

245W: Reading the primary scientific literatureⁱ

All scientific facts as we know them today were originally the findings of someone's experiment. The way in which scientific facts and theories are established follows the general process of the scientific method. After many iterations of the scientific method, those original findings eventually become so well accepted within the scientific community that they are considered incontestable. It is at this point that those findings enter the realm of textbook material. Because many of us start learning science through textbooks and are initially exposed to only those well accepted scientific facts, we are often misled into thinking that all scientific texts contain more or less the truth (Gillen 2006). This is why we write critiques and essays in college: to relearn that scientific papers are persuasive in nature. The best examples of persuasive scientific writing are within the primary literature because it contains the original arguments (Table 1). Compared to primary literature, secondary literature usually comprises collective summaries and interpretations of several pieces of primary literature.

Table 1. The difference between primary and secondary scientific literature

	Primary literature	Secondary literature
Author	The scientist or team of scientists who did the research	Usually a third party, may be another scientist in the same field or a journalist
Examples	Original research articles	Review articles, book chapters, popular science articles

In order to write a critique of primary literature, you first need to know how to read it. Most of the factual information of a research article is contained in the Methods and Results sections. Most of the persuasive components can be found within the Introduction and Discussion. Pechenik (2004) suggests that an effective reading tactic is to read an article a few times until you can write a brief summary of the article, including all the major points such as research questions and findings, within one to two sentences in your own words. Afterwards, you should ask yourself questions such as these (adapted from Pechenik 2004):

1. Why was the study undertaken? (P)
2. What specific questions were addressed?
3. How were these questions addressed? (P)
4. What assumptions were made by the authors? (P)
5. What were the major findings of the study? (P)
6. What was particularly interesting about the paper?
7. What questions remain unanswered by the study?

The questions with “P”s (for “Persuasive”) are the ones you need to be careful of. If you were to answer these questions based on only the material found within the research article, you would be missing the point that it is the authors' job to persuade you that their reasoning, assumptions, approach, and interpretation are valid. Do you think that the authors made a good case as to why their study is important, and why

their assumptions are valid? Do you think the authors' experimental approach(es) successfully addresses their specific question(s)? Do you agree with the authors' interpretation of their results? Once you are able to answer all of these questions (as well as others you come up with yourself), and are able to back your own statements (another layer of persuasiveness comes in here), you will be ready to write a solid critique that reflects your understanding and evaluation of the research article you chose.

References

Gillen, C. M. 2006. Criticism and interpretation: teaching the persuasive aspects of research articles. *CBE - Life Sciences Education* 5:34-38

Pechenik, J. A. 2004. *A Short Guide to Writing about Biology*, 5th ed. Pearson Longman

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