Lab 3

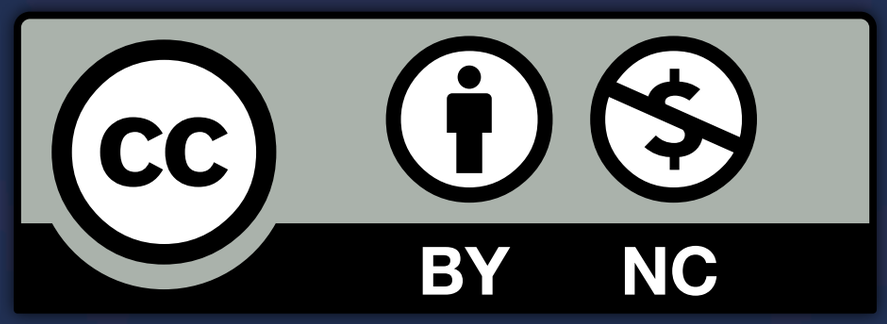
R/ggplot2

Feb 7, 2013 – Michael Porath (@poezn)

Original Slides

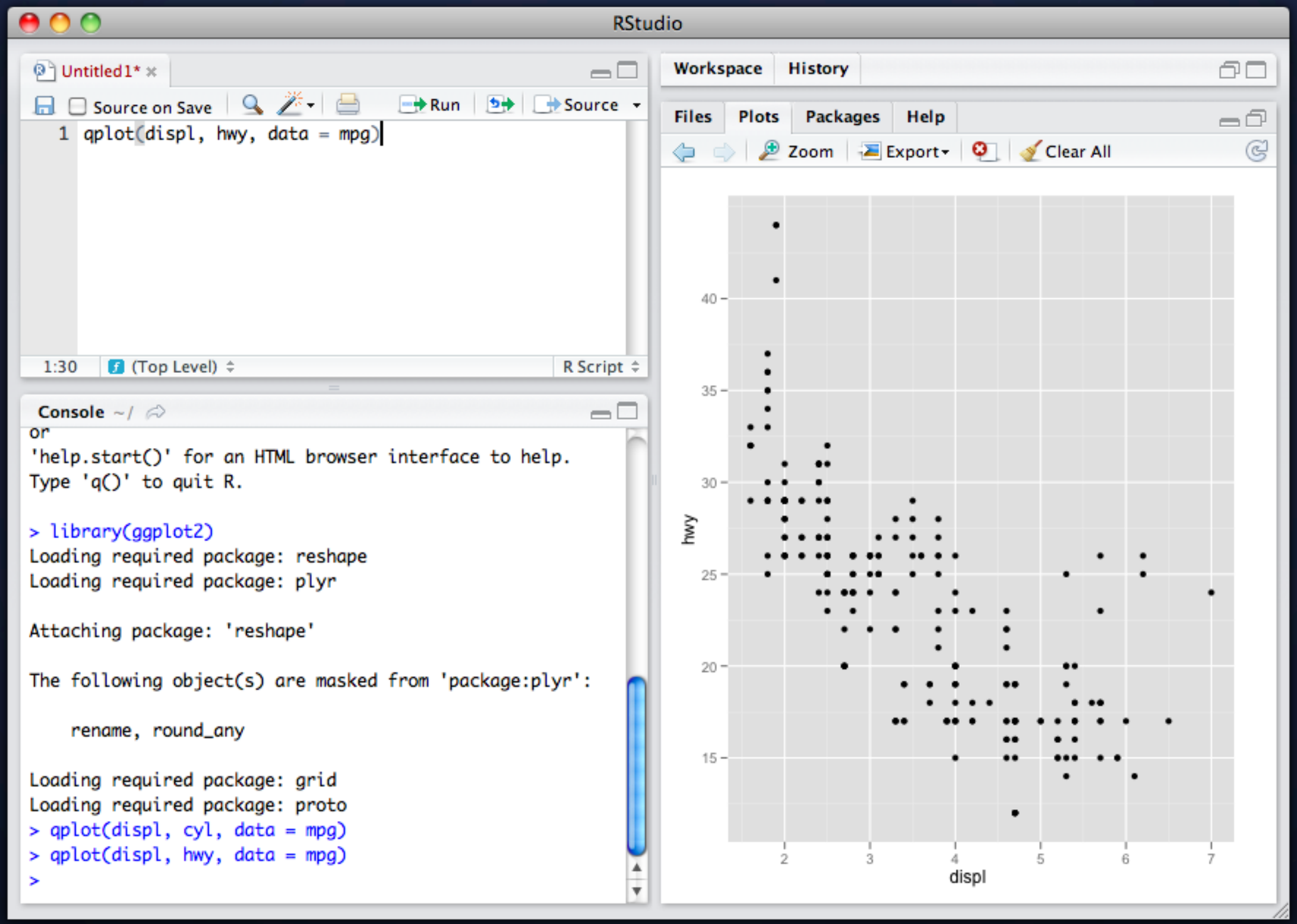
"Intro to R and ggplot2"

by Hadley Wickam, creator of ggplot2



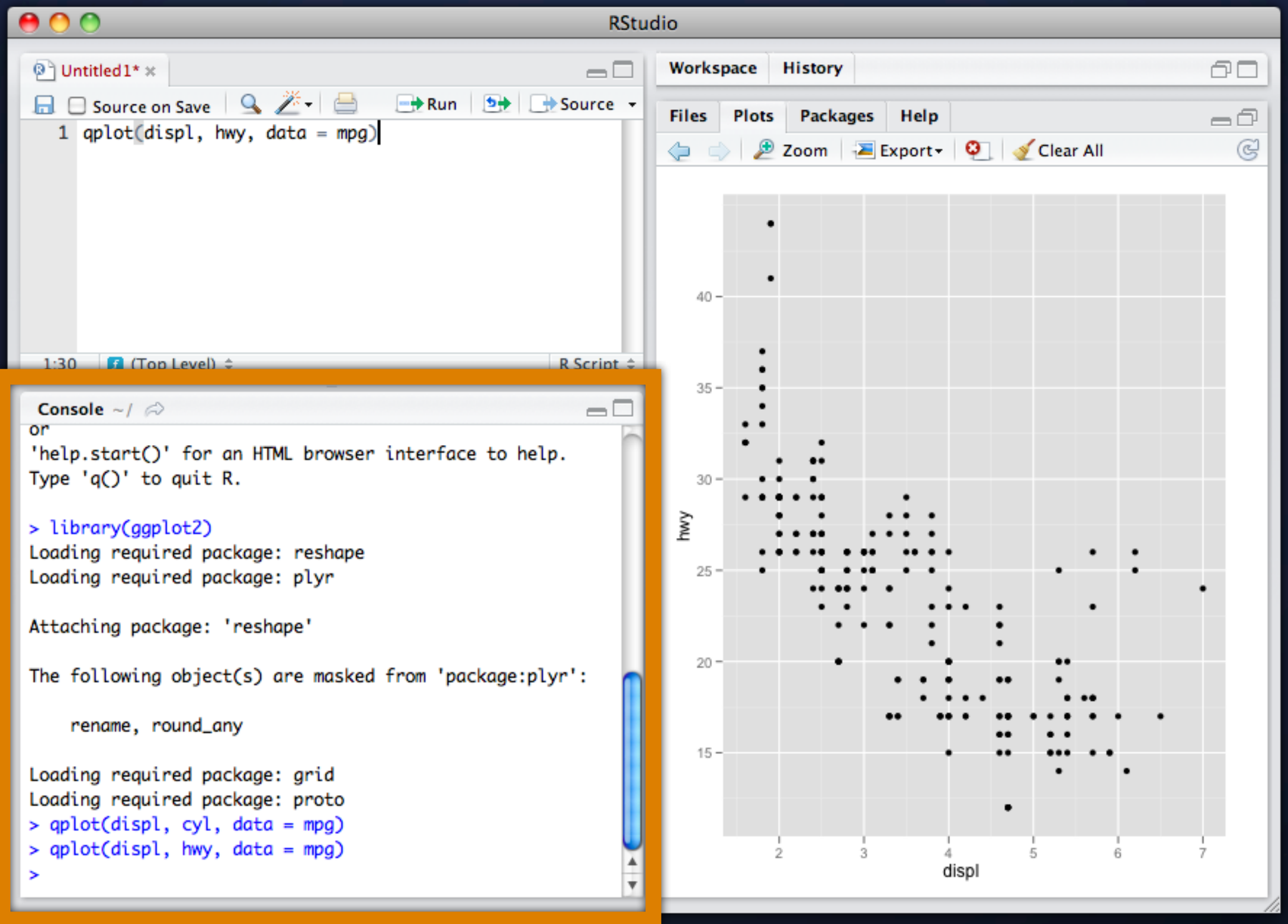
Rstudio

Rstudio


RStudio
Untitled1*
Source on Save
Run
Source
1 qplot(displ, hwy, data = mpg)
1:30
(Top Level)
R Script
Console ~/
or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.
> library(ggplot2)
Loading required package: reshape
Loading required package: plyr
Attaching package: 'reshape'
The following object(s) are masked from 'package:plyr':
rename, round_any
Loading required package: grid
Loading required package: proto
> qplot(displ, cyl, data = mpg)
> qplot(displ, hwy, data = mpg)
>
Workspace
History
Files
Plots
Packages
Help
Zoom
Export
Clear All
hwy
displ
40
35
30
25
20
15
2
3
4
5
6
7

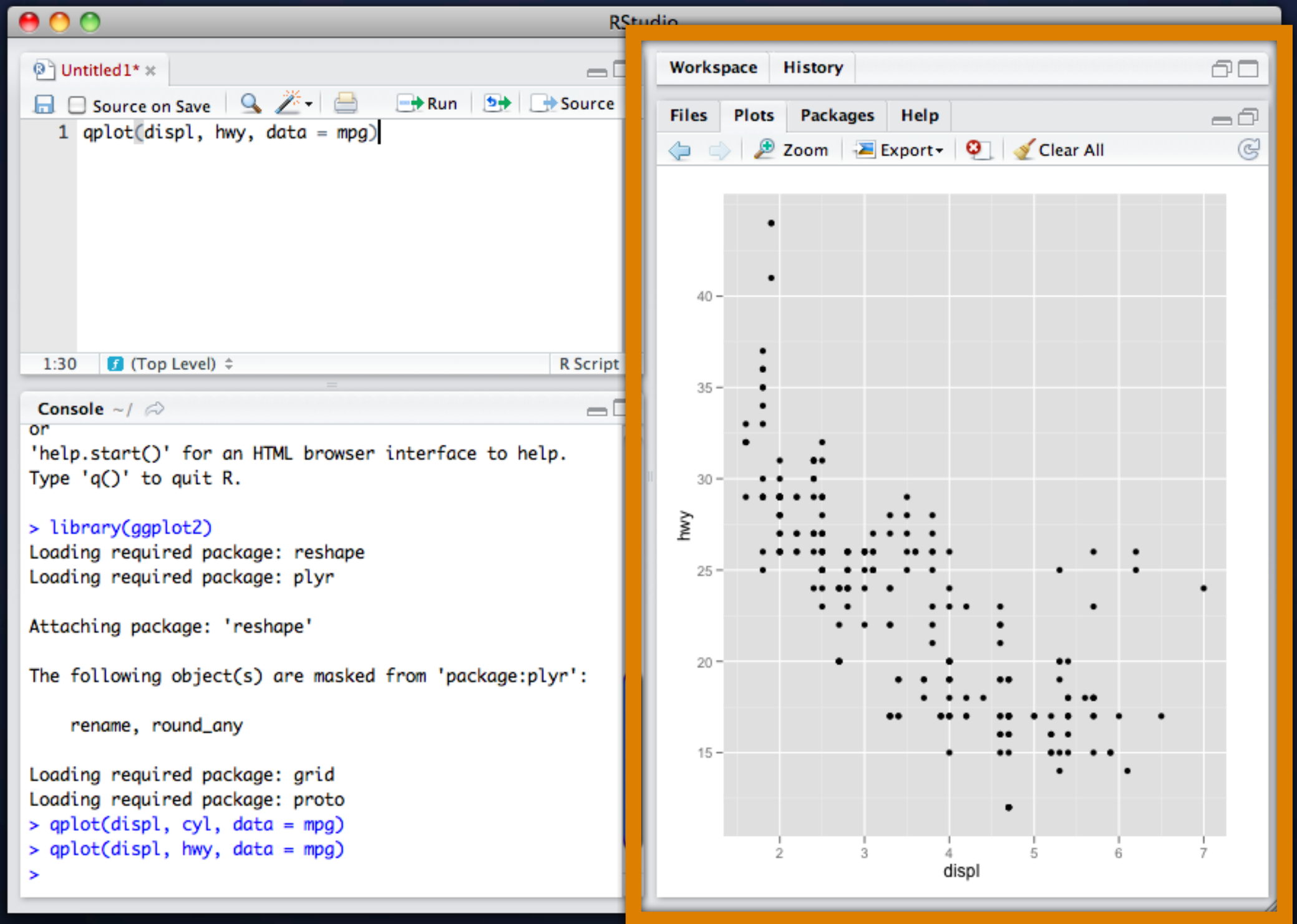
Rstudio

Console - run code here



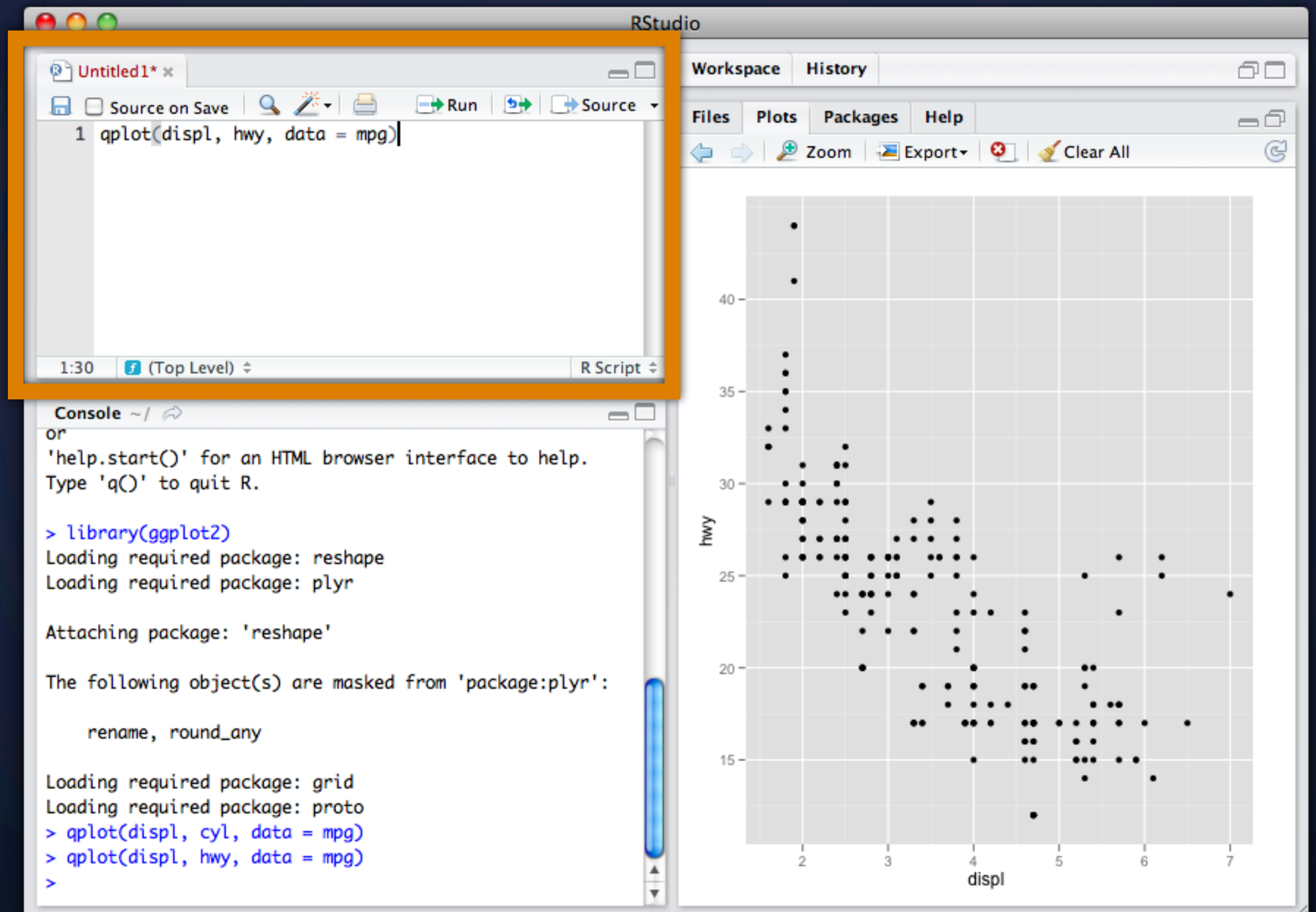
Rstudio

Output - plots and help



Rstudio

Editor - Save code here



Shortcuts

Learn them!

In editor

Cmd/*ctrl* + *enter* – send code to console

ctrl + *2* – move cursor to console

In console

Up arrow – retrieve previous command

ctrl + *up arrow* – search commands

ctrl + *1* – move cursor to editor

Scatter Plot Basics

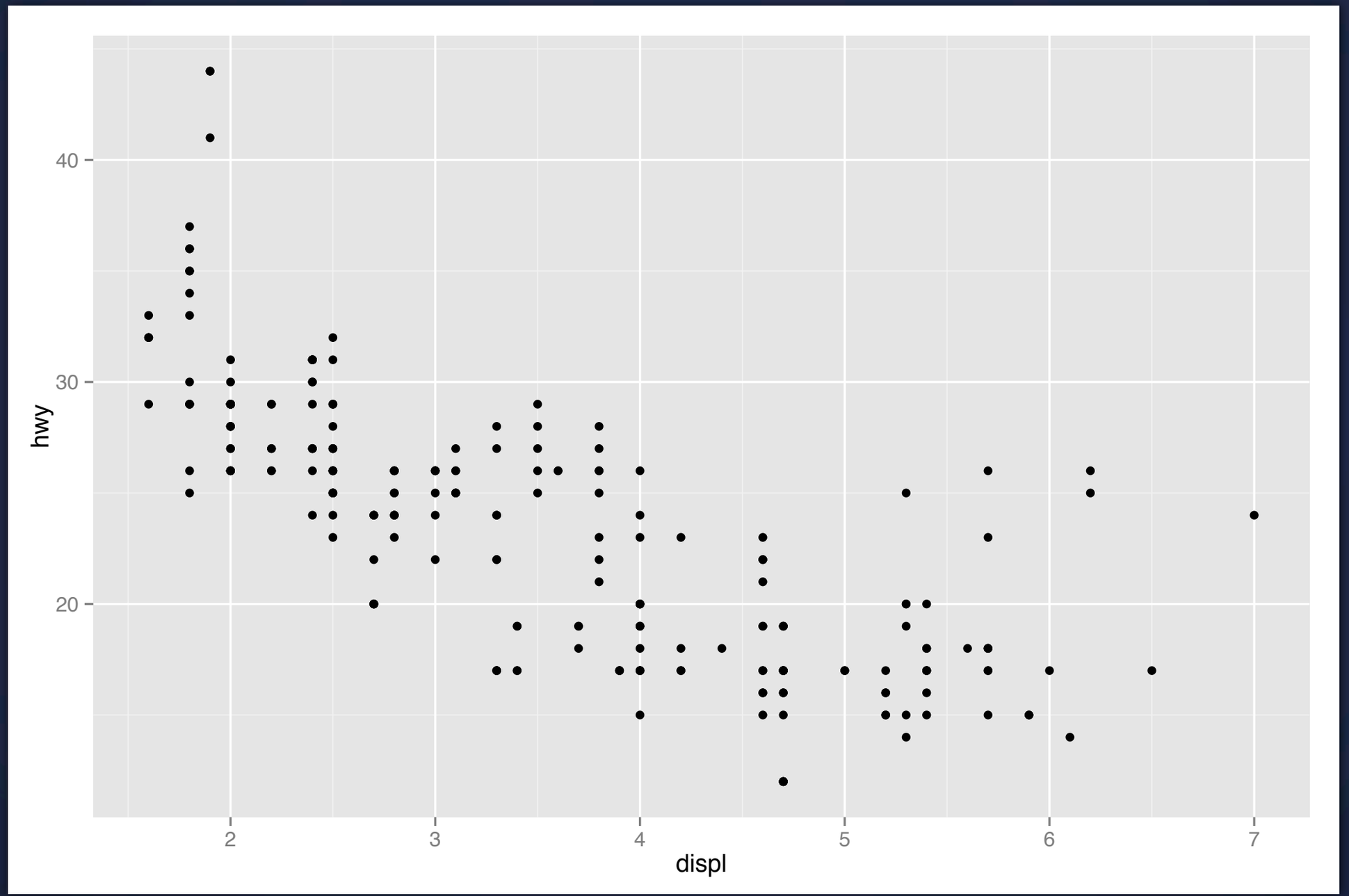
```
install.packages("ggplot2")
library(ggplot2)

?mpg
head(mpg)
str(mpg)
summary(mpg)

qplot(displ, hwy, data = mpg)
```

Scatter Plot Basics

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

?mpg
head(mpg)
str(mpg)
summary(mpg)

qplot(displ, hwy, data = mpg)
```

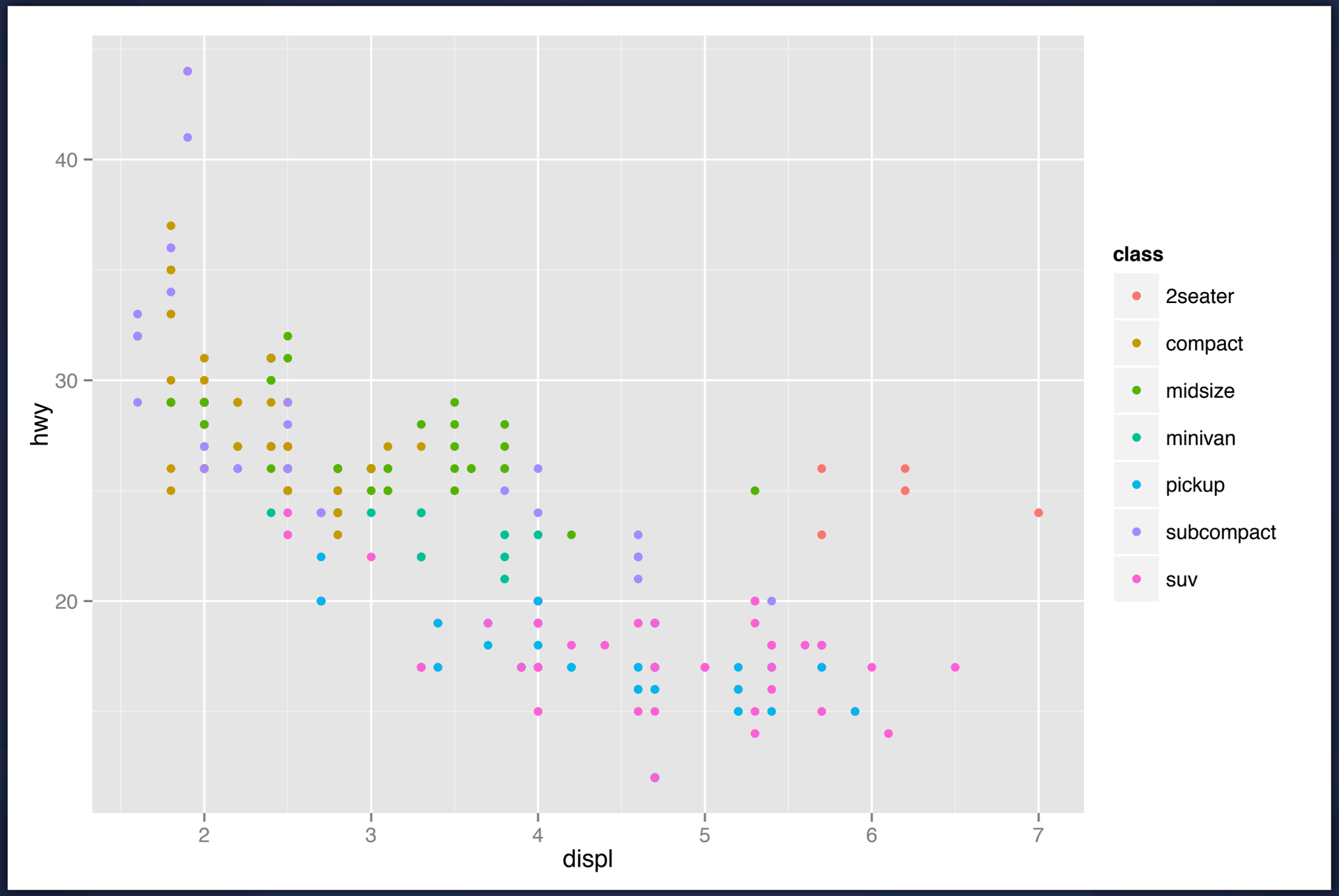
always explicitly specify the data

Scatter Plot Basics



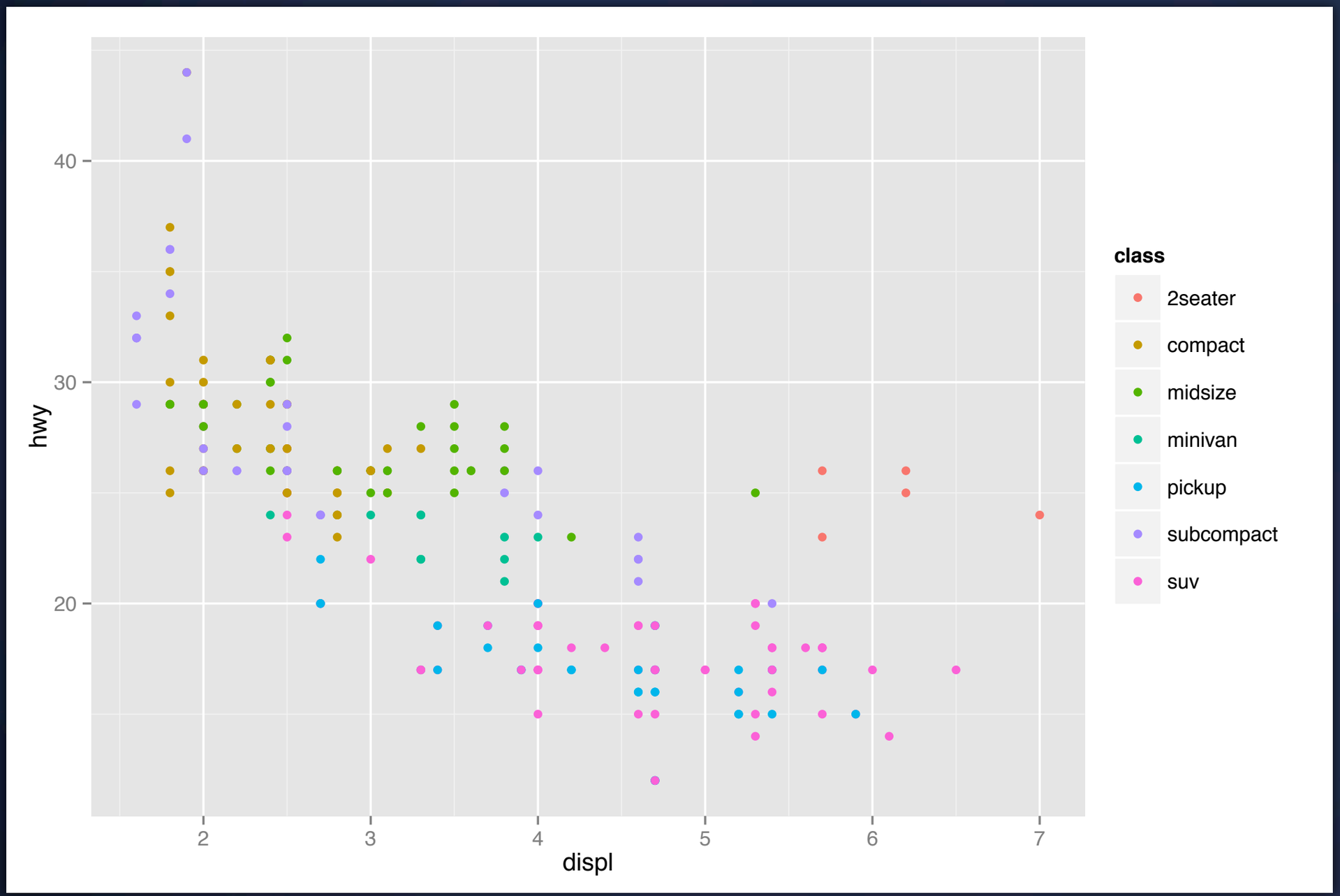

```
qplot(displ, hwy, data = mpg)
```

Additional Dimensions?




```
qplot(displ, hwy, colour=class, data=mpg)
```

Additional Dimensions?



legend chosen and displayed automatically

```
qplot(displ, hwy, colour=class, data=mpg)
```

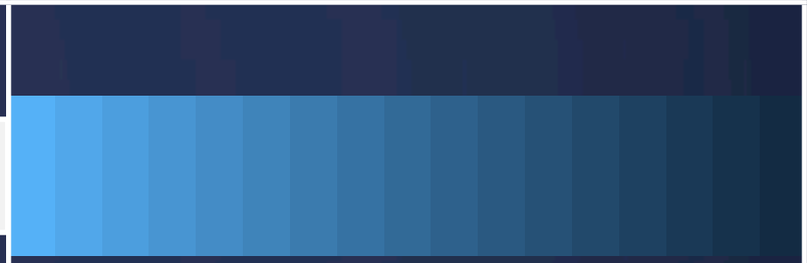
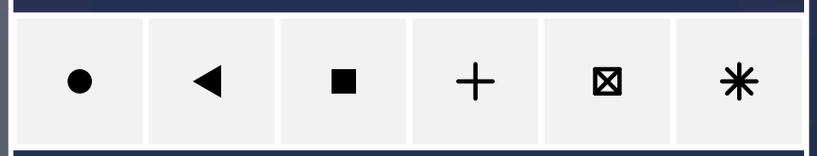
Your Turn

Experiment with color, size, and shape aesthetics.

What's the difference between discrete or continuous variables?

What happens when you combine multiple aesthetics?

Discrete vs Continuous variables

	Discrete	Continuous
Color		
Size	discrete size steps	Linear mapping between radius and value
Shape		?

Faceting

= Small Multiples

Your turn!

```
qplot(displ, hwy, data=mpg) + facet_grid(. ~ cyl)

qplot(displ, hwy, data=mpg) + facet_grid(drv ~ .)

qplot(displ, hwy, data=mpg) + facet_grid(drv ~ cyl)

qplot(displ, hwy, data=mpg) + facet_wrap(~ class)
```

Faceting

= Small Multiples

Your turn!

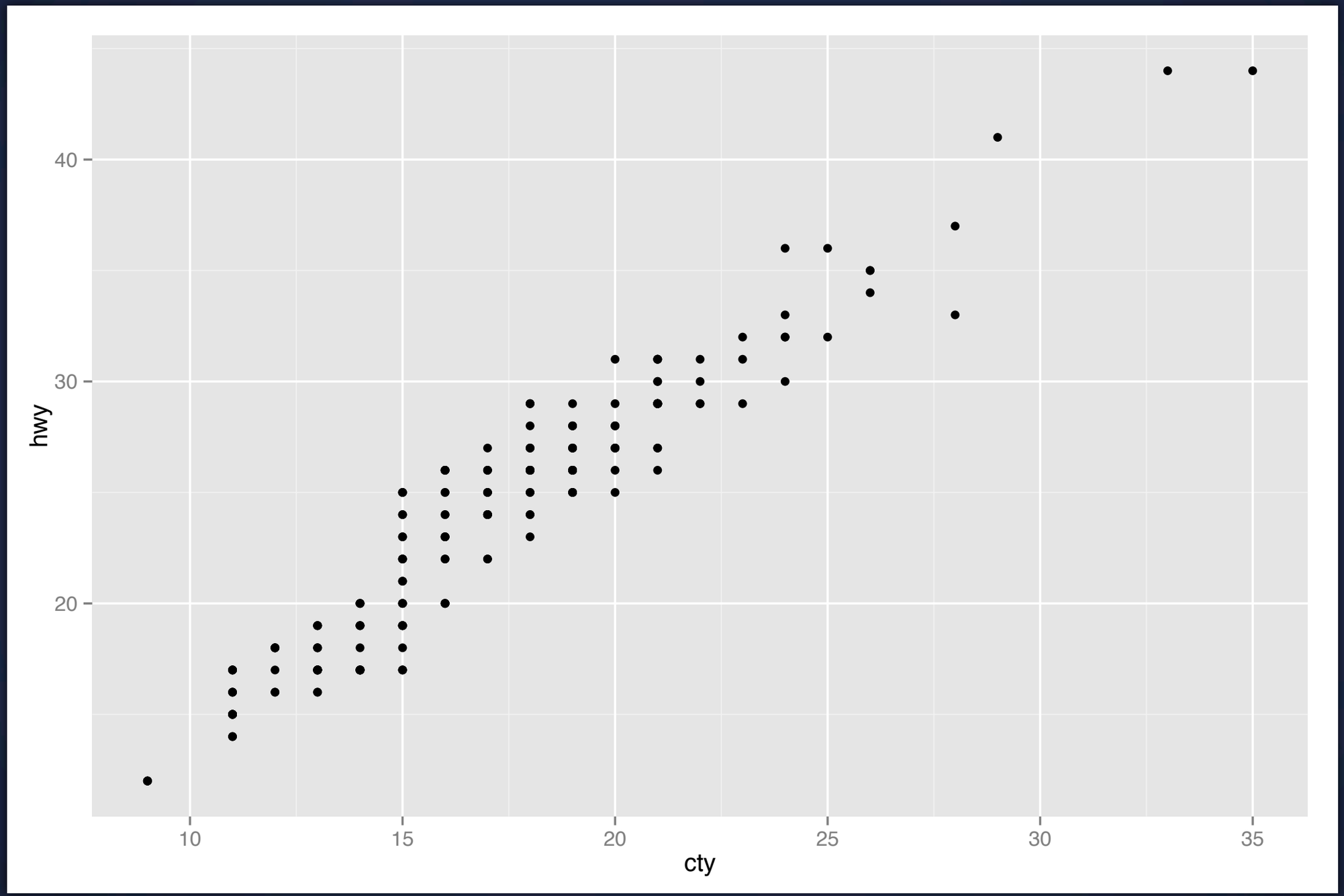
```
qplot(displ, hwy, data=mpg) + facet_grid(. ~ cyl)
qplot(displ, hwy, data=mpg) + facet_grid(drv ~ .)
qplot(displ, hwy, data=mpg) + facet_grid(drv ~ cyl)
qplot(displ, hwy, data=mpg) + facet_wrap(~ class)
```

Summary

`facet_grid()` 2d grid, rows ~ cols, . for no split

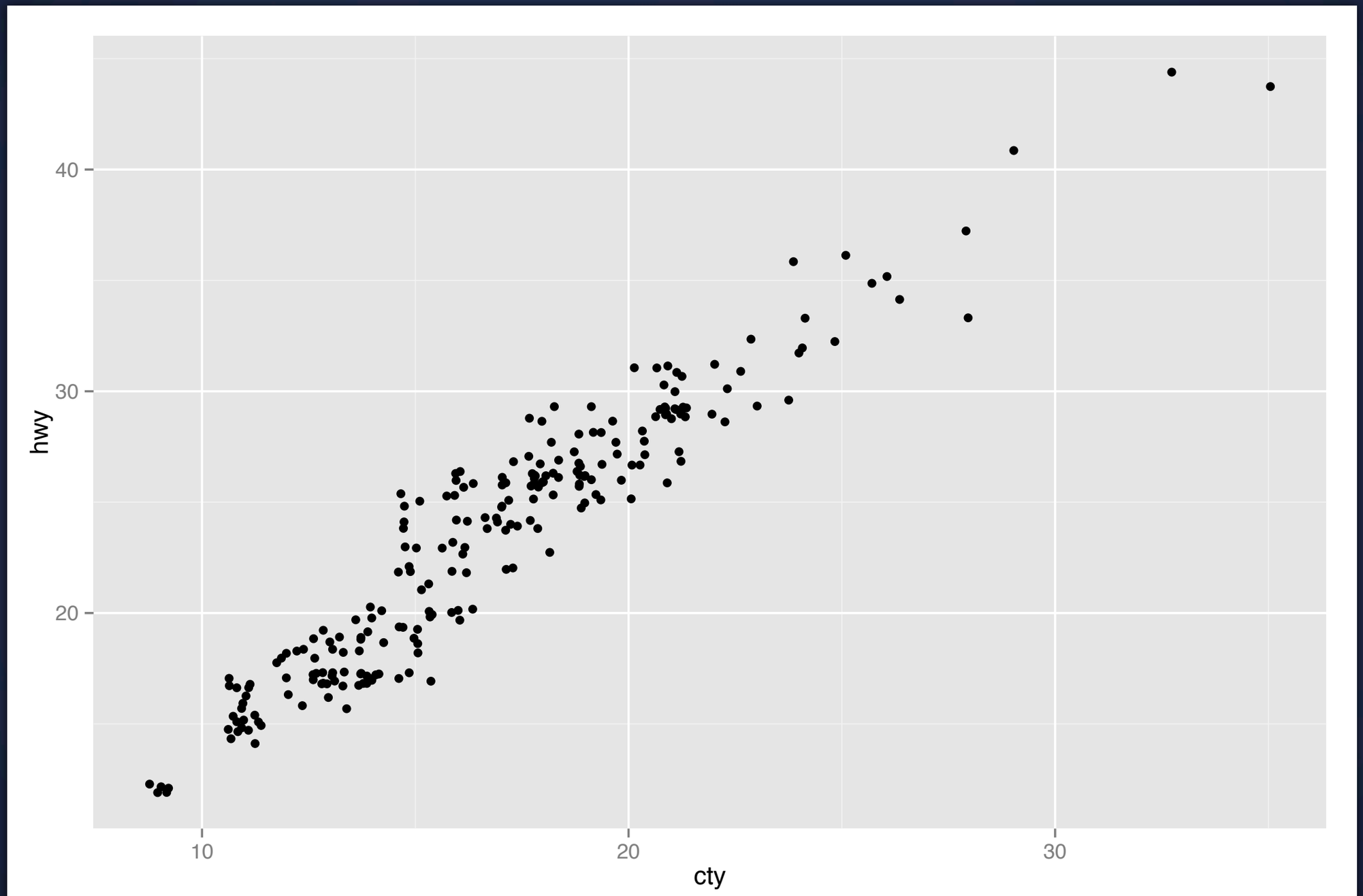
`facet_wrap()` 1d ribbon wrapped into 2d

What's the problem here?



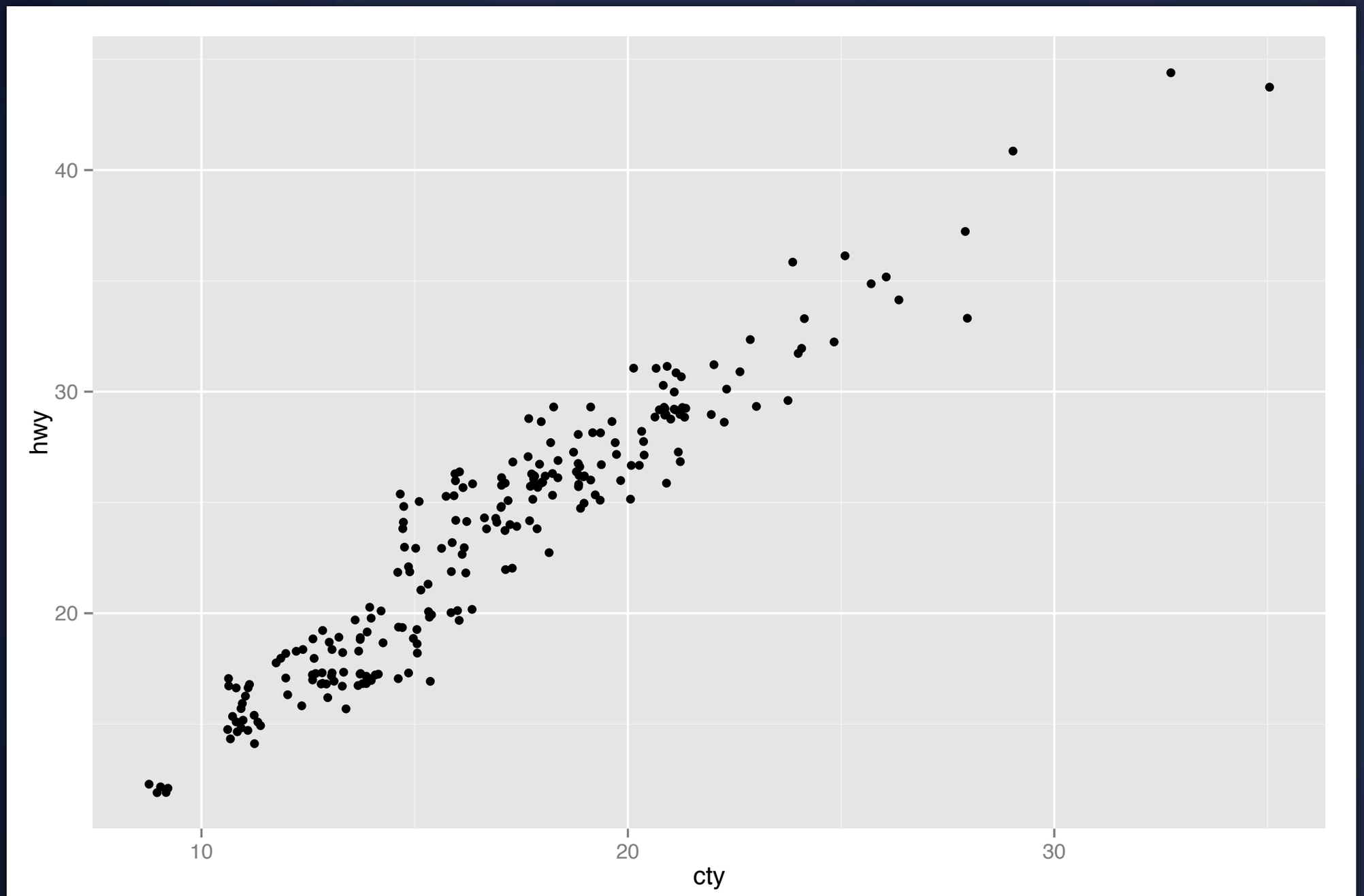

```
qplot(cty, hwy, data = mpg)
```

What's the problem here?




```
qplot(cty, hwy, data = mpg, geom = "jitter")
```

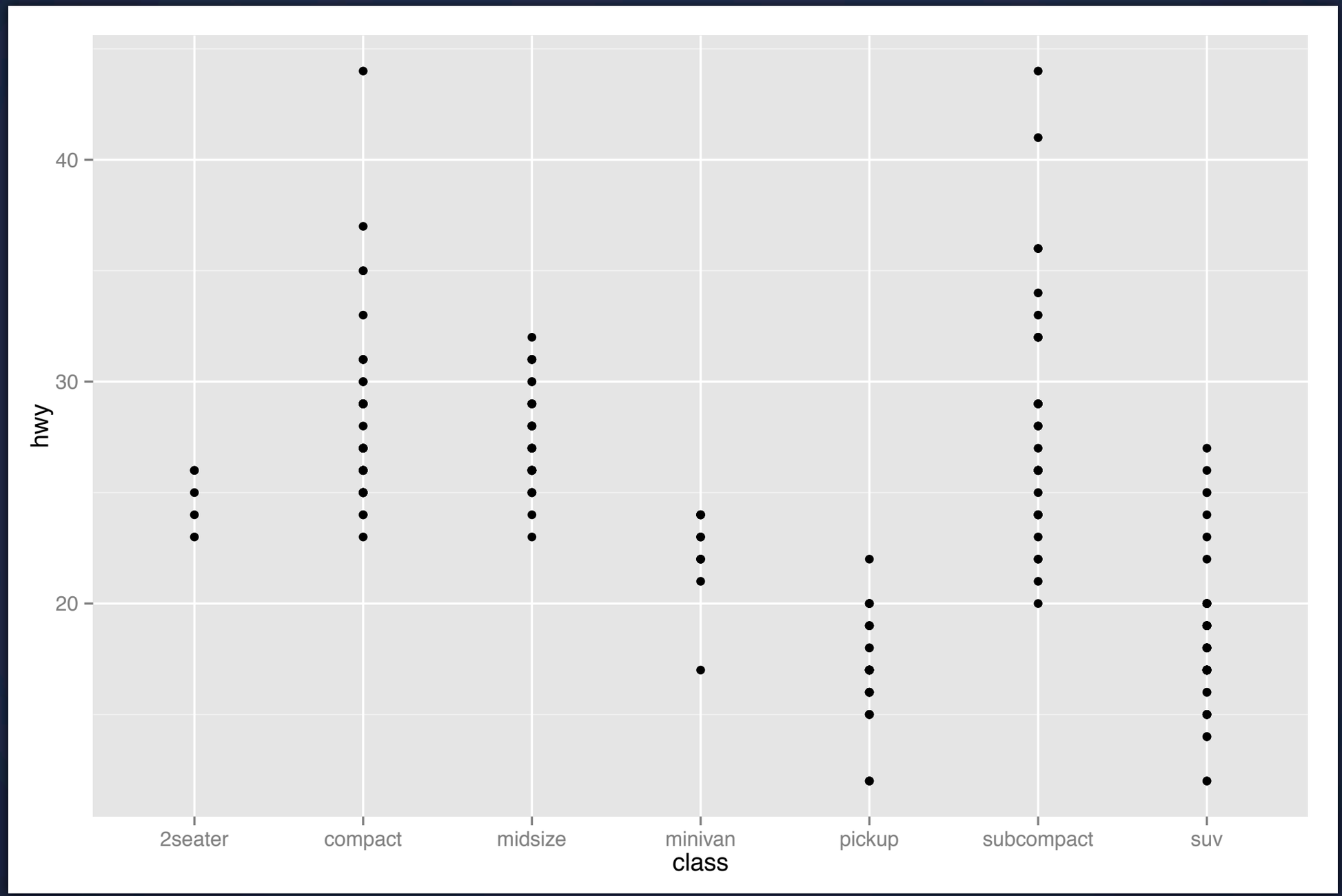
What's the problem here?



geom controls type of plot

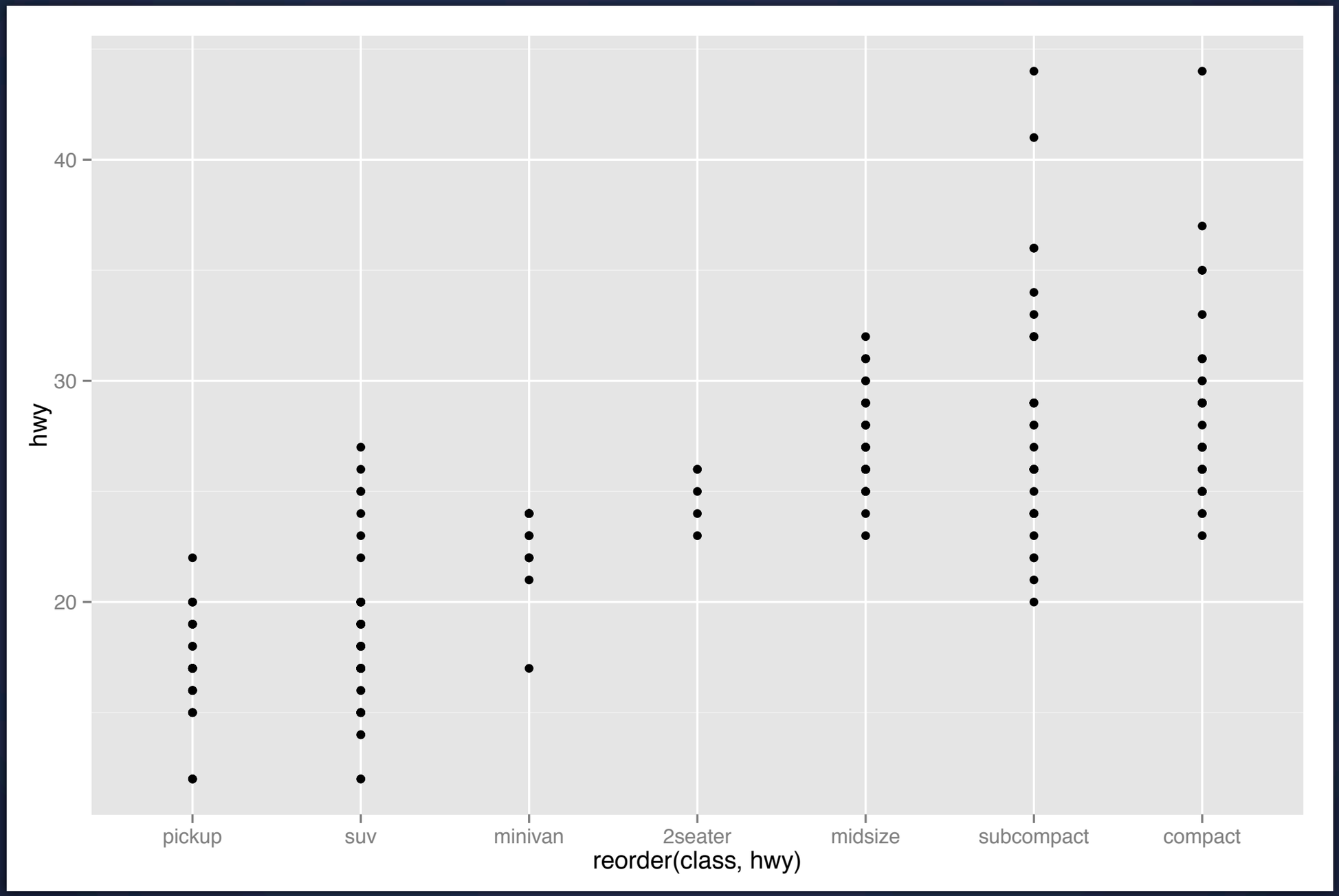
```
qplot(cty, hwy, data = mpg, geom = "jitter")
```

How can we improve this plot?



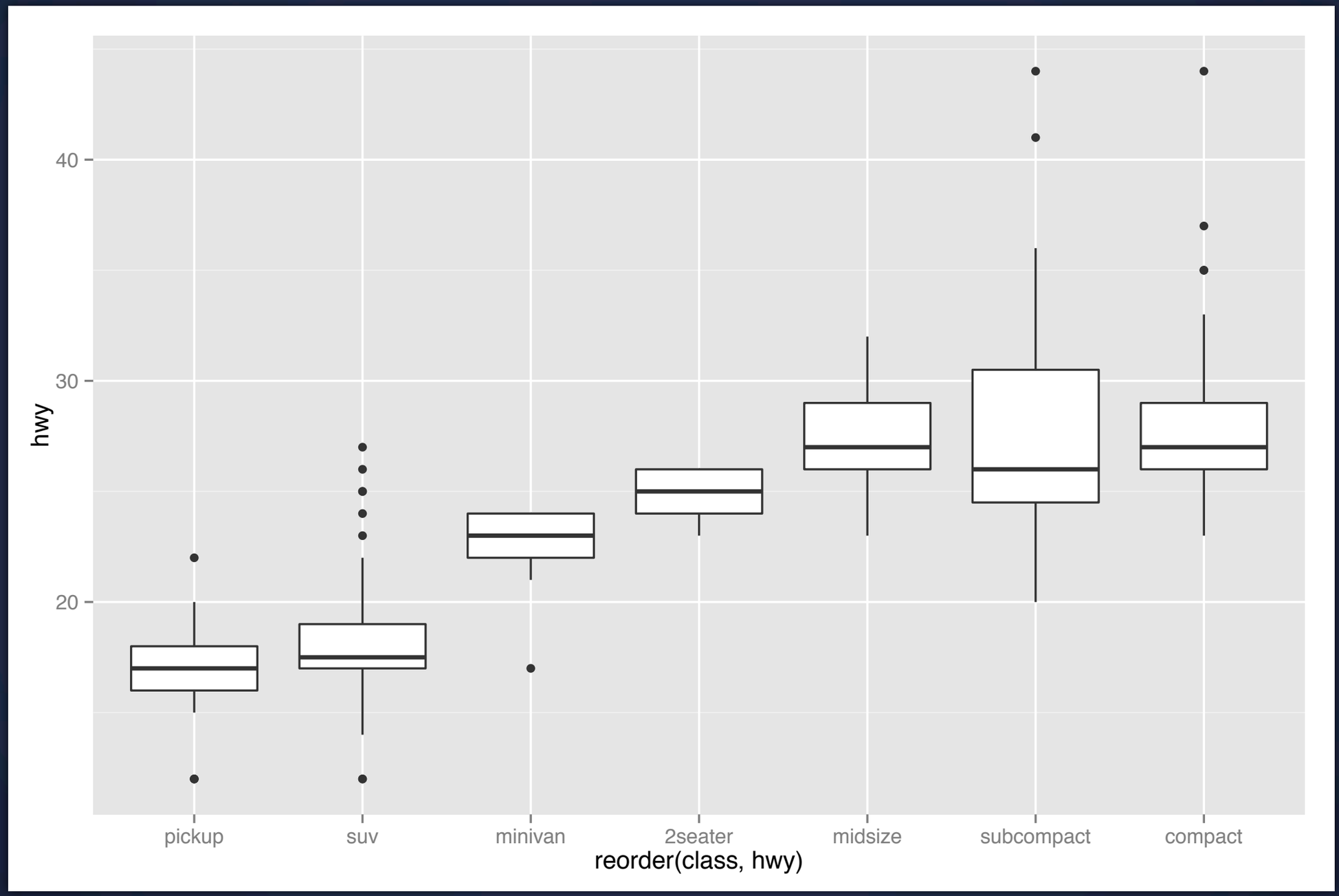

```
qplot(class, hwy, data = mpg)
```

How can we improve this plot?



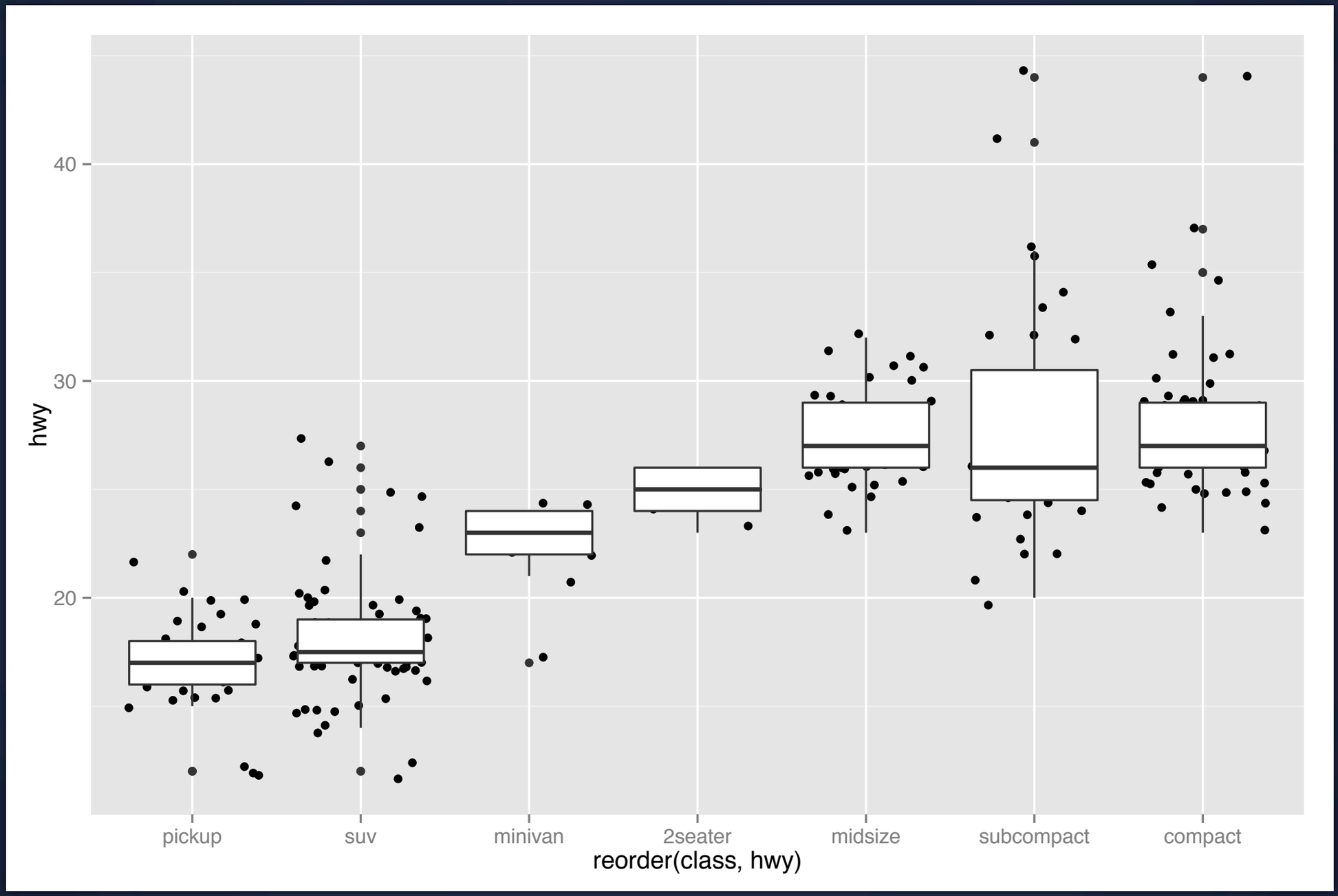

```
qplot(reorder(class, hwy), hwy, data = mpg)
```

How can we improve this plot?




```
qplot(reorder(class, hwy), hwy, data = mpg, geom = "boxplot")
```

How can we improve this plot?




```
qplot(reorder(class, hwy), hwy, data=mpg, geom=c("jitter", "boxplot"))
```

Your Turn

Read the help for reorder. Redraw the previous plots with class ordered by median `hwy`.

How would you put the jittered points on top of the boxplots?

Diamonds

A bigger data set

Diamonds data

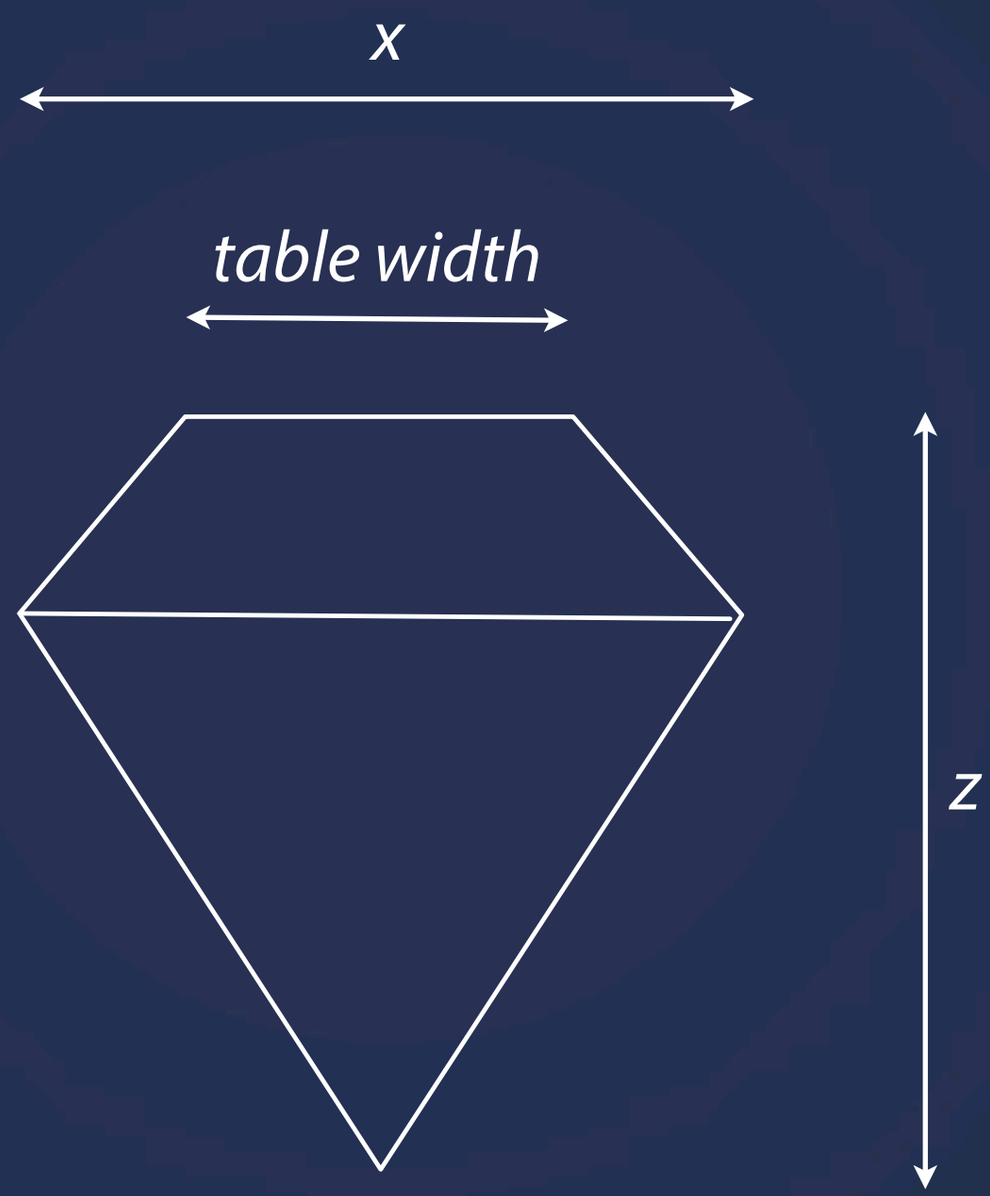
~54,000 round diamonds from http://www.diamondse.info

Carat, colour, clarity, cut

Total depth, table, depth, width, height

Price

Metrics of a diamond



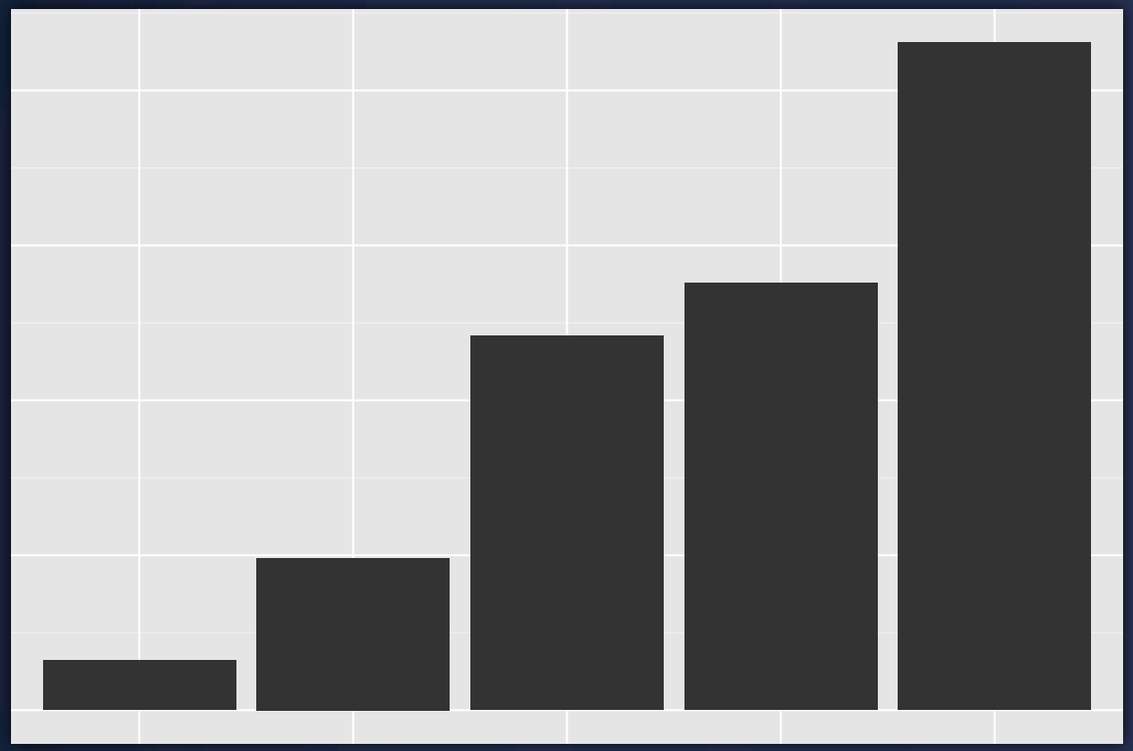
depth = z / diameter

*table = table width / x * 100*

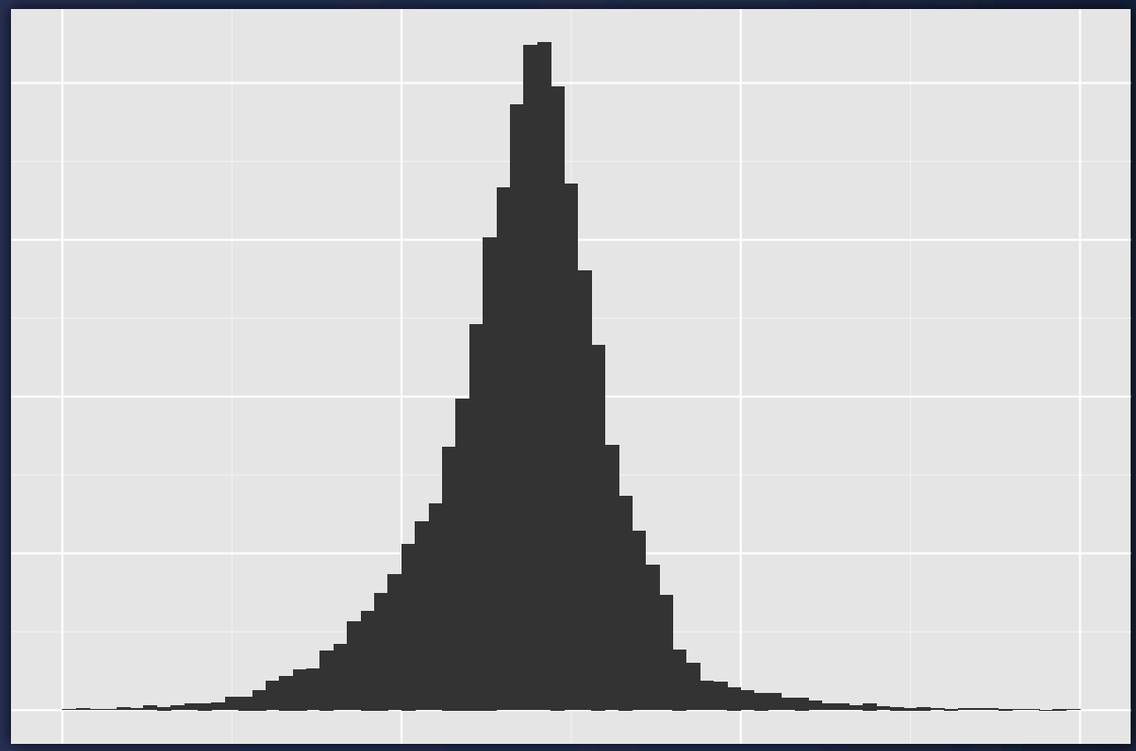
Your Turn

Inspect the data set

Barcharts vs Histograms



Nominal/categorical variables



Continuous variables

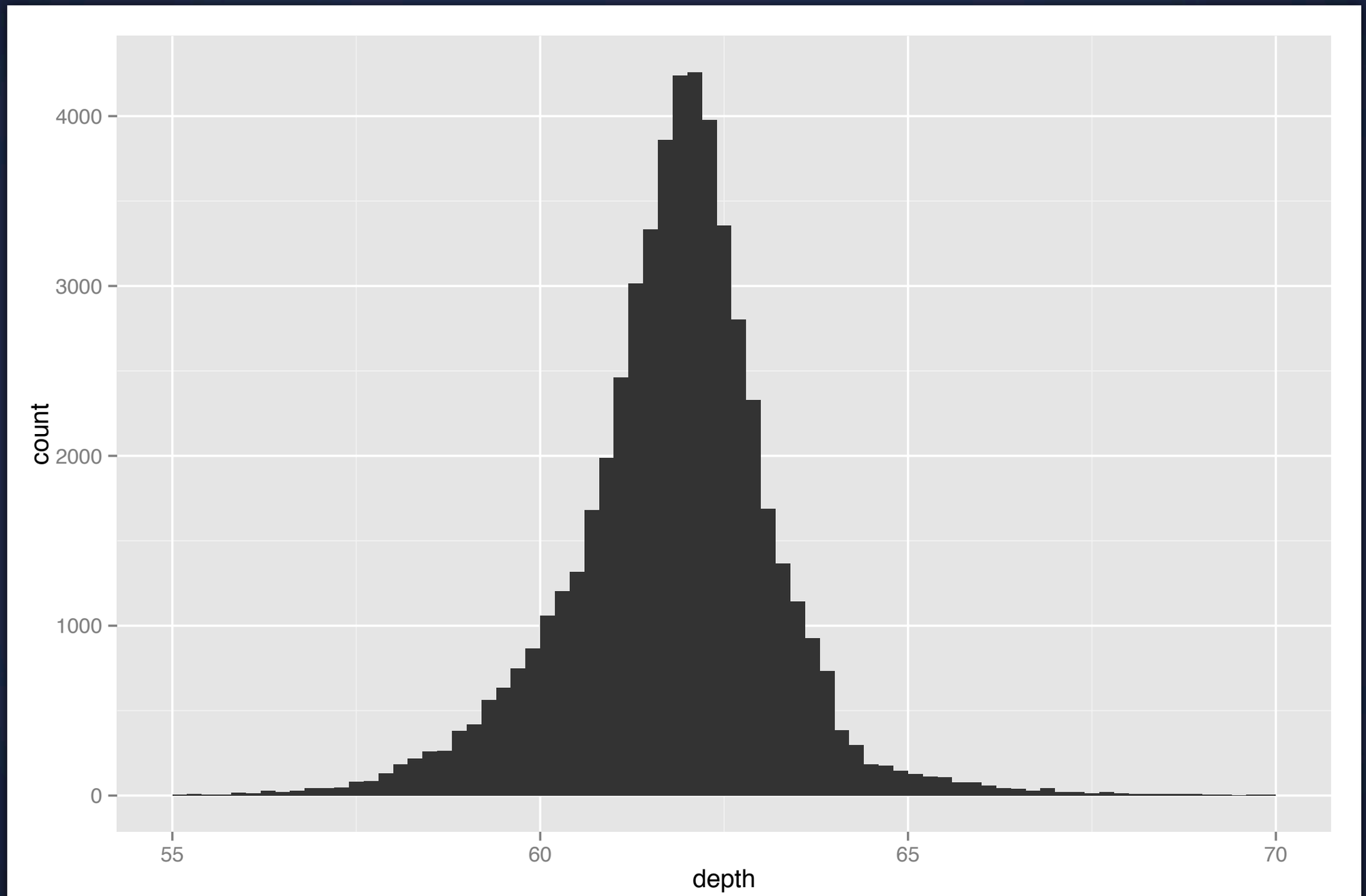
Let's plot

With only one variable, qplot guesses that you want a bar chart or histogram

```
qplot(cut, data = diamonds)

qplot(carat, data = diamonds)

# Change binwidth
qplot(carat, data = diamonds, binwidth = 1)
qplot(carat, data = diamonds, binwidth = 0.1)
qplot(carat, data = diamonds, binwidth = 0.01)

last_plot() + xlim(0, 3)

resolution(diamonds$carat)
```

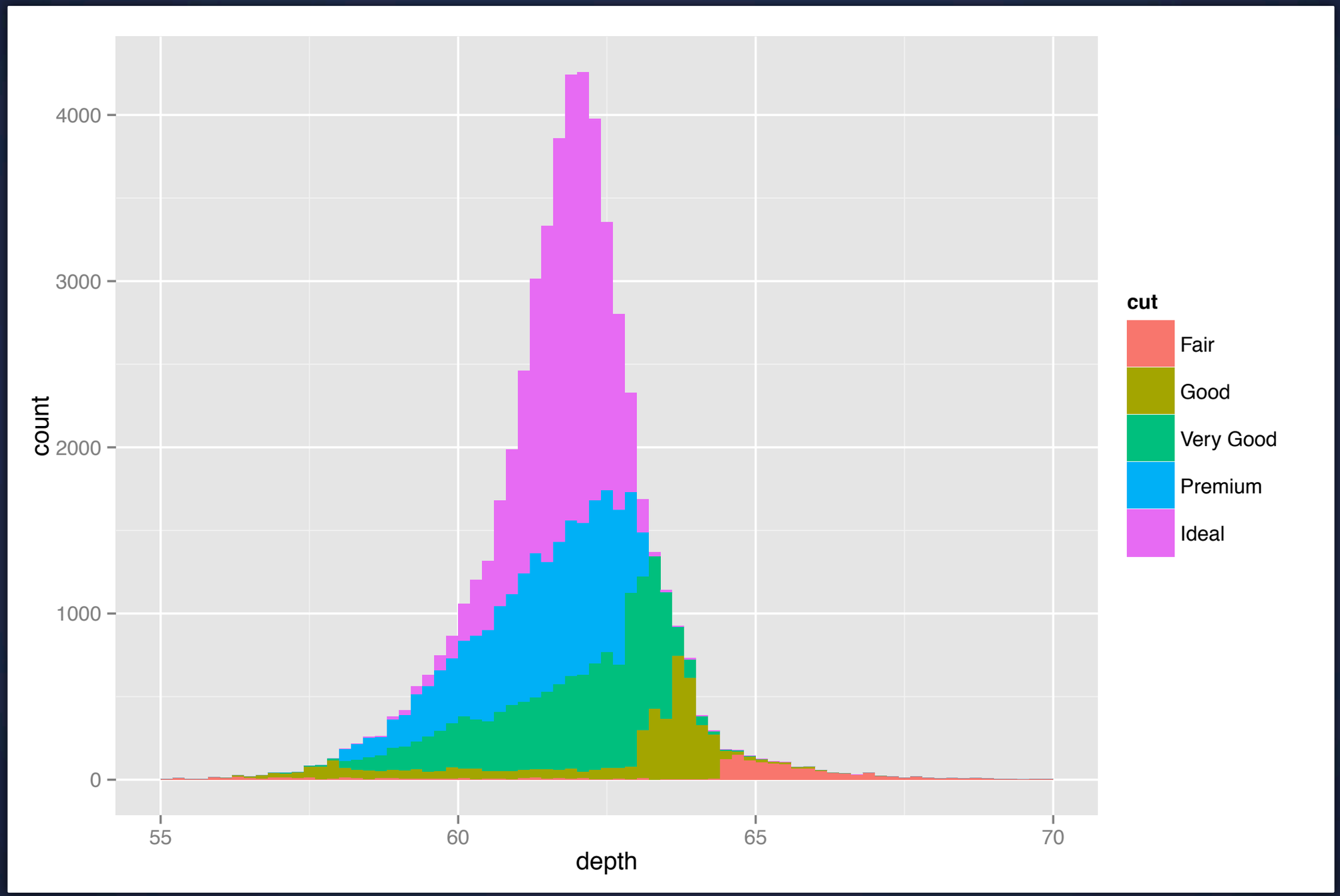
Always experiment with the bin width!

Additional Dimensions



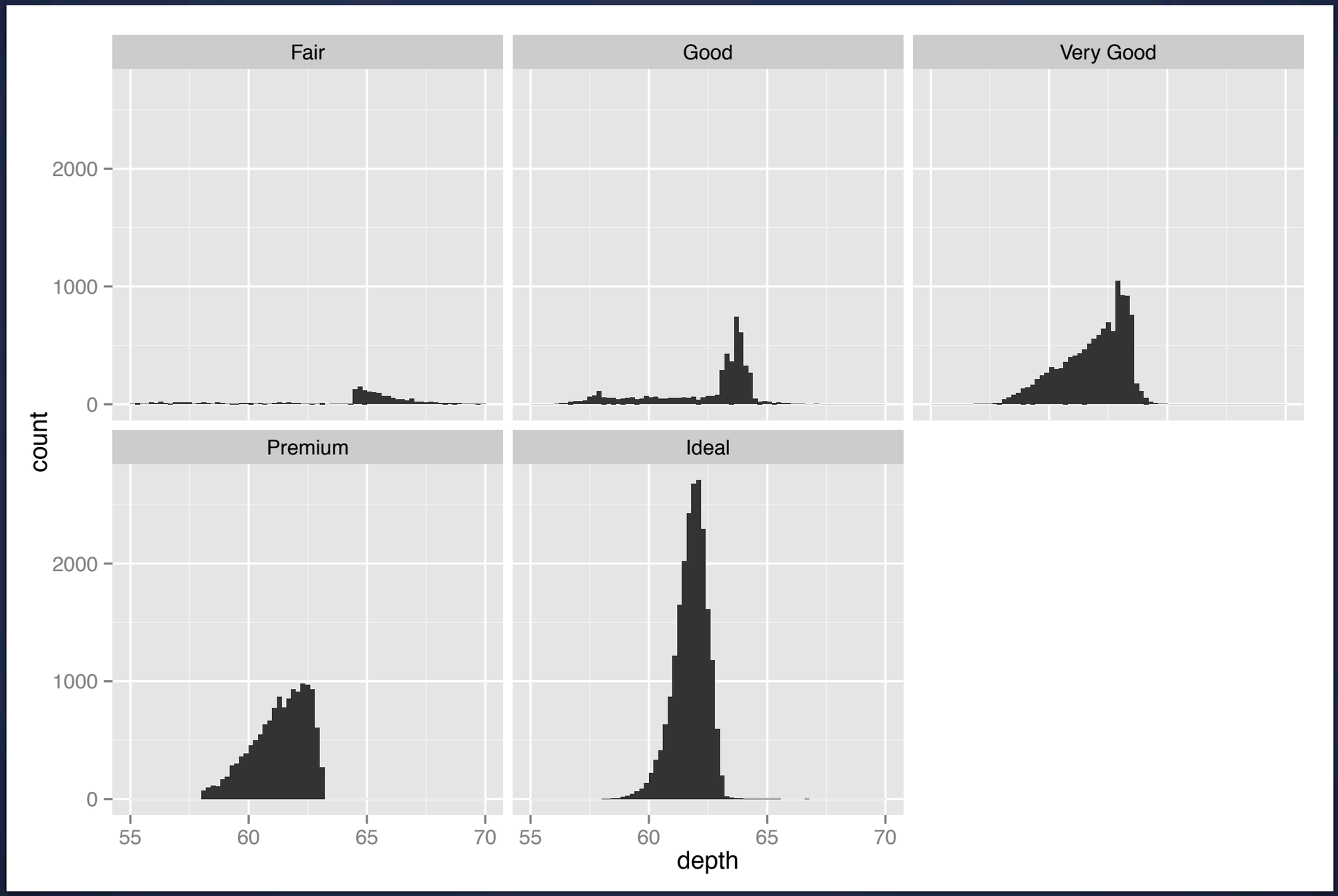

```
qplot(depth, data = diamonds, binwidth = 0.2) + xlim(55, 70)
```

Additional Dimensions




```
qplot(depth, data = diamonds, binwidth = 0.2, fill = cut) + xlim(55, 70)
```

Additional Dimensions




```
qplot(depth, data = diamonds, binwidth = 0.2, fill = cut) + xlim(55, 70)
    + facet_wrap(~ cut)
```

Your Turn

Explore the distribution of price. What is a good `binwidth` to use?

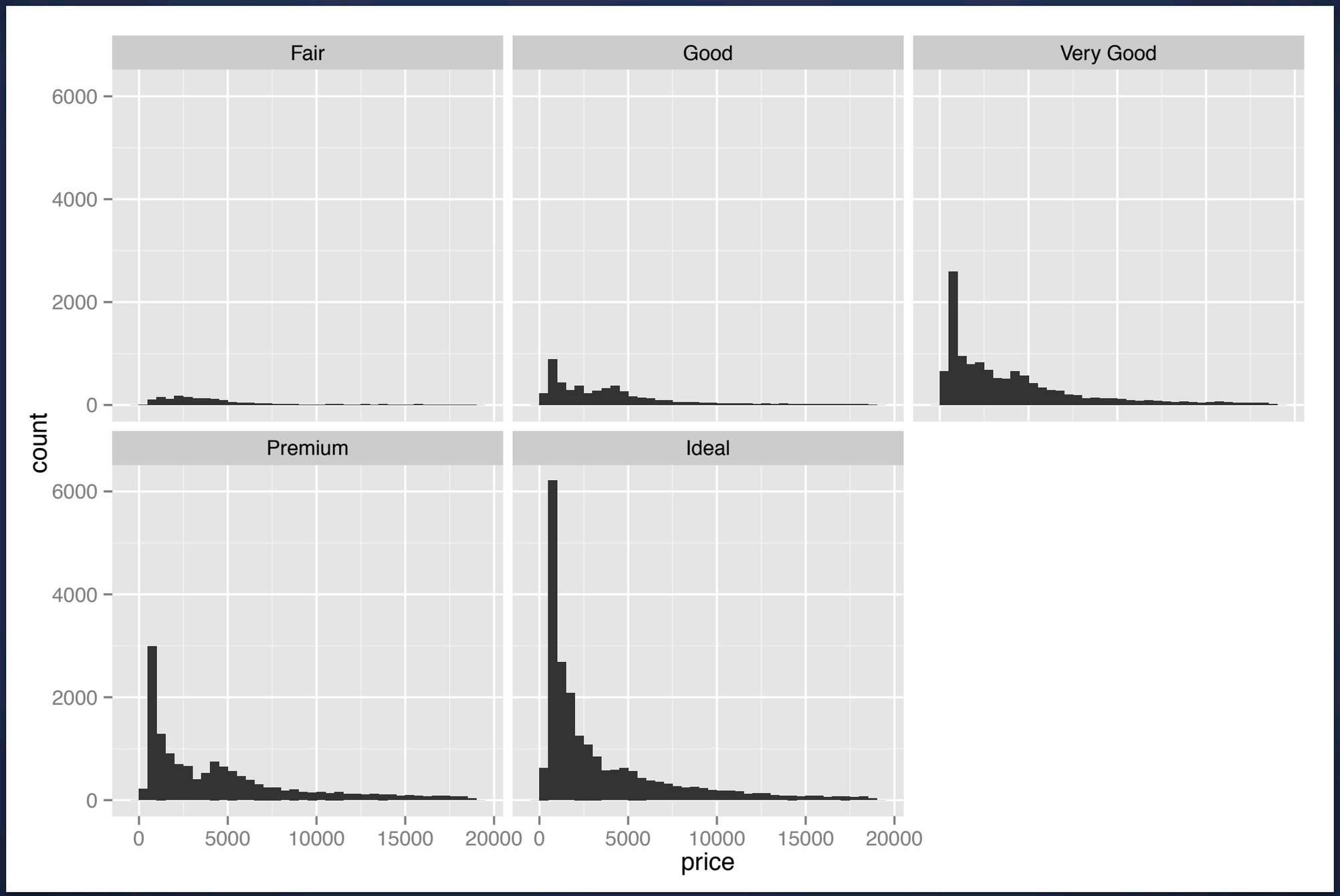
Hint: Diamonds are expensive!

Practice zooming in on regions of interest.

How does price vary with color, cut, or clarity?

Frequency Histogram

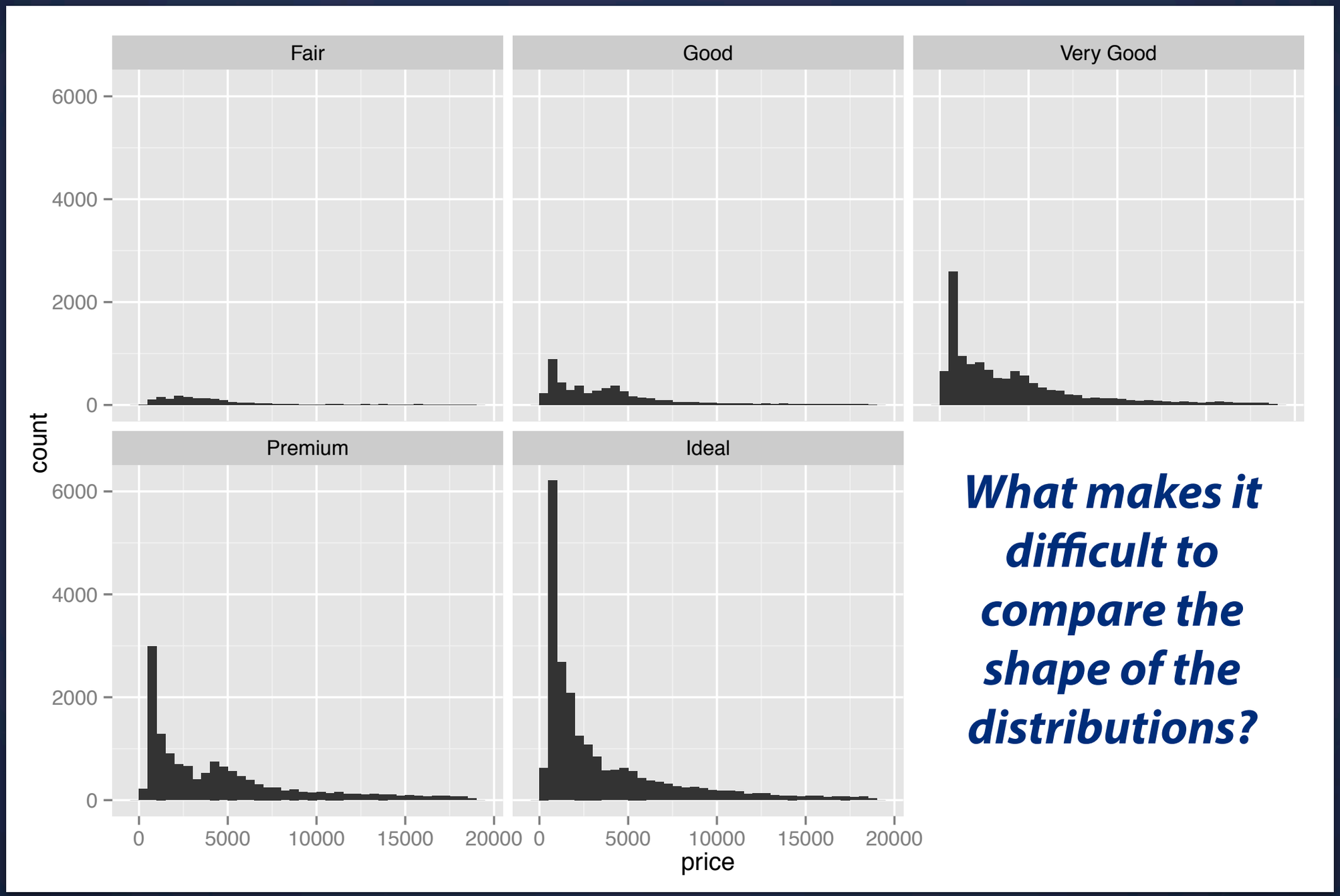
They're helpful, but come with caveats




```
qplot(price, data = diamonds, binwidth = 500) + facet_wrap(~ cut)
```

Frequency Histogram

They're helpful, but come with caveats



What makes it difficult to compare the shape of the distributions?

```
qplot(price, data = diamonds, binwidth = 500) + facet_wrap(~ cut)
```

Frequency Histogram

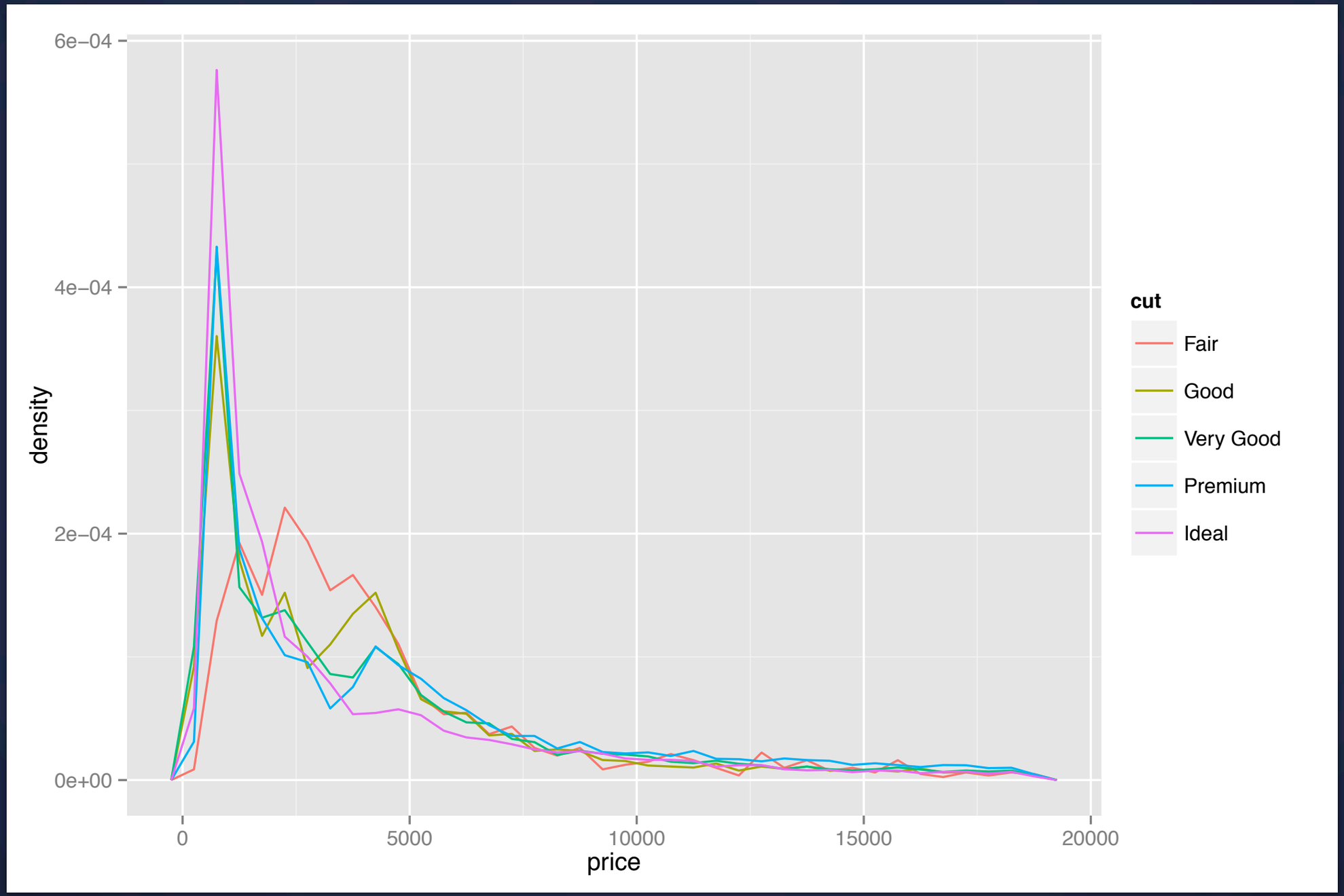
They're helpful, but come with caveats

```
# Large distances make comparisons hard
qplot(price, data = diamonds, binwidth = 500) +
facet_wrap(~ cut)

# Stacked heights hard to compare
qplot(price, data = diamonds, binwidth = 500, fill = cut)
```

```
# Much better - but still have differing relative
abundance
qplot(price, data = diamonds, binwidth = 500,
      geom = "freqpoly", colour = cut)

# Instead of displaying count on y-axis, display density
# .. indicates that variable isn't in original data
qplot(price, ..density.., data = diamonds, binwidth = 500,
      geom = "freqpoly", colour = cut)
```

Density Histogram

Shows relative distribution better




```
qplot(price, ..density.., data = diamonds, binwidth = 500,
      geom = "freqpoly", colour = cut)
```

Where Next?

Learn more about

- Aggregating your data: `plyr`
- Working with dates: `lubridate`
- Regular expressions: `stringr`
- A consistent philosophy of data: google “tidy data”
- `ggplot2`: http://blog.ggplot2.org/ + ggplot2 mailing list

Other Resources

- The art of R programming http://amzn.com/1593273843
- Data manipulation with R http://amzn.com/0387747303
- http://www.r-bloggers.com/
- http://stackoverflow.com/questions/ tagged/r

Next Lecture

Dashboards. Guest lecture by Stephen Few