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Confirmation Bias among Business Students: the Impact on Decision-Making

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Appendix

Confirmation Bias is a common problem for decision makers in organizations as well as in society-at-large. Causes include attribution error, optimism bias, primacy effect, anchoring, and self-serving bias. Collectively these have a negative impact on the accuracy and quality of decision-making. This study replicates initial work on confirmation bias conducted by Wason in the l960s but focuses on a sample of business students rather than the general public. A total of one hundred thirty students were presented with a sequence of numbers that 'follow a pattern or rule'. Participants were asked to give other examples that follow the same rule and then to describe the rule. Participantswere then asked to identify their level of confidence that they had in fact uncovered the rule. One hundred seventeen out of one hundred thirty students incorrectly identified the rule yet expressed a confidence level exceeding 88%. The confidence level for the thirteen students identifying the correct rule was only 54.3%. The research suggests that business educators may need to focus on critical thinking and teaching skills such as 'devil's advocate' that will help improve analytical reasoning and reduce the tendency toward confirmation bias among future business leaders.

Keywords: Decision-making, confirmation bias, devil's advocate, attribution error

1.0 Introduction

It can be persuasively argued that all management functions require decision-making and that the act of making sound decisions is the most crucial work of a manager. These decisions range from tactical to strategic, from planning to personnel. As a result of the central importance of decision-making, practically every management textbook will devote several chapters to decision-making or a closely related topic. Adam Smith, David Ricardo and John Stuart Mills are generally recognized as the pioneers of capitalism. They held the belief that people behave and make decisions in entirely rational ways. Rational economic thought and reasoning still plays an important role in management education but many now recognize that rational thought does not always guide our decision-making. Richard Thaler, author of Misbehavior: The Making of Behavioral Economics and professor of behavioral science at the University of Chicago notes that economists "must stop making excuses and accept the fact that humans are human, fallible and liable to irrational beliefs and biases" one of the most prominent examples being confirmation bias (Hutt, 2016). In the typical management textbook, the discussion of decision-making frequently begins with the introduction of the 'Rational Decision-Making Model'. The steps in the model include: correctly identifying the problem or goal; developing alternatives; evaluating the alternatives; implementingthe selected alternative; and evaluating results. While the rational model appears logical, and to be consistent with economic theory regarding rational decision making, in reality it is rarely practiced.

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People have difficulty recognizing problems or opportunities, difficulty in processing large quantities of information, and are sometimes blind to the tendency of the rational model to ignore the idea that emotions also influence perhaps even dominate the decision-making process. Decisions made using the rational decisión making model are in fact rational only if the selection of the problem or opportunity was free ofconfirmation bias.

2.0 Common Decision-Making Models

The four common organizational decision-making models include the Rational Model, the Carnegie Model, the Incremental Process Model, and the Garbage Can Model. Each model is discussed and the model's propensity to suffer from confirmation bias is noted below.

2.1 Rational Model

At the organizational level, the rational decision-making approach is typically operationalized by a management science approach where statistics and mathematical modeling are used to analyze various problems or solutions. This will only work, however, when problems are analyzable, when the variables can be identified and measured in a structured and logical way and when there is agreement about the problem or goal to begin with. When more qualitative variables are important, the rational or management science approach is less successful. Assuming there is agreement about the problem or goal and that the decision is structured and logical, there should be little concern about confirmation bias when using a management science approach to decision-making. Unfortunately, when selecting the problem or goal, confirmation bias can lead decision-makers in the wrong direction even though they are using highly sophisticated approaches to analyze data. They may, in fact, be analyzing the wrong data. The challenge is to be sure that the selection of a goal or identification of a problem has not suffered from confirmation bias.

2.2 The Carnegie Model

A second model of organizational decision-making is the Carnegie model. Itis based on the work of Richard Cybert, James Marsh, and Herbert Simon, professors at Carnegie Mellon University. This model stresses the importance of developing collaborative decisions within the organization. It is frequently thought of as a negotiating or political model. It is best used when there is disagreement about the problem or goal. Before developing solutions to problems or developing strategies to reach goals, the Carnegie model stresses the importance of first negotiating and agreeing on the problem or goal before proceeding (Daft, 1995). Since the Carnegie model deals with a diversity of opinions it clearly is subject to confirmation bias.

2.3 Incremental Decision Process Model

A third organizational decision-making model is the incremental decision process model. This model recognizes that decisions can be made in a step by step fashion. The model is best used when there is agreement about the problem or the goal but there is uncertainty as to how best to proceed. This model can be thought of as a trial and error approach. It might be argued that this model is the least likely of the four decision-models to suffer from confirmation bias. It is not, however, completely free of this problem. The confirmation bias traitsof primacy and anchoring may lead decision makers to agree upon a problem or goal that is not the best choice and then to make incremental movement toward a poorly selected choice.

2.4 The Garbage Can Model

The last organizational decision model is known as the garbage can model. This is the most unusual of the four models. The name suggests that it is an unfavorable approach to decision-making. In reality, it can be a very useful approach. In fact two of the most important decisions many people make are made using this model: selection of a mate and choice of a career. Were these choices made rationally? By negotiation? By trial and error? The answer is usually no. They relied on the garbage can model even if we were unaware of the model at the time. The garbage can model relies on intuition, inspiration and insight. It requires that decision makers be aware of their environment, of problems and opportunities in the environment, and to be open minded enough to see how some problems and opportunities can be linkedfor a successful outcome. Can confirmation bias have a negative impact when decisions are made using this model? Absolutely.

Almost by definition our intuition, insight and moments of inspiration are likely impacted by our perception which is frequently held captive by our tendency toward confirmation bias. What exactly is confirmation bias and what common errors are made because of confirmation bias?

3.0 Common Perception Errors in Decision-Making

A number of common perceptual errors have been identified that prevent the rational decision-making model from functioning 'rationally'. Many involve different forms of attribution error. A common attribution error is the tendency to attribute the behavior of others more to internal than to external factors and our own behavior to external rather than internal factors. A study of military pilot error focused on five hazardous thought patterns which are believed to be related to poor judgment among pilots. The study found that a form of attribution theory called optimism bias contributed to poor pilot decisions (Stewart, 2006). Another attribution error is self-serving bias.This is a perceptual error whereby people tend to believe they are responsible for favorable results and others are to blame regarding negative outcomes. A decision-making error that has particular significance to this study is the primacy effect. This is a perceptual error in which we quickly form an opinion based on the first information we receive. Unfortunately, first impressions are sometimes wrong and are difficult to change. Once an individual has established a "first impression" there is a tendency to select subsequent information that supports the initial impression – and to screen out information that is contradictory to the initial impression. The primacy affect results in 'anchoring'. Anchoring is a mental bias where one tends to rely too heavily on the first piece of information offered (the anchor) when making decisions. Anchoring occurs when individuals use initial information to make subsequent judgments without seeking additional information and without evaluating the information critically. It is a form of Groupthink without the group. Collectively, these common perceptual errors constitute confirmation bias.

4.0 Confirmation Bias

"Most of our problems do not occur because of what we don't know….they occur because of what we do know that just ain't so!" Mark Twain Attribution errors, the primacy effect, and anchoringall contribute to a common decision-making judgment error known as confirmation bias. In laymen's terms confirmation bias has been described as "seeing only what we want to see or hearing only what we want to hear." In practice, it is more than this. It includes consciously or unconsciously avoiding information that contradicts or disagrees with our currently held viewpoint. It is a type of cognitive bias that favors information that confirms previously held beliefs or biases. It impacts how people gather information, it influences how people interpret and recall information, how we interpret news sources so that they uphold our existing views and how we remember things that reinforce our views and attitudes and forget or neglect things that are contrary to our viewpoint. Confirmation biasimpacts our ability to make better decisions. As Robert F. Wall confirmed in a Harvard Business Review article, these cognitive biases detract from sound decision – making.(Wall, 2012) Research has pointed out that confirmation bias can produce misdiagnosis in a doctor's office as well as in an executive suite. A doctor who has reached a conclusion as to what disease a patient has may look for evidence that only confirms this diagnosis while overlooking evidence that would tend to disconfirm it. It has been suggested that physician training should include a course in inductive reasoning in addition to deductive reasoning. A good diagnostician will test his or her initial hypothesis by searching for evidence against the hypothesis. (Bradford, 2015) Studies have also found that confirmation bias can have a negative impact on investment decisions even though these decisions are typically made using highly sophisticated econometric modeling and financial ratio analysis. Another finding here was that there was no difference in gender predisposition to confirmation bias. (Bashir, 2013)

Much of the original research on confirmation bias was conducted by a British psychologist, Peter Wason, in the 1960's. He conducted a series of experiments where subjects were shown a triple set of numbers such as "2-4-6". The tasks of the subjects was to identify the "rule" that applied to the three numbers. The subjects were instructed to develop similar sets of three numbers that obeyed the same rule. The subjects formed a hypothesis that the rule was a sequence of even numbers that followed this rule such as "4-8-10", "6-8-12", 20-22-24' and they were informed that their choices "obeyed the rule". As they continued to identify choices that "obeyed the rule" their expressed confidence in their choices continued to increase. As it turned out the research subjects were incorrect in their hypothesis regarding the rule. The actual rule simply called for a series of increasing numbers. They did not have to be even numbers or in any particular sequence, as long as each number was simply larger than the previous number.

Almost all of the subjects in Wason's experiment formed a similar hypothesis and formed number sequences that proved their "incorrect" hypothesis while very few asked questions or experimented with different sequences that might disprove their initial hypothesis and in the process reveal a more correct hypothesis and a better decision. The parrticipants only sought to confirm what they believed was true. This is confirmation bias.

Approximately ten years after Wason's initial work on confirmation bias, another famous test took place at the University of Minnesota, conducted by psychologist Mark Snyder and Nancy Cantor. They began by creating a story about an imaginary woman named Jane. During the course of Jane's imaginary day, she would do some activities that were introverted, like drinking alone in a coffee shop, and some things that were extroverted, like socializing with friends. The team then asked participants to read Jane's story, and several days later, randomly divided the participants into two groups. One group was asked if Jane would make a good librarian, the other, if she would make a good real estate agent. Snyder and Cantor found that results were predictable. Participants who were asked if Jane would make a good real estate agent tended to recall only details that would confirm that she would. Those who were asked if she would make a good librarian recalled primarily consistent introverted behavior. Neither group tended to recall contradictory information. (Snyder, 1975) The study confirms that "selective recall" – the habit of remembering only facts and experiences that reinforce our assumptions play a significant role in confirmation bias. (Hunt, 2016).

4.1 **Confirmation Bias in Society**

Confirmation bias is not limited to managerial or organizational decision-making. It is easily recognized in broader society especially in political activities and viewpoints and in religion. Some will argue that the citizens of the U.S. have become highly divided politically and in social beliefs. On one side of the political-social divide, you have approximately one third of voters who will only listen to Fox News, Breitbart News, Sean Hannity or Rush Limbaugh, etc. for information and viewpoints. On the other side of the divide you have about one third who will only listen to MSNBC, CNN, the Huffington Post, andliberal opinion leaders from mainstream media. Both sides are suffering from confirmation bias and our nation is worse off because of the poor decisions that will result from the bias and the resulting failure to critically analyze problems and proposed solutions. The growth in information technology and social media may actually increase our propensity for confirmation bias rather than reduce it. Rather than enhance knowledge the internet has produced an information glut, or as one observer called it, "infoxication". Online content is often collectedand targeted to fit our preferences, interests and personality, thus the internet can even enhance our existing biases and undermine our motivation to learn new things. The recent growth in 'fake news' and unsubstantiated charges of 'fake news' can only strengthen our biases. Paul Resnick and colleagues at the University of Michigan's School of Information recently noted that "collectively, online filters will isolate people in information bubbles only partially of their own choosing, and the inaccurate beliefs they form as a result may be difficult to correct. Ironically, then, the proliferation of search engines, news aggregators and feed-rank algorithms is more likely to perpetuate ignorance than knowledge" (Chamorro-Premuzic, 2014).

4.2 Confirmation Bias among Business Students

This paper is an attempt to study the phenomena of confirmation bias among a group of business students – those who will be the organizational leaders and decision-makers of tomorrow. Using an approach very similar to Wason's experimental design, a group of approximately evenly divided undergraduate and graduate students were asked to participate in a short exercise. They were provided several examples of numbers that followed a set pattern or 'rule'. The examples were "2-4-8", "1-2-4", and "5-10-20". The students were asked to complete three tasks: 1) Provide another numerical sequence that "obeys" the rule, 2) Provide a brief written explanation of the 'rule'; and 3) Identify on a scale of 10% to 100%, their level of confidence that they had in fact identified the correct 'rule'.
The following research question was tested:

Hypothesis: Business students are not as prone to Confirmation Bias as the public-at-large.

The results, however, did not support this Hypothesis and instead confirmed Wason's original findings. Business students, in spite of their training are, like the public, highly prone to confirmation bias. Of the 130 students participating in the study, 117 identified an incorrect 'rule', the most common being that each number in a sequence must be doubled. When asked how confident they were in their choice, the most common response was 100% confidence. The average for the 117 students was 88.2% confidence.

Only thirteen students actually identified the 'correct' rule, that simply being that each number must exceed the previous number. When asked about their level of confidence in their decision, the average confidence level of the correct students was only 54.3%. The levels ranged from 10% to 90%. A chi-square analysis was conducted on the resulting statistic. The chi-square statistic is 28.7185. The p-value is .00001. The result is significant at the .01 level of confidence. Thus, the test Hypothesis was found to be null. Business students are prone to Confirmation Bias at the .01 level of significance. The outcome of this study would suggest that business students are subject to suffering from confirmation bias to a significant degree.

Business students tend to seek out only information that is consistent with their initial impression and to feel strongly that they are correct in their view. Forthe handful of students who did not succumb to the 'primacy effect' or 'anchoring', and who in fact did question the obvious actually made better decisions. But this group of students' confidence level in their decisions was substantially lower than those students who made incorrect hypotheses. This might suggest that the more strongly we feel we are correct, the more likely we are to suffer from confirmation bias.

5.0 Conclusion and Recommendations

Are there lessons for those of us who teach decision-making in business schools and executive education programs? Yes, there is ample evidence that confirmation bias occurs in organizational settings as well as society-at-large. Fortunately, there are a number of studies, practices and examples that shed light on techniques that can be taught and approaches taken to avoid confirmation bias. One key example is the approach used by Warren Buffet to avoid 'the brain bug' as Buffett referred to confirmation bias. At a recent Berkshire Hathaway annual meeting in Omaha, Buffett invited hedge fund trader Doug Kass to participate. Kass is a vocal critic of Buffett and his investment style, and is actually betting against Berkshire Hathaway stock by shorting it (Dooley, 2013). Forbes magazine described Buffett's step as "largely unprecedented". Buffett's simple action was praised by Forbes as a way of preventing confirmation bias. Management teams must learn to value and encourage open and constructive criticism. Rather than asking for validation of our strategy seek contrary viewpoints. Another approach, suggested as a technique in many management textbooks is to appoint specific individuals or small groups to play the role of "devil's advocate". These individuals or groups are not simply given an opportunity to disagree, they are actually charged with taking a different look at the decision and playing a contrarian role. In an interesting side note, the term "devil's advocate" originated hundreds of years ago in the Roman Catholic Church. When an individual was being considered for "sainthood", the church appointed certain priests to "represent the devil" and to bring up reasons why the individual should not be granted sainthood. Fortunately, few business decisions rise to this level. Most of our decisions could, however, benefit from a reasoned period of critical review.

In addition to these useful and straightforward suggestions for avoiding confirmation bias, there are more detailed approaches. In one Harvard Business School article, Daniel Kahneman, Dan Lovallo, and Olivier Sibony, identify twelve detailed questions that should be asked before making a major decision in order to accurately assess a risk or opportunity and make the right decision regarding how to manage it. This detailed approach, however, is not recommended for routine decisions because of the time and cost involved (Kahneman, Lovallo, &Sibony, 2011).
Another example involved professionals engaged in software development and testing. The authors of this study suggest that the goal of software testing should be to "fail the code". They found that strong logical reasoning and hypothesis testing skills are important factors in the software developer's performance. The authors recommend that companies should focus on improving logical reasoning and hypothesis testing skills for their employees by designing training programs with this specific objective (Calikli&Bener, 2010).

Robert F. Wolf identified eight strategies for overcoming cognitive bias in a Harvard Business Review article. The strategies Wolf identified include searching for disconfirming evidence; recognizing the important role of the team contrarian; seeking diverse outside opinions; rewarding the process not simply the outcomes; reframing the problem for further analysis; redefining the problem and avoiding an escalation of commitment; developing a process to allow teams to "cut the losses" without penalty; and avoiding premature public commitment to a course of action. (Wolf, 2012) Management educators should continue to teach logical reasoning and hypothesis testing skills. These skills should focus on teaching both deductive reasoning and inductive reasoning. We should also stress the importance of managers creating a climate or culture, as Warren Buffet did, where challenging assumptions is viewed as valuable and not as a hostile act. Assigning the role of Devil's Advocate is useful here. As management educators, we need to teach this skill. It is not easy. Too many times the Devil's Advocate is viewed as a negative, hostile person or group that is opposed to change and progress.

They are sometimes referred to as the "Yes, but group", abounding with negativity. The opposite is the "Yes, and" crowd. Commonly known as "Yes men or women" they bring very little of value to strategic or tactical discussions.They are more like cheerleaders. Finding a way to avoid confirmation bias in a positive way is the challenge. Stressing the skills needed to disagree agreeably, to include inductive reasoning as well as deductive reasoning, and to play the 'devil's advocate' in a positive way are crucial.

Arguably, one of the most important steps is to help our students and our leaders realize and understand that their beliefs and decision-making abilities are not as rational and correct as first thought. We all tend to suffer from confirmation bias to some degree. As the common saying goes: The first step to recovery is admitting that you have a problem. It would appear that we should educate our students regarding confirmation bias and teach them to more critically analyze information and perceptions before making difficult and costly decisions.

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