

Suppose I have 3 coins in my pocket,

biased 3:1 in favour of tails

a fair coin,

I biased 3:1 in favour of heads

I randomly select one coin and flip it once, observing a head. What is the probability that I have chosen coin 3?

		Prior	Likelihood	Un-normalised Posterior	Normalised Posterior
Coin	θ	$p(\theta)$	$p(x = 1 \theta)$	$p(x = 1 \theta)p(\theta)$	$\frac{p(x=1 \theta)p(\theta)}{p(x)^{\dagger}}$
1	0.25	0.33	0.25	0.0825	0.167
2	0.50	0.33	0.50	0.1650	0.333
3	0.75	0.33	0.75	0.2475	0.500
	Sum	1.00	1.50	0.495	1.000



Suppose a screening test for doping in sports is claimed to be '95% accurate', meaning that 95% of dopers, and 95% of non-dopers, will be correctly classified. Assume 1 in 50 athletes are truly doping at any time. If an athlete tests positive, what is the probability that they are truly doping?

## Think: what would this mean for 1,000 athletes?



'Expected frequency trees' now in GCSE Maths syllabus:

Il {calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams}.





