

APPENDIX

NSA'S CRITICAL THINKING AND STRUCTURED ANALYSIS CLASS SYLLABUS²³⁰

Background

Twenty-first Century intelligence issues involve uncertainty, mysteries, and risk. This differs from the 20th Century paradigms of security, secrets, and prevention. Analysis of current complex issues requires of its practitioners novel approaches including a productively imaginative process of inquiry. Questions an analyst asks not only serve as devices for attracting existing evidence, but also as devices for generating new evidence not presently considered. In this way, analysts more thoroughly examine complex issues and, aided by technology, are more likely to create novel intelligence and prevent strategic surprise.

However, such reasoning is at odds with how people – all people, including intelligence analysts – naturally think. Instead, people seek to confirm the first answer to a problem they discover, selectively using evidence to support that position *even when there is compelling evidence that an alternative hypothesis may actually be the correct one*. That people routinely fall prey to such poor thinking is well documented. Indeed, most commercial advertisers strive to take advantage of this. So do adversaries. One element of most intelligence failures includes poor thinking on the part of analysts—poor thinking of which adversaries have taken advantage. So how can analysts avoid such thinking?

One solution is to teach intelligence analysts to think critically.

²³⁰ This syllabus has been developed and refined by the author through several years of teaching critical thinking at the National Security Agency's National Cryptologic School. An early version of the course bore similarity to one developed by (then) MSGT Robert D. Folker, while a student at the (now) National Defense Intelligence College. Folker's course focused on the methods of analysis, not on the overarching critical thinking. His course (as written) is not taught at the college.

Critical thinking provides structure to the reasoning process that identifies for analysts where they are likely to go astray. It offers a means for self-reflective reasoning that leads to improved thinking. If such thinking is aided by structured analytic techniques, then analysts will (and do) improve how they resolve issues with which they are confronted. The quality of their work improves.

This critical thinking and analytic problem-solving course offers participants a chance to learn a paradigm for critical thinking and critically explore 14 different structured methods of analysis. Texts by critical thinking experts Richard Paul and Linda Elder, and structured analysis experts Morgan Jones and Richards Heuer, as well as materials developed by the instructor, teach the concepts and techniques. Classroom problems as well as operational examples (introduced and developed by the students from their own work) reinforce and help transfer what is learned into the operational environment. A final project developed by student teams completes the formal requirements.

Learning to think critically and to solve problems in a structured manner requires active participation. The class requires 40 hours of classroom time, consisting of ten sessions of four hours each. The method of instruction is Socratic, demanding active classroom participation. Participants also can expect homework, requiring both office and non-office time. Participants will prepare reading summaries for each class session, and develop one (or more) operational examples of at least one structured analytic method. Finally, participants work together on teams to complete classroom assignments and a final project dealing with an operational issue (employing at least five structured analytic methods).

Administration:

Enrollment: Up to 21 Students.

Class Date/Time/Duration: One 4-hour class per day for 10 weeks.

Class Location: _____.

Homework: Yes, but hopefully not too odious. Operational examples are required. A team project is due at the end of the course.

Texts:

Elder, Linda, and Richard Paul. *The Foundations of Analytic Thinking: How to Take Thinking Apart and What to Look for When You Do* (Dillon Beach, CA: Foundation for Critical Thinking, 2003).

Heuer, Richards J., Jr. *The Psychology of Intelligence Analysis* (Washington, DC: Center for the Study of Intelligence, 1999), URL: <<http://cia.gov/csi/books/19104/index.html>>, last accessed 15 March 2006.

Jones, Morgan D. *The Thinker's Toolkit: Fourteen Skills for Making Smarter Decisions in Business and in Life* (New York, NY: Crown Publishing Group, 1997).

Several handouts (TBD)

Objectives:

The overall objective of the class is to enable you to critically think about analysis and what analysts are tasked to analyze. A second objective is to provide you with a set of analytic tools that are useful to your analysis. At the end of the class you will be equipped with a set of analytic skills and will have honed your critical thinking skills, allowing you to better function in the workplace. Specifically, the course objectives are as follows:

Upon completion of this course you will be able to:

- Use critical thinking techniques to provide structure to your analytic reasoning.
- Identify, describe, and employ 14 methods for structured reasoning.
- Demonstrate critical thinking proficiency through lecture, classroom participation, and weekly homework assignments.
- Complete a final class assignment using a minimum of five structured analytic methods presented in this course.
- Apply knowledge of critical thinking by using a set of analytic tools designed to hone your skills as an analyst.

In other words, at the end of this 10-week-long class, you will have

- Learned to critically analyze intelligence-associated data, information, and evidence.
- Honed your critical thinking skills.
- Built a “toolbox” of analytic and problem-solving methods.
- Become better analysts.

For example, when you approach a problem you will be able to

- Discover the true problem by restating and considering alternative outcomes.
- Have a variety of methods by which you can organize and make sense of the relevant evidence.

Formal Requirements:

Written summaries of readings. (No more than one page per chapter assigned.) The summaries should answer *exactly* the questions on page five of the syllabus. The summaries should also include answers to the exercises in Morgan Jones’ book. The summaries will be typed unless prior arrangements have been made with the instructor. In-class discussions will draw heavily on the readings.

Problems from the work environment (Operational Exemplars). As we study the elements of reasoning and the methods of problem solving, we need operational examples

against which to apply/illustrate what we are learning. You will be responsible for providing at least one of those examples for the class to be presented during the week we discuss the method. The best exemplars may be saved for use in subsequent classes.

Final project. Working in teams of three or four, and using any Problem Restatement and Divergent and Convergent Thinking plus at least three other methods developed in the course – for a total of at least five methods – you will develop an operational project to be presented at the last class. You will apply the elements of critical thinking to the method chosen as well as the specific problem, apply the appropriate methods to solve of problem, report the results, and evaluate the process. The project will be presented during a 15–20 minute briefing. A list of the specific elements that must be included and the format by which the project is graded is on the last page of this syllabus.

Grading:

- **Written Summaries (25%).** Due weekly. The first summary will be graded. Subsequently, a random number generator will be used to select three (3) additional summaries for grading. Grading will be based on the “Universal Intellectual Standards” in *The Foundations of Analytic Thinking* and on whether instructions are followed. For example, if you are asked to identify what key questions an author is attempting to answer, *it is expected that you will provide those questions in the reading summary.*
- **Class Participation (25%).** Since this is a discussion course, you are expected to engage in the process.
- **Operational Exemplars (25%).** Assigned the first week. No longer than 5 minutes each.
- **Final Project (25%).**

Class Descriptions and Weekly Assignments (complete prior to each class):

Class 1 – How We Don’t Think and How We Might

Reading Assignment: *The Thinker’s Toolkit: Fourteen Skills for Making Smarter Decisions in Business and in Life*, Chapters 1–2 (Part One).
Psychology of Intelligence Analysis, 1–30.
Critical Thinking: Concepts and Tools, entire work.

Written Assignment: *Reading summaries for chapters from Jones and Heuer. Exercises in text.*

Class Objectives: *At the end of Class 1 you will be able to:*

- Define a bias and discuss the implications of biases in our decisions.
- Identify sources of cognitive biases.
- Describe the inherent dangers/benefits of biases and the difficulty of compensating for perceptual biases.
- Describe the characteristics and three principles of perception.
- Describe how analysts fall prey to absence-of-evidence biases.
- Describe how anchoring impacts analytical decision-making.
- Describe how a target can use assimilation biases to deceive.
- Acknowledge how analysts unwittingly use confirmation bias to support early assessments.
- Discuss how hindsight and reliability biases play a part in intelligence failures.
- Describe how oversensitivity to consistency bias can lead to undesirable results.
- Discuss how expert biases and the Pollyanna and Cassandra complexes distort our thinking.
- Describe how cultural, personal, and organizational

mindsets impact analysis.

- Define mindsets, discuss how they are derived, and describe how they influence predictions.
- Identify how we think.
- Describe critical thinking and the standards used for evaluating our thinking.
- Identify the elemental structures of thought.
- Describe the differences between inferences and assumptions in intelligence analysis.

Class 2 – Critical Problem Restatement and Alternative Thinking

Reading Assignment: *The Thinker's Toolkit: Fourteen Skills for Making Smarter Decisions in Business and in Life*, Chapters 3, 5.

Written Assignment: *Reading summaries for each chapter. Exercises in text.*

Class Objectives: *At the end of Class 2 you will be able to:*

- Demonstrate knowledge of the critical thinking process by providing an example that meets the universal intellectual standards.
- Describe the role of questioning in critical thinking.
- Identify the three types of questions used in critical thinking.
- Determine the sample domains involved in complex questions.
- Define problem restatement and apply its use through a practical example.
- Discuss the role that our biases play in problem restatement.
- Demonstrate knowledge of the critical thinking process by providing an example that meets the universal intellectual standards.
- Define divergent thinking and its benefits when performing a problem restatement.
- Discuss the pitfall involved in problem definition and how it relates to problem restatement.
- Describe some effective techniques for problem restatement.
- Identify the types of problems that benefit from problem restatement.
- Discuss how points of view influence the critical thinking process.
- Discuss the logic, benefits, risks, and elements of divergent thinking.
- Identify the four main ideas of divergent thinking.

- Describe what is needed to move from divergence to convergence.
- Identify the types of problems that benefit from divergent thinking.

Class 3 – Pollyanna, Cassandra, and Marshaling

Reading Assignment: *The Thinker's Toolkit: Fourteen Skills for Making Smarter Decisions in Business and in Life*, Chapters 4, 6.

Written Assignment: *Reading summaries for each chapter. Exercises in text.*

Class Objectives: *At the end of Class 3 you will be able to:*

- Discuss the pros-cons-fixes approach to critical thinking and the six-step method employed by successful analysts.
- Identify the logic behind the pros-cons-fixes approach and discuss those critical thinking problems best suited to this method.
- Apply the techniques of sorting, chronologies, and timelines to critical thinking and identify those critical thinking problems best suited for this approach.
- Identify the two-step technique used for sorted lists, chronologies, and timelines.

Class 4 – Causes, Squares, and Shrubs

Reading Assignment: *The Thinker's Toolkit: Fourteen Skills for Making Smarter Decisions in Business and in Life*, Chapters 7, 8, 9.

Written Assignment: *Reading summaries for each chapter. Exercises in text.*

Class Objectives: *At the end of Class 4 you will be able to:*

- Discuss the purpose, logic, underlying question, evidence, concepts, and types of problems best suited for causal flow diagramming.
- Identify the major factors and cause-and-effect relationships influencing causal flow diagramming.
- Characterize the differences between direct and inverse relationships and their impact on causal flow diagramming.
- Define a feedback loop and discuss what makes it stable or unstable.
- Apply your knowledge of causal diagramming by participating in a classroom exercise.
- Discuss the purpose, logic, underlying question, evidence, concepts, and types of problems best suited for scenario matrices and trees.
- Define and discuss the characteristics and differences between matrices and scenario trees.
- Apply your knowledge of scenario matrices by participating in a classroom exercise.
- Apply your knowledge of scenario trees by participating in a classroom exercise.

Class 5 – Weighing the Likelihood

Reading Assignment: *The Thinker's Toolkit: Fourteen Skills for Making Smarter Decisions in Business and in Life*, Chapters 10, 13.

Written Assignment: *Reading summaries for each chapter. Exercises in text.*

Class Objectives: *At the end of Class 5 you will be able to:*

- Discuss how individuals view issues.
- Discuss the purpose, logic, underlying question, evidence, concepts, and types of problems best suited for weighted ranking.
- List the 9-step process involved in weighted ranking.
- Demonstrate knowledge of weighted ranking through class and small group exercises.
- Discuss the purpose, logic, underlying question, evidence, concepts, and types of problems best suited for probability.
- Define and describe how and why we characterize and assign events, and how this influences intelligence analysis.
- Discuss and explain the differences between mutually exclusive and conditionally dependent events relative to probability.
- Identify the seven steps in creating a probability tree.
- Apply your knowledge of probability by participating in a classroom exercise.

Class 6 – Testing the Devil’s and Other’s Advocacy

Reading Assignment: *The Thinker’s Toolkit: Fourteen Skills for Making Smarter Decisions in Business and in Life*, Chapters 11–12.

The Psychology of Intelligence Analysis, Chapter 8.

Written Assignment: *Reading summaries for each chapter. Exercises in text.*

Class Objectives: *At the end of Class 6 you will be able to:*

- Define intelligence.
- Discuss the purpose, logic, underlying question, evidence, concepts, and types of problems best suited for devil’s advocacy.
- Define, describe, and characterize situations appropriate to employ methods of devil’s advocacy in intelligence analysis
- Demonstrate prowess in devil’s advocacy through participation in a practical case study.
- Discuss the purpose, logic, underlying question, evidence, concepts, and types of problems best suited for hypothesis testing.
- Discuss the benefits of hypothesis testing.
- Identify the 8-step process of hypothesis testing.
- Demonstrate prowess in hypothesis testing through participation in a practical case study.

Class 7 – Analyzing Apples and Toyotas

Reading Assignment: *The Thinker's Toolkit: Fourteen Skills for Making Smarter Decisions in Business and in Life*, Chapters 14, 15, 16.

Written Assignment: *Reading summaries for each chapter. Exercises in text.*

Class Objectives: *At the end of Class 7 you will be able to:*

- Describe how individual viewpoints influence utility analysis.
- Define utility analysis and discuss the type of problems best suited for this method.
- Identify the logic of utility analysis.
- Employ utility analysis to arrive at the most cost-effective solutions.
- List the steps involved in creating a utility tree and apply this knowledge by participating in classroom exercises.
- List the steps involved in creating a utility matrix and apply this knowledge by participating in classroom exercises.
- Examine the benefits of structuring as it applies to utility and probability analysis.
- Describe the differences between utility and probability analysis.
- Examine multi-perspective utility analysis and its use by participating in classroom exercises.
- List the 13 steps of multi-perspective utility analysis.
- Apply your knowledge of multi-perspective utility analysis by participating in a classroom exercise.

Class 8 – And Now for Something Completely Different

Reading Assignment: *Review all assigned readings.*

Written Assignment: *None.*

Class Objectives: *At the end of Class 8 you will be able to:*

- Describe which structured analysis methods work best in particular situations.
- Demonstrate knowledge of critical thinking and structured analysis through a practicum.
- Demonstrate your knowledge of critical thinking and structured analysis through a small group exercise.

Class 9 – Final Project Preparation

Reading Assignment: *Review all assigned readings.*

Written Assignment: *None.*

Class Objectives: *During Class 9 you will:*

- Learn through experience the pros and cons of research, analysis and reporting in small teams.

Class 10 – Final Project Presentation and Wrap-up

Reading Assignment: *Review all assigned readings.*

Written Assignment: *None.*

Class Objectives: *During Class 10:*

- Your small group will make a multi-media presentation on the analytic problem you chose.

Methods:

- A sample of the problem statement and restatement process.
- A sample of the convergent and divergent thinking applied to the problem.
- Concise demonstrations of the three structured analytic methods used to answer the analytic problem.

Assessment:

- **You are evaluated on how clearly the group presents its project, and on whether the project requirements listed above are met as shown on the last page of the syllabus.**

Reading Summary Questions:²³¹

For each chapter/work, answer the following questions (in writing) about the reading.

1. What is the author's purpose? If there is more than one main point, what is the overarching purpose?
2. What are the key questions the author raises/addresses?
3. What evidence does the author provide to support his argument?
4. What inferences does the author make from the evidence?
5. On what underlying concepts does the author rely?
6. What does the author take for granted? What assumptions does the author make?
7. What are the implications of the author's point of view? What are the implications if we adopt/do not adopt what the author recommends?
8. What is the author's point of view? What other points of view are there?

231 Paul and Elder, *Concepts and Tools*, 13.

Final Project Evaluation Worksheet²³²

	Clarity	Accuracy	Precision	Relevance	Depth	Breadth	Logic	Significance	Fairness
Purpose									
Key Questions									
Assumptions									
Evidence									
A: Methods									
B: Analysis									
Concepts									
Inferences									
Implications									
Other Points of View									
Lessons Learned									
Comments									

232 Derived by author from Paul and Elder, *Concepts and Tools*, 2–9.