MICHAEL J. MOLNAR

DECODING THE ENERGY ENIGMA

IMPROVED DECISION-MAKING ON THIS GENERATION'S MOST PRESSING ISSUE

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Dedicated to Tazia

Mom, Dad, Linda and Lisa

Jeffrey, Jessica, Alyssa and Brianna

I would like to thank Linda Molnar for her help editing this book

Preface: Why Are Outcomes So Bad for Something So Important?

"Human behavior flows from three main sources:
desire, emotions and knowledge."
- Plato
Greek Philosopher (428 to 347 B.C.)

Energy is critical to national security, economic growth, the environment and individuals' health. It is a key area of focus for governments as well as business leaders and investors. Yet, for something so important, why are the decisions made and outcomes achieved often so poor?

For example: How has every U.S. President since the early 1970s adamantly declared energy independence as a crucial goal, yet none has achieved it? Why do some parts of the energy world repeatedly undergo phenomenal booms only to be followed by massive busts? How did some of the most sophisticated investors in the world lose billions on their solar investments? How did European carbon regulations lead to incentives to burn more coal – the exact opposite of their intention? How does a hedge fund lose $6 billion of its $9 billion under management in just a few weeks of trading natural gas? Why is the world so slow to react to global warming even though the scientific community has issued clear warnings since 1988?

This book is the culmination of two distinct passions of mine: the energy sector and decision-making. My time studying at The University of Chicago – an academic arena that is the center of the debate on rational versus behavioral thinking in economics – piqued my interest in how people form judgments and make decisions. My curiosity drove me to subsequently attend The London School of Economics to study Decision Sciences exclusively. This led to a Visiting Research Fellow role at a think tank. There, my work centered on providing insight into the stock market's valuation of companies, which is nothing more than the collective judgment of many individual participants in the market.

My focus on energy began after making a career move to Wall Street, as I wanted to focus on the part of the world economy that I believed mattered the most. Since then, I have held a variety of positions all with a focus on the energy sector: Founding Partner of a long/short equity hedge fund, Founding Partner of a boutique investment bank, and lead equity analyst for the coal and alternative energy sectors at Goldman Sachs. These roles have allowed me the opportunity to observe, advise and invest in countless situations in the energy sector.

Enigmas are typically defined as "something puzzling or difficult to understand." Decisions and the subsequent outcomes for governments, business leaders and investors in energy certainly qualify as enigmas. My goal is not to tell the reader *what* to think but rather to explain *why* poor thinking occurs and *how* it can be improved in the future. My hope is that the tools provided in this book decode the energy enigma, even if just a bit, to help governments, business leaders and investors make better decisions about what is arguably the most vital part of the world economy.

February 2016
New York, NY

Behavioral Economics: Understanding How Judgment Forms

"My failures have been errors in judgment, not of intent."
- Ulysses S. Grant
Commanding General of the Union,
18th President of the United States (1822 to 1885)

Judgments, Decisions and the Interplay with Systems

Systems are made up of many different variables, not the least of which are people and the decisions they make. People are involved in energy systems as policymakers, business executives, investors and private citizens. Unfortunately, as we will discuss, the mind has inherent biases that can skew humans to have poor judgment; and bad judgment is a harbinger of a bad decision.

People's judgments and subsequent decisions impact systems in two ways. First, judgments by people are felt as key variables within existing system structures. For example, expectations about future profitability of new capacity are often a key judgment which is made as executives decide whether and how much to build.

People's judgments can also be a determinant of the structure of the system itself. For example, the policymakers that decided to regulate emissions of acid rain judged that something needed to be done and acted. Regulations like these create new sets of rules and variables (in this case, the price of emissions) and by doing so create a new system structure.

How is Judgment Formed? Understanding Your Two Minds

We can all remember times that our judgment seemed logical, analytical and effective. Data is gathered, analysis is performed, judgment formed, and a reasonable decision is made. However, if we conjure up a bit of self-awareness, there are other times where we were considerably less thoughtful. Our judgments seem rushed, based on spurious information, or were formed without us really "thinking." The result is often a bad decision that we look back on with some degree of embarrassment.

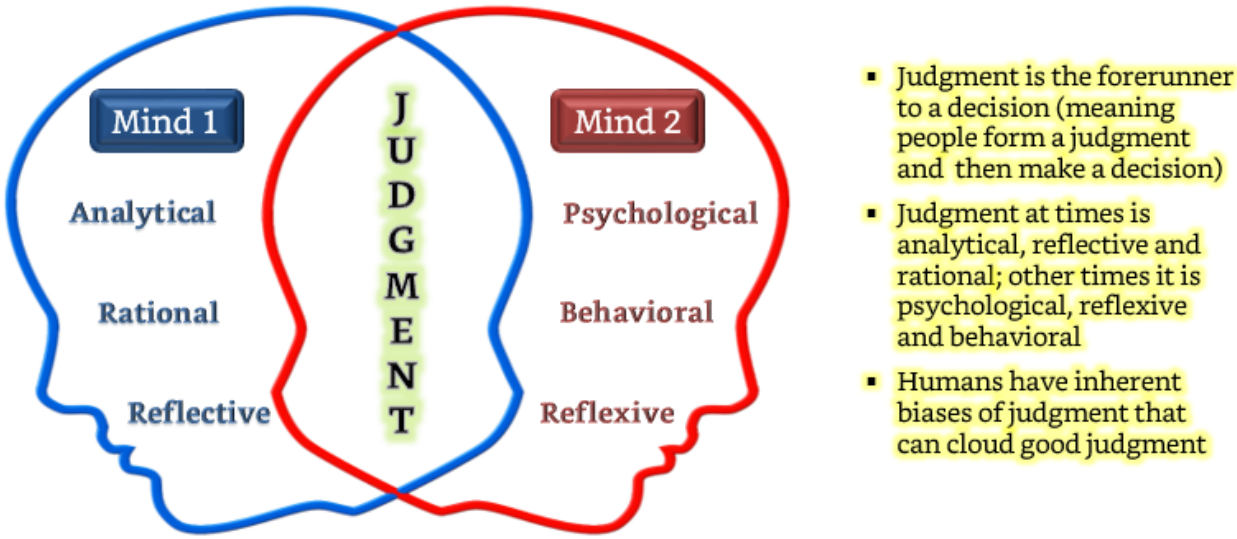
Evaluating how judgment forms is more nuanced than analyzing system structures. Systems structures can be thought through, evaluated, and debated with a certain level of facts and logic. Judgment is more difficult to evaluate with such precision. Yet, most people would agree that there are two aspects of one's mind at work – one that appears more thoughtful at times and one a bit less so.

This reasonably obviously point has had some considerable debate among economists. Much of classical economic theory portends that individuals are non-emotional mathematically efficient decision-makers. People carefully assess options, obtain relevant data, analyze it and make the

economically most rational choice. Twenty years or so ago, another camp in economics – those living in the real world and possessing an understanding of psychology and marketing – began to question these views. These so-called behavioral economists contend that there are a host of reasons, often psychological or behavioral in nature, why individuals do not always make the rational mathematically optimal choice. Through considerable research, they have shown that people possess biases in forming quality judgments.

There is no reason to overcomplicate the issue. The mind forms judgments, sometimes more rationally and sometimes less so. We will call Mind 1 the rational one, and Mind 2 the behavioral one. At times, the rational mind dominates and, at times, the behavioral mind dominates. Most times, it is very hard to differentiate as both minds influence judgment simultaneously. When the behavioral mind dominates, it does not mean that the outcome is necessarily a bad decision, but there are clear risks of biases entering judgment due to the influence of Mind 2.

Figure 36: The Two Minds That Influence our Judgment



Source: Michael Molnar

Two behavioral economics' pioneers have described similar concepts. Richard Thaler in his book, *Misbehaving,* uses the terms "Econs" and "Humans." "Econs" are those mathematically optimizing perfect decision-makers often described by classical economists, and "humans" are, well, normal people. Daniel Kahneman in his book, *Thinking Fast and Slow,* describes "System 1" and "System 2." System 1 is the automatic part of the mind that is constantly forming judgments often unbeknownst to us. System 2 is more reflective and controlled thinking. The particular words used to describe these aspects of judgment formation are not nearly as important as recognition that judgment can be influenced in two distinct manners.

Framing the Types of Judgment Biases

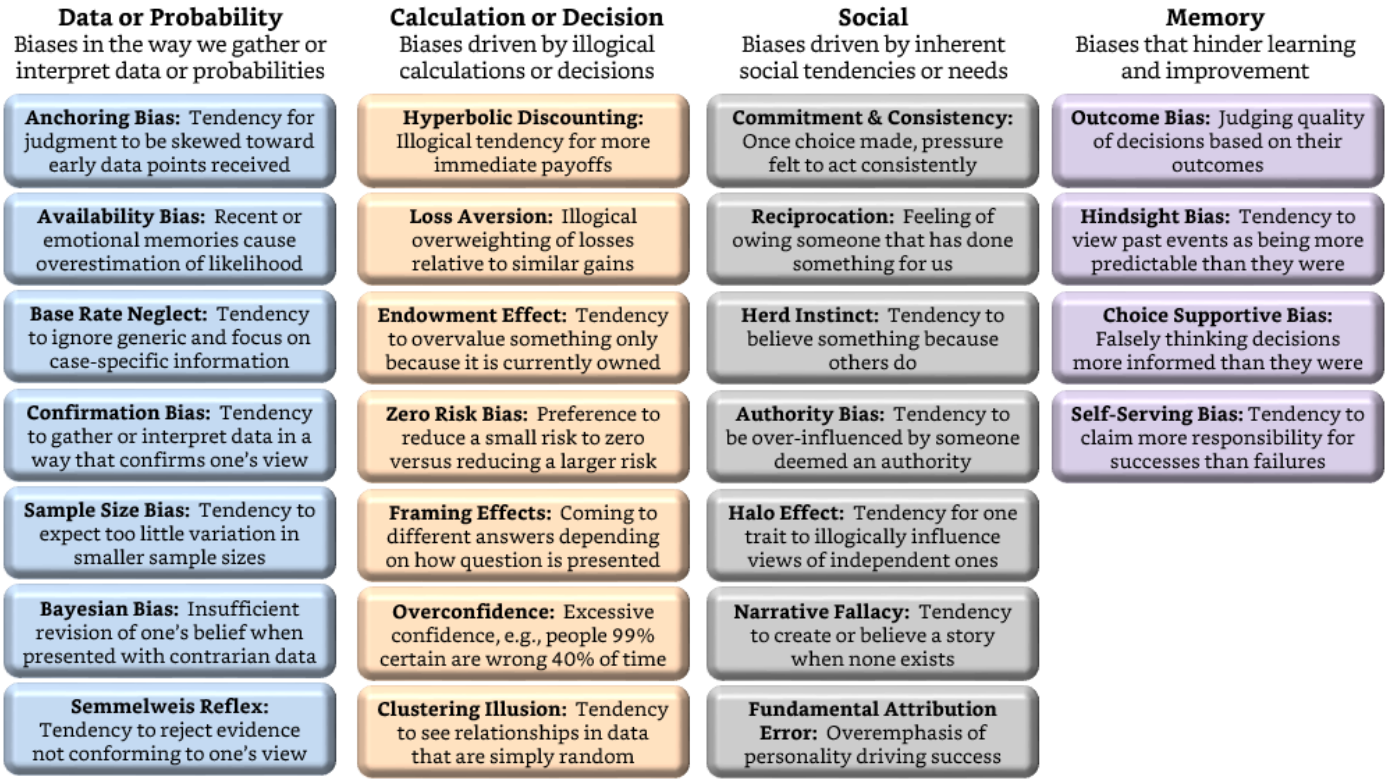
There has been considerable research on the biases that creep into our minds and skew judgment. Richard Cialdini, a psychology professor at Arizona State University, wrote the highly acclaimed book called, *Influence*, in 1984 which showed great examples of how we are easily influenced in irrational ways. Paco Underhill, an anthropologist by training, highlighted how people make purchasing decisions in his work, *Why We Buy: The Science of Shopping* (1999), which is standard reading for many in the retail world. Amos Tversky and Daniel Kahneman, psychologists by training, pioneered research in behavioral economics in the 1970s, receiving a Nobel Prize in 2002. Richard Thaler, an economics professor at the University of Chicago, performed some of the most influential research showing the importance of psychology on decision-making. There are countless others and the field continues to grow.

This research has identified countless biases, by some measures over 100, that cloud good judgment. While comprehensive, a list of 100 discrete biases is not altogether helpful. Therefore, I have segregated those most relevant to our research into the following four groups (See Figure 37):

1. **Data or Probability Biases:** Biases in the way we gather or interpret data or probabilities
2. **Calculation or Decision Biases:** Biases resulting in illogical calculations or decisions
3. **Social Biases:** Biases driven by inherent social tendencies or needs
4. **Memory Biases:** Biases that hinder learning and improvement

The list below is by no means comprehensive, but simply the most common biases emerged during the research we conducted. Many of these biases interact with one another so it is important to not always think that each bias is always a discrete event. The following four sections discuss each of the biases in some detail. The descriptions are fairly short as the crux of this book is about applying these concepts to energy versus proving their existence which has been done via significant academic research already.

Figure 37: Categories of Select Judgment Biases



Source: Michael Molnar

(1) Data or Probability Biases

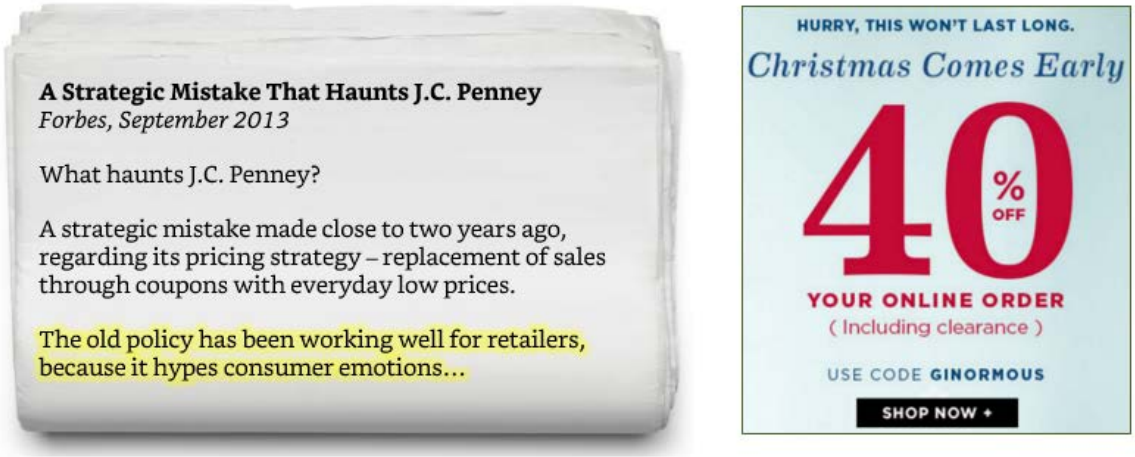
Biases in how we gather or analyze data or probabilities are some of the most common.

Anchoring bias describes how the mind will put too much weight on data received early or at the time of decision relative to its actual importance. Irrationally, this spurious information can skew judgment in material ways. Daniel Kahneman in *Thinking Fast and Slow* described an experiment performed. People were asked two questions: "Is the height of the tallest Redwood tree more or less than 1,200 feet? What is your best guess about the height of the tallest Redwood tree?" Another group was asked the exact same question but 180 feet was the number in the first question versus 1,200 feet. The difference in the answers were striking. The group that had 1,200 feet in the first question had an average answer to the second question of 844 feet. The second group, the ones with 180 feet in the first question, had an average response of 282 feet. This is a classic example of anchoring, where merely stating a number in the first question skews one's judgment in answering the second question.

While there are countless other experiments showing similar results, one only needs to visit a shopping center to see this effect. Many retailers discount to the "suggested retail" price. For many retailers, this "discount" is constant, meaning every week nearly all items discounted. If something

is always 40% off, why continue to perpetuate the view that anyone ever pays the "suggested retail price?" The answer lies in the anchoring bias. Doing so makes customers feel good about getting a deal as they anchor their view of savings to that "suggested retail price." The strategy of eliminating this and having "everyday low pricing" has been tried, but it is often met with resistance; whether people admit it or not, it does not feel as good a deal. For example, J.C. Penny tried moving away from discounting in 2011 and quickly reverted back just two years later after a decline in sales.

Figure 38: Marketers Tug on Consumers' Anchoring Bias When They Discount



Source: Forbes; Gap.com

On Wall Street, investors are often overly influenced by so-called consensus earnings numbers. Once a number (e.g., "Company ABC is estimated to earn $1.50 in earnings per share") is heard it has a substantial effect on judgment. Even those who pride themselves on understanding what consensus should be (e.g., good stock pickers) often do not understand just how influential anchoring is on their own judgment.

Availability bias is where a prior experience that is readily available in one's memory, often because it is emotionally memorable or recently occurred, skews one's judgment. For example, investors in the stock market will often feel more confident predicting the future direction of a stock if they have had a good experience investing in it previously. Traders will often make comments to the effect of, "I know how this stock trades" and feel a sense of confidence in an investment thesis based on prior good experiences with that particular stock. However, the thesis that will drive the future direction of the stock is based on factors that often have nothing to do with what drove the stock in the past. The trader's mind is simply conjuring up the emotionally pleasing memories of past success and skewing one's current judgment.

The Ebola outbreaks in 2015 were another example. For those in the United States, the risk of contracting the disease was infinitesimally small. Yet, there was considerable fear given the substantial media attention. For example, numerous New Yorkers interviewed discussed the fear they had contracting Ebola by riding the subway – no doubt due to recent media reports triggering

the availability bias. There are many such examples. People think there is a much greater probability of an airline crash if one just happened and fears of terrorism increase right after news reports, for example.

Base rate neglect occurs when preconceived stereotypes overshadow probabilities. For example, variations of the following experiment have been performed by academics. A researcher describes a man named who is very athletic, tall and in his mid-20s. They ask a series of people if that person is more likely to be a professional baseball player or an accountant. Inevitably, people massively overweight the man's physical description and answer "baseball player" even though chances are much higher that he is an accountant simply due to the fact that there are many more accountants than baseball players in the world.

Confirmation bias is the mental push to search for, and believe in, information that supports our existing views. It happens all the time on Wall Street when a position moves against an investor and that investor ends up asking others, with known similar views, for their view. Their minds are seeking to quell the discomfort and search for evidence proving they are right and the market is wrong. The result is a false sense of confidence that can cause them to be slow to react to the truth.

For anyone doubting this bias, simply tune in to Twitter or Facebook and see the comments people make. For those who believe in right wing principles, their posts are often littered by Fox News, *The Wall Street Journal* and Anti-Obama memes. For those that are left-leaning, their posts often contain content from MSBNC, *The New York Times*, and anti-Bush memes.

Sample size bias is the tendency to underappreciate the variability in small samples. The following example was detailed in the book, *Thinking, Fast and Slow*. Several years ago, research showed that smaller schools were more successful that bigger ones. The study showed that of the 1,662 schools in Pennsylvania, six of the top 50 schools were small which was four times what one would normally expect according to the study's analysis. The conclusion was that smaller schools were getting better results. The Gates Foundation invested $1.7 billion to implement aspects of these findings, including splitting larger schools into smaller ones.

Closer inspection of the data revealed something else, however. While it was true that there was an abnormally high number of small schools in the top group, there was also a large number of small schools that were among the *worst* schools in the state. This is due to the fact that small sample sizes have large variability. Underestimating that variability and drawing specious conclusions is common.

Wall Street "research" does this all the time with what is known as "channel checks," where calls or visits are made throughout the sales chain to get a feel for what is going on. For example, an analyst will call or visit, say, 10 retail stores to get an understanding of how sales are trending into the holiday season. It is very common for erroneous conclusions to be formed. What may seem to be a pattern is simply the math of a small sample size and lacks any true insight.

Conservatism (sometimes called Bayesian) bias is the tendency to insufficiently adjust one's view as new information becomes known. Thomas Bayes, an English minister and mathematician who lived in the 1700s, developed the math that dictates how people should update their views of probabilities as new information comes to light. This math, called Bayesian Statistics, allows for quantification of conditional probabilities: Given that X happened, what is *now* the probability of Y occurring. The specifics of the math are beyond our scope here, but countless studies have shown that individuals do not adequately adjust their beliefs as new information becomes known. Real-life examples include CEOs failing to adjust strategy to changed market conditions or investors reacting too slowly to new information.

The **Semmelweis reflex** is the tendency to reject information that is contradictory to one's existing belief. It is similar to confirmation bias in that it is driven by humans' desire to avoid cognitive dissonance, the mental stress incurred by holding opposing views in one's head. It is different, however, in that confirmation bias seeks information to confirm one's view, while the Semmelweis Reflex rejects information that has already been made known to you. It is named after Ignaz Semmelweis who was a Hungarian physician who lived in the 1800s. He had the idea, which was novel at the time, for doctors to consistently wash their hands in order to prevent disease. Physicians during this time did not believe this held any merit and, because they had not done it in the past, rejected this recommendation. His ideas were only accepted decades after his death as data continued to prove the merits of this best practice.

(2) Calculation or Decision Biases

Calculation or decision biases occur when the mind is driven to illogically calculate an outcome or make a decision. Some of these biases are similar to the prior group, but they are still different enough to be worth segregating.

Hyperbolic discounting is a fancy word for something we all inherently know. People tend to prefer more immediate payoffs than payoffs over time, even if the payoffs over time are a better economic bet. The conundrum of energy-efficiency investments is a good example. For an investment upfront, long term cost savings often make it a worthwhile investment. Yet many times these investments are not made given the upfront capital cost. We will discuss this in more detail later.

Loss aversion has been studied extensively in the past few decades. Prospect theory, developed by Daniel Kahneman and Amos Tversky in 1979, showed that people do not necessarily think rationally about gains versus losses. One should be indifferent between a gain of $100 and a loss of $100 but the mind tends to weight losses twice as much as gains, which leads to an aversion for losses. This inherent aversion to losses is something Wall Street deals with every day; for example, investors often hold onto losing stocks for too long to irrationally avoid crystallizing the loss.

The **endowment effect** is the tendency to overvalue something simply because we already own, or are endowed, with it already. Researchers have shown this with people who have tickets to concerts or sporting events. For example, assume you have snagged tickets to a hot show for, say, $50. Given the show is sold out, the secondary market price to buy or sell these tickets is $500 per ticket. Many people who would never pay $500 feel totally fine going to the event as they only paid $50. The logical thing to do would be to sell the ticket as the opportunity cost of going is $500, but most people do not. They end up valuing it more simply because they already own it.

There is a Wall Street maxim that states, "You buy your positions each day," which is a recognition of the risk of the endowment effect. It should not matter if you own a position or not, the right question is: "Would you buy it today?" If yes, then keep it. If not, sell it. As with all biases, the endowment effect can be hard to avoid as it is part of our mental makeup. Traders are often no better and "fall in love" with positions all the time.

Zero-risk bias is our tendency to focus on reducing small risks to zero versus decreasing larger ones lower – even though many times the rational decision is usually to do the latter. Nuclear power is an interesting, albeit highly debatable, example. No doubt nuclear issues like those that occurred at Fukushima in Japan are awful and most citizens would like to see this risk reduced to zero. At the same time, nuclear power is a secure source of power not dependent on foreign nations and very clean in terms of carbon dioxide and most pollutants. The preference to reduce this very small risk to zero has resulted in many countries phasing out nuclear entirely. Yet that likely increases very real problems with other pollutants. This example highlights two things. First, many of these biases work together. Nuclear power is something that inherently provokes strong emotions and the availability bias can skew judgment. Second, energy – like most complex issues – is about tradeoffs among imperfect options. Biases such as zero risk bias can result in poor decisions of the various trade-offs involved.

Framing effects are a fascinating bias that build on the insight that humans are loss averse. Consider the use of credit cards at gas stations in America. When this new payment form came about, customers were originally charged a premium. After all, there was a charge assessed by the credit-card company to the merchant, so in turn it made sense to charge customers a bit more for this service as well. Customers, however, were very upset at this additional cost. Gas station owners did something simple, but creative, to solve the problem. They simply changed the "regular" price to the higher amount and then offered a "discount" for users of cash, whereas credit-card owners would pay the new "regular" price. Merely framing the same economic decision differently resulted in a dramatically different outcome as almost immediately customers felt much better about using their credit cards.

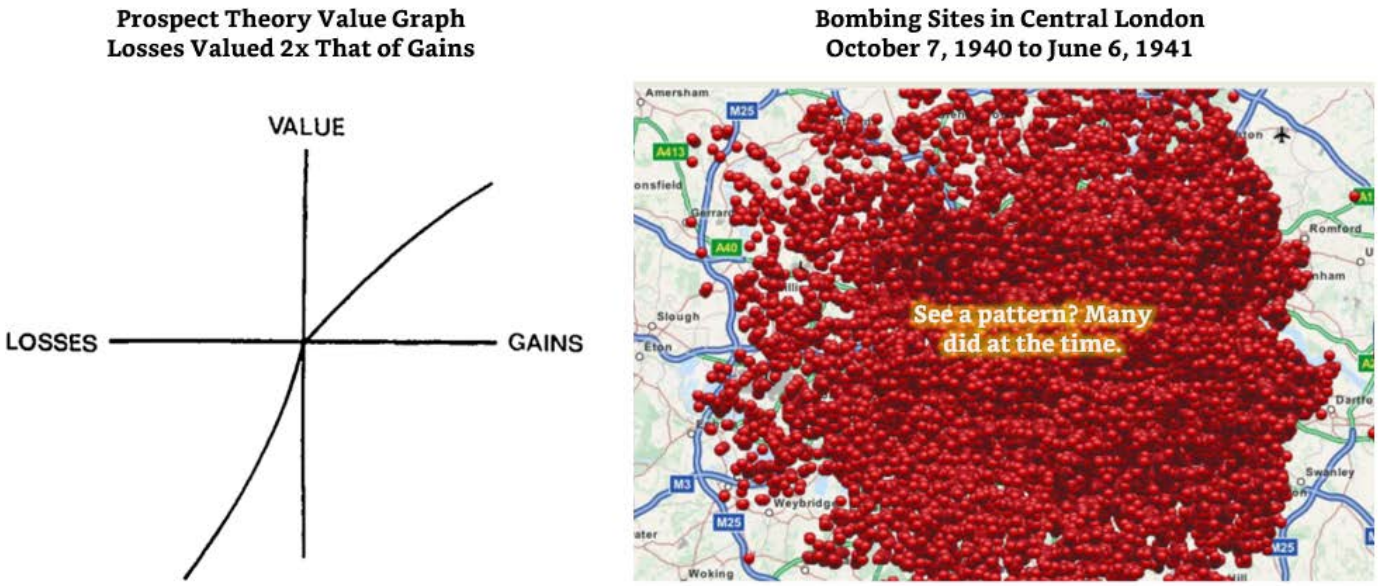
Nowhere is **overconfidence** more endemic than in top business schools or Wall Street. As an experiment, one of my professors in graduate school had each person in the class rate their intelligence to the rest of our business school class on a scale of one to five (three was average). Upon tallying our responses, the average was around 4.25 to 4.5 – we clearly all had a strong view of

ourselves. While we all were quite quantitative and realized the average must be 3.0, we apparently were all a bit too confident in our individual abilities.

Numerous studies have shown similar bias, where people indicate they are 99% certain of something, but end up being wrong, say, 40% of the time. The Wall Street concept of "conviction" is a good example of this bias. Having conviction is deemed to be a positive, showing just how strongly he or she believes in a trade or investment. Unfortunately, it leads to vapid confidence in subpar ideas, which can lead to financial losses.

Finally, the **clustering illusion** is the mind's tendency to see patterns when none exist. An example is during World War II when the Germans were bombing London. Certain areas were hit multiple times while other areas were not hit once. Many people concluded, not illogically at first glance, that German spies were in the areas not hit. However, after the war when the bombings were analyzed statistically, they were found to be totally random. Similar to the sample size bias, the mind has a tendency to want to see patterns when none may exist.

Figure 39: Loss Aversion (left) and Clustering Illusion (right)



Source: Prospect Theory: An Analysis of Decision Under Risk (Kanheman, Tversky, 1979); Bombsight.org

(3) Social Biases

Humans are social animals who constantly interact with one another. As a result, we have inherent social needs and tendencies that can skew our thinking. One such bias, **commitment and consistency** is our tendency to desire to be consistent with prior commitments. This is not necessarily a bad trait but, at times, it can make us think in illogical ways. Robert Cialdini, in his groundbreaking book *Influence*, detailed the research of two Canadian psychologists who asked gamblers before and after betting about their confidence in the outcome. Gamblers were shown to be markedly more confident just after placing the bet, even though nothing had changed. This is

commitment and consistency at work. After making the commitment to the bet, they had an inherent desire to be consistent, which skewed their thinking into being much more confident in the outcome. This plagues good decision-making as it can slow reactions to a changing environment.

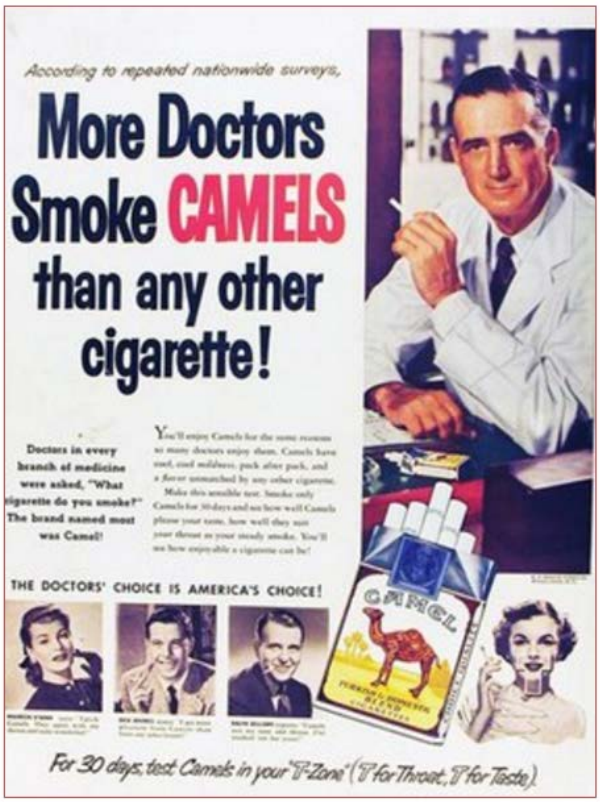
Reciprocation is an inherent feeling of being indebted to someone who has given us something. This inherent bias to reciprocate is very strong as shown by the difference in the rate of contributions to charities that have given a "free" gift to people (without asking for it) versus those that have not. The indebted feeling those that received the free gift causes more of them to give than otherwise would – even when the gift is often deemed a piece of junk that the recipient had no desire in receiving.

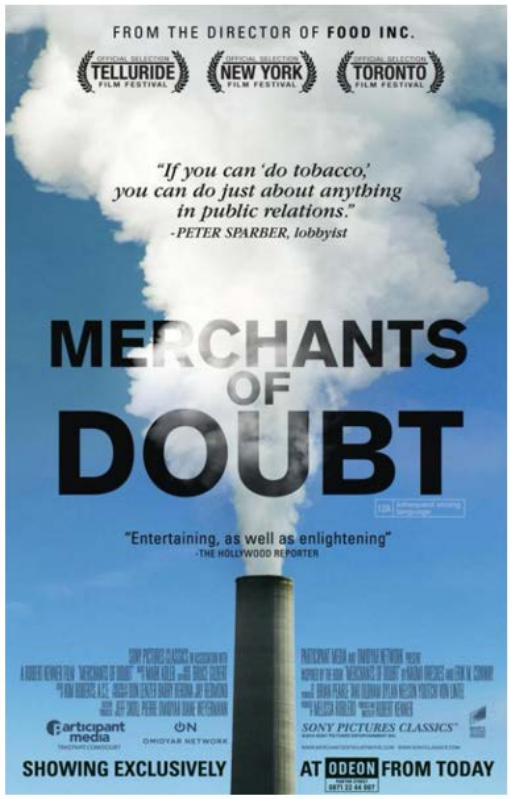
The **herd instinct** is the tendency for people to think like others as it is more psychologically comforting than being alone. If one is wrong but following others, there is comfort in numbers. If one is wrong and alone, it can feel horrible. This is a driver for companies having similar strategies and investors holding the same investments. Sometimes those that believe they are contrarians only take the contrarian point of view once they have found enough people that hold that contrarian view. This perhaps is a "mini-herd instinct" but still highlights the pull of this psychological need.

Authority bias highlights how humans are inclined to be obedient to authority figures. Many times, this makes sense. The individual in the police uniform should be listened to and the person in the lab coat does know a lot about medicine. However, there are all sorts of times this bias skews judgment when it should not. We overweight someone as an expert on television because they are wearing a doctor's coat, even though the small print on the screen says he is an actor. We believe the famous celebrity endorsing a product when it is illogical to do so. We overweight someone's opinion with a fancy title even when their title is irrelevant to the topic on which they are speaking.

A great, and sad, example of this in energy was depicted in the documentary, *Merchants of Doubt*. It showed how certain powerful interests hired public relations firms to create doubt on key topics such as cigarette smoking and climate change. One such hired gun depicted in the film, Marc Marano, clearly understands the power of perceived authority. In an interview he stated, "Well I'm not really a scientist…although I play one on television sometimes," and laughed. Sad, but unfortunately very effective due to the authority bias.

Figure 40: Authority Bias at Work





Source: Camel Cigarettes; Merchants of Doubt movie poster

The halo effect is our tendency to irrationally suppose one specific positive trait is indicative of non-related potential positive traits. For example, tall or good looking people are often judged to be better at their jobs than they are. Yes, they are good looking but that has no bearing on their job performance. CEOs who have done a good job in one industry often are perceived to be a good fit for a role in another company or industry which might not make sense. Many times a protégé of a successful person is viewed as having the traits of their mentor when they might have substantial less skill. These inferences are not completely irrational, but the halo effect can drive judgment to leap to conclusions without doing the necessary diligence.

The **narrative fallacy** is based on the long history of storytelling among people. People are storytellers by nature. For generations, much of our early history and collective intelligence was passed down through parables. Unfortunately, this sometimes creates situations where we create a story or narrative when none exists.

Wall Street loves storytelling. Many times banks will put out "research" with all sorts of analysis equating the current situation to decades ago and drawing conclusions. "Twenty years ago, interest rates moved this way and industrial stocks moved that way," for example. These are interesting, but not always insightful as so many other factors were at play. I remember when I was a sellside analyst protesting an analogous historical reference that was about to be published, a senior member of the

team's reply was indicative. He said, "Listen you might be right, but clients love historical stories referencing today's situation regardless." He was right. Clients love debating a story when they should be more focused on the crux of the current predicament.

Finally, **fundamental attribution error** is our tendency to overemphasize the impact of personality over situational factors in assessing what drove an outcome. CEO competency is often viewed in such a manner. For example, during the boom times of the early 2000s, CEOs of homebuilders were deemed savvy for having made prior decisions that capitalized on the rewards of the current cycle. While some decisions were savvy, it was general economic activity and consumer confidence that primarily drove the boom. For many CEOs, it was a matter of being in the right place at the right time. One of the few exceptionally self-aware executives at a major homebuilder said it best during the last year of the boom, "When this market goes south, make no mistake…no one will be able to give away land much less sell it for a profit." He was right. Situational factors ended up trumping all in the end. Many deemed savvy just months before were facing critical questions about their strategy just months later.

(4) Memory Biases

Biases do not stop when decisions are made. They can continue in how we remember what happened. Unfortunately, these memory biases hinder future learning and improvement.

Outcome bias, evaluating the quality of a decision based mainly on the outcome, is fascinating as most professionals understand this bias but make no effort to counteract it. We simply are biased to feel that a good outcome is the result of a good decision. While they are clearly correlated, plenty of good decisions result in bad outcomes and vice versa. As demonstrated by the case with Brian Hunter, the trader who lost $6 billion in just a few weeks, it is dangerous to recognize this too late.

Hindsight bias is where we tend to think we knew it all along (when we were right), or that a situation that occurred was clearly predictable (when others were wrong). The 2008 U.S. housing bust was obvious, right? The technology bubble in the early 2000s was clear too, yes? These both became obvious in hindsight but not as the situations were developing. Determining what should have been known at the time is not always easy.

Have you ever been in a situation where someone is taking credit for a decision that turned out well, but for different reasons than they anticipated? This is the **choice supportive bias** at work. People have a tendency to falsely believe they were more informed than they were at the time, essentially taking credit for the times they were lucky versus wise. We have a need to be right and, when the outcome is positive, the mind's tendency is to believe we were smarter than we were. People will often create a story in their head that decisions were made for a different reason than they were to fulfill this need.

Finally, **self-serving bias** is another tendency we often recognize in others but not always in ourselves. This is our innate tendency to take credit for success, but not for failure. We inherently

need to be to be right, and admitting failure creates significant cognitive discord. Yet, not admitting failure inhibits a chance for learning. Charlie Munger, Warren Buffet's partner, once said, *"I like people admitting they were complete stupid horses' asses. I know I'll perform better if I rub my nose in my mistakes. This is a wonderful trick to learn."* Few people truly get this point.

What to Do When Playing Offense or Defense

How best to deal with these biases of judgment? Context matters, specifically if you are on the offense or defense in a particular situation. "On offense" means you are trying to persuade others of something. "On defense" means that you are the one that someone is attempting to persuade or influence.

A prime example of someone on offense is a marketer. A somewhat cynical, but not altogether inaccurate, job description is that marketers are tasked with creating a perception that is greater than reality. Discounts to suggested retail prices (anchoring), framing the decision to buy insurance on products where it makes no sense (framing/loss aversion), paying actors to pretend they are doctors to sell goods on television (authority bias) and strategically pricing certain goods lower to give the perception that all prices in the store are a good deal (halo effect) are all such examples. Marketers are masters of understanding and exploiting biases of judgment.

However, biases on offense can also have a more constructive social purpose. The concept of *paternal libertarianism* promoted by Richard Thaler is a good example. The concept is simple: There are certain decisions people should be making, but often are not. Are there ways to frame questions or decisions in ways that nudge them in the right direction (the paternal part) while also maintaining the freedom for them to decide whatever they wish (the libertarian part)?

An example is 401(k) retirement planning. This is something that nearly all people should be doing if they have the option. However, it was historically structured as an "opt-in" selection for workers when they joined a job. Opt-in meant that when people joined a new employer they had to check a box to join the 401(k) program and, if nothing was checked, they were not enrolled. Paternal libertarianism takes the view that enrolling in the 401(k) is clearly the right decision, so there should be an "opt-out" framing instead. In that scenario, the default option is to be automatically enrolled in the plan, unless you proactively opt out. The result: Many more people are saving for retirement in their 401(k) plans which is the right decision for them and society as a whole.

The game plan on offense breaks down at a high level as follows. First, identify the goal. Is it to sell more product, change employee behavior or influence policy makers? Then, evaluate what biases exist or could exist to skew judgment. Finally, develop a program to trigger those biases or avoid the biases from becoming triggered, whatever one's goal may be. As discussed, this can be nefarious or altruistic in its intention, unfortunately or fortunately.

Defensively, there are three steps to be effective:

1. **Awareness and True Recognition of the Power of Biases.** The very first step is a recognition and awareness of the influence of biases on our judgment. However, mere awareness is not enough and, unfortunately, this is where most people stop. The power of these biases is so inherent in our mental makeup that even those who have studied it for years are still massively influenced by them. I have studied behavioral biases for more than 15 years and each day I am amazed at how my own judgment is skewed by the simplest of influences. Step one is both an awareness *and* a respect for their mental pull no matter your awareness.

2. **Understanding When Biases Pose the Most Risk.** This will depend on the situation. Shopping for a car? Beware the sales tactics that may trigger numerous biases. Making an investment? Beware the points in your decision process where your mind will likely deceive you. Knowing when biases pose a risk is critical as they can easily sneak into judgment unnoticed.

3. **Processes to Cut off the Influence.** The final step is to have some process to cut off the power of the bias. Robert Cialdini in his book *Influence* coined the term, "click whrrr" as a sort of mental cue to help counteract bad thinking. Mentally, hear a clicking sound when you recognize the presence of a bias and then a "whirring" sound to begin your process of counteracting its effect on you. So if someone gives you a gift for "free" with the goal of persuading you to donate money, immediately hear a "click" and know judgment is being skewed. Then hear a "whirring," which is your cue to mentally remind yourself that it is a gift and that you are under no obligation to give something in return.

These processes to cut the power off will vary tremendously by the task at hand. For example, investing in stocks often follows some sort of process: Evaluating a universe of possible investments, analyzing several, making a decision to invest, and then managing the portfolio. At each stage, there are biases influencing us and processes can be developed to stop the biases. There is no single right answer but, in order to counteract behavioral biases, one needs a strong awareness along with a process or set of rules designed with the peculiarities of the people involved.

The Biggest Gap in Good Decision-Making

In its simplest form, a good decision has two requirements. One, requisite knowledge of the subject matter and, two, good judgment**. The first component, requisite knowledge, is fairly simple. One needs to know something about the subject in question.** You can have great judgment but not fully understand a particular subject and therefore make a poor decision. The word "requisite" means "that which is required or necessary for a particular purpose" and so it will vary by situation. For example, the knowledge needed by an individual citizen to buy a pair of shoes is different from the required knowledge needed by an institutional investor allocating hundreds of millions of dollars into the development of a hydropower plant.

The second requirement, superior judgment, requires having solid control of Mind 1 and Mind 2. Mind 1, the analytical and rational mind, needs to have the analytical tools necessary for the task at hand. If you are valuing a company, you need to have skills in evaluating accounting, analyzing cash flows, and performing valuation analysis, for example. At the same time, good judgment requires a level of awareness of our inherent biases and processes by which to manage them (Mind 2).

Are people good at all aspects, bad at all three, or a mix? It depends on the person and situation. However, there are some insights to be gained by looking at these three aspects of good decision-making along four groups: individual citizens, business people, policymakers and institutional investors.

On average, individual citizens often lack the knowledge to make effective decisions in complex areas outside their normal areas of interest and work. This makes sense as they have jobs and families to attend to and are not often thinking about a topic such as energy all the time. There is also a considerable amount of poor education on general science issues as evidenced by a survey that showed 26% of Americans believing that the sun revolves around the earth (National Science Board Survey, 2014). For these Americans, many of which have strangely confident views of topics in energy, their judgment is lacking in knowledge and is massively influenced by psychological factors.

Individual citizens, on average, also are typically weaker on average analytically than the other cohorts and are subject to behavioral influences in the way they form judgments. In short, while there is a wide distribution of skills among individuals, the group has a lot of gaps to good decision-making on average and specifically when it comes to energy.

Government often, but not always, has specialized teams on policy areas for topics such as energy. Usually, this means that those teams possess the requisite level of knowledge for the policy being evaluated. Analytically the skills often vary but on average the work is often decent. Behaviorally, judgment is often skewed sharply.

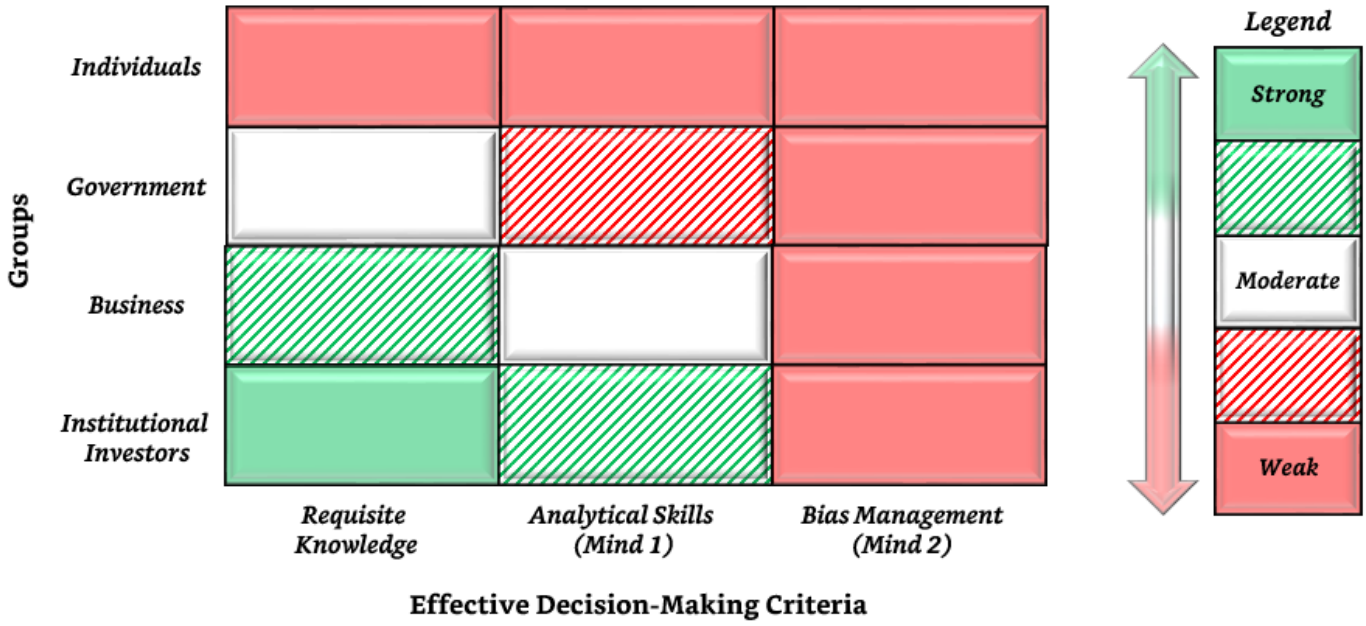
Finally, business and investors often have good requisite knowledge. This makes sense as they are often focused on a particular area such as energy or industrials. For a similar reason, analytical skills are often quite sharp as well but they can fail in complex situations. However, behavioral aspects of judgment are often very weak. There are times that the analytical skills are so sharp that there is a hubris that allow biases to creep in even more as the arrogance of one's perceived intelligence makes them blind to Mind 2's shortcomings.

There are two takeaways:

1. First, while there is a distribution of skills by group on average, **behavioral biases are a clear gap among all**.
2. Second, while bias management is the biggest and most consistent gap to each, I would argue it is **often the area of least focus**. For example, business and investors are focused on

improving their knowledge base and analytical techniques constantly. Yet, very few have any focus on systematically understanding their behavioral biases. Ironically, behavioral biases are often the cause of their worst – and most costly - decisions.

Figure 41: Typical Decision-Making Skill Level by Category By Group



Source: Michael Molnar