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ORGANIZATIONAL CULTURE

A Brief History of Decision Making

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Sometime in the midst of the last century, Chester Barnard, a retired telephone executive and author of *The Functions of the Executive,* imported the term "decision making" from the lexicon of public administration into the business world. There it began to replace narrower descriptors such as "resource allocation" and "policy making."

The introduction of that phrase changed how managers thought about what they did and spurred a new crispness of action and desire for conclusiveness, argues William Starbuck, professor in residence at the University of Oregon's Charles H. Lundquist College of Business. "Policy making could go on and on endlessly, and there are always resources to be allocated," he explains. "'Decision' implies the end of deliberation and the beginning of action."

So Barnard—and such later theorists as James March, Herbert Simon, and Henry Mintzberg—laid the foundation for the study of managerial decision making. But decision making within organizations is only one ripple in a stream of thought flowing back to a time when man, facing uncertainty, sought guidance from the stars. The questions of who makes decisions, and how, have shaped the world's systems of government, justice, and social order. "Life is the sum of all your choices," Albert Camus reminds us. History, by extrapolation, equals the accumulated choices of all mankind.

The study of decision making, consequently, is a palimpsest of intellectual disciplines: mathematics, sociology, psychology, economics, and political science, to name a few. Philosophers ponder what our decisions say about ourselves and about our values; historians dissect the choices leaders make at critical junctures. Research into risk and organizational behavior springs from a more practical desire: to help managers achieve better outcomes. And while a good decision does not guarantee a good outcome, such pragmatism has paid off. A growing sophistication with managing risk, a nuanced understanding of human behavior, and advances in technology that support and mimic cognitive processes have improved decision making in many situations.

Even so, the history of decision-making strategies is not one of unalloyed progress toward perfect rationalism. In fact, over the years we have steadily been coming to terms with constraints—both contextual and psychological—on our ability to make optimal choices. Complex circumstances, limited time, and inadequate mental computational power reduce decision makers to a state of "bounded rationality," argues Simon. While Simon suggests that people would make economically rational decisions if only they could gather enough information, Daniel Kahneman and Amos Tversky identify factors that cause people to decide against their economic interest even when they know better. Antonio Damasio draws on work with brain-damaged patients to demonstrate that in the absence of emotion it is impossible to make any decisions at all. Erroneous framing, bounded awareness, excessive optimism: the debunking of Descartes's rational man threatens to swamp our confidence in our choices, with only improved technology acting as a kind of empirical breakwater.

Faced with the imperfectability of decision making, theorists have sought ways to achieve, if not optimal outcomes, at least acceptable ones. Gerd Gigerenzer urges us to make a virtue of our limited time and knowledge by mastering simple heuristics, an approach he calls "fast and frugal" reasoning. Amitai Etzioni proposes "humble decision making," an assortment of nonheroic tactics that include tentativeness, delay, and hedging. Some practitioners, meanwhile, have simply reverted to the old ways. Last April, a Japanese television equipment manufacturer turned over its

$20 million art collection to Christie's when the auction house trounced archrival Sotheby's in a high-powered round of rock-paper-scissors, a game that may date back as far as Ming Dynasty China.

In this special issue on decision making, our focus—as always—is on breaking new ground. What follows is a glimpse of the bedrock that lies beneath that ground.

Chances Are

Risk is an inescapable part of every decision. For most of the everyday choices people make, the risks are small. But on a corporate scale, the implications (both upside and downside) can be enormous. Even the tritely expressed (and rarely encountered) win-win situation entails opportunity costs in the form of paths not taken.

To make good choices, companies must be able to calculate and manage the attendant risks. Today, myriad sophisticated tools can help them do so. But it was only a few hundred years ago that the risk management tool kit consisted of faith, hope, and guesswork. That's because risk is a numbers game, and before the seventeenth century, humankind's understanding of numbers wasn't up to the task.

A History of Choice

We created this time line to remind readers that the history of decision making is long, rich, and diverse. We recognize that it presents only a tiny sample of the people, events, research, and thinking that have contributed to our current understanding of this subject. Many dates are approximate.

Prehistory

Most early numbering methods were unwieldy, as anyone knows who has tried to multiply XXIII by VI. The Hindu-Arabic numeral system (which, radically, included zero) simplified calculations and enticed philosophers to investigate the nature of numbers. The tale of our progression from those early fumblings with base 10 is masterfully told by Peter Bernstein in *Against the Gods: The Remarkable Story of Risk*.

For millennia, human decisions are guided by interpretations of entrails, smoke, dreams, and the like; hundreds of generations of Chinese rely on the poetic wisdom and divination instructions compiled in the *I Ching*. The Greeks consult the Oracle of Delphi. Prophets and seers of all kinds peer into the future.

Sixth Century BC

Lao-tzu teaches the principle of "nonwillful action": letting events take their natural course.

Confucius says decisions should be informed by benevolence, ritual, reciprocity, and filial piety.

Fifth Century BC

Male citizens in Athens, in an early form of democratic self-government, make decisions by voting.

Fourth Century BC

Plato asserts that all perceivable things are derived from eternal archetypes and are better discovered through the soul than through the senses.

Aristotle takes an empirical view of knowledge that values information gained through the senses and deductive reasoning.

399 BC

In an early jury-trial decision, 500 Athenian citizens agree to send Socrates to his death.

333 BC

Bernstein's account begins in the dark days when people believed they had no control over events and so turned to priests and oracles for clues to what larger powers held in store for them. It progresses quickly to a new interest in mathematics and measurement, spurred, in part, by the growth of trade. During the Renaissance, scientists and mathematicians such as Girolamo Cardano mused about probability and concocted puzzles around games of chance. In 1494, a peripatetic Franciscan monk named Luca Pacioli proposed "the problem of points"—which asks how one should divide the stakes in an incomplete game. Some 150 years later, French mathematicians Blaise Pascal and Pierre de Fermat developed a way to determine the likelihood of each possible result of a simple game (*balla,* which had fascinated Pacioli).

But it wasn't until the next century, when Swiss scholar Daniel Bernoulli took up the study of random events, that the scientific basis for risk management took shape.

Bernoulli (who also introduced the far-reaching concept of human capital) focused not on events themselves but on the human beings who desire or fear certain outcomes to a greater or lesser degree. His intent, he wrote, was to create

Alexander the Great slices through the Gordian knot with his sword, demonstrating how difficult problems can be solved with bold strokes.

49 BC

Julius Caesar makes the irreversible decision to cross the Rubicon, and a potent metaphor in decision making is born.

Ninth Century

The Hindu-Arabic number system, including zero, circulates throughout the Arab empire, stimulating the growth of mathematics.

Eleventh Century

Omar Khayyám uses the Hindu-Arabic number system to create a language of calculation, paving the way for the development of algebra.

Fourteenth Century

An English friar proposes what became known as "Occam's razor," a rule of thumb for scientists and others trying to analyze data: The best theory is the simplest one that accounts for all the evidence.

Seventeenth Century

Stable keeper Thomas Hobson presents his customers with an eponymous "choice": the horse nearest the door or none.

1602

Hamlet, facing arguably the most famous dilemma in Western literature, debates whether "to be, or not to be."

mathematical tools that would allow anyone to "estimate his prospects from any risky undertaking in light of [his] specific financial circumstances." In other words, given the chance of a particular outcome, how much are you willing to bet?

In the nineteenth century, other scientific disciplines became fodder for the risk thinkers. Carl Friedrich Gauss brought his geodesic and astronomical research to bear on the bell curve of normal distribution. The insatiably curious Francis Galton came up with the concept of regression to the mean while studying generations of sweet peas. (He later applied the principle to people, observing that few of the sons—and fewer of the grandsons—of eminent men were themselves eminent.)

But it wasn't until after World War I that risk gained a beachhead in economic analysis. In 1921, Frank Knight distinguished between *risk,* when the probability of an outcome is possible to calculate (or is knowable), and *uncertainty,* when the probability of an outcome is not possible to determine (or is unknowable)—an argument that rendered insurance attractive and entrepreneurship, in Knight's words, "tragic." Some two decades later, John von Neumann and

1620

Francis Bacon asserts the superiority of inductive reasoning in scientific inquiry.

1641

René Descartes proposes that reason is superior to experience as a way of gaining knowledge and establishes the framework for the scientific method.

1654

Prompted by a gamblers' question about the "problem of points," Blaise Pascal and Pierre de Fermat develop the concept of calculating probabilities for chance events.

1660

Pascal's wager on the existence of God shows that for a decision maker, the consequences, rather than the likelihood, of being wrong can be paramount.

1738

Daniel Bernoulli lays the foundation of risk science by examining random events from the standpoint of how much an individual desires or fears each possible outcome.

Nineteenth Century

Carl Friedrich Gauss studies the bell curve, described earlier by Abraham de Moivre, and develops a structure for understanding the occurrences of random events.

Oskar Morgenstern laid out the fundamentals of game theory, which deals in situations where people's decisions are influenced by the unknowable decisions of "live variables" (aka other people).

Today, of course, corporations try to know as much as is humanly and technologically possible, deploying such modern techniques as derivatives, scenario planning, business forecasting, and real options. But at a time when chaos so often triumphs over control, even centuries' worth of mathematical discoveries can do only so much. Life "is a trap for logicians," wrote the novelist G.K. Chesterton. "Its wildness lies in wait."

The Meeting of Minds

In the fifth century BC, Athens became the first (albeit limited) democracy. In the seventeenth century, the Quakers developed a decision-making process that remains a paragon of efficiency, openness, and respect. Starting in 1945, the United Nations sought enduring peace through the actions of free peoples working together.

1880

Oliver Wendell Holmes, in a series of lectures later published as *The Common Law,* puts forth the thesis that "the life of the law has not been logic; it has been experience." Judges, he argues, should base decisions not merely on statutes but on the good sense of reasonable members of the community.

1886

Francis Galton discovers that although values in a random process may stray from the average, in time they will trend toward it. His concept of regression to the mean will influence stock and business analysis.

1900

Sigmund Freud's work on the unconscious suggests that people's actions and decisions are often influenced by causes hidden in the mind.

1907

Economist Irving Fisher introduces net present value as a decision-making tool, proposing that expected cash flow be discounted at a rate that reflects an investment's risk.

1921

Frank Knight distinguishes between risk, in which an outcome's probability can be known (and consequently insured against), and uncertainty, in which an outcome's probability is unknowable.

1938

There is nobility in the notion of people pooling their wisdom and muzzling their egos to make decisions that are acceptable—and fair—to all. During the last century, psychologists, sociologists, anthropologists, and even biologists (studying everything from mandrills to honeybees) eagerly unlocked the secrets of effective cooperation within groups. Later, the popularity of high-performance teams, coupled with new collaborative technologies that made it "virtually" impossible for any man to be an island, fostered the collective ideal.

The scientific study of groups began, roughly, in 1890, as part of the burgeoning field of social psychology. In 1918, Mary Parker Follett made a passionate case for the value of conflict in achieving integrated solutions in *The New State: Group Organization—The Solution of Popular Government*. A breakthrough in understanding group dynamics occurred just after World War II, sparked—oddly enough—by the U.S. government's wartime campaign to promote the consumption of organ meat. Enlisted to help, psychologist Kurt Lewin discovered that people were more likely to change their eating habits if they thrashed the subject out with others than if they simply listened to lectures about diet. His influential "field theory" posited that actions are

Chester Barnard separates personal from organizational decision making to explain why some employees act in the firm's interest rather than in their own.

1944

In their book on game theory, John von Neumann and Oskar Morgenstern describe a mathematical basis for economic decision making; like most theorists before them, they take the view that decision makers are rational and consistent.

1946

The Alabe Crafts Company of Cincinnati markets the Magic 8 Ball.

1947

Rejecting the classical notion that decision makers behave with perfect rationality, Herbert Simon argues that because of the costs of acquiring information, executives make decisions with only "bounded rationality"—they make do with good-enough decisions.

1948

Project RAND, its name a contraction of "research and development," separates from Douglas Aircraft and becomes a nonprofit think tank. Decision makers use its analyses to form policy on education, poverty, crime, the environment, and national security.

1950s

determined, in part, by social context and that even group members with very different perspectives will act together to achieve a common goal.

Over the next decades, knowledge about group dynamics and the care and feeding of teams evolved rapidly. Victor Vroom and Philip Yetton established the circumstances under which group decision making is appropriate. R. Meredith Belbin defined the components required for successful teams. Howard Raiffa explained how groups exploit "external help" in the form of mediators and facilitators. And Peter Drucker suggested that the most important decision may not be made by the team itself but rather by management about what kind of team to use.

Meanwhile, research and events collaborated to expose collective decision making's dark underbelly. Poor group decisions—of the sort made by boards, product development groups, management teams—are often attributed to the failure to mix things up and question assumptions. Consensus is good, unless it is achieved too easily, in which case it becomes suspect. Irving Janis coined the term "groupthink" in 1972 to describe "a mode of

Research conducted at the Carnegie Institute of Technology and MIT will lead to the development of early computer-based decision support tools.

1951

Kenneth Arrow introduces what becomes known as the Impossibility Theorem, which holds that there can be no set of rules for social decision making that fulfills all the requirements of society.

1952

Harry Markowitz demonstrates mathematically how to choose diversified stock portfolios so that the returns are consistent.

1960s

Edmund Learned, C. Roland Christensen, Kenneth Andrews, and others develop the SWOT (strengths, weaknesses, opportunities, threats) model of analysis, useful for making decisions when time is short and circumstances complex.

1961

Joseph Heller's term "catch-22" becomes popular shorthand for circular, bureaucratic illogic that thwarts good decision making.

1965

Corporations use IBM's System/360 computers to start implementing management information systems.

thinking that people engage in when they are deeply involved in a cohesive in-group, when the members' strivings for unanimity override their motivation to realistically appraise alternative courses of action." In his memoir, *A Thousand Days,* former Kennedy aide Arthur Schlesinger reproached himself for not objecting during the planning for the Bay of Pigs invasion: "I can only explain my failure to do more than raise a few timid questions by reporting that one's impulse to blow the whistle on this nonsense was simply undone by the circumstances of the discussion."

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It seems that decisions reached through group dynamics require, above all, a dynamic group. As Clarence Darrow neatly put it: "To think is to differ."

Thinking Machines

Roger Wolcott Sperry begins publishing research on the functional specialization of the brain's two hemispheres.

1966

The phrase "nuclear option" is coined with respect to developing atomic weapons and is eventually used to designate a decision to take the most drastic course of action.

1968

Howard Raiffa's *Decision Analysis* explains many fundamental decision-making techniques, including decision trees and the expected value of sample (as opposed to perfect) information.

1970

John D.C. Little develops the underlying theory and advances the capability of decision-support systems.

1972

Irving Janis coins the term "groupthink" for flawed decision making that values consensus over the best result.

Michael Cohen, James March, and Johan Olsen publish "A Garbage Can Model of Organizational Choice," which advises organizations to search their informational trash bins for solutions thrown out earlier for lack of a problem.

1973

Computer professionals eulogize Xerox PARC of the 1970s as a technological Eden where some of today's indispensable tools sprouted. But comparable vitality and progress were evident two decades earlier at the Carnegie Institute of Technology in Pittsburgh. There, a group of distinguished researchers laid the conceptual—and in some cases the programming—foundation for computer-supported decision making.

Future Nobel laureate Herbert Simon, Allen Newell, Harold Guetzkow, Richard M. Cyert, and James March were among the CIT scholars who shared a fascination with organizational behavior and the workings of the human brain. The philosopher's stone that alchemized their ideas was electronic computing. By the mid-1950s, transistors had been around less than a decade, and IBM would not launch its groundbreaking 360 mainframe until 1965. But already scientists were envisioning how the new tools might improve human decision making. The collaborations of these and other Carnegie scientists, together with research by Marvin Minsky at the Massachusetts Institute of Technology and John McCarthy of Stanford, produced early computer models of human cognition—the embryo of artificial intelligence.

Fischer Black and Myron Scholes (in one paper) and Robert Merton (in another) show how to accurately value stock options, beginning a revolution in risk management.

Henry Mintzberg describes several kinds of decision makers and positions decision making within the context of managerial work.

Victor Vroom and Philip Yetton develop the Vroom-Yetton model, which explains how different leadership styles can be harnessed to solve different types of problems.

1979

Amos Tversky and Daniel Kahneman publish their Prospect Theory, which demonstrates that the rational model of economics fails to describe how people arrive at decisions when facing the uncertainties of real life.

John Rockart explores the specific data needs of chief executives, leading to the development of executive information systems.

1980s

"Nobody ever got fired for buying IBM" comes to stand for decisions whose chief rationale is safety.

1984

W. Carl Kester raises corporate awareness of real options by suggesting that managers think of investment opportunities as options on the company's future growth.

AI was intended both to help researchers understand how the brain makes decisions and to augment the decision-making process for real people in real organizations. Decision support systems, which began appearing in large companies toward the end of the 1960s, served the latter goal, specifically targeting the practical needs of managers. In a very early experiment with the technology, managers used computers to coordinate production planning for laundry equipment, Daniel Power, editor of the Web site DSSResources.com, relates. Over the next decades, managers in many industries applied the technology to decisions about investments, pricing, advertising, and logistics, among other functions.

But while technology was improving operational decisions, it was still largely a cart horse for hauling rather than a stallion for riding into battle. Then in 1979, John Rockart published the HBR article "Chief Executives Define Their Own Data Needs," proposing that systems used by corporate leaders ought to give them data about the key jobs the company must do well to succeed. That article helped launch "executive information systems," a breed of technology specifically geared toward improving strategic decision making at the top. In the late 1980s, a

Daniel Isenberg explains that executives often combine rigorous planning with intuition when faced with a high degree of uncertainty.

1989

Howard Dresner introduces the term “business intelligence” to describe a set of methods that support sophisticated analytical decision making aimed at improving business performance.

1992

Max Bazerman and Margaret Neale connect behavioral decision research to negotiations in *Negotiating Rationally*.

1995

Anthony Greenwald develops the Implicit Association Test, meant to reveal unconscious attitudes or beliefs that can influence judgment.

1996

Web users start making buying decisions based on the buying decisions of people like themselves.

2005

In *Blink*, Malcolm Gladwell explores the notion that our instantaneous decisions are sometimes

Gartner Group consultant coined the term “business intelligence” to describe systems that help decision makers throughout the organization understand the state of their company’s world. At the same time, a growing concern with risk led more companies to adopt complex simulation tools to assess vulnerabilities and opportunities.

In the 1990s, technology-aided decision making found a new customer: customers themselves. The Internet, which companies hoped would give them more power to sell, instead gave consumers more power to choose from whom to buy. In February 2005, the shopping search service BizRate reports, 59% of online shoppers visited aggregator sites to compare prices and features from multiple vendors before making a purchase, and 87% used the Web to size up the merits of online retailers, catalog merchants, and traditional retailers.

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Unlike executives making strategic decisions, consumers don't have to factor what Herbert Simon called "zillions of calculations" into their choices. Still, their newfound ability to make the best possible buying decisions may amount to technology's most significant impact to date on corporate success—or failure.

The Romance of the Gut

"Gut," according to the first definition in Merriam-Webster's latest edition, means "bowels." But when Jack Welch describes his "straight from the gut" leadership style, he's not talking about the alimentary canal. Rather, Welch treats the word as a conflation of two slang terms: "gut" (meaning emotional response) and "guts" (meaning fortitude, nerve).

That semantic shift—from human's stomach to lion's heart—helps explain the current fascination with gut decision making. From our admiration for entrepreneurs and firefighters, to the popularity of books by Malcolm Gladwell and Gary Klein, to the outcomes of the last two U.S. presidential elections, instinct appears ascendant. Pragmatists act on evidence. Heroes act on guts. As Alden Hayashi writes in "When to Trust Your Gut" (HBR February 2001): "Intuition is one of the X factors separating the men from the boys."

We don't admire gut decision makers for the quality of their decisions so much as for their courage in making them. Gut decisions testify to the confidence of the decision maker, an invaluable trait in a leader. Gut decisions are made in moments of crisis when there is no time to weigh arguments and calculate the probability of every outcome. They are made in situations where there is no precedent and consequently little evidence. Sometimes they are made in defiance of the evidence, as when Howard Schultz bucked conventional wisdom about Americans' thirst for a $3 cup of coffee and Robert Lutz let his emotions guide Chrysler's $80 million investment in a $50,000 muscle car. Financier George Soros claims that back pains have alerted him to discontinuities in the stock market that have made him fortunes. Such decisions are the stuff of business legend.

Decision makers have good reasons to prefer instinct. In a survey of executives that Jagdish Parikh conducted when he was a student at Harvard Business School, respondents said they used their intuitive skills as much as they used their analytical abilities, but they credited 80% of their successes to instinct. Henry Mintzberg explains that strategic thinking cries out for creativity and synthesis and thus is better suited to intuition than to analysis. And a gut is a personal, nontransferable attribute, which increases the value of a good one. Readers can parse every word that Welch and Lutz and Rudolph Giuliani write. But they cannot replicate the experiences, thought patterns, and personality traits that inform those leaders' distinctive choices.

A gut is a personal, nontransferable attribute, which increases the value of a good one.

Although few dismiss outright the power of instinct, there are caveats aplenty. Behavioral economists such as Daniel Kahneman, Robert Shiller, and Richard Thaler have described the thousand natural mistakes our brains are heir to. And business examples are at least as persuasive as behavioral studies. Michael Eisner (Euro Disney), Fred Smith (ZapMail), and Soros (Russian securities) are among the many good businesspeople who have made bad guesses, as Eric Bonabeau points out in his article "Don't Trust Your Gut" (HBR May 2003).

Of course the gut/brain dichotomy is largely false. Few decision makers ignore good information when they can get it. And most accept that there will be times they can't get it and so will have to rely on instinct. Fortunately, the intellect informs both intuition and analysis, and research shows that people's instincts are often quite good. Guts may even be trainable, suggest John Hammond, Ralph Keeney, Howard Raiffa, and Max Bazerman, among others.

In *The Fifth Discipline,* Peter Senge elegantly sums up the holistic approach: "People with high levels of personal mastery…cannot afford to choose between reason and intuition, or head and heart, any more than they would choose to walk on one leg or see with one eye." A blink, after all, is easier when you use both eyes. And so is a long, penetrating stare.

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