

Essential Logic

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Introduction

When I was in the fourth grade I had a teacher by the name of Mrs. Vagnus. Although she was probably a very good teacher, to a precocious little boy she seemed just like Mrs. Wormwood does to the imaginative little rascal Calvin, in the comic strip Calvin and Hobbes. Like Calvin I got in trouble a lot in Mrs. Vagnus's class. I can remember quite vividly Mrs. Vagnus drawing a small circle with a piece of chalk on the blackboard and exclaiming in a shrill voice, "Ronnie Pine, get up here right this minute and put your nose against this spot for the rest of the period!" It was very effective punishment. For a little fourth grade boy it was not only excruciatingly confining to be still with my face claustrophobically plastered into the dusty blackboard, but also very embarrassing with my rear facing the class, and my friends giggling and even occasionally firing a spit wad at me when Mrs. Vagnus was not looking.

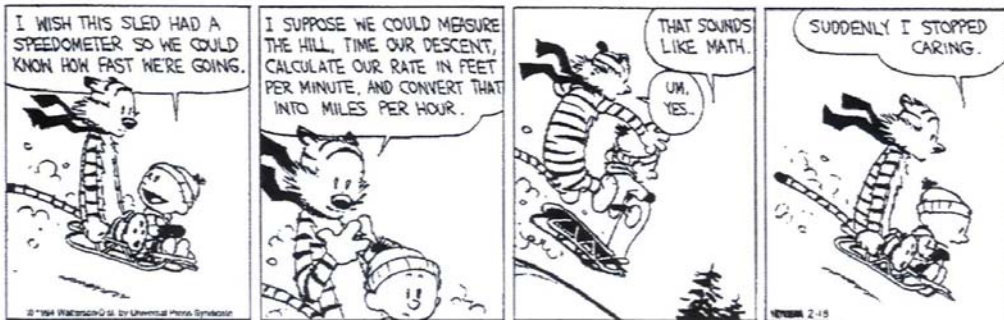
Calvin and Hobbes



I tell this story because you are about to work through a logic course and most of the chapters of this textbook. Many students are intimidated by logic and mathematics. I am often intimidated by art. We did a lot of art work in Mrs. Vagnus's class. Needless to say, I cannot draw very well. To this day when I am required to draw the simplest picture I tremble. A small child could do better. My artistic friends claim that anyone can learn to draw, that the basic ability is in all of us, and my problem is not lack of talent but that I just need some "therapy" -- I need to exorcise Mrs. Vagnus from my mind!

Calvin and Hobbes

by Bill Watterson



One of my reasons for writing this textbook is to convince students who are intimidated by logic and mathematics that all they may need is some therapy. I hope to show you that once the game of analysis is understood, anyone should be able to see that it is just a matter of staying calm enough to see that a complex whole is really just a bunch of simple parts in disguise. In my opinion, logical and mathematical analyses are much easier than writing papers, say in a humanities class where you must synthesize multiple perspectives and a wealth of information, or like this Introduction where there are so many interrelated thoughts I want to convey to you. As part of this therapeutic process, you should also be motivated by realizing that logic and math are very practical tools that simply extend our common sense for the most part to make life easier and more successful. People are not born logical or illogical. We not only all have the basic ability, but we all need this ability because critical thinking is crucial to the success of a democratic society.

Another reason for writing this book is that most logic books use a much different style than I have used. They write in a very objective, neutral, and noncommittal manner and avoid discussing issues that are obviously very important to us. By just offering the student a disconnected "recipe" of logical techniques, they do not put these techniques into a big picture, a cultural or philosophical context. They seem to assume that everyone just knows that being logical is good and that each student can figure out alone how each technique is relevant.

This book will be more personal and take some risks in terms of taking positions on controversial topics. However, the book not only attempts to provide you with some basic critical thinking tools, but also invites you to turn those tools against my own presentation of these tools. In other words, you should feel free to criticize me.

Up front, here are some of my beliefs that you will find directing much of the presentation in this book. I believe that being logical is good. I also believe that modern science has done much more for us than provide high technology and sophisticated gadgets for entertainment. It has provided us with a picture, or "worldview" (to use the

terminology of philosophers), that is startling, humbling, and exhilarating. A worldview that in my opinion we all ought to pay attention to and learn. Science teaches us that our earth is but a fragile, biologically precious grain of sand in a vast and very old universe. It also teaches us that evolution is true, and that we cannot ignore this truth anymore than we can ignore the law of gravity.

However, both logic and science are primarily products of Western culture, and if one has any faith in people and their ability over time to create worthwhile ways of life, it follows that other cultural perspectives ought to be of value also. This implies that there may be many limitations to logic, science, and technology. One of the most interesting questions of our time involves how to achieve a balance between unity (one world) and diversity (many cultures), and what should be the relationship of the many cultures in the world today with our scientific-technological culture. As you will see in Chapter 12, logic itself is not a static, finished discipline, and the philosophies of different cultures may play a role in its growth.

In this book, I have made every effort to present the basic material of introductory logic with a constant link to relevant context and the big picture. What is the relationship between logic and technology? How is logic related to the way a computer works? Do computers think? What is the relationship between logic and values? What does it mean to be a reasonable person? Are there alternate rationalities, different logics depending on one's culture? Is being reasonable simply a matter of what you believe? Can it be shown that some beliefs are better than others? Should everyone accept the results of science? What is the relationship between logic and emotion? Between logic and creativity? Imagination? A happy life?

From these questions it ought to be obvious that this book is not only for students who are intimidated by logic and mathematics. It is also for the science or applied technology major who needs to have not only the underlying logical principles of our Western scientific-technological culture systematically presented, but also needs a bridge to the humanities and the questions that concern us all as human beings.

There is also another reason for attempting such an interconnected approach. Students are confronted daily with an avalanche of perspectives, persuasive appeals, and data bases of information. There is so much going on that it is easy to perceive today's student as "unprepared," as a member of an Internet and video generation that needs pictures for everything and cannot read or think. I believe that some of my professor colleagues misread the contemporary college student. They compare how prepared they were in communication skills and the so-called classics of culture and rhetoric with students in their present classrooms and they are often appalled. What they see as lack of preparation, I prefer to see as "unfocused potential," as for the most part highly intelligent, often street and digital-wise young human beings, networked with and buffeted by enumerable competing subcultures, attempting to assimilate much more than I ever had to at their ages. Thus, a disconnected recipe of thinking skills is no more likely to be successful at producing a critical thinker than a bunch of disconnected historical facts and dates are likely to produce an informed individual. We live in an increasingly

interconnected world; we have no choice but to try to present disciplines as part of this big picture.

So we are going to undertake a process of communication, collaboration, and critical thinking together. It will not be perfect. There will be times when you will struggle. There will no doubt be times when you will be mad at me when you confront a difficult concept or procedure. However, with effort and a sympathetic teacher you should do well. In my opinion, the most important concepts that you learn in college are not those that you understand right away, but rather are those that will require struggle and effort. If my own students are any guide to your probable success, we can predict that this book will change you: You will not just learn fancy techniques, but a discipline of mind, a "tightness" of focus, "thinking surgery" -- to use the terminology of some of my former students -- a valuable tool to turn on given the appropriate context.

A few suggestions:

1. **Don't miss your class if at all possible.** Learning logic, like mathematics, is a sequential activity. It is a ***step by step process***, and, as noted above, wholes only look hard if you can't see the simple pieces. The same applies to a Web class. Don't try to do the work all at once. Work on the material a little at a time throughout each week.

As they say in mathematics, "By an inch it's a cinch; by a yard it's hard." Your instructor will make the material as clear as possible, but he or she will not be able to help you make connections and build up technical proficiency if you miss too many steps.

2. **Put in the time.** To do well in any college course of this nature, for every one hour you spend in class, you should spend at least two hours outside of class reading, doing exercises, reading again, thinking, and discussing the concepts with other students. As noted above, there are many concepts in this book that you will not understand right away. But if you put in at least six hours a week outside of class -- a normal commitment for a college course -- connections will result.
3. **Read slowly and sequentially.** Don't jump around looking for a fast way to finish each chapter. The first five chapters have concept summaries and lists of key terminology. Use them, but only after you have read the main chapter. If after reading a chapter you do not understand a key concept, check it off, and then be bold in class. Ask your instructor to explain the term again and give different examples from those in the text. For the symbolic chapters, read very slowly. Study the examples carefully and constantly go back to them when doing the exercises.

Good luck. Feel free to share your thoughts with me or ask questions. My email address is: pine@hawaii.edu