PROBABLE CAUSE

A *P* value measures whether an observed result can be attributed to chance. But it cannot answer a researcher's real question: what are the odds that a hypothesis is correct? Those odds depend on how strong the result was and, most importantly, on how plausibile the hypothesis is in the first place.

■ Chance of real effect
■ Chance of no real effect

THE LONG SHOT
19-to-1 odds against

THE TOSS-UP
1-to-1 odds

THE GOOD BET
9-to-1 odds in favour

Before the experiment
The plausibility of the hypothesis — the odds of it being true — can be estimated from previous experiments, conjectured mechanisms and other expert knowledge. Three examples are shown here.
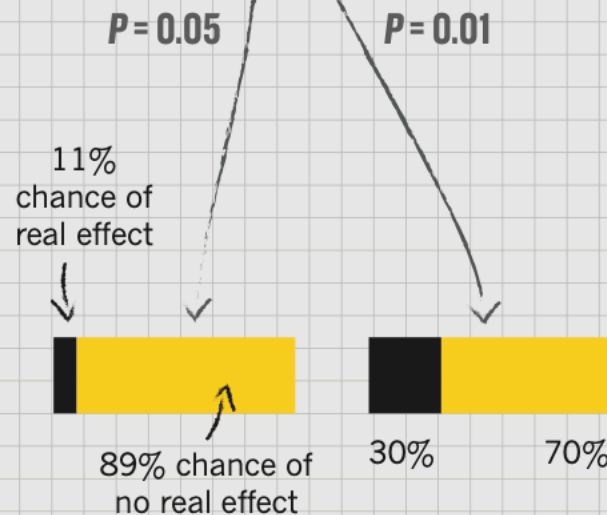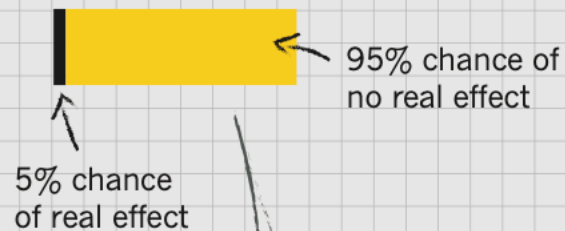
95% chance of no real effect

5% chance of real effect

50%   50%

90%   10%

The measured *P* value
A value of 0.05 is conventionally deemed 'statistically significant'; a value of 0.01 is considered 'very significant'.

P = 0.05   *P* = 0.01

P = 0.05   *P* = 0.01

P = 0.05   *P* = 0.01

11% chance of real effect

After the experiment
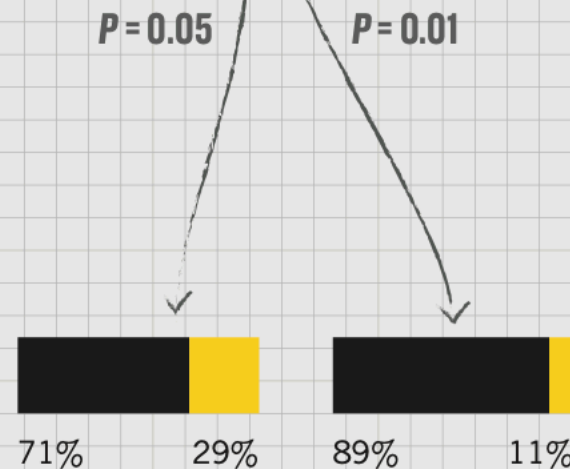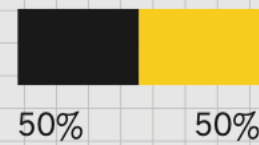A small *P* value can make a hypothesis more plausible, but the difference may not be dramatic.

89% chance of no real effect

30%   70%

71%   29%

89%   11%

96%   4%

99%   1%