





## THOUGHT AND KNOWLEDGE

This best-selling textbook, written by award-winning educator and past president of the American Psychological Association, Diane F. Halpern, applies theory and research from the learning sciences to teach students the thinking skills they need to succeed in today's world. This new edition retains features from earlier editions that have helped its readers become better thinkers. A rigorous academic grounding based in cognitive psychology is presented in a clear writing style with a humorous tone and supported by numerous practical examples and anecdotes.

*Thought and Knowledge, Fifth Edition* has been revised to help students meet the challenges of a global neighborhood and make meaningful conclusions from the overwhelming quantity of information now available at the click of a mouse. The skills learned with this text will help students learn more efficiently, research more productively, and present logical, informed arguments.

*Thought and Knowledge, Fifth Edition* is appropriate for use as a textbook in critical thinking courses offered in departments of psychology, philosophy, English, humanities, or as a supplement in any course where critical thinking is emphasized.

**Diane F. Halpern** is the McElwee Family Professor of Psychology and Roberts Fellow at Claremont McKenna College. She is a past president of the American Psychological Association, the Western Psychological Association, the Society for General Psychology, and the Society for the Teaching of Psychology.

Professor Halpern has won many awards for her teaching and research, including the James McKeen Cattell Fellow Award from the Association for Psychological Science (2013); the Arthur W. Staats Lecture on Unifying

Psychology Award from the American Psychological Association (2013); Outstanding Professor Award from the Western Psychological Association (2002); American Psychological Foundation Award for Distinguished Teaching (1999); Distinguished Career Award for Contributions to Education from the American Psychological Association (1996); and the California State University's State-Wide Outstanding Professor Award.



# THOUGHT AND KNOWLEDGE

An Introduction to Critical Thinking

Fifth Edition

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*Claremont McKenna College*

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## PREFACE TO THE FIFTH EDITION

It is hard to believe, but it has been 30 years since the publication of the first edition of *Thought and Knowledge: An Introduction to Critical Thinking*. The world has changed in many ways over the last three decades. For the first edition, I wrote all of the text long hand (remember that?) and had it typed by a professional secretary who had a sleek new typewriter with a “tape” that allowed her to white out errors and a return key so she did not have to push the carriage return at the end of every line. I am guessing that most readers have no idea what any of this means because they never lived in a world with typewriters or heard of a “carriage return.”

But, despite all of the changes in technology in the last 30 years (yes, there was a time when there was no Internet), the need to think critically has not changed. One might argue that it is even more important now that everyone has easy access to more information than they can possibly use and much of that information is biased in ways that can be difficult to detect. It is to the users of new and emerging technologies that I dedicate this book.

I have many wonderful colleagues, students, and reviewers to thank for their assistance with this edition. I thank Heather Butler, an extraordinary doctoral student who will be Dr. Butler by the time you are reading this. She has helped me question, research, and rethink much of what I know about critical thinking. I also thank Amanda Franco, a doctoral student at University of Minho in Portugal for carefully reading an early draft of this book and offering insightful recommendations. Special thanks to Dr. Heidi Riggio at California State University, Los Angeles, for her careful and creative work on the instructor’s materials and student online exercises in this edition of *Thought and Knowledge* and in previous editions. This edition has a new publisher, Psychology Press, a division of the international



publisher Taylor & Francis. The psychology editor Paul Dukes and the editor assigned for this book, Fred Coppersmith, have been supportive throughout the process of bringing this book to print. In addition, I have been fortunate to have suggestions from some of the top luminaries in the field of teaching critical thinking. Some of the reviewers have chosen to remain anonymous, so I thank them anonymously. Sincere thanks to the following reviewers:

Alan Bensley, Frostburg State University  
Michael Bishop, Florida State University  
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Joe Morrison, Queen's University Belfast  
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Steven L. Schandler, Chapman University  
Deborah Schweikert-Cattin, Regis University  
Eric Stocks, University of Texas at Tyler

This edition benefited enormously from their insightful comments.

I also thank my dear family, who has been supportive of the very long periods of time I spent at my computer writing this edition, my husband, Sheldon Halpern, and my children Evan and Karen Halpern and Jaye Halpern-Duncan. Finally, there are the lights of my life—my incredible grandchildren, who have taught me much about the world, Amanda, Jason, and Belle.

It is my sincere hope that you will enjoy this book and come away with new skills and knowledge that will stay with you for life. Never stop questioning; never stop thinking. Our future depends on it.

## CHAPTER 1

# THINKING

## AN INTRODUCTION

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## 2 Thinking

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Many people would sooner die than think. In fact they do.

—Bertrand Russell (quoted in *Macmillan*, 1989)

Both of my grandmothers came from “the old country”—one from Poland and the other from Romania. I recall stories from my childhood about their dislike for each other, which was always kept as an unspoken but open secret because despite their mutual dislike, my maternal grandmother had a skill that was needed by my paternal grandmother. Because of this need, they had to at least feign liking each other. My maternal grandmother practiced the ancient art of cupping. Many people, including my grandmothers, believed that cupping cured a variety of illnesses. My maternal grandmother would light a match inside a small cup, then after burning off the oxygen in the cup, she would put out the match and place the hot cup on the back of the person seeking the cure. The cup would create a suction so that when it was removed, circles of red welts would appear on the skin where the cup had been placed. The theory behind this treatment was that when the cup was pulled off the body, it would suck out the illness. Did some people who sought this cure feel better afterwards? Anecdotal evidence suggests that they did, but were improvements caused by the sucking action of the cups or the belief that it would work? More importantly, why should we care if at least some people felt better after this treatment? These are all central questions for our discussion of critical thinking.

### The Need for Critical Thinking Skills

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Researchers have estimated the world’s data storage capacity at 295 exabytes—enough information to fill a pile of CDs that would stretch beyond the moon. That vast pile of information is only getting vaster: It increases by a factor of 10 every five years.

—Lea Winerman (2012, p. 44)

We live in the information age. The pursuit of information has become so all-consuming that many people find that they are constantly multitasking—updating Facebook or other social media pages while in class, checking

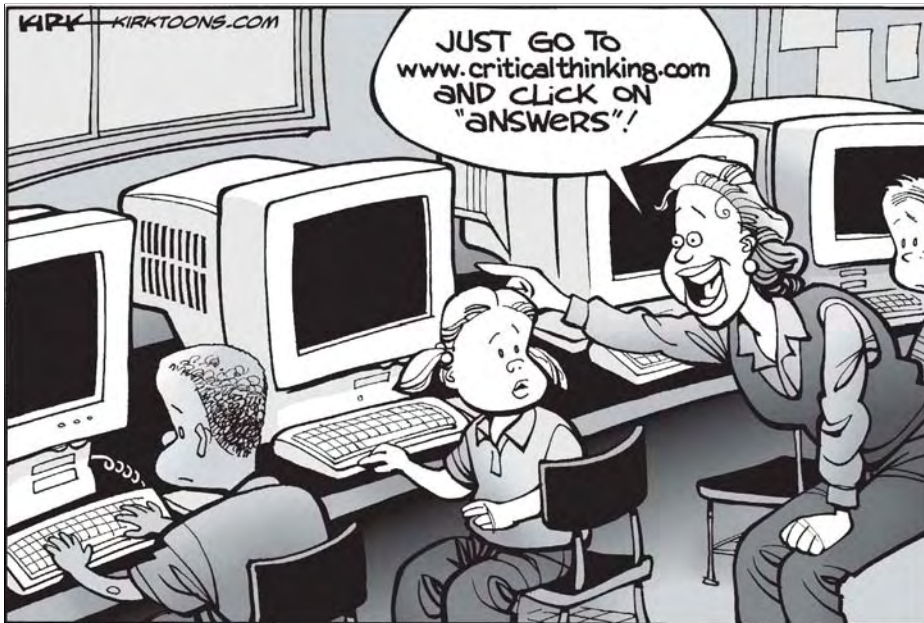
email while driving, and watching television while chatting with family members during dinner. With so much multitasking, many of us are on system overload, with the result that we do each task worse when doing them simultaneously than if we had concentrated on one at a time (Crenshaw, 2008).

The Internet is an integral part of most people's lives, with its wealth of information that exceeds anything we could have imagined even a decade ago. I cannot think of any topic that is so obscure that it cannot be found with just a few keystrokes from a nearby keyboard. The Internet has democratized knowledge. The "important stuff" is no longer kept in dusty library stacks that are available only to a privileged few. Massive quantities of information are available to anyone with a computer (or various other devices) and Internet access—which is almost everyone except those in the most remote regions of the world. But, the widespread availability of information has a down side. A racist-hate website may look like a reliable news source; bogus health information is sold as though it really was "doctor-recommended," and information about international conflicts can provide one-sided accounts that appear to be fair and unbiased. How can any of us know what to believe, and how can we use the massive amounts of information to make informed decisions?

### The Twin Pillars of Knowing and Thinking

If we cannot think intelligently about the myriad of issues that confront us, then we are in danger of having all of the answers, but still not knowing what they mean. The twin abilities of knowing how to learn and knowing how to think clearly about the rapidly proliferating information that we must select from are the most important intellectual skills for the 21st century.

Is there evidence that we need to learn how to think critically? Lots of it. In what may be the most horrifying tale ever told by the prolific science fiction writer, Isaac Asimov (1989), he reported on the true state of scientific understanding and knowledge by Americans. In a telephone survey conducted by the Public Opinion Laboratory at Northern Illinois University, Asimov noted that the researchers found over 20% of the more than 2,000 adults surveyed believe that the sun revolves around the earth. Why, asks Asimov, over 400 years since the scientific community agreed on the fundamental scientific fact that the earth revolves around the sun, are the vast majority of adults still unaware of a basic fact that is "taught" in grammar school science? More recent findings include the responses of 6% if



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Americans who say that the moon landing was staged (Griggs, 2009), and there is always the Flat Earth Society, dedicated to the proposition that well, you can guess the rest.

Over 2.5 million people have purchased the Power Balance Wristband, which claims to improve energy, flexibility, and balance (DiSalvo, 2011). More specifically, the Power Balance (2010) company claims that "optimal health and peak performance occur when your body maintains ionic balance (the exchange between negative and positive charges) and free flowing energy pathways (harmony) at the optimum frequency" (Energy Balance & Systemic Harmony Are the Keys, para. 1). These tiny silicon wristbands retail for \$29.95 or more, and in 2010, the company sold over 2.5 million bracelets. Several famous athletes such as Shaquille O'Neal and David Beckham endorsed the product and CNBC even declared the wristband Sports Product of the Year in 2010 (DiSalvo, 2011). In 2010, after demands from the Australian government to produce evidence in support of their amazing claims, Power Balance LLC admitted that there was "no credible scientific evidence" to support their claims, and they offered a full refund to customers (Power Balance, 2010). This is just one example selected from a countless number in which millions of people spent billions of dollars on a worthless product.

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The depressing list of findings and reports supports the conclusion that many adults do not have adequate thinking and learning skills. It is difficult to imagine any area where the ability to think clearly is not needed. Yet, few of us have ever received explicit instructions in how to improve the way we think. Traditionally, our schools have required students to learn, remember, make decisions, analyze arguments, and solve problems without ever teaching them how to do so. There has been a tacit assumption that adult students already know “how to think.” Research has shown, however, this assumption is wrong. The situation is succinctly summed up by Bill Brock, formerly the Republican Party chairman and currently an international consultant, who, after reading a recent report on the low level of learning and thinking skills of college graduates, exclaimed, “It ought to terrify everybody” (quoted in Frammolino, 1993, p. A41).

### What We Really Need to Know

Proficiency in reading, writing, and arithmetic has traditionally been the entry-level threshold to the job market, but the new workplace requires more from its employees. Employees need to think critically, solve problems, innovate, collaborate, and communicate more effectively.

—American Management Association, 2010, p. 1

What we need to know and be able to do as informed citizens has been changing at an increasingly rapid rate. The workforce is one critical place where we can witness the dizzying pace of change. There is an increased demand for a new type of worker—the “knowledge worker” or the “symbol analyst,” a phrase that is used by the U.S. secretary of labor to describe someone who can carry out multistep operations, manipulate abstract and complex symbols and ideas, acquire new information efficiently, and remain flexible enough to recognize the need for continuing change and for new paradigms for life-long learning. Workers in almost every job category can expect to face novel problems in a workplace that is changing repeatedly. Familiar responses no longer work, and even newly acquired ones will not work for long.

Employers know what they want from their employees and what colleges should be teaching their future employees (Association of American Colleges & Universities, 2010). Their top choice is teach students to communicate effectively both orally and in writing, followed by “critical thinking and analytical reasoning skills.” I would add here that no one can communicate clearly if their thinking is muddy, so these two top concerns are inextricably related. In fact, four of the top five learning outcomes that

## 6 Thinking

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employers want for their employees are subsumed under the general heading of critical thinking—applying knowledge in real-world settings, analyzing and solving problems, connecting choices to actions, and being able to innovate and be creative. The Partnership for 21st Century Skills (2004), a coalition of national organizations that advocate for the skills needed in a global economy, makes it clear that “critical thinking and problem solving” are essential for the citizens of today and for the future. Politicians of every persuasion, blue ribbon panels, workers, and students all recognize the critical importance of critical thinking as the primary objective of education.

Consider this: Most people will finish their formal education between the ages of 18 and 22. Today’s young adults are expected to have the longest average life span in the history of the world, with most living into their 70s and many living into their 80s and 90s. We can only guess what life will be like in the years 2075 or 2085 or beyond, years that many of you who are reading this book will live through. One likely guess is that many of today’s young adults will be working at jobs that currently don’t exist and dealing with technologies that dwarf the imagination of present-day science fiction writers. What do they need to learn during their first two decades of life that will prepare them for their remaining 60+ years?

### Thought and Knowledge

Knowledge will forever govern ignorance: And people who mean to be their own Governours, must arm themselves with the power which knowledge gives.

—James Madison  
(Texas Library Association  
<http://www.txla.org/groups/godort/kip-award.html>)

One of the elementary schools that I attended as a child had the words “Knowledge is Power” chiseled into a concrete block above its front door. If I were asked to amend this maxim based on my experiences over the many years since I last past through those doors, I would edit the concrete block to read, “Thought and Knowledge are Power” because knowledge is powerful only when it is applied appropriately, and thought is powerful only when it can utilize a large and accurate base of knowledge.

This is a book about thought and knowledge and the relationship between these two constructs. It is about thinking in ways that allow us to use previous knowledge to create new knowledge. Everything we know, and

everything everyone else knows—that is, all existing knowledge—was created by someone. When we learn Euclidean geometry, we are learning about knowledge created by the great mathematician, Euclid. Similarly, other eminent inventions and insights such as the wheel, shoes, video games, toilet paper,  $E = mc^2$ , and the “discovery” of America, all represent knowledge created by people. Knowledge is not something static that gets transferred from one person to another like pouring water from one glass to another. It is dynamic. Information becomes knowledge when we make our own meaning out of it. Of course, it is silly to think that we should all start from “scratch” and recreate the wheel or that each of us needs to reinvent our own version of algebra or knowledge in other fields that is readily available that others have created. We build on the knowledge created by others to create new knowledge.

We also create knowledge every time we learn a new concept. The newly acquired information is used to construct our own internal knowledge structures. (“Knowledge structures” is a technical term used by cognitive psychologists to describe all of the interrelated concepts that each of us has about different subjects.) Knowledge is a “state of understanding” that exists only in the mind of the individual knower (King, 1994, p. 16). We use our existing knowledge when we receive new information in order to make sense of the new information, thus the acquisition of knowledge is an active mental process. This idea was expressed more eloquently by Resnick (1985, p. 130) when she said: “Knowledge is no longer viewed as a reflection of what has been given from the outside; it is a personal construction in which the individual imposes meaning by relating bits of knowledge and experience to some organizing schemata.”

### A Working Definition of Critical Thinking

Ultimately, it is not we who define thinking, it is thinking that defines us.  
—Carey, Foltz, & Allan (Newsweek, February 7, 1983)

Although many psychologists and others have proposed definitions for the term “critical thinking,” these definitions tend to be similar with

Take a few minutes and think about your own definition of critical thinking. What would it include and what would it not include?



## 8 Thinking

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considerable overlap among the definitions. In a review of the critical thinking literature, Fischer and Spiker (2000) found that most definitions for the term “critical thinking” include reasoning/logic, judgment, metacognition, reflection, questioning, and mental processes. Jones and his colleagues (Jones, Dougherty, Fantaske, & Hoffman, 1995; Jones, Hoffman, Moore, Ratcliff, Tibbetts, & Click, 1995) obtained consensus from among 500 policy makers, employers, and educators who agree that critical thinking is a broad term that describes reasoning in an open-ended manner and with an unlimited number of solutions. It involves constructing a situation and supporting the reasoning that went into a conclusion.

We can think of critical thinking as good thinking, but that definition leaves us with the problem of recognizing what that is and differentiating good thinking from poor thinking. Here is a simple definition that captures the main concepts: *Critical thinking is the use of those cognitive skills or strategies that increase the probability of a desirable outcome. It is used to describe thinking that is purposeful, reasoned, and goal directed—the kind of thinking involved in solving problems, formulating inferences, calculating likelihoods, and making decisions, when the thinker is using skills that are thoughtful and effective for the particular context and type of thinking task.* Critical thinking is more than merely thinking about your own thinking or making judgments and solving problems—it is effortful and consciously controlled. Critical thinking uses evidence and reasons and strives to overcome individual biases. Decisions as to which outcomes should be desirable are embedded in a system of values and may differ from person-to-person, but the idea that critical thinking makes desirable outcomes more likely provides a way of defining critical thinking (Butler & Halpern, 2012; Moseley et al., 2005; Riggio & Halpern, 2006; Sternberg, Roediger, & Halpern, 2007).

One of my favorite definitions of critical thinking was published over 50 years ago (1960) and comes very close to a contemporary notion of critical thinking: “Critical thinking then is the process of evaluation or categorization in terms of some previously accepted standards . . . this seems to involve attitude plus knowledge of facts plus some thinking skills” (Russell, cited in d’Angelo, 1971, p. 6). In short, Russell’s equation is:

$$\text{Attitude} + \text{Knowledge} + \text{Thinking Skills} = \text{Critical Thinking}$$

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## What's Critical about Critical Thinking?

The “critical” part of critical thinking denotes an evaluation component. Sometimes the word “critical” is used to convey something negative, as when we say, “She is a critical person.” But, evaluation can and should be a constructive reflection of positive and negative attributes. When we think critically, we are evaluating the outcomes of our thought processes—how good a decision is or how well a problem has been solved. Critical thinking also involves evaluating the thinking process—the reasoning that went into the conclusion we’ve arrived at or the kinds of factors considered in making a decision. Daydreams, night dreams, and other sorts of thinking that are not engaged in for a specific purpose are not subsumed under the critical thinking category. Neither is the type of thinking that underlies our routine habits, which although goal-directed, involve very little conscious evaluation, such as getting up in the morning, brushing our teeth, or taking a usual route to school and work. These are examples of **nondirected or automatic thinking**. Other examples of *noncritical thinking* include the rote recall of information (e.g., listing state capitals) or the failure to consider evidence that might support a conclusion that you do not like.

In thinking about critical thinking, consider, for example, someone in need of money who decides to remedy this problem with a trip to the racetrack where he bets on a pretty filly named “Handsome Singer.” There is some (small) chance that he will “win big” if his horse comes in, but this is not an example of critical thinking, even if he reflected on his actions and Handsome Singer was the first to cross the finish line. The most likely outcome is that he will lose the money he bet, surely an undesirable outcome. On the other hand, suppose that he invested his money in a “blue chip” stock instead of betting it on “Handsome Singer.” There is some chance that he will lose his money with this strategy, but on average, in the long run, the likelihood of the desirable outcome of having more money is much higher with the stock investment than it is by betting at the race track. The investment is a rational or reasoned course of action, but it cannot guarantee a desirable outcome. The future is always unknown and there can never be guarantees about the future, even for the best of thinkers. A substantial increase in the likelihood of a desirable outcome is the best that critical thinking can promise, and it is the best hope for the future that anyone can offer.

The focus of this book is on the development and improvement of those skills that characterize clear, precise, purposeful thinking. It is a practical