

How to Read Scientific Research

A practical guide for evaluating studies, figures, evidence, uncertainty, and science headlines

A scientific paper should not be read like a textbook chapter. Read actively, with a clear question, and continuously separate the data from the interpretation. **The goal is not to decide whether you “believe” the paper, but to judge what the study actually supports.**

THE BEST SINGLE STRATEGY: Ask three separate questions: What did the researchers measure? What did they find? What do they claim it means? Keeping these distinct prevents conclusions and headlines from outrunning the evidence.

1 Define the question

Identify the precise hypothesis, population or model, comparison, and outcome. A paper can be interesting yet irrelevant to the question you are trying to answer.

3 Let the figures lead

For each figure, ask what was measured, what the controls were, how many independent observations were included, and whether the graph supports the statement in the text.

5 Judge magnitude and uncertainty

Statistical significance is not the same as biological or practical importance. Look for effect size, variability, confidence intervals, sample size, and consistency across experiments.

2 Read selectively, not linearly

Start with the title and abstract conclusion, then inspect the methods and results. Read the introduction and discussion later, once you understand the evidence being interpreted.

4 Test the study design

Check whether the model fits the question, the comparison groups are appropriate, the methods are reproducible, and major sources of bias or confounding were addressed.

6 Put one paper in context

One study rarely settles a question. Compare it with prior work, note limitations and alternative explanations, and ask whether the claim has been replicated in other systems or populations.

THE SCIENCE-HEADLINE TEST

Before sharing a headline, check whether it preserves the study population, the actual outcome, and the level of certainty. Observational association is not proof of causation; an animal or cell result is not automatically a human treatment; and “promising” does not mean clinically established.

Bottom line: Read for evidence, not authority. Strong papers make their question, methods, data, uncertainty, and limitations visible enough for the reader to evaluate independently.

REFERENCES

Carey, M. A., Steiner, K. L., & Petri, W. A., Jr. (2020). Ten simple rules for reading a scientific paper. *PLOS Computational Biology*, 16(7), e1008032. <https://doi.org/10.1371/journal.pcbi.1008032>

Durbin, C. G., Jr. (2009). How to read a scientific research paper. *Respiratory Care*, 54(10), 1366-1371. <https://doi.org/10.4187/respcare.09541366>