

One reason so many scientific studies may be wrong

6 October 2016, by Geoff Cumming



Traditionally, a p value of less than .05 is the criterion for significance. If you report a p

Statistics: if you torture the data enough, they will confess. Credit: clemsonunivlibrary/ Flickr, CC BY-NC

There is a replicability crisis in science – unidentified "false positives" are [pervading even our top research journals](#).

A false positive is a claim that an effect exists when in actuality it doesn't. No one knows what proportion of published papers contain such incorrect or overstated results, but there are [signs that the proportion is not small](#).

The epidemiologist John Ioannidis gave the best explanation for this phenomenon in a famous paper in 2005, provocatively titled "[Why most published research results are false](#)". One of the reasons Ioannidis gave for so many false results has come to be called " p hacking", which arises from the pressure researchers feel to achieve [statistical significance](#).

What is statistical significance?

To draw conclusions from data, researchers usually rely on significance testing. In simple terms, this means calculating the " p value", which is the probability of results like ours if there really is no effect. If the p value is sufficiently small, the result is declared to be statistically significant.

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