

# How to Read a Journal Article

By Jody Culham

## 1. Ask yourself, "Why am I reading this and what do I want to get out of it?"

A. Are you looking for an overview of a particular topic?

Look for review articles, particularly in high caliber, general audience journals (TINS, TICS, Annual Reviews). Focus on the introduction and discussion. Watch for redundancy-- Respected authors get asked to write many articles and book chapters and end up regurgitating their standard fare.

B. Are you looking for research ideas?

Read the introduction to see what's been done, the discussion to see what questions remain and read the design/methods critically to look for flaws in the logic or design or for alternative hypotheses. Recent topic overviews (e.g., Current Opinion in Neurobiology) can be a great place to start.

C. Are you reading the article for crucial information you need to plan your own experiment?

Pay particular attention to the methods section. Take notes.

D. Are you reading the article to advance your general knowledge?

You may not necessarily have to read it as much as encode it (See point 4 below). Think about how it fits into your existing understanding and whether there is anything that changes "your view of the world." Journals like TICS and TINS can be really useful for keeping up the hot topics in a field. Going to conferences is a great way to keep up with a field without reading.

E. Reading for a course

What do you think the instructor wants you to get out of it (e.g., general knowledge of the field, a critical evaluation of an idea)? How much other reading has been assigned and how much time can you devote to each paper? Don't spend 3 hours reading the first 2 papers and 10 minutes reading the last 8. Don't assume that short papers are easier to read than long ones (Science and Nature in particular can be so concise they are difficult to understand. Look for accompanying News & Views commentaries to summarize them). Excessive course readings, while onerous, can be good practice for learning to extract information from articles as efficiently as possible.

## 2. Do not necessarily "read".

You are not reading a novel where you have to start at the first word, end at the last and read every word in between. Based on your needs above, focus on the relevant sections. If you are reading for ideas, you may not need the minutiae of the methods. If you are reading a topic you know well, you don't need to read the intro particularly deeply. If you are reading for general or specific knowledge, you can skim. Tip from my older-than-God high school English teacher, Alice Tarnava: To quickly extract a paper's info, read only the first sentence of each paragraph. If it's important, read or skim the remainder of the paragraph.

## 3. Data, data, data

For most purposes, it is the data that is important. Interpretations change. Results are constant. Just because the author tells a nice "Just So Story" doesn't mean it is true ("Never let a little bad data interfere with a good theory."). Look at the data and decide for yourself. Many eminent scientists go right to the figures (possibly after a quick perusal of the abstract or intro to understand what the question was). Good papers tell the story in the figures.

#### **4. Don't Xerox -- Neurox!**

When a colleague offered to send a reprint of a paper to neural net modelling guru Terry Sejnowski, he said, "I don't want a xerox. I want to neurox. Rather than sending me the paper, just tell me the key result so I can encode it."

You certainly don't have to xerox every paper ever written with the intention of memorizing its entire contents. You simply need to know where the paper exists and how to find it when you need to look back.

If you are going to take the time to xerox (or download) a paper, take 2-5 minutes to neurox it. Read or skim the abstract, flip through the figures and topic headings briefly and think about why it might (or might not) be useful to read it later. Then file it (see below).

#### **5. Develop a good filing/reference system.**

I highly recommend software such as EndNote to keep track of your articles, where they are filed, and to greatly facilitate compilation and formatting of reference lists. Start using such a database early in your career and you will never develop an intimidating startup effort to use it.

#### **6. Throw away your highlighter.**

So, you've recently been an undergraduate and own heaps of highlighters and textbooks soaked with yellow ink on every line? Give it up. Highlighters encourage passive reading, and the result is butt ugly. Take a pen, pencil or felt pen (ideally in a color other than black so it stands out), and use that to underline key phrases, sidemark key passages that you should re-read if you come back to the article, circle key parameters, and make notes in the sidelines about any criticisms or ideas that come to you.

#### **7. Write the way others should read.**

Where possible, make the sections free-standing so that readers are not forced to read sequentially. At the end of the intro, tell the reader what the question is. In the methods, give the essential design first where possible. (This is constrained by journal formats, but thankfully many are including the key methods in the results section after the intro and leaving the boring technical details to the methods section at the very end). Select figures that tell the story. Tutsi Vilis starts a paper by determining what the figures will be. Put enough information in the figure captions that the figures can be largely freestanding. Where possible, put error bars on graphs so that the reader can do the "eyeball test of significance" rather than (or in addition to) reading the boring stats sections. In the discussion, start by reiterating the key results and then get into the implications.