

## Maximum Likelihood

## 1 Why

We provide a principle for distribution selection based on maximizing the probability of the dataset.

## 2 Definition

We have a set of outcomes A and a dataset  $(a^1, \ldots, a^n)$ . We want a distribution  $p: A \to \mathbf{R}$ . We define  $\bar{p}: A^n \to \mathbf{R}$  by  $\bar{p}(a^1, \ldots, a^n) = \prod_{i=1}^n p(a^i)$ .

The principle of maximum likelihood says to solve:

find p, a distribution to maximize  $\bar{p}(a^1,\ldots,a^n)$