Bayes Updating

What if you take a 2nd test if first one is (+)?

Assume: Correctness of 2^n is not influenced by first.

$P(\text{disease}) = 0.12 \rightarrow$ having disease given that first test = (+)
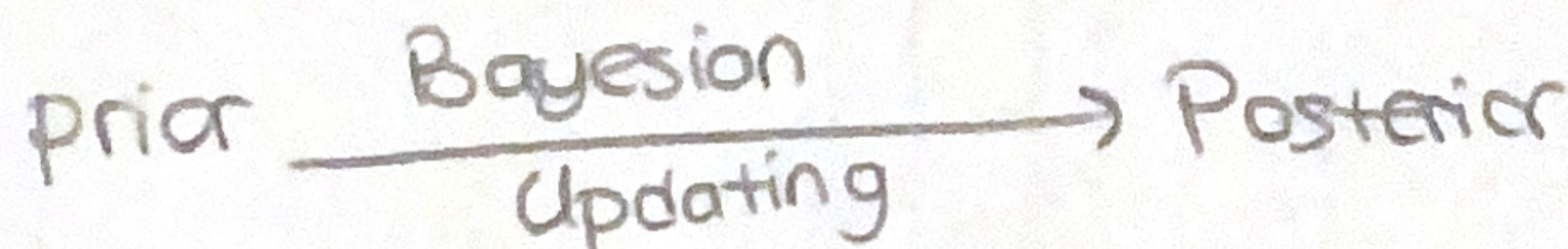
$$P(\text{disease} \mid 2\text{nd test} = (+)) = \frac{P(\text{disease})\, P(2^{nd} = (+)) \mid P(\text{disease})}{P(2^{nd} = (+))}$$

$$= 0.93$$

↳ 2 tests makes it much more probable than one (+) test
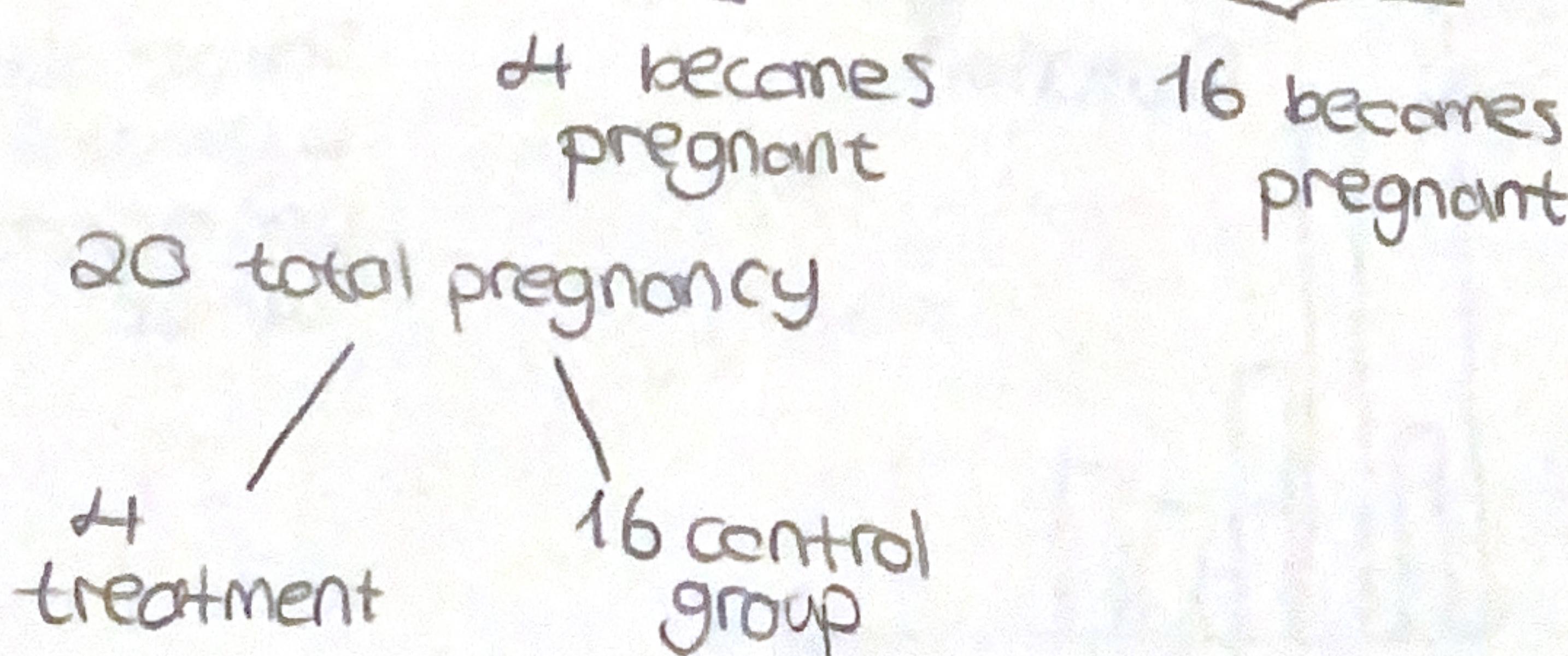
Bayes updating → updating a probability based on an event affecting it.

Update prior to get posterior

$$\text{prior} \xrightarrow[\text{Updating}]{\text{Bayesion}} \text{Posterior}$$
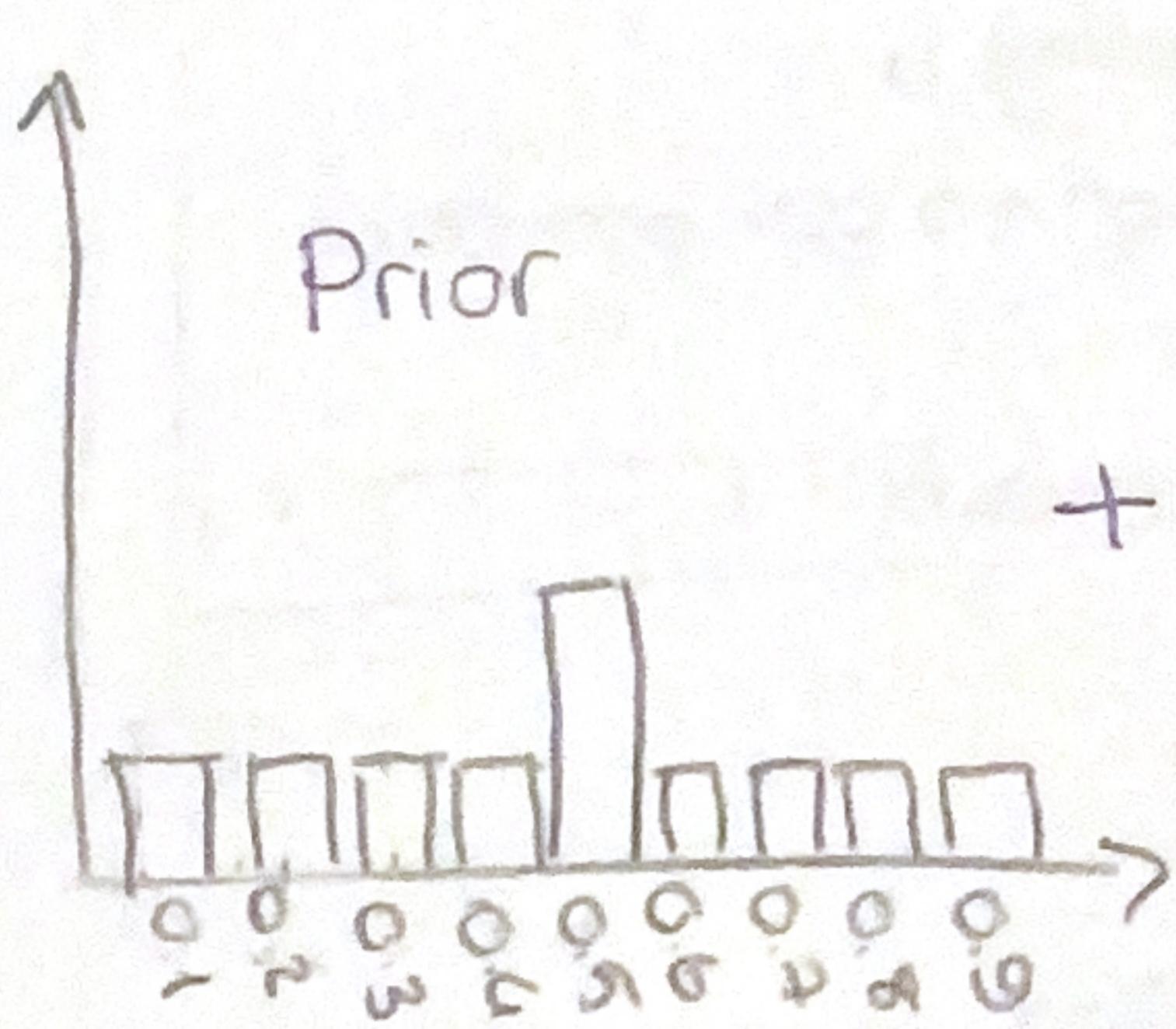
Bayesian Inference

ex// 40 women, 20 asking protection, 20 doesn't.

$\underbrace{\qquad\qquad\qquad}$
4 becomes pregnant   16 becomes pregnant

20 total pregnancy

4 treatment   16 control group
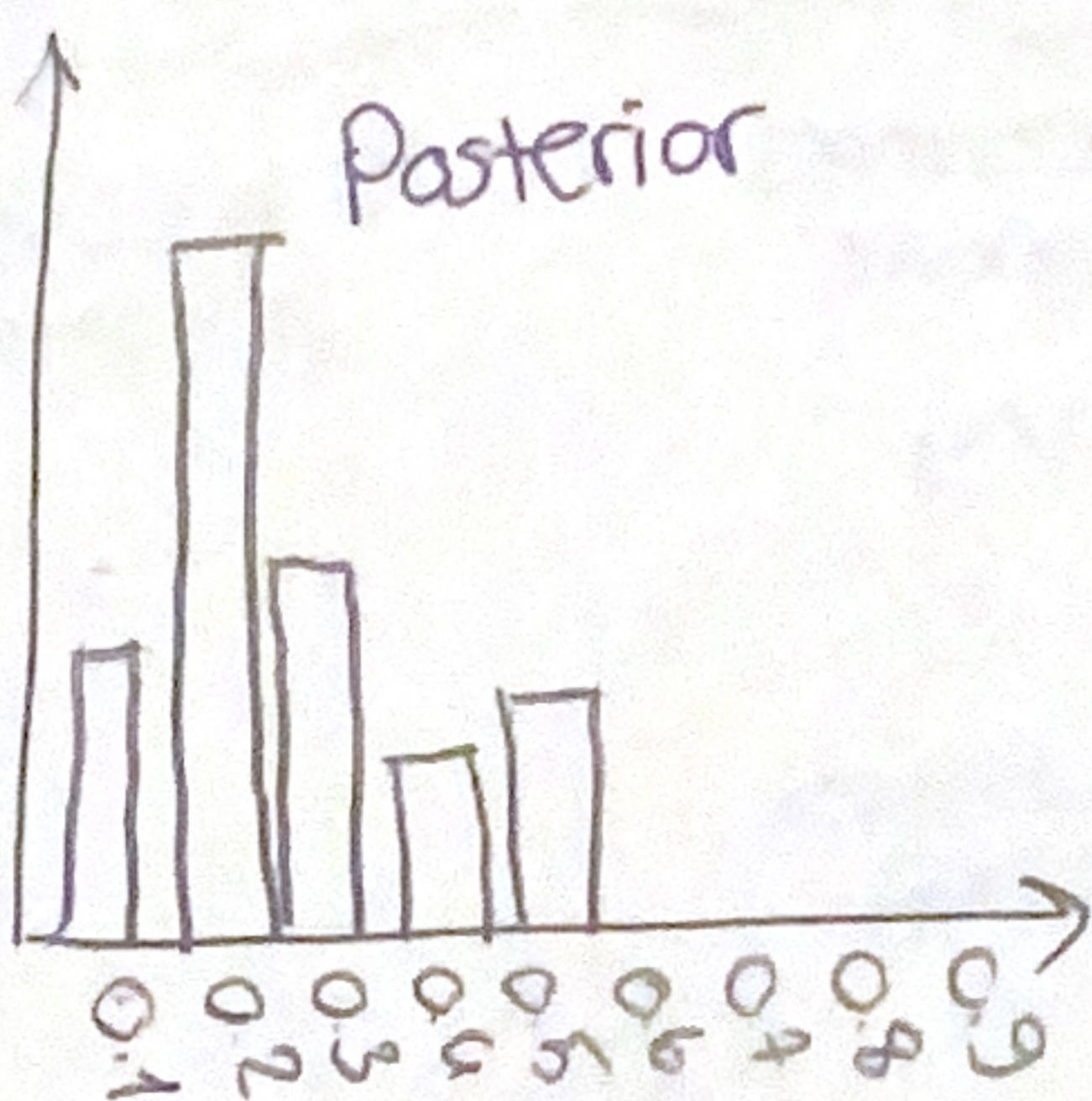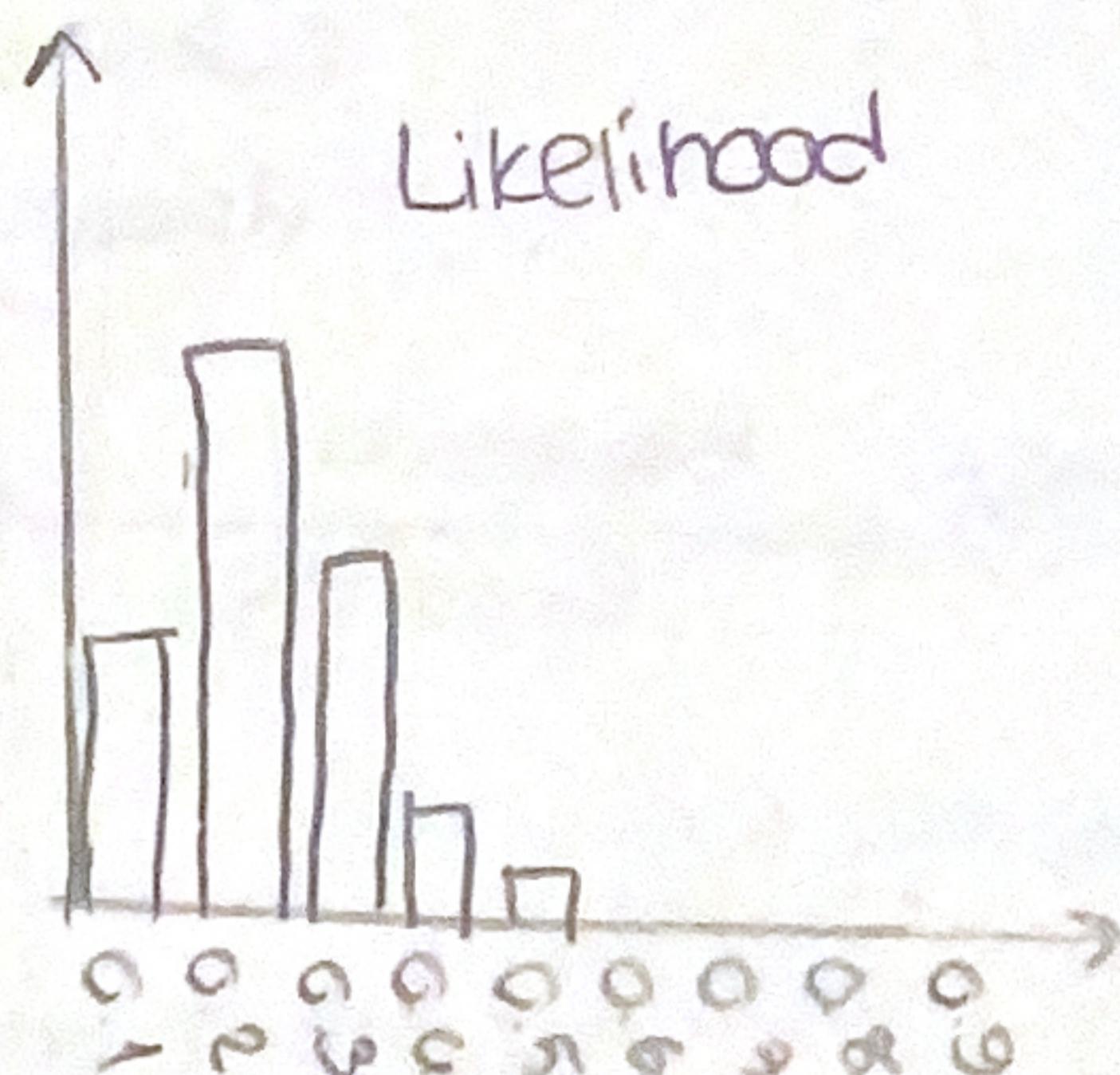
p → pregnancy cases from treatment group 0.5

(assume it can take 0.2, 0.5, 0.8)

Binomial

$P(data|model) = \dfrac{P(k=4|n=20, p)}{P(n, p)}$

p	0.2	0.5	0.8
prior P(model)	0.06	0.52	0.06
likelihood P(data|model)	0.21	0.004	0.003
likelihood × prior	0.013	0.002	0
posterior P(model	data	0.62	0.98	0

Choose the model with highest posterior

Prior

+

Likelihood

Posterior

Sample size büyüdükçe likelihood'un posterior'a etkisi artar.