Car Transmision and Miles Per Gallon

Motor Trend, a magazine about the automobile industry Looking at a data set of a collection of cars, they are interested in exploring the relationship between a set of variables and miles per gallon (MPG) (outcome). They are particularly interested in the following two questions:

"Is an automatic or manual transmission better for MPG" "Quantify the MPG difference between automatic and manual transmissions"

```
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 3.1.2
```

```
library(caret)
```

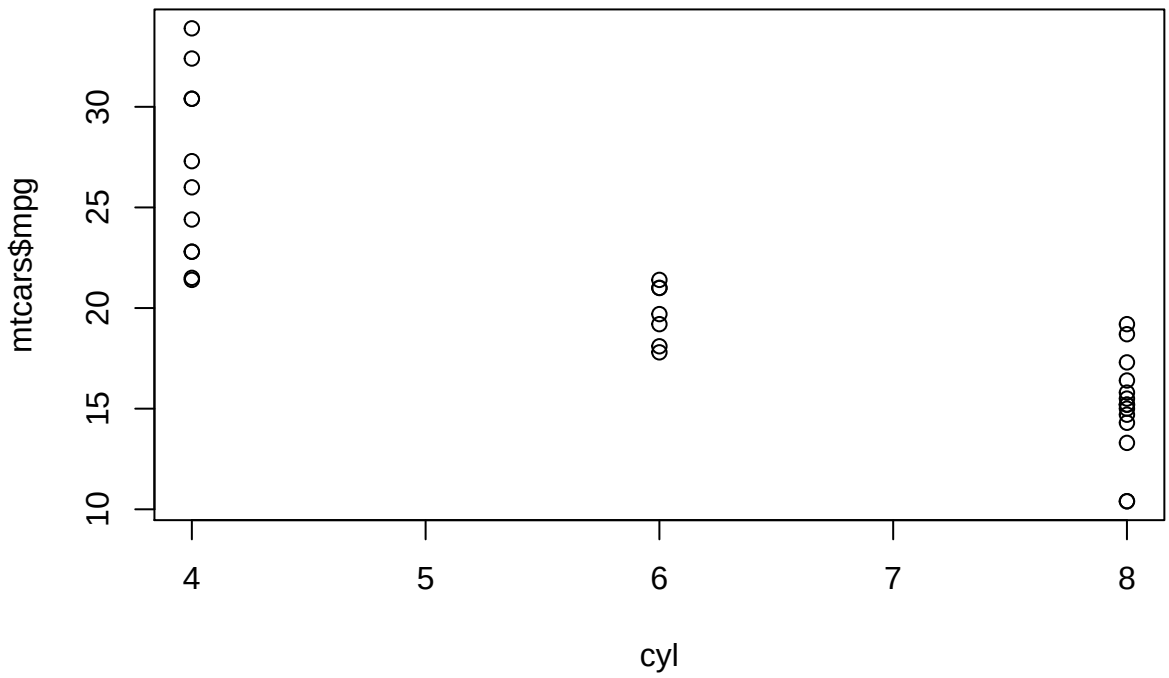
```
## Loading required package: lattice
```

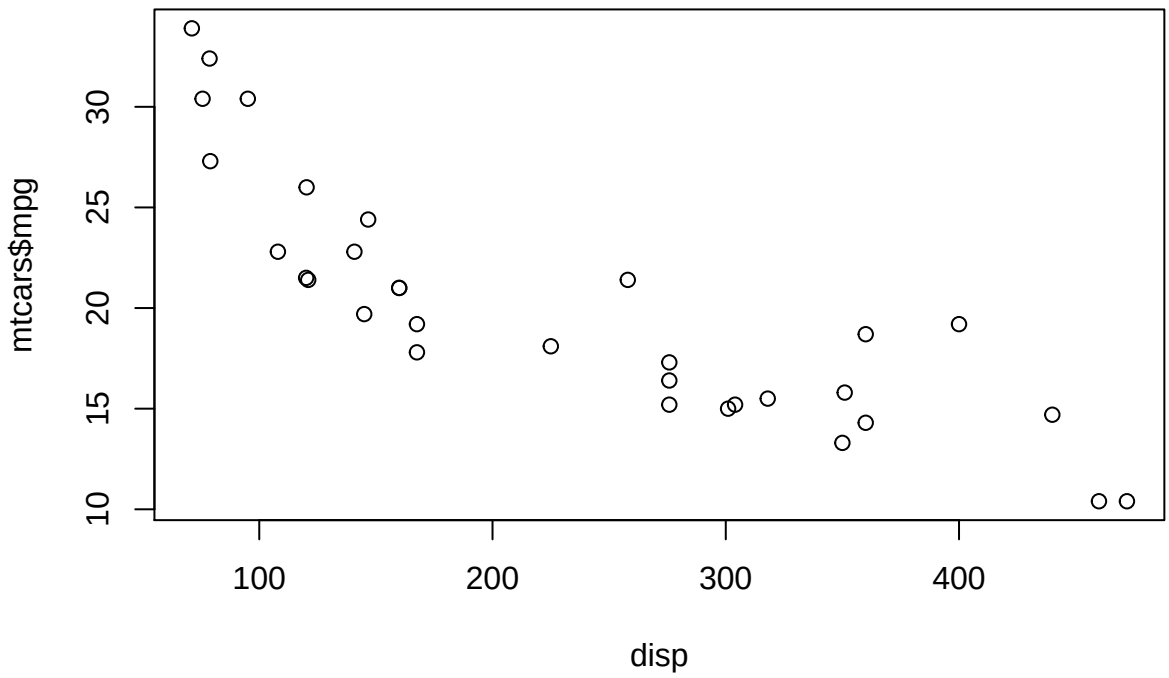
```
data(mtcars)
summary(mtcars)
```

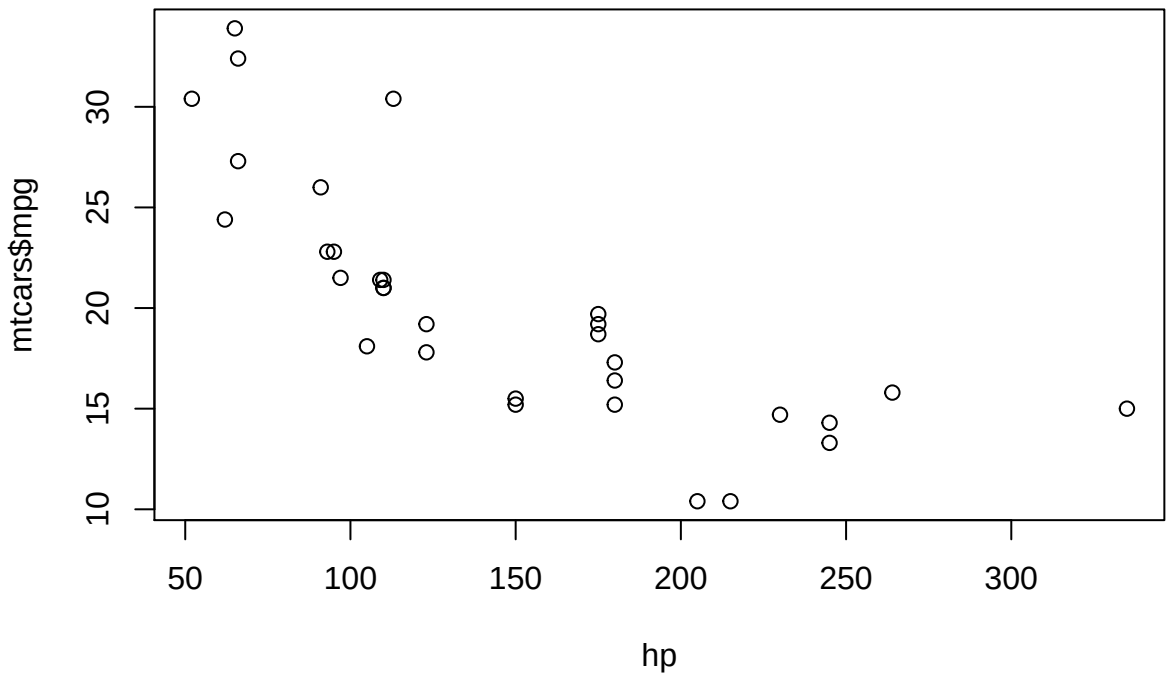
```
##       mpg             cyl             disp             hp       
##  Min.   :10.40   Min.   :4.000   Min.   : 71.1   Min.   : 52.0  
##  1st Qu.:15.43   1st Qu.:4.000   1st Qu.:120.8   1st Qu.: 96.5  
##  Median :19.20   Median :6.000   Median :196.3   Median :123.0  
##  Mean   :20.09   Mean   :6.188   Mean   :230.7   Mean   :146.7  
##  3rd Qu.:22.80   3rd Qu.:8.000   3rd Qu.:326.0   3rd Qu.:180.0  
##  Max.   :33.90   Max.   :8.000   Max.   :472.0   Max.   :335.0  
##       drat             wt             qsec             vs        
##  Min.   :2.760   Min.   :1.513   Min.   :14.50   Min.   :0.0000  
##  1st Qu.:3.080   1st Qu.:2.581   1st Qu.:16.89   1st Qu.:0.0000  
##  Median :3.695   Median :3.325   Median :17.71   Median :0.0000  
##  Mean   :3.597   Mean   :3.217   Mean   :17.85   Mean   :0.4375  
##  3rd Qu.:3.920   3rd Qu.:3.610   3rd Qu.:18.90   3rd Qu.:1.0000  
##  Max.   :4.930   Max.   :5.424   Max.   :22.90   Max.   :1.0000  
##        am              gear            carb      
##  Min.   :0.0000   Min.   :3.000   Min.   :1.000  
##  1st Qu.:0.0000   1st Qu.:3.000   1st Qu.:2.000  
##  Median :0.0000   Median :4.000   Median :2.000  
##  Mean   :0.4062   Mean   :3.688   Mean   :2.812  
##  3rd Qu.:1.0000   3rd Qu.:4.000   3rd Qu.:4.000  
##  Max.   :1.0000   Max.   :5.000   Max.   :8.000
```

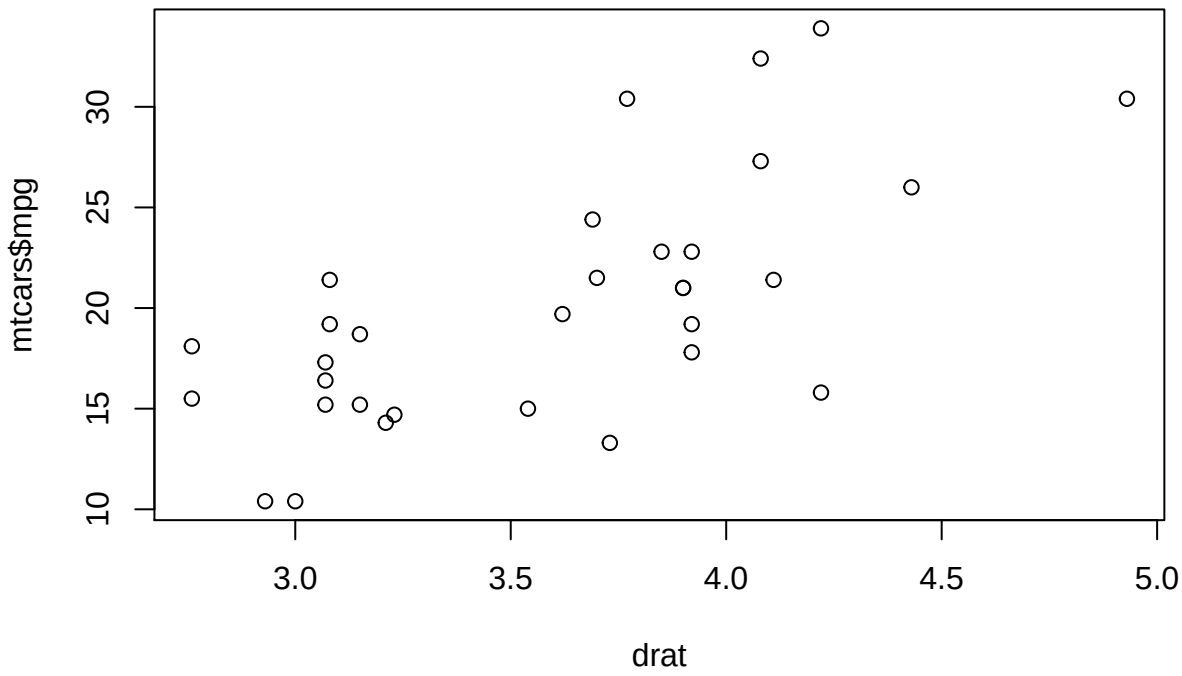
```
#mtcars$am = ifelse(mtcars$am = 0, 'manual', )
```

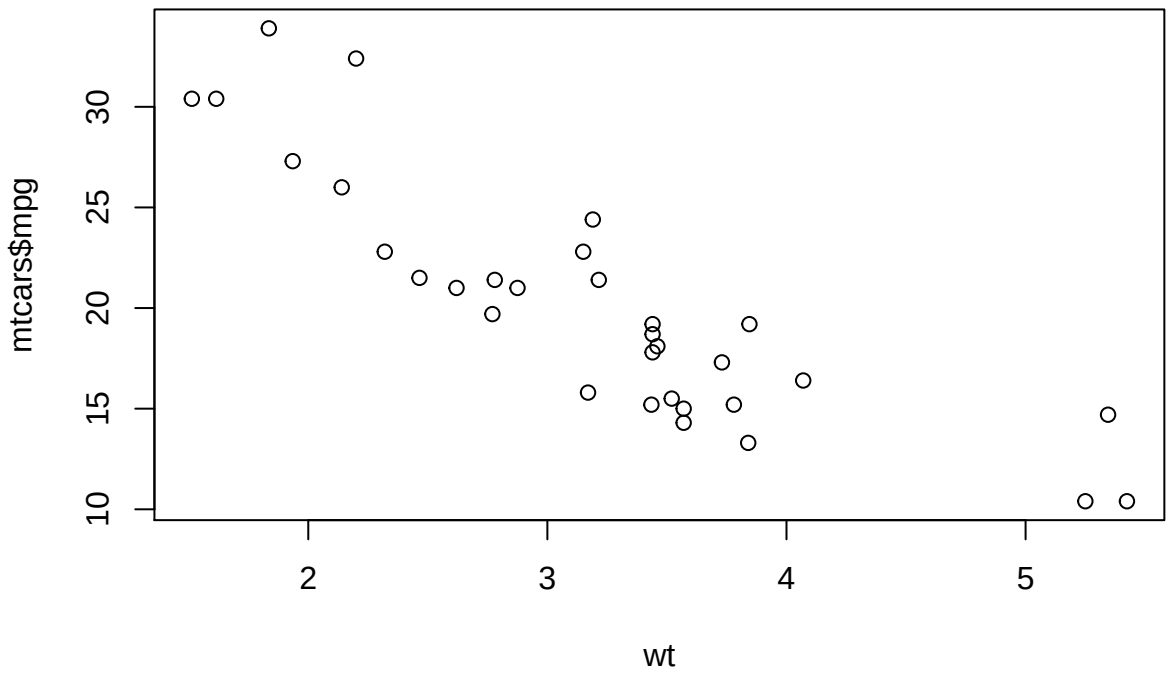
You can also embed plots, for example:

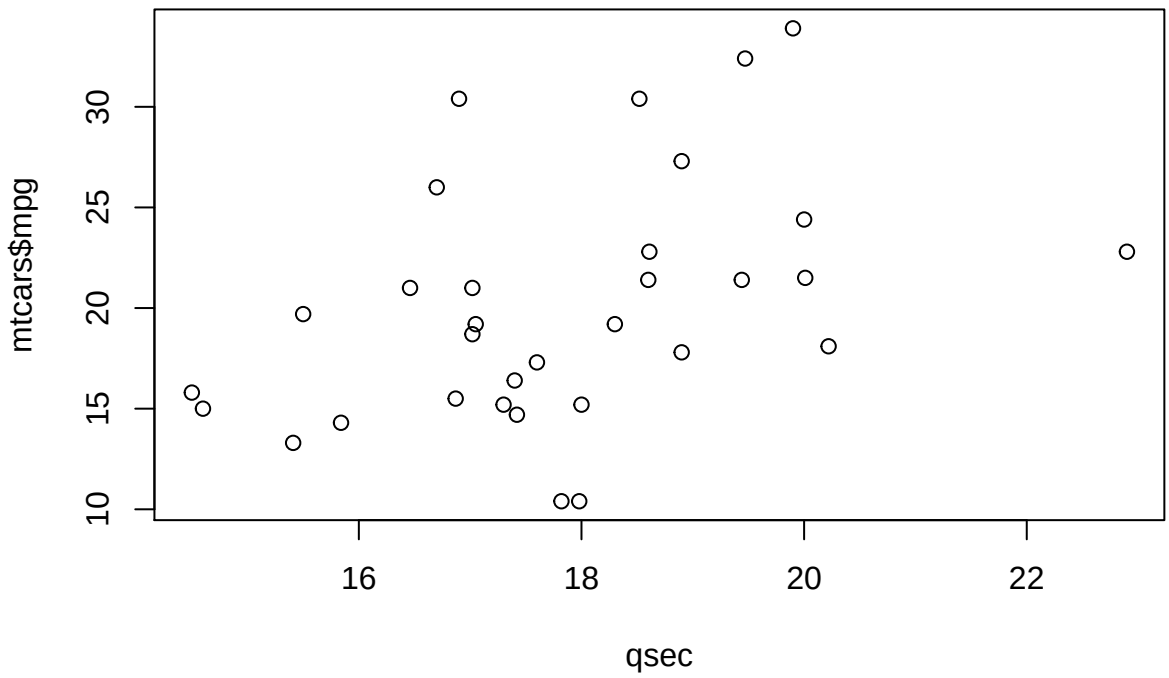

mtcars$mpg
10
15
20
25
30
4
5
6
7
8
cyl

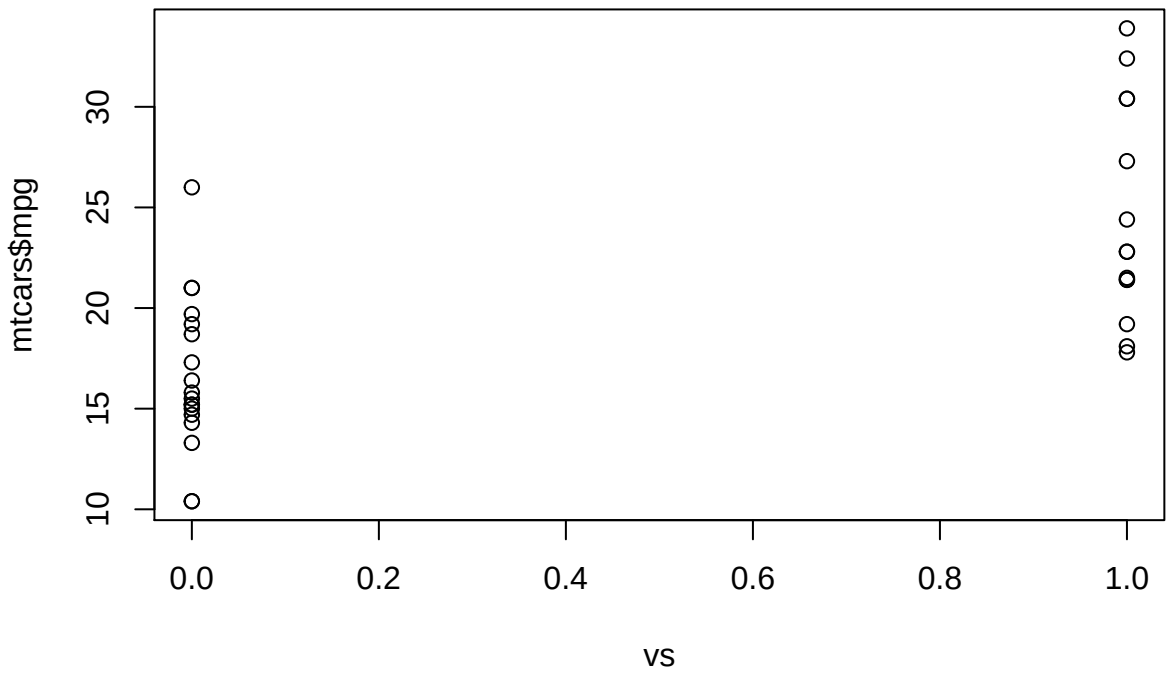

mtcars$mpg
10
15
20
25
30
100
200
300
400
disp

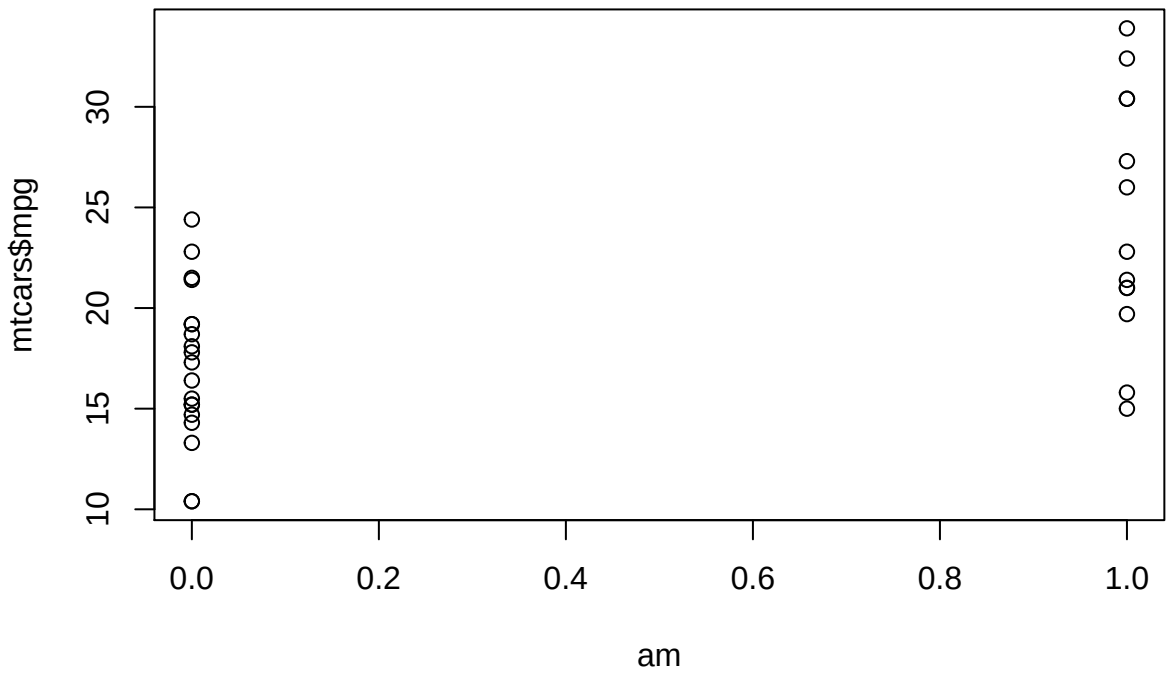

mtcars$mpg
10
15
20
25
30
50
100
150
200
250
300
hp

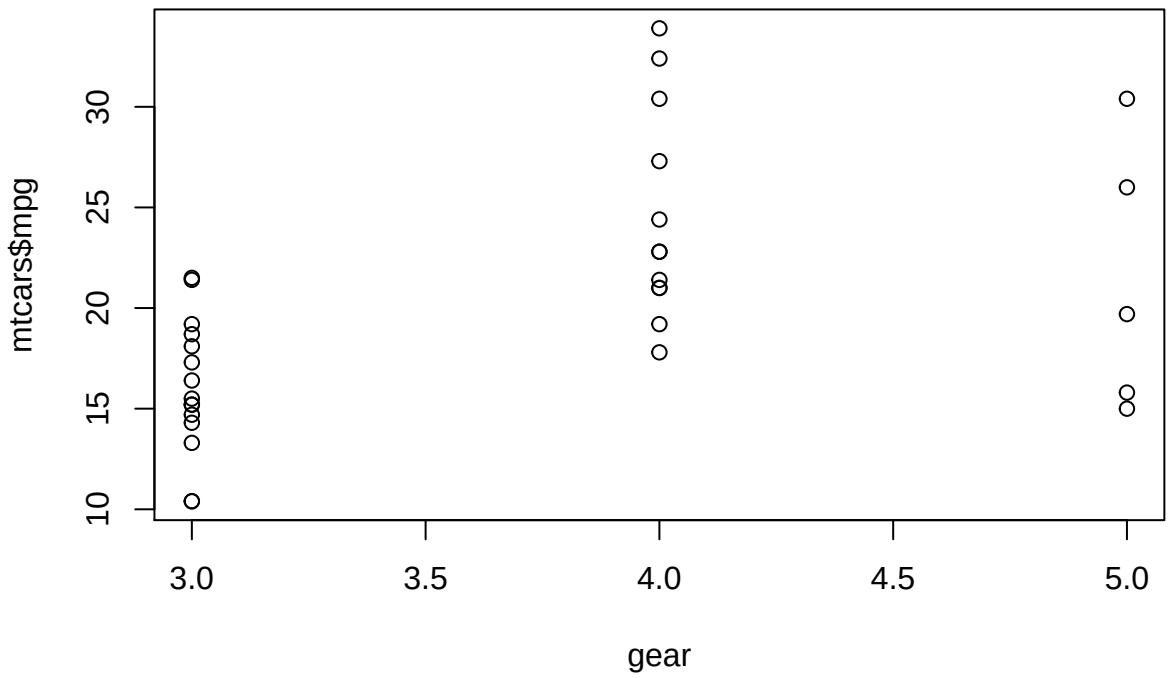

mtcars$mpg
10
15
20
25
30
3.0
3.5
4.0
4.5
5.0
drat

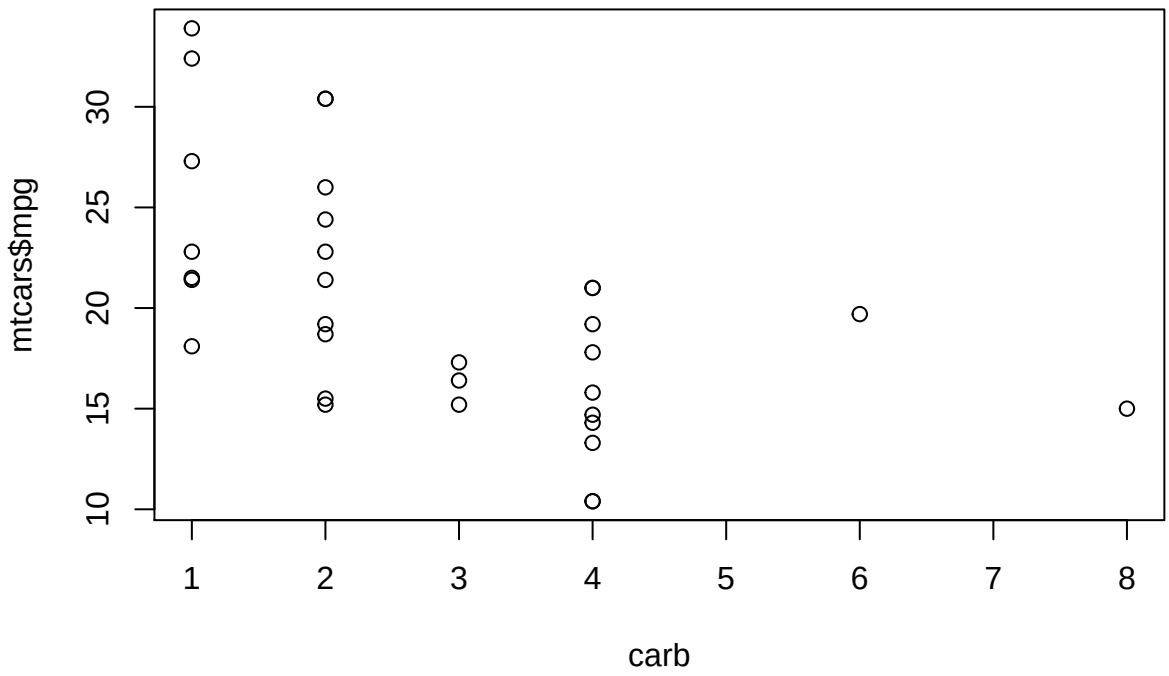

mtcars$mpg
10
15
20
25
30
2
3
4
5
wt

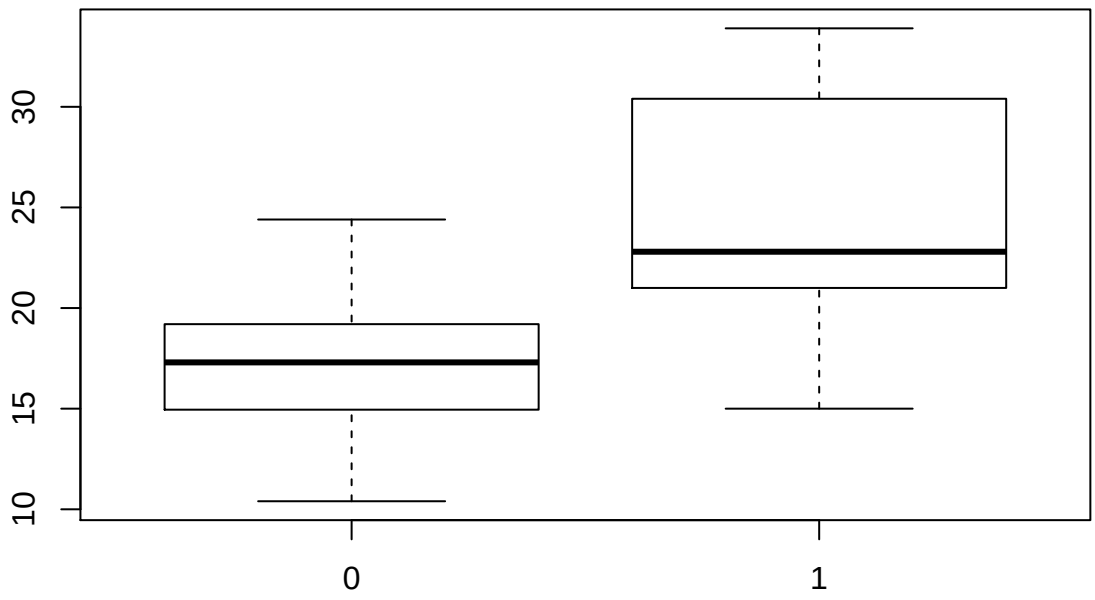

mtcars$mpg
10
15
20
25
30
16
18
20
22
qsec


mtcars$mpg
10
15
20
25
30
0.0
0.2
0.4
0.6
0.8
1.0
vs


mtcars$mpg
10
15
20
25
30
0.0
0.2
0.4
0.6
0.8
1.0
am


mtcars$mpg
10
15
20
25
30
3.0
3.5
4.0
4.5
5.0
gear

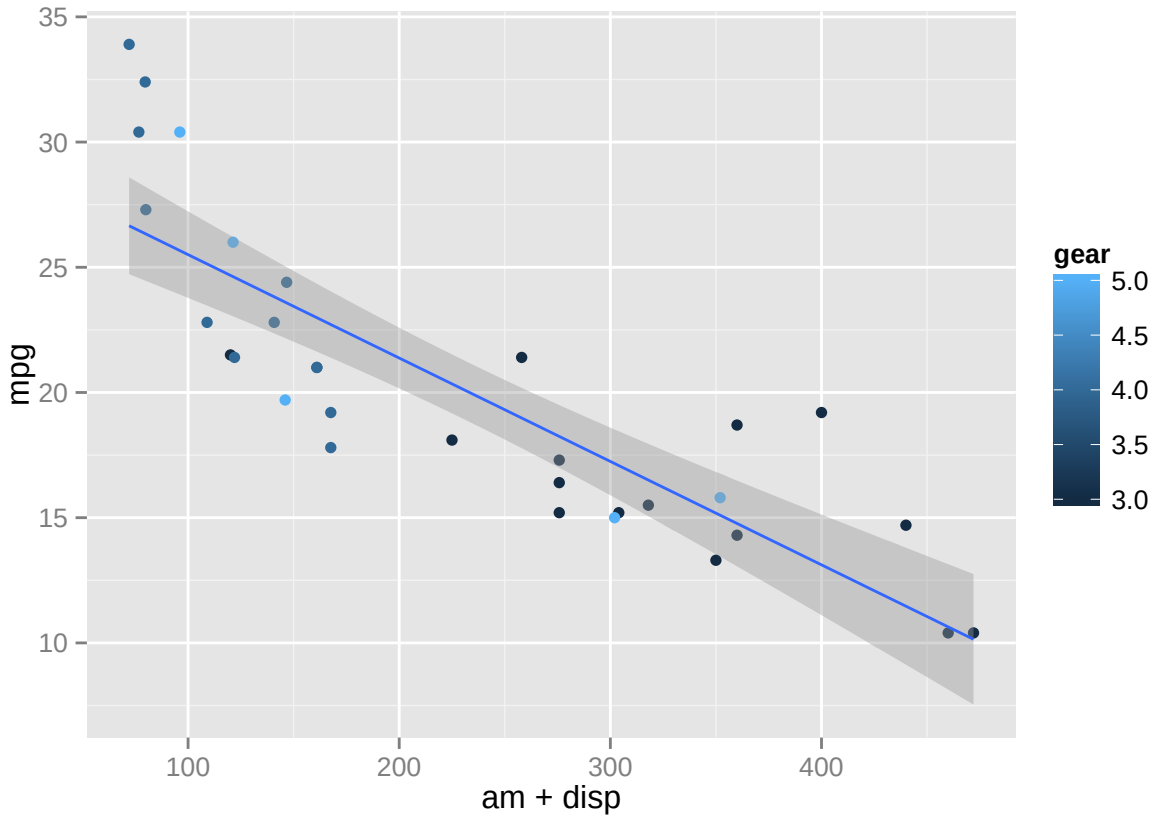

mtcars$mpg
10
15
20
25
30
1
2
3
4
5
6
7
8
carb



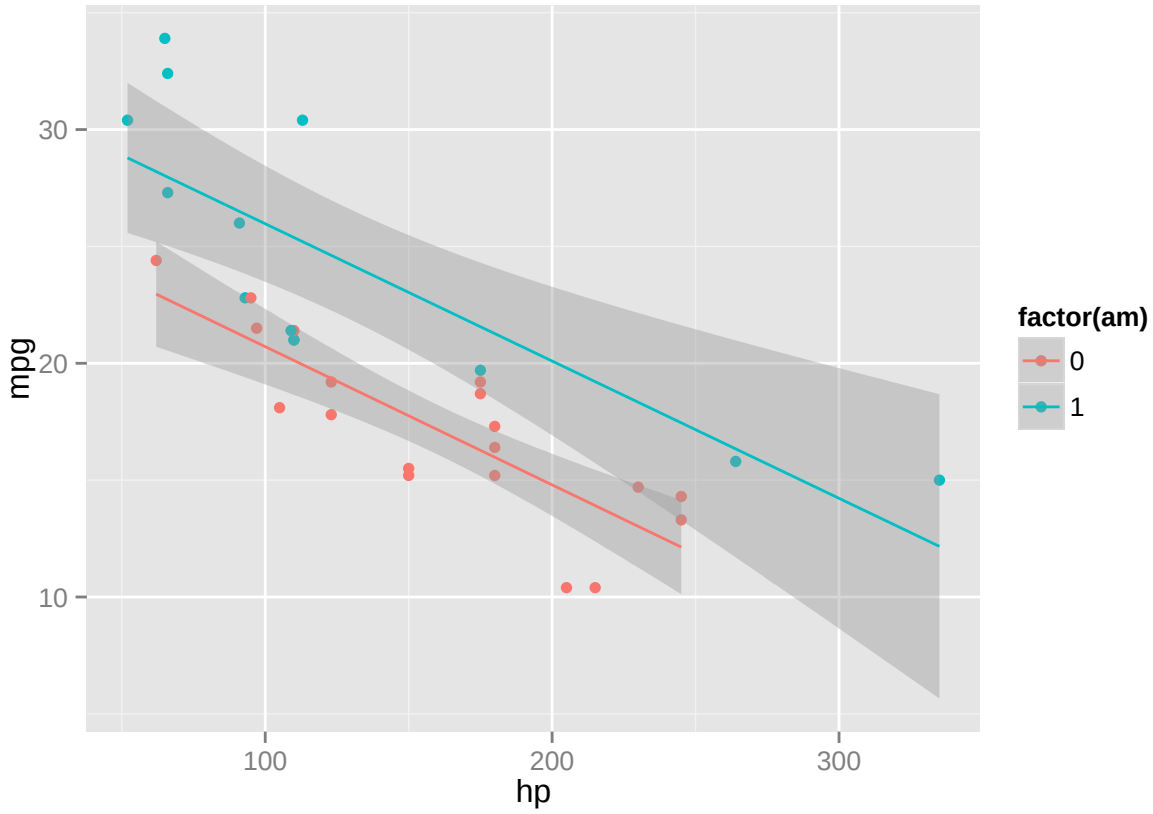

```
fit = lm(mpg ~ ., data=mtcars)
coef(fit)
```

```
## (Intercept)         cyl        disp          hp        drat          wt
## 12.30337416 -0.11144048  0.01333524 -0.02148212  0.78711097 -3.71530393
##        qsec          vs          am        gear        carb
##  0.82104075  0.31776281  2.52022689  0.65541302 -0.19941925
```

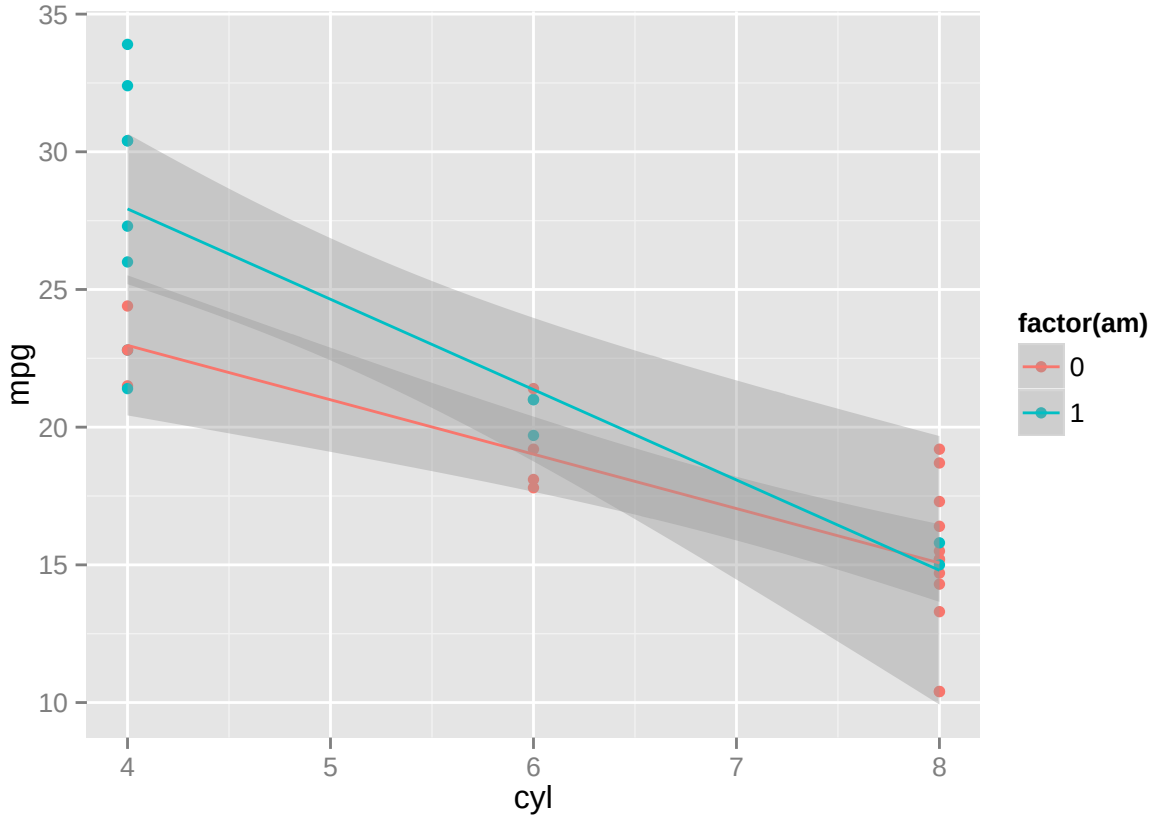
```
qq <- qplot(am+ disp,mpg, colour = gear, data=mtcars)
qq + geom_smooth(method='lm', formula = y~x)
```



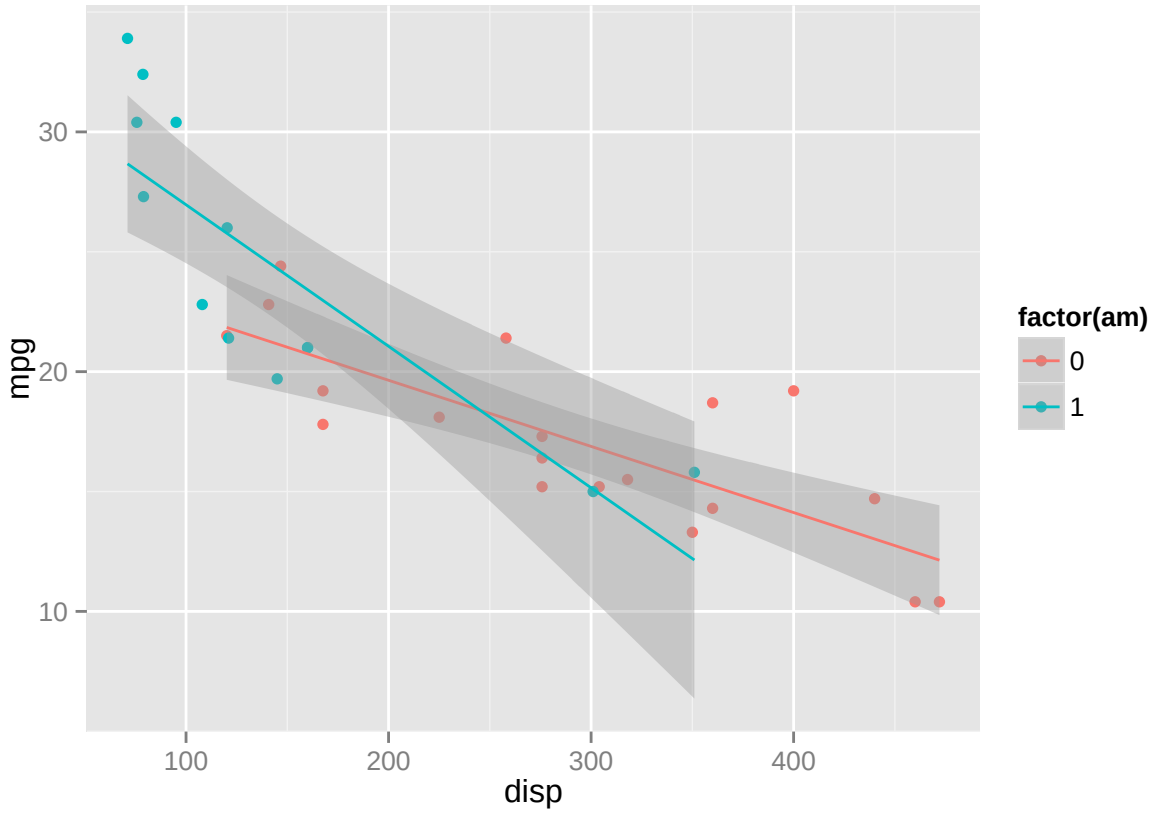

```
qq <- qplot(hp, mpg, colour = factor(am), data=mtcars)
qq + geom_smooth(method='lm', formula = y~x)
```



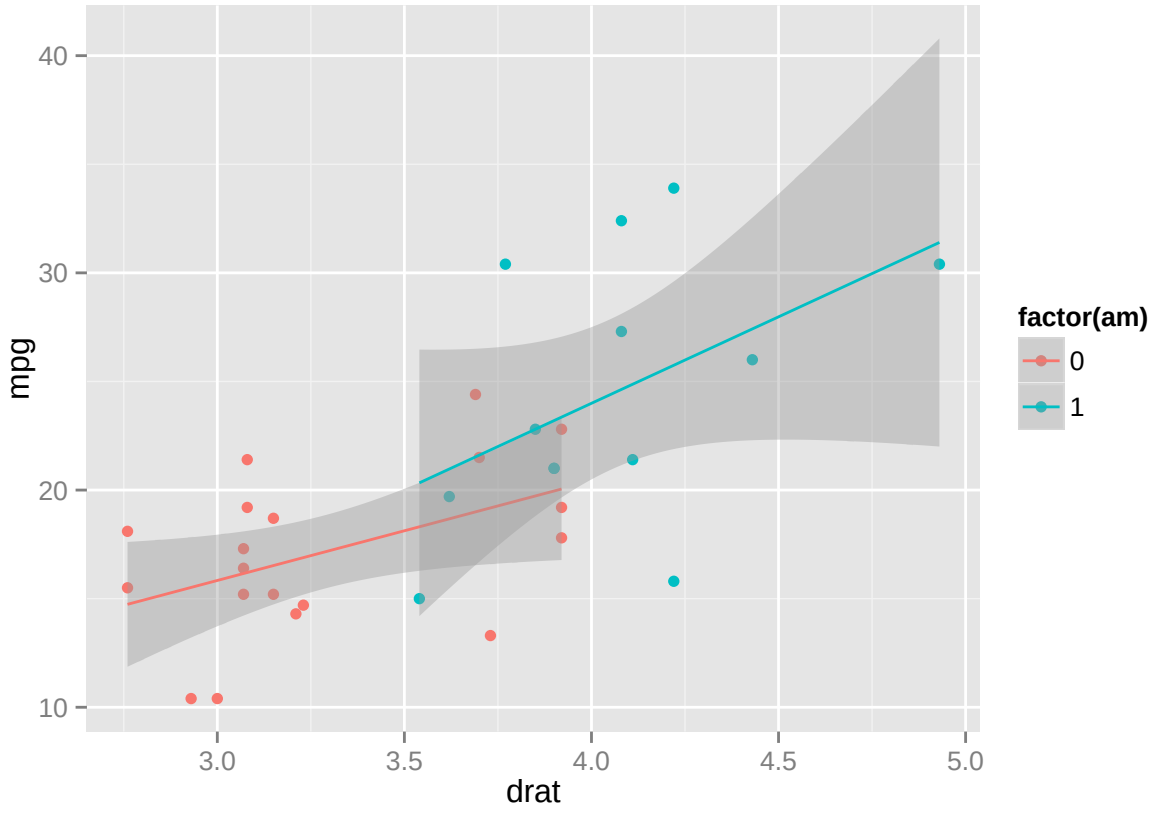

```
qq <- qplot(cyl, mpg, colour = factor(am), data=mtcars)
qq + geom_smooth(method='lm', formula = y~x)
```



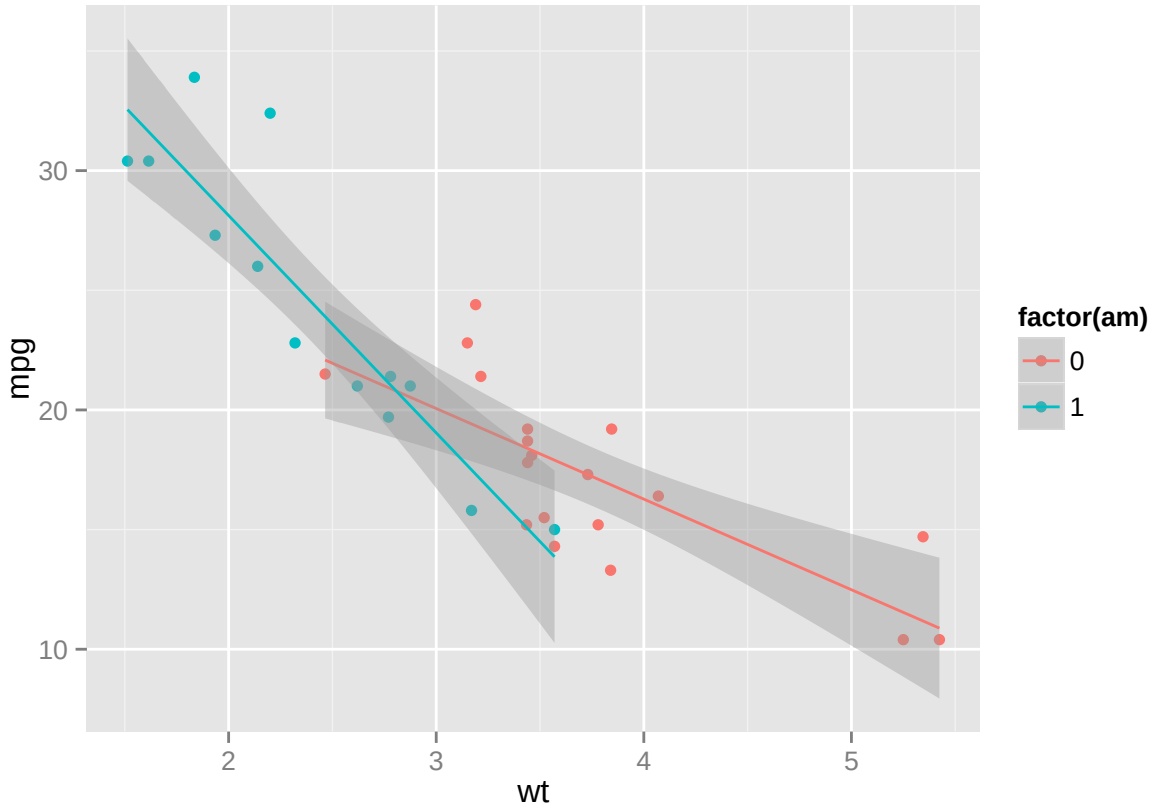

```
qq <- qplot(disp, mpg, colour = factor(am), data=mtcars)
qq + geom_smooth(method='lm', formula = y~x)
```



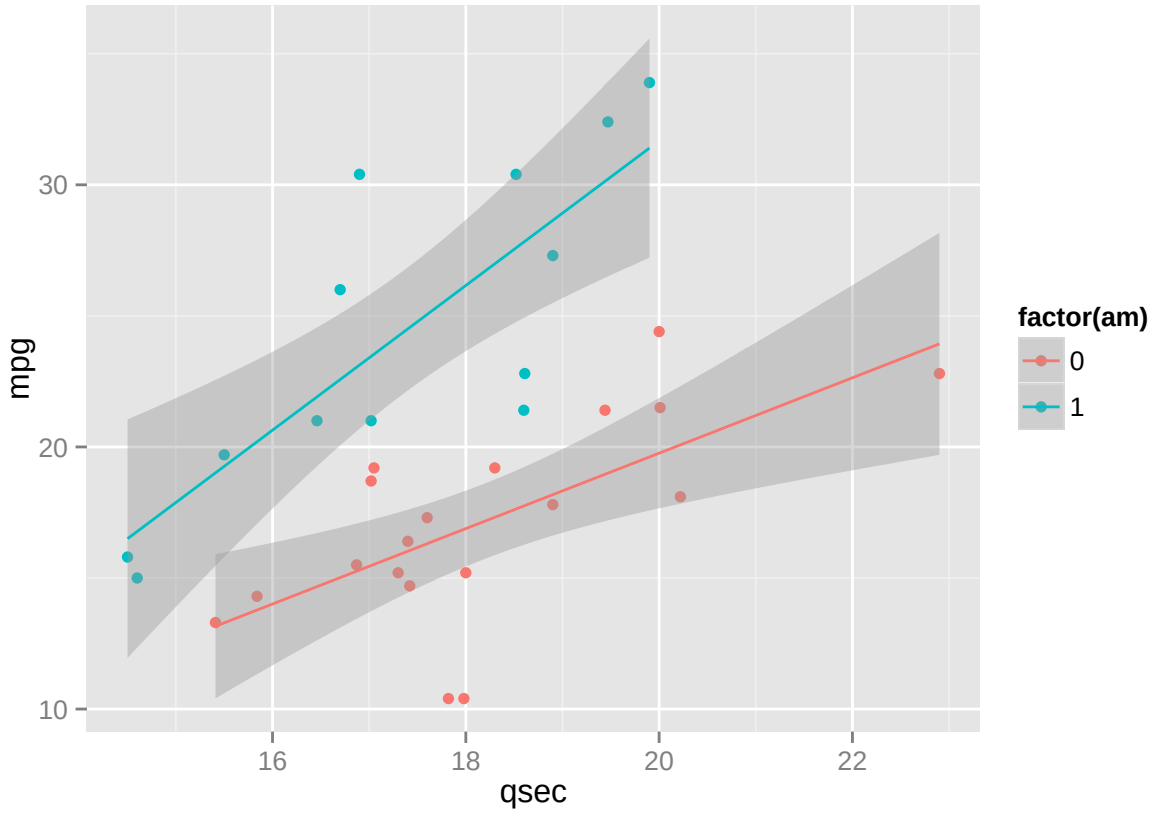

```
qq <- qplot(drat, mpg, colour = factor(am), data=mtcars)
qq + geom_smooth(method='lm', formula = y~x)
```



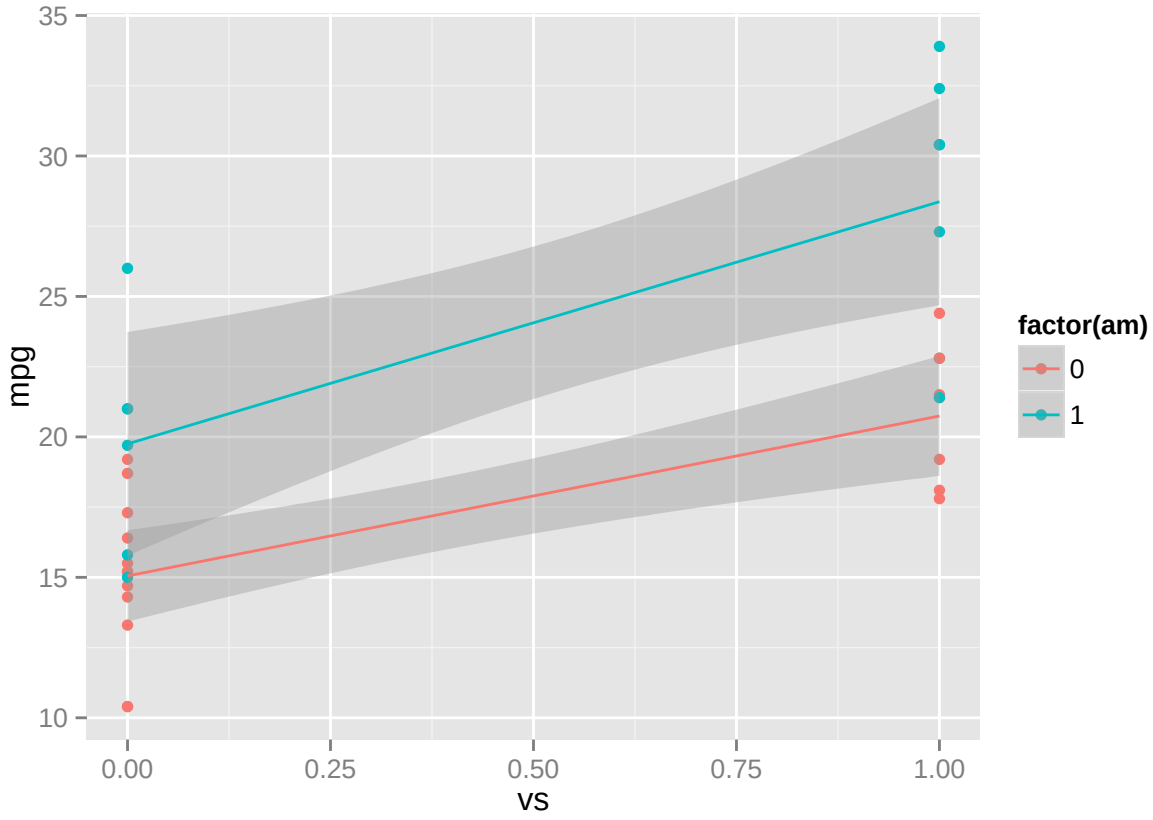

```
qq <- qplot(wt, mpg, colour = factor(am), data=mtcars)
qq + geom_smooth(method='lm', formula = y~x)
```



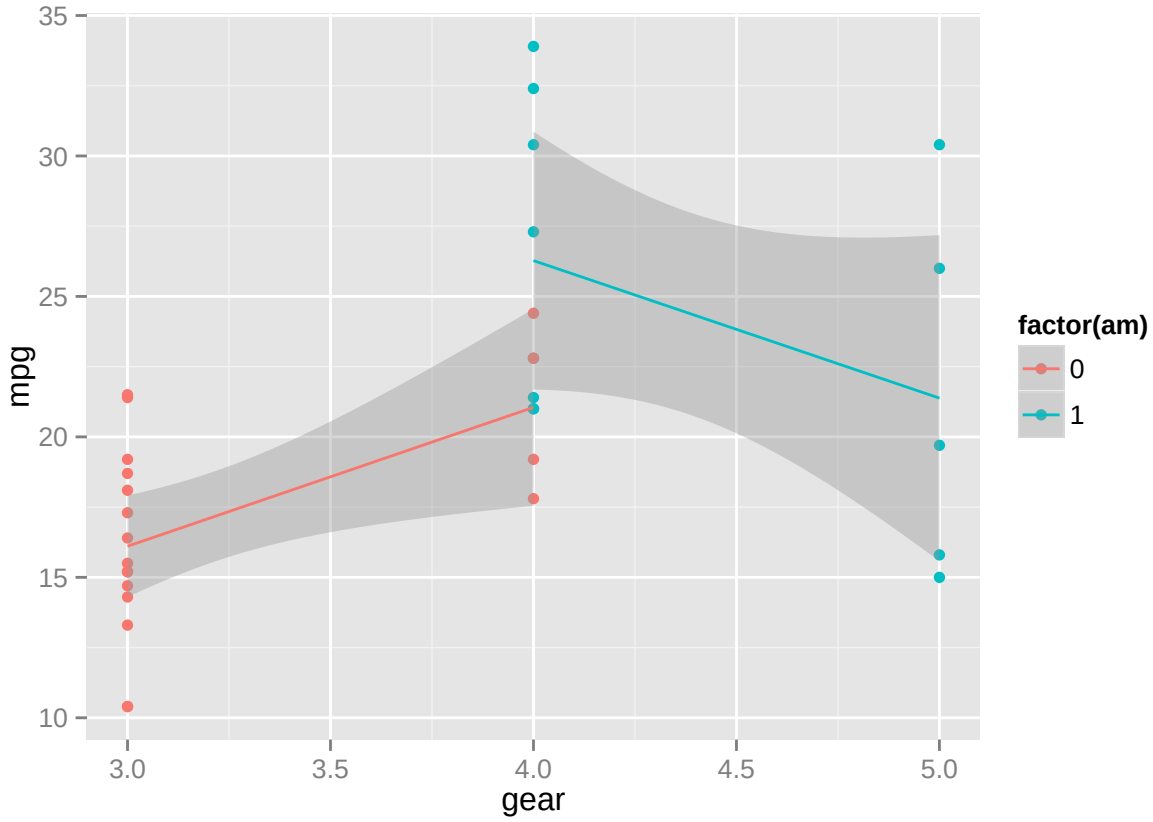

```
qq <- qplot(qsec, mpg, colour = factor(am), data=mtcars)
qq + geom_smooth(method='lm', formula = y~x)
```



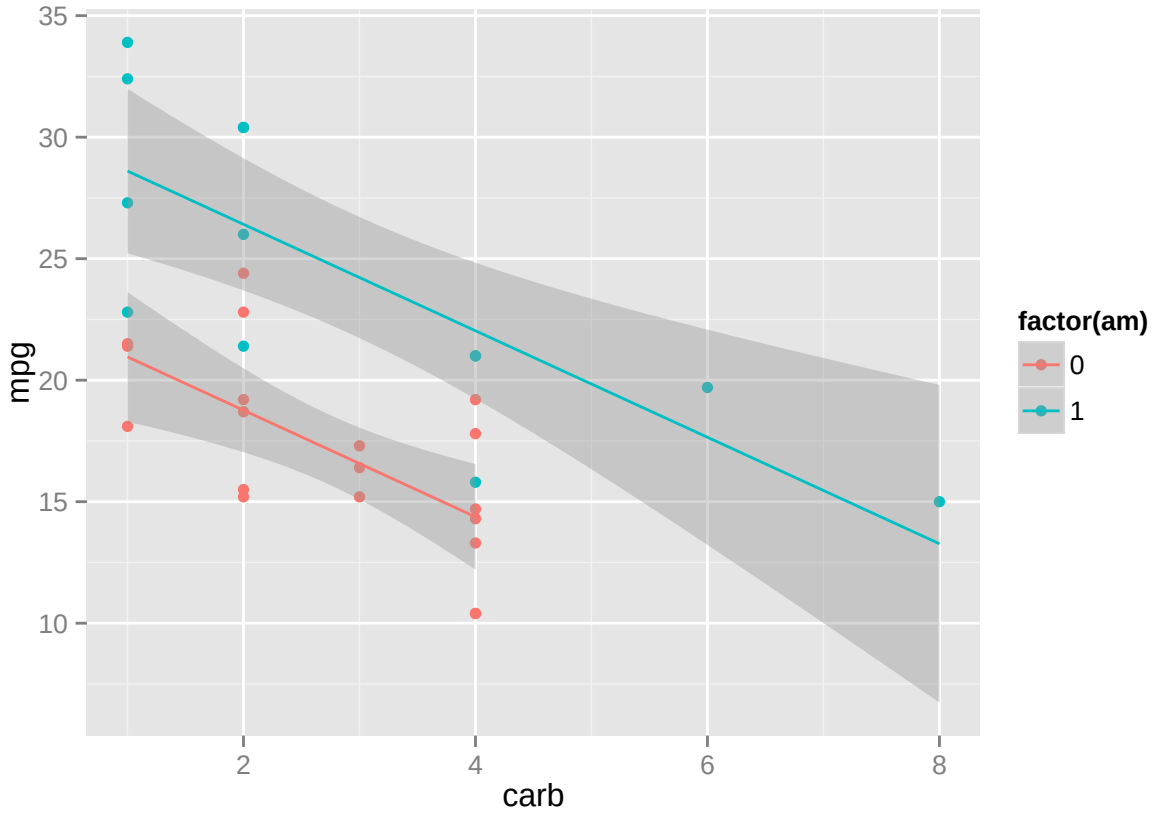

```
qq <- qplot(vs, mpg, colour = factor(am), data=mtcars)
qq + geom_smooth(method='lm', formula = y~x)
```



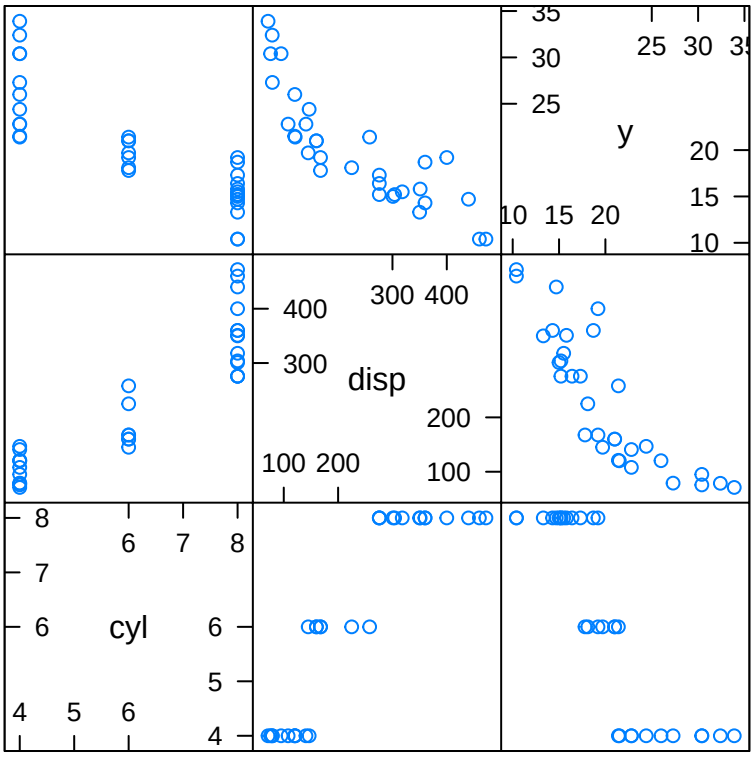

```
qq <- qplot(gear, mpg, colour = factor(am), data=mtcars)
qq + geom_smooth(method='lm', formula = y~x)
```




```
qq <- qplot(carb, mpg, colour = factor(am), data=mtcars)
qq + geom_smooth(method='lm', formula = y~x)
```




```
featurePlot(x=mtcars[,c("cyl", "disp")], y = mtcars$mpg, plot = "pairs")
```



Scatter Plot Matrix

Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

Appendix