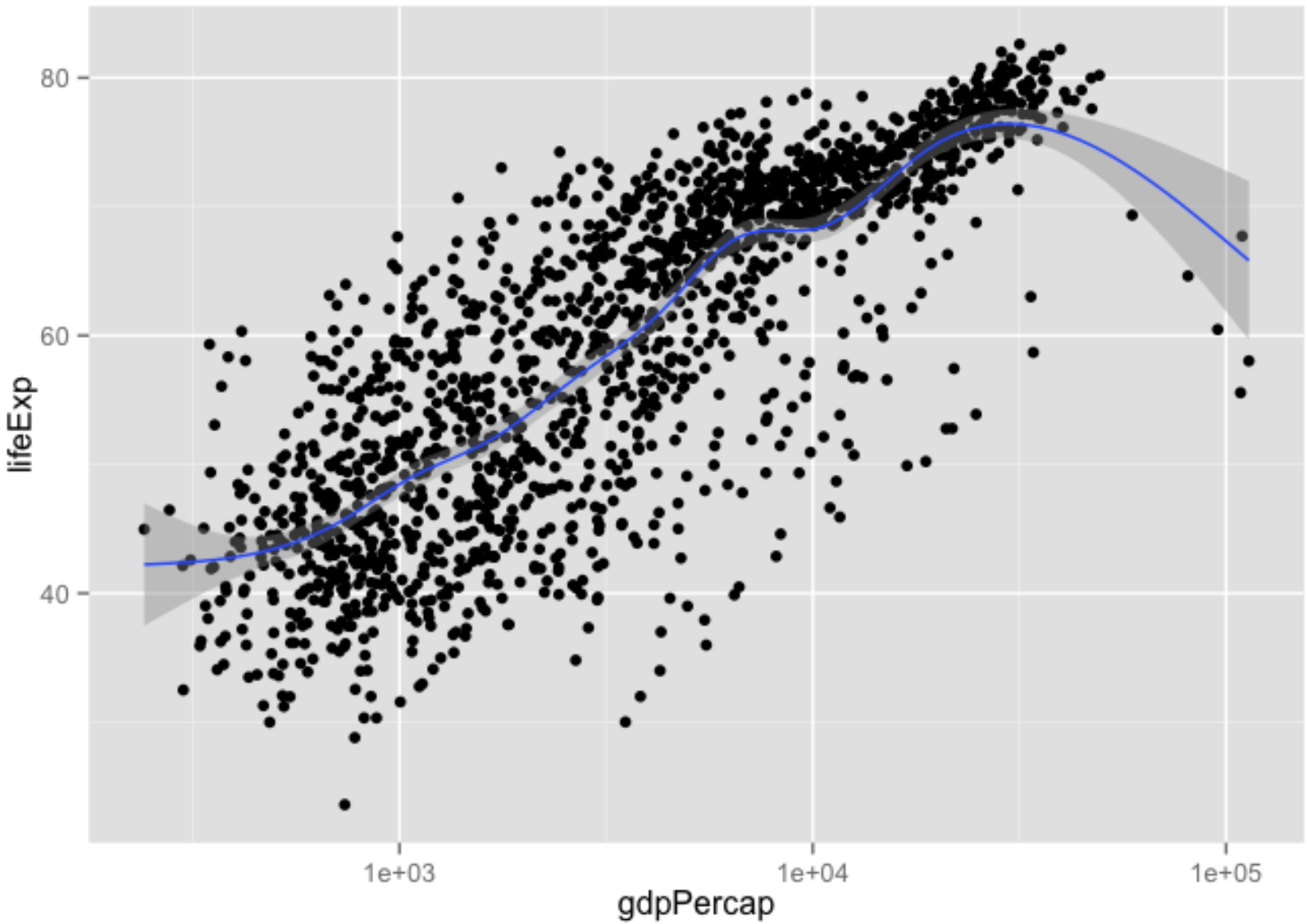

```
p <- ggplot(gapminder, aes(x = gdpPercap, y = lifeExp))
p + geom_point()
```



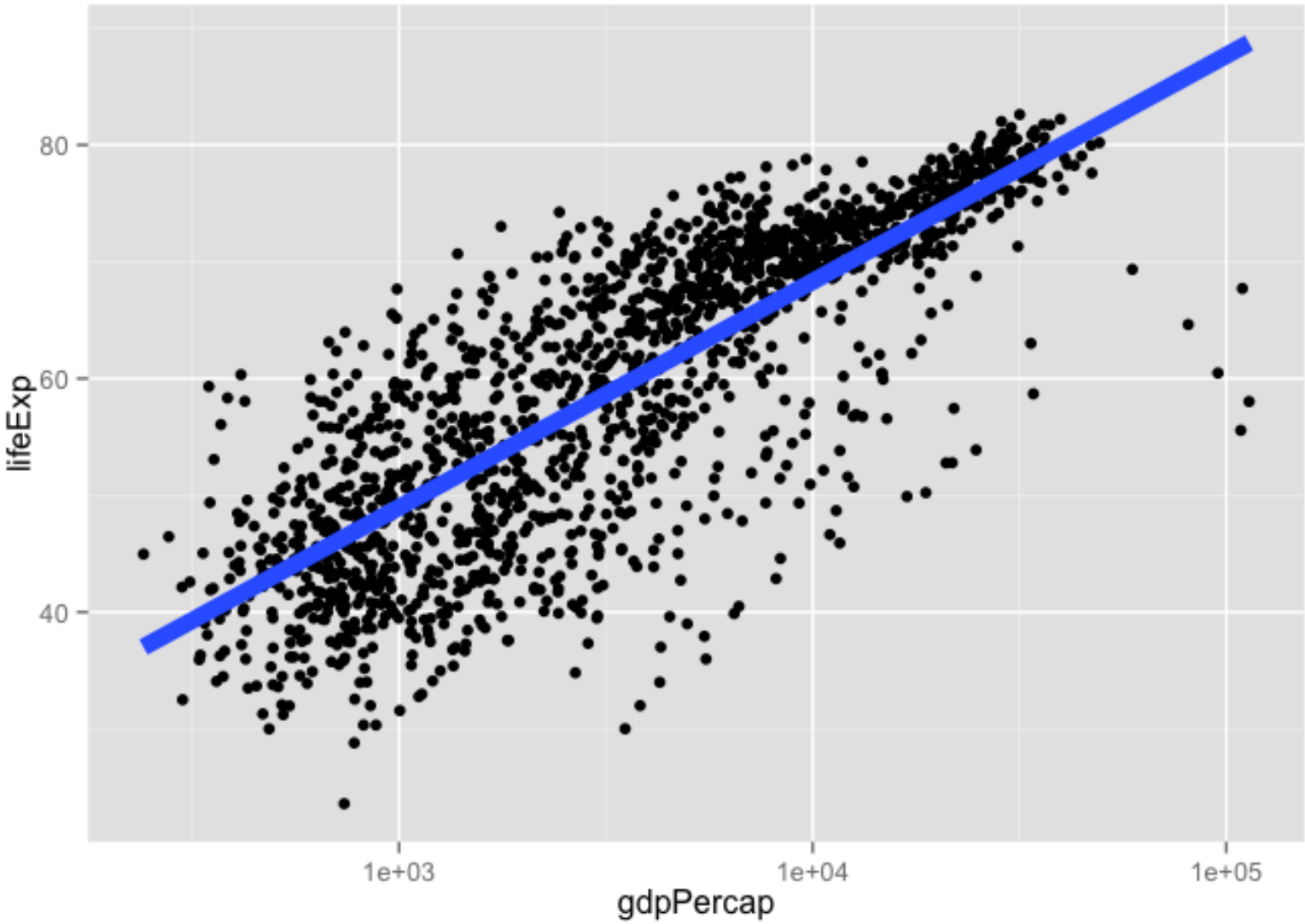

```
ggplot(gapminder, aes(x = log10(gdpPercap), y = lifeExp)) +
geom_point()
```




```
p + geom_point() + scale_x_log10()
```

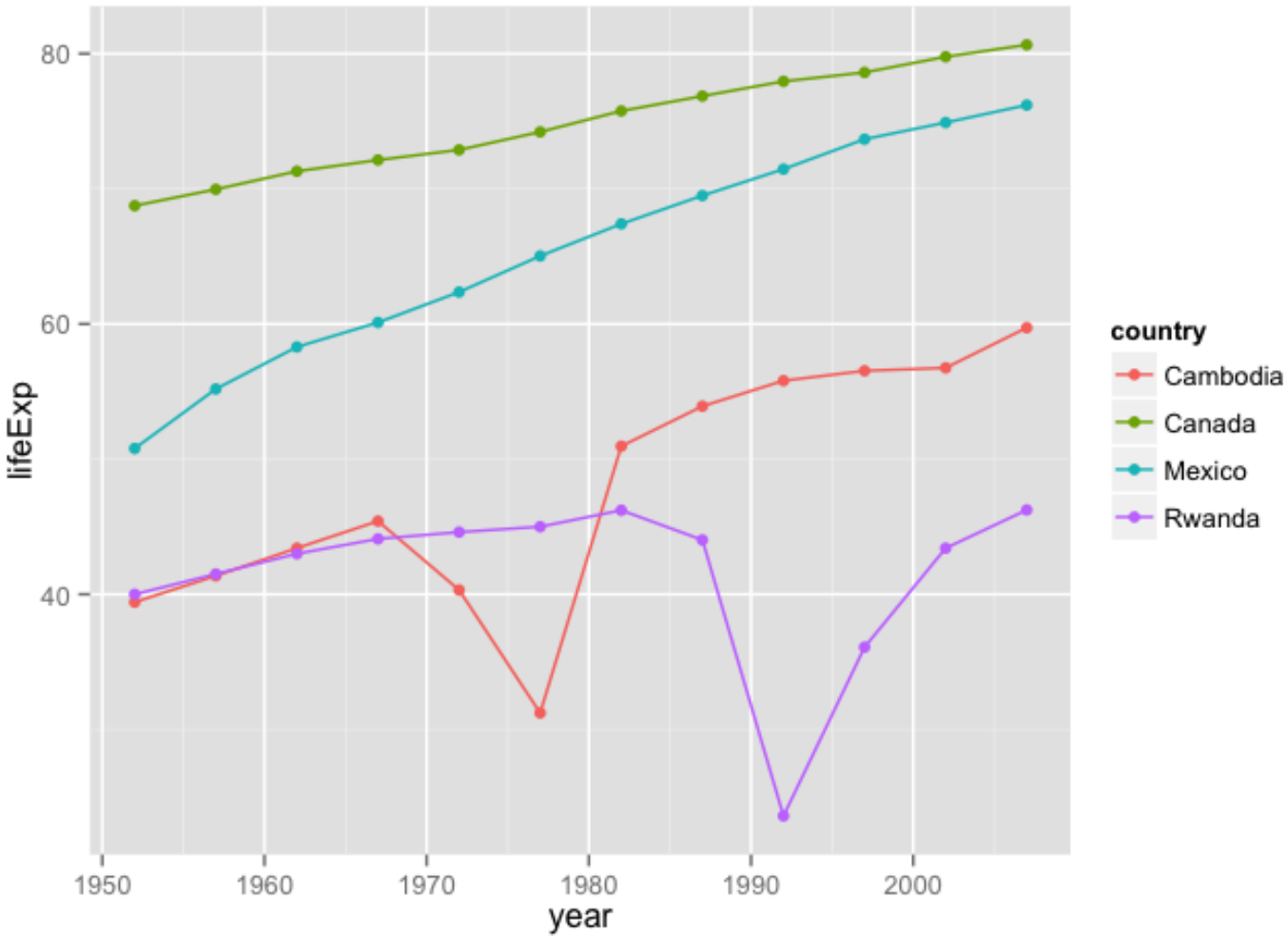



```
p + geom_point() + scale_x_log10() + geom_smooth()
```

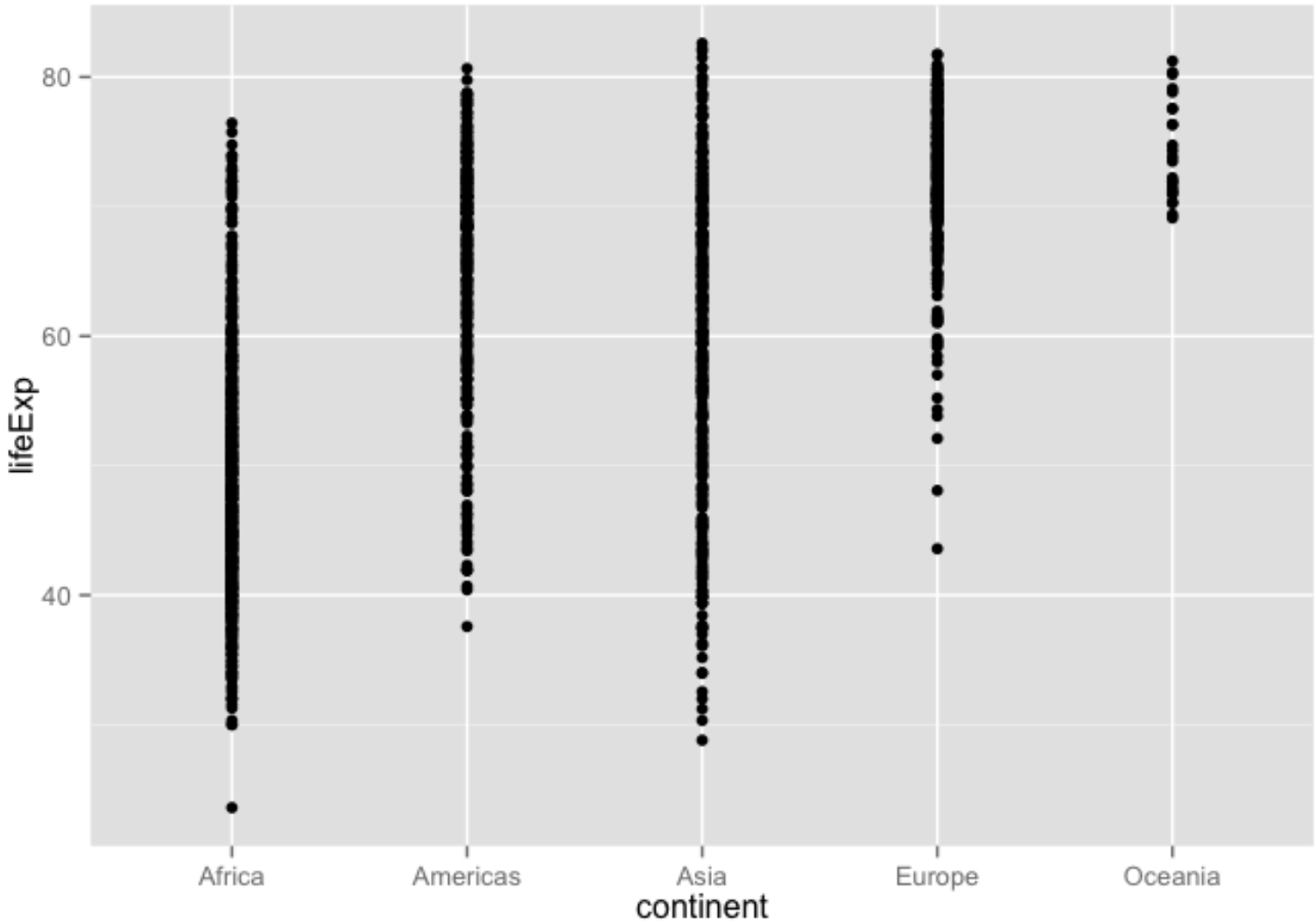



```
p + geom_point() + scale_x_log10() + geom_smooth(lwd = 3,
se = FALSE, method = "lm")
```

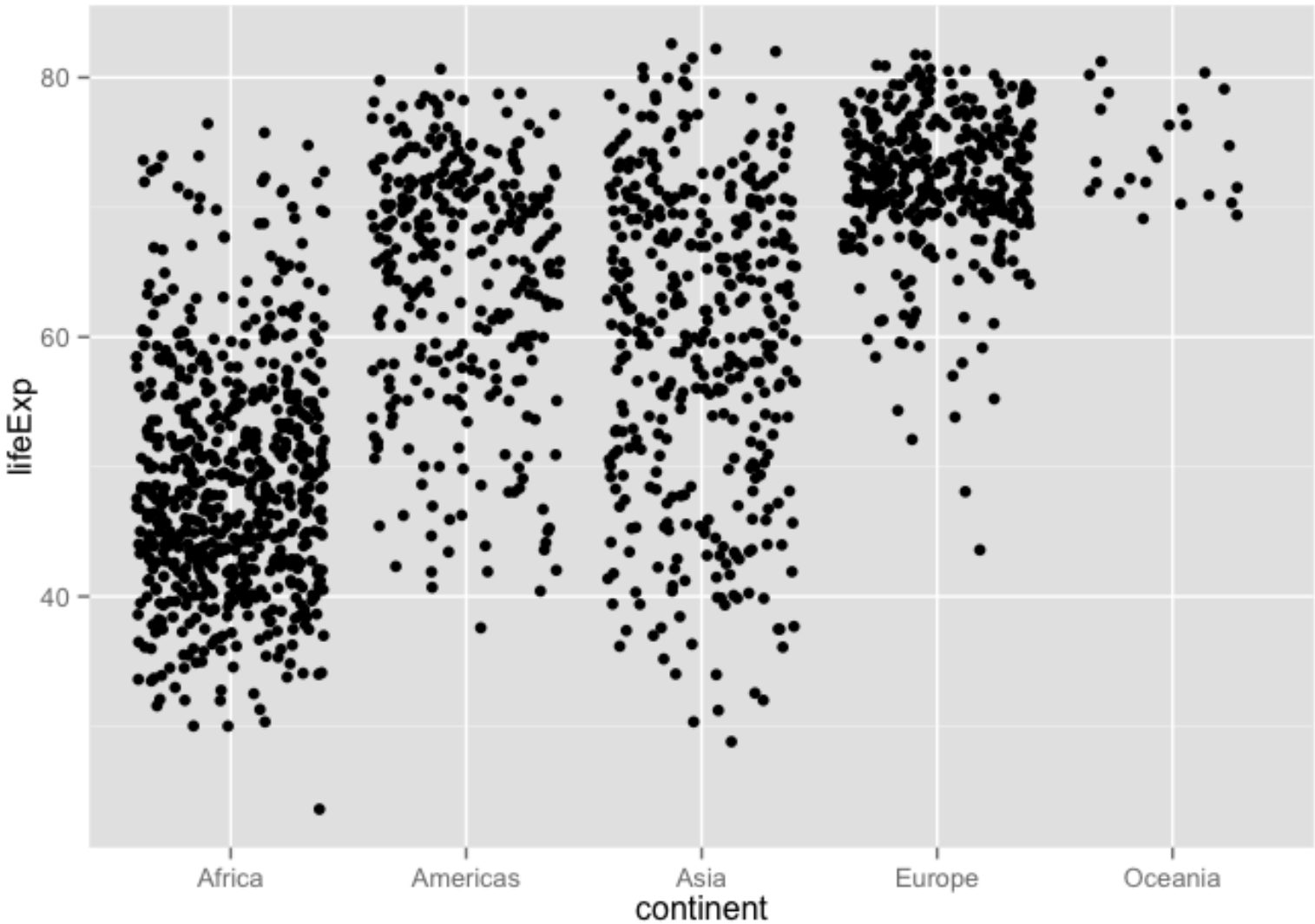

```
ggplot(subset(gapminder, country == "Zimbabwe"),
       aes(x = year, y = lifeExp)) + geom_line() + geom_point()
```



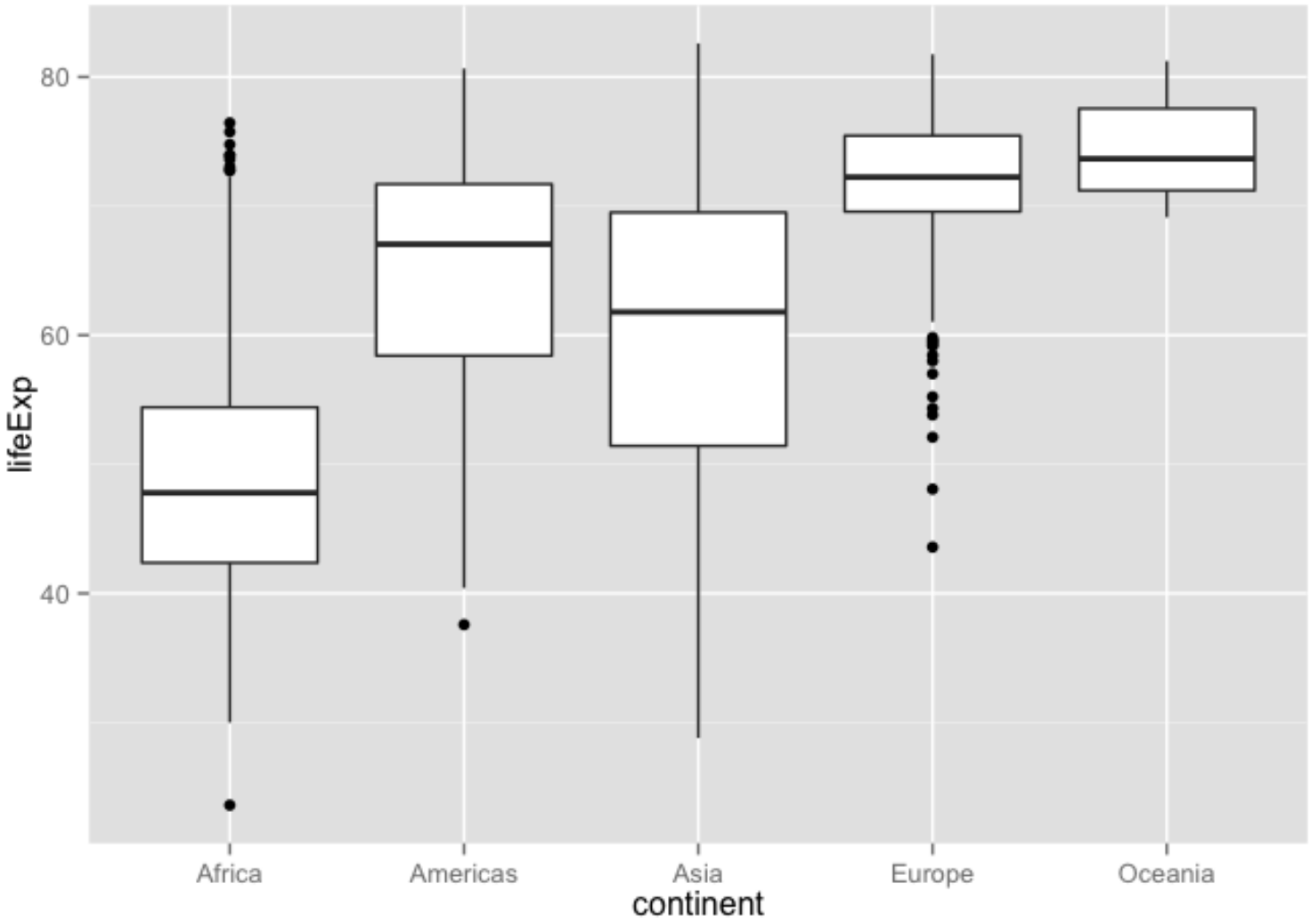

```
jCountries <- c("Canada", "Rwanda", "Cambodia", "Mexico")
ggplot(subset(gapminder, country %in% jCountries),
       aes(x = year, y = lifeExp, color = country)) +
geom_line() + geom_point()
```



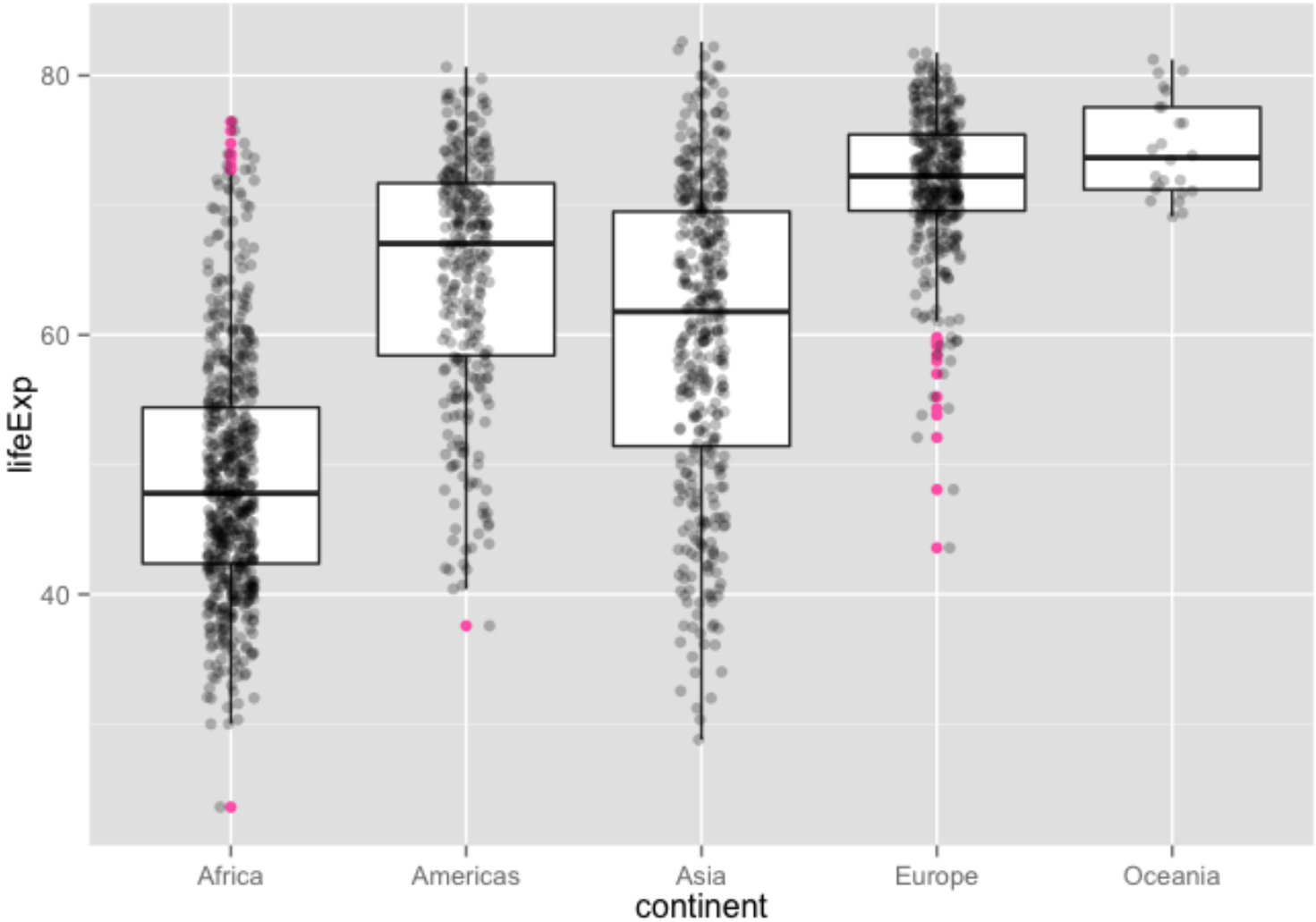

```
ggplot(gapminder, aes(x = continent, y = lifeExp)) +
geom_point()
```



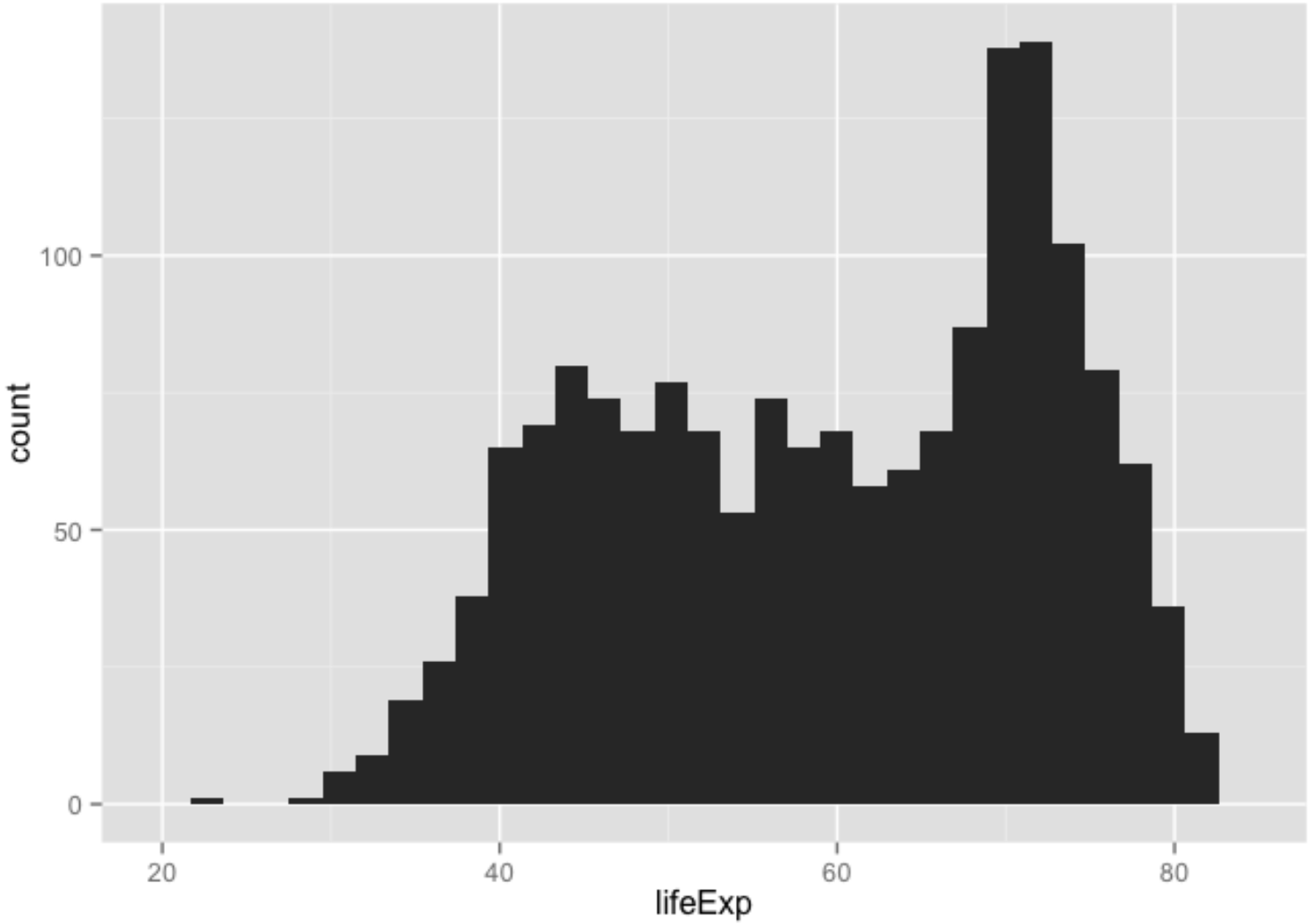

```
ggplot(gapminder, aes(x = continent, y = lifeExp)) +
geom_jitter()
```



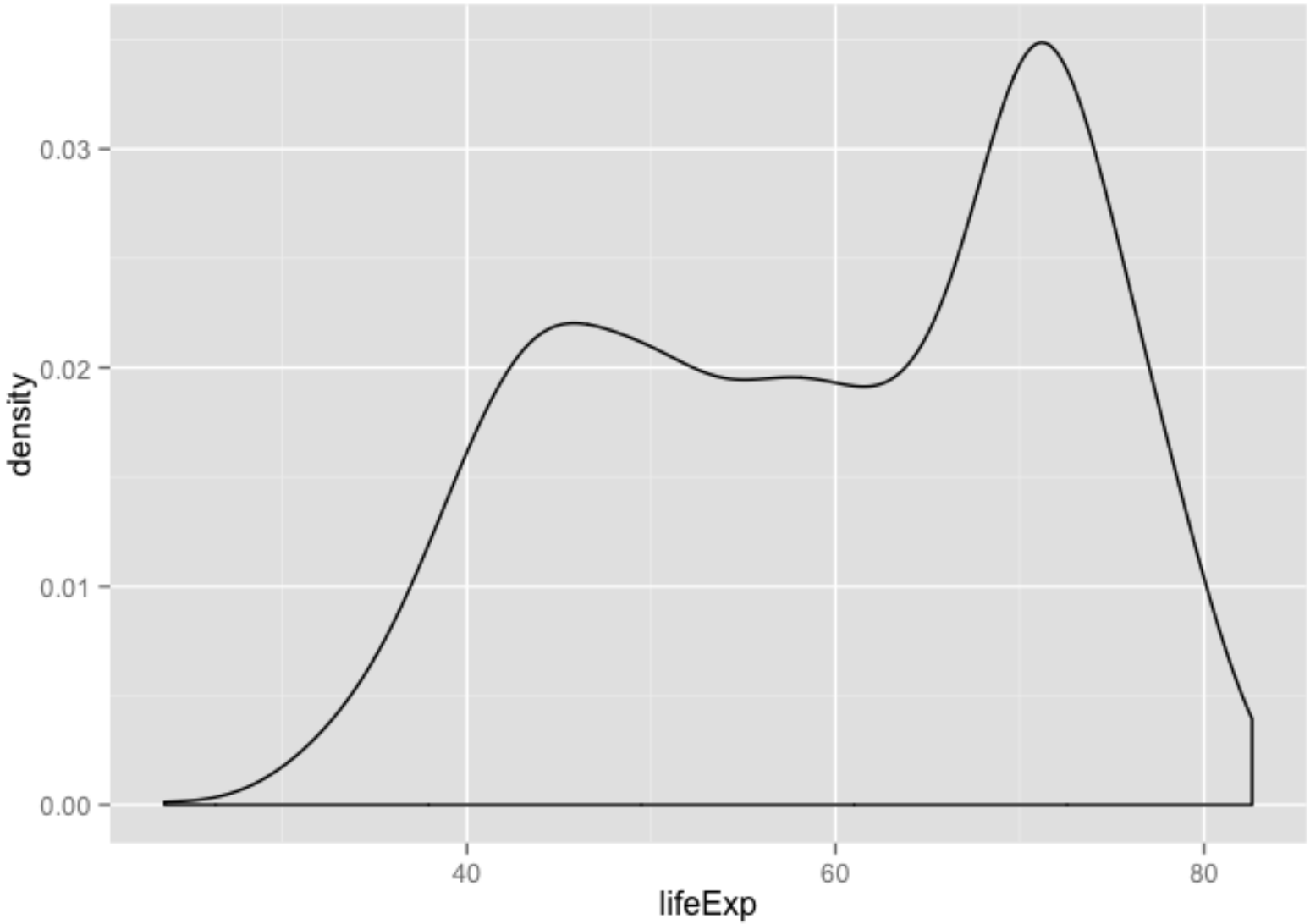

```
ggplot(gapminder, aes(x = continent, y = lifeExp)) +
geom_boxplot()
```



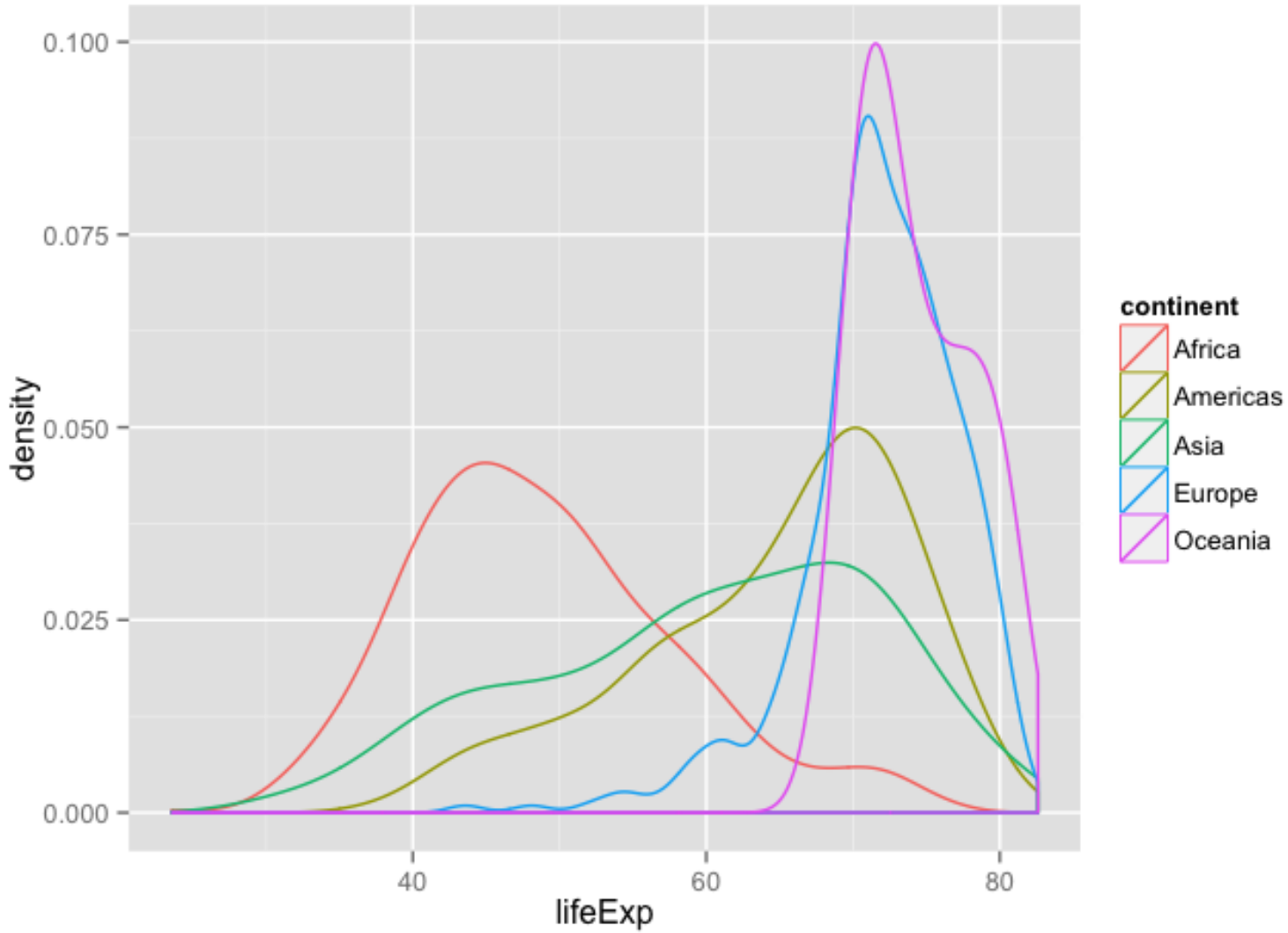

```
ggplot(gapminder, aes(x = continent, y = lifeExp)) +
  geom_boxplot(outlier.colour = "hotpink") +
  geom_jitter(position = position_jitter(width = 0.1, height =
0), alpha = 1/4)
```



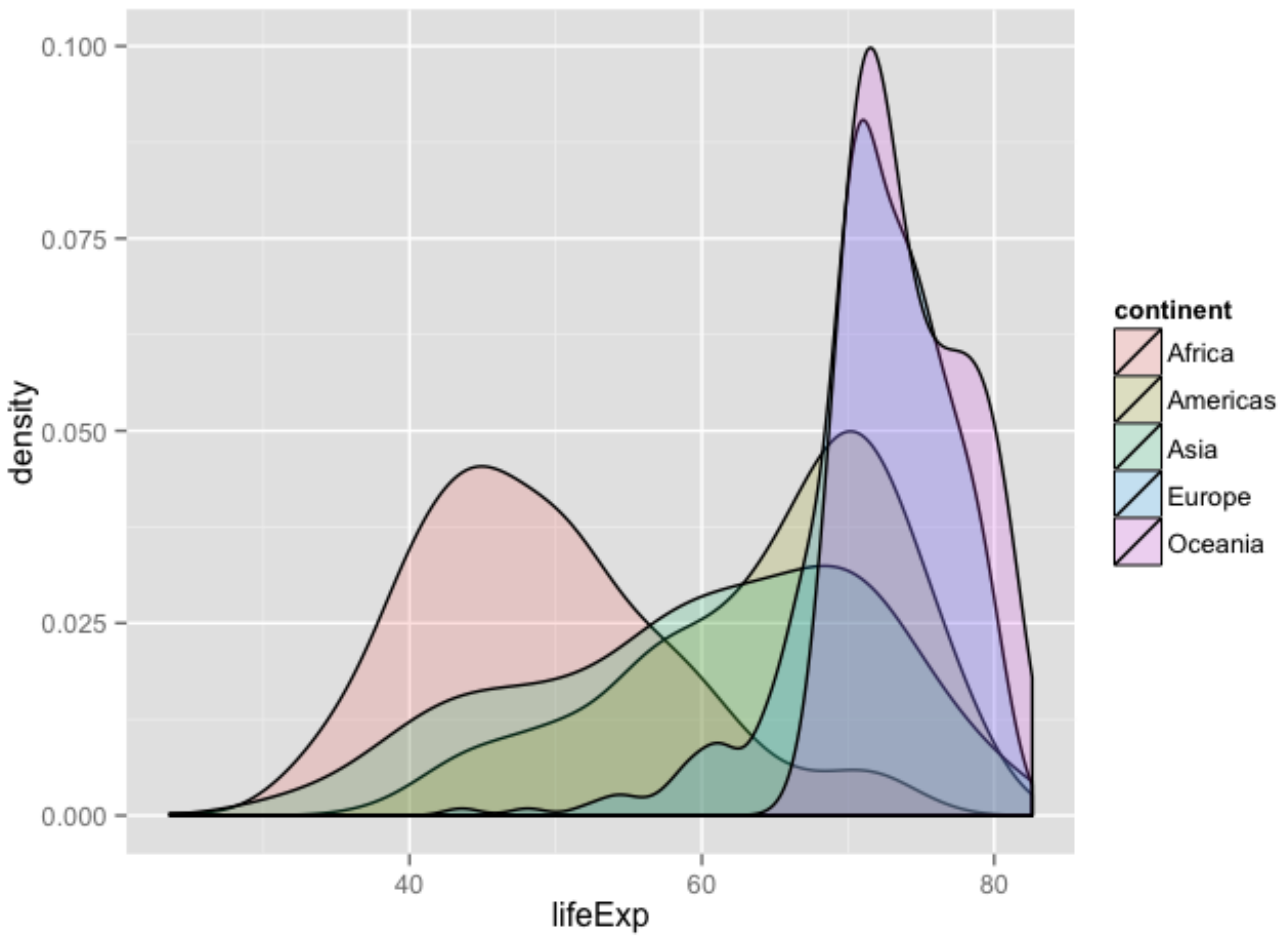

```
ggplot(gapminder, aes(x = lifeExp)) + geom_histogram()
```



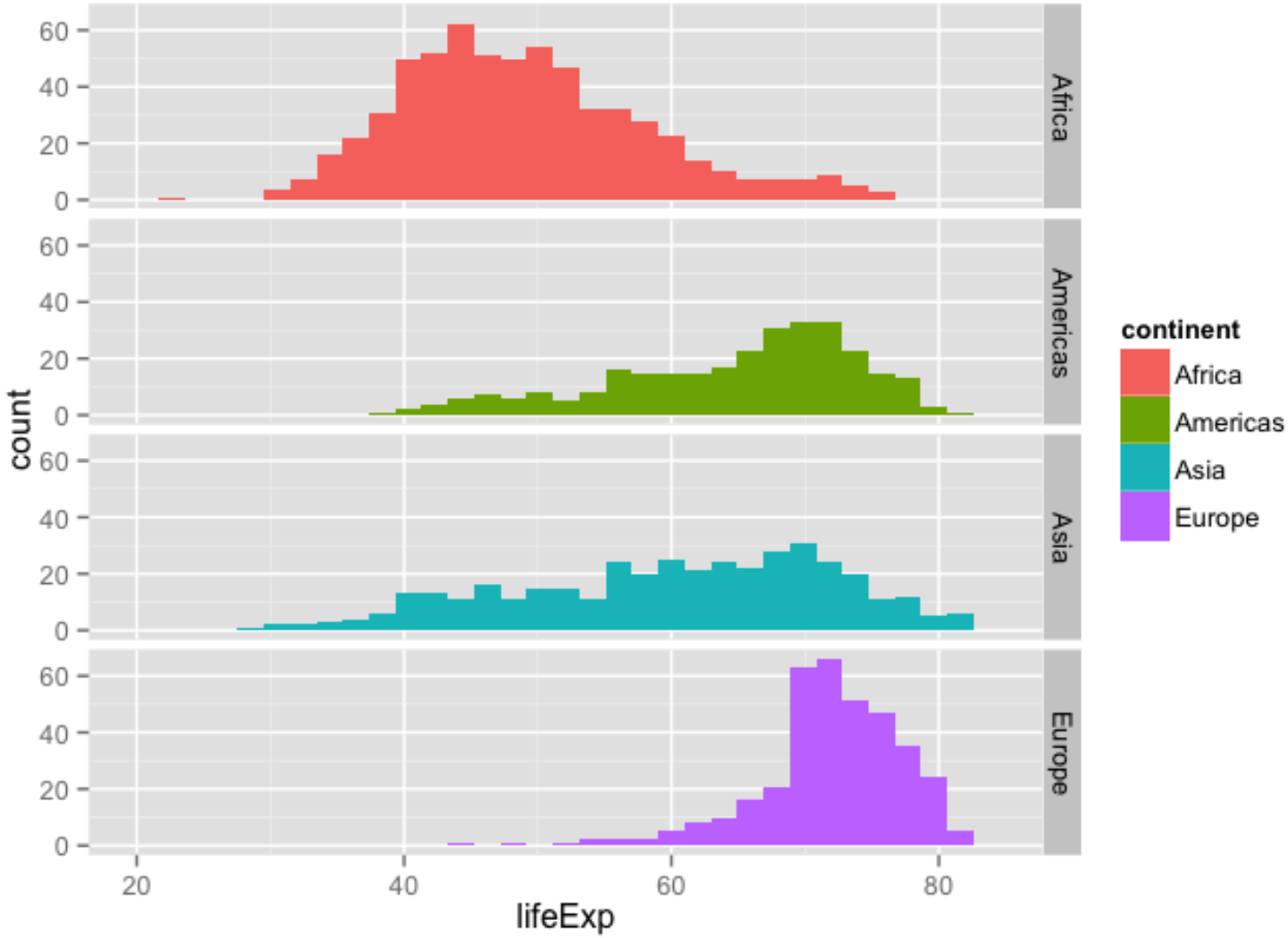

```
ggplot(gapminder, aes(x = lifeExp)) + geom_density()
```



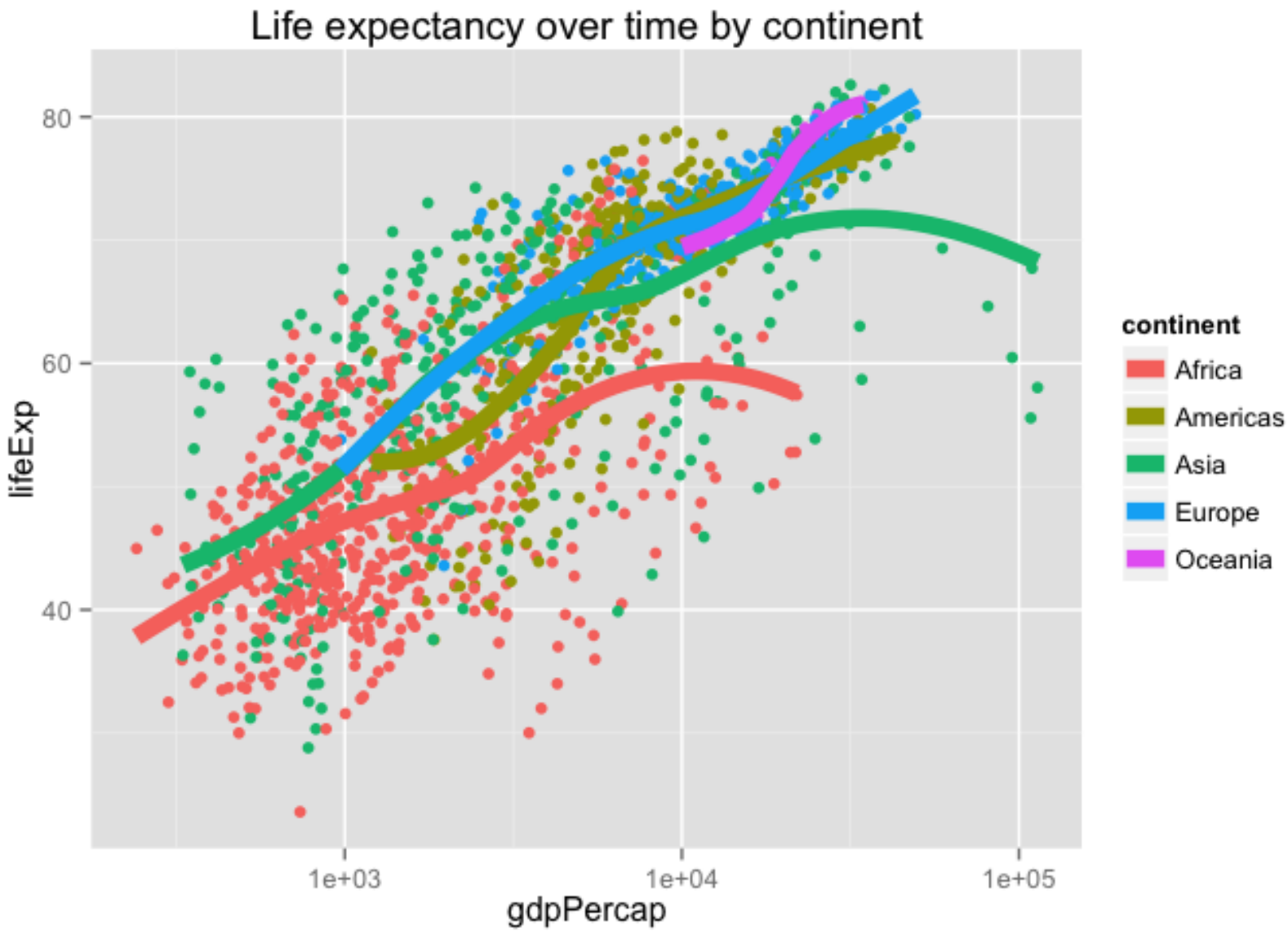

```
ggplot(gapminder, aes(x = lifeExp, color = continent)) +
geom_density()
```



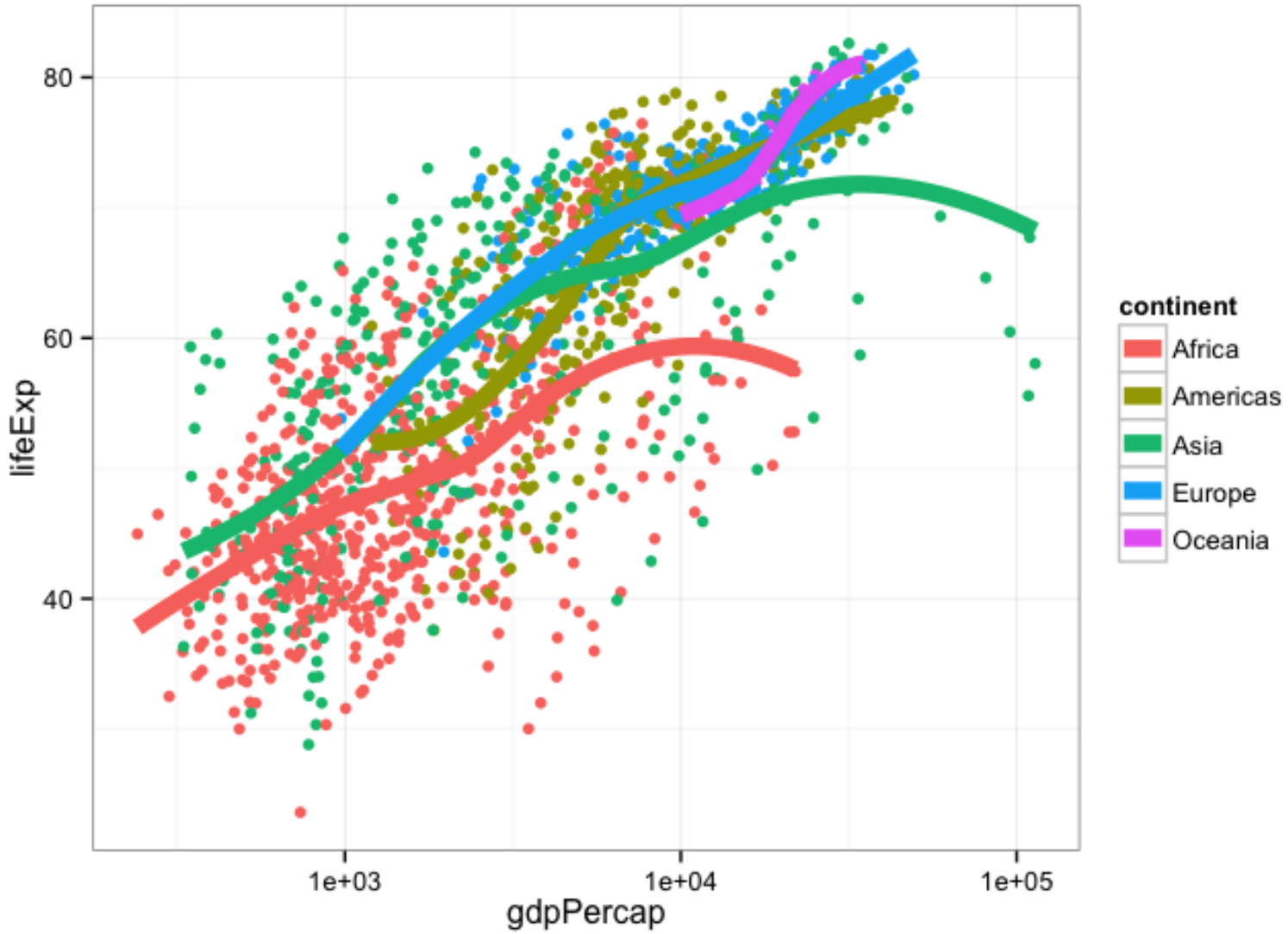

```
ggplot(gapminder, aes(x = lifeExp, fill = continent)) +
  geom_density(alpha = 0.2)
```




```
ggplot(subset(gapminder, continent != "Oceania"),
       aes(x = lifeExp, fill = continent)) +
geom_histogram() +
  facet_grid(continent ~ .)
```




```
p + ggtitle("Life expectancy over time by continent")
```


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

```
p + theme_bw()
```

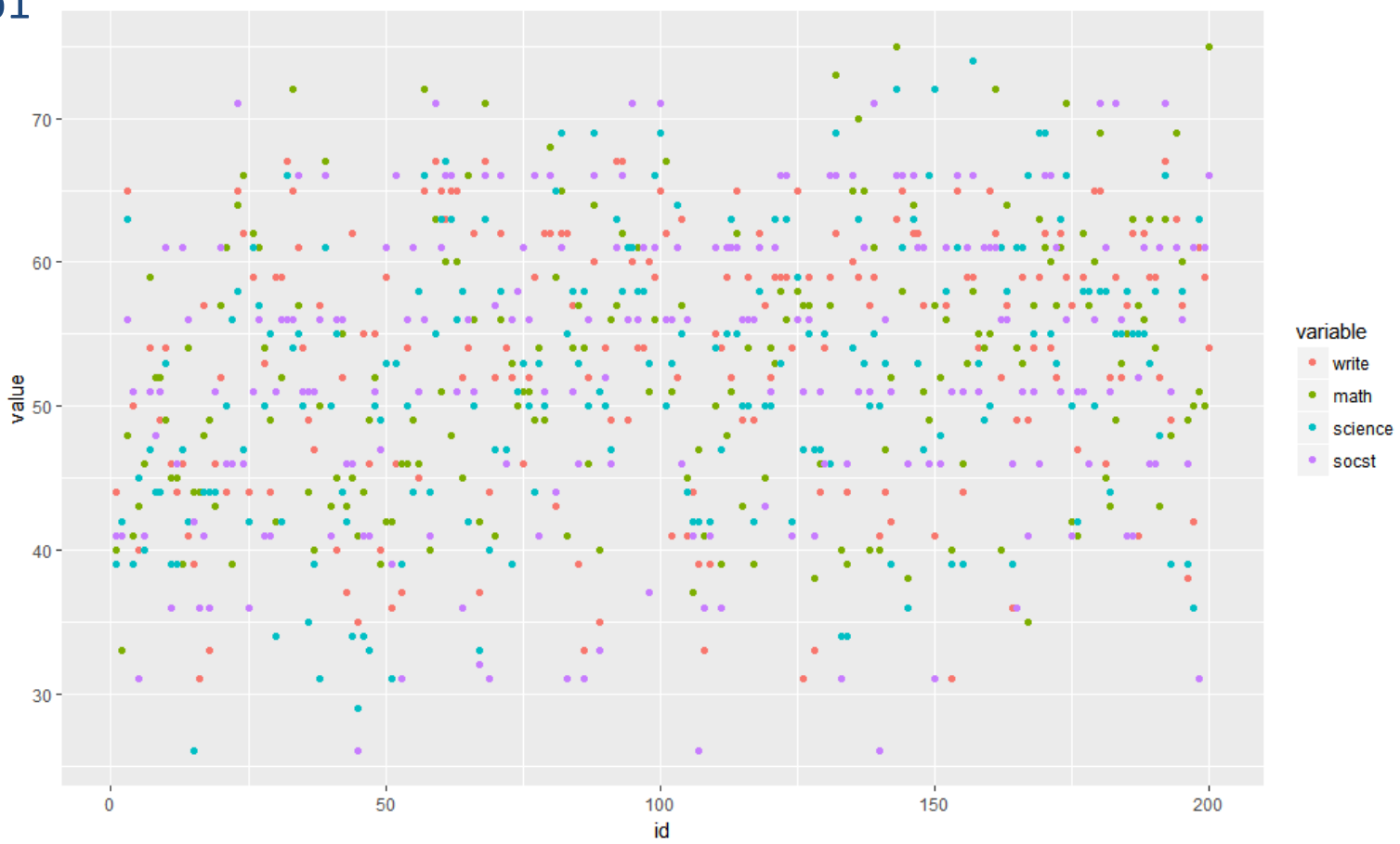
Пример с melt

```
>grades<-read.csv("grades.csv")

>head(grades)

 id write math science socst
1  70    52   41      47    57
2 121    59   53      63    61
3  86    33   54      58    31
4 141    44   47      53    56
5 172    52   57      53    61
6 113    52   51      63    61
```

Хотим построить точечный график оценок для каждого студента, каждый предмет своим цветом

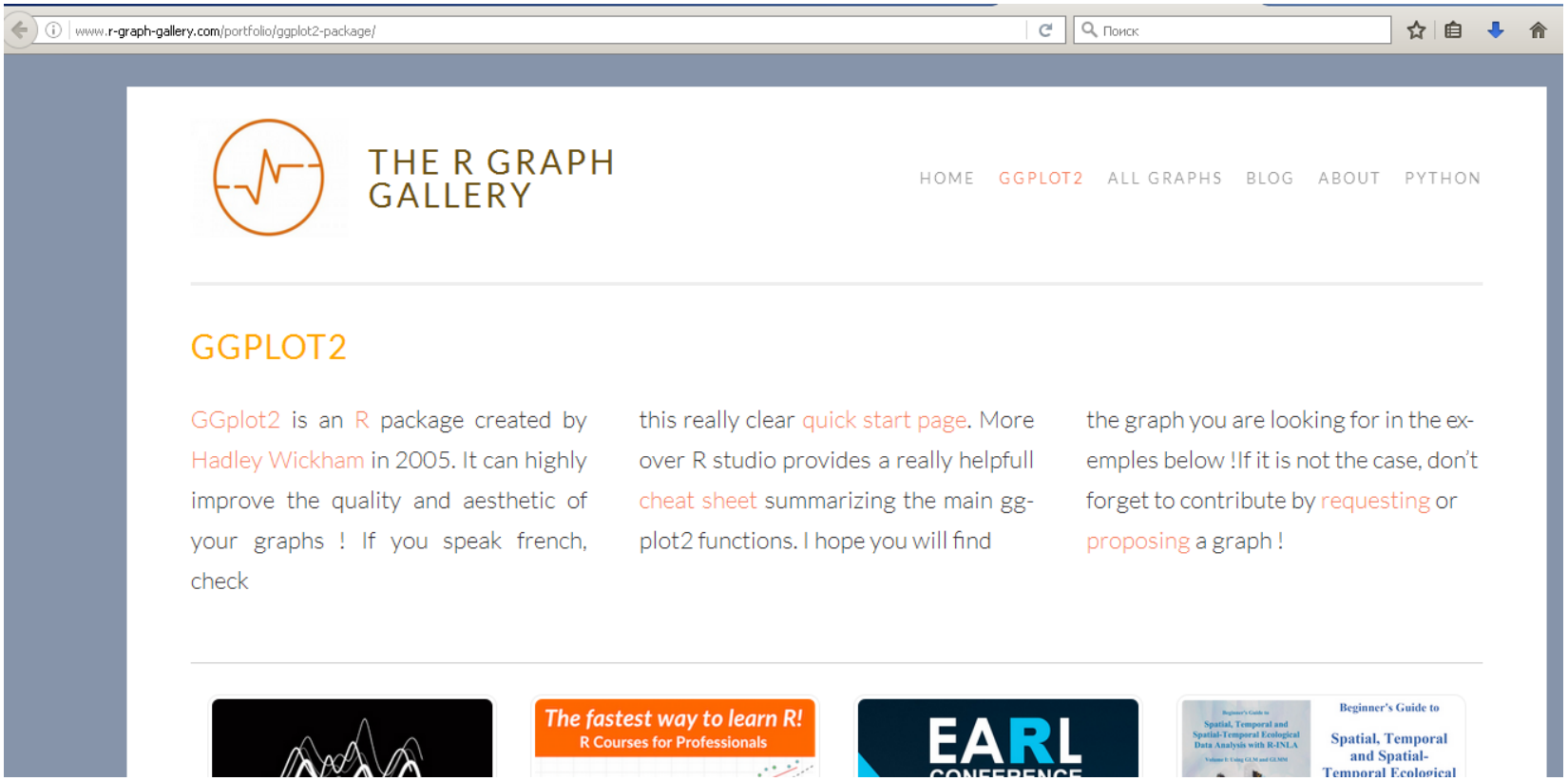
Пример с melt

```
>grades_m<-melt(grades, id.vars = c("id", "X"))
>p1<-ggplot(grades_m, aes(x = id, y = value, color=variable)) + geom_point()
>p1
```



Больше графиков тут:

http://www.r-graph-gallery.com/portfolio/ggplot2-package/



Чистка данных

Источники проблем в данных

- Особенности формата (лишние строки в начале файла, наличие/отсутствие заголовка, нетрадиционные разделители, etc.)
- Отсутствие некоторых данных (na)
- Типы данных (перевод строк в числа и т.п.)
- Выбросы, которые искажают общий тренд

Данные про жилье

```
> install.packages("gdata")
> require(gdata)

>bk <-
read.xls("rollingsales_brooklyn.xls",pattern="BOROUGH")
#все что до строки, содержащей , "BOROUGH", не читаем


head(bk) #смотрим на данные
summary(bk) #сводная статистика, чего сколько
```

Чистим данные

```
head(bk$SALE.PRICE)
[1] $403,572 $218,010 $952,311 $842,692 $815,288 $815,288
3318
Levels: $0 $1 $10 $100 $1,000 $10,000 $100,000 $1,000,000 ...
$999,999
```

Переводим цены в числовой формат

```
>bk$SALE.PRICE.N <- as.numeric(gsub("[^[:digit:]]","", bk
$SALE.PRICE))
```

убираем все кроме цифр, т.е. заменяем все кроме цифр на “”

Чистим данные

Смотрим, для скольки объектов у нас нет данных про цены

```
>sum(is.na(bk$SALE.PRICE.N))
```

Сделаем все имена столбцов маленькими буквами

```
>names(bk) <- tolower(names(bk))
```

Приведем в порядок площади

```
>bk$gross.sqft <- as.numeric(gsub("[^[:digit:]]","", bk
$gross.square.feet))
>bk$land.sqft <- as.numeric(gsub("[^[:digit:]]","", bk
$land.square.feet))
```

Чистим данные

Приводим в порядок даты

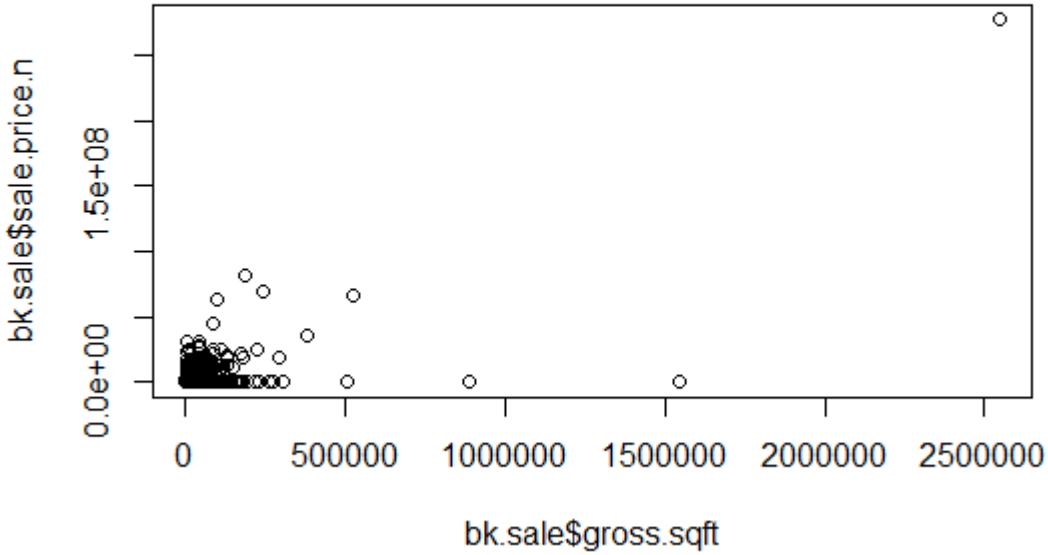
```
>bk$sale.date <- as.Date(bk$sale.date)
>bk$year.built <- as.numeric(as.character(bk$year.built))
```

Надоело писать длинные имена? Работаем с одной таблицей? Нет проблем!

```
>attach(bk)#теперь по-умолчанию работаем только с bk
>hist(sale.price.n)#обращаемся прямо по имени поля
>hist(sale.price.n[sale.price.n>0])
>hist(gross.sqft[sale.price.n==0])
>detach(bk)#закончили работать, открепляемся!
```

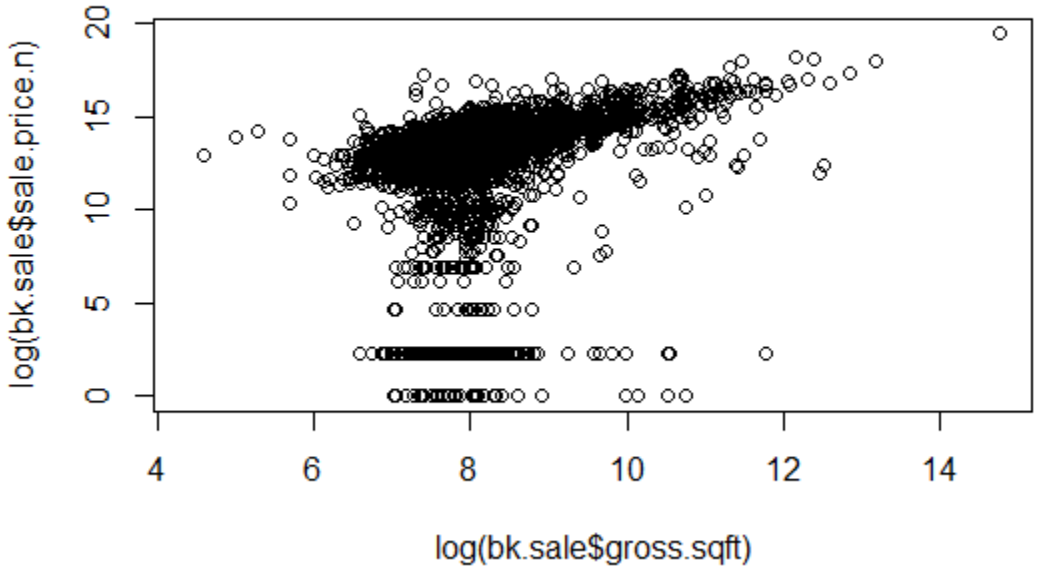
Теперь беглый анализ, как устроены данные

```
>bk.sale <- filter(bk, bk$sale.price!=0 & bk$gross.sqft!=0)
>plot(bk.sale$gross.sqft,bk.sale$sale.price.n)
```



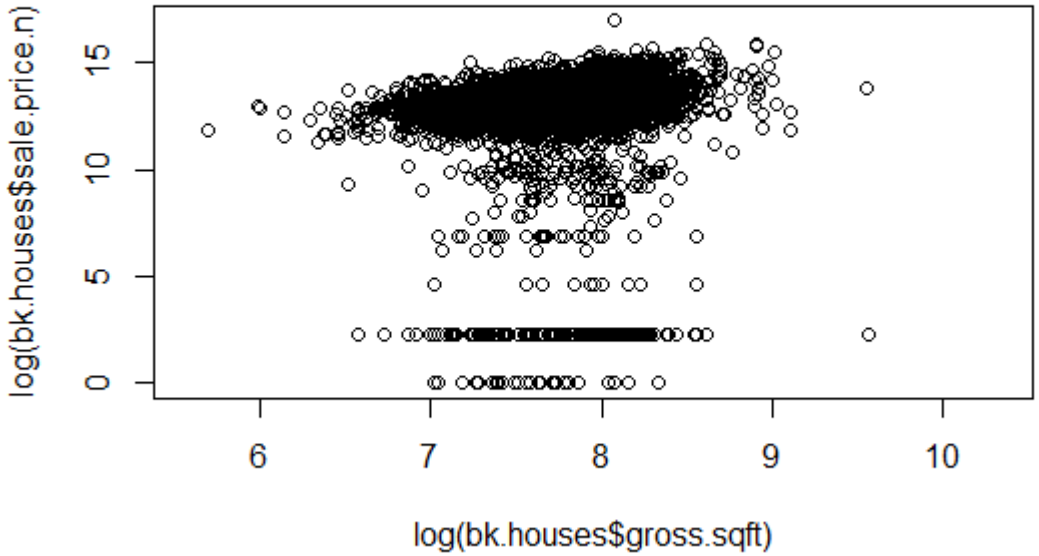
“Вынем” данные из нуля

plot(log(bk.sale$gross.sqft),log(bk.sale$sale.price.n))



Выберем для анализа только дома (категория содержит в названии “FAMILY”)

```
>library(data.table)

> bk.houses <- bk.sale %>% filter(building.class.category %like% "FAMILY")

> plot(log(bk.houses$gross.sqft),log(bk.houses$sale.price.n))
```



Похоже, эти дома какие-то особенные

Уберем “особенные” дома

```
> bk.houses <- bk.houses %>% filter(log(sale.price.n) > 5)
>plot(log(bk.houses$gross.sqft),log(bk.houses$sale.price.n))
```

Добавим линию регрессии

```
>abline(lm(log(bk.houses$sale.price.n)~log(bk.houses$gross.sqft)), col="red")
```