

## Connection between **Suprisal value S**, a **p-value of p** and **Binomial distribution**:

$$S = -\log_2(p) \quad p = \frac{1}{2^S} \quad p = \text{Binom}(S, S, 0.5)$$

S as an integer number

$$S = \log_2(p^{-1}) \quad p = \left(\frac{1}{2}\right)^S \quad p = \binom{S}{S} 0.5^S (1 - 0.5)^{S-S}$$

$$S = \log_2\left(\frac{1}{p}\right) \quad p = 2^{-S} \quad p = \left(\frac{1}{2}\right)^S$$

⇕

Probability for S heads in a toss of S fair coins (Prob = 0.5)

$$2^S = \frac{1}{p}$$