

Professor Mark Davis of Macalester College created this Useful Flyer of Information (part of a series of “UFIs”), inspired by Reader’s Digest founder Dewitt Wallace.

HOW TO READ A SCIENTIFIC PAPER

Since you know how to read, you probably think you know how to read an article in the primary scientific literature. You start at the beginning and read until you finish the article. Right? Wrong. Reading scientific articles effectively requires a very different approach.

First, read the name of the author, or authors, along with their institutional affiliation. Then, note the name of the journal and the date of publication. Ok, you can glance at the title first, but pay more attention to the author's name and the date of publication. Scientists seldom remember actual journal titles, and virtually never refer to articles by the titles. In conversation with other scientists, they might say, "did you see the article by Janzen that came out in Science last summer?" Paying attention to the institutional affiliation can, over time, help you recognize which are the leading institutions in certain types of research. This can be helpful to you as a student since it can help you identify good graduate schools.

Next, read the Abstract, if one is included in the paper. The abstract is a summary of all the key aspects of the paper, including objectives, methods, results, and implications of the study. The abstract will give you a conceptual framework with which to read the article in more detail, if you are still interested after reading the abstract. Think of it as a kind of road map that you want to consult before beginning your journey through the article. If the article does not have an abstract, skip immediately to the end of the paper. Articles without abstracts usually end with a summary paragraph or paragraphs that provide a similar overview of the paper. After reading the abstract (or summary), you might decide the paper's topic doesn't interest you. In this case, you are done reading the article, unless, of course, it is an assignment for a class. Then you have to read it anyway.

Next, read the Introduction. The introduction is where the author sets the paper's topic in a larger scientific context. Basically, the author tries to persuade you that the topic and the paper are worthy of your interest and continued reading. This is usually also where the author spells out the goals of the research being reported. Introductions are very important sections to read.

Next, skip the Methods and Results section and **go directly** to the Discussion. Well, you might want to take a minute and look at some of the graphs and tables that the author included to illustrate some of the key findings. But skip the text of the methods and results for now. A good discussion will begin with a recap of the research's major findings and then go on to discuss the implications of the research. A good discussion will pick up on some of the ideas presented in the Introduction and show how the results of the study bear on these ideas. Since you have just finished reading the Introduction, this should all be familiar material.

Next, if you want know more details about the findings and about the specific methodology used, go back and read the Methods and Results sections. These sections are written primarily

for other scientists who specialize in similar research and these sections are often quite detailed and technical. Focus on the parts of the Methods and Results that interest you. If you are interested in the details, you will probably find that you will end up rereading the Methods and Results sections several times. Once you have obtained the information you want from these sections, you might want to reread sections of the Discussion again to see if you would have drawn the same conclusions and interpretations as the author.

Next, read the Acknowledgments. This can be very illuminating actually since this is where the author tells you who provided assistance with the paper. Once you begin to get to know an area of research, you become aware of the different camps and allegiances that develop among scientists. It is interesting to see who the author consulted with in writing the paper, and this information sometimes can give you some insight as to why the paper was written in the way that it was. This is also where the author will list the sources of financial support for the research. This is interesting in that this information begins to give you an understanding of the scientific infrastructure of this and other countries, i.e., what groups or agencies are funding what types of research.

Next, skim through the Bibliography or Literature Cited Section. This also can be surprisingly interesting since you will see who the author decided to cite, and if you are familiar with the field, who the author did not cite. Omissions are sometimes as illuminating as inclusions. The other value in perusing this section is that you might discover sources that you had not known about, but probably should have. Jot them down and check them out.

Other minutia that can be interesting: Look to see if the author's current address is different than his/her address when the research was conducted, and if it has changed if the person is affiliated with a college or university. A change often indicates the author was a graduate student when the research was conducted, and the current address can tell you if the person was able to get an academic job after obtaining their degree. Yes, scientific articles can have a bit of human interest in them. Look to see when the paper was first received for review, when the revision was returned, and when it was accepted for publication. This will give you an idea of how long it actually takes to get something published. This can be depressing.

Good Luck. Reading scientific articles effectively requires some experience. You will get better with practice. If you are reading a particularly good article, pause for a moment and try to determine what the author has done to write an effective article. Once you figure out what you like about the article, remember it the next time you write one.

Note: Many of the ideas included in this UFI came from Michael Palmer, who in turn borrowed from James Thompson.