

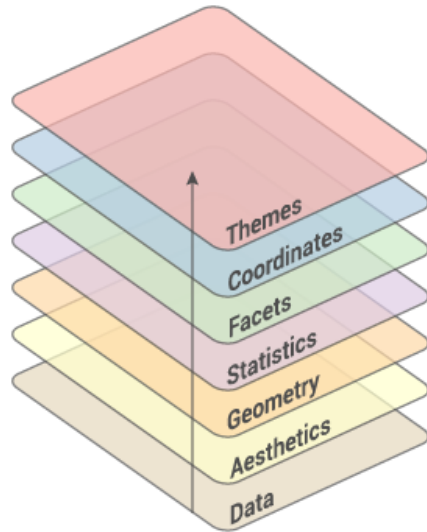
Only edit title, subtitle & author above this ---

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Grammar of Graphics



- **Data:** Input data
- **Geom:** A geometry representing data. Points, Lines etc
- **Aesthetics:** Visual characteristics of the geometry. Size, Color, Shape etc
- **Scale:** How visual characteristics are converted to display values
- **Statistics:** Statistical transformations. Counts, Means etc
- **Coordinates:** Numeric system to determine position of geometry. Cartesian, Polar etc
- **Facets:** Split data into subsets

Building a graph

```
ggplot (data = <DATA>) +
```

```
<GEOM_FUNCTION> (mapping = aes(<MAPPINGS>),
```

```
stat = <STAT> , position = <POSITION>) +
```

```
<COORDINATE_FUNCTION> +
```

```
<FACET_FUNCTION> +
```

```
<SCALE_FUNCTION> +
```

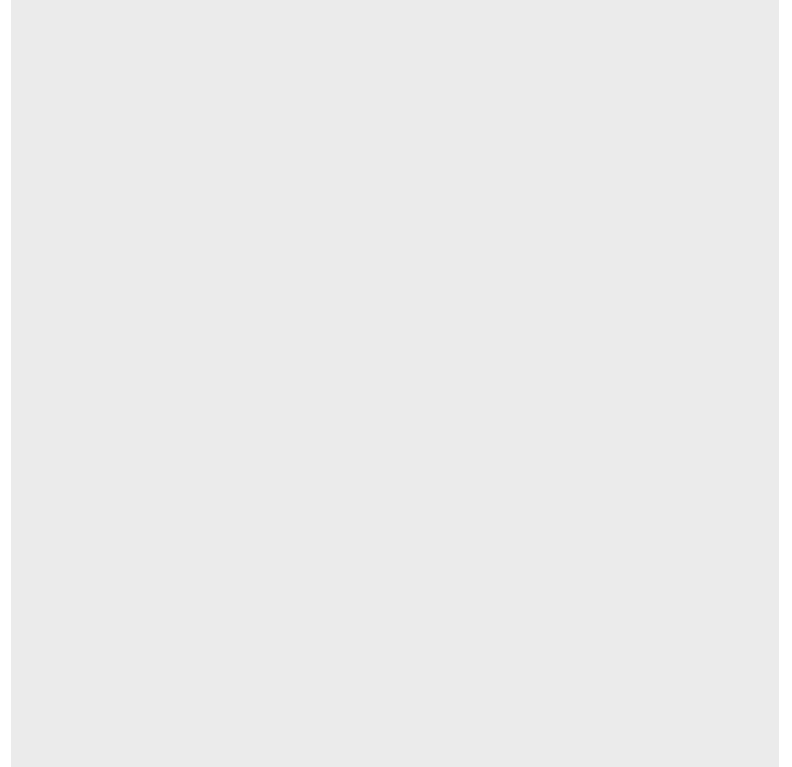
```
<THEME_FUNCTION>
```

required

Not
required,
sensible
defaults
supplied

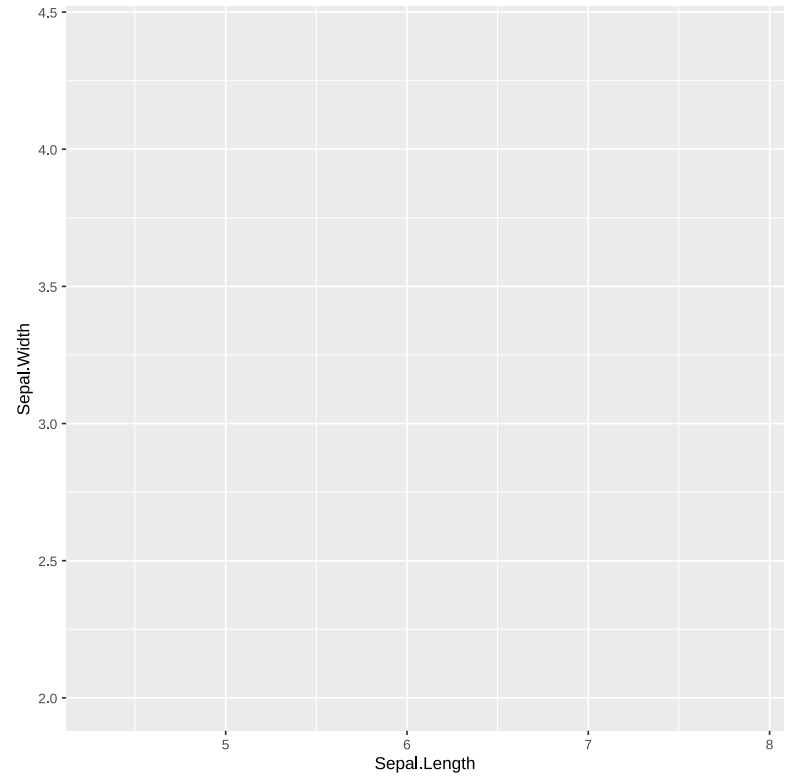
Build-Demo

```
ggplot(iris)
```



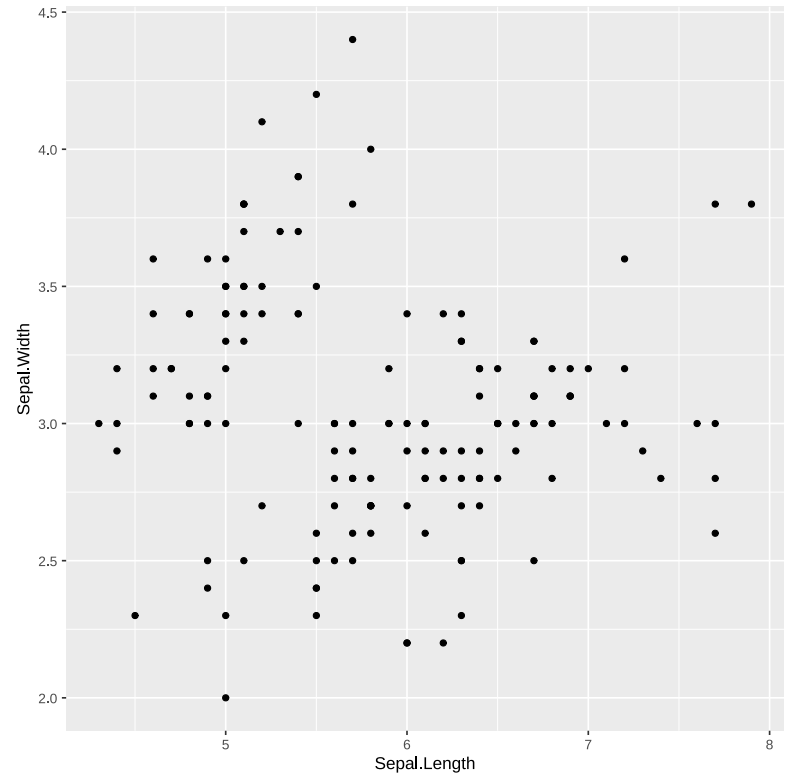
Build-Demo

```
ggplot(iris,aes(x=Sepal.Length,  
                y=Sepal.Width))
```



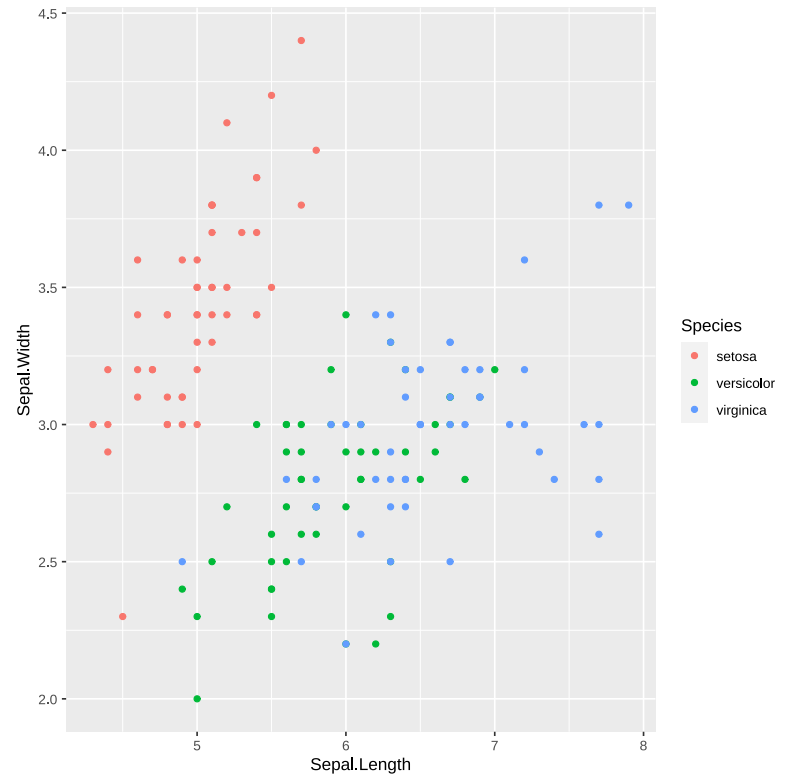
Build-Demo

```
ggplot(iris,aes(x=Sepal.Length,  
                y=Sepal.Width))+  
  geom_point()
```



Build-Demo

```
ggplot(iris,aes(x=Sepal.Length,  
                y=Sepal.Width,  
                colour=Species))+  
  geom_point()
```



Geoms

Basic



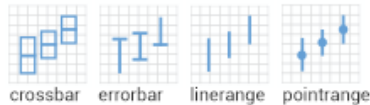
One variable



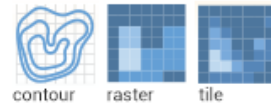
Two variables



Error



Three variables



Map

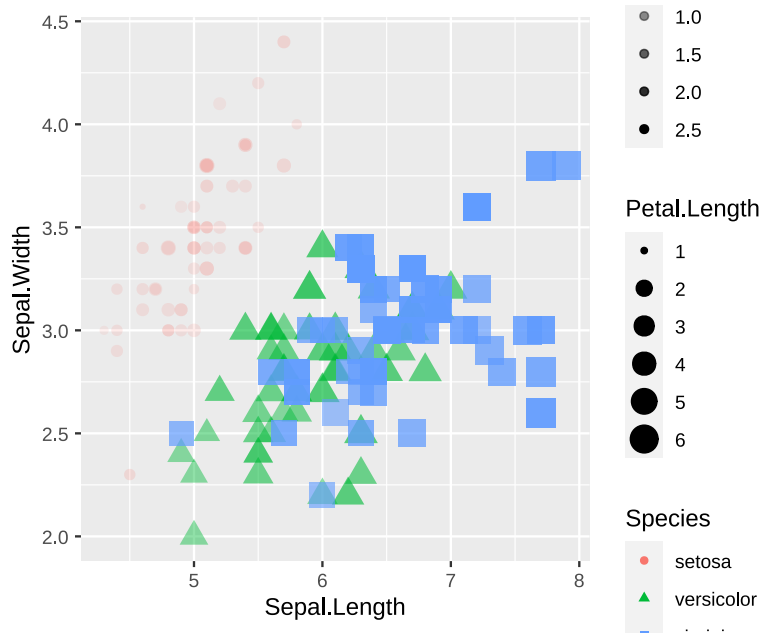


```
p <- ggplot(iris)
# scatterplot
p+geom_point(aes(x=Sepal.Length,y=Sepal.Width))
# barplot
p+geom_bar(aes(x=Sepal.Length))
# boxplot
p+geom_boxplot(aes(x=Species,y=Sepal.Width))
# search
help.search("^geom_",package="ggplot2")
```

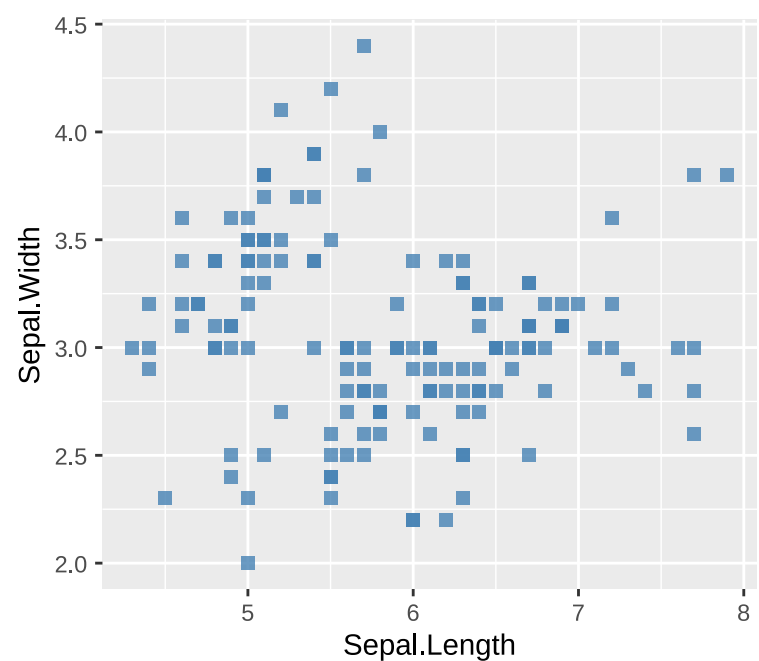
Aesthetics

- Aesthetic mapping vs aesthetic parameter

```
ggplot(iris)+  
  geom_point(aes(x=Sepal.Length,  
                 y=Sepal.Width,  
                 size=Petal.Length,  
                 alpha=Petal.Width,  
                 shape=Species,  
                 color=Species))
```



```
ggplot(iris)+  
  geom_point(aes(x=Sepal.Length,  
                 y=Sepal.Width,  
                 size=2,  
                 alpha=0.8,  
                 shape=15,  
                 color="steelblue"))
```





Thank you. Questions?

R version 4.1.3 (2022-03-10)

Platform: x86_64-pc-linux-gnu (64-bit)

OS: Ubuntu 18.04.6 LTS

Built on : 📅 22-Feb-2023 at 🕒 15:35:00

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