

A Field Guide to Recognizing "Bad" Science

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To be an informed consumer of data, the ability to evaluate evidence supporting scientific claims is essential. Likewise, the ability to recognize faults in methodology and blunders in reporting is equally crucial. The issues below are common mistakes and errors made by those who purport to employ the scientific method:

SENSATIONALISM

It is common for titles and banners of articles to contain words and phrases to intrigue the reader. These kinds of attractors may often mislead or oversimplify the material presented.

BLIND RELIANCE ON MEDIA

In regards to news coverage, the author/s of a story may misinterpret the results and conclusions of the researcher/s. These distortions may be the result of the author/s not being familiar with the methodology used. Always try to read the original research before drawing your own conclusions.

CONFLICT OF INTEREST

Companies often hire scientists to research a product and publicize their findings. While this arrangement should not invalidate their conclusions, this possible conflict of interest should be taken into consideration when assessing the validity of the findings.

CORRELATION & CAUSATION

It is common for correlation and causation to be confused on the part of the author/s. A correlation does not necessarily equate to a causal effect between variables.

UNSUPPORTED CONCLUSIONS

Conjecture and assumption will drive hypothesis creation. Yet, research should be clear as to what the data collected should infer and what it should not. If a possible effect is mentioned, it should be addressed in just that way: possible.

SAMPLE SIZE

In inferential research, the smaller the sample size means the less confidence there is in the sample. Samples can be unavoidable small for a variety of reasons. These findings can still be valid. However, larger samples equate to more representative results.

THE NO CONTROL GROUP

In clinical trials, results from a test group need to be compared to a group that has not received the effect of the variable introduced. These groups should be allocated randomly. In general experiments, a control test should be used where all variables are controlled.

UNREPRESENTATIVE SAMPLE

In human subject research, each should be selected to be representative of the population from which they were drawn. If the sample differs from the population, the conclusions of the research may be biased.

"CHERRY PICKING"

Cherry picking is the selective mention of data that affirms the research hypothesis/hypotheses and does not address those findings that refute it. If a published article or report draws conclusions from only a portion of the study results, the conclusions are invalid.

REPLICATION

A study should be able to be replicated by independent researchers. Future studies should be tested over a wide-range of conditions to ensure consistency. Dramatic claims of extraordinary findings require more than one study to ensure research veracity.

PEER-REVIEWED MATERIAL

Peer-review entails other experts in the discipline examining the methodology and findings of the study. These experts will critique the study and make recommendations as to its worthiness for publication. While peer-review does not absolutely guarantee that a study and its findings are valid, it is another step in the process to ensure the process the researcher/s followed was sound and rational. When possible, additional peer-reviewed material pertaining to the subject under consideration should be consulted.