To facilitate institutional memory and learning, thorough postmortem analyses should be conducted on all significant intelligence failures. Analytical (as distinct from collection) successes should also be studied. These analyses should be collated and maintained in a central location, available for review to identify the common characteristics of analytical failure and success. A meta-analysis of the causes and consequences of analytical success and failure should be widely distributed and used in training programs to heighten awareness of analytical problems.

To encourage learning from experience, even in the absence of a high-profile failure, management should require more frequent and systematic retrospective evaluation of analytical performance. One ought not generalize from any single instance of a correct or incorrect judgment, but a series of related judgments that are, or are not, borne out by subsequent events can reveal the accuracy or inaccuracy of the analyst's mental model. Obtaining systematic feedback on the accuracy of past judgments is frequently difficult or impossible, especially in the political intelligence field. Political judgments are normally couched in imprecise terms and are generally conditional upon other developments. Even in retrospect, there are no objective criteria for evaluating the accuracy of most political intelligence judgments as they are presently written.

In the economic and military fields, however, where estimates are frequently concerned with numerical quantities, systematic feedback on analytical performance is feasible. Retrospective evaluation should be standard procedure in those fields in which estimates are routinely updated at periodic intervals. The goal of learning from retrospective evaluation is achieved, however, only if it is accomplished as part of an objective search for improved understanding, not to identify scapegoats or assess blame. This requirement suggests that retrospective evaluation should be done routinely within the organizational unit that prepared the report, even at the cost of some loss of objectivity.

Exposure to Alternative Mind-Sets

The realities of bureaucratic life produce strong pressures for conformity. Management needs to make conscious efforts to ensure that well-reasoned competing views have the opportunity to surface within the Intelligence Community. Analysts need to enjoy a sense of security, so that partially developed new ideas may be expressed and bounced off

others as sounding boards with minimal fear of criticism for deviating from established orthodoxy.

Much of this book has dealt with ways of helping analysts remain more open to alternative views. Management can help by promoting the kinds of activities that confront analysts with alternative perspectives—consultation with outside experts, analytical debates, competitive analysis, devil's advocates, gaming, and interdisciplinary brainstorming.

Consultation with outside experts is especially important as a means of avoiding what Adm. David Jeremiah called the "everybody-thinks-like-us mindset" when making significant judgments that depend upon knowledge of a foreign culture. Intelligence analysts have often spent less time living in and absorbing the culture of the countries they are working on than outside experts on those countries. If analysts fail to understand the foreign culture, they will not see issues as the foreign government sees them. Instead, they may be inclined to mirror-image—that is, to assume that the other country's leaders think like we do. The analyst assumes that the other country will do what we would do if we were in their shoes.

Mirror-imaging is a common source of analytical error, and one that reportedly played a role in the Intelligence Community failure to warn of imminent Indian nuclear weapons testing in 1998. After leading a US Government team that analyzed this episode, Adm. Jeremiah recommended more systematic use of outside expertise whenever there is a major transition that may lead to policy changes, such as the Hindu nationalists' 1998 election victory and ascension to power in India.[157]

Pre-publication review of analytical reports offers another opportunity to bring alternative perspectives to bear on an issue. Review procedures should explicitly question the mental model employed by the analyst in searching for and examining evidence. What assumptions has the analyst made that are not discussed in the draft itself, but that underlie the principal judgments? What alternative hypotheses have been considered but rejected, and for what reason? What could cause the analyst to change his or her mind?

Ideally, the review process should include analysts from other areas who are not specialists in the subject matter of the report. Analysts within the same branch or division often share a similar mind-set. Past experience with review by analysts from other divisions or offices indi-

157. Transcript of Adm. David Jeremiah's news conference at CIA, 2 June 1998.

cates that critical thinkers whose expertise is in other areas make a significant contribution. They often see things or ask questions that the author has not seen or asked. Because they are not so absorbed in the substance, they are better able to identify the assumptions and assess the argumentation, internal consistency, logic, and relationship of the evidence to the conclusion. The reviewers also profit from the experience by learning standards for good analysis that are independent of the subject matter of the analysis.

Guiding Analytical Products

On key issues, management should reject most single-outcome analysis—that is, the single-minded focus on what the analyst believes is probably happening or most likely will happen. When we cannot afford to get it wrong, or when deception is a serious possibility, management should consider mandating a systematic analytical process such as the one described in Chapter 8, "Analysis of Competing Hypotheses." Analysts should be required to identify alternatives that were considered, justify why the alternatives are deemed less likely, and clearly express the degree of likelihood that events may not turn out as expected.

Even if the analyst firmly believes the odds are, say, three-to-one against something happening, that leaves a 25-percent chance that it will occur. Making this explicit helps to better define the problem for the policymaker. Does that 25-percent chance merit some form of contingency planning?

If the less likely hypothesis happens to be, for example, that a new Indian Government will actually follow through on its election campaign promise to conduct nuclear weapons testing, as recently occurred, even a 25-percent chance might be sufficient to put technical collection systems on increased alert.

Verbal expressions of uncertainty—such as possible, probable, unlikely, may, and could—have long been recognized as sources of ambiguity and misunderstanding. By themselves, most verbal expressions of uncertainty are empty shells. The reader or listener fills them with meaning through the context in which they are used and what is already in the reader's or listener's mind about that subject. An intelligence consumer's interpretation of imprecise probability judgments will always be biased in favor of consistency with what the reader already believes. That means the intelligence reports will be undervalued and have little impact on the

in many fields, probably including intelligence analysis. This is supposed to be the job of the branch chief or senior analyst, but these officers are often too busy responding to other pressing demands on their time.

It would be worthwhile to consider how an analytical coaching staff might be formed to mentor new analysts or consult with analysts working particularly difficult issues. One possible model is the SCORE organization that exists in many communities. SCORE stands for Senior Corps of Retired Executives. It is a national organization of retired executives who volunteer their time to counsel young entrepreneurs starting their own businesses. It should be possible to form a small group of retired analysts who possess the skills and values that should be imparted to new analysts, and who would be willing to volunteer (or be hired) to come in several days a week to counsel junior analysts.

New analysts could be required to read a specified set of books or articles relating to analysis, and to attend a half-day meeting once a month to discuss the reading and other experiences related to their development as analysts. A comparable voluntary program could be conducted for experienced analysts. This would help make analysts more conscious of the procedures they use in doing analysis. In addition to their educational value, the required readings and discussion would give analysts a common experience and vocabulary for communicating with each other, and with management, about the problems of doing analysis.

My suggestions for writings that would qualify for a mandatory reading program include: Robert Jervis' *Perception and Misperception in International Politics* (Princeton University Press, 1977); Graham Allison's *Essence of Decision: Explaining the Cuban Missile Crisis* (Little, Brown, 1971); Ernest May's "*Lessons" of the Past: The Use and Misuse of History in American Foreign Policy* (Oxford University Press, 1973); Ephraim Kam's, *Surprise Attack* (Harvard University Press, 1988); Richard Betts' "Analysis, War and Decision: Why Intelligence Failures Are Inevitable," *World Politics,* Vol. 31, No. 1 (October 1978); Thomas Kuhn's *The Structure of Scientific Revolutions* (University of Chicago Press, 1970); and Robin Hogarth's *Judgement and Choice* (John Wiley, 1980). Although these were all written many years ago, they are classics of permanent value. Current analysts will doubtless have other works to recommend. CIA and Intelligence Community postmortem analyses of intelligence failure should also be part of the reading program.

Scholars selected for tours of duty in the Intelligence Community should include cognitive psychologists or other scholars of various backgrounds who are interested in studying the thinking processes of intelligence analysts. There should also be post-doctoral fellowships for promising scholars who could be encouraged to make a career of research in this field. Over time, this would contribute to building a better base of knowledge about how analysts do and/or should make analytical judgments and what tools or techniques can help them.

Management should also support research on the mind-sets and implicit mental models of intelligence analysts. Because these mind-sets or models serve as a "screen" or "lens" through which analysts perceive foreign developments, research to determine the nature of this "lens" may contribute as much to accurate judgments as does research focused more directly on the foreign areas themselves.[156]

Training

Most training of intelligence analysts is focused on organizational procedures, writing style, and methodological techniques. Analysts who write clearly are assumed to be thinking clearly. Yet it is quite possible to follow a faulty analytical process and write a clear and persuasive argument in support of an erroneous judgment.

More training time should be devoted to the thinking and reasoning processes involved in making intelligence judgments, and to the tools of the trade that are available to alleviate or compensate for the known cognitive problems encountered in analysis. This book is intended to support such training.

Training will be more effective if supplemented with ongoing advice and assistance. An experienced coach who can monitor and guide ongoing performance is a valuable supplement to classroom instruction

156. Graham Allison's work on the Cuban missile crisis (Essence of Decision, Little, Brown & Co., 1971) is an example of what I have in mind. Allison identified three alternative assumptions about how governments work--the rational actor model, organizational process model, and bureaucratic politics model. He then showed how an analystÍs implicit assumptions about the most appropriate model for analyzing a foreign government's behavior cause him or her to focus on different evidence and arrive at different conclusions. Another example is my own analysis of five alternative paths for making counterintelligence judgments in the controversial case of KGB defector Yuriy Nosenko. Richards J. Heuer, Jr., "Nosenko: Five Paths to Judgment," *Studies in Intelligence*, Vol. 31, No. 3 (Fall 1987), originally classified Secret but declassified and published in H. Bradford Westerfield, ed., *Inside CIA's Private World: Declassified Articles from the Agency Internal Journal 1955-1992* (New Haven: Yale University Press, 1995).

consumer's judgment. This ambiguity can be especially troubling when dealing with low-probability, high-impact dangers against which policymakers may wish to make contingency plans.

Managers of intelligence analysis need to convey to analysts that it is okay to be uncertain, as long as they clearly inform readers of the degree of uncertainty, sources of uncertainty, and what milestones to watch for that might clarify the situation. Inserting odds ratios or numerical probability ranges in parentheses to clarify key points of an analysis should be standard practice.

The likelihood of future surprises can be reduced if management assigns more resources to monitoring and analyzing seemingly low-probability events that will have a significant impact on US policy if they do occur. Analysts are often reluctant, on their own initiative, to devote time to studying things they do not believe will happen. This usually does not further an analyst's career, although it can ruin a career when the unexpected does happen. Given the day-to-day pressures of current events, it is necessary for managers and analysts to clearly identify which unlikely but high-impact events need to be analyzed and to allocate the resources to cover them.

One guideline for identifying unlikely events that merit the specific allocation of resources is to ask the following question: Are the chances of this happening, however small, sufficient that if policymakers fully understood the risks, they might want to make contingency plans or take some form of preventive or preemptive action? If the answer is yes, resources should be committed to analyze even what appears to be an unlikely outcome.

Managers of intelligence should support analyses that periodically re-examine key problems from the ground up in order to avoid the pitfalls of the incremental approach. Receipt of information in small increments over time facilitates assimilation of this information to the analyst's existing views. No one item of information may be sufficient to prompt the analyst to change a previous view. The cumulative message inherent in many pieces of information may be significant but is attenuated when this information is not examined as a whole.

Finally, management should educate consumers concerning the limitations as well as the capabilities of intelligence analysis and should define a set of realistic expectations as a standard against which to judge analytical performance.

The Bottom Line

Analysis can be improved! None of the measures discussed in this book will guarantee that accurate conclusions will be drawn from the incomplete and ambiguous information that intelligence analysts typically work with. Occasional intelligence failures must be expected. Collectively, however, the measures discussed here can certainly improve the odds in the analysts' favor.

judgment, but also justify briefly why other alternatives were rejected or considered less likely. To avoid ambiguity, insert an odds ratio or probability range in parentheses after expressions of uncertainty in key judgments.

Ongoing Monitoring

In a rapidly changing, probabilistic world, analytical conclusions are always tentative. The situation may change, or it may remain unchanged while you receive new information that alters your understanding of it. Specify things to look for that, if observed, would suggest a significant change in the probabilities.

Pay particular attention to any feeling of surprise when new information does not fit your prior understanding. Consider whether this surprising information is consistent with an alternative hypothesis. A surprise or two, however small, may be the first clue that your understanding of what is happening requires some adjustment, is at best incomplete, or may be quite wrong.

Management of Analysis

The cognitive problems described in this book have implications for the management as well as the conduct of intelligence analysis. This concluding section looks at what managers of intelligence analysis can do to help create an organizational environment in which analytical excellence flourishes. These measures fall into four general categories: research, training, exposure to alternative mind-sets, and guiding analytical products.

Support for Research

Management should support research to gain a better understanding of the cognitive processes involved in making intelligence judgments. There is a need for better understanding of the thinking skills involved in intelligence analysis, how to test job applicants for these skills, and how to train analysts to improve these skills. Analysts also need a fuller understanding of how cognitive limitations affect intelligence analysis and how to minimize their impact. They need simple tools and techniques to help protect themselves from avoidable error. There is so much research to be done that it is difficult to know where to start.

and you analyze the sensitivity of your conclusions to those assumptions. Ask yourself, would different assumptions lead to a different interpretation of the evidence and different conclusions?

Consider using the matrix format discussed in Chapter 8, "Analysis of Competing Hypotheses," to keep track of the evidence and how it relates to the various hypotheses.

Guard against the various cognitive biases. Especially dangerous are those biases that occur when you lack sufficient understanding of how a situation appears from another country's point of view. Do not fill gaps in your knowledge by assuming that the other side is likely to act in a certain way because that is how the US Government would act, or other Americans would act, under similar circumstances.

Recognize that the US perception of another country's national interest and decisionmaking processes often differs from how that country perceives its own interests and how decisions are actually made in that country. In 1989–90, for example, many analysts of Middle Eastern affairs clearly assumed that Iraq would demobilize part of its armed forces after the lengthy Iran-Iraq war so as to help rehabilitate the Iraqi economy. They also believed Baghdad would see that attacking a neighboring Arab country would not be in Iraq's best interest. We now know they were wrong.

When making a judgment about what another country is likely to do, invest whatever time and effort are needed to consult with whichever experts have the best understanding of what that country's government is actually thinking and how the decision is likely to be made.

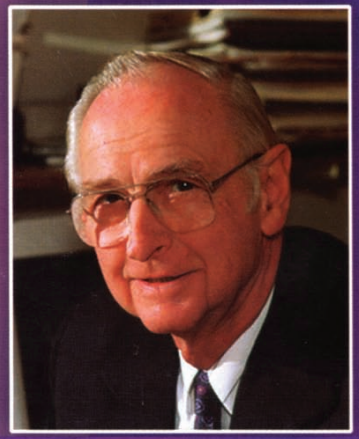
Do not assume that every foreign government action is based on a rational decision in pursuit of identified goals. Recognize that government actions are sometimes best explained as a product of bargaining among semi-independent bureaucratic entities, following standard operating procedures under inappropriate circumstances, unintended consequences, failure to follow orders, confusion, accident, or coincidence.

Selecting the Most Likely Hypothesis

Proceed by trying to reject hypotheses rather than confirm them. The most likely hypothesis is usually the one with the least evidence against it, not the one with the most evidence for it.

In presenting your conclusions, note all the reasonable hypotheses that were considered. Cite the arguments and evidence supporting your

The Author



Richards J. Heuer, Jr. worked for the CIA for nearly 45 years—first as a staff officer from 1951 until his retirement in 1979 and then as a contractor on a variety of projects until 1995. He began his career in the Directorate of Operations and later transferred to the Directorate of Intelligence, where he headed the unit working on analytic methods in the Office of Political Analysis. He is now a consultant for the Defense Security Service's Security Research Center in Monterey, California.

Mr. Heuer was awarded the Agency Seal Medallion in 1987 for developing and teaching an innovative methodology for addressing complex and challenging problems facing the Intelligence Community. He was recognized in 1988 for his "outstanding contribution to the literature of intelligence," and again in 1996 for "superior accomplishment." In addition to his work on the psychology of intelligence analysis, Mr. Heuer is a published author on counterintelligence, deception, analytical methodology, and personnel security issues.

Many of the chapters in this book were originally written for the Directorate of Intelligence in the 1980s. They were recently edited and assembled, along with additional material that Mr. Heuer prepared specifically for this book, under the auspices of the CIA's Center for the Study of Intelligence.

I have been a fan of Richards Heuer ever since I met him and read some of his material 20 years ago. This book combines Dick's many years of experience with his extensive knowledge of psychological research. He examines impediments to good intelligence analysis and points the way to how to overcome them. The volume should be of real assistance to people faced with the need to draw sound estimates from changing and ambiguous information.

Robert Jervis
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Collect information to evaluate all the reasonable hypotheses, not just the one that seems most likely. Exploring alternative hypotheses that have not been seriously considered before often leads an analyst into unexpected and unfamiliar territory. For example, evaluating the possibility of deception requires evaluating another country's or group's motives, opportunities, and means for denial and deception. This, in turn, may require understanding the strengths and weaknesses of US human and technical collection capabilities.

It is important to suspend judgment while information is being assembled on each of the hypotheses. It is easy to form impressions about a hypothesis on the basis of very little information, but hard to change an impression once it has taken root. If you find yourself thinking you already know the answer, ask yourself what would cause you to change your mind; then look for that information.

Try to develop alternative hypotheses in order to determine if some alternative—when given a fair chance—might not be as compelling as your own preconceived view. Systematic development of an alternative hypothesis usually increases the perceived likelihood of that hypothesis. "A willingness to play with material from different angles and in the context of unpopular as well as popular hypotheses is an essential ingredient of a good detective, whether the end is the solution of a crime or an intelligence estimate."[155]

Evaluating Hypotheses

Do not be misled by the fact that so much evidence supports your preconceived idea of which is the most likely hypothesis. That same evidence may be consistent with several different hypotheses. Focus on developing arguments *against* each hypothesis rather than trying to confirm hypotheses. In other words, pay particular attention to evidence or assumptions that suggest one or more hypotheses are *less* likely than the others.

Recognize that your conclusions may be driven by assumptions that determine how you interpret the evidence rather than by the evidence itself. Especially critical are assumptions about what is in another country's national interest and how things are usually done in that country. Assumptions are fine as long as they are made explicit in your analysis

155. Roberta Wohlstetter, *Pearl Harbor: Warning and Decision* (Stanford: Stanford University Press, 1962), p. 302.

Defining the Problem

Start out by making certain you are asking—or being asked—the right questions. Do not hesitate to go back up the chain of command with a suggestion for doing something a little different from what was asked for. The policymaker who originated the requirement may not have thought through his or her needs, or the requirement may be somewhat garbled as it passes down through several echelons of management. You may have a better understanding than the policymaker of what he or she needs, or should have, or what is possible to do. At the outset, also be sure your supervisor is aware of any tradeoff between quality of analysis and what you can accomplish within a specified time deadline.

Generating Hypotheses

Identify all the plausible hypotheses that need to be considered. Make a list of as many ideas as possible by consulting colleagues and outside experts. Do this in a brainstorming mode, suspending judgment for as long as possible until all the ideas are out on the table.

Then whittle the list down to a workable number of hypotheses for more detailed analysis. Frequently, one of these will be a deception hypothesis—that another country or group is engaging in denial and deception to influence US perceptions or actions.

At this stage, do not screen out reasonable hypotheses only because there is no evidence to support them. This applies in particular to the deception hypothesis. If another country is concealing its intent through denial and deception, you should probably not expect to see evidence of it without completing a very careful analysis of this possibility. The deception hypothesis and other plausible hypotheses for which there may be no immediate evidence should be carried forward to the next stage of analysis until they can be carefully considered and, if appropriate, rejected with good cause.

Collecting Information

Relying only on information that is automatically delivered to you will probably not solve all your analytical problems. To do the job right, it will probably be necessary to look elsewhere and dig for more information. Contact with the collectors, other Directorate of Operations personnel, or first-cut analysts often yields additional information. Also check academic specialists, foreign newspapers, and specialized journals.

PART IV—CONCLUSIONS

Chapter 14

Improving Intelligence Analysis

This chapter offers a checklist for analysts—a summary of tips on how to navigate the minefield of problems identified in previous chapters. It also identifies steps that managers of intelligence analysis can take to help create an environment in which analytical excellence can flourish.

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How can intelligence analysis be improved? That is the challenge. A variety of traditional approaches are used in pursuing this goal: collecting more and better information for analysts to work with, changing the management of the analytical process, increasing the number of analysts, providing language and area studies to improve analysts' substantive expertise, revising employee selection and retention criteria, improving report-writing skills, fine-tuning the relationship between intelligence analysts and intelligence consumers, and modifying the types of analytical products.

Any of these measures may play an important role, but analysis is, above all, a mental process. Traditionally, analysts at all levels devote little attention to improving how they think. To penetrate the heart and soul of the problem of improving analysis, it is necessary to better understand, influence, and guide the mental processes of analysts themselves.

Checklist for Analysts

This checklist for analysts summarizes guidelines for maneuvering through the minefields encountered while proceeding through the analytical process. Following the guidelines will help analysts protect themselves from avoidable error and improve their chances of making the right calls. The discussion is organized around six key steps in the analytical process: defining the problem, generating hypotheses, collecting information, evaluating hypotheses, selecting the most likely hypothesis, and the ongoing monitoring of new information.

caused only by self-interest and lack of objectivity, would you have believed this? (Answer: Probably yes.) And would you have believed it if this chapter had reported these biases can be overcome by a conscientious effort at objective evaluation? (Answer: Probably yes.)

These questions may lead you, the reader, to recall the state of your knowledge or beliefs before reading this chapter. If so, the questions will highlight what you learned here—namely, that significant biases in the evaluation of intelligence estimates are attributable to the nature of human mental processes, not just to self-interest and lack of objectivity, and that they are, therefore, exceedingly difficult to overcome.

tant to efforts to overcome them. Subjects were instructed to make estimates as if they did not already know the answer, but they were unable to do so. One set of test subjects was briefed specifically on the bias, citing the results of previous experiments. This group was instructed to try to compensate for the bias, but it was unable to do so. Despite maximum information and the best of intentions, the bias persisted.

This intractability suggests the bias does indeed have its roots in the nature of our mental processes. Analysts who try to recall a previous estimate after learning the actual outcome of events, consumers who think about how much a report has added to their knowledge, and overseers who judge whether analysts should have been able to avoid an intelligence failure, all have one thing in common. They are engaged in a mental process involving hindsight. They are trying to erase the impact of knowledge, so as to remember, reconstruct, or imagine the uncertainties they had or would have had about a subject prior to receipt of more or less definitive information.

It appears, however, that the receipt of what is accepted as definitive or authoritative information causes an immediate but unconscious restructuring of a person's mental images to make them consistent with the new information. Once past perceptions have been restructured, it seems very difficult, if not impossible, to reconstruct accurately what one's thought processes were or would have been before this restructuring.

There is one procedure that may help to overcome these biases. It is to pose such questions as the following: Analysts should ask themselves, "If the opposite outcome had occurred, would I have been surprised?" Consumers should ask, "If this report had told me the opposite, would I have believed it?" And overseers should ask, "If the opposite outcome had occurred, would it have been predictable given the information that was available?" These questions may help one recall or reconstruct the uncertainty that existed prior to learning the content of a report or the outcome of a situation.

This method of overcoming the bias can be tested by readers of this chapter, especially those who believe it failed to tell them much they had not already known. If this chapter had reported that psychological experiments show no consistent pattern of analysts overestimating the accuracy of their estimates, or of consumers underestimating the value of our product, would you have believed it? (Answer: Probably not.) If it had reported that psychological experiments show these biases to be