

The Mind, Brain and Heart: A Paradigm for Predicting Outcomes¹

By Maury Seldin²

Understanding modern decision making is enhanced by understanding the transition to the Enlightenment, or Age of Reason.

“With Newton’s synthesis, the Enlightenment began with an unprecedented confidence in human reason, and the new science’s success in explicating the natural world affected by philosophy in two ways: first, by locating the basis of human knowledge in the human mind and its encounter with the physical world; and, second, by directing philosophy’s attention to an analysis of the mind that was capable of such cognitive success.”

So writes Richard Tarnas in *The Passion of the Western Mind: Understanding the Ideas That Have Shaped Our World View* [Page 333].

This confidence in human reason utilizes the mind’s interpretation of the world. Tarnas also writes,

“For if the human mind was in some sense fundamentally distinct and different from the external world, and if the only reality that the human mind had direct access to was its own experience, the world apprehended by the mind was only the mind’s interpretation of the world.... everything that this mind could perceive and judge would be to some undefined extent determined by its own character, its own subjective structures” [Page 417].

Locke was at the watershed of enlightened thinking. In the words of Brownowski and Mazlish in *The Western Intellectual Tradition* [Page 200], “Thus Locke vindicated the empirical or natural road to all knowledge against the rationalistic or supernatural approach.”

This critical development is best seen in the context of the scientific revolution. Tarnas [Page 421] continues with the following:

“The modern mind has demanded a specific type of interpretation of the world: its scientific method has required explanations of phenomena that are concretely **predictive** [emphasis added], and therefore impersonal, mechanistic, structural. To fulfill their purposes, these explanations of the universe have been ‘cleansed’ of all spiritual and human qualities... Of course we cannot be certain that the world is what these explanations suggest. We can be certain that the world is to an indeterminate extent *susceptible* to this way of interpretation.”

In short, Western civilization during the Enlightenment, in contrast to ancient civilization, saw reason as a predictive tool that could help forecast outcomes of different courses of action. The process relied on the use of the mind in the context of the structure by which science advanced knowledge.

¹ The context of this essay is the 2005 Seminar on Improving Decisions at the Academy of Senior Professionals at Eckerd College (ASPEC), which, in turn, is in the context of the book in progress, *Improving Decisions: Toward a New Age of Enlightenment*, available on the ASPEC Center for Scholarly Enterprise (ACSE) site, <http://www.spicequest.com/acse/index.htm>. Click on “Improving Strategic Decisions.” The first part of that book has been published by the Homer Hoyt Institute as a monograph, *The Challenge to Our Thought Leaders*. It is available on the Hoyt website, www.hoyt.org.

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The philosophers, having rejected the supernatural, debated the role of observation and interpretation of their observations. Then, in the early 20th century, Alfred North Whitehead, in *Science and the Modern World*, takes note that,

“However you disguise it [the occurrence of nature as apprehended by the mind but attributable to nature] ...is the practical outcome of the characteristic of scientific philosophy...

...we must note its astounding efficiency as a system of concepts for the organization of scientific research...Every university in the world organises itself in accordance with it...It is not only reigning, it is without rival.

And yet – it is quite unbelievable. This conception of the universe is surely framed in terms of high abstractions, and the paradox only arises because we have mistaken our abstractions for concrete realities” [Pages 54-55].

This use of the mind in the context of the structure by which science advanced knowledge set the pattern by which professionals of the 20th century viewed the world. The lawyers looked for precedents, the physicians looked for categorization, and engineers for the one and only true answer for surely there must be only one right answer.

The process of specialization is a useful way to advance the knowledge in a particular discipline, but it may overlook the holistic perspective that considers the relationships to other disciplines, as well as the overlaps among disciplines. Whitehead wrote of the dangers of the narrow education of professionals, warning that this approach

“...produces minds in a groove. Each profession makes progress, but it is progress in its own groove...But there is no groove of abstractions which is adequate for the comprehension of human life. Thus in the modern world, the celibacy of the medieval learned class has been replaced by the celibacy of the intellect which is divorced from the concrete contemplation of complete facts...

The dangers arising from this aspect of professionalism are great, particularly in our democratic societies. The directive force of reason is weakened. The leading intellects lack balance. They see this set of circumstances, or that set; but not both sets together...” [Page 197].

With these thoughts in mind, let us turn to the operation of the mind.

Habits of the Mind

The Brain. Scientific discoveries about the brain in recent decades have revealed remarkable insights into how our brains work. We now know, for example, that the brain operates as a network of connections among cells so as to be a processing system for information of various sorts. It is an information system built upon the sensory systems of the body that integrates the information into thought and emotional processes. The mind is the brain at work

A paragraph from Edward O. Wilson’s book, *On Human Nature*, sheds a lot of light on how the mind processes information. It is as follows:

“...A schema is a configuration within the brain, either inborn or learned, against which the input of nerve cells is compared. The matching of the real and expected patterns can have one or the other of several effects. The schema can contribute to a person’s mental “set,” the screening out of certain details in favor of others, so that the conscious mind perceives a certain part of the environment more vividly than others and is likely to favor one kind of decision over another. It can fill in details that are missing from the actual sensory input and create a pattern in the mind that is not entirely present in reality. In this way the gestalt of objects – the impression they give of being a square, a face, a tree, or whatever – is aided by the taxonomic powers of the schemata” [Page 75].

Paradigms. As Wilson suggests, the framework for the integration of information within the mind is the paradigm within which one interprets the observation. The perspective imbedded in the paradigm influences the forecast of outcomes. People see things differently depending upon the culture in which they developed, among other factors.

The ability to see things is, in some measure, dependent upon how well the neural connections have been developed. Just as languages are easier to learn at earlier ages than at maturity, dealing with abstract reasoning early on will facilitate one's ability to grasp more abstract concepts in later life.

Judgment. To err is human, of course, and there are a number of ways the mind strays toward errors in judgment. One common mistake that is well known to astute investors goes by the name of the "gambler's fallacy." This error involves a misinterpretation of the law of large numbers, using overall statistical odds of a certain outcome occurring in a population to predict the outcome of one particular instance. The classic example is the tossing of a coin that has resulted in a long series of heads or tails and the erroneous inference that the next toss has a high probability of yielding the opposite of what it has been in the long series. [See *Cognition: Exploring the Science of the Mind*, by Daniel Reisberg, Chapter 11].

The statistical problem in this category of reasoning is a misapplication of the law of large numbers, and specifically the assumption that the law applies equally well in the case of small numbers. The smaller the sample size, the greater the variability in results, when compared to the larger sample. Thus, judgments from a small sample, if based upon reasoning that the next event will move the enlarged sample closer to what one expects under the law of large numbers, simply is erroneous. If the coin is a fair coin, each flip has a 50/50 chance of landing heads or tails, without regard to the preceding sequence of throws.

Another common error is reasoning from a single case to the entire population. Reisberg reports on a study by Hamill, Wilson, and Nisbett. In that study, subjects were questioned on their view of the criminal justice system after viewing videotapes of prison guards. Different subjects saw films of different guards, with one film depicting the guard as sympathetic, while the other showed a contemptuous guard. Some subjects were told that the guard they saw was typical, while others were told that the same guard was atypical. Others were given no information about the representativeness of the guard that they saw. The study indicated that information as to the representativeness of the guard made no difference to the overall attitude of the subjects to the criminal justice system. The conclusion, in Reisberg's words, was that "These data and other laboratory findings ... make it clear that subjects are quite willing to draw conclusions from a single case, even when they have been explicitly warned that the case is not representative."

These two judgmental errors fall into Reisberg's classification of representiveness. Additional classifications by Reisberg include errors associated with the availability of information, detecting co-variation, and the influence of base rates. The pattern of media coverage, for example, falls within the category of judgment errors associated with availability of information. People are influenced as to their reasoning about specific events as a result of the way in which media reports the events and selects language to describe what has taken place.

Within each of the classifications there are various types of errors. One that ties back to the opening of the discussion on the brain is an example of co-variation. Referring to one particular study, Reisberg writes, "Their data reminds us that professional training does not make you immune to illusions, that professionals, just like everyone else, are fully capable of 'projecting' their beliefs onto the evidence and perceiving patterns that are not there." Like Edward Wilson, who sees the inherent imperfections in how the schema influences the decision-making process, Reisberg acknowledges that there is no "perfect" reasoning. It is worth mentioning, though, that reasoning can never be inherently rational or irrational. Instead, it is more helpful to view the matter of rational or irrational thinking as a process that is a matter of degree, rather than a discrete absolute.

Habits of the Heart

The Way We Live. The way we live depends, in some measure, on the habits of the heart. According to Bellah, these are the mores of our society, including the “consciousness, culture, and daily practices of life.” The preface to the first edition of Bellah’s et. al. book titled, *Habits of the Heart*, starts off with, “How ought we to live? How do we think about how to live? Who are we, as Americans? What is our character?”

The American tradition is rooted in the belief in the individual and the possibility of equality. Alexis de Tocqueville wrote in 1835 of what he called individualism, in his famous *Democracy in America*. In Chapter II, he notes, “Individualism is a mature and calm feeling, which disposes each member of the community to sever himself from the mass of his fellows and to draw apart with his family and friends, so that after he has thus formed a little circle of his own, he willingly leaves society at large to itself. Selfishness originates in blind instinct; individualism proceeds from erroneous judgment more than from depraved feelings; it originates as much in deficiencies of mind as in perversity of heart.” In Chapter IV, “That the Americans Combat the Effects of Individualism by Free Institutions,” he points out that the infusion of political life at levels close to the people enables one to see that their gaining support for their interests often leads them to co-operation. This use of free institutions enables man to pursue his individual interests as part of a community.

The free institutions are now habits of the heart for Americans. In large part, though, they have arisen because of habits of the mind. This is best understood in the context of the development of American culture and society. However, an intellectual history of America does shed some additional light.

Lewis Perry, in the preface to his book, *Intellectual Life in America: A History*, writes, “The glory of America was not economic advance, but the spread of refinement and idealism.” Economic advance may not have been the glory, but it provided substantial enhancements to the quality of life of a great many Americans as well as the power to defend ourselves. In the absence of “refinement and idealism,” however, that power is undermined and the quality of life also suffers.

Perry also notes in his preface that “We shall trace the great reversal by which the emotions, once regarded as subversive of orderly thinking, achieved respectability and even dominance in the most common views of morality. There emerged an American orthodoxy that accorded ‘the heart’ precedence over ‘the head’.”

The Way Our Culture Works. While the Enlightenment paved the way for the founding principles of the American way of life, the way our culture works has been changing. We remain steeped in the rigor of the scientific method, and we operate in a paradigm that seeks to predict the outcomes of policy actions predicated on the economic man. It is our way of thinking.

From a historical perspective, as Robert N. Bellah suggests in his preface to *The Broken Covenant* [1975], there has been a clear idea since the 18th century about the origins and basis for American society:

“...there was a common set of religious and moral understandings rooted in a conception of divine order under a Christian, or at least a deist, God. The basic moral norms that were seen as deriving from that divine order were liberty, justice, and charity, understood in a context of theological and moral discourse which led to a concept of personal virtue as the essential basis of a good society.”

The opening paragraph of Bellah’s book adds that crisis and tradition continue to be important tests of the adaptability of American society:

“Once in each of the last three centuries America has faced a time of trial, a time of testing so severe that not only the form but even the existence of our nation have been called in question. Born out of the revolutionary crisis of the Atlantic world in the late 18th century, America’s first

time of trial was our struggle for independence and the institution of liberty. The second time of trial came not long before the end of the nation's first hundred years. At stake was the preservation of the union and the extension of equal protection of the laws to all members of society. We live at present in a third time of trial at least as severe as those of the Revolution and Civil War. **It is a test of whether our inherited institutions can be creatively adapted** [emphasis added] to meet the 20th century crisis of justice and order at home and in the world. It is a test of whether republican liberty established in a remote agrarian backwater of the world in the 18th century shall prove able or willing to confront successfully the age of mass society and international revolution. It is a test of whether we can control the very economic and technical forces, which are our greatest achievement, before they destroy us.”

Charles A. Reich, in *The Greening of America* [1971], supports the notion of institutional adaptation:

“What is the machinery that we rely upon to turn our wishes into realities? In the private sphere, the market system. In the public sphere, the public version of the market system: voter democracy, or democratic pluralism. In both spheres, a system of administration and law, resting ultimately on the Constitution. Could it be that the American crisis results from a structure that is obsolete? All of the other machinery we use becomes obsolete in a short time. A social institution, which is, after all, only another type of machinery, is not necessarily immune from the same laws of obsolescence. The ideals or principles of a society might remain valid, but the means for applying the principles could lose their effectiveness” [page 10].

Our American society has moved from the historic individuality, which had substantial control, into an intensely complex political-economic structure *that is increasingly* international in character, and with a scale so large that any decision making is based upon a plurality of philosophical views and/or analyses which need to transcend the scientific paradigm in order to enhance the collective quality of life.

The issue is control of our institutions. Do we understand the emerging system well enough to manage it? And, in attempting to manage it, how do we think about the issues?

Motivation as a Factor. Reason is not the only factor at play. Motivation also is a critical factor in decisions. According to Donald Calne, in *Within Reason: Rationality and Human Behavior* [1999], “Motivation is the drive to find mental rewards and to escape mental punishment... This concept of motivation can be illustrated by examples. We feel pleasure when we instinctively escape from danger, or when we emotionally reciprocate affection, or when we achieve a cultural goal such as winning an Oscar. In contrast, reason lacks the capacity to motivate because it cannot make us feel anything. Its nature does not include any direct link to mental rewards. Although it is, of course, always available to be applied to a task that entails a reward” [Page 27].

During the French Revolution, the motivation of the Jacobins did Condorcet in, not reason. Motivation also has caused people to sacrifice themselves when cultures impose their irrational wills. Calne addresses this in his fourth chapter, “Social Behavior,” detailing the 419,654 British casualties on the Rive Somme during a four-month period in World War I. Calne notes “Nothing significant was gained in return for the appalling British losses on the first day on the Somme, but the policy to continue the attack did not falter.” In Calne’s words, “Most men fought because they saw it as their duty. Most had no thoughts about the politics or purposes of the war, and they had no concerns about the competence or intention of their leaders” [Page 73]. The motivation of the British population was strong. Shortly after the start of the war, an appeal was issued for 100,000 volunteers. Some 600,000 volunteers answered the call to join the British army.

This chapter of Calne's book also discusses the bravery and motivation displayed by the Japanese kamikaze pilots in World War II. The chapter quotes the "Hymn of the Dead," a poem the young pilots sent home to their mothers. It is as follows:

"If I go away to sea
I shall return a corpse awash.
If duty calls me to the mountain,
a verdant sword will be my pall;
For the sake of the Emperor I will not die
peacefully at home."

Half a century later, we see the same motivations in the so-called suicide bombers in the Middle East, more accurately described as homicide bombers. These individuals are responding to a culture that expects them to sacrifice, and to terrorist leaders and supporters that may offer cash rewards to the their families after the "martyr" has accomplished his or her task.

Faith in reason has been associated with faith in science. Calne writes that faith in reason reached its zenith toward the end of the 19th century when it was seen that reason "worked." But the hopes were not fulfilled in the 20th century. The opposition to reasoning is coalescing and may be seen in that "The growing strength of cults, religious fundamentalism, and political extremism reflects this disenchantment."

Emotion is sometimes considered as an alternative to reason. But emotion may in fact be part of reasoning itself. To quote from the introduction of Martha C. Nussbaum's *Upheavals of Thought: The Intelligence of Emotions* [2001],

"A lot is at stake to view emotions in this way, as intelligent responses to the perception of value. If emotions are suffused with intelligence and discernment, and if they contain in themselves an awareness of value and importance, they cannot, for example, easily be sidelined in accounts of ethical judgment, as so often they have been in the history of philosophy. Instead of viewing morality as a system of principles to be grasped by the detached intellect, and emotions as motivations that either support or subvert our choice to act according to principle, we will have to consider emotion as part and parcel of the system of ethical reasoning."

If emotion is part of reasoning, which we have identified as a tool, then emotion is also a tool. But, as Calne points out, emotion is a motivation. Can it be that emotion is both a motivator and a tool?

Apparently, Nussbaum would answer yes, if I read the following quote correctly; "Emotions are not just the fuel that powers the psychological mechanism of a reasoning creature, they are parts, highly complex and messy parts, of this creature's reasoning itself." She continues with an explanation of her views with the position that "emotions are appraisals or value judgments."

To better understand the processes, it is helpful to look at the actual processes of the mind and the brain .

The Essence of the Process. The essence of the process of human choice is that the mind, by using the brain, processes selective information in the ways it has learned through biological development and culture (nature and nurture). This process is in a paradigm that is based on values, also learned through biological development and culture (nature and nurture). However one chooses to classify emotions as related to reason, the intelligence of the mind deals with both the forces of tightly or loosely reasoned logic melded with emotional force that is significantly affected by culture. The blends may be different for different people and for different circumstances, and errors in reasoning do occur, but reason alone is not as good an indicator for understanding or forecasting behavior as is a combination of reason and emotion. But, both reason and emotion are rooted in the values of individuals and groups. Thus, the big issue is to identify the values and the way in which the individuals or groups deal with the information.

Habits of the Collective Hearts and Minds

Science of Networks. Now we need to consider that predicting behavior of groups of people is not the same as aggregating predictions of individual behavior. This is so because the interaction of individuals may result in a different behavior than would occur without interaction.

Duncan J. Watts, in his book, *Six Degrees: The Science of a Connected Age*, identifies the question of how individual behavior aggregates to collective behavior as “one of the most fundamental and pervasive questions in all science” [Page 24].

Watts writes,

“...A human brain, for example, is in one sense a trillion neurons connected together in a big electrochemical lump. But to all of us who have one, a brain is clearly much more, exhibiting properties like consciousness, memory, and personality, whose nature cannot be explained simply in the aggregations of neurons.

“As Nobel laureate Philip Anderson explained in his famous 1971 paper. ‘More is Different,’ physics has been reasonably successful in classifying the fundamental particles, and in describing their individual behavior and interactions, up to the scale of single atoms. But throw a bunch of atoms together, and suddenly the story is entirely different. That’s why chemistry is a science of its own, not just a branch of physics [Page 25].

“What makes the problem hard, and what makes complex systems complex, is that the parts making up the whole don’t sum up in any simple fashion. Rather they interact with each other, and in interacting, even quite simple components can generate bewildering behavior [Pages 25-26].

Watts also writes,

“Fortunately, as capricious, confusing, and unpredictable as individual humans are, when many of them get together, it is sometimes the case that we can understand the basic organizing principles while ignoring many of the complicated details. This is the flip side of complex systems. While knowing the rules that govern the behavior of individuals does not necessarily help us predict the behavior of the mob, we *may* be able to predict the very same mob behavior without knowing very much at all about the unique personalities and characteristics of the individuals that make it up” [Page 26].

One way of viewing the interactions of people is in the context of their connections, much like viewing a network. It is important to consider that the people in the network are doing something. Thus, there is interaction. Furthermore, the network itself may evolve with changes that make it different at different points in time. It is this dynamic character that is of principal concern because once a change has started to evolve, it may die out or it may cascade, resulting in a dramatic change from the way things were.

Understanding interactions is important in predicting outcomes. Another source on the science of networks is Albert-Laszlo Barabasi, who writes in *Linked: The New Science of Networks*, that there is a strict architecture in complex systems found in various disciplines and that the events that occur are connected in ways described in the science of networks which is discovering the laws of self-organization. He concludes the introductory chapter with the following;

“Networks are present everywhere...You will come to appreciate how the Internet, often viewed as an entirely human creation, has become more akin to an organism or an ecosystem, demonstrating the power of the basic laws that govern all networks. You will see how the emergence of terrorism is also ruled by the laws of network formation and how these deadly webs take advantage of the fundamental robustness of nature’s webs. You’ll wonder at the amazing similarities among such diverse systems as the economy, the cell, the Internet, using one to grasp the other. This will be an eye opening trip across disciplines that I hope will challenge you to step out of the box of reductionism and explore, link by link, the next scientific revolution: the new science of networks.”

A critical aspect of networks is that they are dynamic rather than static. This element requires viewing the process of change as a force in developing the structure in which nodes are linked to become a network. This thinking applies in the field of real estate, as linkages are critical in the production of income by real estate and the forces affecting that income production are subject to the vicissitudes of the economy and ecology, and the political environment as well as subject to a wide variety of other disciplines.

Emergence. Emergence is a concept of bottom-up action by a group, acting without directions from a leader. It is a self-organizing system. Steven Johnson writes in *Emergence: The Connected Lives of Ants, Brains, Cities, and Software* that emergent systems

“... get their smarts from below. In a more technical language, they are complex adaptive systems that display emergent behavior. In these systems, agents residing on one scale start producing behavior that lies one scale above them: ants create colonies; urbanites create neighborhoods; simple pattern-recognition software learns how to recommend new books. The movement from low-level rules to higher to higher-level sophistication is what we call emergence” [Page 18].

Johnson discusses the idea of thinking of brains as “...a device for processing and storing information, like the clustered neighborhoods...and being a collective enterprise.” Then using ants as an analogy, he continues “The ‘colony’ brain is the sum of thousands and thousands of simple decisions executed by individual ants. The individual ants don’t have anything like a personality, but the colonies do” [Page 115].

If we extend this analogy and concept of emergent systems to group behavior we have another system of collective hearts and minds.

Predicting Outcomes. If we stay with the paradigm of science as it developed since the Enlightenment, the Age of Reason, we would predict outcomes of courses of action based upon reason, we have errors beyond the “bounded rationality.”

Joachim Winter, on the web, writes the following:

“The term *bounded rationality* is used to designate rational choice that takes into account the cognitive limitations of both knowledge and cognitive capacity. Bounded rationality is a central theme in behavioral economics. It is concerned with the ways in which the actual decision-making process influences decisions. Theories of bounded rationality relax one or more assumptions of standard expected utility theory.”

Our understanding is that people may try to be rational to some degree but fall short. This is described by Duncan Watts in *Six Degrees of Freedom*, as follows;

“In the 1950’s, Herbert Simon...pointed out that as mathematically attractive as it might be, rational utility maximization is ultimately a made-up theory, and so can only be considered a good description of human behavior to the extent that it actually works, if empirical evidence, not to mention common sense, suggests that people do not behave rationally, then why not make up a theory that is more plausible? Replacing mathematical convenience with intuition, Simon proposed that people *try* to behave rationally, but their capacity to do so is bounded by cognitive constraints and limited access to information. In short, they exhibit what he called *bounded rationality* [Page 211].

Add to this the errors in reasoning as discussed earlier, and the role of emotion, and we see that the habits of the heart and mind make forecasting outcomes more difficult than if it were all governed by reason.

On top of this is the group behavior which may be generated from bottom-up responses, such as emergence, and group behavior as a result of network cascading, and the complexity is compounded.

The complexity adds an additional uncertainty to forecasting outcomes. This added uncertainty calls for a strategic approach. That is the subject of the book in progress.
