

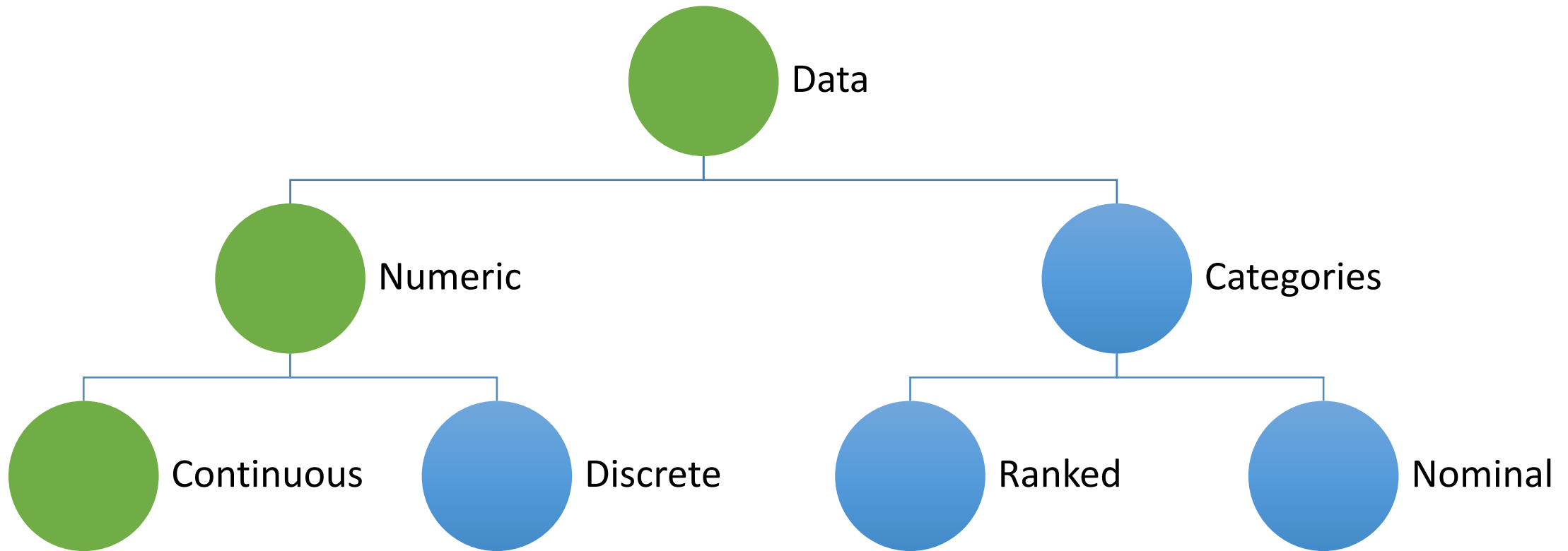
Statistics with Spa OWS

Lecture 3

Julia Schroeder

Julia.schroeder@imperial.ac.uk

Data types



Data types

 Data

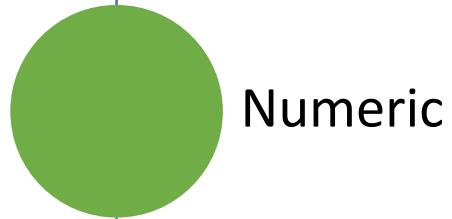
 Numeric

 Continuous

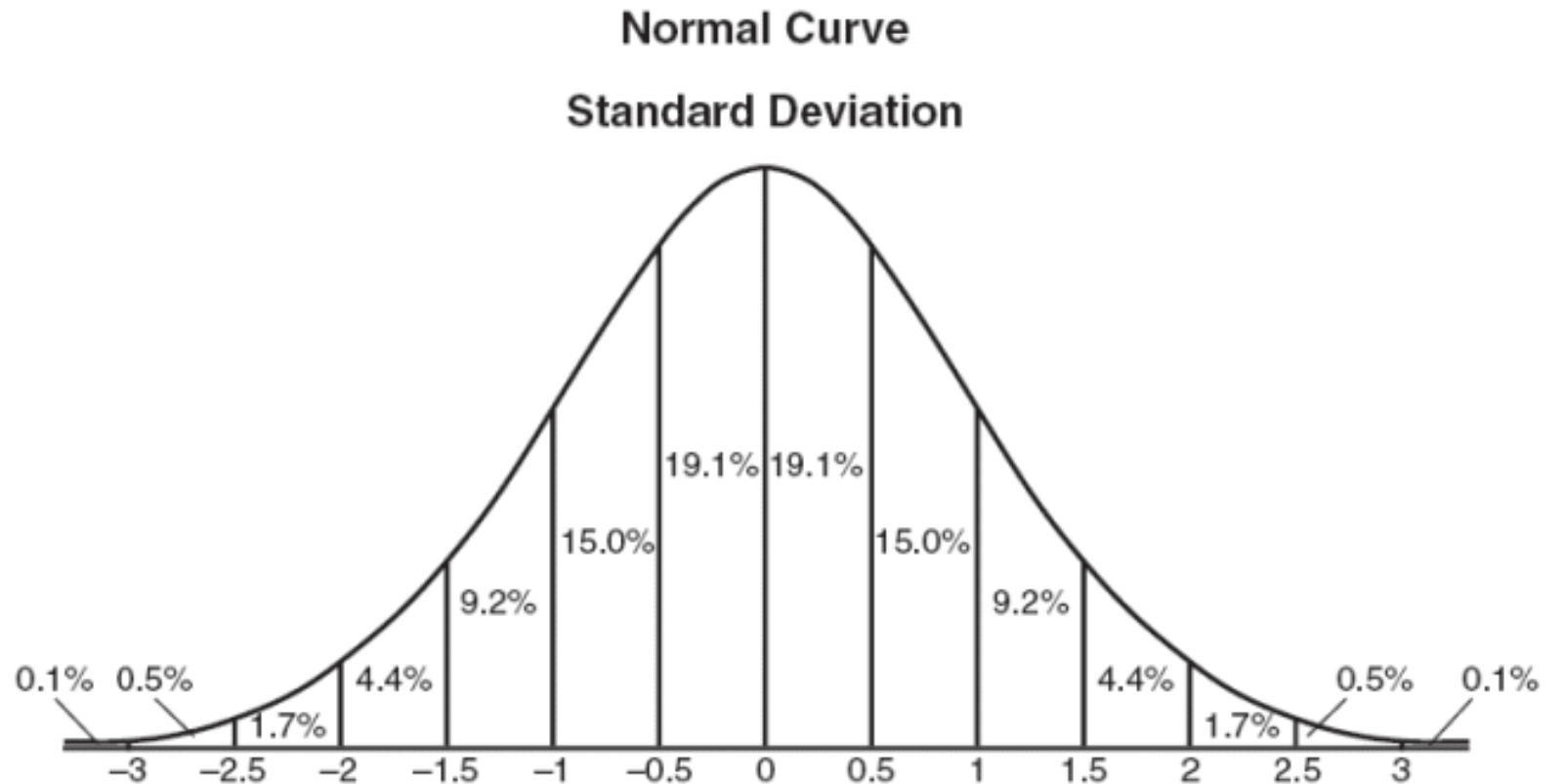
0.3, -5.985,
189.652589,
ect



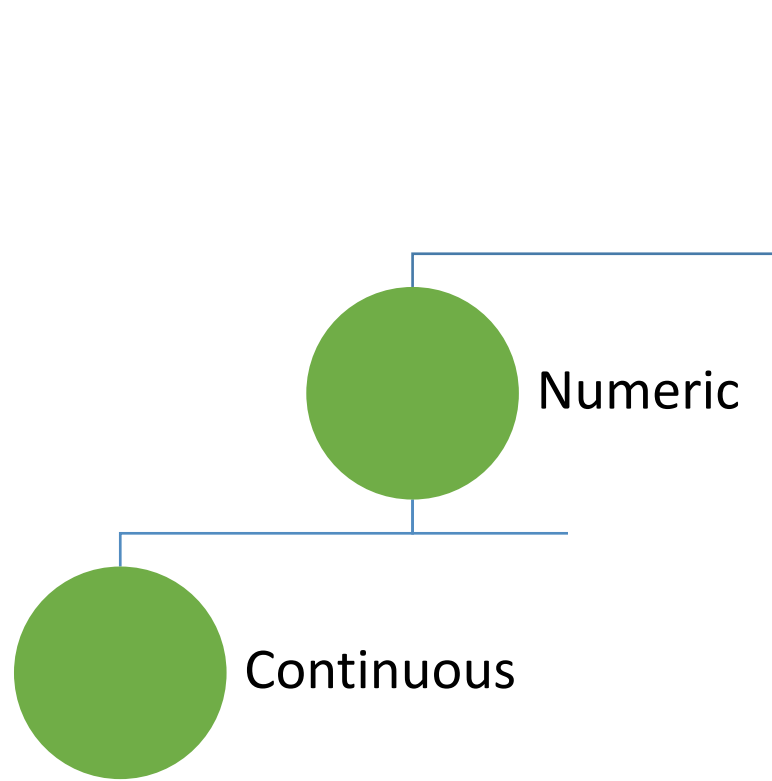
Data types



Continuous values
Sampled from normal distribution

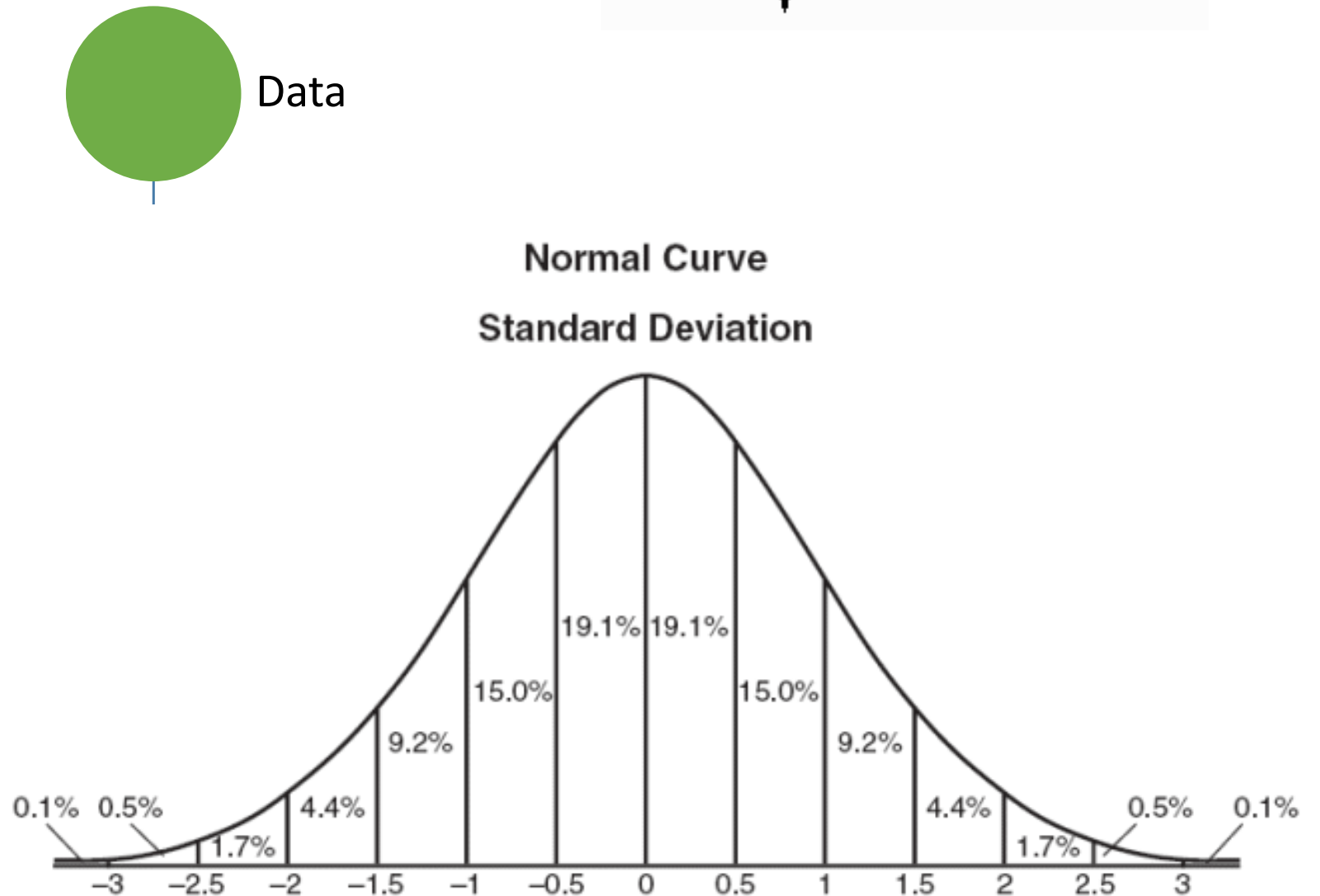


Data types

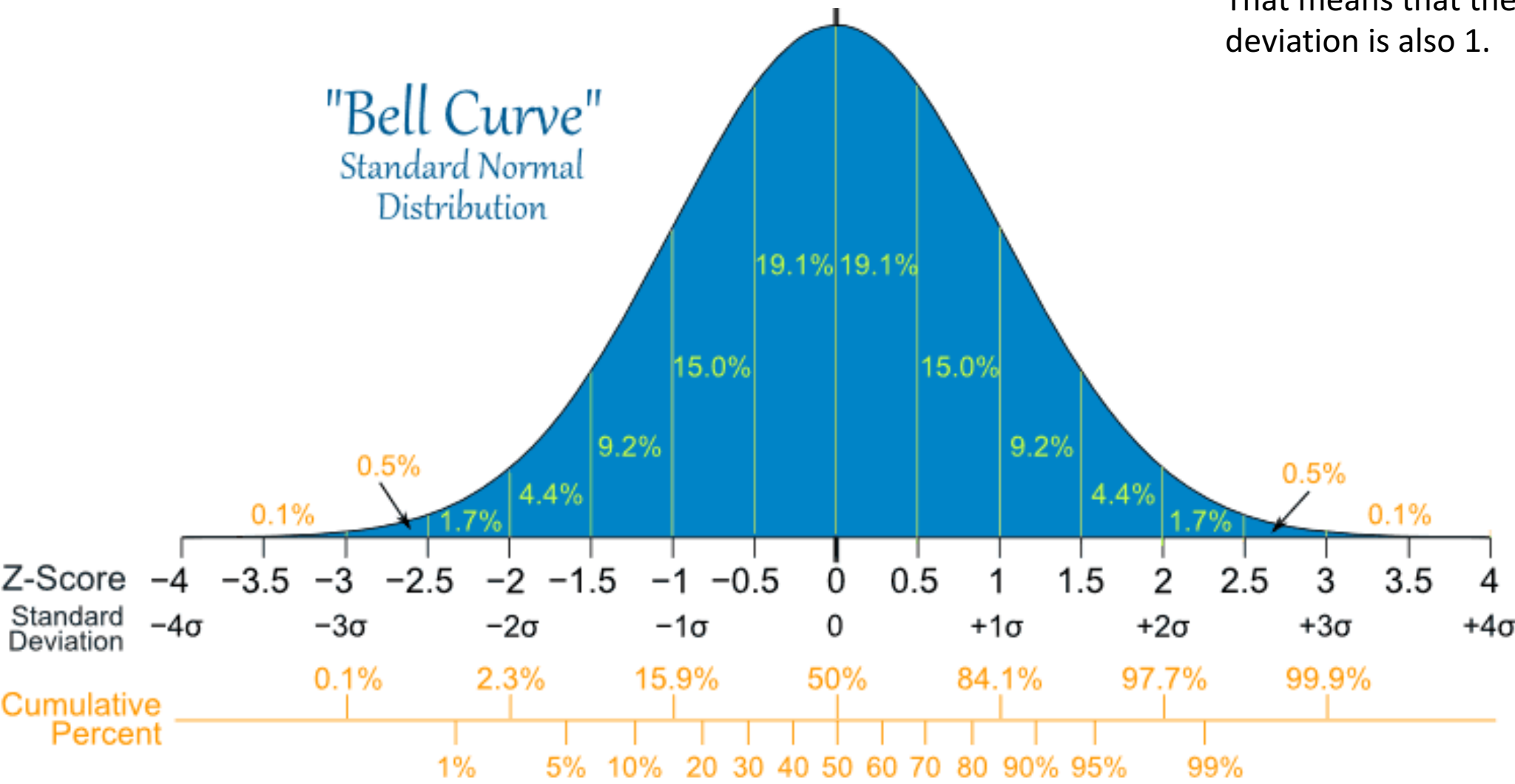


Continuous values
Sampled from normal distribution
Probability distribution defined by
mean and variance!

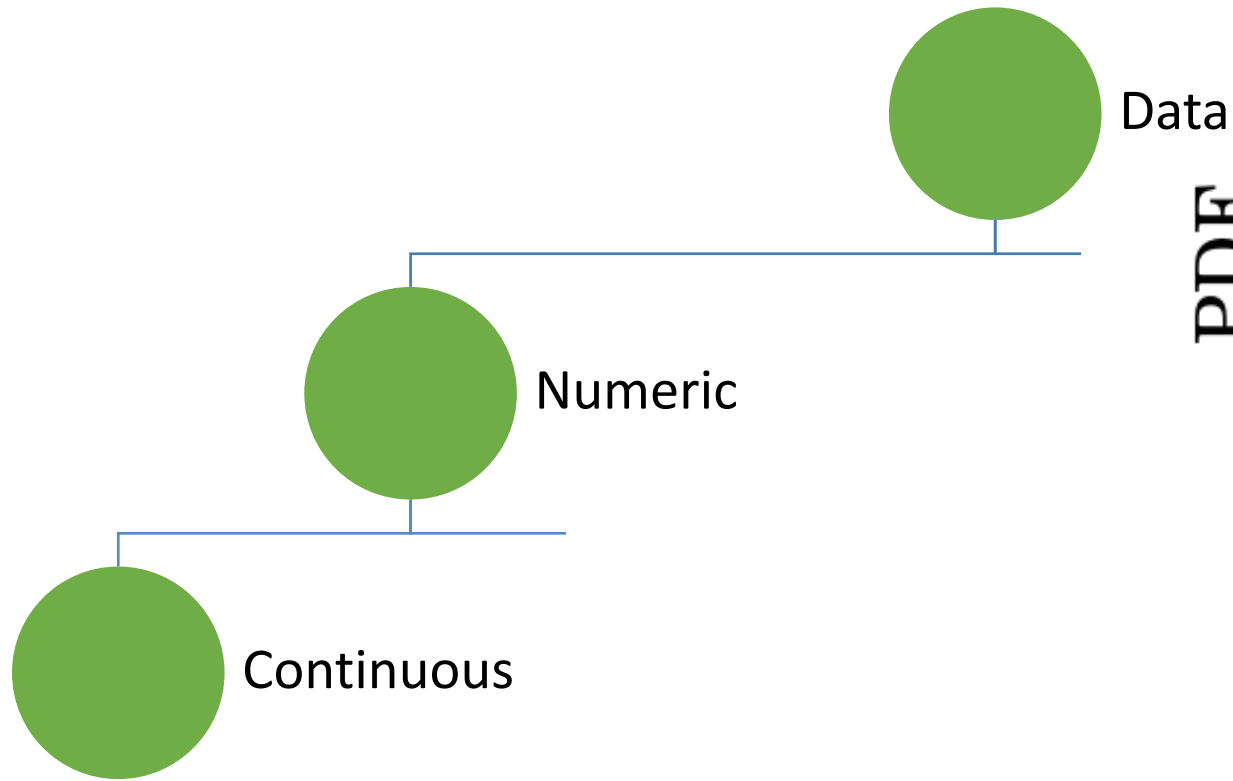
$$p(X) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(X-\mu)^2}{2\sigma^2}}$$



Z-distribution is a normal distribution with a mean of 0, and a variance of 1.
That means that the standard deviation is also 1.



Data types

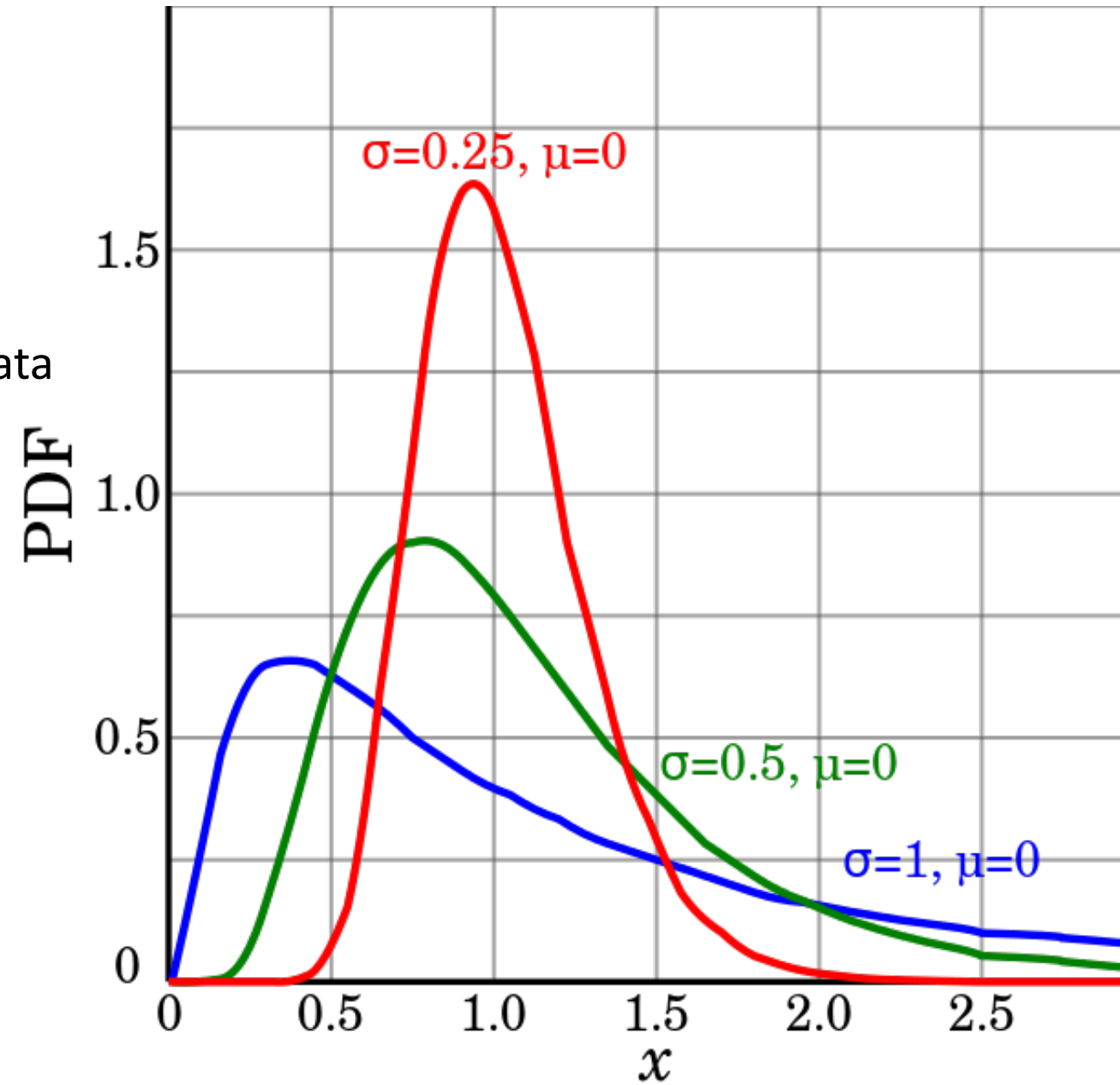


Continuous values

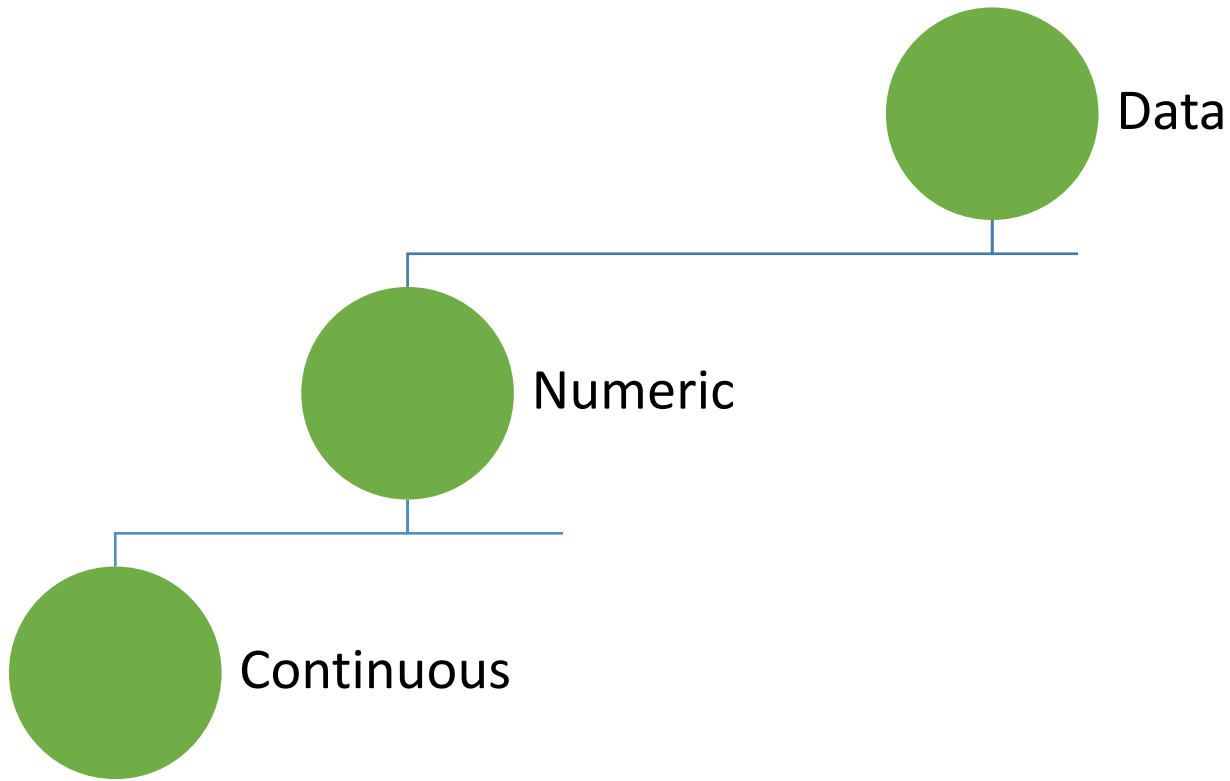
Log-normal

-> measurements that cannot be zero

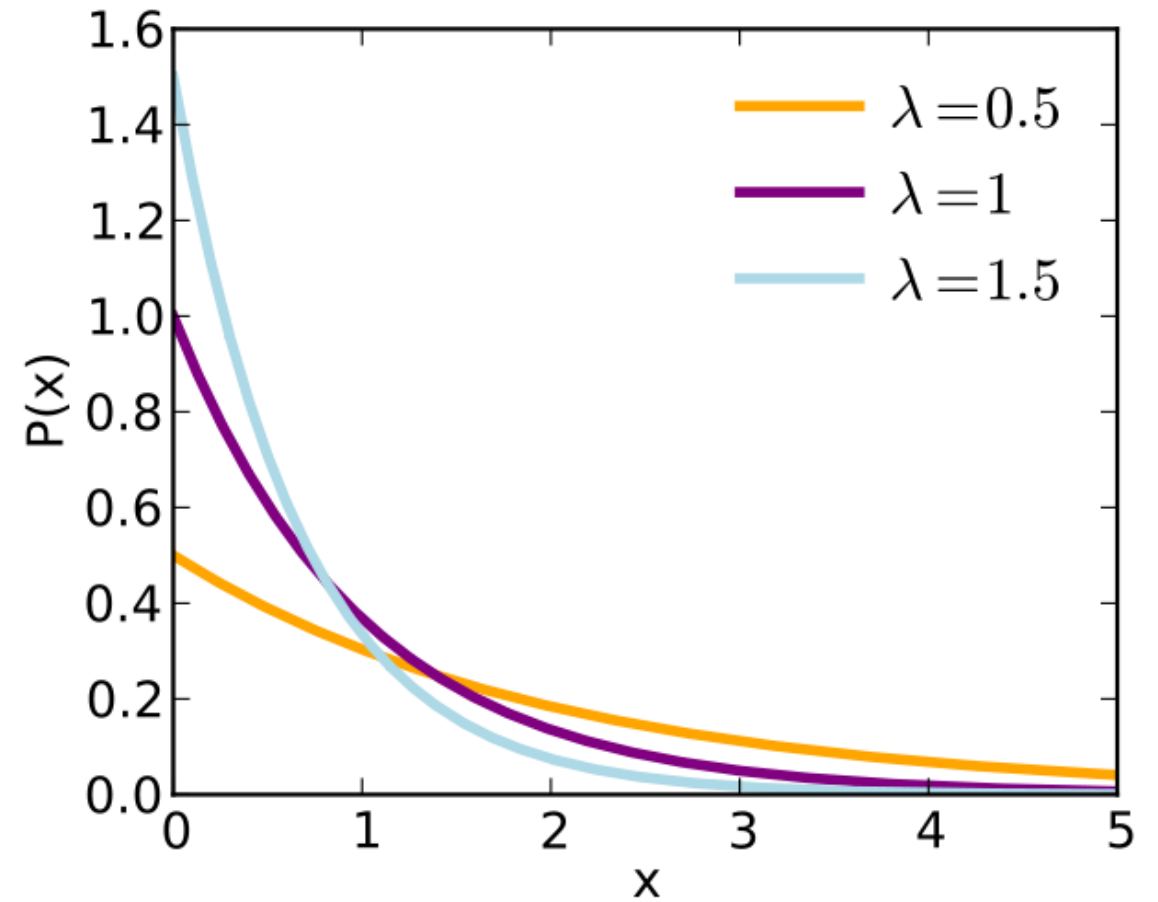
→ Positive relationship between mean and variance



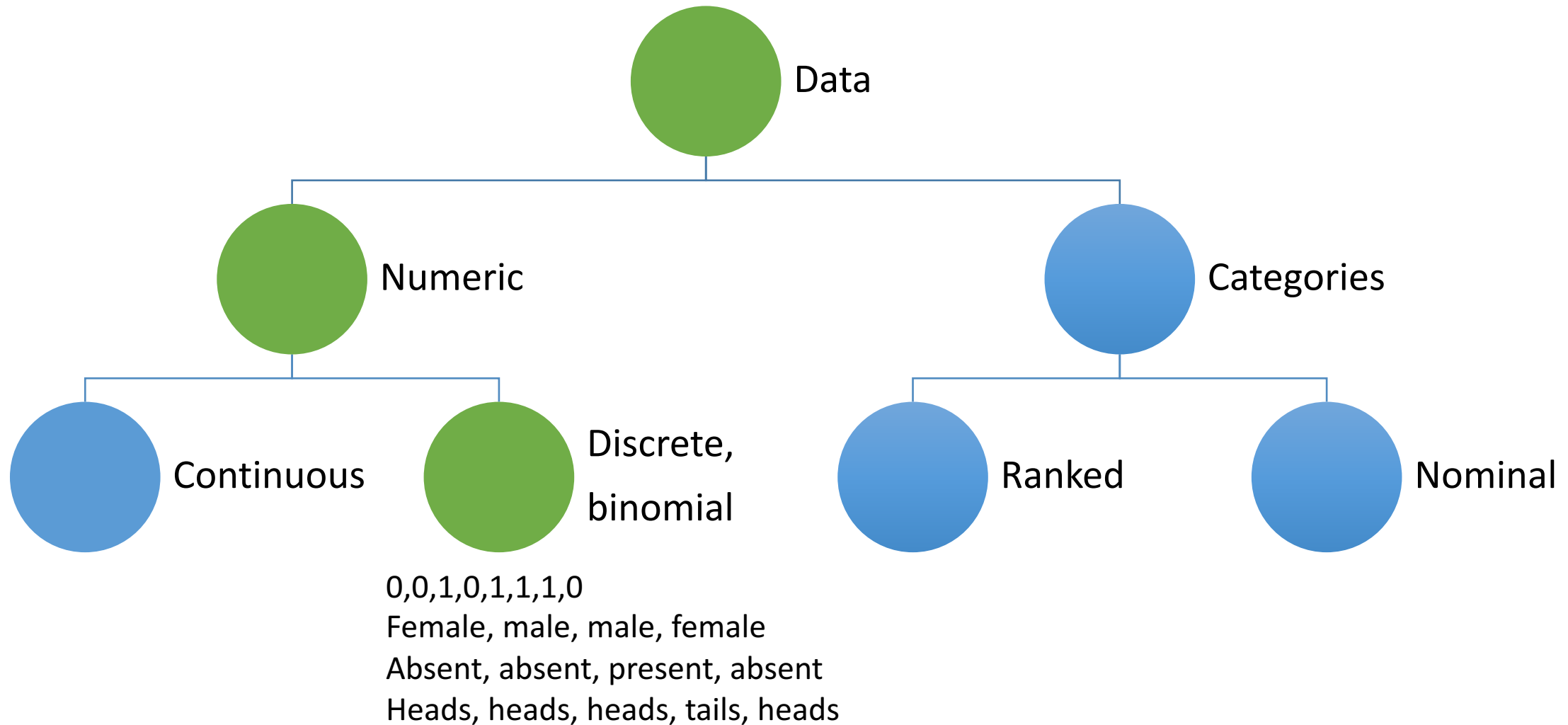
Data types



Continuous values
Exponential distribution
e.g. time interval (from diagnosis to death)



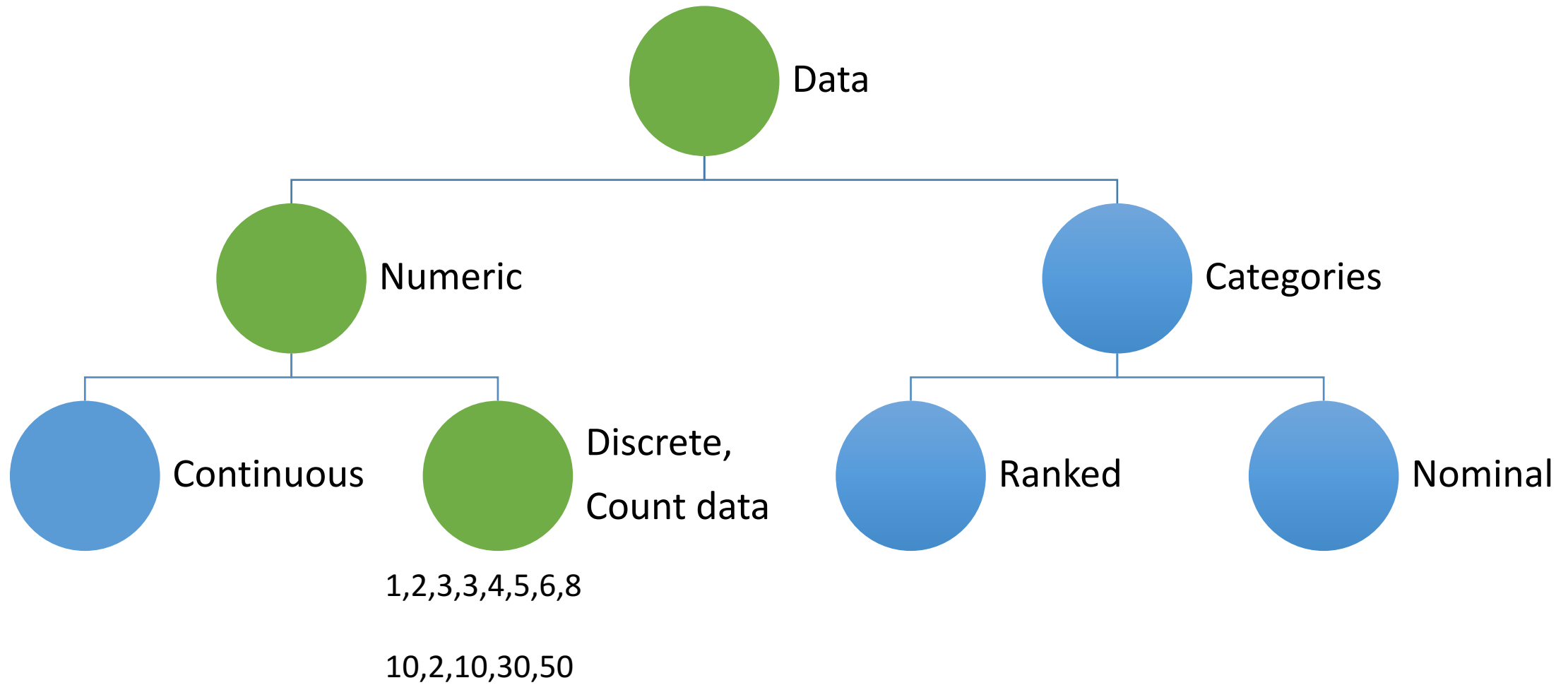
Data types



Multinomial data

More than two possible outcomes

Data types



Count data – Poisson distribution

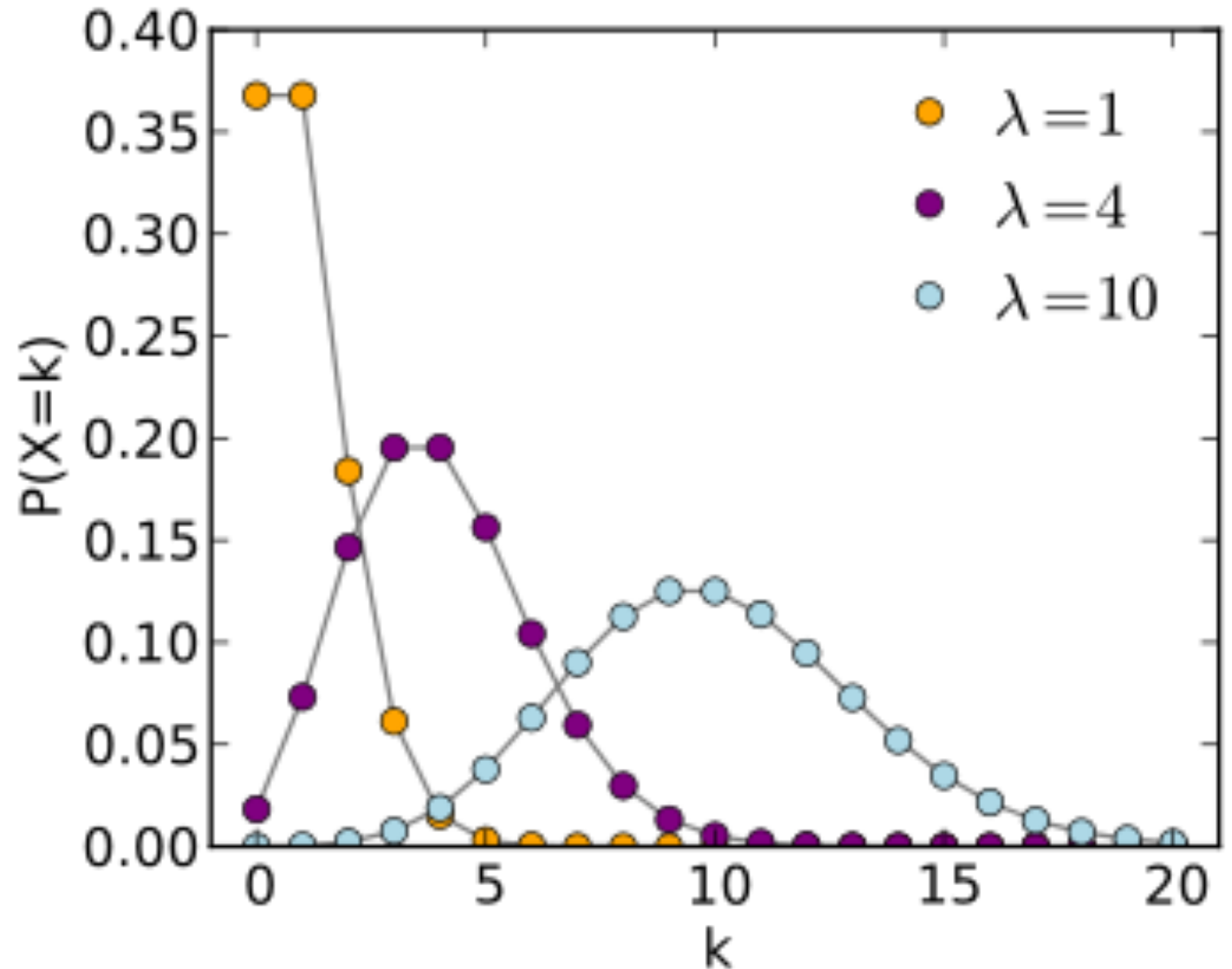
Counting

How many offspring has a bird?

Species number in a forest

...

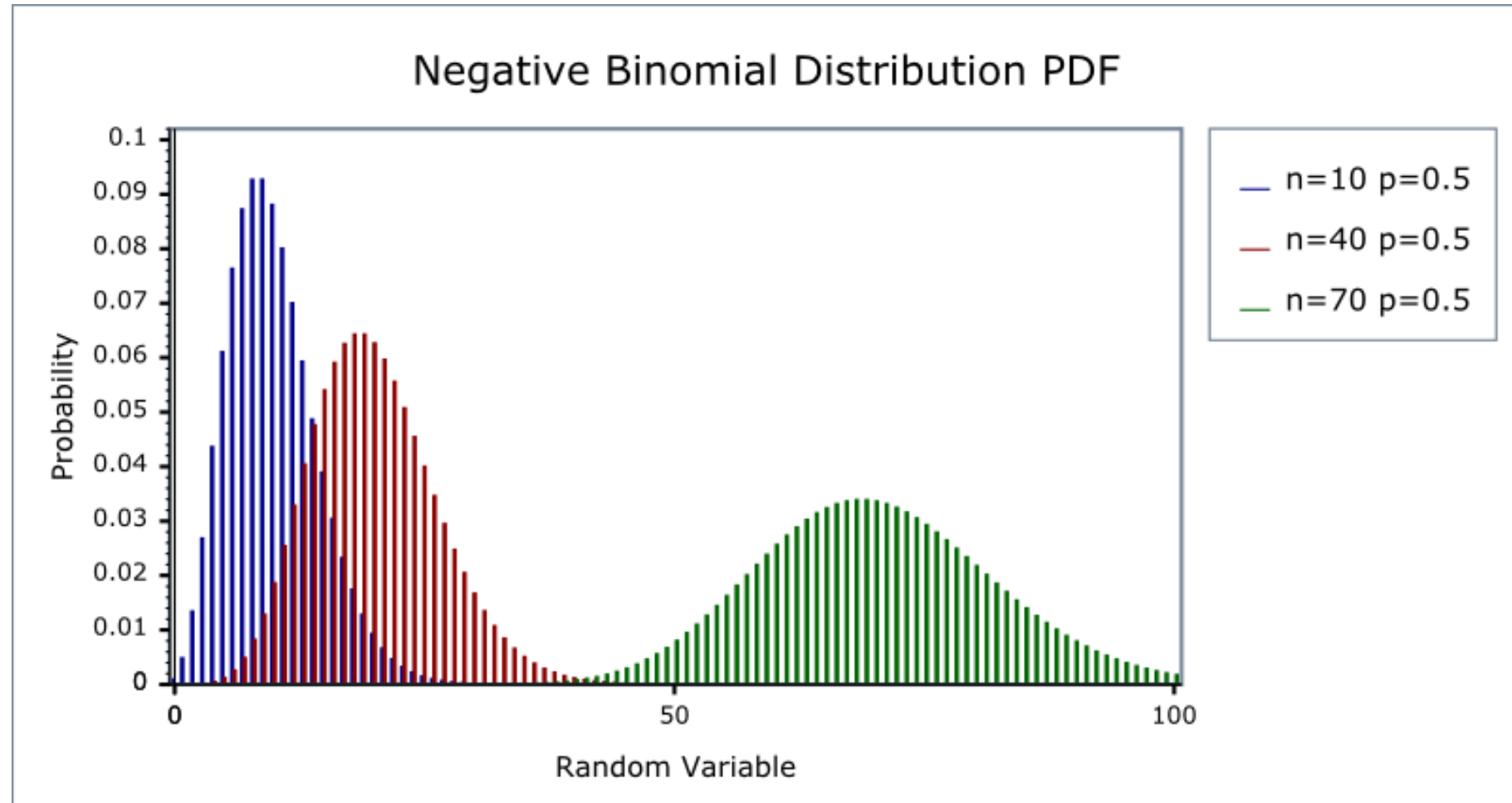
Mean = variance!



Count data – negative binomial

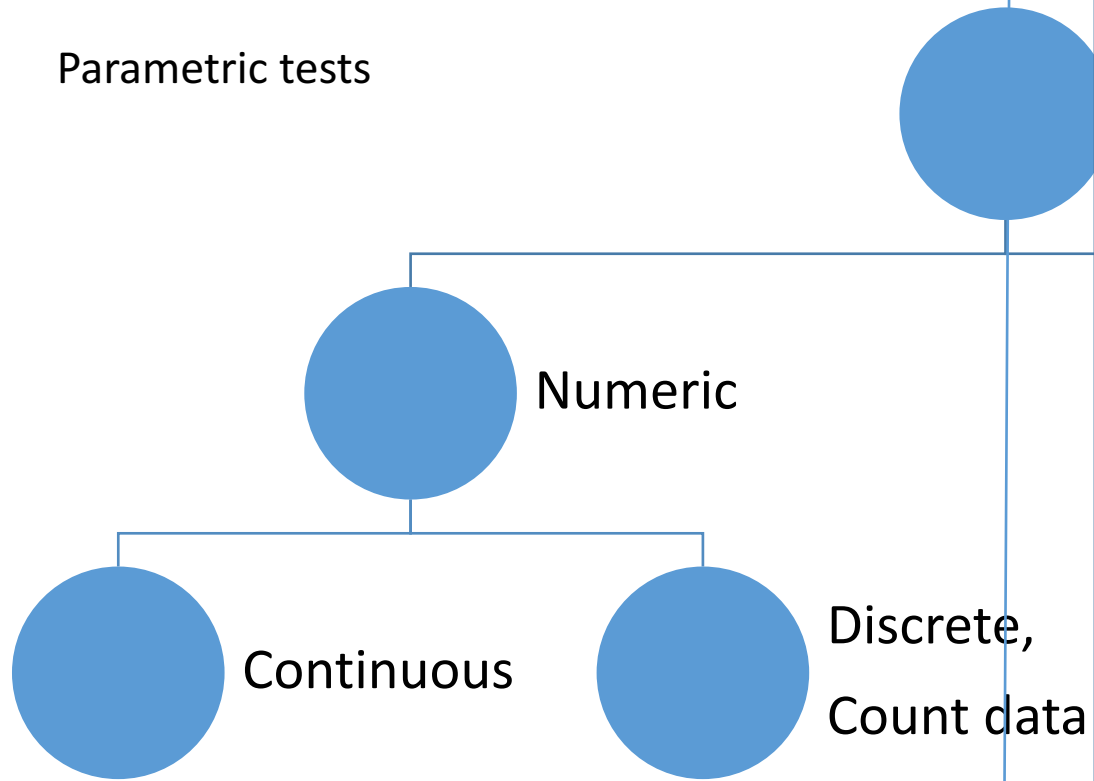
Mean \neq variance

No need for independence

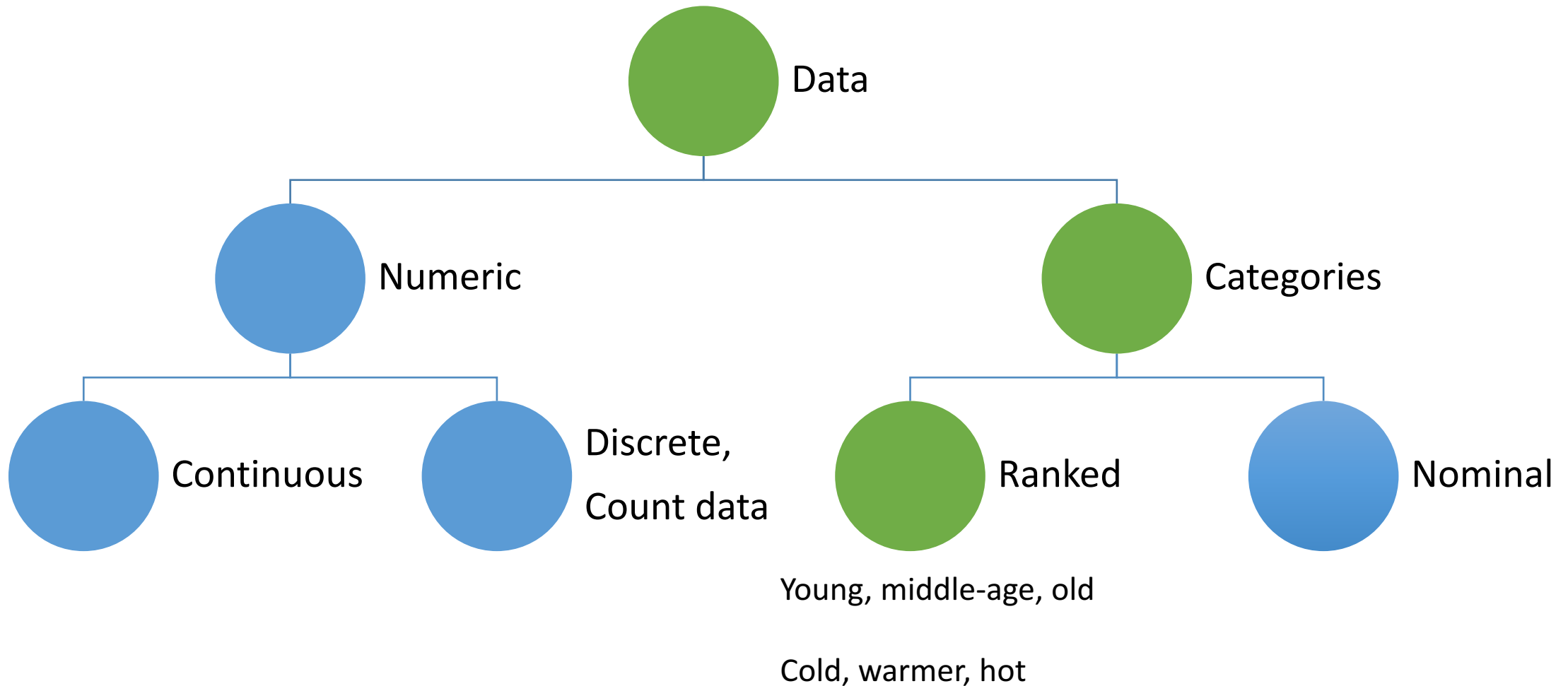


Data types

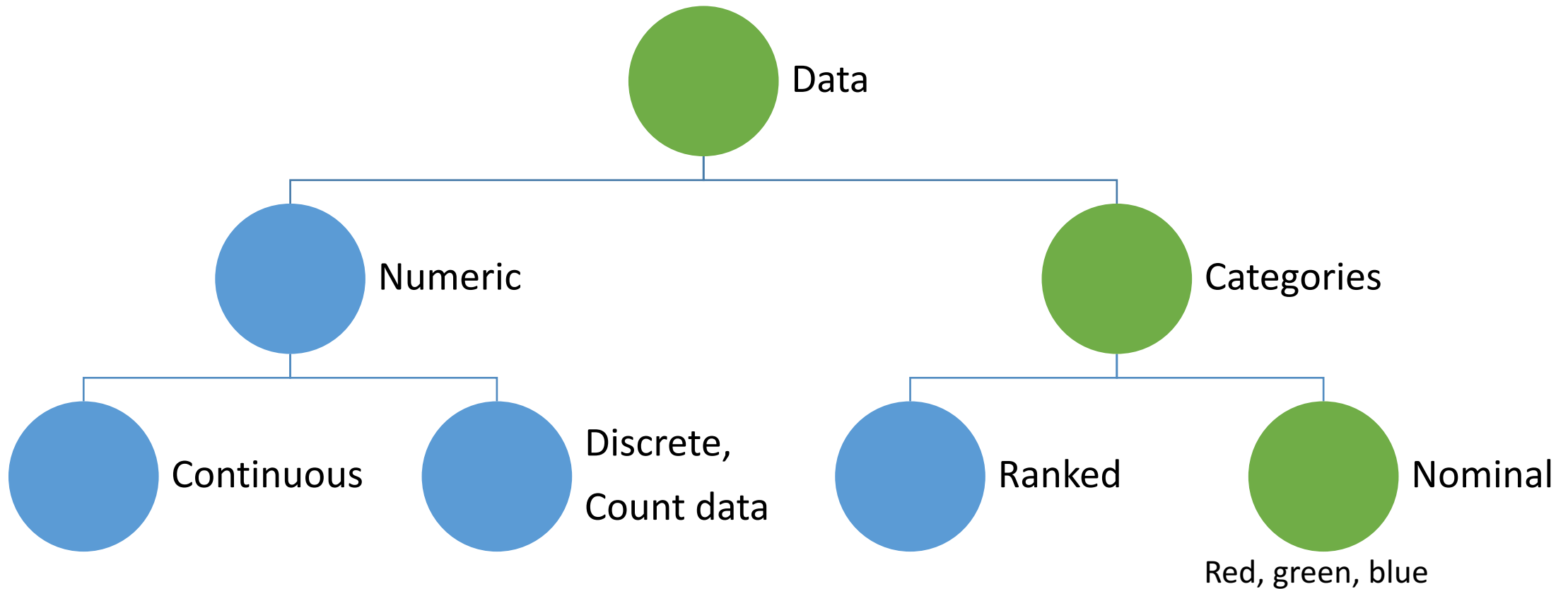
Parametric tests



Data types



Data types



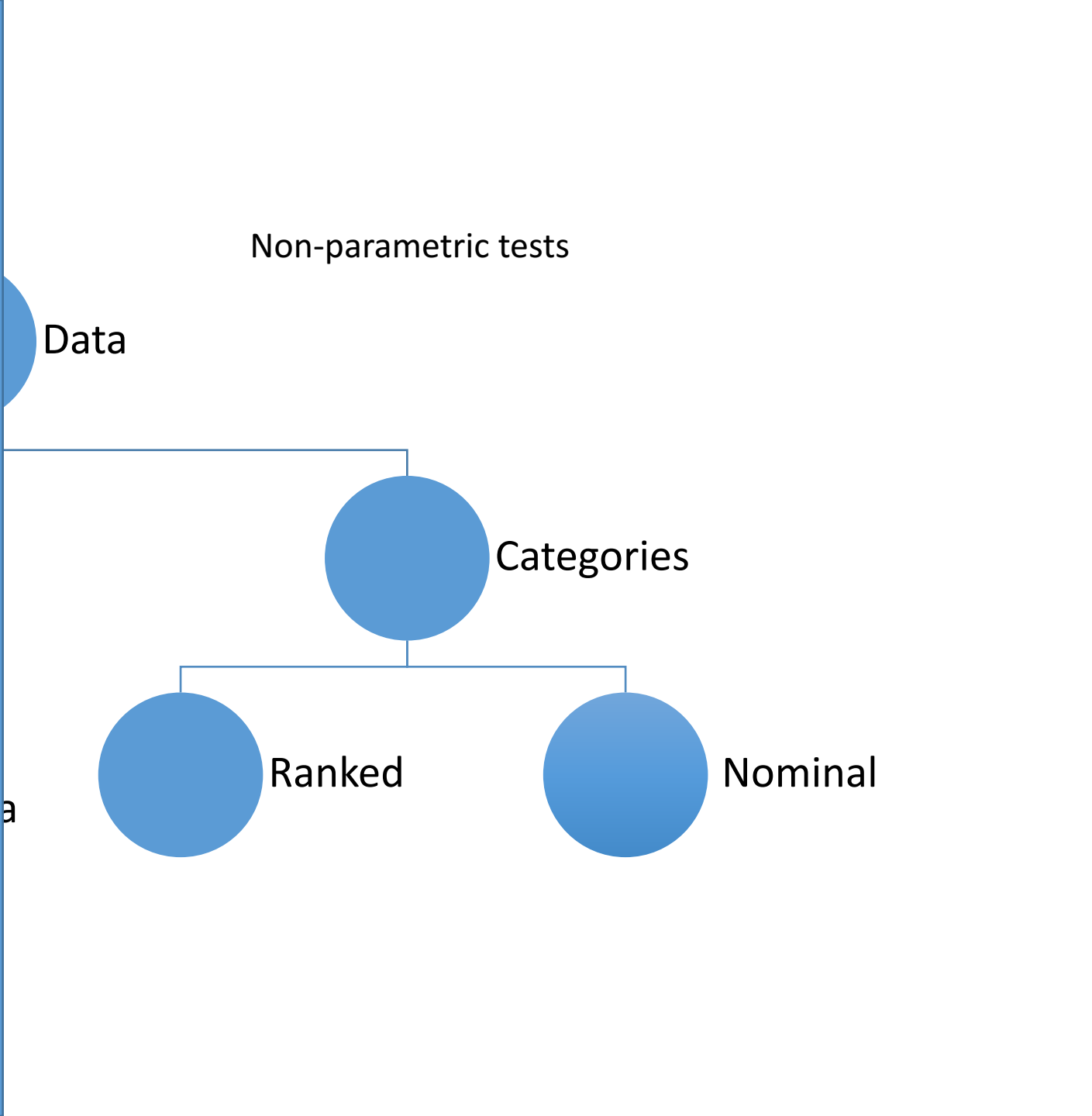
Non-parametric tests

Data

Categories

Ranked

Nominal



Check-in – learning goals!

- **Description**

- Descriptive statistics of a distribution
- Variance, standard deviation describe distribution

- **Different data types**

- Non-parametric data – can be problematic

- **Parametric data:** continuous and discrete

- Data can follow different distributions

Exercise – DO IT NOW (no handout)!

- Determine the type of each variable in the sparrow dataset
- Look at their distributions
- Find r functions to draw the probability and density distributions for
 - Gaussian
 - Poisson
 - Binomial
 - Random

Exercise – DO IT NOW (no handout)!

- Determine the type of each variable in the sparrow dataset
- Tell us all about these variables

Exercise – DO IT NOW (no handout)!

- Determine the type of each variable in the sparrow dataset
- Tell us all about these variables
- How to draw a Poisson distribution?

Exercise – DO IT NOW (no handout)!

- Determine the type of each variable in the sparrow dataset
- Tell us all about these variables

- How to draw a Poisson distribution?
- How to draw a binomial distribution?

Exercise – DO IT NOW (no handout)!

- Determine the type of each variable in the sparrow dataset
- Tell us all about these variables
- How to draw a Poisson distribution?
- How to draw a binomial distribution?
- Gaussian?

Exercise – DO IT NOW (no handout)!

- Determine the type of each variable in the sparrow dataset
- Tell us all about these variables
- How to draw a Poisson distribution?
- How to draw a binomial distribution?
- Gaussian?
- Random?

Exercise – DO IT NOW (no handout)!

- Determine the type of each variable in the sparrow dataset
- Tell us all about these variables
- How to draw a Poisson distribution?
- How to draw a binomial distribution?
- Gaussian?
- Random?
- What is the difference between a density plot and a probability plot?