

THE SCIENCE BEHIND THE CONTROVERSY

Duke University
Writing 20: Academic Writing
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Sections 22, 39

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Materials for this course are online at <https://courses.duke.edu/>

“In laboratory studies, caterpillars of the monarch butterfly were killed as a result of feeding on milkweed that had been artificially contaminated with pollen from transgenic corn that expressed the *cryIAb* gene from *B. thuringiensis*...”

Deepak Saxena, Laboratory of Microbial Ecology, Department of Biology, New York University
Nature, Dec. 2, 1999

“USDA researcher Rich Hellmich...discovered that most of the studies indicated Bt corn is not a threat to lepidoptera, including the monarch butterfly.”

Anthony M. Shelton, Department of Entomology, Cornell University
Forum for Applied Research and Public Policy, Fall 2000

“The science of transgenic technology is highly complex, and issues relating to environmental impact — such as the distribution and effect of pollen shed from these plants — are not simple. They involve an understanding of the ecology of the corn crop, its weed competitors, and the biology of these highly visible butterflies... [T]hese issues feed a third concern — a misunderstanding of the detailed nature of the experimentation, which results in misleading conclusions by the media, public interest groups, and scientists themselves.”

Mark K. Sears, Professor and Chair, Department of Environmental Biology, University of Guelph,
Forum for Applied Research and Public Policy, Winter 2000

Many public controversies have an underlying, but often under-acknowledged and under-appreciated scientific dimension. Popular opinion and public policy are often formed without an adequate understanding of how scientific knowledge both informs and defines public issues. We hear citizens and journalists raising questions such as: Is irradiated food safe to eat? Does genetically engineered corn kill monarch butterflies? Are childhood vaccines harmful? But because of the complexity of scientific experimentation and findings that undergird such controversies, such questions, posed as "hot button" issues, are usually not suitable to simple "yes/no" responses. Using various case studies where scientific fact has been accommodated to public interest, students will learn to critically analyze the relevant professional scientific literature, and will take up sophisticated written arguments on these subjects.

TEXTS

For students to purchase:

Williams and Colomb. *The Craft of Argument (concise edition)*. Chicago: University of Chicago Press, 2003.

Provided in class or on-line via course web-site:

Against All Odds: Inside Statistics. The Question of Causation. Annenberg/CPB Collection, 1989.

Aprahamian, C. Experimental cervical spine injury model: evaluation of airway management and splinting techniques. *Annals of Emergency Medicine*. 1984; 13: 584-7.

Coggon, David; Cooper, Cyrus. Fluoridation of water supplies: Debate on the ethics must be informed by sound science. *British Medical Journal*. 1999; 319: 269-270.

Fluoride, yes (editorial). *Cumberland Times News*. March 21, 2000.

Hausen, Hannu W. Fluoridation, fractures, and teeth: fluoride does not cause fractures but its benefits may vary. *British Medical Journal*. 2000 v321 i726:844.

Letters to the Editor: Fluoridation is a poisonous fraud. *Wall Street Journal*, April 20, 2000.

Lonely Causes – Redbait and Switch: The Far Right Warred Against Fluoride; Now It's the Lefties' Turn. *Wall Street Journal*. Apr 12, 2000.

Losely, J.; Rayor, L.; and Carter, M. Transgenic pollen harms monarch larvae. *Nature*. 1999;399:214.

Shelton, Anthony M., et al. “Pest Control, Rumor Control,” *Forum for Applied Research and Public Policy*, Fall 2000.

Sherrell, Darlene. Rethinking fluoridation. *Earth Island Journal*. 1998;13 n2 p40-42.

Purpose

“A *justificationist* attitude directs learners to justify, prove, defend, and insist upon what they believe, since being “correct” is rather more than an intellectual imperative. It is a psychological imperative... The *fallibilist* proceeds from the assumption that all human beings are fallible, especially in their ideas. Thus, the fallibilists assume that their own ideas contain errors and can be improved through criticism. Energies are devoted not to justifying one’s beliefs but to investigating them in the certainty that they contain errors and in the hope of eliminating some of them.”

Neil Postman, *Teaching as a Conserving Activity*

“Most students begin college assuming that they can go on doing a kind of writing called ‘knowledge-telling’: In high school, they told their teachers what they already knew, in correct English sentences, assembled into coherent paragraphs... In fact, your college teachers will expect you to do something different. We ask you to write papers for many reasons, but rarely just to report what you read or heard in class. Most teachers, most of the time, will expect you to explain and support not *their* position, but *yours*. We want you to lay out a claim that *you* have come to believe and to explain why you believe it, in more detail than you may think necessary. That doesn’t mean we expect your claim to be unique, only that you reached it because you thought through the reasons, evidence and alternate views.”

Williams and Colomb, “A Message to Students,” *The Craft of Argument*

Academic Writing is the only course taken by all undergraduates at Duke University. Its aim is to help you write powerfully about texts and ideas—and thus to take active part in the conversations of the academy. The University Writing Program has identified four practices we believe are key to this sort of critical, intellectual work: reading closely, making use of the work of others, drafting and revising, and making texts public. (See <http://www.ctlw.duke.edu/uwp.html> for more on the UWP and the programmatic goals of Writing 20.) You will be offered the chance this term to work on your writing through taking part in the give-and-take of an academic seminar—a course whose members read and talk about a common set of texts and issues and who share their writings about them with each other.

“The Science Behind the Controversy” will focus on the literature through which information about current scientific and technological research is disseminated. The course is designed to help you learn to analyze and interpret scientific literature, and to use these analyses to write sophisticated, nuanced arguments on important technological issues. Throughout the course you will work closely with your peers and with me to improve your writing. When you leave this course, I hope you will be better able to write with a sense of purpose, to make each word and sentence count, and to present a complex written argument clearly and concisely. I also hope you leave a more careful and skeptical reader of scientific literature of all kinds.

Design

In our investigation of some current scientific and technological controversies, we will study examples of the different types of sources and evidence available to us as citizens and as scholars.

In the first part of the course we will take up the issues of water fluoridation and the risks of talking on cell phones while driving, as we work on some of the basic principles of academic argumentation (including claims and evidence) that you will make use of during this course, both in your reading of other authors’ works and in your own writing. We will also begin to discuss some vocabulary and ideas related to experimental methodology.

During the second part of the course we will consider some aspects of analyzing scientific literature. We will pay particularly close attention to the distinction between causation and correlation, the meaning of statistical (as opposed to practical) significance, the artificiality of experiments, and the limits of generalizing from data. We will carefully review some scientific journal articles, paying close attention to what the scientist(s) actually did in relation to what they concluded and what secondary sources reported about their work.

In the last and longest section, we will take up two controversial issues in their larger contexts. Here you will work on writing complex and nuanced arguments considering the limits of scientific knowledge and contradictory claims of risks and benefits.

COURSE OUTLINE

I. Arguments about science and technology in the popular press: Water fluoridation

Word choices

Organizing arguments

Claims

Qualifying and hedging

Design of experiments

II. Scientific literature – working with secondary sources

Advantages and disadvantages of secondary sources

Evidence

Paragraphing

Analyzing secondary scientific sources

III. Scientific literature – working with primary sources

Interpreting scientific literature

Crafting nuanced arguments

Statistical significance and practical significance

Causation and correlation

Introductions and conclusions

Details

Your work in this course will fall into one of four categories:

EXERCISES: These are short in-class or take-home tasks that will provide examples or practice for work done in assignments or papers and will often be completed in small groups. Exercises are not graded.

ASSIGNMENTS: These are graded short-to-medium length tasks designed to help you understand ideas and develop writing and analytic skills that you will be using in your work throughout the semester. We will often be working with these materials in class, so *no late submissions will be accepted*. These assignments must be brought to class (or e-mailed to me as directed) by the stated deadline. Examples of assignments are short writings and revisions, peer reviews and drafts of major papers (see below). Grades will be A, B, C, D or 0.

PAPERS: This category includes a review article and two 5-8 page papers that you will write during the latter part of the course. You will be required to take each through multiple drafts.

Grading of drafts:

Drafts of your papers will count as assignment grades.

- 1st drafts will be graded primarily on sincerity of effort and “reach”
- 2nd drafts will be graded on how well your revisions incorporate suggestions and account for concerns articulated by your classmates and me.

Final grades on papers will be based on a rubric that you will be provided. Grades for each draft and final papers will be lowered one letter grade for each day late. First late day begins once the submission deadline has passed.

Grades

Assignments (one grade dropped)	40%
Review article	10%
Papers (2)	25% each

Note: There may well be a time during the semester when you will be late or not be able to attend class (*for whatever reason*). Be smart and save your dropped grade for that day. An assignment missed for official school business (athletic events, student conferences, etc.) *will be* counted as the dropped grade. If you will miss more than one class, be sure to make plans to turn in the assignments.

Format

Your work for this course **must** be composed in Microsoft Word and brought to class or sent electronically as instructed. Put your **name, assignment title, draft, and date on the first page** of each of your writings. For papers, think of an accurate and clear title for your writing and put that on the first page as well. Use a header to **number** the following pages. For all work unless specified otherwise, format your text in a 12-point Times New Roman font, double-spaced, with conventional margins and headings. *Keep an electronic copy of all exercises and each draft of each paper you write for this course.* This means you will need to form the habit of duplicating a document and then making changes to the new copy. Keep copies of *all drafts* of all assignments on a back-up disk, or learn how to save copies of your work to your personal space on the Duke servers. You will need these copies of the various drafts of your papers to complete your work for the course—since when you turn in the final, revised version of a project, I will ask you to submit earlier versions as well.

The Writing Studio

The main offices of the Writing Studio are located on the second floor of the Academic Advising Center on East Campus. (There are also satellite locations at Perkins and Lilly Libraries.) You can go to the Studio for free help with drafting, revising, or editing any writing project you are doing for a course at Duke. The consultants there will work with you on a one-time basis, or they can help you with your writing regularly throughout the term. I encourage you to make use of the Studio; it shows you are taking the work of this course seriously. You can schedule an appointment online at <http://www.ctlw.duke.edu/wstudio/index.html>. Be sure to bring a copy of the assignment and your draft with any comments (mine, yours and/or peers).

Proofreading and Editing

This is not a course in the mechanics of writing. Students in Writing 20 are expected to be able to write reasonably correct prose. This means you are responsible for making sure that your work is presented with care and thought. While I am willing to help you with any questions you may have about points of style, usage, or grammar, **I should not be the first reader of your work and I will not accept any writing that strikes me as hurriedly or carelessly prepared. So make sure to review, edit, and proofread all the work you do for this course before you turn it in.** Use a spell-checker but don't rely on it. Get a good college dictionary (either print or online) and writer's handbook—and learn how to use them as well. (See me if you have any questions.) *And feel free to ask friends or roommates to look over your work.*

Plagiarism

To deliberately present someone else's work as your own is to plagiarize. When you quote, paraphrase, respond to, or in any other way draw on the work of others in your writing—as you will surely do in this course—you need to acknowledge that you are doing so. This is the case whether your sources are published authors, fellow students, teachers, or friends. *The penalty for plagiarism is failure for this course.* On a practical level, you will be asked to cite and document sources in your writing. The Duke Library has also posted guides to documenting sources and avoiding plagiarism at <http://www.lib.duke.edu/libguide/citing> and <http://www.lib.duke.edu/libguide/plagiarism>.) If you have any questions about if or how you should document your use of a text or idea, play it safe, ask me.