DEVELOPING SKILLS FOR CRITICAL THINKING IN THE PROCESS OF SOLVING OF SECURITY PROBLEMS

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Abstract

This elaboration discusses on the most important essential skill for Leaders in the security sector: critical thinking. It is hard to imagine a leader today, especially those who are involved in solving security issues, who does not think critically, or at least uses the concept in making decisions. Critical thinking leads to a greater certainty and confidence in an uncertain future. This skill helps us to simplify complex scenarios and brings clarity to the ambiguous situations. In essence, critical thinking is about learning how to think and how to judge and improve the quality of thinking.

In the elaboration, we start with the definition of critical thinking and its philosophy, and we consider the purpose of the thinking and components of critical thinking with brief definitions of each of the categories in the elements of reasoning. Further, we consider the uses of critical thinking in the decision making process. Critical thinking is useful only in those situations where human beings need to solve problems, make decisions, or decide in a reasonable and reflective way what to believe or what to do. At the end, we discuss about the use of scientific methods in the security problem solving process, and we propose a model in which scientific methods are implemented on the base of operational researches, statistical analyses, mathematical and computer modeling, simulations, analytical reasoning, and common sense. This model can be implemented in the process of understanding and improvement of the conduction of some security operations.

Key words: *critical thinking, decision making process, problem solving, education, curricula, scientific methods, information technology, modeling and simulation*

Introduction

Critical thinking consists of mental processes of discernment, analyzing and evaluating. It includes all possible processes of reflecting upon a tangible or intangible item in order to form a solid judgment that reconciles scientific evidence with common sense.

Becoming a critical thinker is an admiral goal requiring a committed effort to learn the concepts, practice the elements, and teach the ways. It is critical for the military professionals, and also for decision makers in any crisis situations, to develop this essential strategic leader skill. Clausewitz recognized the value of critical thinking for strategic leaders when he wrote, "…the human mind is far from uniform. If we then ask what sort of mind is the likeliest to display the qualities of military genius, experience and observation will tell us that it is the inquiring rather than the creative mind, the comprehensive rather than the specialized approach, the calm rather than the excitable head to which in war we would choose to entrust the fate of our brothers and children, and the safety and honor of our country."[1]

A primary task of any military or security system educational institution is the development of leadership, management, and decision making skills. We believe that underlying these skills is the ability to exercise consequential / critical thinking. Including critical thinking in an educational curriculum is not something peculiar to the military or security system educational institutions. Critical thinking is nominally included in many elementary, secondary, and faculty level curricula. Critical thinkers gather information from all senses, verbal and / or written expressions, reflection, observation, experience and reasoning. Critical thinking has its basis in the intellectual criteria that go beyond subject-matter divisions and which include: clarity, credibility, accuracy, precision, relevance, depth, breadth, logic, significance and fairness.

Decision makers today are faced with an increasingly complex world in which resources, particularly financial ones, are severely limited. Decision analysis, which takes a rational approach to decision making, can help decision makers structure their approach, gain a greater understanding of the situation they face and ultimately arrive at a decision with more confidence.

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[1] Carl Von Clausewitz, "On War," Edited by Michael Howard and Peter Paret, (Princeton NJ: Princeton University Press, 1976), p 112.

Definition of critical thinking

Today, a number of definitions of thinking and of critical thinking in particular exist in academia. We have used definitions from a number of authors; some related to thinking in general (Rubinstein and Firstenberg 1987)[2], and some who were focused specifically on critical thinking (Brookfield 1987:7-11),[3] (Walters 1990)[4], and (Paul 1993)[5].

The definition which is the most appropriate for connection of critical thinking with decision making is the following:

"Critical thinking is defined as disciplined, self-directed thinking displaying a mastery of intellectual skills and abilities - thinking about your thinking while you are thinking to make your thinking better."

There are also developed a series of shorthand labels such as "thinking about thinking" and "quality control of the mind." The shorthand for critical thinking that has become most popular is "thinking outside of the box."

The following is one of the definitions of critical thinking that summarizes our approach:[6]

Critical thinking is the ability to think about one's thinking in such a way as:

- to recognize its strengths and weaknesses and, as a result,
- to recast the thinking in an improved form.

Such thinking about one's thinking involves the ability to identify the basic elements of thought (purpose, question, information, assumption, interpretation, concepts, implications, point of view) and assess those elements using universal intellectual criteria and standards (clarity, accuracy, precision, relevance, depth, breadth, and logicalness).

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[2] Rubinstein, Moshe F. and Firstenberg, Iris R.,(1987) "Tools for thinking, Developing Critical Thinking and Problem-Solving Abilities," J.E. Stice (ed.), *New Directions for Teaching and Learning*, No. 30, Summer, Jossey - Bass San Francisco.

[3] Brookfield, Stephen D**.,** (1989) *Developing Critical Thinkers - Challenging Adults to Explore Alternative Ways of Thinking and Acting*, Jossey Bass Publishers, San Francisco, p 7-11.

[4] Walters, Kerry S., (1990) "Critical Thinking, Rationality, and the Vulcanization of Students," *The Journal of Higher Education*, Robert J. Silverman (ed.), OH: Ohio State University Press in Affiliation with the American Association for Higher Education.

[5] Paul, Richard, (1993) *Critical Thinking - What Every Person Needs to Survive in a Rapidly Changing World (Third Edition*), edited by Jane Willsen and A.J.A. Binker, Foundation for Critical Thinking, Santa Rosa, CA.

[6] Paul, Richard, (1993) *Critical Thinking - What Every Person Needs to Survive in a Rapidly Changing World (Third Edition*), edited by Jane Willsen and A.J.A. Binker, Foundation for Critical Thinking, Santa Rosa, CA.

Fundamentally, critical thinking is a form of judgment, a specifically purposeful and reflective judgment. Using critical thinking, we make a decision or solve the problem of judging what to believe or what to do, but do so in a reflective way. That is by giving due consideration to the evidence, the context of judgment, the relevant criteria for making that judgment well, the applicable methods or techniques for forming that judgment, and the applicable theoretical and construct for understanding the nature of the problem and the question at hand. These elements also happen to be the key defining characteristics of professional fields and academic disciplines.

The philosophy of critical thinking

Universal concepts and principles of critical thinking can be applied to any context or case but only by reflecting upon the nature of that application. Critical thinking forms, therefore, a system of related, and overlapping, modes of thought such as anthropological thinking, sociological thinking, historical thinking, political thinking, psychological thinking, philosophical thinking, mathematical thinking, chemical thinking, biological thinking, ecological thinking, legal thinking, ethic thinking, musical thinking, thinking like a painter, sculptor, engineer, business person, etc. In other words, though critical thinking principles are universal, their application to disciplines requires a process of reflective contextualization.[7]

We are often asked why we go to the effort of trying to teach critical thinking; people already know how to think. The first answer to this question is that yes, we all think, but do we do it well and are we able to evaluate the quality of our thinking? We can respond to this question with the statement that reflects our philosophy: "We are always thinking, the question is, are we in charge of our thinking, or is our thinking in charge of us?"[8]

There are also more complex answers to the question of why we need to teach critical thinking. These start with an understanding that the security environment has changed fundamentally since 1989. The old paradigms that we lived in have shifted or been demolished, and responses that worked for us during the period of "cold war" may no longer be applicable. As a result of the changes on many fronts, the defense and security sector has an immediate and widespread need for people who can examine assumptions, work through problems and evaluate different courses of actions, consider the implications of situations, and look not only to first order consequences

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[7] B.W. Hamby, (2007) *The Philosophy of Anything: Critical Thinking in Context.* Kendall Hunt Publishing Company, Dubuque Iowa, ISBN 978-0-7575-4724-9

[8] Walters, Kerry S., (1990) "Critical Thinking, Rationality, and the Vulcanization of Students," *The Journal of Higher Education*, Robert J. Silverman (ed.), OH: Ohio State University Press in Affiliation with the American Association for Higher Education.

of actions, but second and third order consequences as well.[9] In other words, we need people who can think critically. This is reflected in the Army's new leadership doctrine. The *FM22-100, Army Leadership*, describes critical thinking using the term "critical reasoning" (page 7 - 12) and identifies it as one of the key conceptual skills leaders must possess starting at the junior leader level.[10]

Components of critical thinking

While an issue can be examined starting at any point along the wheel, we normally start at the top with the purpose of the thinking. The following are brief definitions of each of the categories in the elements of reasoning, and they are reproduced from the material presented by Dr. Paul in 1993:[11]

- **Purpose, goal, or end in view.** Whenever we reason, we reason to some end, to achieve some objective, to satisfy some desire, or fulfill some need. One source of problems in student reasoning is traceable to defects at the level of goal, purpose, or end. If the goal is unrealistic, for example, or contradictory to other goals the student has, if it is confused or muddled in some way, the reasoning used to achieve it is problematic.
- **Question at issue or problem to be solved.** Whenever we attempt to reason something out, there is at least one question at issue, at least one problem to be solved. One area of concern for assessing student reasoning, therefore, will be the formulation of the question to be answered or the problem to be solved, whether with respect to the student's own reasoning, or to that of others.
- **(Information) The empirical dimension of reasoning.** Whenever we reason, there is some "stuff," some phenomena about which we are reasoning. Any "defect" then in the experiences, data, evidence, or raw material upon which a person's reasoning is based is a possible source of problems.
- **Inferences.** Reasoning proceeds by steps in which we reason as follows: "Because this is so, that also is so (or probably so)," or "Since this, therefore that." Any "defect" in such inferences is a possible source of problems in our reasoning.

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[9] Richard Paul and Linda Elder, (2001) "Critical Thinking: Tools for Taking Charge of Your Learning and Your Life," (Upper Saddle River NJ: Prentice Hall, 2001).

[10] See more in *FM22-100, Army Leadership*

[11] Paul, Richard, (1993) *Critical Thinking - What Every Person Needs to Survive in a Rapidly Changing World (Third Edition)*, edited by Jane Willsen and A.J.A. Binker, Foundation for Critical Thinking, Santa Rosa, CA.

- **The conceptual dimension of reasoning.** All reasoning uses some ideas or concepts and not others. These concepts can include the theories, principles, axioms and rules implicit in our reasoning. Any "defect" in the concepts or ideas of the reasoning is a possible source of problems in the student reasoning.
- **Assumptions.** All reasoning must begin somewhere, must take some things for granted. Any "defect" in the assumptions or presuppositions with which the reasoning begins is a possible source of problems in student reasoning. Assessing skills of reasoning involves assessing their ability to recognize and articulate their assumptions, again according to the relevant standards. The student's assumptions may be stated *clearly* or unclearly; the assumptions may be *justifiable* or unjustifiable, *crucial* or extraneous, *consistent* or contradictory.
- **Implications and consequences.** No matter where we stop our reasoning, it will always have further implications and consequences. As reasoning develops, statements will logically be entailed by it. Any "defect" in the implications or consequences of our reasoning is a possible source of problems. The ability to reason well is measured in part by an ability to understand and enunciate the implications and consequences of the reasoning. Students therefore need help in coming to understand both the relevant standards of reasoning out implications and the degree to which their own reasoning meets those standards.
- **Point of View or Frame of Reference.** Whenever we reason, we must reason within some point of view or frame of reference. Any "defect" in that point of view or frame of reference is a possible source of problems in the reasoning. A point of view may be too narrow, too parochial, may be based on false or misleading analogies or metaphors, may contain contradictions, and so forth. It may be restricted or unfair. Alternatively, student reasoning involving articulation of their point of view may meet the relevant standards to a significant degree: the point of view may be broad, flexible, and fair; it may be clearly stated and consistently adhered to.

Implementation of critical thinking in the decision making process

Critical thinking is useful only in those situations where human beings need to solve problems, make decision, or decide in a reasonable and reflective way what to believe or what to do. That is, just about everywhere and all the time. Critical thinking is important wherever the quality of human

thinking significantly impacts the quality of life (of any sentient creature). For example, success in human life is tied to success in learning. At the same time, every phase in the learning process is tied to critical thinking.

Irrespective of the sphere you thought, "a well cultivated critical thinker":[12]

- raises vital questions and problems, formulating them clearly and precisely;
- gathers and assesses relevant information, using abstract ideas to interpret it effectively
- comes to well-reasoned conclusions and solutions, testing them against the relevant criteria and standards;
- thinks open-mindedly within the alternative systems of thought, recognizing and assessing, as they need to be, their assumptions, implications, and practical consequences; and
- communicates effectively with others in figuring out solutions to complex problems.

A lack of leaders' critical thinking in the Decision Making Process (DMP) is a causal factor for failure in the process of security operations execution. However, critical thinking can improve the DMP of the leaders in the security sector. Critical thinking applied to the decision making process of the staff, increases the probability of successful decisions by minimizing errors in visualizing operations, assessing evidence, questioning assumptions, selecting alternatives, monitoring objectives, and knowing when to stop with the analytical thinking. The DMP is useful as a tool to organize and display the results of the analysis and thinking. Critical thinking is about how to think, while the DMP is what to think about.

What is the role of critical thinking in the analytical and intuitive decision making in the process of solving security problems? The DMP is a tool for problem solving. If thinking is not done correctly then decisions are wrong and the problem is not solved. Instead, poor decisions create more problems. Therefore, critical thinking increases the probability of solving the security problem through better choices and decisions.

There are two types of decisions made in the DMP: *intuitive* and *analytical*.[13]

In a fluid fast-paced tactical battlefield situation, or any other crisis situation, intuitive decision making is the gut level response in time sensitive situations. The human brain is "hardwired" to make intuitive decisions.

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[12] Richard Paul and Linda Elder, (2006) *The Miniature Guide to Critical Thinking: Concepts & Tools*. Published by the Foundation for Critical Thinking. ISBN 0-944583-10-5

[13] Richard Paul and Linda Elder, (2006) *The Miniature Guide to Critical Thinking: Concepts & Tools*. Published by the Foundation for Critical Thinking. ISBN 0-944583-10-5

Hardwired means that our innate neural structure is fixed and predictable, much like the internal hardware in a computer is fixed. Approximately 90% of all decisions are intuitive and approximately 85% of decisions are made in less than a minute.[14]

The other 10% of decisions that require analytical thinking are the ones of which most people lack the skills to accomplish. The problem with relying only on intuitive decisions is that the decision maker does not consider alternatives and can be blinded by mindsets. Additionally, the decision maker frequently "satisfies" by choosing the first Course of Action (COA) that seems satisfactory or good enough, instead of the optimal COA.

Conversely, analytical decision making is a conscious reasoning based on breaking down a complex problem into its component parts for closer inspection and usually involves a systematic procedure. For the leaders and staffs, analytical decision-making is frequently used:[15]

- when time is available;
- within new and ambiguous situations;
- to justify the decision;
- when there is a conflict among people with different concerns;
- and when an optimal COA is required.

Since critical thinking can enhance the DMP, how do leaders and staff begin to use it? Combat commanders and other security leaders will benefit from critical thinking rather than applying old solutions to new problems. Thinking about thinking is a realization that the greatest computer ever invented, the human brain, is subject to programming errors which cause a skewed perception of the world, according to how we want to see it, not how it really is. To become proficient at the critical thinking, it should become a daily habit.[16]

Combat commanders, other security leaders and their staffs can practice critical thinking in everyday problems: buying a car, deciding on children's college, financial investments, career choices, reading the Early Bird, After Action Reviews, mission planning and debriefs, developing plans for operations (OPLANS), war games, etc. However, just talking about critical thinking will not improve the DMP. To see a real performance improvement requires practice and a willingness to change a mindset over time, if needed.

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[14] Watman, Kenneth. "Critical Thinking." Lecture. U.S. Naval War College, Newport, RI: 18 March 2004.

[15] See more in United States Army Research Institute, "Study Report 95-01, Critical Factors in the Art of Battlefield Command", 1994

[16] Mark Bowden, Blackhawk Down (New York: Atlantic Monthly Press, 1999), p. 354.

Scientific methods in the problem solving process

Professionals aim to provide rational bases for decision making and problem solving by seeking to understand and structure complex situations and to use this understanding to predict system behavior and improve system performance. Much of this work is done using analytical and numerical techniques to develop and manipulate mathematical and computer models of organizational systems composed of people, machines, and procedures.

Perhaps no single factor has as much potential as the information explosion for changing the way in which military and other security organizations function during peace and war (or any other crisis). Breakthroughs in sensors, information processing, communications, and visualization will make huge amounts of information available to the individual soldier. Time will shrink, and space will expand. Furthermore, emerging technologies will allow knowledge-level information to become largely the responsibility of computers rather than responsibility of individuals. To effectively implement these technological developments, military needs unprecedented delegation of decision-making authority, decentralization, and flatter organizational structures.

Decision makers today are faced with an increasingly complex world in which resources, particularly financial ones, are severely limited. Decision analysis, which takes a rational approach to decision making, can help decision makers structure their approach, gain a greater understanding of the situation they face and ultimately arrive at a decision with more confidence.

The emphasis of the education and training of leaders in security sector should be put on critical thinking; value orientation towards professionalism, ethics, and cooperation; good academic background in the field of Operation Research, System Analysis, Artificial Intelligence, Networking, Organization of Life Cycle Support; Foreign Languages, Law and Economics Competence, as well as development of research experience and strive for quality.[17]

Problem Solving Process, in which scientific methods are implemented using operational research, statistical analyses, mathematical and computer modeling, simulations, analytical reasoning and common sense, consist of several steps:[18]

- **Perception of situation** (may involve current operations or response to an unexpected crisis.);

[17] Spacecast (1995): Professional Military Education in 2020. Airpower Journal, 9.2 (Summer 1995), pp. 27 - 41.
[18] Frederick S. Hillier & Gerald J. Lieberman, (2005) *Introduction to Operations Research*, McGraw-Hill: Boston MA; 8th. (International) Edition.

- **Problem formulation** (describe system, define boundaries, state assumptions, select performance measures, define variables, define constraints, data requirements);
- **Constructing a model** (problem must be translated from verbal, qualitative terms to logical, quantitative terms. A logical model is a series of rules, usually embodied in a computer program. A mathematical model is a collection of functional relationships by which allowable actions are delimited and evaluated.);
- **Solving the mathematical model** (many tools are available - Linear Programming, Discrete-Time Markov Chains, Network Optimization, Continuous-Time Markov Chains, Integer Programming, Queuing, Nonlinear Programming, and Decision Analysis. Some lead to "optimal" solutions, others only evaluate candidates - trial and error to find "best" course of action);
- **Implementation** (a solution to a problem usually implies changes for some individuals in the organization, often there is a resistance to change, making the implementation difficult, user-friendly system needed, those affected should go through training);

The goal is to solve a problem. We always have to consider that the implemented model must be valid and tractable, and the solution must be useful. In the model, the scientific method is used to investigate the problem of concern. In particular, the process begins by carefully observing and formulating the problem, including gathering all relevant data. The next step is to construct a scientific (typically mathematical) model that attempts to abstract the essence of the real problem. It is then hypothesized that this model is a sufficiently precise representation of the essential features of the situation that the conclusions (solutions) obtained from the model are also valid for the real problem. Next, suitable experiments are conducted to test this hypothesis, modify it as needed, and eventually verify some form of the hypothesis. This step is frequently referred to as a model validation.

It is evident that no single individual should be expected to be an expert on all the many aspects of this kind of work, or the problems typically considered in the respond to complex crisis situations. This would require a group of individuals having diverse backgrounds and skills. Therefore, when a full study of a new problem is undertaken, it is usually necessary to use a team approach. Such a team typically needs to include individuals who are collectively highly trained in mathematics, statistics and probability theory, economics, business administration, computer science, engineering and the physical sciences, the behavioral sciences, and the special techniques of operational research. The team also needs to have the necessary experience

and variety of skills to give appropriate consideration to the many ramifications of the problem throughout the organization.

This model can be implemented to the understanding and improvement of the security operations. Improvement can be measured by minimization of cost, maximization of efficiency, or optimization of other relevant measures of effectiveness.

Conclusion

To summarize, it is clear that critical thinking is not going away. As time goes on, more and more personnel in security organisations will have been exposed to it in some fashion before they even get to the organisation. Paradoxically, given stereotypes of the military or any other security organisation because of recruiting and retention differences, we may well see critical thinking have an earlier and deeper impact in the uniformed part of the Army, Police, or other security organisations. Certainly, the rate of change within those organisations, the need to make good decisions in the absence of absolute, definable right answers, and the increasing volume and complexity of information coming at leaders will not make critical thinking less valuable.

Security leaders and their staffs should model and encourage habitual critical thinking because a lack of critical thinking in the Decision Making Process is a causal factor in failure at the operational level. Frequently, the Decision Making Process solution is plagued by a lack of analytic depth, faulty assumptions, vague analysis and wishful thinking. However, critical thinking can be used to sort through complex, incomplete and ambiguous information when using a structured analytical process and introspective thinking. Critical thinking is a means to improve the quality of analytic and intuitive decisions. It does not only evaluate possibilities, it generates new possibilities by challenging individual and group thinking. Recognizing predictable mental barriers is a first step in weeding out errors in the Decision Making Process.

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