The Thinker’s Guide to

Analytic Thinking

How To Take Thinking Apart
And What To Look For When You Do

The Elements of Thinking
and
The Standards They Must Meet

By Dr. Linda Elder and Dr. Richard Paul

Based on Critical Thinking Concepts & Tools
A Companion to:
The Miniature Guide to Critical Thinking Concepts and Tools

The Foundation for Critical Thinking
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Why a Guide on Analytic Thinking?

Analysis and evaluation are recognized as crucial skills for all students to master. And for good reason. These skills are required in learning any significant body of content in a non-trivial way. Students are commonly asked to analyze poems, mathematical formulas, biological systems, chapters in textbooks, concepts and ideas, essays, novels, and articles—just to name a few. Yet how many students can explain what analysis requires? How many have a clear conception of how to think it through? Which of our graduates could complete the sentence: “Whenever I am asked to analyze something, I use the following model:…”

The painful fact is that few students have been taught how to analyze. Hence, when they are asked to analyze something scientific, historical, literary, or mathematical—let alone something ethical, political, or personal—they lack a model to empower them in the task. They muddle through their assignment with only the vaguest sense of what analysis requires. They have no idea how sound analysis can lead the way to sound evaluation and assessment. Of course, students are not alone. Many adults are similarly confused about analysis and assessment as intellectual processes.

Yet what would we think of an auto mechanic who said, “I’ll do my best to fix your car, but frankly I’ve never understood the parts of the engine,” or of a grammarian who said, “Sorry, but I have always been confused about how to identify the parts of speech.” Clearly, students should not be asked to do analysis if they do not have a clear model, and the requisite foundations, for the doing of it. Similarly, we should not ask students to engage in assessment if they have no standards upon which to base their assessment. Subjective reaction should not be confused with objective evaluation.

To the extent that students internalize this model through practice, they put themselves in a much better position to begin to think historically (in their history classes), mathematically (in their math classes), scientifically (in their science classes), and therefore more skillfully (in all of their classes). When this model is internalized, students become better students because they acquire a powerful “system-analyzing-system.”

This thinker’s guide is a companion to The Miniature Guide to Critical Thinking Concepts and Tools. It supports, and is supported by, all of the other miniature guides in the series. It exemplifies why thinking is best understood and improved when we are able to analyze and assess it EXPLICITLY. The intellectual skills it emphasizes are the same skills needed to reason through the decisions and problems inherent in any and every dimension of human life.

Why the Analysis of Thinking is Important

Everyone thinks; it is our nature to do so. But much of our thinking, left to itself, is biased, distorted, partial, uninformed, or downright prejudiced. Yet the quality of our life and of what we produce, make, or build depends precisely on the quality of our thought. Shoddy thinking is costly, both in money and in quality of life. If we want to think well, we must understand at least the rudiments of thought, the most basic structures out of which all thinking is made. We must learn how to take thinking apart.

All Thinking Is Defined by the Eight Elements That Make It Up

Eight basic structures are present in all thinking: Whenever we think, we think for a purpose within a point of view based on assumptions leading to implications and consequences. We use concepts, ideas and theories to interpret data, facts, and experiences in order to answer questions, solve problems, and resolve issues. Thinking, then:

- generates purposes
  - raises questions
  - uses information
  - utilizes concepts
  - makes inferences
  - makes assumptions
  - generates implications
  - embodies a point of view

Each of these structures has implications for the others. If you change your purpose or agenda, you change your questions and problems. If you change your questions and problems, you are forced to seek new information and data. If you collect new information and data…

Essential Idea: There are eight structures that define thinking. Learning to analyze thinking requires practice in identifying these structures in use.
All Humans Use Their Thinking To Make Sense of the World

The words thinking and reasoning are used in everyday life as virtual synonyms. Reasoning, however, has a more formal flavor. This is because it highlights the inference-drawing capacity of the mind.

Reasoning occurs whenever the mind draws conclusions on the basis of reasons. We draw conclusions whenever we make sense of things. The result is that whenever we think, we reason. Usually we are not aware of the full scope of reasoning implicit in our minds.

We begin to reason from the moment we wake up in the morning. We reason when we figure out what to eat for breakfast, what to wear, whether to make certain purchases, whether to go with this or that friend to lunch. We reason as we interpret the oncoming flow of traffic, when we react to the decisions of other drivers, when we speed up or slow down. One can draw conclusions, then, about everyday events or, really, about anything at all: about poems, microbes, people, numbers, historical events, social settings, psychological states, character traits, the past, the present, the future.

By reasoning, then, we mean making sense of something by giving it some meaning in our mind. Virtually all thinking is part of our sense-making activities. We hear scratching at the door and think, “It’s the dog.” We see dark clouds in the sky and think, “It looks like rain.” Some of this activity operates at a subconscious level. For example, all of the sights and sounds about us have meaning for us without our explicitly noticing that they do. Most of our reasoning is unspectacular. Our reasoning tends to become explicit only when someone challenges it and we have to defend it (“Why do you say that Jack is obnoxious? I think he is quite funny”).

Throughout life, we form goals or purposes and then figure out how to pursue them. Reasoning is what enables us to come to these decisions using ideas and meanings.

On the surface, reasoning often looks simple, as if it had no component structures. Looked at more closely, however, it implies the ability to engage in a set of interrelated intellectual processes. This miniature guide is largely focused on making these intellectual processes explicit. It will enable you to better understand what is going on beneath the surface of your thought.

Essential Idea: Reasoning occurs when we draw conclusions based on reasons. We can upgrade the quality of our reasoning when we understand the intellectual processes that underlie reasoning.

Be aware: When we understand the structures of thought, we ask important questions implied by these structures.
Analyzing Problems

Identify some problem you need to reason through. Then complete the following:

What exactly is the problem? (Study the problem to make clear the kind of problem you are dealing with. Figure out, for example, what sorts of things you are going to have to do to solve it. Distinguish problems over which you have some control from problems over which you have no control. Pay special attention to controversial issues in which it is essential to consider multiple points of view.)

The key question that emerges from the problem is… (State the question as clearly and precisely as you can. Details are very important.)

My purpose in addressing the problem is… (Know exactly what you are after. Make sure you are not operating with a hidden agenda and that your announced and real purposes are the same.)

Actively seek the information most relevant to the question. (Include in that information options for action, both short-term and long-term. Recognize limitations in terms of money, time, and power.)

Some important assumptions I am using in my thinking are… (Figure out what you are taking for granted. Watch out for self-serving or unjustified assumptions.)

If we solve this problem, some important implications are… If we fail to solve this problem, some important implications are… (Evaluate options, taking into account the advantages and disadvantages of possible decisions before acting. What consequences are likely to follow from this or that decision?)

The most important concepts, theories, or ideas I need to use in my thinking are… (Figure out all significant ideas needed to understand and solve the problem. You may need to analyze these concepts. Use a good dictionary.)

The point(s) of view is/are as follows: (Know the point of view from which your thinking begins. Be especially careful to determine whether multiple points of view are relevant.)

After reasoning through the parts of thinking above, the best solution (conclusion) to the problem is… (If the problem involves multiple conflicting points of view, you will have to assess which solution is the best. If the problem is one-dimensional, there may be just one “correct” solution.)

If I, and many others, fail to reason well through this issue, the implications are that we will unnecessarily contribute to pollution's many harmful effects.

Analyzing Problems

The Problem of Pollution as an Example

What is the problem? The problem is pollution and the fact that because people are not doing enough to reduce it, a host of negative consequences are occurring (e.g., increased medical problems, loss of animal and plant life, increased contamination of the earth’s water sources).

Questions that emerge from the problem are… What can I personally do to reduce pollution? A related question is: What can we collectively do to reduce pollution?

My purpose in addressing the problem is to increase the things I do to contribute to a more healthy biosphere.

The important information relevant to the question is information about what I am currently doing to increase pollution (such as generating trash that could be recycled, driving a car, etc.), information about what I could do to reduce the amount of pollution I contribute to (such as locating recycling centers, pursuing alternative forms of transportation, etc.), information about environmental groups I might support, etc.

Some important assumptions I am using in my thinking are that pollution is causing significant damage to the biosphere, that everyone can help reduce pollution, that I, and everyone else, have an obligation to make a significant effort to help reduce pollution.

If many people were to reason well through this issue, some implications are that there would be a longer and higher quality of life for millions of people. Additionally, plant and animal species and ecosystems would be protected. A host of other positive implications would follow as well, implications for the atmosphere, the waterways, the forests, etc.

The most important concepts, or ideas, I need to use in my thinking are the concepts of pollution, and that of a healthy biosphere. Each of these concepts leads to a host of further technical, ecological, and ethical concepts required to understand the multiple dimensions of pollution and the ethical responsibilities that knowledge of its many harmful effects entails.

My point of view is as follows: I am looking at pollution. I am seeing it as something I can help reduce through many means.

After reasoning through the parts of thinking above, the best solution (conclusion) to the problem will be to put into action the various options that my research has revealed.

1 This problem is presented without details and is intended merely to exemplify how one might begin to reason through the logic of a complex question. When using this approach, the more details one includes, the deeper the analysis can be. Many layers of detail could then be specified based on research into all of these levels. For further background information on this particular problem, see the Logic of Ecology (p. 40).
Analyzing the Logic of a Subject

When we understand the elements of reasoning, we realize that all subjects, all disciplines, have a fundamental logic defined by the structures of thought embedded in them.

Therefore, to lay bare a subject’s most fundamental logic, we should begin with these questions:

- What is the main purpose or goal of studying this subject? What are people in this field trying to accomplish?
- What kinds of questions do they ask? What kinds of problems do they try to solve?
- What sorts of information or data do they gather?
- What types of inferences or judgments do they typically make? (Judgments about…)
- How do they go about gathering information in ways that are distinctive to this field?
- What are the most basic ideas, concepts or theories in this field?
- What do professionals in this field take for granted or assume?
- How should studying this field affect my view of the world?
- What viewpoint is fostered in this field?
- What implications follow from studying this discipline? How are the products of this field used in everyday life?

These questions can be contextualized for any given class day, chapter in the textbook and dimension of study. For example, on any given day you might ask one or more of the following questions:

- What is our main purpose or goal today? What are we trying to accomplish?
- What kinds of questions are we asking? What kinds of problems are we trying to solve? How does this problem relate to everyday life?
- What sort of information or data do we need? How can we get that information?
- What is the most basic idea, concept or theory we need to understand to solve the problem we are most immediately posing?
- From what point of view should we look at this problem?
- What can we safely assume as we reason through this problem?
- Should we call into question any of the inferences that have been made?
- What are the implications of what we are studying?

Be aware: Many people who have studied science in school fail to think scientifically in their professional and personal lives.
The Logic of History

Purpose: To create a “story” about the past that captures its dynamics and helps us make decisions about the present and plans for the future.

Looking at the past as something that can be understood through study and interpretation from multiple viewpoints.

What happened during this particular time period and in this particular place in the past that can help us understand current events and make future decisions?

Elements of Reasoning

Information: Important information from the past gathered in the attempt to devise an account of the dynamics of the past.

Judgements about the past based on important information about how and why things happened as they did.

Interpretation and Inference: The past is understandable through careful study and interpretation.

Assumptions: The past as understandable through careful study and interpretation.

Essential Concepts: The past as understandable through careful study and interpretation.

Implications and Consequences: That there are important patterns in the past that can be figured out through systematic observation and interpretation and that help us live better in the future.

Point of View: If we systematically study the past, we can gain important knowledge of patterns that shed light on the present and help us live better in the future.

Be aware: Much human thinking is “historical.” We use our beliefs (formed in the past) to make thousands of decisions in the present and plans for the future. Much of this historical thinking is deeply flawed.

The Logic of Sociology

Purpose: To learn how and why people act the way they do as a result of living with others in groups.

Seeing human behavior as deeply shaped by the beliefs and values of groups.

How do humans behave in groups?

Elements of Reasoning

Information: Information about specific human groups and the characteristics they do and do not share.

Judgements about groups that tell us how humans behave in groups, and why.

Interpretation and Inference: Humans as a herd or conforming animal.

Essential Concepts: Humans as a herd or conforming animal.

Assumptions: Humans as a herd or conforming animal.

Implications and Consequences: A central determinant in the life of humans is the group to which we belong.

Point of View: If I know the groups a person belongs to, I can predict much of his/her behavior.

Be aware: Much of our everyday decision-making is based on poor “sociological” thinking. For example, we often uncritically conform to peer groups when we should question them or note their contradictions and inconsistencies.
Conclusion

Clearly there are many varieties of analysis specific to particular disciplines and technical practices. These forms of analysis often require technical training of a specialized nature. For example, one cannot do qualitative analysis in chemistry without instruction in chemistry.

What we have provided in this guide, however, is the common denominator between all forms of analysis because all forms require thoughtful application and all thought presumes the elements of thought. For example, one cannot think analytically FOR NO PURPOSE. Or think analytically, with NO QUESTION in mind. This much should be self-evident. Unfortunately, it is not self-evident to most students.

Those who would develop analytic minds need guidance, instruction, and practice in monitoring their thinking using intellectual tools applicable to every discipline. They need to learn to question purposes, goals, problem definitions, information, concepts, etc… It is these interdisciplinary analytic tools that enable those skilled in them to understand and assess their analytic thinking, whether in a highly technical area or in an everyday personal application. It is these analytic tools that enable one to get at the most fundamental logic of any discipline, subject, problem, or issue. They provide the means for transfer of learning between and among subjects and disciplines. They enable motivated persons to gain an overview of their learning in any and every situation analyzed, to think their way into and out of various intellectual domains.

Of course, there are no magic pills that will create analytic questioning minds. As in any important area of skills and abilities, all learners need to log hundreds of hours to gain command and deep insight. There are no shortcuts. We hope that this thinker’s guide will serve as a launching pad toward analytic proficiency. It is admittedly a first step only, but it is an essential, and we believe a powerful, first step. The question is, “Do you have the will and the insight to commit yourself to the long-term practice required?”
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The Thinker’s Guide series provides convenient, inexpensive, portable references that students and faculty can use to improve the quality of studying, learning, and teaching. Their modest cost enables instructors to require them of all students (in addition to a textbook). Their compactness enables students to keep them at hand whenever they are working in or out of class. Their succinctness serves as a continual reminder of the most basic principles of critical thinking.

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