Questioning the Science:  
How to Write a Critical Summary

Assignments:

1.1: Introduction to the critical summary (one 1-page paper)  
Due Wednesday, Feb. 24th in the online dropbox for your section

1.2: Critical summaries in your topic (one paper UP TO 2 pages in length)  
Due Monday, Apr. 5th in the online dropbox for your section

The critical summary is a powerful tool for understanding scientific texts. By taking a close look at the research on an issue, you will build a solid foundation for discussion of the scientific term paper. This is a critical summary because you are not only reading the text, you are also questioning it in the same skeptical way that scientists evaluate their own and others’ work. You will turn in two critical summaries of scientific texts during the first half of the semester. Your task in the critical summary is to identify and summarize the main scientific findings and supportive evidence in the text. These fall into four categories:

1. What is the question? What questions are the authors seeking to answer? What specific ideas are being tested in the scientific study?

2. What was done? How did the authors answer the questions posed? What methods were used?

3. What are the results? What observations and data are presented? What are the conclusions? What is the evidence for the conclusions?

4. Why is it important? Why is the answer to the scientific question meaningful? How general are the findings?

The question is the main topic of the text. The hypothesis is the expected answer to the question before the study, based on the scientific findings up to that point in time. The scientific findings in the study may present results that show the hypothesis as valid or invalid, subject to uncertainties, or they may provide a different answer to the scientific question. Every scientific finding has some associated uncertainty or range of conditions where it is true.

For example, if the question I sought to answer in my study were “How big is the earth?” then my observations of the earth’s average circumference would be my main results. The methods would consist of how, when, and where I made them (i.e. with a ball of twine as I flew around the world once, or with a satellite taking thousands of extremely accurate measurements over the whole globe every day for a year). If my hypothesis were “The earth will shrink to half its size in the next 10,000 years,” then a prediction of how the size will change would be my main result, supported perhaps by my computer model and the data used to validate it.

In order to write a critical summary, you should first read the abstract or introduction of the text. An abstract is a concise summary of the main findings and supporting evidence to be presented and usually follows the title of the article or chapter. Begin to question the text by asking about hypothesis, observation, prediction, and uncertainty. See how much you can learn through a careful reading of the abstract or introduction. You may also want to read the conclusion of the text at this time, where the
findings, supporting evidence, and uncertainties are often restated. Make a note of anything that is unclear to you, any aspects of the scientific study that you were unable to identify, or any areas that need more detailed information in order to be understood.

**For the second assignment, you will read TWO full articles.**

As you read the main portion of the article, keep your notes in mind. Reading an entire scientific paper can be challenging, even for scientists with different backgrounds! Remember that you are reading a record not only of the main findings and support as encapsulated in the hypotheses, observations, predictions, and uncertainties; primary scientific texts are also records of the detailed experimental methods required for other scientists to reproduce and expand the findings. Some of the details are not relevant to our goals in this course, so you may skim over them. Read in enough detail to clarify those areas you noted when reading the abstract or introduction and conclusion.

A one- or two-page paper is not very long, so you should be concise and specific in your writing. The critical summary should be your own interpretation of the main scientific findings and evidence in a single text. State the hypothesis of the text right away in order to give your reader the topic of the text and a clue about the main results. In your writing, identify the aspects of the results and evidence as observation and/or prediction. Explain how the evidence addresses the hypothesis and supports the main findings. Carefully state the uncertainties or limitations on the results. If you can think of sources of uncertainty not stated in the text, include those as well. The uncertainties often become questions for further scientific research and are at the heart of any scientific debate.

Some of the texts that you read may be “review articles.” Here the authors seek to bring together the individual findings of many researchers in order to make some broader conclusions about the state of scientific knowledge. These sources will be very useful as you progress toward the term papers. A critical summary of a review article also addresses the main findings and supporting evidence in the form of hypothesis, observation, prediction, and uncertainty. The only difference is that the results and evidence are an amalgam of the work of many different scientists as interpreted by the author(s). You should treat these texts in the same way as a research article written by one or more scientists presenting their own research.

**For this second assignment, you should choose which of the two topics you will address for your final paper and read the appropriate papers. Both of the papers are posted on the course website (http://www.courses.fas.harvard.edu/~eps5/writing_assignment/writing.html).**

**Topic 1:** The recovery of stratospheric ozone


**Topic 2:** Climate in the past: reconstructing the temperature record of the last 500 years
