

# • BAD SCIENCE •

## 1. SENSATIONALISED HEADLINES



Headlines of articles are commonly designed to entice viewers into clicking on and reading the article. At best, they over-simplify the findings of research. At worst, they sensationalise and misrepresent them.

## 2. MISINTERPRETED RESULTS



News articles sometimes distort or misinterpret the findings of research for the sake of a good story, intentionally or otherwise. If possible, try to read the original research, rather than relying on the article based on it for information.

## 3. CONFLICT OF INTERESTS



Many companies employ scientists to carry out and publish research - whilst this does not necessarily invalidate research, it should be analysed with this in mind. Research can also be misrepresented for personal or financial gain.

## 4. CORRELATION & CAUSATION



Be wary of confusion of correlation & causation. Correlation between two variables doesn't automatically mean one causes the other. Global warming has increased since the 1800s, and pirate numbers decreased, but lack of pirates doesn't cause global warming.

## 5. SPECULATIVE LANGUAGE



Speculations from research are just that - speculation. Be on the look out for words such as 'may', 'could', 'might', and others, as it is unlikely the research provides hard evidence for any conclusions they precede.

## 6. SAMPLE SIZE TOO SMALL



In trials, the smaller a sample size, the lower the confidence in the results from that sample. Conclusions drawn should be considered with this in mind, though in some cases small samples are unavoidable. It may be cause for suspicion if a large sample was possible but avoided.

## 7. UNREPRESENTATIVE SAMPLES



In human trials, researchers will try to select individuals that are representative of a larger population. If the sample is different from the population as a whole, then the conclusions may well also be different.

## 8. NO CONTROL GROUP USED



In clinical trials, results from test subjects should be compared to a 'control group' not given the substance being tested. Groups should also be allocated randomly. In general experiments, a control test should be used where all variables are controlled.

## 9. NO BLIND TESTING USED



To prevent any bias, subjects should not know if they are in the test or the control group. In double-blind testing, even researchers don't know which group subjects are in until after testing. Note, blind testing isn't always feasible, or ethical.

## 10. 'CHERRY-PICKED' RESULTS



This involves selecting data from experiments which supports the conclusion of the research, whilst ignoring those that do not. If a research paper draws conclusions from a selection of its results, not all, it may be cherry-picking.

## 11. UNREPLICABLE RESULTS



Results should be replicable by independent research, and tested over a wide range of conditions (where possible) to ensure they are generalisable. Extraordinary claims require extraordinary evidence - that is, much more than one independent study!

## 12. JOURNALS & CITATIONS



Research published to major journals will have undergone a review process, but can still be flawed, so should still be evaluated with these points in mind. Similarly, large numbers of citations do not always indicate that research is highly regarded.