

Estimating the probability of success from a single binomial trial

When to use this

Use this program when your data consists of the number of successes y in a single binomial experiment with N trials and you want to estimate the parameter p (the probability of success in a single Bernoulli trial).

The likelihood for this model is binomial,

$$f(y|p) = \binom{N}{y} p^y (1-p)^{N-y}$$

The number of trials N and the number of successes y are the only values passed to Stan.

The prior for p

The default model file `binomial_single_trial.stan` is set up with a uniform prior for p , coded as `beta(1,1)`, which is equivalent.

If you have better information about p , you might consider using a $\beta(a,b)$ prior. The mean of a $\beta(a,b)$ distribution is $a/(a+b)$, and the higher a and b are, the more the probability mass concentrates near 0.5.

The default Stan model file

The name of the model file in the example code is `binomial_single_trial.stan`

```
//Estimate the probability of success from a single binomial experiment with n trials
data {
  int N;
  //number of trials
  int<lower=0> y;
  //number of successes
}
parameters {
  real<lower=0, upper=1> p;
  //probability of success p
}
model {
  p ~ beta(1,1);
  //uniform prior for p
  y ~ binomial(N,p);
  //binomial likelihood given p
}
```