Making Management Decisions: the Role of Intuition and Emotion

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The work of a manager includes making decisions (or participating in their making), communicating them to others, and monitoring how they are carried out. Managers must know a great deal about the industry and social environment in which they work and the decision-making process itself to make decisions well. Over the past 40 years, the technique of decision making has been greatly advanced by the development of a wide range of tools—in particular, the tools of operations research and management science, and the technology of expert systems

But these advances have not applied to the entire domain of decision making. They have had their greatest impact on decision making that is well-structured, deliberative, and quantitative; they have had less impact on decision making that is loosely structured, intuitive, and qualitative; and they have had the least impact on face-to-face interactions between a manager and his or her coworkers—the give and take of everyday work.

In this article, I will discuss these two relatively neglected types of decision making: "intuitive" decision making and decision making that involves interpersonal interaction. What, if anything, do we know about how judgmental and intuitive processes work and how they can be made to work better? And why do managers often fail to do what they know they should do—even what they have decided to do? What can be done to bring action into closer accord with intention?

My article will therefore have the form of a diptych, with one half devoted to each of these topics. First, I will discuss judgmental and intuitive decision making; then I will turn to the subject of the manager's behavior and the influence of emotions on that behavior.

Sometimes the term rational (or logical) is applied to decision making that is consciously analytic, the term nonrational to decision making that is intuitive and judgmental, and the term irrational to decision making and behavior that responds to the emotions or that deviates from action chosen "rationally." We will be concerned, then, with the nonrational and the irrational components of managerial decision making and behavior. Our task, you might say, is to discover the reason that underlies unreason.

Intuition and Judgment

As an appendix to the *Functions of the Executive* (Harvard University Press, 1938), Chester I. Barnard published an essay, based on a talk he had given in 1936 at Princeton, entitled "Mind in Everyday Affairs." [1] The central motif of that essay was a contrast between what Barnard called "logical" and "nonlogical" processes for making decisions. He speaks of "the wide divergence of opinion . . . as to what constitutes a proper intellectual basis for opinion or deliberate action." And he continues:

> *By "logical processes" I mean conscious thinking which could be expressed in words or by other symbols, that is, reasoning. By "non-logical processes" I mean those not capable of being expressed in words or as reasoning, which are only made known by a judgment, decision or action.*

Barnard's thesis was that executives, as contrasted, say, with scientists, do not often enjoy the luxury of making their decisions on the basis of orderly rational analysis, but depend largely on intuitive or judgmental responses to decision-demanding situations.

Although Barnard did not provide a set of formal criteria for distinguishing between logical and judgmental decision making, he did provide a phenomenological characterization of the two styles that make them easily recognizable, at least in their more extreme forms. In logical decision making, goals and alternatives are made explicit, the consequences of pursuing different alternatives are calculated, and these consequences are evaluated in terms of how close they are to the goals.

In judgmental decision making, the response to the need for a decision is usually rapid, too rapid to allow for an orderly sequential analysis of the situation, and the decision maker cannot usually give a veridical account of either the process by which the decision was reached or the grounds for judging it correct. Never-

theless, decision makers may have great confidence in the correctness of their intuitive decisions and are likely to attribute their ability to make them rapidly to their experience.

Most executives probably find Barnard's account of their decision processes persuasive; it captures their own feelings of how processes work. On the other hand, some students of management, especially those whose goal is to improve management-decision processes, have felt less comfortable with it. It appears to vindicate snap judgments and to cast doubt on the relevance of management-science tools, which almost all involve deliberation and calculation in decision making.

Barnard did not regard the nonlogical processes of decision as magical in any sense. On the contrary, he felt they were grounded in knowledge and experience:

The sources of these non-logical processes lie in physiological conditions or factors, or in the physical and social environment, mostly impressed upon us unconsciously or without conscious effort on our part. They also consist of the mass of facts, patterns, concepts, techniques, abstractions, and generally what we call formal knowledge or beliefs, which are impressed upon our minds more or less by conscious effort and study. This second source of non-logical mental processes greatly increases with directed experience, study and education. (p 302)

At the time I wrote *Administrative Behavior* (1941-42), I was troubled by Barnard's account of intuitive judgment (see the footnote on p. 51 of *AB*), largely, I think, because he left no clues as to what subconscious processes go on while judgments are being made. [2] I was wholly persuaded, however, that a theory of decision making had to give an account of both conscious and subconscious processes (see the end of p. 75 to the top of p. 76). I finessed the issue by assuming that both the conscious and the unconscious parts of the process were the same, that they involve drawing on factual premises and value premises, and operating on them to form conclusions that became the decisions.

Because I used logic (drawing conclusions from premises) as a central metaphor to describe the decision-making process, many readers of *Administrative Behavior* have concluded that the theory advanced there applies only to "logical " decision making, not to decisions that involve intuition and judgment. That was certainly not my intent. But now, after nearly 50 years, the ambiguity can be resolved because we have acquired a solid understanding of what the judgmental and intuitive processes are. I will take up the new evidence in a moment; but first, a word must be said about the "two brains" hypothesis, which argues that rational and intuitive processes are so different that they are carried out in different parts of the brain.

Split Brains and Forms of Thought

Physiological research on "split brains"—brains in which the corpus callosum, which connects the two hemispheres of the cerebrum, has been severed—has provided encouragement to the idea of two qualitatively different kinds of decision making—the analytical, corresponding to Barnard's "logical," and the intuitive or creative, corresponding to his "non-logical." The primary evidence behind this dichotomy is that the two hemispheres exhibit a division of labor: in right-handed people, the right hemisphere plays a special role in the recognition of visual patterns, and the left hemisphere in analytical processes and the use of language.

Other evidence in addition to the split-brain research suggests some measure of hemispheric specialization. Electrical activity in the intact brain can be measured by EEG techniques. Activity in a brain hemisphere is generally associated with partial or total suppression in the hemisphere of the alpha system, a salient brain wave with a frequency of about ten vibrations per second. When a hemisphere is inactive, the alpha rhythm in that hemisphere becomes strong. For most right-handed subjects, when the brain is engaged in a task involving recognition of visual pattern, the alpha rhythm is relatively stronger in the left than in the right hemisphere; with more analytical tasks, the alpha rhythm is relatively stronger in the right hemisphere. (See Doktor and Hamilton, 1973, and Doktor, 1975, for some experiments and a review of the evidence.[3])

The more romantic versions of the split-brain doctrine extrapolate this evidence into the two polar forms of thought labeled above as analytical and creative. As an easy next step, evaluative nuances creep into the discussion. The opposite of "creative," after all, is "pedestrian." The analytical left hemisphere, so this story goes, carries on the humdrum, practical, everyday work of the brain, while the creative right hemisphere is responsible for those flights of imagination that produce great music, great literature, great art, great science, and great management. The evidence for this romantic extrapolation does not derive from the physiological research. As I indicated above, that research has provided evidence only for some measure of specialization between the hemispheres. It does not in any way imply that either hemisphere (especially the right hemisphere) is capable of problem solving, decision making, or discovery independent of the other. The real evidence for two different forms of thought is essentially that on which Barnard relied: the observation that, in everyday affairs, men and women often make competent judgments or reach reasonable decisions rapidly—without evidence indicating that they have engaged in systematic reasoning, and without their being able to report the thought processes that took them to their conclusion.

There is also some evidence for the very plausible hypothesis that some people, confronted with a particular problem, make more use of intuitive processes in solving it, while other people make relatively more use of analytical processes (Doktor, 1978).[3]

For our purposes, it is the differences in behavior, and not the differences in the hemispheres, that are important. Reference to the two hemispheres is a red herring that can only impede our understanding of intuitive, "non-logical" thought. The important questions for us are "What is intuition?" and "How is it acccomplished?" not "In which cubic centimeters of the brain tissue does it take place?"

New Evidence on the Processes of Intuition

In the 50 years since Barnard talked about the mind in everyday affairs, we have learned a great deal about the processes human beings use to solve problems, to make decisions, and even to create works of art and science. Some of this new knowledge has been gained in the psychological laboratory; some has been gained through observation of the behavior of people who are demonstrably creative in some realm of human endeavor; and a great deal has been gained through the use of the modern digital computer to model human thought processes and perform problem-solving and decision-making functions at expert levels.

I should like to examine this body of research, which falls under the labels of "cognitive science" and "artificial intelligence," to see what light it casts on intuitive, judgmental decision making in management. We will see that a rather detailed account can be given of the processes that underlie judgment, even though most of these processes are not within the conscious awareness of the actor using them.

The Expert's Intuition

In recent years, the disciplines of cognitive science and artificial intelligence have devoted a great deal of attention to the nature of expert problem solving and decision making in professional-level tasks. The goal of the cognitive science research has been to gain an understanding of the differences between the behavior of experts and novices, and possibly to learn more about how novices can become experts. The goal of the artificial intelligence research has been to build computer systems that can perform professional tasks as competently as human experts can. Both lines of research have greatly deepened our understanding of expertise.[4]

Intuition in Chessplaying

One much studied class of experts is the grandmasters in the game of chess. Chess is usually believed to require a high level of intellect, and grandmasters are normally full-time professionals who have devoted many years to acquiring their mastery of the game. From a research standpoint, the advantage of the game is that the level of skill of players can be calibrated accurately from their official ratings, based on their tournament success.

From the standpoint of studying intuitive thinking, chess might seem (at least to outsiders) an unpromising research domain. Chess playing is thought to involve a highly analytical approach, with players working out systematically the consequences of moves and countermoves, so that a single move may take as much as a half hour's thought, or more. On the other hand, chess professionals can play simultaneous games, sometimes against as many as 50 opponents, and exhibit only a moderately lower level of skill than in games playing under tournament conditions. In simultaneous play, the professional takes much less than a minute, often only a few seconds, for each move. There is no time for careful analysis.

When we ask the grandmaster or master how he or she is able to find good moves under these circumstances, we get the same answer that we get from other professionals who are questioned about rapid decisions: It is done by "intuition," by applying one's professional "judgment" to the situation. A few seconds' glance at the position suggests a good move, although the player has no awareness of how the judgment was evoked.

Even under tournament conditions, good moves usually come to a player's mind after only a few seconds' consideration of the board. The remainder of the analysis time is generally spent verifying that a move appearing plausible does not have a hidden weakness. We encounter this same kind of behavior in other professional domains where intuitive judgments are usually subjected to tests of various kinds before they are actually implemented. The main exceptions are situations where the decision has to be made before a deadline or almost instantly. Of course we know that under these circumstances (as in professional chess when the allowed time is nearly exhausted), mistakes are sometimes made.

How do we account for the judgment or intuition that allows the chess grandmaster usually to find good moves in a few seconds? A good deal of the answer can be derived from an experiment that is easily repeated. First, present a grandmaster and a novice with a position from an actual, but unfamiliar, chess game (with about 25 pieces on the board). After five or ten seconds, remove the board and pieces and ask the sub-

jects to reproduce it. The grandmaster will usually reconstruct the whole position correctly, and on average will place 23 or 24 pieces on their correct squares. The novice will only be able to replace, on average, about 6 pieces.

It might seem that we are witnessing remarkable skill in visual imagery and visual memory, but we can easily dismiss that possibility by carrying out a second experiment. The conditions are exactly the same as in the first experiment, except that now the 25 pieces are placed on the board at random. The novice can still replace about 6 pieces and the grandmaster—about 6! The difference between them in the first experiment does not lie in the grandmaster's eyes or imagery, but in his knowledge, acquired by long experience, of the kinds of patterns and clusters of pieces that occur on chessboards in the course of games. For the expert, such a chess board is not an arrangement of 25 pieces but an arrangement of a half dozen familiar patterns, recognizable old friends. On the random board there are no such patterns, only the 25 individual pieces in an unfamiliar arrangement.

The grandmaster's memory holds more than a set of patterns. Associated with each pattern in his or her memory is information about the significance of that pattern—what dangers it holds, and what offensive or defensive moves it suggests. Recognizing the pattern brings to the grandmaster's mind at once moves that may be appropriate to the situation. It is this recognition that enables the professional to play very strong chess at a rapid rate. Previous learning that has stored the patterns and the information associated with them in memory makes this performance possible. This, then, is the secret of the grandmaster's intuition or judgment.

Estimates have been made, in a variety of ways, of the number of familiar patterns (which psychologists now call chunks) that the master or grandmaster must be able to recognize. These estimates fall in the neighborhood of 50,000, give or take a factor of two. Is this a large number? Perhaps not. The natural language vocabularies of college graduates have been estimated to be in the range of 50,000 to 200,000 words, nearly the same range as the chess expert's vocabularies of patterns of pieces. Moreover, when we recognize a word, we also get access to information in our memories about the meaning of the word and to other information associated with it as well. So our ability to speak and understand language has the same intuitive or judgmental flavor as the grandmaster's ability to play chess rapidly.

Intuition in Computerized Expert Systems

A growing body of evidence from artificial intelligence research indicates that expert computer systems, capable of matching human performance in some limited domain, can be built by storing in computer memory tens of thousands of *productions*. Productions are computer instructions that take the form of "if-then" pairs. The "if" is a set of conditions or patterns to be recognized; the "then" is a body of information associated with the "if" and evoked from memory whenever the pattern is recognized in the current situation.

Some of our best data about this organization of expert knowledge come from the areas of medical diagnosis. Systems like CADUCEUS and MYCIN consist of a large number of such if-then pairs, together with an inference machine of modest powers. These systems are capable of medical diagnosis at a competent clinical level within their respective limited domains. Their recognition capabilities, the if-then pairs, represent their intuitive or judgmental ability; their inferencing powers represent their analytical ability.

Medical diagnosis is just one of a number of domains for which expert systems have been built. For many years, electric motors, generators, and transformers have been designed by expert systems developed by large electrical manufacturers. These computer programs have taken over from professional engineers many standards and relatively routine design tasks. They imitate fairly closely the rule-of-thumb procedures that human designers have used, the result of a large stock of theoretical and practical information about electrical machinery. Recognition also plays a large role in these systems. For example, examination of the customer's specifications "reminds" the program of a particular class of devices, which is then used as the basis for the design. Parameters for the design are then selected to meet the performance requirements of the device.

In chemistry, reaction paths for synthesizing organic molecules can be designed by expert systems. In these systems, the process appears relatively analytic, for it is guided by reasoning in the form of means-ends analyses, which work backward from the desired molecule, via a sequence of reactions, to available raw materials. But the reasoning scheme depends on a large store of knowledge of chemical reactions and the ability of the system to recognize rapidly that a particular substance can be obtained as the output of one or more familiar reactions. Thus, these chemical synthesis programs employ the same kind of mixture of intuition and analysis that is used in the other expert systems, and by human experts as well.

Other examples of expert systems can be cited, and all of them exhibit reasoning or analytic processes combined with processes for accessing knowledge banks with the help of recognition cues. This appears to be a universal scheme for the organization of expert systems—and of expert human problem solving as well.

Notice that there is nothing "irrational" about intuitive or judgmental reasoning based on productions. The conditions in a production constitute a set of premises. Whenever these conditions are satisfied, the production draws the appropriate conclusion—it evokes from memory information implied by these conditions or even initiates motor responses. A person learning to drive a car may notice a red light, be aware that a red light calls for a stop, and be aware that stop-

ping requires applying the brakes. For an experienced driver, the sight of the red light simply evokes the application of brakes. How conscious the actor is of the process inversely, how automatic the response is, may differ, but there is no difference in the logic being applied.

Intuition in Management

Some direct evidence also suggests that the intuitive skills of managers depend on the same kinds of mechanisms as the intuitive skills of chessmasters or physicians. It would be surprising if it were otherwise. The experienced manager, too, has in his or her memory a large amount of knowledge, gained from training and experience and organized in terms of recognizable chunks and associated information.

Marius J. Bouwman has constructed a computer program capable of detecting company problems from an examination of accounting statements.[5] The program was modeled on detailed thinking-aloud protocols of experienced financial analysts interpreting such statements, and it captures the knowledge that enables analysts to spot problems intuitively, usually at a very rapid rate. When a comparison is made between the responses of the program and the responses of an expert human financial analyst, a close match is usually found.

In another study, R. Bhaskar gathered thinking-aloud protocols from business school students and experienced businessmen, who were all asked to analyze a business policy case.[6] The final analyses produced by the students and the businessmen were quite similar. What most sharply discriminated between the novices and the experts was the time required to identify the key features of the case. This was done very rapidly, with the usual appearances of intuition, by the experts; it was done slowly, with much conscious and explicit analysis, by the novices.

These two pieces of research are just drops of water in a large bucket that needs filling. The description, in detail, of the use of judgmental and analytical processes in expert problem solving and decision making deserves a high priority in the agenda of management research.

Can Judgment Be Improved?

From this and other research on expert problem solving and decision making, we can draw two main conclusions. *First*, experts often arrive at problem diagnoses and solutions rapidly and intuitively without being able to report how they attained the result. *Second*, this ability is best explained by postulating a recognition and retrieval process that employs a large number—generally tens of thousands or even hundreds of thousands—of chunks or patterns stored in long term memory.

When the problems to be solved are more than trivial, the recognition processes have to be organized in a coherent way and they must be supplied with reasoning capabilities that allow inferences to be drawn from the information retrieved, and numerous chunks of information to be combined. Hence intuition is not a process that operates independently of analysis; rather, the two processes are essential complementary components of effective decision-making systems. When the expert is solving a difficult problem or making a complex decision, much conscious deliberation may be involved. But each conscious step may itself constitute a considerable leap, with a whole sequence of automated productions building the bridge from the premises to the conclusions. Hence the expert appears to take giant intuitive steps in reasoning, as compared with the tiny steps of the novice.

It is doubtful that we will find two types of managers (at least, of good managers), one of whom relies almost exclusively on intuition, the other on analytic techniques. More likely, we will find a continuum of decision-making styles involving an intimate combination of the two kinds of skill. We will likely also find that the nature of the problem to be solved will be a principal determinant of the mix.

With our growing understanding of the organization of judgmental and intuitive processes, of the specific knowledge that is required to perform particular judgmental tasks, and of the cues that evoke such knowledge in situations in which it is relevant, we have a powerful new tool for improving expert judgment. We can specify the knowledge and the recognition capabilities that experts in a domain need to acquire as a basis for designing appropriate learning procedures.

We can also, in more and more situations, design expert systems capable of automating the expertise, or alternatively, of providing the human decision maker with an expert consultant. Increasingly, we will see decision aids for managers that will be highly interactive, with both knowledge and intelligence being shared between the human and the automated components of the system.

A vast research and development task of extracting and cataloging the knowledge and cues used by experts in different kinds of managerial tasks lies ahead. Much has been learned in the past few years about how to do this. More needs to be learned about how to update and improve the knowledge sources of expert systems as new knowledge becomes available.

Progress will be most rapid with expert systems that have a substantial technical component. It is no accident that the earliest expert systems were built for such tasks as designing motors, making medical diagnoses, playing chess, and finding chemical synthesis paths. In the area of management, the analysis of company financial statements is a domain where some progress has been made in constructing expert systems. The areas of corporate policy and strategy are excellent candidates for early development of such systems.

What about the aspects of executive work that involve the managing of people? What help can we expect in improving this crucial component of the management task?

Knowledge and Behavior

What managers know they should do—whether by analysis or intuitively—is very often different from what they actually do. A common failure of managers, which all of us have observed, is the postponement of difficult decisions. What is it that makes decisions difficult and hence tends to cause postponement? Often, the problem is that all of the alternatives have undesired consequences. When people have to choose the lesser of two evils, they do not simply behave like Bayesian statisticians, weighing the bad against the worse in the light of their respective possibilities. Instead, they avoid the decision, searching for alternatives that do not have negative outcomes. If such alternatives are not available, they are likely to continue to postpone making a choice. A choice between undesirables is a dilemma, something to be avoided or evaded.

Often, uncertainty is the source of the difficulty. Each choice may have a good outcome under one set of environmental contingencies, but a bad outcome under another. When this occurs, we also do not usually observe Bayesian behavior; the situation is again treated as a dilemma.

The bad consequences of a manager's decision are often bad for other people. Managers sometimes have to dismiss employees or, even more frequently, have to speak to them about unsatisfactory work. Dealing with such matters face to face is stressful to many, perhaps most, executives. The stress is magnified if the employee is a close associate or friend. If the unpleasant task cannot be delegated, it may be postponed.

The manager who has made a mistake (that is to say, all of us at one time or another) also finds himself or herself in a stressful situation. The matter must be dealt with sooner or later, but why not later instead of sooner? Moreover, when it is addressed, it can be approached in different ways. A manager may try to avoid blame—"It wasn't my fault!" A different way is to propose a remedy to the situation. I know of no systematic data on how often the one or the other course is taken, but most of us could probably agree that blame-avoiding behavior is far more common than problem-solving behavior after a serious error has been made.

The Consequences of Stress

What all of these decision-making situations have in common is stress, a powerful force that can divert behavior from the urgings of reason. They are examples of a much broader class of situations in which managers frequently behave in clearly nonproductive ways. Nonproductive responses are especially common when actions have to be made under time pressure. The need to allay feelings of guilt, anxiety, and embarrassment may lead to behavior that produces temporary personal comfort at the expense of bad long-run consequences for the organization.

Behavior of this kind is "intuitive" in the sense that it represents response without careful analysis and calculation. Lying, for example, is much more often the result of panic than of Machiavellian scheming. The intuition of the emotion-driven manager is very different from the intuition of the expert whom we discussed earlier. The latter's behavior is the product of learning and experience, and is largely adaptive; the former's behavior is a response to more primitive urges, and is more often than not inappropriate. We must not confuse the "nonrational" decisions of the experts—the decisions that derive from expert intuition and judgment—with the irrational decisions that stressful emotions may produce.

I have made no attempt here to produce a comprehensive taxonomy of the pathologies of organizational decision making, but simply have given some examples of the ways that stress interacts with cognition to elicit counterproductive behavior. Such responses can become so habitual for individuals or even for organizations that they represent a recognizable managerial "style."

Organizational psychologists have a great deal to say about ways of motivating workers and executives to direct their efforts toward organizational goals. They have said less about ways of molding habits so that executives can handle situations in a goal-directed manner. When it comes to handling situations, two dimensions of behavior deserve particular attention: the response to problems that arise, and the initiation of activity that looks to the future.

Responding to Problems

The response of an organization to a problem or difficulty, whether it results from a mistake or some other cause, is generally one that looks both backward and forward. It looks backward to establish responsibility for the difficulty and to diagnose it, and forward to find a course of action to deal with it.

The backward look is an essential part of the organization's reward system. The actions that have led to difficulties, and the people responsible for those actions, need to be identified. But the backward look can also be a source of serious pathologies. Anticipation of it—particularly anticipation that it will be acted on in a punitive way—is a major cause for the concealment of problems until they can no longer be hidden. It can also be highly divisive, as individuals point fingers to transfer blame to others. Such outcomes can hardly be eliminated, but an organization's internal reputation for fairness and objectivity can mitigate them. So can a practice of subordinating the blame finding to a diagnosis of causes as a first step toward remedial action.

Most important of all, however, is the forward look: the process of defining the problem and identifying courses of action that may solve it. Here also the reward system is critically important. Readiness to

search for problem situations and effectiveness in finding them need to be recognized and rewarded.

Perhaps the greatest influence a manager can have on the problem-solving style of the organization as a role model is making the best responses to problems. The style the manager should aim for rests on the following principles:

1. Solving the problem takes priority over looking backward to its causes. Initially, backward looks should be limited to diagnosing causes; fixing responsibility for mistakes should be postponed until a solution is being implemented.

2. The manager accepts personal responsibility for finding and proposing solutions instead of seeking to shift that responsibility either to superiors or to subordinates, although the search for solutions may, of course, be a collaborative effort involving many people.

3. The manager accepts personal responsibility for implementing action solutions, including securing the necessary authority from above if required.

4. When it is time to look backward, fixing blame may be an essential part of the process, but the primary focus of attention should be on what can be learned to prevent similar problems from arising in the future.

These principles are as obvious as the Ten Commandments and perhaps not quite as difficult to obey. Earlier, I indicated that stress might cause departures from them, but failure to respond effectively to problems probably derives more from a lack of attention and an earlier failure to cultivate the appropriate habits. The military makes much use of a procedure called "Estimate of the Situation." Its value is not that it teaches anything esoteric, but that through continual training in its use, commanders become habituated to approaching situations in orderly ways, using the checklists provided by the formal procedure.

Habits of response to problems are taught and learned both in the manager's one-on-one conversations with subordinates and in staff meetings. Is attention brought back repeatedly to defining the problems until everyone is agreed on just what the problem is? Is attention then directed toward generating possible solutions and evaluating their consequences? The least often challenged and most reliable base of managerial influence is the power to set the agenda, to focus attention. It is one of the most effective tools the manager has for training organization members to approach problems constructively by shaping their own habits of attention.

The perceptive reader will have discerned that "shaping habits of attention" is identical to "acquiring intuitions." The habit of responding to problems by looking for solutions can and must become intuitive—cued by the presence of the problem itself. A problem-solving style is a component of the set of intuitions that the manager acquires, one of the key components of effective managerial behavior.

Looking to the Future

With respect to the initiation of activity, the organizational habit we would like to instil is responsiveness to cues that signal future difficulties as well as to those that call attention to the problems of the moment. Failure to give sufficient attention to the future most often stems from two causes. The first is interruption by current problems that have more proximate deadlines and hence seem more urgent; the second is the absence of sufficient "scanning" activity that can pick up cues from the environment that long-run forces not impinging immediately on the organization have importance for it in the future.

In neither case is the need for sensitivity to the future likely to be met simply by strengthening intuitions. Rather, what is called for is deliberate and systematic allocation of organizational resources to deal with long-range problems, access for these resources to appropriate input from the environment that will attract their attention to new prospects, and protection of these planning resources from absorption in current problems, however urgent they may be. Attention to the future must be institutionalized; there is no simpler way to incorporate it into managerial "style" or habit.

It is a fallacy to contrast "analytic" and "intuitive" styles of management. Intuition and judgment—at least good judgment—are simply analyses frozen into habit and into the capacity for rapid response through recognition. Every manager needs to be able to analyze problems systematically (and with the aid of the modern arsenal of analytical tools provided by management science and operations research). Every manager needs also to be able to respond to situations rapidly, a skill that requires the cultivation of intuition and judgment over many years of experience and training. The effective manager does not have the luxury of choosing between "analytic" and "intuitive" approaches to problems. Behaving like a manager means having command of the whole range of management skills and applying them as they become appropriate. ■

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Dr. Simon has published over 600 papers and 20 books and monographs.

ENDNOTES

1. Chester I. Barnard's (1938) *The Functions of the Executive* (Cambridge, Mass.: Harvard University Press), contains the essay on the contrast between logical and nonlogical processes as bases for decision making.

2. Simon, H. A. (1978) *Administrative Behavior*, 2nd ed. New York: Free Press.

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3. Two works that examine the split brain theory and forms of thought are R. H. Doktor's "Problem Solving Styles of Executives and Management Scientists," in A. Charnes, W. W. Cooper, and R. J. Niehaus's (eds.) *Management Science Approaches to Manpower Planning and Organization Design* (Amsterdam: North-Holland, 1978); and R. H. Doktor and W. F. Hamilton's "Cognitive Style and the Acceptance of Management Science Recommendations" (*Management Science*, 19:884-894, 1973).

4. For a survey of cognitive science research on problem solving and decision making, see Simon, H. A. (1979) *The Sciences of the Artificial*, 2nd ed., Cambridge, Mass.: The MIT Press, Chapters 3 and 4.

5. Marius J. Bouwman's doctoral dissertation, *Financial Diagnosis* (Graduate School of Industrial Administration, Carnegie-Mellon University, 1978).

6. R. Bhaskar's doctoral dissertation, *Problem Solving in Semantically Rich Domains* (Graduate School of Industrial Administration, Carnegie-Mellon University, 1978).