Not *p*-Values, Said a Little Bit Differently

American Statistical Association:

"P-values do not measure the probability that the studied hypothesis is true…"

E.S. Pearson :

"Gosset…had a tremendous influence on the … idea which has formed the basis of all the…researches of Neyman and myself. It is the simple suggestion that the only valid reason for rejecting a statistical hypothesis is that some alternative hypothesis explains the events with a greater degree of probability."

- *p*-values summarize
$$P(Data|Hypothesis)$$

- We care about
$$P(Hypothesis|Data)$$

➤ Related by Bayes theorem, but not the same

Is a coin fair

$h = 26$ heads out of $n = 64$ tosses
$$p = 0.08$$

$$P(u \ = \ 0.5 | h, n) =$$
$$\frac{P_B(h, n | \mu \ = \ 0.5) \times \ P(\mu \ = \ 0.5)}{\int_{-\infty}^{\infty} P_B(h, n | \mu \ = \ 0.5) \ \times \ P(\mu) d\mu}$$
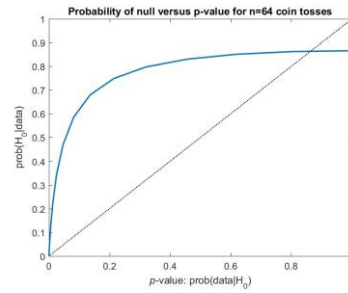
Let $\pi \equiv P(\mu = 0.5) = 0.5$, prior otherwise be $U(0,1)$

$P(\mu = 0.5 | h = 26, n = 64) = 0.59$

Vary number of heads