

Confused about COVID? Here's how to read a research paper

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Credit: AI-generated image ([disclaimer](#))

Scientific evidence can be difficult to understand. Normally we can rely on experts to interpret it for us, or the media to accurately report any interesting new discoveries, but the pandemic has challenged this.

Almost daily we are faced with contradictory views claiming to be

"based on the scientific evidence." But if you're not an academic, how can you go about checking the evidence for yourself?

Scientific research is communicated in the form of "research papers" published in professional journals. To ensure accuracy, each [paper](#) is carefully checked by both editors and outside [academic experts](#) in a process called "peer review." Although peer review is [not perfect](#), it does tend to ensure articles are more reliable compared with those produced in other types of publishing.

Therefore, to judge the [scientific evidence](#) for yourself, you need to read and understand peer-reviewed papers. This can be daunting, but if you approach research papers with the right strategy they can be easier to digest.

1. Find the research paper

Following the publication of new research, the results are often summarized by the media. Frustratingly, these summaries seldom provide a link to the original [peer-reviewed](#) paper itself.

To find the original paper, one good strategy is to track down the original press release from the university or company releasing the research. You can also use an academic search engine like [Google scholar](#) or [PubMed](#) to search for recent papers published by the authors, who are normally (although not always) named by journalists.

Historically readers have had to pay to read [academic papers](#), but increasingly research papers are free to readers through "[open access](#)" arrangements. Unfortunately, if a paper is not open access, there is not much you can do to read it without paying a fee to the publisher.

2. Read the abstract and look at the pictures

Research papers are long and dense with a very different structure compared with articles in the normal media. Media articles start with the most important information in the first few lines and then add background or contextual information as the article progresses.

Research papers start off with an introduction describing the background, then sections describing the methods and results, a discussion (highlighting strengths and weaknesses of the research), and finally the conclusion—often only in the very last few sentences. However, to help speed up reading, a summary or "abstract" is always provided at the beginning.

The abstract is the best place to start (and is almost always available for free). If you are not an expert in the subject area, make sure you look up any words you do not understand, because everything mentioned in the abstract will be key to understanding the paper as a whole.

After reading the abstract you may find you have gathered all the information you need about the research, but if after reading it you still would like to find out more, have a quick look at the pictures, figures and diagrams (if available) to get a better idea of the experiments being reported.

3. Determine how good the journal is and who wrote the paper

After reading the abstract I normally look at who the authors are, what university or company they work for, and how good the journal publishing the paper is.

Academics with a track record of producing high-quality research are a good sign. The first and last authors listed in research papers [are often the most important](#), so look them up to see what else they have produced.

Having the research published in a good journal is also important, because the better journals are able to access more experienced peer reviewers and editors. Here the ["impact factor"](#) of a journal is often quoted, which relates to how many other researchers refer to the papers published in it.

However, in recent years impact factors have been [strongly criticised](#) as a way of judging journals, even though it's still true that the best research is published in a fairly small number of journals. One alternative to relying on the impact factor is to simply look up the journal title online to see what researchers say about it. As researchers spend a lot of time discussing which journals are best, this should allow you to find out fairly quickly whether the journal you're looking at is a reputable one.

4. Read the discussion

If you have got this far you are probably convinced that the research paper is interesting and worth a bit more effort to read. So next, find the part of the paper that discusses the results (often called the discussion) and read through this carefully, flicking back to the methods or results sections if you need to understand in more detail how the experiments were done. Again, look up any terms you do not understand.

5. Read the introduction and check out some of the references

Once you have a good idea of what the paper is reporting, finish off by

reading the introduction—this normally provides an overview of why the experiments were conducted in the first place. You should now have a very good idea of what the paper is reporting and some of the wider context.

If you are particularly interested in the topic, look too at some of the key references that the paper quotes. If the paper isn't brand new, go back to an academic search engine to see whether others have since referenced (or cited) it, and what they are saying about the research.

6. When a paper is not a paper

A word of warning: not every article published in a journal reports new research. Journals also contain news articles, opinion pieces and reviews. These are seldom peer reviewed, and although still written for a professional audience, are not considered primary research.

Another thing to watch out for are versions of research papers that are made available online in advance of being checked by peer reviewers, in a form called "preprints." Preprints can be very useful for finding out about new results quickly because the [peer review](#) and journal publication process can take up to a year. This has been necessary during the pandemic, for example. These preprints are normally clearly labelled, just as a warning that the information in them should not be relied upon in the same way as a full, peer-reviewed [research paper](#).

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