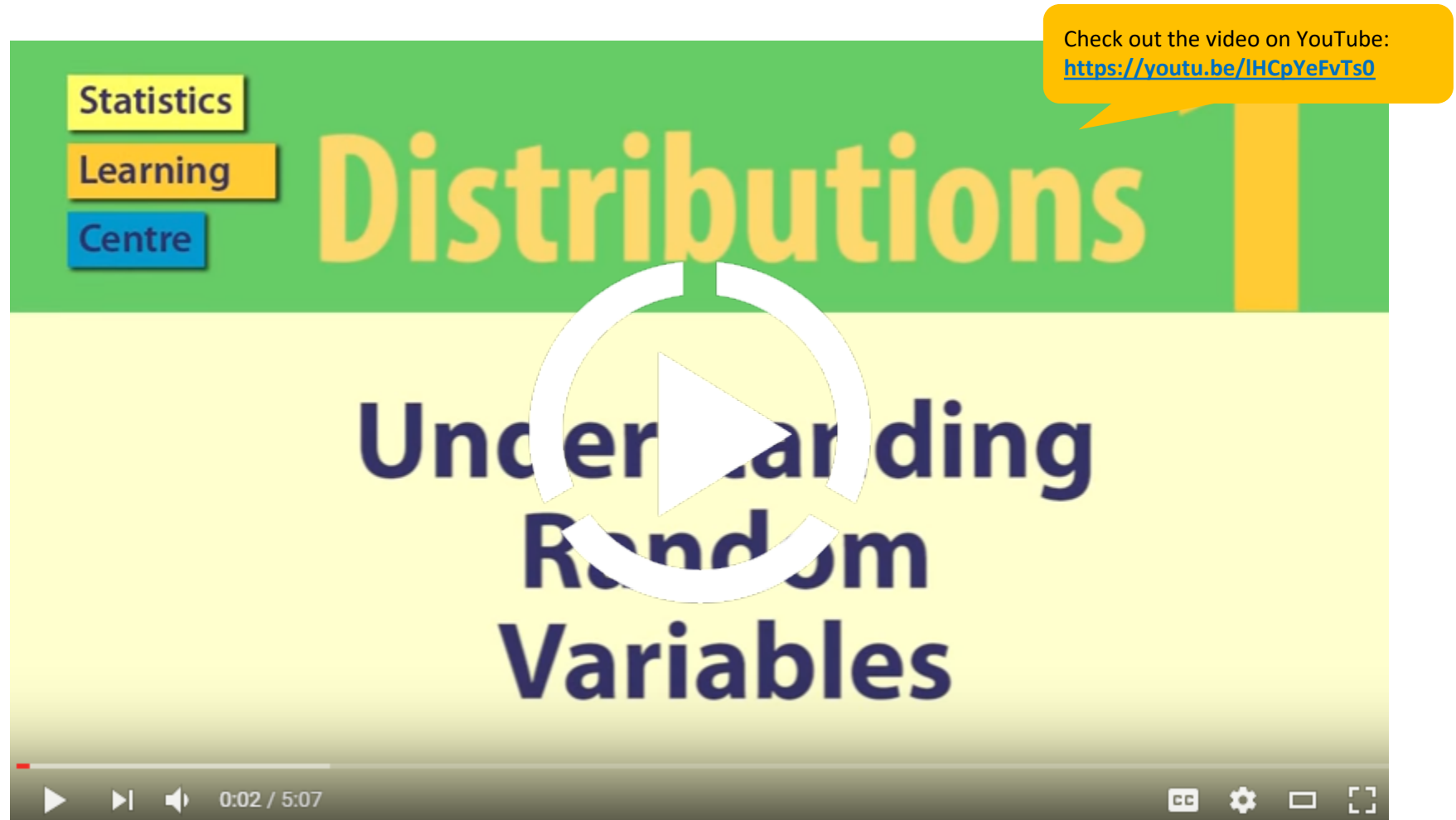
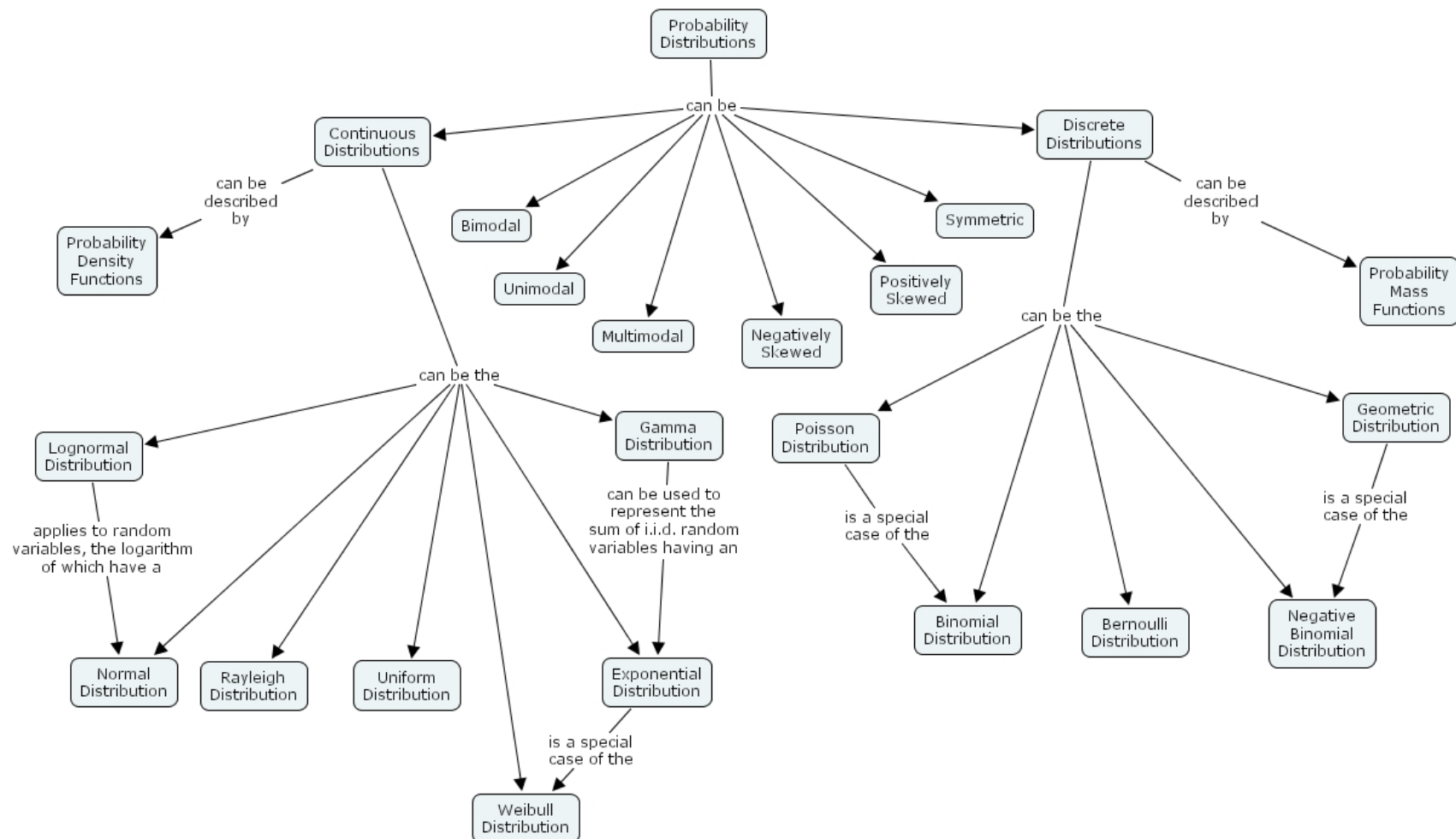


Simulating variables by using distributions

Understand discrete and continuous random variables

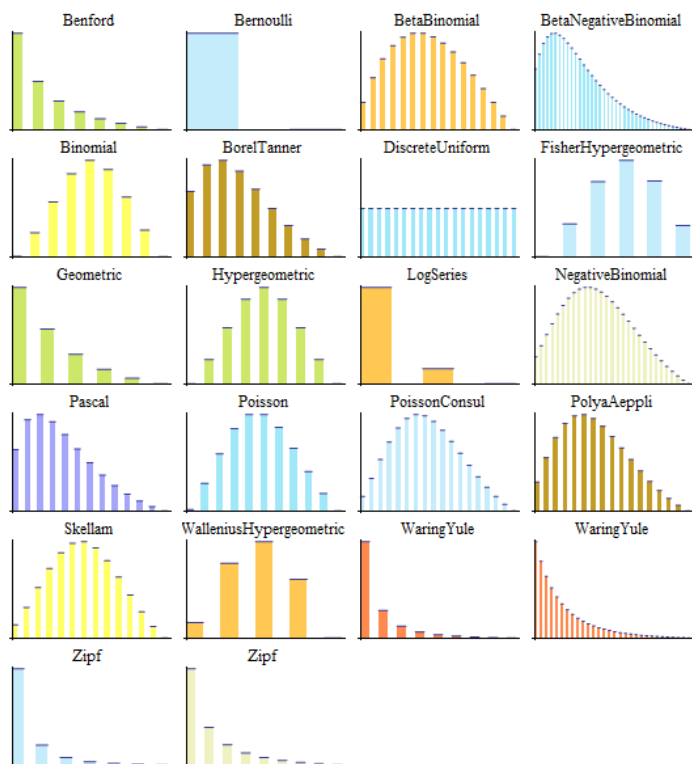


Working with distributions is a complex topic

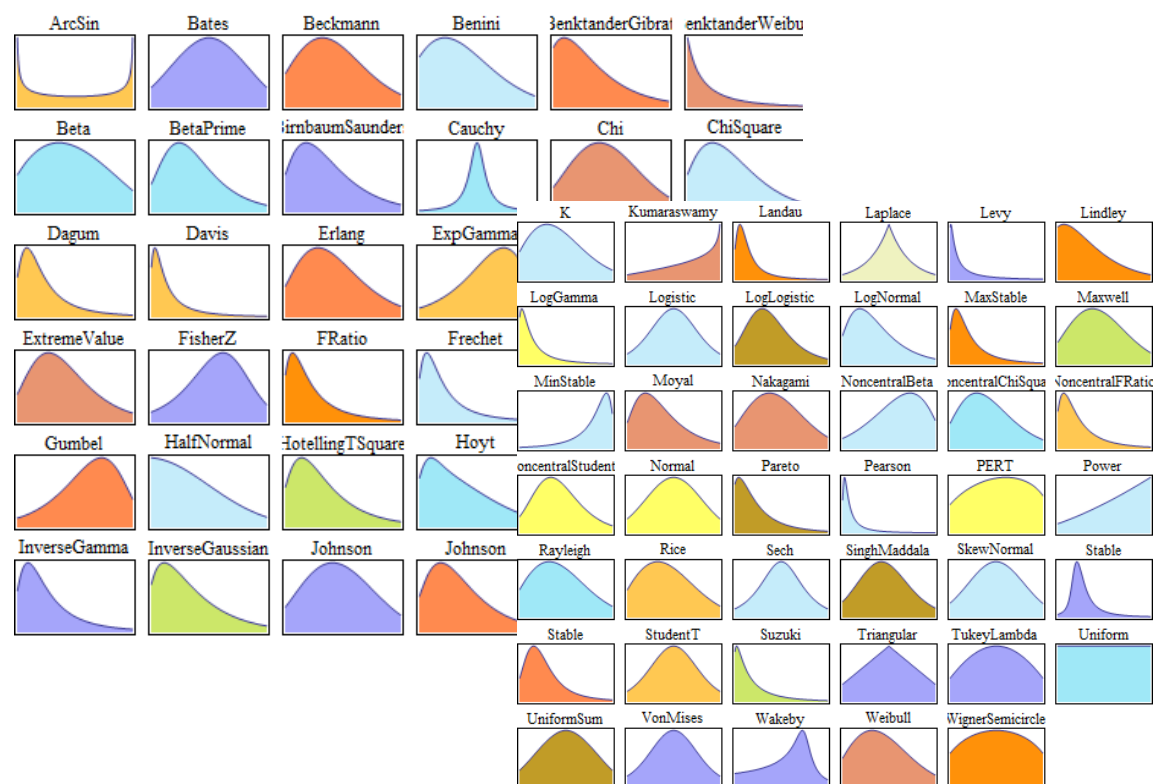


Be aware of the main distinction between discrete and continuous distributions

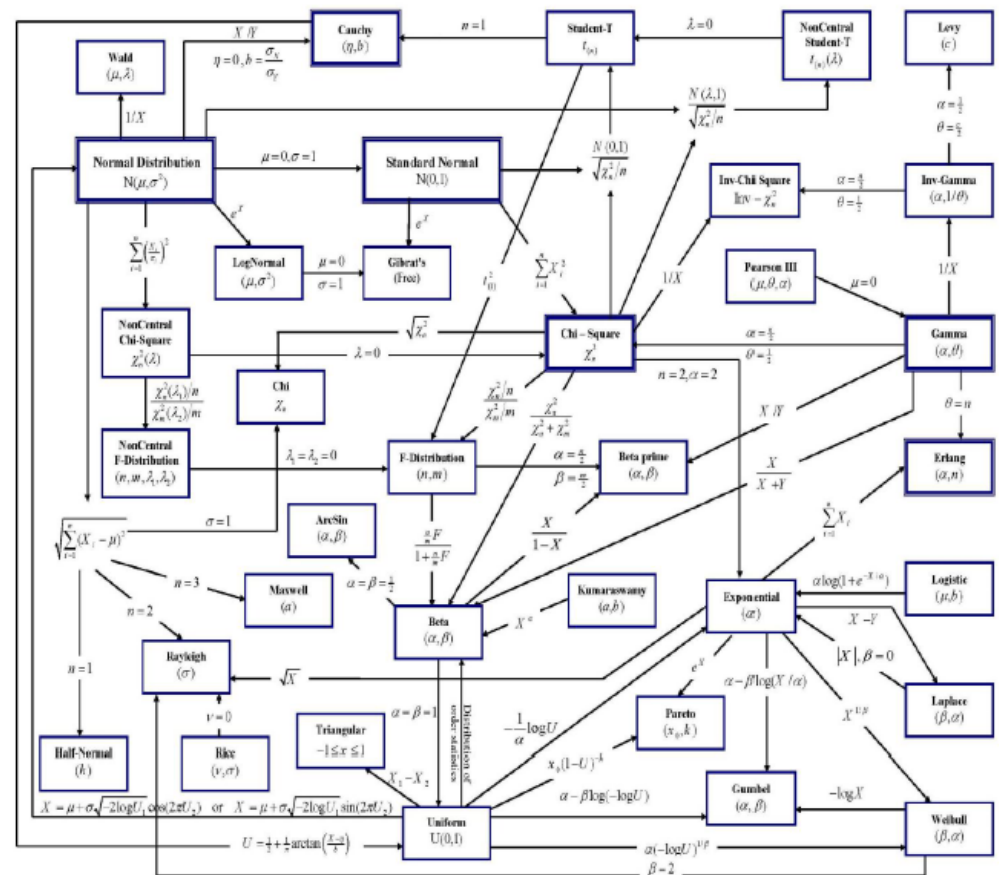
Discrete



Continuous



Continuous



Discrete distribution simulation in R

`sample()` takes a sample of the specified size from the elements of `x` ("without replacement"). By default the samples follow a uniform distribution.

```
sample(x=10, size=5)
```

3 1 9 7 6

¹
`sample()` draws a specified random number from `x`

- Numbers can also be set to occur more than once ("with replacement"):

```
sample(x=10, size=5, replace=TRUE)
```

7 2 5 7 6

²
`replace=TRUE` allows numbers to occur more than once. The default setting of `replace` is `FALSE`

- It is also possible to set probabilities for each possible discrete value, see help files for further details.

Continuous distribution simulation in R

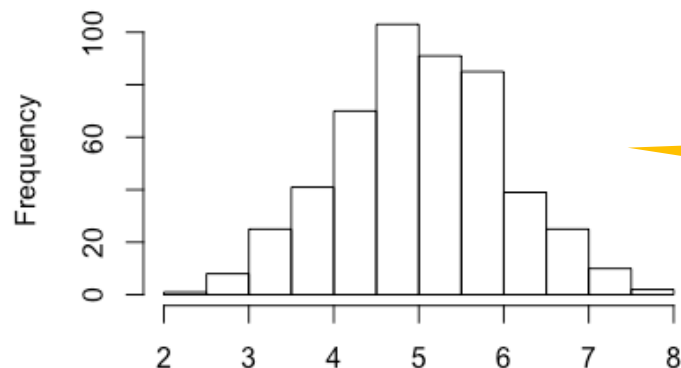
`rnorm()` generates numbers for a given mean and standard deviation following a normal distribution (also called Gaussian distribution).

```
rnorm(x=500, mean=5, sd=1)
```

```
hist(rnorm(500, mean=5, sd=1))
```

1
`rnorm()` draws x numbers from a normal distribution with mean of 5 and standard deviation of 1

Histogram of `rnorm(n = 500, mean = 5, sd = 1)`



2
The histogram of the random draw does indeed show normally distributed observations

Sidenote: Setting seeds to recreate the same numbers

```
rnorm(5)
```

```
-1.1960395  0.1594669 -0.3198490  1.1133854 -0.1156591
```

```
rnorm(5)
```

```
1.6771783  -1.8002855  0.6941651  0.5835565  1.3846009
```

```
set.seed(98309)
```

Setting a seed will give the function to create random variables a specified input

```
rnorm(5)
```

```
-1.2099976 -0.8490359 -1.3451985  0.1210326 -1.3757058
```