Likelihood of an observation

- The Likelihood asks us to imagine a possible world, and in that world, figure out what could happen
- Think of the likelihood in a story. It is not how plausible it is that it really happened in the real world, but how consistent the events of the story are with the world in which it happens

$$P(\text{Events} \mid \text{Assumed World})$$

- Mathematically, the Likelihood is just a count of how many ways something could happen under some hypothesis about the world
- The more ways to produce a data set under a hypothesis, the higher the likelihood attributed to a data set under that hypothesis

$$P(y \mid \theta)$$

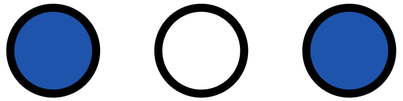
Likelihood as counting

- An evil statistician created an urn that contain 4 white or blue balls

Five possible configurations (worlds)

(1) [○○○○], (2) [●○○○], (3) [●●○○], (4) [●●●○], (5) [●●●●]

- We observe 3 observations with replacement:



Example from: