

## Combining Plots

### Source

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### Background

R makes it easy to combine multiple plots into one overall graph, using either the `par()` or `layout()` function.

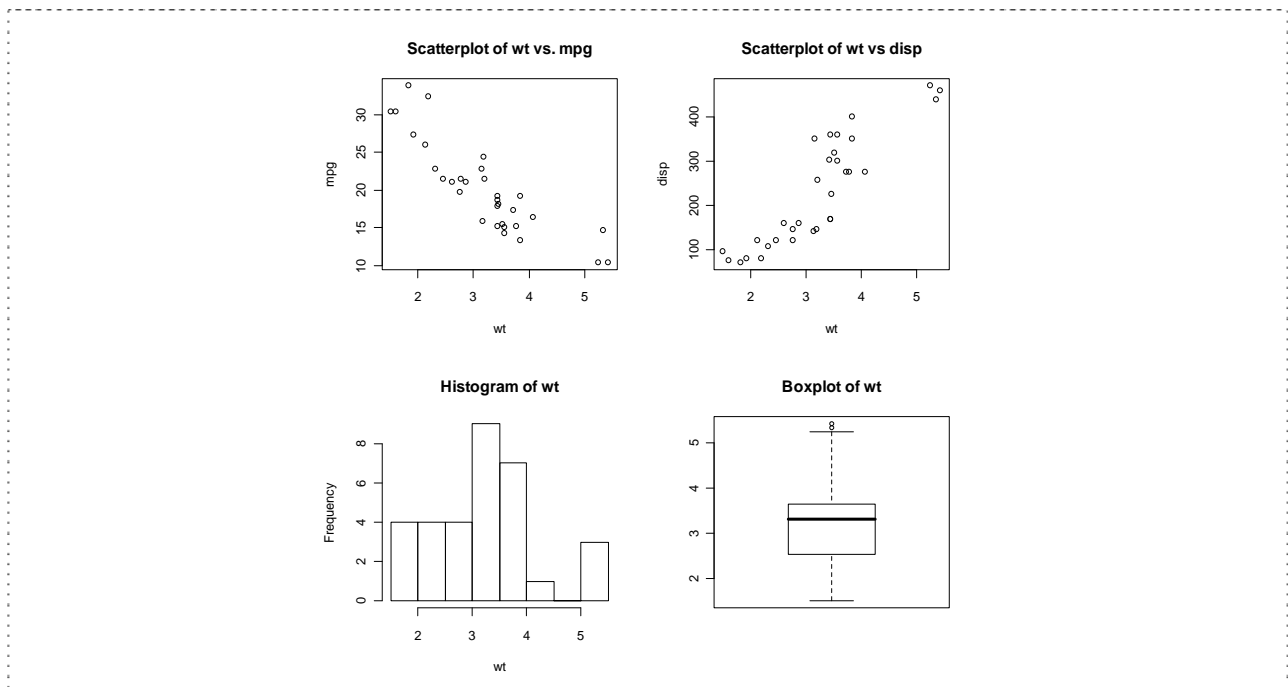
With the `par()` function, you can include the option `mfrow=c(nrows, ncols)` to create a matrix of `nrows` x `ncols` plots that are filled in by row. `mfcow=c(nrows, ncols)` fills in the matrix by columns.

### 4 figures arranged in 2 rows and 2 columns

```
attach(mtcars)
par(mfrow=c(2,2))

show <- function()
{
  plot(wt,mpg, main="Scatterplot of wt vs. mpg")
  plot(wt,disp, main="Scatterplot of wt vs disp")
  hist(wt, main="Histogram of wt")
  boxplot(wt, main="Boxplot of wt")
}

show()
```

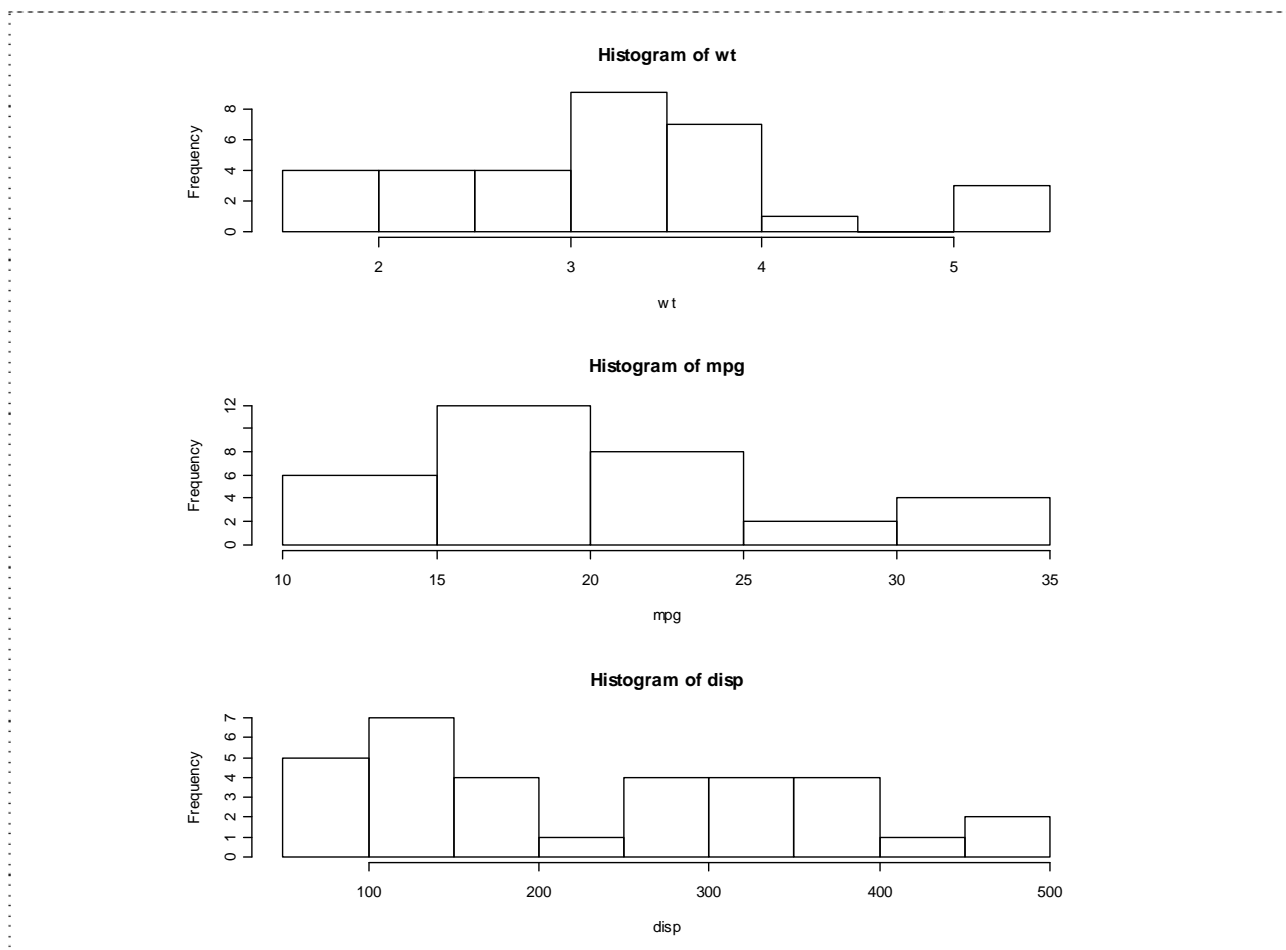


### 3 figures arranged in 3 rows and 1 column

```
attach(mtcars)
par(mfrow=c(3,1))
```

```
show <- function()
{
  hist(wt)
  hist(mpg)
  hist(dis)
}
```

```
show()
```



### One figure in row 1 and two figures in row 2

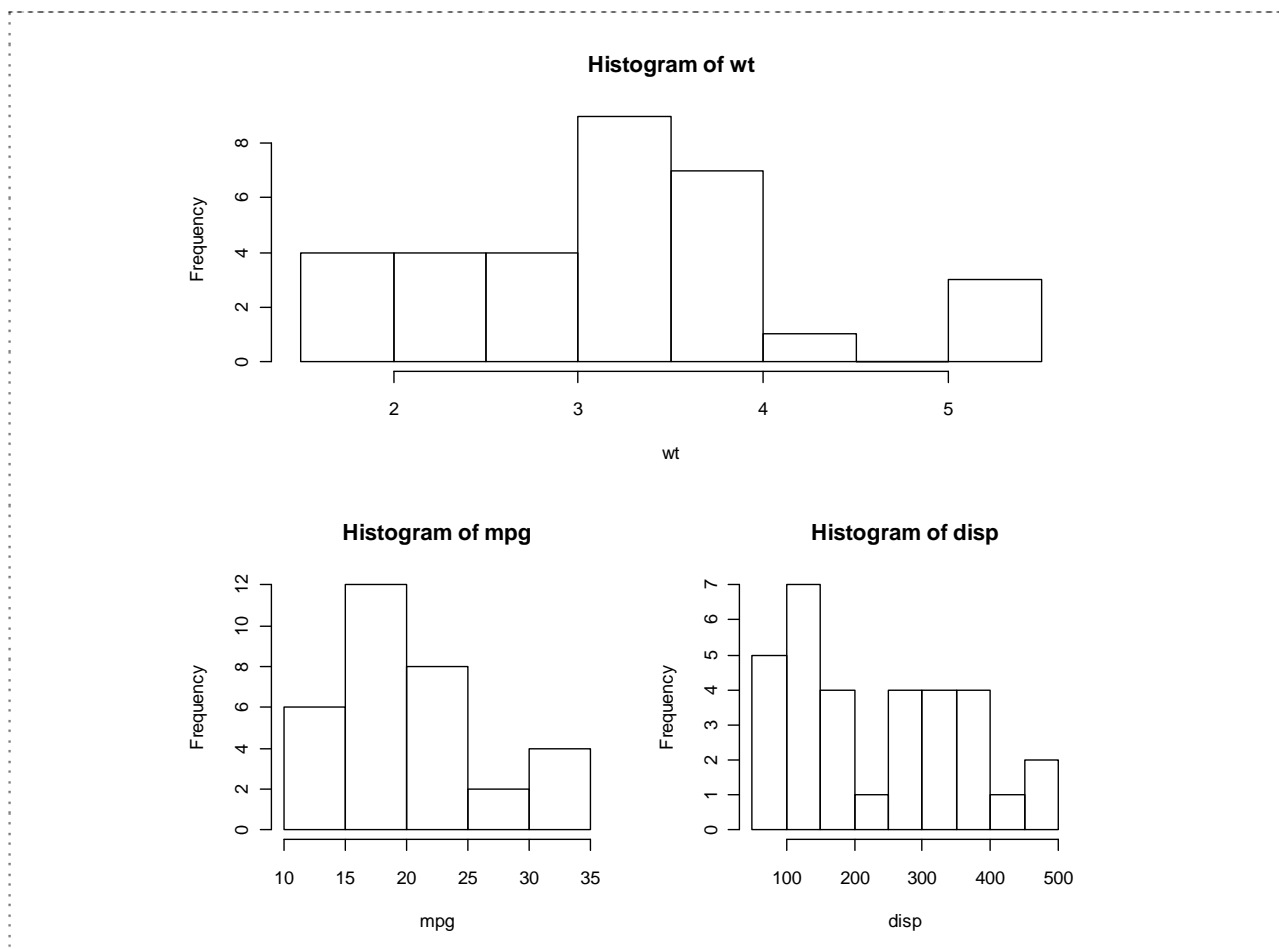
The `layout()` function has the form `layout(mat)` where `mat` is a matrix object specifying the location of the `N` figures to plot.

```
attach(mtcars)
layout(
  matrix(c(1,1,2,3),
    2,
```

```
2,
byrow = TRUE)
)

show <- function()
{
  hist(wt)
  hist(mpg)
  hist(dis)
}

show()
```



### One figure in row 1 and two figures in row 2

Optionally, you can include `widths=` and `heights=` options in the `layout()` function to control the size of each figure more precisely. These options have the form

- `widths=` a vector of values for the widths of columns
- `heights=` a vector of values for the heights of rows.

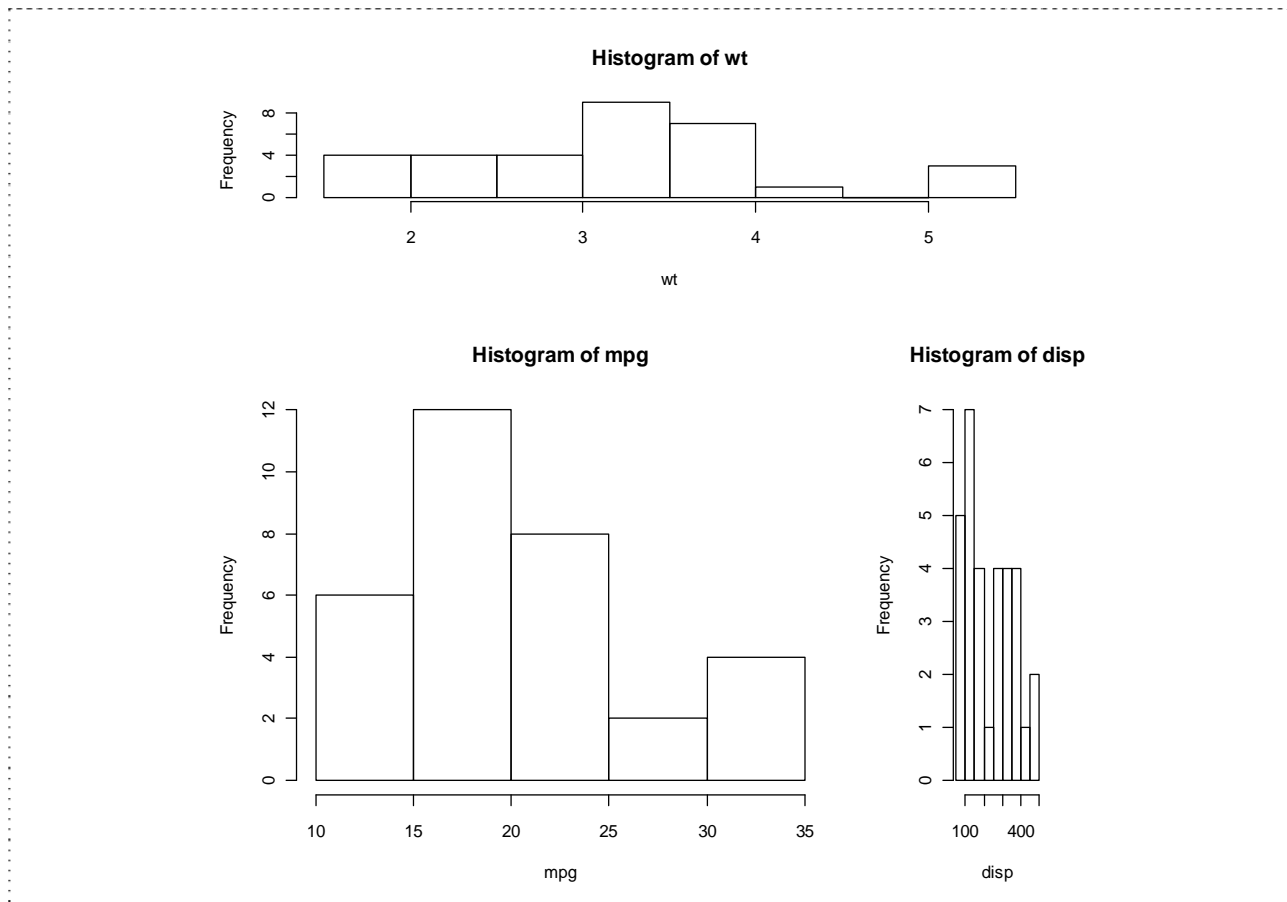
Relative widths are specified with numeric values. Absolute widths (in centimetres) are specified with the `lcm()` function.

See `help(layout)` for more details.

```
attach(mtcars)
# row 1 is 1/3 the height of row 2
# column 2 is 1/4 the width of the column 1
layout(
  matrix(c(1,1,2,3),
    2,
    2,
    byrow = TRUE),
  widths=c(3,1),
  heights=c(1,2)
)
```

```
show <- function()
{
  hist(wt)
  hist(mpg)
  hist(dis)
}
```

`show()`



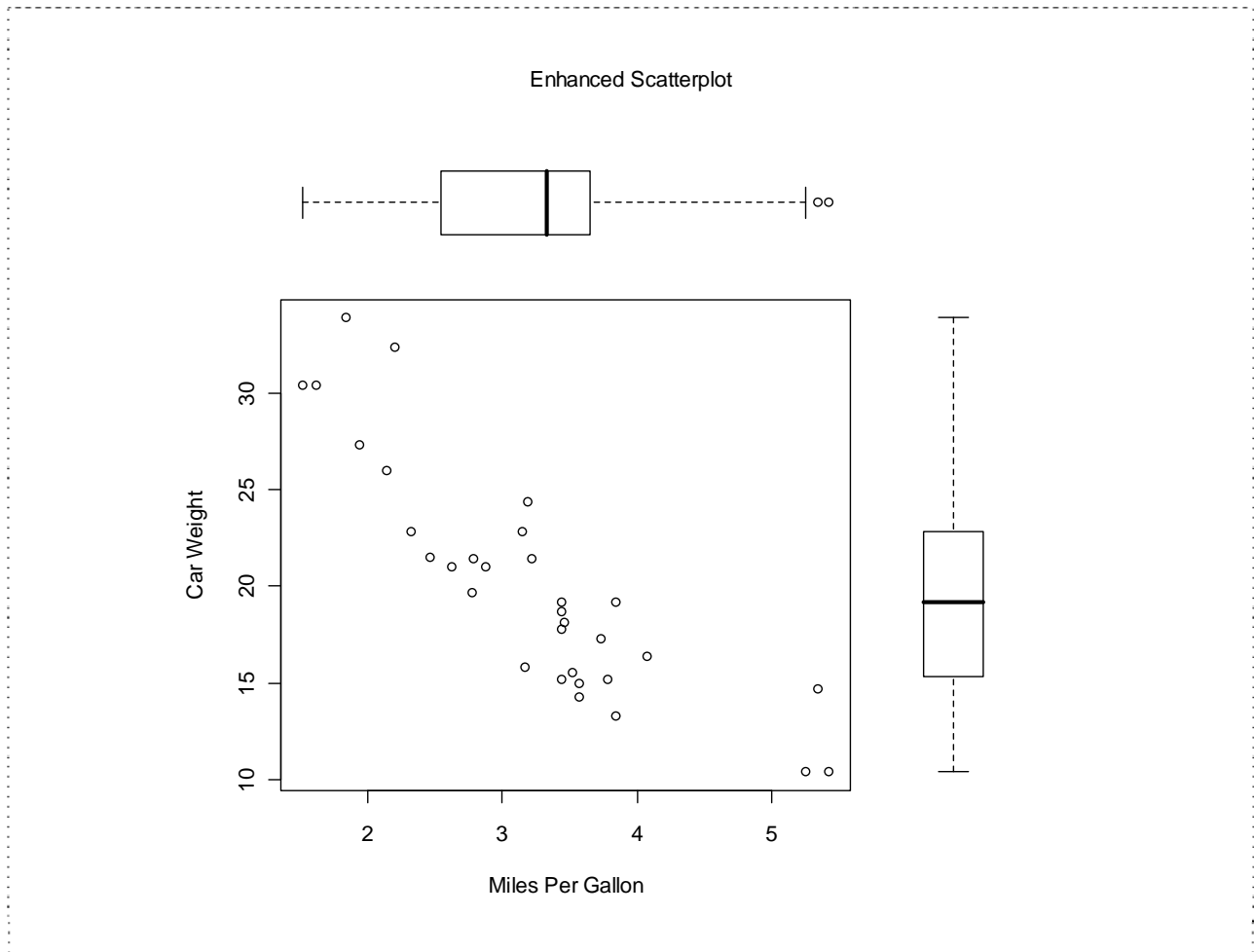
## creating a figure arrangement with fine control .

### Add boxplots to a scatterplot

In the following example, two box plots are added to scatterplot to create an enhanced graph

```
show <- function()
{
  par(fig=c(0,0.8,0,0.8), new=TRUE)
  plot(
    mtcars$wt,
    mtcars$mpg,
    xlab="Miles Per Gallon",
    ylab="Car Weight"
  )
  par(fig=c(0,0.8,0.55,1), new=TRUE)
  boxplot(
    mtcars$wt,
    horizontal=TRUE,
    axes=FALSE
  )
  par(fig=c(0.65,1,0,0.8), new=TRUE)
  boxplot(
    mtcars$mpg,
    axes=FALSE
  )
  mtext(
    "Enhanced Scatterplot",
    side=3,
    outer=TRUE,
    line=-3
  )
}

show()
```



To understand this graph, think of the full graph area as going from (0,0) in the lower left corner to (1,1) in the upper right corner. The format of the `fig=` parameter is a numerical vector of the form `c(x1, x2, y1, y2)`. The first `fig=` sets up the scatterplot going from 0 to 0.8 on the x axis and 0 to 0.8 on the y axis. The top boxplot goes from 0 to 0.8 on the x axis and 0.55 to 1 on the y axis. I chose 0.55 rather than 0.8 so that the top figure will be pulled closer to the scatter plot. The right hand boxplot goes from 0.65 to 1 on the x axis and 0 to 0.8 on the y axis. Again, I chose a value to pull the right hand boxplot closer to the scatterplot. You have to experiment to get it just right.

`fig=` starts a new plot, so to add to an existing plot use `new=TRUE`.

You can use this to combine several plots in any arrangement into one graph.