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The Role of Critical Thinking in Problem Analysis

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Introduction

Contrary to what the name implies, critical thinking is not thinking that is critical of others. It is “fundamental” or “vital” thinking. Critical thinking is thinking that drills down to the essence of a problem. It is introspective thinking that questions everything and everyone. Critical thinking should not be thought of as an effort to refute any particular choice or decision, but rather as a way to balance evidence, reason, and options.

Critical thinkers make better decisions because they question their understanding of a subject before making a decision. They are aware of the tendency among decision makers toward lazy, superficial thinking and instead ask questions to illustrate their depth of understanding. Critical thinkers pursue reason and logic as the foundation for effective decision making. They “think hard” rather than thinking quickly.

Asking questions about what we believe and why we believe it puts the extent of our real understanding (knowledge) into perspective. Introspective thinking reveals what we know and do not know for certain about a subject. It unveils the nature and significance of false assumptions and gaps in information. Questioning what you have been told by others may make it harder to make a decision, but the choice will ultimately be made with a fuller understanding of what is the best option in a given situation.

What Is a Good Decision?

The first paper in the Critical Thinking Series, [*What is a “Good” Decision? How is Quality Judged?*](#), provides an explanation of how to judge the quality of decisions. In short, a decision is of high quality to the extent that the decision maker knows what risks they are taking by making that decision. They know how good or bad their information is and the biases inherent in their reasoning.

A good decision does not necessarily turn out to be the best decision in hindsight, but is the choice with the best chance of being successful given what is known. The quality of a decision is determined by the quality and quantity of information being utilized and by the reasoning being employed to arrive at the decision. Incorrect and/or incomplete information and reasoning lead to erroneous predictions of future outcomes.

A bad decision is one in which the decision maker was poorly informed, because of bad information, incomplete information, or faulty reasoning. The decision maker chooses between options without understanding everything they need to know about the pros and cons of each option, or even whether all options have been considered. They do not know how good or bad their information is.

A high-quality (good) decision is based on a methodical analysis of the available information and on sound reasoning. Good decisions do not depend on luck. They are not just the result of “throwing the dice”; they are examples of well-informed risk-taking. The decision maker knows what they do not know and makes the best choice in light of this knowledge.

Bias Gets in the Way

The second paper in the critical thinking series, [*Managing Analytical bias – Why Good Decisions Don't Come Easily*](#), discusses the reason why much of our thinking is not particularly balanced.

The natural tendency in decision making is:

- to consider only those alternatives that are obvious,
- to analyze only the areas of uncertainty with which we are familiar
- to quickly compare the known options through a haze of bias and assumptions.

In general, intuitive or instinctual problem solving (which leads to decisions) is performed by trial and error. Even highly educated people typically muddle through problem analysis in a haphazard way. Most people are content with an occasional success and assume that no one else could do any better.

Biased viewpoints are what prevent people from being objective in their analysis of a situation or problem that requires a decision. Bias is created by experience, education, and genetics. It is the expression of how one thinks and reasons about particular subjects. Bias, in its various forms, discourages us from being thorough in our problem analyses. It exaggerates our understanding of the factors that relate to a decision and encourages quick, poorly informed decisions. The influence of bias is always at play, undermining our ability to be truly objective.

The Role of Critical Thinking

So, good decisions are ones in which the decision maker understands what they do not know about what they must decide. However, people exaggerate what they think they know. Biased viewpoints encourage people to exaggerate their own knowledge and the validity of the information sources they are drawing on. The result is a lot of poorly informed, illogical decisions. The cure that is needed is a structured approach to thinking which will help to ensure balanced reasoning and informed choices. This cure is critical thinking.

Developing a Questioning Outlook

To develop as a critical thinker, you must learn to ask the right questions and to then judge the quality of the answers. Becoming a skilled thinker requires practice. Because of the influence of bias and its distorting effect on one's perception of knowledge, the mere act of thinking does not ensure that one is becoming an increasingly skilled thinker over time. We become more opinionated, but not necessarily better informed.

Becoming a more skilled thinker requires discipline in much the same as the way one would advance in the development of any set of skills in any sport or activity. Improvement comes from guided skills development such as instruction, practice, constructive criticism, and then more structured practice. Imagine trying to learn skills any other way. Would you ever become an excellent soccer player without being told what to practice or how to measure improvement? Would any parent launch a child's soccer career by leaving them in a field without any idea of what the rules of the game were, the nature of the activities, or the level of performance of other players? No, but this is how personal decision-making skills are allowed to develop.

The average person presumes that because of their routine mental activity they are becoming an ever more skilled thinker by virtue of random practice, just like learning to play soccer by being left on a field with a ball. A person might become better at some skills (kicking hard or far), but it is unlikely that they will fulfill all their potential without guidance. Becoming better thinkers and decision makers is much the same. To improve requires practice and standards against which to compare results. It requires instruction in both the attributes (structures) of critical thinking and measures of success (quality standards).

Socratic Process

This excerpt from the [Center and Foundation for Critical Thinking's A Brief History of the Idea of Critical Thinking](#) discusses the importance of the Socratic method and developing skills related to examining assumptions:

The intellectual roots of critical thinking are as ancient as its etymology traceable, ultimately, to the teaching practice and vision of Socrates 2,500 years ago who discovered by a method of probing questioning that people could not rationally justify their confident claims to knowledge.

Confused meanings, inadequate evidence, or self-contradictory beliefs often lurked beneath smooth but largely empty rhetoric. Socrates established the fact that one cannot depend upon those in "authority" to have sound knowledge and insight. He demonstrated that persons may have power and high position and yet be deeply confused and irrational. He established the importance of asking deep questions that probe profoundly into thinking before we accept ideas as worthy of belief.

He established the importance of seeking evidence, closely examining reasoning and assumptions, analyzing basic concepts, and tracing out implications not only of what is said but of what is done as well. His method of questioning is now known as "Socratic Questioning" and is the best known critical thinking teaching strategy. In his mode of questioning, Socrates highlighted the need in thinking for clarity and logical consistency.

Socrates set the agenda for the tradition of critical thinking, namely, to reflectively question common beliefs and explanations, carefully distinguishing those beliefs that are reasonable and logical from those which — however appealing they may be to our native egocentrism, however much they serve our vested interests, however comfortable or comforting they may be — lack adequate evidence or rational foundation to warrant our belief."

Improved Thinking

To become a critical thinker you must ask questions of yourself and everyone else. Critical thinking is drilling down to clarify meaning, eliminate inaccuracies, improve comprehension, and strive for intellectually honest results.

To develop as a thinker you must recognize that thinking has structures and that those structures require understanding and practice in order for you to become adept in their use. You are maturing as a thinker when you begin to notice the way you are thinking and are able to recognize the strengths and weaknesses in that thinking. As your reasoning improves, you build an objective view of your own thinking. Reading this paper will not make you a critical thinker. It might, however, get you started on the path to more informed reasoning.

The structures of thinking may also be referred to as "elements of reason," "parts of thinking," or the "fundamental structures of thought." The terms are interchangeable.

Reasoning (thinking) is the process of drawing conclusions based on reasons (evidence). We reason to make sense of something and to give it meaning. Most reasoning is subconscious. Our thinking only becomes apparent when it is challenged and we are forced to explain our decisions or viewpoints.

Critical thinking has its own skill sets and measures of success. They are the Structures of Thinking in combination with Universal Intellectual Values (standards).

Critical thinking involves being able to first dismantle our thinking into the component parts and to then judge the reasoning and evidence revealed by the dismantling on the basis of universal intellectual values, according to The Elements of Reasoning and the Intellectual Standards, the [Center and Foundation for Critical Thinking](#).

Structures:

- Purpose
- Problem
- Assumptions
- Point of view
- Data, information and evidence
- Concepts and ideas
- Inferences, interpretations and conclusions
- Implications and consequences

Values:

- Clarity
- Accuracy
- Precision
- Relevance
- Depth
- Breadth
- Logic
- Fairness

Purpose

Thinking always has a purpose. It may not be monumental, but when one is pondering, it is always about something and that something is generally a question that needs an answer — an itch that needs to be scratched. So, humans reason with a purpose. To understand thinking, we must understand the function it serves and the direction in which it is heading. The process of critical thinking requires bringing our goals and desires into the light of conscious awareness.

We must be careful not to assume that the announced purposes of our thinking are the actual purposes. For example, do you buy a particular style of car because it is economical to operate or is it really because a new car makes you appear successful? What we say and how we reason are often different. Our purpose colors the way we see the world and vice versa. Our point of view, and hence purpose, are affected by experiences. In the example of purchasing a car, our definition of "economical" is unique, as are the qualities of a car that we might think of as implying success.

Problem to Solve

The purpose of reasoning is to solve a problem, to answer a question, or make a choice. There is always a question that needs a resolution, however subtle. Reasoning always has a purpose directed toward an outcome in the form of a decision or choice being made. The product of reasoning can be a simple decision (such as whether to go out for dinner with your spouse), an inference (such as thinking that your spouse is mad at you based on his/her posture when speaking to you), a judgment (such as your spouse has bad posture), and/or a conclusion (your spouse needs to see a chiropractor).

Assumptions

Assumptions are the things we take for granted as being true when we are figuring something out. They are part of our system of beliefs. We assume our perceptions and beliefs are true and we use them to interpret the world. Beliefs, and the assumptions that follow from them, can be sensible or illogical depending on whether there is evidence to support the assumptions. The objective is to recognize the difference. Assumptions form the basis of inferences. We form inferences in order to make sense quickly of what is happening around us. Assumptions, and the inferences that follow, permeate our lives.

For example, when we see a group of children heading toward a park carrying a football, we infer that they are going to the park and will play football together in the park, using the ball that they are carrying and wearing the clothes that they have on. We might even assume that they all live nearby and are all good friends of about the same age.

Assumptions and the inferences we make from them are everywhere. Critical thinkers must learn to deconstruct the inferences that our minds jump to so that they become apparent and can be deconstructed. This mental dismantling allows critical thinkers to separate raw experience (what we know to be true) from the interpretations of that experience (what we automatically assume to be true).

Point of View

Point of view is the culmination of our experiences, biases, and training. It manifests itself as our character or personality. We all view issues from a unique angle. There are many influences that in combination help to form our point of view. Among these influences are time, culture, religion, gender, discipline, profession, economic status, education level, and age.

Critical thinkers take charge of their point of view by bringing it out into the open. They actively study and analyze situations from alternative points of view and say, "This is how I see it, but my competitor will view the situation from a different perspective." Asking questions that help to clarify the perspective held by others is very helpful in understanding their thinking. The more points of view we are able to incorporate into our thinking, the more balanced our reasoning will become.

Data, Information and Evidence

All reasoning is based on the assimilation of information. This information can be in any number of forms, including generally known facts, things you believe to be facts, scientific data, opinions, gossip, and experiences. Since your reasoning is based on available information, it seems only fair to ask oneself and others, "Upon which information are you basing your reasoning?"

Critical thinkers seek more and better data, when others would not bother. They question the information that is available as well as the information that others presume to have. Critical thinkers realize that conclusions can only be as good as the information that went into the thinking process by which those conclusions were formed. Critical thinkers have a healthy skepticism for the quality of data, particularly when it is presented in support of a belief that serves the vested interests of some organization or individual.

Concepts and Ideas

Concepts are mental groupings of ideas that provide these ideas with a sense of order. All professions or disciplines such as business, psychology, and biology have their own set of concepts and related technical vocabulary to make thinking and communicating in that profession easier, and even possible. Concepts underlie all of our understandings. For example, you must know the concepts of strike, ball, shortstop and mitt in order to understand the rules of baseball.

To develop as a critical thinker, it is necessary to recognize the mind's power to create concepts as a convenient way of managing complexity. It is over these types of shortcuts that you must train yourself to take charge. They are the foundations of your preconceptions and assumptions. The ability to "remove" this or that idea from the concept that encompasses it allows you to test alternative ideas.

Inferences, Interpretations and Conclusions

Reasoning interprets information/data on the basis of what we believe to be true (beliefs and assumptions) in order to figure out something else. An inference is a step of the mind that leads to a conclusion. For example, you may study the financial reports of a company to make a judgment about its future performance. You believe that there is a governing body that regulates the content of financial reports and, based on that belief you assume that the financial report is honest and accurate. The report suggests that sales for the company will rise rapidly over the next year and you infer that it is therefore a good company in which to invest.

The analysis of the financial report embodies your point of view on the subjects of capital markets, investment strategies, and the honesty of written reports. One's point of view and assumptions interact and result in inferences. Critical thinkers recognize the inferences being made, the assumptions (beliefs) upon which the inferences are based, and the point of view that is brought to bear on the analysis. Being able to dissect thinking into these component parts and to recognize the inputs allows critical thinkers to broaden the scope of their outlook, see situations from multiple points of view, and, as a result, to make better decisions.

Implications and Consequences

The implications and consequences of reasoning is where our thinking is leading. Implications are what might happen. They lead to consequences, which are the outcomes that actually do happen. They can each be positive or negative in their outlook.

When you are told by a superior to get a report done "right away," is she telling you to forsake quality (proofreading) in order to complete the report earlier? Is she saying that you work too slowly? Does she dislike you and looks for ways to be critical? Is she implying that the report is late and it is your fault? A critical thinker would not jump to conclusions but instead would ask clarifying questions.

Critical thinkers use questioning to clarify what is intended from a communication. They then make inferences on the basis of the communicator's stated intentions—no more, no less. Say what you mean, and mean what you say" is a principle of critical thinkers. Upholding this principle requires an honest appraisal of one's real intentions and the intentions of others. Critical thinkers try to infer only what is implied by hard evidence—no more, no less.

Interplay of Structures of Thinking

The relationships between the structures are nonlinear. There are no clear boundaries between the elements. Instead they function in an interdependent fashion like the segments of a body. The point to remember is that all of the structures are always present no matter what the quality of one's reasoning. The trick to becoming a skilled thinker is to practice making distinctions between the elements and to develop an understanding of the interrelationship of the elements within your thinking. It is difficult at first but becomes easier with practice.

Quality Standards

The next step is to judge how well our thinking was dissected. The universal intellectual values are used to dissect the dissection. They allow us to quality control the degree and depth of our reasoning. For example, we know to question the quality of data, information, and experiences that are used in our reasoning. But when is the questioning complete? What is enough? When should we be satisfied with our level of understanding of the data being employed?

The answer, unfortunately, is not black and white. It is a matter of judgment. That judgment is based on the universal intellectual values that are used to judge the quality of our efforts to understand the structures of our thinking. Critical thinkers keep the universal values in mind when thinking about our thinking. We decide for ourselves when the analysis is sufficiently thorough to allow for a well-enough informed decision.

- **Clarity:** Avoid ambiguity.
"Could you elaborate further on that point? Could you express that point in another way? Could you give me an illustration? Could you give me an example?"¹
- **Accuracy:** Identify the degree of opinion or guesswork in statements and claims.
"Is that really true? How could we check that? How could we find out if that is true?"¹
- **Precision:** Avoid generalities in order to allow us to understand exactly what is at issue and what is known to be true.
"Could you give more details? Could you be more specific?"¹
- **Relevance:** Ensure that the discussion relates directly to the problem, question, or issue by keeping the thinking on track.
"How is that connected to the question? How does that bear on the issue?"¹
- **Depth:** Avoid the superficial. Ask questions that dig beneath the surface of an issue to uncover hidden complexities.
"How does your answer address the complexities in the question? How are you taking into account the problems in the question? Is that dealing with the most significant factors?"¹
- **Breadth:** Consider issues from all relevant viewpoints in order to avoid a narrow-minded approach to reasoning.
"Do we need to consider another point of view? Is there another way to look at this question? What would this look like from a conservative standpoint?"¹
- **Logic:** Ensure that all of our thoughts interrelate in a sensible fashion.
"Does this really make sense? Does that follow from what you said? How does that follow? But before you implied this, and now you are saying that; how can both be true?"¹
- **Fairness:** Ensure our thinking is justified, given the context in which it is being applied. Self-deception is an easy trap to fall into when there are vested interests at stake.
"Do I have a vested interest in this issue? Am I sympathetically representing the viewpoints of others?"¹

¹ Excerpt from Universal Intellectual Standards, Foundation for Critical Thinking, www.CriticalThinking.org

Ethics

Layered on top of the consideration of structures and intellectual values is ethics. Ethics relate to the purpose for which critical thinking serves. Critical thinking is a tool that can be used for both bad and good. Becoming an ethical critical thinker involves developing a sense of fair-mindedness and applying the barb of our criticism evenly. We must recognize mistakes in our own thinking as readily as we see it in that of others.

As you develop as a critical thinker, you must be conscious of being fair-minded rather than self-centered. It is everyone's tendency to see mistakes in the thinking of others but not necessarily the weaknesses in our own thinking. Self-centered thinking is referred to as "weak sense" critical thinking. It is weak because it is not fair-minded and does not balance the considerations of opposing viewpoints.

Sophistry

Sophistry is weak-sense critical thinking. It is synonymous with the art of politics. One does not expect a politician to point out the weaknesses in their own campaign strategies or the strength of their opponents'. Ethical critical thinkers would. Weak-sense critical thinkers are focused on winning arguments rather than on being fair-minded. They use emotional appeals and intellectual trickery in ways that appeal to people's prejudices and fears.

Ethical critical thinkers strive to be fair-minded. They make the effort to incorporate the viewpoint of others in their decision-making processes. They recognize high-quality reasoning in others and are willing to change their views when confronted with better reasoning than their own.

Conclusion

Critical thinking is the methodical analysis of reasoning. It is about understanding the implications of inputs (data) and influences (bias) to the reasoning process. Critical thinking allows us to take control of our thinking rather than letting it become hijacked by convenience, mindset, assumptions, and bias.

Critical thinkers are able to ensure that they think (reason) with the greatest clarity and precision of which they are capable. They are able to approach problem solving with a level of detachment that permits a thorough and balanced analysis. Critical thinkers take the time necessary to make excellent decisions rather than choosing to make fast, good-enough decisions.

Critical thinkers seek first to understand. They take the time to find out what they do not know before reaching conclusions. They make more effective decisions as a result.

For Further Reading

For more information on the field of critical thinking, readers are referred to www.CriticalThinking.org, the website of the Foundation for Critical Thinking. The author would like to thank Dr. Linda Elder, and the Foundation for Critical Thinking for their contributions to the art and science of critical thinking and for permission to draw on their body of work for this paper. The content of this paper is based entirely on information provided by the foundation and its publications.

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About the Author

Brian Egan has been a contract instructor for Global Knowledge since 1999. He divides his time between management consulting, project management, technical writing, and professional development training. Brian has started companies in such diverse fields as fish farming, woodwork, gift manufacturing, and catering. He is the author of numerous training courses relating to professional skills, project management, and decision making.