Instructor's Manual

The Art of Questioning:
An Introduction to Critical Thinking

Daniel E. Flage
James Madison University

Prentice Hall, Upper Saddle River, New Jersey 07458

10 9 8 7 6 5 4 3 2 1

ISBN 0-13-049238-8

Printed in the United States of America

Table of Contents

***The Art of Questioning: An Introduction to Critical Thinking*, Daniel E. Flage, Prentice Hall, 2004.**

This manual begins with some general remarks on the purpose of the book. It contains sample syllabi. It contains solutions to the even-numbered problems. It contains suggestions for approaching the various chapters. It contains three sample examinations and the questions in the test bank. You can design examinations that reflect your preferred examination schedule and the chosen content of your course with the Prentice Hall Test Generator. Please contact the author through the publisher, through the Department of Philosophy and Religion, MSC 7504, James Madison University, Harrisonburg, VA 22807, (540) 568-6394, or flagede@jmu.edu if you have any comments or questions.

Preface: The Purpose of *The Art of Questioning*

Warning: The following four paragraphs contain pretentious prose of the sort you'd expect in a preface. I apologize, but I didn't believe my editors would let me get by with either, "The propose of this book is to encourage students to raise questions about the information with which they're bombarded and to provide guidance in evaluating that information" or, better (?), "The purpose of this book is to teach students a little logic without using the word 'logic', since some students find the word 'logic' frightening."

In the Information Age, we are bombarded with claims and counter-claims. There are the usual suspects who would have us accept their claims at face value: advertisers, politicians, pundits, and assorted purveyors of linguistic legerdemain. The Internet provides information on virtually any issue, and, as *we* know, the overwhelming majority of it should be ignored. And there are numerous people—all of us at one time or another—who unwittingly present hearsay evidence as if it were indubitable truth. What is a person to do?

The primary purpose of *The Art of Questioning* is to instill in students a willingness to question what they hear, see, and read, and to provide guidance in evaluating that information. Most first-year college students have proven they can "learn the facts." Few have asked why the facts are as they are, or whether the statements they have accepted as factual are true or well supported by evidence. Students who "question authority" seldom examine the credentials either of the authority questioned or of the authority which supplants it.

It is my hope that students completing a course using this book will regularly ask two questions. (1) Given any statement, is it true? (2) What reasons are there to believe that the statement is true or false? To answer the first question, they will need to ferret out what is claimed. Are there ambiguities? Is anything vague? How precise must the claim be to determine whether it is true or probably true? To answer the second, they must understand the domain of argument and evidence. So the book begins with some general considerations regarding language before focusing on argument.

According to Socrates, the unexamined life is not worth living. By learning to ask questions about what they believe and what they do or should do, and by developing strategies to find rational answers to those questions, students will be on their way to an examined life. An examined life may not be easy. Students will discover that many questions have no clear answers. While one strives for certainty, often the best one can do is obtain a reasonable degree of probability. Nonetheless, one hopes that by raising questions and seeking evidentially supported answers, it is possible to stave off disaster in both one's personal and communal life.

A few remarks on assessment tests

If your school is like mine, 'assessment' is the word of the decade. There are several nationally and internationally recognized, commercially available assessment tests for critical thinking. None is perfect. I tend to believe that we learn more about our students' abilities to reason carefully by having them analyze an extended essay and write an argumentative essay than we learn from a 50-minute Scantron® test. The essay approach, however, is time consuming, difficult to quantify, and might be deemed "subjective," three traits which are not applauded by administrators.

If you have any say in choosing the test, there are various questions you might ask. (1) Are the instructions clear and free from unnecessary jargon? If the students can't understand the instructions, you're not testing the

desired skill. Particularly if you use a pretest, can you expect students to understand instructions such as, "Determine whether the conclusion in each of the following arguments follows with necessity from the premises"? (2) Does the test cover the skills in the appropriate way? When there are alternative interpretations of a logical procedure, such as the distinction between the Aristotelian and Boolean interpretations of categorical logic, does the test assume the same interpretation you covered in the course? To answer these questions, you will need to go through the tests carefully with an answer key. If you do this, you will discover, for example, that the *Watson-Glaser Critical Thinking Appraisal*, Form A (Harcourt Brace Jovanovich, 1980) assumes the Aristotelian interpretation of categorical logic, since the "correct" answer to question number 37 is that the conclusion follows, and the conclusion follows *only* on the Aristotelian interpretation. (3) Related to the second question, is the answer key correct? If the questions are multiple choice, is the "correct" answer clearly so? Are there other possible answers that are equally reasonable? (4) Finally, what skills are tested? There are literally hundreds of skills deemed "critical thinking skills." Any commercially available test will test only a small subset of those skills. Dr. Don Fawkes presents a lengthy list of skills at http://www.geocities.com/fawkesdx/. He also includes a comparison of skills covered on various commercially available tests, which might provide a useful beginning for your own evaluations.

If you have no say on which critical thinking skills test is used at your school, I can only assure you that all the commercially available tests exhibit the forms of psychometric wonderfulness on which your assessment officer thrives. My concern is with the content. And I cannot *recommend* that students be given hints regarding any dubious "correct" answers, hints of the form "9 = A." Regardless of the importance your school ascribes to assessment tests, it wouldn't be proper to give such hints, would it?

Syllabi: Ways to Use *The Art of Questioning*

The Art of Questioning is a comprehensive introduction to critical thinking. As such, it should include everything you would want in a critical thinking course. It also contains more material than you could expect to cover in a one-semester course. So, I include several possible syllabi for courses with alternative objectives. The first three syllabi assume that the course is a sixteen-week semester course in which final exams are given during the sixteenth week.

My course. The course I teach is a stand-alone critical thinking course. In our general education program, it is linked to an oral communication course and a writing course. In principle, if not always in practice, some of the topics covered in the critical thinking course are duplicated, reinforced, or approached in different ways in the companion courses. My syllabus is as follows.

Week 1: What is critical thinking? Some hazards of language. Discussion. Introduction and Chapters 1-4
Week 2: Chapters 5-8
Week 3: Chapters 9-10
Week 4: Chapters 10-11. Test #1 on Friday
Week 5: Categorical Syllogisms: Chapters 14-15
Week 6: Chapters 15-17
Week 7: Chapters 18-19
Week 8: Chapters 19-20
Week 9: Chapters 22-24
Week 10: Chapter 21-24, Test #2 on Friday
Week 11: Chapters 25-26
Week 12: Chapters 26-27
Weeks 13-14: Chapter 28-31, Informal Fallacies
Weeks 14-15: Chapter 32, Essay Analysis

I assume that there are three basic questions on which the critical thinker focuses. (1) Is a given statement true? (2) What reasons are there to believe that the statement is true or false? (What is the argument?) (3) How good are the reasons given to believe that the statement is true? (How strong is the argument?) Since one must know what the statement asserts before examining questions of truth and falsehood, I begin with questions regarding language, particularly questions concerning ambiguity and vagueness. The focus is on argument. I cover the early chapters rather quickly, so the students have some understanding of the distinction between argument and other forms of

discourse. We treat questions of observation and testimony (Chapters 10 and 11) in terms of inductive arguments. There is then a fairly thorough examination of deduction and an extended examination of induction. We typically conclude either with a discussion of informal fallacies or essay analysis. These topics tend to draw together topics examined earlier in the course.

There are several points to note about my syllabus. First, I do not include a discussion of ethics and aesthetics (Chapter 12). Moral and aesthetic issues are complex. While I consider Chapter 12 a good introduction to some of those issues, I skip the chapter due to time constraints and the fear that students will believe they have "all the answers" after a brief examination of the topics. Second, I do not examine truth tables (Chapter 21). Again, time is a reason. Another reason is that the administrators of our general education program frown upon symbolization. Third, while the course concludes with informal fallacies or essay analysis, the 'or' is exclusive. There generally is not sufficient time to do both.

If you want to teach approximately the same course I teach, the syllabus could be modified in any number of ways. I approach categorical syllogisms *both* by way of a set or rules and by Venn diagrams. The reason is that the learning styles of students differ. "Visual learners" tend to prefer Venn diagrams—and symbolic representations of propositional arguments—while many students prefer the rule approach. You might elect to use only one approach. While I spend considerable time on syllogisms, even though most ordinary arguments are propositional, you might exclude some of the chapters on categorical logic and devote more time to propositional arguments. This should allow more time for such things as essay analysis.

An alternative syllabus: beginning with informal fallacies. Some people prefer using informal fallacies as a springboard to broader discussions. If you are one of those, you might prefer a syllabus such as the following:

Week 1: What is critical thinking? Some hazards of language. Introduction and Chapters 1-4
Week 2: Chapters 5-8
Week 3: Chapters 9-10
Week 4: Chapters 28-29
Week 5: Chapters 30-31 Test
Week 6: Chapters 13-15
Week 7: Chapters 16-17
Week 8: Chapters 18-19
Week 9: Chapters 20-21
Week 10: Chapters 22-23
Week 11: Chapter 24 Test
Week 12: Chapters 25-26 (Chapters 10-12 might be used in conjunction with the discussion of induction.)
Week 13: Chapters 26-27
Weeks 14-15: Essay analysis

Students generally find informal fallacies interesting and confusing. If the informal fallacy chapters are used early in the course, the several references to other chapters act as a means of showing why what is done later is relevant to the discussion of "everyday" arguments. The syllabus can, of course, be modified to deemphasize categorical syllogisms if that fits your needs or interests.

Another approach: beginning with induction. Few students enter college with a clear understanding of arguments. While those who participated in debate in high school might have some understanding of deduction, many students have confronted arguments only indirectly through discussions of "the scientific method." (They've confronted deductive arguments in math, but math problems are seldom set forth as arguments.) Further, most of the arguments they confront in daily life are inductive. So, rather than going from pristine arguments to messy arguments, as I tend to do, one might claim it is better to meet the students on somewhat familiar turf, and begin with a discussion of induction, going from there to the formal rigors of deductive argument. On such an approach, the syllabus might look more like this:

Week 1: What is critical thinking? Some hazards of language. Introduction and Chapters 1-4
Week 2: Chapters 5-8
Week 3: Chapters 8-9 Test

Week 4: Chapter 10 (or Chapters 10-11)
Week 5: Chapter 11 (or Chapters 11-12)
Week 6: Chapter 25
Week 7: Chapter 26
Week 8: Chapter 27 Test
Week 9: Chapters 20-21
Week 10: Chapters 21-22
Week 11: Chapters 23-24 Test
Week 12: Chapters 28-29
Week 13: Chapters 30-31
Weeks 14-15: Essay analysis

This syllabus is subject to numerous variations. For example, as it stands, there is nothing on categorical syllogisms. One might want to substitute some discussion of categorical syllogisms for some of the material on propositional logic or devote time to syllogisms in place of essay analysis or informal fallacies. Some might want to insert the discussion of informal fallacies after the general discussions of arguments (Chapters 6-9).

In a writing course. First-year college students often take a two-semester writing course. *One* objective of such a course is to teach students to read carefully. *Another* objective is to teach students to write well and, often, persuasively. These are issues covered in Chapters 32 and 33 of *The Art of Questioning*. While many of my students have suggested that the examination of argument *before* taking the required writing course is useful, the book could be used with a book of essays as the basis for a writing course. Chapter 32 walks students through the process of *reading* an argumentative essay. Chapter 33 walks students through the process of writing an argumentative essay (with an emphasis on writing for clarity).

There are several ways *The Art of Questioning* could be incorporated into a writing course. So, I sketch a couple alternatives.

(1) The abstract-before-the-concrete approach. Many collections of essays used in writing courses take a rhetorical approach based on Aristotle's *Rhetoric*. Hence, they begin with a brief discussion of the distinction between *pathos* (emotional elements), *logos* (reasoning), and *ethos* (credibility). A course built around *The Art of Questioning* would focus on the logical elements and the strength of the evidence presented. Such a course might begin with a week or two in which students examine short essays in the unguided way in which typical first-year undergraduates do so. After a bit of flailing, the instructor could say something such as, "Since essays include arguments—reasons given for claiming that a statement is true—we would do well to look at ways to identify and evaluate arguments." This would be followed by a brief (3-5 week) critical thinking course. Such an abbreviated course could include most of the following:

Chapters 6-9 (the basic introduction to arguments)
Chapters 23-24 (which contain the most common deductive argument forms found in essays)
Probably Chapter 11 (testimony), since that would provide guidelines for evaluating authorities
Some elements from Chapters 25-27
Chapter 32 How to Read an Essay

Typically, reading comes before writing. One would expect the writing instructor to be teaching various writing techniques along the way. The instructor might require descriptive writing and explanatory writing before tackling the argumentative essay. Chapters 4 and 5 would provide a good conceptual background for such assignments.

Argumentative essays are more challenging than descriptions and explanations. Chapter 33, How to Write an Argumentative Essay, would provide the backbone around which assignments to write argumentative essays would be built. If the course is a writing-and-literature course, Chapter 27, Hypotheses, Explanations, and Argument to the Best Explanation, could also be incorporated, since it discusses how an interpretive essay is an instance of an argument to the best explanation.

A course of this sort probably would run two semesters. If a quarter to a third of a semester is devoted to general critical thinking issues, there would not be sufficient time in one semester to require students to engage in a sufficient volume of writing and revision to master or significantly improve their writing. *The Art of Questioning* would function as the basis for an introduction to reasoning, as a manual for critical reading, as a manual for writing argumentative essays, and as a resource for other issues regarding arguments (e.g., informal fallacies, categorical syllogisms) that arise along the way.

(2) A one-semester course with a focus on argumentative essays. If students already have honed their critical thinking skills, *The Art of Questioning* might be used in a one-semester course devoted explicitly to writing argumentative essays. In such a course, one might expect a brief review of issues such as recognizing and constructing arguments (Chapters 6-8), and a brief review of essay analysis (Chapter 32)— these preliminaries might take three or four class periods—but the focus would be on the methods and techniques discussed in Chapter 33. In such a course, the remainder of the book would stand as a ready resource regarding particular issues germane to argument.

The Study Guide

The Study Guide is an additional source for students. It contains a short outline of each chapter that highlights most of the vocabulary words from the chapter, a ten-question vocabulary quiz, a discussion of the major points in the chapter, and some additional exercises. Chapter 33, Writing an Argumentative Essay, also contains a discussion of resources that are useful to writers. There are also supplements to Chapters 26 and 27 and a discussion of Euler diagrams. The supplement to Chapter 26 concerns the probability calculus and other issues regarding numbers. The supplement to Chapter 27 is a discussion of Mill's Methods of Induction. The discussion of Euler diagrams assumes the Boolean interpretation of categorical logic. The system is sound and complete. The discussion examines the use of Euler diagrams to evaluate syllogisms and the use of Euler diagrams to find missing premises.

The Website

The Companion Website, www.prenhall.com/flage/, contains further resources. There are flow charts for some of the individual chapters, as well as a collection of flow charts that summarize the entire process of critical thinking. For those who would like to carry formal proof techniques beyond the scope covered in *The Art of Questioning*, Chapter 6 of my *Understanding Logic* (Prentice Hall, 1995), is included on the Web page. This focuses on propositional logic, including conditional and indirect proof. Solutions to the odd-numbered exercises for that chapter are on the student Web page; solutions for the even-numbered exercises are on the instructor-only portion of the Web page.

At various places in *The Art of Questioning* there are references to URLs. The links are on the web page, so, for example, students can easily observe the various works of art to which there are allusions in Chapter 12. Since Prentice Hall carefully maintains the Web page, the links will be carefully maintained, so if there are changes, the changes will be found on the Web page.

The Test Bank (TestGen and QuizMaster)

The TestGen program (on CD-ROM) allows you to construct your own tests from the test bank for the book. The test bank contains all the vocabulary quiz questions and exercises in the Study Guide, as well as additional exercises and vocabulary questions for most of the chapters. The complete bank of test questions is included at the end of this manual. The QuizMaster program can be placed on a computer network. I believe the TestGen and QuizMaster programs will be a very useful program for both those of you who give paper tests and those who utilize the Internet. It should be a boon for those of you who teach onlin

Suggestions for using *The Art of Questioning*

The book is divided into eight parts. The chapters in each part are closely related to one another, so my remarks are grouped by parts. I hope some of these materials will be useful. If you develop techniques that you find particularly useful, you are invited and encouraged to post them on the instructors section of www.prenhall.com/flage/.

Many of the assignment suggestions concern news stories. This is primarily a matter of convenience. If your critical thinking course is part of an integrated core program or tied in some other way to another class or classes, it would be ideal to develop some assignments relative to the materials that are used in one of the other classes. If you give an assignment on descriptions (Chapter 4), for example, you might ask the students to look at a particular passage in their history book or in a book they are reading for their literature class. Critical thinking applies to virtually every aspect of one's life, so diversity among sources of assignments is beneficial.

Part I: Chapters 1-5

Part I concerns the basic elements of language. Chapter 1 is concerned with statements. Statements are true or false. It is important to stress that truth and falsity are *only* properties of statements, or that as used in your course they are only properties of statements. To determine whether a statement is true or false, you need to determine what is being claimed. Words are often ambiguous or vague. Poor sentence construction often results in ambiguous claims—sometimes with comedic effect. You might want to find a number of sentences that contain ambiguous words, or vague words, or which are loosely constructed and ask the students whether the statements are true or false. Since the top of my head more closely resembles a billiard ball than a jungle, I often ask, "True or false: Dr. Flage is bald." After an audible gasp, there is a great deal of talk about "balding", which works just as well, since it is unclear when one has passed the line from balding to bald. Discussing examples and trying to figure out which of several possible meanings is probably the one intended drives home problems with ambiguity and vagueness. Humorous examples are always good.

The distinction between factual and verbal disputes is fairly straightforward, and students might believe real cases of confusing verbal disagreements for factual disagreements seldom arise. If you think about it for a while, I suspect you can think of a case or two of "serious scholarly disputes" which were largely verbal. I remember a case in which two Wittgenstein scholars—one a scholar of the early Wittgenstein, the other a scholar of the later Wittgenstein—engaged in a fundamentally verbal dispute. If you can find an example or two—ideally examples that are not horribly scholarly—it should drive home the point.

If you're looking for a homework assignment on Chapter 1, you might ask students to comb newspapers, magazines, textbooks, and so forth looking for examples of vagueness, ambiguity, and verbal disputes. I suspect this would be a difficult assignment, and it might be more reasonable to have a standing request that students bring in examples when they find them. If you give extra credit in your class, you might work out a way to gain extra credit points for finding such examples. Or if you like student journals, asking students to find ten or fifteen examples of ambiguous statements (complete with citations) from their readings over the course of a semester might be reasonable. Similar assignments might be made regarding topics in other sections of the book.

Chapter 2 concerns commands and questions. Questions of vagueness and ambiguity can arise. The more pressing matter is one of authority. Does the person or organization giving a command have the authority to do so? Why or why not? Since commands can be reformulated as obligation statements, the chapter provides an occasion for discussing kinds of obligations and possible conflicts among obligations. Questions concerning authority are related to questions regarding testimony (Chapter 11). Questions concerning obligation are related to ethics (Chapter 12). You might want to point out the connections with later chapters, or refer back to Chapter 2 when you discuss the later chapters.

Chapter 3 is on the emotional connotations of words. The emotional connotations of words can influence our beliefs or actions without presenting an argument. The emotional connotations of words can show the writer's or speaker's bias. So, you might want to look at some advertisements to show how the wording might influence beliefs or actions. You might want to look at a news story to show how the choice of words tends to show the bias of the

newspaper or magazine. You might also discuss how bias can "blind" a person to various facts. (This is related to Chapters 10 and 11.)

If you are looking for a homework assignment for you students, you might give them an advertisement and ask them to rewrite it using emotionally neutral terms. They might also discuss how the shift in wording influences the persuasive nature of the ad. The Study Guide includes such a discussion of an ad for a business fraternity. The Study Guide also includes a brief discussion of "weasel words."

Chapter 4 concerns descriptions. Descriptions answer the questions Who? What? When? Where? and sometimes How? We might think this is obvious, but pointing out the obvious is sometimes important. On the one hand, it helps students focus on the central points in factual discussions. On the other, it reminds them of some of the things that should be included in writing an essay exam. When I was a college freshman (people were freshmen back then), one of my history professors pointed out the need to answer the journalistic questions in writing an essay exam. It was helpful then, and I suspect it would be helpful now. Further, there is a tendency to draw unstated inferences from descriptions. If there is a news story about flooding in the Midwest or rioting in Beirut, does this tell you how widespread the phenomenon was? By devoting some time to descriptions, students should learn to attend to *exactly* what is said.

If you want to give a homework assignment on Chapter 4, you might find a news story and ask your students to determine who did what to whom, when, where, and how. You might pose a number of questions regarding inferences drawn or one might be tempted to draw from the news story. Depending upon the story, you might also have them judge the bias of the author based upon emotionally charged terms.

Chapter 5 is an introduction to explanations. Explanations answer the questions Why? and sometimes How? The How? questions are typically How do you do something? or How did something happen? The latter is a variation on Why? Explanations are very common. Students regularly confuse explanations and arguments. So, I believe it is important to stress that in an explanation, the phenomenon to be explained (the explanandum) is known first. It is also worth noting that one often needs to know something about the context from which discourse was taken if one is to determine *what* is known or assumed at the outset.

The exercises for the chapter include asking students to find explanations in various academic contexts. I know of no other kinds of homework assignment that one reasonably could give at this point regarding explanations. We return to explanation and the evaluation of explanatory hypotheses in Chapter 27.

Part II: Chapters 6-9

The heart of the book is the discussion of argument. This begins in Chapters 6 and 7 with a discussion of the distinction between deductive and inductive arguments. When discussing argument forms, I include an analogy to other kinds of forms. I've included the "Can it strengthen or weaken the argument if you add another premise? If it can, then the argument is inductive" approach to distinguishing inductive arguments from valid deductive arguments (in Chapter 8). There are exercises in which the student is asked to give another argument of the same form as the given. There are deductive counter-example exercises (which students might find challenging). There are examples of different kinds of inductive arguments: analogies, inductive generalizations, arguments to the best explanation. You can go through the two chapters with considerable care, and, if you're lucky, by the time you finish, about half your students will have a vague idea of the distinction between a valid deductive argument and an inductive argument. Don't be discouraged. They'll understand it by the end of the course.

Part of the problem is that the definitions of 'induction' and 'deduction' are unfamiliar and somewhat technical. A valid deductive argument form is an argument pattern such that it is impossible for all the premises to be true and the conclusion false. Anything less than a valid deductive argument is an inductive argument (and some inductive arguments are so weak one hesitates calling them arguments). Part of the problem is that your students probably have been taught that deductive arguments go from general premises to a particular conclusion, and inductive argument go from particular premises to a general conclusion. I attempt to disabuse them of the faulty (if common) definition by giving examples of what *everyone* would grant are deductive arguments which do not follow the prescribed pattern.

All humans are mortals.	If Jan goes to the movie, then Stan goes to the movie.
All Greeks are humans.	Jan goes to the movie.
All Greeks are mortals.	Stan goes to the movie.

Similarly, I give them an example of an analogy which goes from particular (singular) cases to particular cases.

> Sam and Jan are alike insofar as they are both first-year students at State U., and they both take English 101, Humanities 101, and History 101.
> Sam takes Speech 101.
> So, it is likely that Jan takes Speech 101.

I point out that there is *no* generalization before reaching the conclusion. Such examples help, but I doubt that the students understand the distinction before you devote some time to either categorical syllogisms or propositional arguments.

Chapter 8 focuses on recognizing arguments. There are lists of premise indicators and conclusion indicators. There is a discussion of how to understand premise and conclusion indicators: as a premise indicator, 'since' is short for 'since it is true that'. There is general procedure for identifying premises: Find the conclusion first and ask what reasons are given for you to believe that the statement is true. And there's a bit on enthymemes. My favorite example of an enthymeme is in the Nook passage in Dr. Seuss's *One Fish Two Fish Red Fish Blue Fish*. (The students find this amusing.) The missing premise has to be either "Everything that can cook is a thing that can read" (which yields a valid argument) or "Everything that can read is a thing that can cook" (which yields an invalid argument). Then we ask whether either possible premise is true, or whether there might be a context assumed in which "Everything that can cook is a thing that can read" would be true, e.g., readers of Dr. Seuss books. I stress the importance of treating arguments with respect and that the principle of charity is *not* an anything-goes principle. If you have to bend over backwards to find a context in which the argument is sound or strong, you'll point out the cases of vagueness or ambiguity, so there is a criticism of the manner in which the argument is presented, even if you ultimately deem the matter acceptable.

At this point I typically do two things. We bring in a few issues of the university newspaper and spend most of a period looking for arguments. We look at the editorial page, the op-ed page, and several regular columns, where one should expect to find arguments (and often does not). We look at some advertisements, noting that the conclusion is usually an implicit "You should buy our stuff." Then I give them the following homework assignment:

> In the popular press (newspapers, magazines, textbooks other than critical thinking textbooks or logic textbooks) find four arguments. State the arguments formally, distinguishing between the premises and the conclusion:
>
> Premise:
> Premise:
> Premise:
> Conclusion:
>
> Indicate whether they are inductive or deductive, giving reasons for your judgment. Are the arguments "good"; that is, if the premises are true, is there good reason to accept the conclusion, and are the premises true? **Arguments we have already examined in class *may not be included***. You must provide a complete reference for the articles from which the arguments are taken.

I ask for a formal presentation of the argument since marking premises and conclusions on the original newspaper or magazine article usually leaves it unclear whether the students have found their way through the argument. For the remainder of the assignment, I give a great deal of credit for effort (or completion). I'm more interested in whether the students have *some* understanding of the inductive/deductive distinction than whether they consistently get it right. I also give partial credit for explanations, which they regularly confuse explanations with arguments. Some students confuse conditional statements with argument. For that confusion I give no credit.

As you might note, I only ask my students to find four arguments. That probably is not enough. Ten would be better, but you always need to consider "trivial" issues, such as the amount of time you have for grading (returning homework promptly is always a good idea), the value you place on your sanity, and so forth. The assignment also would be better if they were limited to one advertisement, one from an editorial, one from a letter to an editor, one from a textbook or a textbook in a certain discipline, and so forth. You'll discover, however, that they will have some trouble finding *any* arguments.

Chapter 9 is on argument trees. The emphasis in the chapter is on formally stating (reconstructing) arguments as a first step toward building an argument tree, ferreting out missing premises, and considering alternative ways of reconstructing a given argument. In constructing argument trees, students have to develop arguments of their own, or meta-arguments if you prefer, since they must provide reasons why some of the arguments considered should be understood one way rather than another, reasons to believe that a certain premise was assumed, and so forth.

Argument trees are useful insofar as they require students to carefully think through the elements of an argument. Some of you might want to use them throughout the semester, even though the book does nothing with them after Chapter 9. The stalwart will give their students arguments and tell them to go forth and construct trees. My approach is more modest. We work through a goodly number of argument trees in class, but the tests I give on them are multiple choice. (See sample test 1.) I assume (perhaps incorrectly) that developing an understanding of argument is a slow process, and while it is reasonable to expect students to be able to determine early in the game which of five trees is the best representation of an argument, it takes considerably more skill to construct their own trees. If you wish to give argument trees a major role in your critical thinking course, you will probably want to devote at least a week or two to trees, and you'll probably want to use some of the arguments in Chapters 6, 7, and 8 as the basis for constructing additional trees.

Part III: Chapters 10-12

Chapters 10-12 focus on everyday arguments, although in the cases of observation statements and testimony it might not be immediately obvious to the student that the topic is induction. Chapters 10 and 11 are concerned with the *evaluation* of observation reports and testimony. Criteria are given for evaluating observation reports and criteria are given for evaluating testimony. Complying with any one of the criteria tends to strengthen or weaken the evidence that the observation claim or testimony should be accepted. Failure to comply tends to weaken the evidence. Discussions—the students will need to develop arguments—can focus on why a given criterion in a given situation is a telling reason why the claim should be rejected, while the same might not be the case in another.

Chapter 11 includes a discussion of evaluating research sources, with a number of cautions regarding research in general and the Internet in particular. If *The Art of Questioning* is used as part of a writing course, this might be of particular interest, although it is an issue that is relevant to the life of any undergraduate.

It is well known that eye-witnesses to an event often given conflicting accounts of the event. You might ask one of your colleagues to interrupt your class and ask two or three carefully scripted questions. This should take no more than a minute—thirty seconds would be better. When he or she leaves, ask your students to write down a description of the person and the content of the conversation. Then discuss the observations to see how consistent they are. Ideally, the exchange would be videotaped, so the observation statements could be checked against an instant replay. (Those with a flair for the dramatic can think of interesting variations on this. At one time I thought a "robbery" would be interesting—complete with a curtain call in which the "robber" is introduced as Professor So-and-so, given a plaster statue for "best lead in a critical thinking drama," etc.—but some students might find that traumatic, others might be proactive and injure the "robber," and still others might call the police on their cell phones. So, be imaginative, but within reasonable limits.)

If you're looking for an example of learning how to interpret what you see, you might consider satellite images. United States Geological Survey images of any part of the United States are available at http://terraserver.microsoft.com/default.aspx. Some are a bit dated, so you *will* find images of the World Trade Center Towers, though you might not find an image of the street on which you live. As satellite imagery during the war in Iraq tended to show, what you're seeing is not always obvious.

Chapter 12 is on ethics and aesthetics. It is *not* an introduction to moral and aesthetic theory. Its purpose is to show (a) that reasonable arguments can be developed regarding moral and aesthetic issues, (b) that it is not unreasonable to claim that the development of moral or aesthetic knowledge is analogous to the development of scientific knowledge, and (c) it is reasonable to claim that some moral and aesthetic claims are true. Moral rules are taken as statements of means to the end of "societal health." Although the chapter will not cure students of moral relativism, I believe it will at least give some reason to call moral relativism into doubt. It ties into the topics of the previous two chapters insofar as the approach to ethics and aesthetics is broadly inductive. (If your area is moral philosophy, I'm sure you'll find many points to criticize.) The chapter contains *no* exercises, although I believe the discussion questions could provide the basis for interesting conversations.

Part IV: Chapters 13-19

For most of two thousand years, categorical syllogisms were paradigms of deductive arguments. They still provide an easy introduction to deductive arguments. This part contains two approaches to evaluating categorical syllogisms. Chapter 15 introduces six rules for evaluating syllogisms. Chapter 16 introduces the Venn diagram technique for evaluating syllogisms. In addition the Study Guide includes an Euler diagram technique for the Boolean interpretation of categorical syllogisms. I have introduced alternative approaches to categorical syllogisms, since students differ in learning styles. I typically teach rules first. About 75 percent of my students use the rule approach. (I've long assumed that if I taught Venn diagrams first, 75 percent would use Venn diagrams.) There are always about 25 percent of my students who latch onto one approach and find the other intractable. And every two or three years, someone opts for Eulers (which I allow, but probably shouldn't). My working assumption is that critical thinking is a practical enterprise, so some of the standard things you'd find in a logic book are not included. There is no discussion of mood and figure, for example, although I say a few words about mood and figure below. The discussions start with the simplest cases—argument forms given in terms of *S*, *P*, and *M*—then we add words, then we worry about finding missing premises, and finally we look at messy arguments in ordinary English. Included below are (1) a chart showing the application of the rules to the 256 argument forms and where arguments of some of those forms are found in the chapters and (2) a chart showing the Venn diagrams for the 64 possible combinations of premises.

Chapters 13 and 14 provide an introduction to categorical propositions and syllogisms. Chapter 13 introduces the notion of a categorical proposition together with the terms used to describe them: quantity (quantifier, universal, negative), quality (affirmative, negative), subject term, predicate term, standard form categorical proposition. Similarly, Chapter 14 introduces the notion of a categorical syllogism together with the terms used to describe them: major term, major premise, minor term, minor premise, middle term, standard form categorical syllogism, validity, form, soundness. Experience suggests that some students have problems recognizing that a particular negative proposition is a *negative* proposition. It takes some time for some students to understand the distinctions among major, minor, and middle terms. You will also discover that some students need reminders regarding premise and conclusion indicators.

There are several questions that arise regarding the treatment of syllogisms, so I'll put in my two cents worth—and, of course, if you believe claiming it's worth two cents inflates its value, please ignore them. (1) There are those who suggest that since critical thinking is a practical enterprise and since it is intended to apply to everyday life, we should keep everything in words. I believe that is a mistake. Argument forms are abstract entities. One of the marks of an educated mind is the ability to abstract from the given. So, stripping terms down to a single letter or a small number of letters (a meaningful abbreviation) is consistent with the broader objectives of education. Further, once you have determined that there are exactly three terms used in the same sense throughout the syllogism, the words are superfluous. It is easier for all concerned to use letters. (I'd appeal to economic or environmental issues regarding the excessive use of chalk or ink, but that might be pushing things.) (2) There are those who suggest that since *P*, *S*, and *M* represent the major term, the minor term, and the middle term, you should always restate the syllogism in terms of *P*, *S*, and *M*. I believe that's a mistake too. Students must determine which terms *are* the major, minor, and middle, but the probability of a purely clerical error increases if students need to shift from words to something other than abbreviations. Further, *you* want to see what they are doing with the argument—especially when they are playing with ordinary English arguments (Chapter 19)—and this is masked by changing everything to *P*, *S*, and *M*. Indeed, when dealing with ordinary English syllogisms, you will probably want to specify at least one term and abbreviation—"Treat 'cool cats' (CC) as the minor term"—to preserve your own sanity. Without such a specification, grading can become a nightmare.

Chapter 15 introduces six rules for evaluating categorical syllogisms. These are *not* rules that are tied to a list of fallacy names, such as you find in Copi and Cohen's *Introduction to Logic* or Flage's *Understanding Logic*. I believe these are simpler to apply than the traditional rules. The rules are also redundant: *except for rule 1*, if a syllogism breaks one rule, it breaks at least two. (Rule 1 basically says, "Make sure you have a syllogism.") So, rule 6, for example, could be dropped without loss in judging validity. I have retained it, however, since it is useful in finding a missing premise (Chapter 17). I believe that applying the rules should be straightforward. The only confusion the students are likely to have concerns distribution. I generally give my students the standard account of distribution and add, "If the notion of distribution is puzzling, put a Post-It® note on the page with the distribution chart, do about thirty problems, and it will become second nature."

Chapter 16 introduces Venn diagrams. Some students have problems with Venn diagrams. You will need to stress that one diagrams *only* the premises and then checks to see if the conclusion is diagrammed. (No matter how often you say that, you will see some very strange Venn diagrams on which students diagrammed the conclusion of an invalid argument.) Since the idea is that you diagram the premises to see if you've diagrammed the conclusion, you might consider doing two-circle diagrams for each of the premises on overhead projector transparencies, and then join them together to form a three-circle diagram. If there are two universal premises, exactly four areas of the three-circle diagram must be shaded if *any* conclusion follows—and it's fewer than one time out of four that the *correct* conclusion is diagrammed. Since shading is done by way of lines, you can assure your students that whenever diagramming results in an area that is crosshatched, the argument is invalid.

Students regularly have problems determining on which line the *X* is if the *X* is on a line. I always tell my students that *X* goes on the line of the circle *not* mentioned in the premise. That doesn't always help. I've suggested that they consider drawing each circle in a different color so they know which circle is which. That usually doesn't help (although it is suggested in the Study Guide). I suspect that one simply has to go through examples until the students "see it"—and recognize that some never will. Of course, if an *X* goes on a line, the argument is invalid.

I recommend being very strict and insist that the Venn diagrams be done exactly one way: upper left circle for the minor term, upper right circle for the major term, and bottom circle for the middle term. There is a good reason and a better reason for this. If they always do the diagrams in the same way, students should be able to complete the diagram and tell at a glance whether the argument is valid. If they're always done the same way, you won't lose your mind as quickly; you won't have to twist diagrams, turn diagrams, and look at diagrams in mirrors to see whether they are correct. I'll let you decide which the better reason is.

While we might delight in the celestial realms of forms without words and be only slightly pained by the descent into domain of standard-form categorical syllogisms, at some point we must confront the reality of ordinary language. Chapter 17 begins this descent by looking at enthymemes. If the conclusion is unstated and you're using rules, check three points first. If the middle term is undistributed or distributed twice, or if there are two negative premises, or if there are two particular premises, the argument is invalid. If you pass those hurdles, it's a snap: the conclusion is particular if and only if there is a particular premise; the conclusion is negative if and only if there is a negative premise; and then you only need to match up distributions. And somewhere along the way you'll have to check to see that you have exactly three terms. If you're doing Venns, just do them, and see what conclusion, if any, you can read off the diagram.

Looking for a missing premise is not much harder. If you're using rules check to make sure you *don't* have (a) a negative premise and an affirmative conclusion, or (b) a particular premise and a universal conclusion, or (c) an unequally distributed major or minor term (it's one or the other, but not both, of course—a point some of your students will miss). If any of those sins are committed, mark it invalid, name the rule, and go on to the next problem. If there are no problems, start at the bottom of the list of rules and read off whether it has to be particular or universal, affirmative or negative, and make sure the distribution of the major or minor and middle terms are correct, and you're done. Well, you're almost done. It's at this point that you can make sure you have exactly three terms. And you really should ask whether the missing premise is true. (You'll discover, alas, that despite your best efforts, some students will look for true premises rather than premises that yield a valid syllogism, or if they're asked to indicate whether the missing premise is true, they'll forget.)

You can do this with Venn diagrams too. If you've been doing Venns as long as I have (which is unlikely) you'll initially find it a bit strange. If you diagram a universal premise and a universal conclusion of a syllogism in

which there is a premise that will yield a valid syllogism, you'll double-shade (crosshatch). Don't panic. This is as it should be. The missing premise is *partially* diagrammed, and it should be easy to read off what the premise has to be. When you diagrammed the conclusion, two areas were shaded; one of those areas was crosshatched. The area that was *not* crosshatched when diagramming the conclusion is a partial diagram of the missing premise. If you have a particular premise and a particular conclusion of a syllogism in which there is a premise that will yield a valid syllogism, you'll introduce four *X*s in three areas of the diagram. The area that has two *X*s will have one *X* if you later diagram the premises. The other *X* you diagrammed when diagramming the conclusion can be ignored. The other *X* you diagrammed when diagramming the given premise must fall in a shaded area. So, that will tell what the missing universal premise has to be. It takes just a bit more thought when you're given a universal premise and a particular conclusion, for then you'll have to figure out which of the two *X*s will be introduced by the premise. It can be only one *X*, and that *X* cannot fall on a line. Of course, if there are four distinct areas of the diagram shaded, or you introduce only one *X* or four *X*s in four distinct areas of the diagram, the argument is invalid—as you could confirm by checking the rules. Again, you will want to check to make sure you have exactly three terms assigned the same meaning throughout when you've finished, and it's always good to have the students indicate whether the missing premise is true. If a term is used in more than one sense, you'll typically say that either more than one meaning has been assigned to a term (in which case the premises are true, but the argument violates rule 1), or one of the premises or conclusion is false. If the conclusion is false, it will have to be deemed a violation of rule 1.

Chapter 18 focuses on conversion, obversion, and (indirectly) contraposition, since these will be needed to engage in arguments if full-blooded ordinary English. There are also discussions of the Aristotelian and Boolean squares of opposition. Students often enjoy the squares of opposition. You'll have to decide if your students can handle that much fun.

Chapter 19 goes into the details of ordinary English. There are alternative ways to say All, No, and Some. There are nonstandard quantifiers. There are synonyms and antonyms. They'll have to convert and obvert to put things into standard form. It's great fun! Of course, you might need to introduce your students to one of the great mysteries of the academic world: the dictionary. The exercises include ten of Lewis Carroll's sorites. They're included because I believe they're delightful and because I believe students can learn quite a lot about the topics in the chapter by doing them. They're all valid, and the final conclusion is given. By working through them, the students should be able see the ways conversion, obversion, substitution of synonyms, substitution of antonyms, and questions of context play out in practice. The only shortcoming is that all the statements can be treated as universals. They're given last on the principle that *prima facie* crazy things come last.

While the book does not concern itself with moods and figures of syllogisms, a few remarks are in order so that you will be able to use the following chart and the later examples of Venn diagrams.

The mood of a categorical syllogism consists of three letters, the first for the major premise, the second for the minor premise, and the third for the conclusion. So, an argument of the mood AAA consists of a major premise, a minor premise, and a conclusion, each of which is a universal affirmative proposition. An argument of the mood EIO consists of a major premise which is a universal negative, a minor premise which is a particular affirmative, and a conclusion which is a particular negative.

For every mood, there are four possible arrangements of the terms in the premises. These are known as the four figures of categorical syllogisms. They are represented in the following chart:

Figure 1	Figure 2	Figure 3	Figure 4
M — P	P — M	M — P	P — M
S — M	S — M	M — S	M — S
S — P	S — P	S — P	S — P

Given a combination of mood and figure, we can name each of the 256 distinct forms of categorical syllogisms. An EAI-4 has a major premise which is a universal negative, a minor premise which is a universal affirmative, and a conclusion which is a particular affirmative with the terms arranged in figure four:

No P are M.
All M are S.
Some S are P.

The following chart indicates which argument forms are valid (there are fifteen of them) by placing an *X* in the *V* (valid) column, and which of rules 2-6 are violated by each of the other forms. Other columns show where an argument of the given mood and figure are found in Chapters 14-17 and 19. *Ex.* indicates that it was an example in the chapter. Exercise numbers in Chapters 17 and 19 marked with an asterisk (*) are one of a number of alternative forms that could be represented by the argument given in the exercise.

		V	2	3	4	5	6	Ch 14	Ch 15	Ch 16	Ch 17	Ch 19
AAA	1	V						Ex.	Ex.	Ex.	Ex., 4	II 9, II 15*
AAA	2		X	X				II 6	III 6	IV 6		
AAA	3		X		X				I 1	II 1		
AAA	4			X	X							I 2, III 11, III 13
AAE	1			X		X						
AAE	2		X			X						
AAE	3		X	X	X	X			III 5	IV 5		
AAE	4				X	X		II 20				
AAI	1				X		X		I 26	II 26		
AAI	2		X	X	X		X					
AAI	3		X				X					
AAI	4			X			X		III 7	IV 7		
AAO	1			X	X	X	X		I 27	II 27		
AAO	2		X		X	X	X					
AAO	3		X	X		X	X	II 14				
AAO	4					X	X					
AEA	1		X			X						
AEA	2			X		X						
AEA	3		X			X						
AEA	4			X		X						
AEE	1		X	X					II 2	III 2		
AEE	2	V							I 9	II 9	38	I 10, II 6*, II 10, II 12*, III 15
AEE	3		X	X					I 8	II 8		I 8, III 1*M45
AEE	4	V							I 12	II 12	20*	
AEI	1		X		X	X	X	II 7				
AEI	2			X	X	X	X					
AEI	3		X		X	X	X					
AEI	4			X	X	X	X					
AEO	1		X	X	X		X		I 13	II 13		
AEO	2				X		X	II 13	III 14	IV 14		
AEO	3		X	X	X		X					
AEO	4				X		X		I 28	II 28		
AIA	1				X		X					
AIA	2		X	X	X		X					
AIA	3				X		X					
AIA	4		X	X	X		X					
AIE	1			X	X	X	X					
AIE	2		X		X	X	X					
AIE	3			X	X	X	X		I 29	II 29		
AIE	4		X		X	X	X					
AII	1	V						Ex. 1	III 15	IV 15	Ex., 3, 16, 40	I 4*, II 7, II 13, II 15*
AII	2		X	X								III 9
AII	3	V									Ex., 30	I 6*, II 8*
AII	4		X	X								

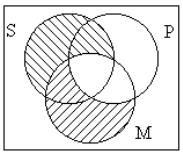
AIO	1			X		X			I 21	II 21		I 4*
AIO	2		X			X			II 3	II 3		
AIO	3			X		X			I 22	II 22		
AIO	4		X			X						
AOA	1		X		X	X	X					
AOA	2			X	X	X	X					
AOA	3					X	X					
AOA	4		X	X		X	X					
AOE	1		X	X	X		X					
AOE	2				X		X					
AOE	3			X			X	I 9				
AOE	4		X				X					III 12
AOI	1		X			X						
AOI	2			X		X				Ex.		
AOI	3				X	X			Ex.	Ex.		I 6*
AOI	4		X	X	X	X						
AOO	1		X	X								
AOO	2	V						Ex.	I 20	II 20	Ex., 5, 14	I 5, II 4, II 6*, II 11, II 12*
AOO	3			X	X				I 18	II 18		III 1
AOO	4		X		X				I 19	II 19		
EAA	1			X		X						
EAA	2			X		X						
EAA	3		X	X	X	X						
EAA	4		X	X	X	X						
EAE	1	V								Ex.	8, 9, 15, 20*, 33	
EAE	2	V									Ex.	I 1, II 3*
EAE	3		X		X			I 1				
EAE	4		X		X							
EAI	1			X	X	X	X					
EAI	2			X	X	X	X					
EAI	3		X	X		X	X					
EAI	4		X	X		X	X					
EAO	1				X		X	II 3				
EAO	2				X		X		III 1	IV I		
EAO	3		X				X					
EAO	4		X				X					
EEA	1		X	X		X			III 4	IV 4		
EEA	2		X	X		X						
EEA	3		X	X		X						
EEA	4		X	X		X			III 3	IV III		
EEE	1		X			X				Ex.		
EEE	2		X			X			III 8	IV 8		
EEE	3		X			X			I 23	II 23		
EEE	4		X			X			II 8	III 8		
EEI	1		X	X	X	X	X					
EEI	2		X	X	X	X	X		III 9	IV 9		
EEI	3		X	X	X	X	X		Ex.			
EEI	4		X	X	X	X	X	II 2				
EEO	1		X		X	X	X					
EEO	2		X		X	X	X					
EEO	3		X		X	X	X		I 24	II 24		
EEO	4		X		X	X	X		III 10	IV 10		
EIA	1			X	X	X	X		I 30	II 30		
EIA	2			X	X	X	X					
EIA	3			X	X	X	X		III 2	IV 2		
EIA	4			X	X	X	X					

EIE	1				X		X					
EIE	2				X		X	I 5				
EIE	3				X		X					
EIE	4				X		X					
EII	1			X		X						
EII	2			X		X						
EII	3			X		X						
EII	4			X		X			I 15	II 15		
EIO	1	V							III 12	IV 12	7*, 26*, 29*	
EIO	2	V							I 3	II 3	26*, 39	II 3*
EIO	3	V						Ex. 2	I 25	II 25	1, 7*, 17*, 29*	
EIO	4	V							II 4	III 4	17*	II 1, II 8*
EOA	1		X	X	X	X	X	I 4			Ex.	
EOA	2		X	X	X	X	X					
EOA	3			X		X	X		I 14	II 14		
EOA	4			X		X	X					
EOE	1		X		X	X	X				Ex.	
EOE	2		X		X	X	X					
EOE	3					X	X					
EOE	4					X	X					
EOI	1		X	X		X					Ex.	
EOI	2		X	X		X			III 16	IV 16		
EOI	3			X	X	X						
EOI	4			X	X	X						
EOO	1		X			X					Ex.	
EOO	2		X			X			III 11	IV 11		
EOO	3				X	X		I 2				
EOO	4				X	X						
IAA	1		X				X					
IAA	2		X				X					
IAA	3			X			X					
IAA	4			X			X					
IAE	1		X	X		X	X					
IAE	2		X	X		X	X					
IAE	3			X	X	X	X					
IAE	4			X	X	X	X	I 4				
IAI	1		X		X				I 17	II 17		
IAI	2		X		X							
IAI	3	V							Ex.		Ex., 6*, 13, 35	II 2, II 14, III 4
IAI	4	V							I 16	II 16	Ex., 6*, 21, 28	
IAO	1		X	X	X	X						
IAO	2		X	X	X	X						
IAO	3			X		X						
IAO	4			X		X						
IEA	1					X	X	II 15				
IEA	2					X	X					
IEA	3					X	X					
IEA	4					X	X					
IEE	1			X			X					
IEE	2			X			X					
IEE	3			X			X					
IEE	4			X			X					
IEI	1				X	X						III 8*
IEI	2				X	X						
IEI	3				X	X		II 19				
IEI	4				X	X						

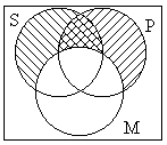
IEO	1			X	X				I 7	II 7			III 8*
IEO	2			X	X								
IEO	3			X	X								
IEO	4			X	X				II 9	III 9			
IIA	1		X		X		X						
IIA	2		X		X		X	II 1					
IIA	3		X		X		X						
IIA	4		X		X		X						
IIE	1		X	X	X	X	X						
IIE	2		X	X	X	X	X						
IIE	3		X	X	X	X	X						
IIE	4		X	X	X	X	X	II 8					
III	1		X				X	I 7					I 9*
III	2		X				X						
III	3		X				X			Ex.			
III	4		X				X		II 5 (?)	III 5 (?)			
IIO	1		X	X		X	X						
IIO	2		X	X		X	X						
IIO	3		X	X		X	X						
IIO	4		X	X		X	X	I 6					
IOA	1				X	X	X						
IOA	2				X	X	X						
IOA	3		X			X	X	II 4					
IOA	4		X			X	X						
IOE	1			X	X		X						
IOE	2			X	X		X						
IOE	3		X	X			X						
IOE	4		X	X			X		III 19	IV 19			
IOI	1					X	X						I 9*
IOI	2					X	X						
IOI	3		X		X	X	X	II 16					
IOI	4		X		X	X	X						
IOO	1			X			X		I 2	II 2			
IOO	2			X			X						
IOO	3		X	X	X		X						III 2
IOO	4		X	X	X		X	II 11					
OAA	1		X	X		X	X						
OAA	2					X	X						
OAA	3			X	X	X	X						
OAA	4		X		X	X	X						
OAE	1		X				X						
OAE	2			X			X						
OAE	3				X		X						
OAE	4		X	X	X		X	I 10					
OAI	1		X	X	X	X			III 17	IV 17			
OAI	2				X	X							
OAI	3			X		X							
OAI	4		X			X		II 5					
OAO	1		X		X				I 5	II 5			
OAO	2			X	X				I 4	II 4			
OAO	3	V						Ex.	I 6	II 6	10		II 5
OAO	4		X	X					Ex.				
OEA	1			X		X	X						
OEA	2		X			X	X						
OEA	3			X		X	X						
OEA	4		X			X	X						III 10

OEE	1				X	X				III 5
OEE	2	X	X		X	X				
OEE	3				X	X	II 12			
OEE	4	X	X		X	X				
OEI	1		X	X	X					
OEI	2	X		X	X					
OEI	3		X	X	X					
OEI	4	X		X	X					
OEO	1			X	X			I 10	II 10	
OEO	2	X	X	X	X		II 17			
OEO	3			X	X					
OEO	4	X	X	X	X			II 10	III 10	
OIA	1	X	X	X	X	X				
OIA	2			X	X	X				
OIA	3	X	X	X	X	X				
OIA	4			X	X	X				
OIE	1	X		X		X				
OIE	2		X	X		X				
OIE	3	X		X		X	Ex. 3			
OIE	4	X	X	X		X				
OII	1	X	X		X	X				
OII	2				X	X				
OII	3	X	X		X	X				
OII	4				X	X				
OIO	1	X				X	II 18			III 6
OIO	2		X			X		I 11	II 11	
OIO	3	X				X		II 7	III 7	
OIO	4		X			X				
OOA	1		X	X	X	X				
OOA	2	X		X	X	X				
OOA	3	X	X		X	X				
OOA	4				X	X				
OOE	1			X	X	X				
OOE	2	X	X	X	X	X	I 8			
OOE	3	X			X	X	II 9			
OOE	4		X		X	X				
OOI	1		X		X	X				
OOI	2	X			X	X				
OOI	3	X	X	X	X	X				
OOI	4			X	X	X				
OOO	1				X	X	II 10			
OOO	2	X	X		X	X				
OOO	3	X		X	X	X		III 18	IV 18	
OOO	4		X	X	X	X				I 3

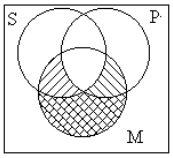
On the Boolean interpretation, at most one conclusion follows from a pair of premises. There are sixty-four possible combinations of premises. The following are the Venn diagrams for those sixty-four forms. When a conclusion follows, it is given under the argument form. (The third letter in the mood is blank, because the diagram is only for the premises.)



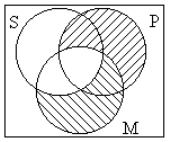
AA_-1
All M are P.
<u>All S are M.</u>
All S are P.



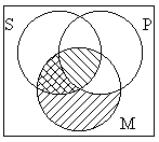
AA_-2
All P are M.
<u>All S are M.</u>



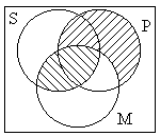
AA_-3
All M are P.
<u>All M are S.</u>



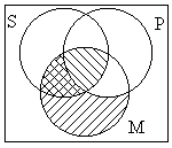
AA_-4
All P are M.
<u>All M are S.</u>



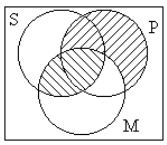
AE_-1
All M are P.
<u>No S are M.</u>



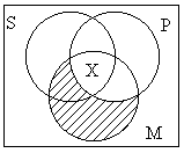
AE_-2
All P are M.
<u>No S are M.</u>
No S are P.



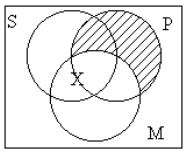
AE_3
All M are P.
<u>No M are S.</u>



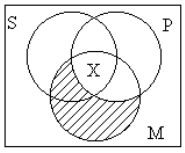
AE_-4
All P are M.
<u>No M are S.</u>
So S are P.



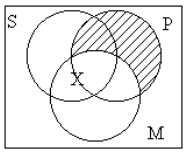
AI_-1
All M are P.
<u>Some S are M.</u>
Some S are P.



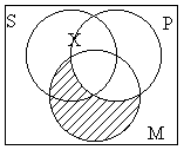
AI_-2
All P are M.
<u>Some S are M.</u>



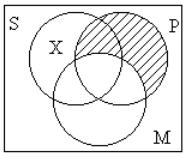
AI_-3
All M are P.
<u>Some M are S.</u>
Some S are P.



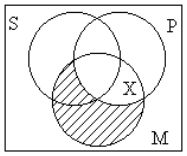
AI_-4
All P are M.
<u>Some M are S.</u>



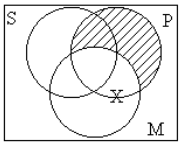
AO_-1
All M are P.
<u>Some S are not M.</u>



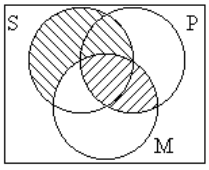
AO_-2
All P are M.
<u>Some S are not M.</u>
Some S are not P.



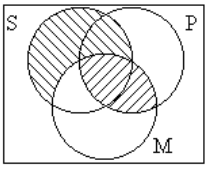
AO_-3
All M are P.
<u>Some M are not S.</u>



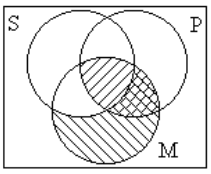
AO_-4
All P are M.
<u>Some M are not S.</u>



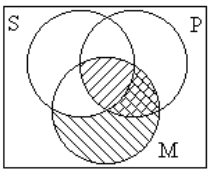
EA_-1
No M are P.
<u>All S are M.</u>
No S are P



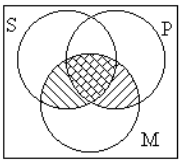
EA_-2
No P are M.
<u>All S are M.</u>
No S are P.



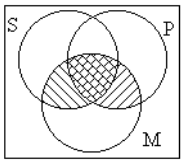
EA_-3
No M are P.
<u>All M are S.</u>



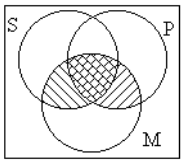
EA_-4
No S are M.
<u>All M are S.</u>



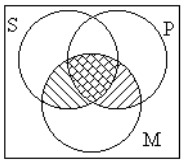
EE_-1
No M are P.
No S are M.



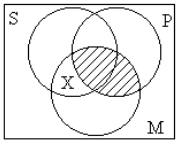
EE_-2
No P are M.
No S are M.



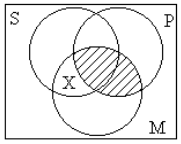
EE_-3
No M are P.
No M are S.



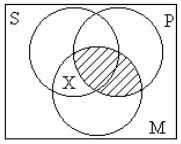
EE_-4
No S are M.
No M are S.



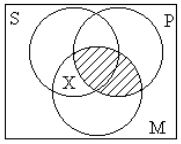
EI_-1
No M are P.
Some S are M.
Some S are not P.



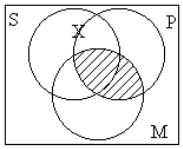
EI_-2
No P are M.
Some S are M.
Some S are not P.



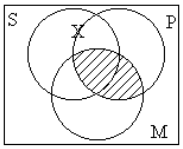
EI_-3
No M are P.
Some M are S.
Some S are not P.



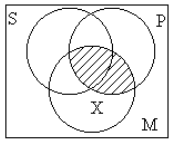
EI_-4
No S are M.
Some M are S.
Some S are not P.



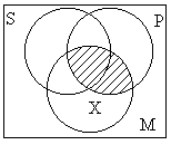
EO_-1
No M are P.
Some S are not M.



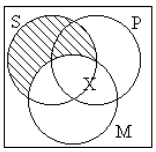
EO_-2
No P are M.
Some S are not M.



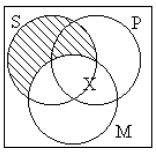
EO_-3
No M are P.
Some M are not S.



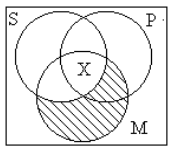
EO_-4
No S are M.
Some M are not S.



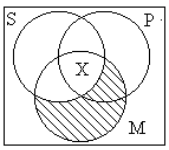
IA_-1
Some M are P.
All S are M.



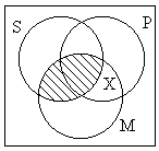
IA_-2
Some P are M.
All S are M.



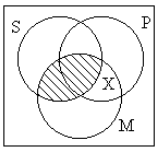
IA_-3
Some M are P.
All M are S.
Some S are P.



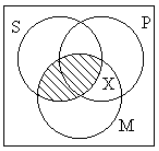
IA_-4
Some P are M.
All M are S.
Some S are P.



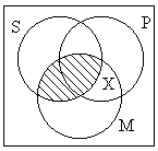
IE_-1
Some M are P.
No S are M.



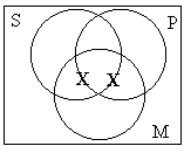
IE_-2
Some P are M.
No S are M.



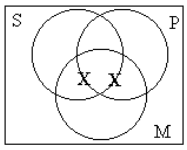
IE_-3
Some M are P.
No M are S.



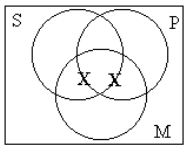
IE_-4
Some P are M.
No M are S.



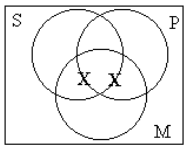
II_-1
Some M are P.
Some S are M.



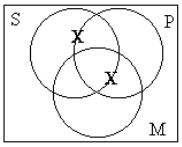
II_-2
Some P are M.
Some S are M.



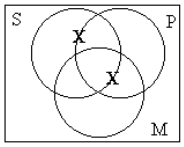
II_-3
Some M are P.
Some M are S.



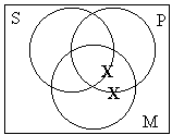
II_-4
Some P are M.
Some M are S.



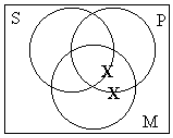
IO_1
Some M are P.
Some S are not M.



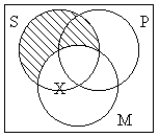
IO_-2
Some P are M.
Some S are not M.



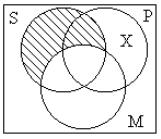
IO_-3
Some M are P.
Some M are not S.



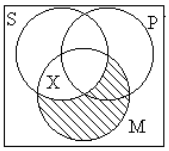
IO_-4
Some P are M.
Some M are not S.



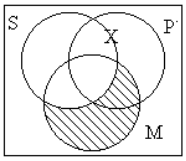
OA_-1
Some M are not P.
All S are M.



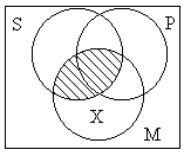
OA_-2
Some P are not M.
All S are M.



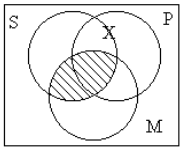
OA_-3
Some M are not P.
All M are S.
Some S are not P.



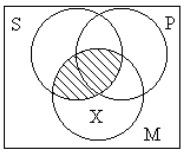
OA_-4
Some P are not M.
All M are S.



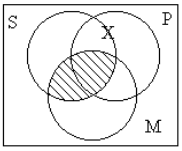
OE_-1
Some M are not P.
No S are M.



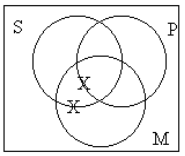
OE_-2
Some P are not M.
No S are M.



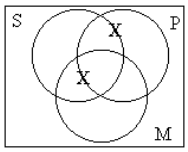
OE_-3
Some M are not P.
No M are S.



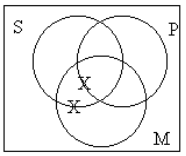
OE_-4
Some P are not M.
No M are S.



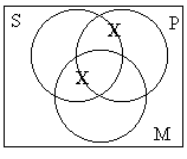
OI_-1
Some M are not P.
Some S are M.



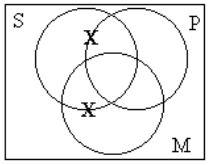
OI_-2
Some P are not M.
Some S are M.



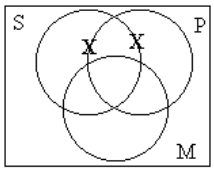
OI_-3
Some M are not P.
Some M are S.



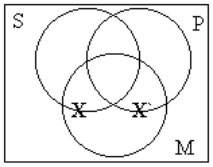
OI_-4
Some P are not M.
Some M are S.



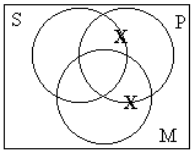
OO_-1
Some M are not P.
Some S are not M.



OO_-2
Some P are not M.
Some S are not M.



OO_-3
Some M are not P.
Some M are not S.



OO_-4
Some P are not M.
Some M are not S.

Part V: Chapters 20-24

Chapters 20-24 cover issues in propositional logic. Propositional argument forms are the most common deductive forms in ordinary English. So, if critical thinking courses are eminently practical and you have to choose between propositional arguments and categorical syllogisms, you'd probably want to focus on propositional arguments.

The question that immediately arises is, "To symbolize, or not to symbolize?" That is a difficult question. If the purpose of a critical thinking course is ultimately practical, this might suggest that we should resist the temptation to torment our students with the beauty and elegance of symbolic notion. As anyone who has taught symbolic logic knows, symbolphobia is real and sometimes fatal. On the other hand, just as students who are "visual learners" thrive on Venn diagrams but find the rules for judging the validity of categorical syllogisms inscrutable, they find symbolic notation useful, particularly when they're dealing with extended arguments. So, my inclination is that in the best of all possible worlds, one approaches propositional arguments in both ways. This is why the main body of the text is strictly verbal, but the symbolic notion is introduced in sidebars. Of course, if you're going to do anything with truth tables, I would consider it quite mad to use an ordinary language approach. That's why Chapter 21 is purely symbolic.

Of course, it's reasonable to argue that the ability to think abstractly is a mark of intellectual maturity, that teaching students to handle symbolic notation is teaching them to think abstractly, and so we should teach symbolic notion as a means to increasing their intellectual maturity. *Q.E.D.*—or almost. Students who find symbols puzzling can consult the English/Symbolese-Symbolese/English dictionary in the Study Guide or on the Web page: www.prenhall.com/flage/. But if the Powers at your school command—as they did at mine—that "Thou shalt not do formal proofs" and "Thou shalt not torment thy students with symbolese," you might still use it as an aid for those students who are visual learners. Symbolic notation *can* be taught in dark corners of sleazy cafés, although arguments based on pedagogical considerations should carry the day.

I have little to say about the chapters themselves. Chapter 20 talks about compound propositions in ways those of us trained in logic might be expected to speak. In effect, even if you don't introduce symbols, negation, conjunction, disjunction, material implication, and material equivalence are treated as if you do. Chapter 21 uses truth tables to test for validity, to determine whether a statement is contingent, tautologous, or contradictory, and to test for logical equivalence. Chapter 22 introduces what I consider the propositional argument forms most commonly used in English: simplification, conjunction, affirming the antecedent (*modus ponens*), denying the consequent (*modus tollens*), hypothetical syllogism, disjunctive syllogism, constructive dilemma, and destructive dilemma, plus three common fallacies: denying the antecedent, affirming the consequent, and improper exclusive disjunctive syllogism. The focus in the exercises is on identifying argument forms. There are thirty-five exercises in Chapter 22. There are more in the next chapter, some of which are enthymematic. There are still more in the Study Guide. *My* students seem to have trouble identifying argument forms, even after a hundred or more examples/exercises. I assume part of the problem rests on the numerous ways to say 'if'. So, I'm inclined to believe that the more you can push them on argument form identification, the better. Chapter 23 concerns enthymemes relative *only* to the argument forms examined in Chapter 22. It also does a bit with extended arguments ("argument chains"). The exercises ask students to find the final conclusion of the argument, which usually is either a simple statement or the denial of a simple statement. *You know* and *I know* if there is only one simple statement that shows up in the premises only once, the final conclusion will either be that statement or its denial. I never tell that to my students, since I fear that they'll try to decide whether it's the statement or its negation by flipping a coin. (I *do* mention that fact in the Study Guide, however.) Chapter 24 introduces De Morgan's Theorems, double negation, a

version of material equivalence, and transposition. Again there are identify-the-argument-form and what's-the-final-conclusion? exercises, but this time they require the use of equivalences.

You will notice that there are no proofs in the book. If you want your students to do simple proofs, you could give them the conclusions of the what's-the-final-conclusion? exercises and ask them to do the derivation. You will notice that the "system" of propositional logic is anything but complete. If you want a complete system of propositional logic, one that allows you to do elaborate proofs, there is a supplement to Chapter 24 on the Web page, www.prenhall.com/flage/. This is the system in Chapter 6 of my *Understanding Logic* (Prentice Hall, 1995). There are differences in the names of the rules. Affirming the antecedent, for example, takes its Latin name, *modus ponens* (MP), and denying the consequent is called *modus tollens* (MT). I assume that this difference in nomenclature will make little or no difference, since I assume that anyone who decides to do any significant amount of natural deduction would not use the less complete system in Chapters 22-24.

There is one point that should be noted. When I teach logic, I am very strict in applying the rules for the first few weeks we do proofs. Each move in the proof has a distinct line. So, if we commute and simplify, there is a distinct line for each. As the students become comfortable with the rules, I allow them to combine very specific moves in one line, so long as they justify the move by indicating both rules used *in the correct order*, for example, by stating the justification, "Com. + Simp." I also allow them to use a single rule twice in a line, so long as it is indicated by making the justification, for example, "DeM twice" or "DeM × 2." I mention this only because some of the solutions in the Test Bank employ those conventions. Whether *you* want to assume this somewhat lax approach to proofs is *your* call. If you do, I recommend that the practice be quite limited. Given the opportunity, students like to combine three, four, or five steps in a line, and at that point it becomes almost impossible to determine whether the students have correctly employed the rules.

Part VI: Chapters 25-27

If your students were formally familiar with any arguments before they started your course, most of them were familiar with inductive arguments. Deduction was probably limited to math courses and the mathematical portions of the sciences, where the word 'argument' seldom arises. They all have some experience with "the scientific method." Similarly, unless high school literature courses have changed greatly in the past three decades, they at least heard of similes and metaphors. And most of the reasoning they've done outside of their math classes was inductive. Part VI discusses analogies, generalizations, and arguments to the best explanation.

Chapter 25 concerns both argumentative and nonargumentative uses of analogy. It begins by distinguishing among the uses of analogy to describe, explain, inquire, and argue. By this time students *should* have a clear understanding of the distinctions among descriptions, explanations, and arguments, but some will still be a bit unclear, regardless of the point in the course at which you cover these chapters. So, you might want to begin your discussion with a bit of review. Since your students will undoubtedly have *used* analogies in each of these ways, they might provide various examples from their everyday lives.

The heart of the chapter is argument by analogy. As in the discussions of evaluating observation statements and testimony (Chapters 10 and 11), criteria are given for evaluating analogies. The criteria provide grounds for claiming that the argument is strengthened or weakened. When discussing examples, sometimes there will be disagreements regarding the applicability of one of the criteria. More often you can expect disagreements regarding the overall strength of the argument. You can expect interesting discussions.

Chapter 26 concerns arguments to generalizations and surveys. The criteria are similar to those for evaluating arguments by analogy. Since we are constantly bombarded with reports of polls, over half the chapter is devoted to surveys and evaluating the information given on the basis of a survey. Because polls are so common, discussing a recent poll might prove interesting.

The Study Guide includes a supplement to Chapter 26 concerning the probability calculus and the notions of average. The Internet can prove a useful source regarding probability calculations. Regardless of your views of state-run lotteries, the Web pages for games such as Powerball or the Big Game Megamillions give odds that are accurate to the ones place. So, if you want to work on probabilities, you could have your students determine the formulas that result in the odds. (It's an easy way to check whether one understands the formulas.) You could also

use the odds for poker hands. www.pokerinformation.com/odds.html gives odds for poker hands, but they're imprecise. For example, the odds for being dealt a royal flush in five cards is rounded to the nearest thousand. A useful website concerning the probability calculus is http://www.math.uah.edu/stat/: It takes one far beyond the supplement in the Study Guide.

Chapter 27 concerns hypotheses and arguments to the best explanation. In one sense, this is the easiest induction chapter to discuss. All the students will have some acquaintance with hypothesis formation. Everyone has engaged in some kind of troubleshooting. So, everyone will know something about the basic territory. If there is a common, everyday problem your students confront, that might be the basis for a good discussion early in the chapter. If there has been a disaster, such as a major airplane crash that is in the news, you could discuss the procedures that are followed by the National Transportation Safety Board in attempting to determine the cause of the crash. And, of course, there are always good examples from the physical and social sciences.

The Study Guide includes a supplement to Chapter 27 concerning Mill's Methods of Induction.

Part VII: Chapters 28-31

Students learn to identify informal fallacies by looking at many examples. So, there are examples of each plus many exercises in the chapters. I know of few alternatives to doing *many* exercises to drive home the distinctions among the fallacies. *You* will need to decide whether knowing the names of the fallacies is an appropriate end, or whether they are better understood as indications of ways in which reasoning can go wrong. While there is a good sample of the most common informal fallacies, it is not a complete list. You *might* want to discuss other fallacies that are similar to those discussed in the chapters.

The normal claim is that informal fallacies are common mistakes in reasoning. It is true that they pop up now and then, but my experience is that they are far less common than most critical thinking instructors might like to claim. One place they seem to be common is in the political arena. So, if you cover informal fallacies early in a semester in which there is a national or state election, you could have your students keep a journal of informal fallacies employed by the candidates. Sufficient mud is always slung (variations on personal attack). Red herrings and straw person fallacies are not uncommon. Other, nonpolitical, commercials often use mob appeal or false cause.

Part VIII: Chapters 32-33

In Chapter 9, when discussing argument trees, I recommend that as much of the original verbiage as possible be preserved. This avoids charges of the straw person fallacy. The *disadvantage* of such an approach is that you do not know whether the students have understood the content of the argument. If you want to know whether the students have *understood* the argument, you might ask them to "restate the argument in their own words." I tend to question whether that is wise early in the game. If Chapter 32 is used late in the course and the emphasis throughout the book that other people's arguments must be treated with respect has been driven home, it is reasonable to suggest that the students should restate the arguments in their own words, recognizing that this still requires that they state the argument as strongly as the texts will allow.

If you're looking for essays, the Internet is a good source of often relatively bad essays. Finding information on the authors is sometimes difficult. One time I assigned an essay for analysis, and some enterprising students sent an e-mail to the author asking, "What makes you a particular expert on the topic discussed?" The reported reply was that the author said he had no special expertise on the topic, which was interesting.

I have little advice on writing (Chapter 33). Short writing assignments are always good at the beginning. Topics should be of interest to you, since you'll read about it numerous times. Ideally, topics also should be of interest to the students. This poses a problem, since what you or I believe they *should* find of intellectual interest is often a topic in which the students have no special interest. When choosing some of the essays included in the book, I did an informal poll of my students, and they indicated that they were tired of abortion, euthanasia, and the other "hot" contemporary issues. That's a partial explanation of why there are essays by the Car Talk guys. You might choose an issue that is being discussed on campus, or you might poll your students regarding topics they find interesting. It's easier to write on something that is of interest. It might be particularly useful to have them write on a "hot" campus issue, since it will require them to take a relatively dispassionate look at the topic.

On Using Videos

If you like to use videos in your classes, there are a number of *Nova* episodes you might want to consider:

Nova: Can you believe TV ratings? (surveys)
Nova: Do scientists cheat?
Nova: Secrets of the psychics (alternative explanations)
Nova: Why the Towers Fell
Nova: Vanished! (*Stardust*, the airplane that crashed into the Andes, is discussed in Chapter 27.)

These have the virtue (or vice) of taking the whole hour (plus a few minutes, if you have 50 minute periods).

I often use *Junk Science* with John Stossel (ABC News: discussions of putatively scientific claims that didn't hold up) in conjunction with the discussion of testimony (Chapter 11). It is a bit dated—there are allusions to and pictures of Princess Diana—but it's generally interesting and raises the right kinds of questions about testimony.

In conjunction with a discussion of mob appeal, you might want to show a few minutes of *Triumph of the Will* by Leni Riefenstahl (1934 Nuremberg Rally). It is mob appeal with a vengeance.

If you wish to assign feature-length films for the students to watch outside of class and, perhaps, write a bit about their relevance for issues in the course, there are any number that might be of interest. The following two might be taken into consideration.

Wit, an HBO film by Mike Nichols (2001) is about a woman dying from cancer who is used for an experimental protocol. It raises a number of interesting ethical issues.

The Rules of Engagement, a Paramount film by William Friedkin (2000) is relevant to observation and testimony, and it raises a number of ethical questions. One discovers that the hero was the only person who was in a position to make the relevant observations, and the corroborating evidence from a surveillance camera was destroyed.

And you might want to keep your VCR in the ready when watching news programs. A few years ago there was an interesting segment on *Good Morning America* about the Loch Ness Monster, for example. Every now and then there is an interesting segment on the national news, although it's typically past by the time you realize you wanted to tape it. And, of course, commercials are sometimes very interesting and a good source for discussion.