

DIRECTORATE FOR ANALYSIS

ANALYTIC METHODOLOGIES

A Tradecraft Primer: Basic Structured Analytic Techniques

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MARCH 2008

FOREWORD

This primer is intended to be a companion to the Sherman Kent School's *A Tradecraft Primer: Structured Analytic Techniques for Improving Intelligence Analysis*. The only duplication occurs where DIA's Directorate for Analysis differs slightly in the use or interpretation of a given technique. The primer was developed to give analysts in the Directorate for Analysis a reference document for the basic structured analytic techniques that form the content base of DI's analytic foundation courses — composed of the *Fundamentals of Intelligence Analysis* and all variations of the *Critical Thinking and Structured Analysis* courses. Therefore, while the potential use of the techniques is limited only by the individual's imagination, this primer focuses on their use for intelligence analysis.

This primer includes common basic structured analytic techniques that help mitigate bias and mindset that may influence analysis. The techniques are presented in a clear and concise manner using intelligence-based examples to demonstrate the value to the analyst. Analysts are expected to determine the relevance of each technique to their subject matter or problem set and then adopt those most appropriate to their analysis. Current and emerging mandates, including product evaluation based on developed standards and sourcing requirements from the Office of the Director for National Intelligence, can be met best through ongoing efforts to improve the analyst's understanding and use of a critical thinking process and structured analytic techniques. This primer is one of many actions intended to meet that goal.

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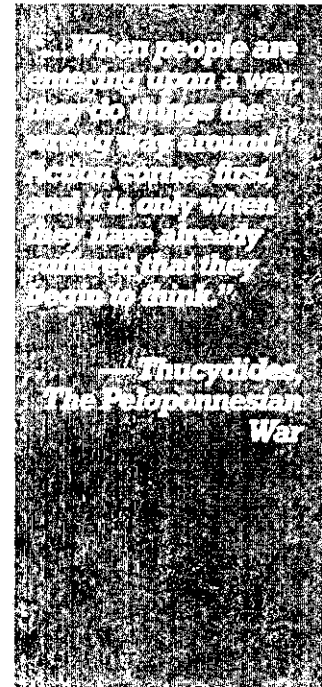


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INTRODUCTION

This primer is intended to support Defense Intelligence Agency analyst training courses and give the analyst an efficient reference to analytic methods to gain insight into intelligence challenges while helping to mitigate bias and mindset that may influence analysis. When integrated with a viable approach to critical thinking, these techniques are the best first line of defense against the most common cognitive biases facing intelligence analysts.

The techniques in this primer are intended not only for use each time the analyst gets a new task or completes a new assessment but also as part of the daily process of gathering and assessing evidence on the assigned subject matter. Many of the examples in this primer are hand drawn to reinforce the ease with which they can be integrated into the daily work flow. Analysts should determine which techniques provide the most insight for them based on their individual capabilities and preferences. The more techniques an analyst uses when analyzing problem sets, the more confidence the analyst will have in his or her assessments.

The level of possible success an analyst gains using these techniques will be largely based on the fidelity with which they are used. This includes reviewing all relevant evidence and data in the same systematic manner regardless of its initial perceived value.

The techniques in this primer are presented in an order in which most analysts would work through an intelligence problem:

- Issue Identification: Properly identifying the issue or problem.
- Evidence Diagnostics: Ensuring evidence is systematically reviewed.
- Hypothesis Generation: Creatively determining reasonable options or alternatives.
- Structured Analytic Techniques: Systematically reviewing hypotheses or options to gain insight for better understanding and presentation.

Analysts face new challenges as the diversity of groups working common issues expands. One of the important functions of this primer is the establishment of a common terminology within the analytic community that will provide a degree of efficiency and accuracy in communication not previously experienced.

Some techniques are believed to be new, or at least of unknown origin. Others have been adapted from other Intelligence Community training centers and some adapted from concepts included in Morgan D. Jones's book *The Thinker's Toolkit: 14 Powerful Techniques for Problem Solving*.

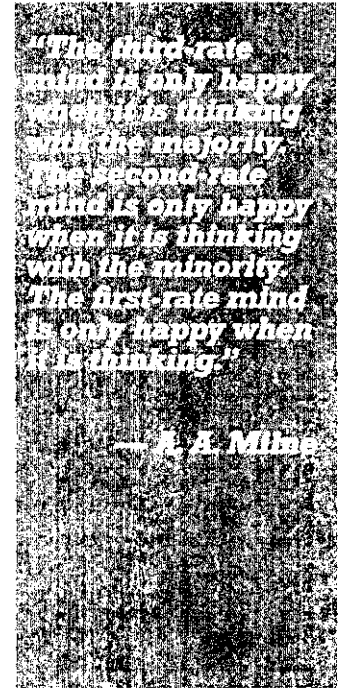
"Analytic tradecraft is the practiced skill of applying learned techniques and methodologies appropriate to an issue to mitigate bias, gain insight, and provide persuasive understanding of the issue to members of the U.S. Government and its allies." — Directorate for Analysis definition.

ISSUE DEVELOPMENT

Most questions can be broken down into three categories. Questions of preference rarely intrude on the substantive world of intelligence analysis outside preferences of the subject of a biography. As such, they do not require methods or techniques for ensuring a quality response.

Questions of fact have only one correct answer. Some science and technology intelligence topics respond to questions of fact, although the specific answer frequently is based on very detailed and precise factors. As a result, the use of the response and level of variance acceptable are considerations and part of gaining the understanding necessary to provide the appropriate answer.

Most intelligence analysis is conducted in response to questions of judgment. These are questions where the quality of the answer can vary widely and the better the understanding of the issue or problem to be analyzed, the better the chances of a high-quality answer. Therefore, issue development is an important ingredient for improving the quality of the finished intelligence developed in response to the question. Beyond having a healthy dialogue with the customer or the official customer liaison, there are methods for the analyst to review and develop the question or issue to be analyzed in the process for meeting customer needs. Those techniques follow.



ISSUE DEVELOPMENT

A technique used to ensure the central issues and alternative explanations of an issue or problem are identified within the scope and focus of the problem statement to aid in gaining the best answer. This technique is also known as framing the question and problem restatement.

WHEN TO USE

Issue development should be used anytime the analyst begins to assess a new issue or problem or begins a new research endeavor to mitigate bias toward the issue. This technique may be used at any point throughout the analytic process, but it is especially useful when a new hypothesis or new evidence is introduced. This method is also well employed in reexamining a hypothesis or problem when an analyst is “stuck.”

VALUE ADDED

Proper issue identification can save a great deal of time and effort that is easily misspent on research and analysis of a poorly stated issue that gives free rein to the analyst’s bias. Poorly stated issues frequently fall into the following categories:

- Issue is solution driven. (Where is the WMD in Iraq?)
- Issue is assumption driven. (When China launches rockets into Taiwan, will the Taiwanese government collapse?)
- Issue definition is too broad or ambiguous. (What is the status of Russia’s air defense system?)
- Issue definition is too narrow or misdirected. (Who is voting for President Chavez in the election?)

POTENTIAL PITFALLS

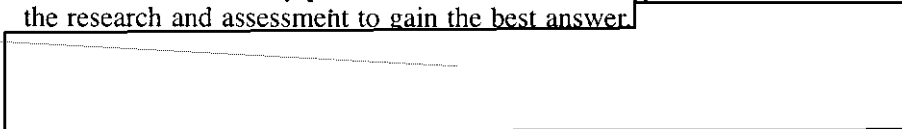
Although issue identification only takes 5 to 10 minutes with practice, analysts new to the technique tend to think it takes too long to accomplish. Poorly articulated issues, questions, or tasks are more difficult to redefine and may require reengaging with the source of the issue for clarification.

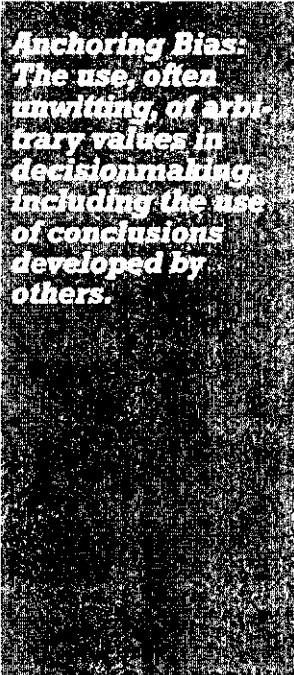
THE METHOD

Below are some of most efficient ways to ensure the issue is properly identified. The following processes may be used in any order and should be used together to identify the central issues and alternative explanations.

Paraphrase. Redefine the issue without losing the original meaning. Review the results to see if they provide a better foundation upon which to conduct the research and assessment to gain the best answer.

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Anchoring Bias:
The use, often unwitting, of arbitrary values in decisionmaking, including the use of conclusions developed by others.

180 Degrees. Turn the issue on its head. Is the issue the one asked or the opposite of it?

[Redacted area]

Broaden the Focus. Instead of focusing on only one piece of the puzzle, step back and look at several pieces together. What is the issue before you connected to?

[Redacted area]

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Narrow the Focus. Can the issue be broken down further? Take the question and ask about the components that make up the problem.

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Redirect the Focus. What outside forces impinge on this issue? Is deception involved?

[Redacted area]

Ask "Why." Ask "why" of the initial issue or question. Develop a new question based on the answer. Then ask "why" of the second question and develop a new question based on that answer. Repeat this process until you believe the real problem emerges. This process is especially effective in generating possible alternative answers.

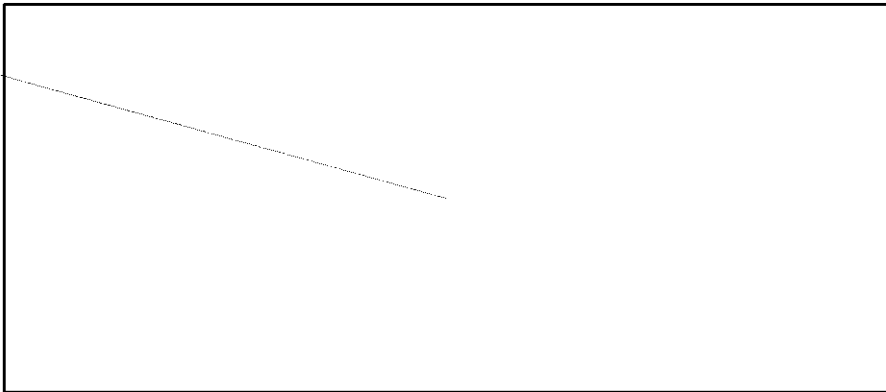
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Example

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TIPS

- Always state the identified issue in a simple, positive question using active voice.
- When evidence indicates the issue may be improperly developed, return to the methods outlined above and review it again.

NOTES

DIAGNOSTIC TECHNIQUES

The Sherman Kent School's primer includes several elements of evidence review under the diagnostic title Quality of Information. This primer recommends reviewing the source, the information, the relevance of the information, and the possibility for denial and deception and considering them separate parts of the whole. The source is reviewed for reliability whereas the information is reviewed for viability. While related, they do not necessarily have a direct correlation. Relevance is frequently missed in the review of the source and information because of the perceived importance of the information even though it is not related to the issue being assessed. Denial and deception is too frequently relegated to a separate review or consideration, leading to less insight and understanding of the evidence or information than can be gained when source, information, and relevance are part of the consideration of denial and deception.

This primer also recommends that the diagnostic evaluation be recorded as part of the tracking of evidence so bias toward more recent reports or a failure to remember previous concerns is lessened. Efforts to automate the administration of tracking evidence, the diagnostics, and use of structured analytic techniques continue and are intended to support the techniques and recommendations in this primer.

DIAGNOSTICS

NOTES

SOURCE CHECK

An evaluation of the source of information being marshaled for analysis to help determine source reliability and credibility based on the source's history and operational parameters.

WHEN TO USE

The source check should be conducted with the other information diagnostics as part of the first full review of the information. Any delay in the check will allow bias to form and potentially supersede good analytic tradecraft practices. If time allows, a second review after the initial draft assessment can pay dividends in determining the strengths and weaknesses of the information on which an analytic assessment rests. It also ensures that the appropriate confidence has been expressed.

VALUE ADDED

The primary value of this diagnostic technique is to mitigate bias for or against a given source. It also provides insight into the strength and weaknesses of the source being used that translates into a more cogent assessment of the source's reliability. In addition, the source check can:

- Provide an opportunity to catch errors of interpretation.
- Identify intelligence gaps.
- Give the analyst an opportunity to develop a confidence level for the source.
- Create a robust analyst-collector relationship based on source knowledge.

POTENTIAL PITFALLS

Over time an analyst's mindsets can promote bias for or against a given source of information that easily leads to shortcuts in checking sources. The categorization of all reports from a given source as poor or excellent can lead to an intelligence failure.

THE METHOD

At a minimum, analysts should systematically consider asking the following questions when evaluating their sources:

Human Intelligence (HUMINT)

- Are there multiple points of view in this report? What are they? (e.g., source and reporting officer)
- Who wrote the report, and what organization do they belong to?
- What is the evaluation of the source within the report?

- Has the reporting officer/handler interjected his or her opinions or assessments into the report (e.g., suggested coordinates of a village mentioned by the source)?
- Did the handler interpret correctly what the source actually meant (e.g., are there language barriers or expertise barriers that could be incorrectly reported)?
- What is the source's point of view?
- What is the source's placement/access in relation to the information reported?
- What is this source's history based on previous reporting?
- Can you discern the source's motivation and background?

Geospatial Intelligence (*GEOINT*)

- Are there features or activity that could be more effectively detected through nonliteral imagery analysis?
- Were there special collections initiated against the area of interest?
- Is the collection strategist well versed in special collection strategies?
- What is the currency of geospatial data sets?
- What is the experience of the Geographical Information Systems or imagery analyst?

Signals Intelligence (*SIGINT*)

Communications Intelligence (COMINT)

- Who translated the conversation, and what organization do they belong to?
- What is the language or transcription proficiency of the translator?
- Do they understand slang or technical terms associated with the topic?

Electronic Intelligence (ELINT)

- What type(s) of collection platform(s) was used and what gaps exist in the collection coverage?
- Are there any anomalies or artifacts associated with the collection?
- Does this collection have any equipment limitations, or is it subject to environmental factors?
- How accurate is the intercept location(s) and operating mode of the emitter(s)? Are they valid for the signal? Was the signal(s) properly identified?
- Is the signal new or known? Does the emitter correlate to a known site, platform, or system?
- What is the coverage and location accuracy (ellipse size based on how many hits)?

Measurement and Signature Intelligence (MASINT)

- What are the collection platform capabilities and limitations?
- Do I understand what the data is telling me? (Implications?)
- Who analyzed the data, and what organization do they belong to? What is their ability? Are they experienced with this type of problem?
- What was the duration of collection?
- What is the frequency of collection? When does it occur (time/day)?
- Is additional data being collected at different times?
- What is the coverage and location accuracy (ellipse size based on how many hits)?
- How often do you have access to it?

Open-Source Intelligence (OSINT)

- If based on a foreign language: Who translated the report and what organization do they belong to? What is their ability? Do they understand slang? Are they experienced with this type of problem?
- Who wrote/published the report, and what organization do they belong to?
- What is the author/publisher's history based on previous reports?
- Are there multiple points of view in this report? What are they, and whose are they?
- What is the author's point of view and purpose?
- What is the author's background and motivation? What are his or her identifiable biases?

TIPS

- Use the DI-developed spreadsheet available on the DI Tradecraft Sharepoint site to track your marshaled information and record your confidence in the source as a constant reminder of your findings.

NOTES

SOURCE CHECKS

QUALITY-OF-INFORMATION CHECK

A way to evaluate completeness and validity of available information separately from the source.

WHEN TO USE

The quality-of-information check should be initially conducted during the research and marshaling phases of the analytic process. The purpose is to gain insight into the validity strengths and weaknesses of the action information gathered independent of the source. Periodic reviews of the quality of the information should be conducted after the initial marshaling to prevent assumptions or weak judgments from becoming fact over time.

VALUE ADDED

Determining the quality of information independently of the source of the information is important to ensure that neither unduly compromises or supports the other. That is, an excellent source can knowingly and admittedly pass third- or fourth-hand information that may be of low quality. It is important to keep the two reviews separate. This check can:

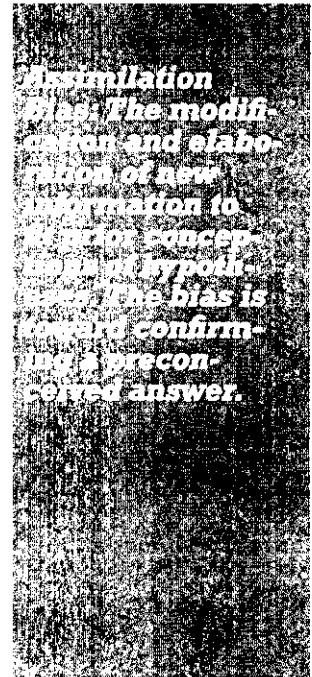
- Provide the most important basis of determining confidence of the assessment and judgments.
- Provide an opportunity to mitigate assimilation or confirmation bias based on the source.
- Provide an opportunity to catch errors of interpretation.
- Identify intelligence gaps.
- Help identify areas of concern of denial and deception.
- Give the analyst an opportunity to clearly convey to the customers a better understanding of the analyst's confidence in the aspects of the problem.

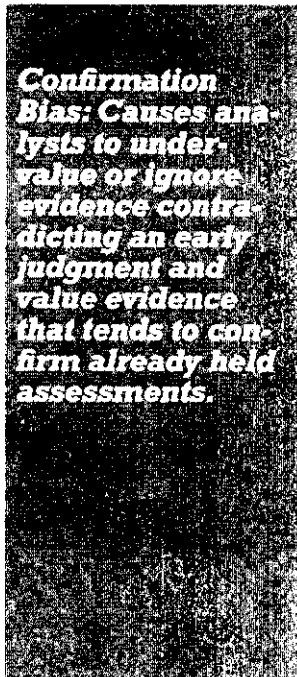
POTENTIAL PITFALLS

Analysts can become susceptible to circular reporting and source-based bias when reviewing the quality of information. Critical information can occasionally be found in reports from sources judged to have low access or a poor record. To not review the information on the basis of quality independent of the source could cause the information to be unduly dismissed. Where the same analyst works the same subject or area for extended periods of time, the analyst may miss the significance of incremental changes. Use the indicators or signposts of change to mitigate this possibility.

THE METHOD

At a minimum, analysts should systematically ask themselves the following questions when evaluating the quality of information:





Human Intelligence (HUMINT)

- Who wrote the report, and to what organization do they belong?
- What changes have been made to the data since original collection?
- What is the collector’s evaluation of the information in the report?
- Can the source’s purpose be ascertained?
- Was the information first-, second-, or third-hand?
- Is there information from a separate INT that corroborates this report?
- Is this information consistent or inconsistent with previous information?
- Do you have any concerns that denial and deception may be in the information? Why?

Geospatial Intelligence (GEOINT)

- What is the frequency of collection? When does it occur (time/day)?
Have there been any recent changes to the frequency of collection or exploitation?
- Are additional images being taken at different times?
- Is the target aware of overhead imagery capabilities?
- Are there GEOINT-based indicators being used to assess the site or the activity?
- Is there a geospatial aspect to the information?

Signals Intelligence (SIGINT)

Communications Intelligence (COMINT)

- Is this a complete transcript (verbatim) or a processed (analyzed) summary of the traffic?
- Was this report a snippet of a much longer conversation?
- Did a collection shortfall preclude capturing all of the traffic?

Electronic Intelligence (ELINT)

- Is the signal correlated to any events or activity?
- What was the duration of collection?
- What is the frequency of collection? When does it occur (time/day)?
- Are additional signals being collected at different times?
- Is there any additional intelligence that correlates with this emitter activity?
- Has the activity been corroborated by another form of intelligence?

TIPS

- Consciously avoid relating the source to the information until the quality-of-information check is complete. If relating the source to the quality of the information changes your opinion of the information, make sure you can articulate why.
- Use the DI-developed spreadsheet available on the DI Tradecraft Sharepoint site to track your marshaled information and record your confidence in the quality of information as a constant reminder of your findings.

RELEVANCE CHECK

A review determining the relevance of the marshaled information to the issue or question being addressed.

WHEN TO USE

Analysts should review the relevance of all information as it is obtained. If the issue changes, or information indicates the issue needs to be reviewed for possible change of scope, etc., it may be necessary to return to review information previously judged not to be relevant.

VALUE ADDED

This check will ensure the analyst saves time by not assessing information that is not relevant to the central issues being studied. The check also:

- Mitigates the analyst's biases reviewing each piece of information individually.
- Increases the analyst's level of confidence that the assessment is based on thoroughly analyzed data.
- Allows the analyst to easily identify intelligence that is important to his or her judgments.
- Helps identify intelligence gaps.

POTENTIAL PITFALLS

The review can become time consuming if there is a large amount of information.

THE METHOD

Approach each piece of data by determining if it relates to the central issues or alternative possibilities being analyzed. Questions to consider during the review are as follows:

- Does this relate to the main intelligence problem? (Is it related economically, socially, politically, or militarily?)
- Does this relate to subordinate issues associated with the main intelligence problem?
- Does this make sense with what we know?
- Does this make sense with what we think?
- Does this beg further questions or possibly highlight adversarial changes that need to be addressed analytically?
- Is this consistent with previous information? If not, what caused the change?

- What are the implications given this information? (For the U.S., allies and the adversary.)
- What additional information do you need to clarify the issue or lend new insights?
- Develop new collection requirements as necessary based on the review.

TIPS

- Look for alternatives. When reviewing information for relevance, an additional alternative may be raised that in turn requires the issue or problem to be reviewed and restated.
- Use the DI-developed spreadsheet available on the DI Tradecraft Sharepoint site to track your marshaled information and record your confidence in the relevance as a constant reminder of your findings.

HYPOTHESES GENERATION

Hypotheses are preliminary explanations or possible outcomes that are meant to be tested. The generation of hypotheses is the basis of the structured analytic techniques where the analysis of alternatives is paramount to gaining insight and the best answer to a question of judgment.

In a profession where abductive reasoning is commonly used, the Black Swan Rule continues to apply. That is, no matter how many white swans one finds to prove that all swans are white, it only takes one black swan to disprove this hypothesis. Disproving a hypothesis is far more emphatic and valid than attempting to prove it.

Abduction, or inference to the best explanation, is a method of reasoning in which one chooses the hypothesis that would, if true, best explain the relevant evidence. Abductive reasoning starts from a set of accepted facts and infers to their most likely, or best, explanations. The term abduction is also sometimes used to mean just the generation of hypotheses to explain observations or conclusions, but the former definition is more common both in philosophy and computing. (Wiki last reviewed 3 December 2007.)

The principle of disproof is a hard doctrine. Even though it is fundamental to effective inquiry, its use is often resisted because of the effects of the very mindsets and biases the approach is attempting to remedy. For example, if two analysts propose two different hypotheses to explain a particular phenomenon, evidently at least one of these hypotheses must be at least partially or completely incorrect. Perhaps this is why so many analysts tend to resist the strong analytic approach.

This difficulty can be mitigated by the method of multiple hypotheses. A famous geologist, T.C. Chamberlin said the trouble is that when we make a single hypothesis, we become attached to it.

“The moment one has offered an original explanation for a phenomenon which seems satisfactory, that moment affection for his intellectual child springs into existence, and as the explanation grows into a definite theory his parental affections cluster about his offspring and it grows more and more dear to him.... There springs up also unwittingly a pressing of the theory to make it fit the facts and a pressing of the facts to make them fit the theory...”

“To avoid this grave danger, the method of multiple working hypotheses is urged. It differs from the simple working hypothesis in that it distributes the effort and divides the affections.... Each hypothesis suggests its own criteria, its own method of proof, its own method of developing the truth, and if a group of hypotheses encompass the subject on all sides, the total outcome of means and of methods is full and rich.”

T.C. Chamberlin proposed the method of multiple hypotheses in 1897.

NOTES

DIVERGENT/CONVERGENT THINKING¹

A form of brainstorming that generates new analytic ideas, hypotheses, or concepts through an unconstrained individual or group process.

WHEN TO USE

This technique works best when an individual is willing to work as part of a group to develop multiple ideas, hypotheses, or concepts. It can be used either at the beginning of an analytic project to help generate the initial hypotheses or at a later stage if the initial result proves inadequate. New information may be found that could cause the analyst to return to this technique to integrate it into the existing hypotheses.

VALUE ADDED

When properly done, this technique can maximize an analyst or group effort to overcome individual biases. It also exposes external factors potentially affecting their analysis or new and larger issues that must be addressed. Creative thinking and the reevaluation of analytic mindsets occur as new ideas are considered, unknown issues come to the fore, and existing ideas, hypotheses, and concepts are reexamined.

POTENTIAL PITFALLS

When the technique is used allowing the members to voice their ideas, there are two relevant obstacles to overcome. First, group members are very susceptible to anchoring bias. One negative comment or gesture can shut down the creativity of the members of the group. Secondly, analysts think much faster than they voice their thoughts, causing nonspeaking members to either forget an idea or to become frustrated. Both obstacles can be overcome to some degree by the use of Post-it notes and not allowing verbal or physical reaction to anyone else's idea.

THE METHOD

Creative thinking works best when a trained facilitator is available to ensure the session is fruitful. The creative thinking process actually consists of two phases: a divergent phase, where group members create new ideas via brainstorming, and a convergent phase, where group members cluster ideas for review, consolidation, and follow-up action.

There are many approaches to creative thinking. This is an example of a typical session:

Divergent Phase

Step One: Organize the group. Group members should come from a vari-

¹ This technique is adapted from the concept of the same named technique in *The Thinker's Toolkit: 14 Powerful Techniques for Problem Solving* by Morgan D. Jones.

ety of backgrounds (cross fertilization is important). Cognitive diversity, different points of view, and a wide range of experience are important. Small groups tend to function better than large ones; five to seven participants is a good target.

Step Two: Focus on a specific topic or question. It should not be so broad that no solution is possible or so narrow that creativity won't help. Make clear to all members in advance that discussion will not be constrained by current positions or available evidence.

Step Three: Have everyone write down at least one idea before discussion starts. Use paper, white boards, or Post-it notes to record ideas. That will allow easy clustering of ideas during the convergent phase.

Step Four: Have the group verbally generate as many ideas as possible. When a group has one or more strong personalities, the facilitator can have the members stop all verbalization and write their ideas down and post them where others can read them and build on any idea. Listen closely as others talk; this will help generate ideas. Suspend judgment; do not eliminate ideas; what looks crazy at first may become valuable later, after more thought or when new data is received.

Step Five: Let the first session last for 45-60 minutes or until a noticeable decline in activity takes place. Then take a break. Keep going for two more sessions, ending each when the activity falls off. After the third such period, it is time to stop the divergent phase.

Convergent Phase

Step One: Group the ideas by theme, then set aside any that do not easily fit with any group. Then through voting or other means, select the themes or outliers that deserve further attention.

Step Two: After the session is over, have the individuals spend time alone to silently review the submission and consider:

- Which of the alternatives are reasonable and would meet the goals of the decisionmaker?
- What are the alternative's shortcomings?
- What are the alternative's benefits?

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Example



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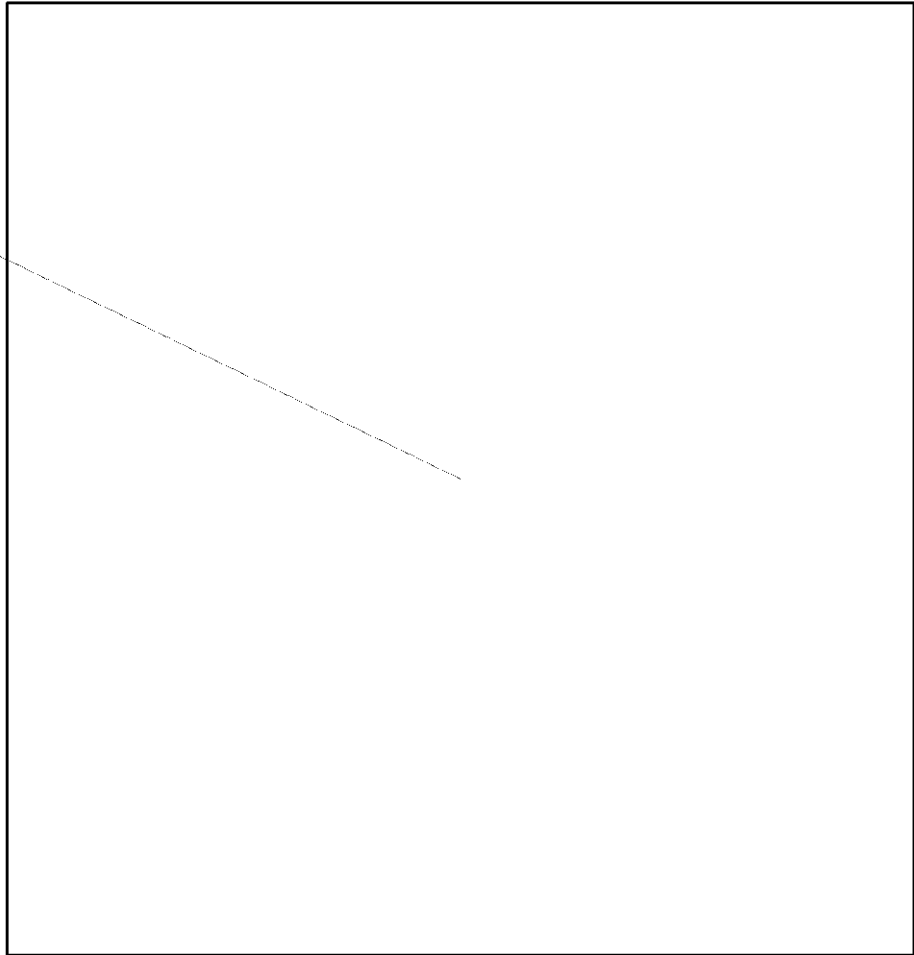
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DIVERGENT THINKING

TIPS

- When brainstorming alone, write as many thoughts about the topic as possible. Do not be afraid to stretch your idea of reality.
- Get your coworkers to review your ideas and discuss the feasibility, likelihood, and capabilities needed for these ideas to be true.

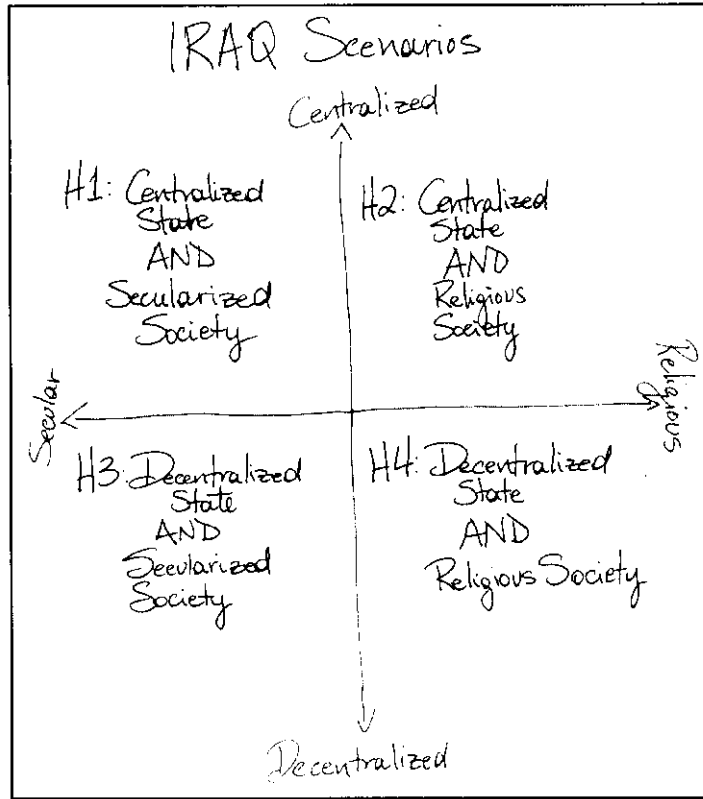
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