

# Data Visualization with R

## Ggplot2 tutorial (part 2)

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Each plot can be thought as a separate variable, and the sum of the variables will make the final plot. You can define:

```
p1 <- ggplot(df,  
             aes(x=Electricity_consumption_per_capita))  
p2 <- p1 + geom_histogram()  
p3 <- p1 + geom_histogram(bins=15)  
p4 <- p3 + xlab("Electricity consumption per capita")
```

and you can choose to plot p2, p3, or p4.

Scales `scale_x_continuous` or `scale_x_discrete` can be used to specify the axes. `name`, `limits`, `breaks`, and `labels` are the main parameters that can be adjusted.

```
p1 <- ggplot(df, aes(x=gdp_per_capita))
p2 <- p1 + geom_histogram()
p3 <- p2 + scale_x_continuous(
  name="GDP per capita",
  limits=c(0, 50000),
  breaks=seq(0, 40000, 4000),
  labels=c("0K", "4K", "8K", "12K", "16K",
    "20K", "24K", "28K", "32K", "36K", "40K"))
```

# Polar coordinates

You can define the coordinates with `coord_cartesian` or `coord_polar`:

```
t <- seq(0, 360, by=15)
r <- 2
qplot(r, t) +
  coord_polar(theta="y") +
  scale_y_continuous(breaks=seq(0, 360, 30))
```

A Trellis display allows creating a plot for each group of a categorical variable:

```
p <- ggplot(df,  
  aes(x=gdp_per_capita,  
      y=Electricity_consumption_per_capita)) +  
  geom_point()  
p + facet_grid(Country ~ .)  
p + facet_grid(. ~ Country)  
p + facet_wrap(~Country)
```

You can group subplots horizontally, vertically or wrapped together.

# Shapes and colors

You can change shape and color for the entire plot:

```
ggplot(df, aes_string(x=var1, y=var2)) +  
geom_point(color=2, shape=2)
```

Or assign a different shape and color for each group of a categorical variable:

```
ggplot(df, aes_string(x=var1, y=var2)) +  
geom_point(aes(color=Country, shape=Country))
```

Theme is used to change the non-data elements of the plot:

Theme	Type	Arguments
axis.title.x	element_text	size, color, family, angle
axis.title.y	element_text	size, color, family, angle
plot.background	element_rect	fill, color, linewidth
panel.background	element_rect	fill, fill, color, line width
panel.grid.major	element_line	color, linetype, linewidth

Type `?theme` to show all possible types of themes, their types and their arguments.

You can add themes to the plot to customize the non-data elements:

```
p1 <- ggplot(dfn, aes(Genre, WorldGross))
p2 <- p1+ geom_bar(aes(fill=LeadStudio),
                  stat="Identity",
                  position="dodge")
p3 <- p2 + theme(axis.title.x=element_text(size=15),
                 axis.title.y=element_text(size=15),
                 plot.background=element_rect(fill="gray87"),
                 panel.background=element_rect(fill="beige"),
                 panel.grid.major=element_line(color="Gray",
                                                linetype=1))
```



You can use predefined themes:

```
p2 + theme_bw() + ggtitle("theme_bw()")  
p2 + theme_classic() + ggtitle("theme_classic()")  
p2 + theme_classic() + ggtitle("theme_gray()")  
p2 + theme_minimal() + ggtitle("theme_minimal()")
```

You can also use define your own theme:

```
mytheme <- theme(legend.title=element_blank(),  
  legend.position="bottom",  
  text=element_text(color="Blue"),  
  axis.text=element_text(size=12,  
    color="Red"),  
  axis.title=element_text(size=rel(1.5)))
```

and use it for a single plot:

```
p2 + mytheme + ggtitle("Changed Plot with my theme")
```

or for all the plots by placing it at the beginning of your code:

```
theme_set(my_theme)
```

You can change the color palette.

Type `?scale_fill_brewer` to see all the color palettes available.

```
p4 <- p2 + theme_bw() + ggtitle("theme_bw()")  
p4 + scale_fill_brewer(palette="Spectral")
```