Five Steps to Critically Reading a Manuscript

1. What’s the claim?
The major claim(s) is usually found in Title and abstract.

Is the claim causal or associative? If the title has an active verb, that can be a good sign. A well-written paper will usually state its most important findings in the abstract, at the end of the introduction, and at the beginning of the discussion.

It’s often helpful to make a small diagram. You can focus your initial read-through on the abstract, the headings and figures of the results section, and the discussion, to get a sense of the paper as a whole.

2. Why do I care?
This information is usually found in Introduction + discussion.

What’s the Context? Novelty? Impact?

Different people care about different things, so there is no right answer to this, but it colors how you read the paper and what you’re looking for. Look up terms you don’t understand as you go along.

3. Do the data support the claim?
Usually found in figures + legends + text + methods. Most people read figures and legends first (or only), and then use text and methods as reference/explanation. But remember: papers are not linear, and there is nothing wrong with jumping around. In a well-written paper, the figures plus legends will be self-explanatory. Mark important results and conclusions as you go (pen, highlighter, pdf annotation …).

There are two very important considerations to evaluate the data:

A. technical: Are the experiments performed/presented/interpreted correctly? Are the correct controls there? Is the interpretation of the data correct? Are there alternative explanations? Are extrapolations from in vitro to in vivo justified?

B. most importantly, logical: Do the conclusions support the claim? Remember, the experiments could be done perfectly, but still fail to prove the claim: always keep the claim in mind. Refer frequently to the methods and figure legends; these components can offer clarification on how experiments were designed and will help you interpret the data.

Interpret the data yourself to verify that the authors’ conclusions are valid and are not overstated.

Which parts of the claims are supported and which are not?

What are the KEY experiments, and what is just padding? (padding is OK, in fact can be good, but it can also obfuscate and distract, so know what’s key and what’s not).

Go back to abstract once more: is the claim proven?
4. Do I believe it?
Extremely important. If the paper claims the existence of squirrels, I will need little evidence. But if it claims the existence of pink elephants, robust evidence is needed, preferably using multiple experimental approaches. A paradigm-shifting conclusion needs a lot of support. Everything in a paper leads to this: convince the reader that you are right. Apply the “sniff test”: do the conclusions “smell right” based on the data?

5. Take-home message?
It’s hard to remember much a couple of weeks after reading a paper, so it can be helpful to decide on the spot what one or two points to remember. Every paper has its holes, even the best. So don’t get hung up on unimportant holes. Always remember the bottom line: do I believe it?

And don’t forget:
When WRITING a paper, the SAME rules apply!