

Lazy Thinking: How Cognitive Easing Effects the Decision Making Process of Business Professionals

Gianmarco Armenia
347-891-5660
385 Annadale Rd.
Staten Island, New York
Garmenia91@gmail.com
May, 2013
Finance
Matthew Morey
Finance Department

Contents

Abstract.....	3
Introduction	4
I. Literature Review	7
A. <i>System 1 & System 2</i>	7
B. <i>Cognitive Ease and Cognitive Strain</i>	9
C. <i>Overconfidence</i>	11
D. <i>Endowment</i>	13
E. <i>Herding</i>	16
II. How Cognitive Ease Effects Business Decisions	18
A. <i>Cognitive Easing and Overconfidence</i>	18
B. <i>Cognitive Easing and Endowment</i>	21
C. <i>Cognitive Easing and Herding</i>	22
III. Methodology	25
<i>Questions:</i>	26
IV. Results and Discussion.....	30
A. <i>Questions 1, 2, 4 & 5</i>	30
B. <i>Question 3</i>	32
C. <i>Word Association</i>	33
V. Conclusion to the Experiment	35
VI. Conclusion	37
VII. References.....	41
VIII. Appendix.....	43

Abstract

This paper examines how business and financial decision making are influenced by behavioral biases such as cognitive ease, overconfidence, herding and the endowment effect. I do this in two ways. First, I show historical examples of irrational decisions and the detrimental effects on the individual, society, the company, and shareholders from these decisions. Second, I conduct a survey of business students to examine how susceptible they are to behavioral biases. I find that most students are in fact allowing cognitive easing to alter their decisions negatively.

Introduction

The human mind is a complex and wonderful instrument. To this day theories exist on how it operates and what exactly is stored within it. One of the most important things that occur within the human mind is the process of making decisions. The decision making process is vital to the entire human race. Every action performed, every choice made, and every event that occurs in one's life is shaped by their decision making process. Therefore understanding how individuals make decisions can help shape final decisions. If this is the case, people can shape their decisions to steer them to more optimal outcomes.

Throughout history, it is clear that regretful decisions yielding negative outcomes have been made. One sector, in particular, where the decision making process is vital is the financial sector. The decisions made within this sector not only affect the financial well-being of the decision makers, but also that of society. Given the interconnected financial system, optimal decisions are not only needed but demanded. However, human beings are not always rational decision makers, and that is where the issue lies. They are often emotionally driven and therefore malleable to many biases, altering their decision making process.

Humans tend to avoid stressful and demanding cognitive strain, often making them vulnerable to many biases. This "laziness" and desire for cognitive ease often invites individuals to a world of irrationality where the decisions made can be detrimental. This mental folly known as cognitive ease causes individuals, such as business executives and professionals, to make irrational and non-optimal decisions. Professionals, as well as most individuals, tend to believe they have full control of their

decisions. However, this is a fallacy. Several cognitive biases alter their decisions, resulting in negative outcomes. For example, there are CEOs who have an immense amount of knowledge, MBAs, lifetime amounts of training and experience, and yet still make mistakes that when realized in hindsight seem absolutely outrageous. These non-optimal or inefficient decisions are a result of Cognitive ease.

Cognitive easing played an important role in the collapse of many, once great, companies such as Blockbuster, AOL, PanAm, and even more recently problems surrounding Hewlett Packard. In each of these companies executives made irrational decisions due to cognitive ease and as result not only hurt their company, but also the workers, suppliers, consumers and all other stakeholders. For example, Pan American Airlines' CEO, William Seawell, made a careless decision in 1980 that would inevitably lead to the airlines demise. Seawell crafted the acquisition of National Airlines, through a bidding war, in order to bolster PanAm's domestic routes. He purchased National for over four hundred million dollars and inadvertently increased PanAm's debt severely. While the purchase of National helped grow Pan Am's airline fleet, Seawell did not realize that he had paid much too high a price for the deal. Seawell also failed to analyze the enormous amount of debt Pan Am had already realized from the previous purchase of its larger Boeing aircrafts. After this deal was finalized, Seawell was replaced one year later. In addition, all efforts to decrease the company's debt by the new CEO, Edward Acker, proved futile, followed by the collapse of PanAm. In the midst of the bidding war for National Airlines William Seawell's continued effort to bid exuberantly regardless of the outrageous value National Airlines had already reached was irrational. Cognitively speaking, it was easier for him to go on and bid until the war was over. Deviating from

that bidding war required too much cognitive effort, analytical effort, and time, which ran the risk of losing National Airlines. Cognitive easing influenced Seawell's irrational and careless decision, and with exposure to behavioral biases such as overconfidence, endowment and herding, these irrational decisions are even harder to avoid.

This paper will discuss the different methods in which business professionals, mainly in the field of finance, think in response to cognitive ease and how those thinking processes, in conjunction with other behavioral biases, affect the way business professionals make decisions that bare monumental negative impacts on society. Within the following pages, the Literature Review will introduce and explain some of the major concepts such as system 1 and 2 as well as cognitive easing. This section will also describe, in detail, three behavioral biases that cognitive easing helps to play a role in. These biases are overconfidence, herding, and endowment. Section two will describe several historical situations, within business, that depict how cognitive easing and these behavioral biases influence one another in causing professionals to make irrational decisions. Sections three and four, will discuss my experiment depicting the presence of cognitive easing in both undergraduate and graduate business students.

I. Literature Review

A. *System 1 & System 2*

Human beings have a gift many other living organisms do not possess. Humans possess the ability to think in various manners such as simple concise thinking or analytical thinking often related to problem solving. Specifically, these two thinking patterns are known as System 1 and System 2, respectively (Khaneman).

“System 1 operates automatically and quickly, with little or no effort and no sense of voluntary control” (Khaneman 20). This thinking pattern can be identified as instantaneous or primal. For example, System 1 is used to solve a simple mathematical equation such as $1+1$. It requires little to no concentration and can be solved almost effortlessly, cognitively speaking. “The capabilities of System 1 include innate skills that we share with other animals. We are born prepared to perceive the world around us, recognize objects, orient attention, avoid losses, and fear spiders” (Khaneman 21). Normally, individuals do not even realize that they are using System 1. The thought to “orient to the source of a sudden sound, detect hostility in a voice, [or] completing the phrase bread and ...” (Khaneman 21) are all part of the System 1 way of thinking.

“System 2 allocates attention to the effortful mental activities that demand it, including complex situations. The operations of System 2 are often associated with the subjective experience of agency, choice, and concentration” (Khaneman 21). System 2 requires more attention and concentration, resulting in a lengthier and more strenuous

thought process. This thinking pattern can be often related to activities such as “bracing for the starter gun in a race, filling out a tax form, [and] checking the validity of a complex logical argument” (Khaneman 22). Therefore, System 2 would not be used or needed when trying to solve a simple mathematical equation such as $1+1$, but mandatory when trying to solve a more complex equation such as $17*43$.

Due to System 2’s need for cognitive effort, it is less likely for System 2 to operate under conditions in which someone’s mental effort has depleted. If an individual is cognitively busy, exhausted, or under the influence of temptation, System 2 is less likely to operate. Many of these situations, such as temptation, require high levels of self-control which demands a high level of cognitive effort (Khaneman). Therefore, an individual who is dieting while in the vicinity of delicious desserts is more likely to make an irrational or non-optimal decision. This effect was demonstrated through a study that involved parole judges in Israel who spend their entire days reviewing parole applications.

The cases are presented in random order, and the judges spend little time on each one, an average of 6 minutes. (The default decision is denial of parole; only 35% of requests are approved. The exact time of each decision is recorded, and the times of the judges’ three food breaks--morning break, lunch, and afternoon break--during the day are recorded as well.) The authors of the study plotted the proportion of approved requests against the time since the last food break. The proportion spikes after each meal, when about 65% of requests are granted. During the two hours or so until the judges’ next feeding, the approval rate drops steadily, to about zero just before the meal. (Khaneman 43)

When the judges were hungry and depleted of their own mental resources, system 2 was absent. Due to this absence, they spent little time analyzing the applicant for parole and simply rejected him or her. However when the judge had eaten the approval rating increased quite significantly because system 2 was present so that the judges were more

careful to analyze the applicant's qualifications for parole. This can also occur to professionals in business sector who may be physically exhausted and are asked to make decisions. Their mental resources are most likely depleted and the decision they make will most likely have regrettably lasting outcomes.

Systems 1 and 2 are not always independent from each other. Individuals use both systems in their everyday lives and at they act as complements:

The division of labor between System 1 and System 2 is highly efficient: it minimizes effort and optimizes performance. The arrangement works well most of the time because system 1 is generally very good at what it does: its models of familiar situations are accurate, its short-term predictions are usually accurate as well, and its initial reactions to challenges are swift and generally appropriate (Khaneman 25).

Unfortunately, System 1 has limitations and does not always result in accuracy. Its primitive thinking pattern limits it from assessing statistical or logical situations precisely. This issue often causes System 1 to yield simpler responses than intended (Khaneman). Unlike System 2, System 1 is always running in the background of an individual's mind and it cannot be turned off. Due to its twenty-four hour service, System 1 often interrupts situations that require System 2, which often causes an inefficient final decision.

B. Cognitive Ease and Cognitive Strain

Cognitive ease is the mental state in which “things are going well – no threats, no major news, no need to redirect attention or mobilize effort” (Khaneman 59). If an individual's thought process has successfully utilized System 1, in that it required no extra effort by System 2 to complete the said task, that individual is experiencing cognitive ease. Cognitive strain on the other hand, “indicates that a problem exists, which

will require increased mobilization of System 2” (Khaneman 59). Each mentality induces different emotional stimuli and often results in various outcomes.

When under cognitive ease, individuals make decisions in a completely different manner than when under cognitive strain. Cognitive strain triggers the mind to use System 2’s extra resources and analyze the situation more thoroughly. The use of these extra resources tends to result in the individual solving the problem correctly or making a better decision. Shane Fredericks’ “Cognitive Reflection Test” or CRT attempted to prove this theory by giving out tests including mathematical questions that would evoke an immediate intuitive answer that is incorrect. To simulate cognitive strain, two tests were written with identical questions, except one test had a smaller, slightly illegible, font and the other had a normal legible font. The smaller font induced cognitive strain, while the legible font did not. The result showed that “90% of the students who saw the CRT in normal font made at least one mistake in the test, but the proportion dropped to 35% when the font was barely legible” (Khaneman 65). “Cognitive strain, whatever its source, mobilizes System 2, which is more likely to reject the intuitive answer suggested by System 1” (Khaneman 65). Cognitive strain forces the mind and individual to avoid its lazy tendencies and work harder, thus triggering System 2.

Knowing that system two is triggered in situations that instill cognitive strain can be helpful in many professional settings. Successful managers and executives are able to inspire their workers to perform their absolute best. This is not an easy task to accomplish and in situations where a company needs to change/increase performance, managers need to inspire their workers to perform better. One way this can be done is by inducing slight cognitive strain. Managers can create a sense of urgency. “Perhaps the best way to

challenge the status quo is for a leader to forcefully create a sense of urgency” (Dess, Lumpkin and Eisner 415). This urgency will induce cognitive strain and trigger System 2, and by doing so enable individuals to use more resources in order to analyze situations better and make ideal decisions.

C. Overconfidence

Overconfidence is defined as the “inaccurate, overly positive perceptions of one’s abilities or knowledge” (Moore and Kennedy 719). Furthermore, “individuals not only tend to have positive self-perceptions, they often believe they are more talented and competent than others, even when they are not” (Moore and Kennedy 718). This perception can include a greater sense of strength, intelligence, and experience. “In short, people think they are smarter and have better information than they actually do” (Pompian 51). As overconfidence increases, people are more likely to act irrationally and put themselves in situations that they cannot handle.

The overconfidence bias is often present within investment. Whether the individual is investing in the stock market, bond market, or playing casino slot machines overconfidence often plays a key role. Michael Pompian discusses two types of overconfidence that affects investors: “prediction overconfidence” and “certainty overconfidence”. Prediction overconfidence occurs when “confidence intervals that investors assign to their investment predictions are too narrow” (Pompian 52). Investors perceive that their investment prediction will be more favorable than they actually will be. This is often caused by blindness from their overconfident behavior. Certainty overconfidence occurs when “investors are often also too certain of their judgments”

(Pompian 52). When an investor makes a decision that he/she follows through with regardless of the available information (often in disagreement with their decision) they are a victim of certainty overconfidence. Certainty overconfidence occurs after the decision has been made, while prediction overconfidence occurs when attempting to make a decision. Investors who are victimized by both types of overconfidence bias frequently make irrational decisions that may not be optimal to him/her and to the market.

In the financial sector, overconfidence has a considerable effect on not only the individual's well-being, but also that employee's firm. Many studies have found that upper management positions have been affected by this behavioral bias. An experiment conducted by Ulrike Malmendier and Geoffrey Tate examines the "relation between corporate decision-making and personal characteristics of the leading executive inside the corporation" (Malmendier and Tate 35).The experiment determined how overconfident a CEO may or may not be depending on the investment choices he or she makes within the company. The conclusion found "a strong positive relationship between the sensitivity of investment to cash flow and executive overconfidence" (Malmendier and Tate 35). This over confident behavior by investors, including average brokers and high net worth CEOs, can cause damaging market fluctuations. Specifically, this behavior often results in market calamities such as bubbles. It is essential to require a "need to more fully incorporate behavioral aspects (like investor overconfidence) into investor decision-making models" (Evanoff, Kaufman and Malliaris 2). Incorporating such behavioral aspects will help decrease irrational decisions which in return create more stable and optimal market conditions.

D. Endowment

The endowment effect is a behavioral bias which causes individuals to add more value to possessions or ideas they own, more than those they do not own. “The endowment effect describes the fact that people demand much more to give up an object than they are willing to spend to acquire it” (Huck, Kirchsteiger and Oechssler 1). This bias causes irrational behavior because it contests the basic principles of economics:

Endowment bias is inconsistent with standard economic theory, which asserts that a person’s *willingness to pay* for a good or an object should always equal the person’s *willingness to accept dispossession* of the good or the object, when the dispossession is quantified in the form of compensation (Pompian 138).

When the individual is endowed with a particular object they own, they will not sell it at the market price for which they would rationally purchase it. Dan Ariely describes three reasons why the endowment effect occurs in humans in his book, Predictably Irrational. He states that humans become endowed to objects or ideas because humans fall in love with what they have, humans focus on the losses more heavily than they do gains, and they assume that the opposite party in a transaction will perceive the transaction similarly (Ariely, Predictably Irrational 174-75). Each of these reasons contest basic economic principles and cause individual to make irrational decisions.

One of the most important reasons for why the endowment effect has such a great effect on individuals is loss aversion. Loss Aversion occurs because “changes that makes things worse (losses) loom larger than improvements or gains” (Kahneman, Knetsch and Thaler 199). As stated previously, individuals tend to focus on losses more so than they do gains. This causes them to experience a greater pain when losing something, than feeling joy from gaining that same object. Loss aversion is very common in the financial

sector, especially regarding investors. Investors tend to hold on to losing stocks more so than onto winning stocks. This is not only counterintuitive but irrational. A winning stock, in the short term, is statistically likely to continue rising. Therefore, one should hold on to it longer. Instead investors sell the stock before it reaches its peak to make a profit. On the other hand, they become attached to stocks that continue to fall because the loss hurts more than the gain produces joy. They become so attached to the stock that they cannot let go of it unless they can break even. Instead they fail to understand that the stock will statistically continue falling and they will continue to lose money (Pompian 210). This example of loss aversion also coincides with the endowment effect as the investors become endowed to the stock due to loss aversion. The endowment effect restricts them from understanding the statistics behind investing and instead they invest using their emotions rather than their logic.

Another study was conducted by William Samuelson and Richard Zeckhauser to illustrate the endowment effect within investments. They conducted an experiment in which they told investors to imagine that they would acquire one of four given investment options. These investment options included: a moderately risky stock, a riskier stock, a treasury security, and a municipal security. A second group had been given the same choices except that they were required to imagine that they had already inherited one of the securities and could cede the inheritance at any time without any penalty (Pompian 141). The experiment concluded that the investors showed signs of endowment to the investments they had inherited because most of the investors did not give up the initial inheritance. The experiment showed that “the investors in the second group showed a tendency to retain whatever was “inherited.” This is a classic case of the

endowment bias. Most wealth management practitioners have encountered clients who are reluctant to sell securities bequeathed by previous generation” (Pompian 141). The endowment effect can have unfortunate results for investors. As stated earlier, when this is coupled with loss aversion, it can cause investors to make irrational decisions, often causing them to lose money.

The endowment effect does not only come into play when an individual buys or invests in a physical object. Individuals could also become endowed to ideas:

Once we take ownership of an idea – whether it’s about politics or sports – what do we do? We love it perhaps more than we should. We Prize it more than it is worth. And most frequently, we have trouble letting go of it because we can’t stand the idea of its loss. What are we left with then? An ideology - rigid and unyielding (Ariely, Predictably Irrational 177-78).

Once an idea is endowed, it is hard for that individual to part from it. This occurs because they become emotionally attached to their idea as they would to a car they owned. If the idea is created by the person becoming endowed to it, the effect becomes even stronger. This is known as the “Ikea effect” and its usage with physical and non-physical objects. The Ikea effect was created by Dan Ariely and Mike Norton. It states that individuals add more value to objects and ideas that were created by them more so than those that are not created by them. A book shelf that was bought at Ikea and built by the individual will have more value, in the owners perspective, than that same book shelf being bought already built. This is mainly due to the emotional investment and time put into building the book shelf. Dan Ariely conducted an experiment to demonstrate this theory using origami. He allowed students to make origami figures and then bid on them, comparing the creators’ bids with the non-creators’ bids. The experiment showed that the creators on average bid much higher than the non-creators did for the same origami (Ariely, The

Upside of Irrationality 93). The “difference between creators and non-creators was not in how they viewed the art of origami in general but in the way that the creators came to love and overvalue their own creations” (Ariely, *The Upside of Irrationality* 94). This behavior is inconsistent with basic economic principles, causing individuals to act irrationally.

E. Herding

Herding is the behavior associated with humans who follow what other people are doing rather than their own intuition. What makes this behavior irrational is that the people they are following often contest what they believe is optimal, based on the information they hold. Herding is pervasive in the financial sector. “Herding, that is, imitation among investors, is said to appear in markets when, instead of following their own beliefs and private information, investors decide to imitate the decisions of other traders, who they perceive to be better informed” (Blasco, Corredor and Ferrerueta 2). In particular, investors who herd often switch their stance on investing (buying or selling) based on what other investors may be doing or how the market shifts. “Start with a trader who before any observable price changes has a trade (buy or sell) in mind. We say that this trader engages in herding behavior if he switches from selling to buying in the face of rising prices, or if he switches from buying to selling in the face of falling prices” (Park and SgROI 8). If prices in the market increase, a trader will shift from buying to selling and if prices decrease he/she will do the opposite. In this situation, the investor is simply doing what most other investors are doing and not taking into any consideration his or her own understanding of the shifts occurring in the market. This behavior is irrational because it is not optimal for the market and goes against the efficient market hypothesis.

The efficient market hypothesis describes the shift from buying to selling (or vice versa) by investors due to new or acquired information. Herding effectively disrupts that idea. This “investor behavior can cause price fluctuations that are not necessarily due to new information arrival, but to the emergence of collective phenomena such as herding behavior” (Blasco, Corredor and Ferreruela 2). When an investor herds, he/she is not using any information to make the decision to buy or sell, instead he/she is reacting the way others do. This behavior is not optimal to the market and can result in market disruptions such as asset price bubbles.

II. How Cognitive Ease Effects Business Decisions

Now that I have described in detail the main concepts behind the issue, that professional within the business sector are prone to making non-optimal decisions due to cognitive ease, in this section I will survey the literature to show how cognitive easing takes place within business decisions. Cognitive easing is as present in the business sector as it is in everyday life. The effects it has on the thought and individual decision-making process result in irrational and detrimental decisions. Cognitive easing's interference with both System 1 and 2 thinking patterns may either cause behaviors related to behavioral biases or enhance their usage and detrimental effects. In the following sections, I will discuss both past and recent examples of how cognitive easing further effects or induces overconfident behavior, endowment effects, and herding tendencies.

A. Cognitive Easing and Overconfidence

Cognitive easing causes individuals to use System 1 in situations where System 2 would be more optimal. System 1's emotionally driven nature causes individuals to become overconfident. In this case, professionals, such as investors, advisors, and executives become overconfident through cognitive easing and its persuasive nature of letting one's mind rest from using system 2. More recently, the business sector has witnessed the effects of overconfident investors and CEOs and their hubristic behavior. The Time Warner and AOL Merger (1999-2000) and the most recent Hewlett Packard

and Autonomous merger (2012) are prime examples of cognitive easing and its effect on CEO decision making process and their vulnerability to overconfident behavior.

CEOs, regardless of their expertise, are susceptible to overconfident behavior as much as anyone else. The decisions most CEOs make require extensive thought, statistical analysis, and concentration. Many of these decisions involve investments within the company, including, but not limited to, the introduction of new products or services, the expansion of the company into other industries, the expansion into another region, as well as mergers and acquisitions. These decisions cannot be made quickly, but should be carefully examined, understood, and finally executed. These decisions require System 2. Due to cognitive easing and the added behavioral bias of overconfidence, many of these decisions are made using system 1 instead. Overconfidence is driven by emotion, similarly as system 1 is, and together they result in irrational decisions.

CEOs quite often exhibit excessive overconfidence about the future potential of their business leading to overvaluation of the firms. As individuals, the CEOs are driven by emotions which may lead them to believe, for example, that they have better skill than the average CEO, the risk they face are relatively low, and the expected cash flows are higher than average (Ottow 4).

These overconfident CEOs over value their skills and as a result, through cognitive easing, fail to statistically analyze data, devote ample time to the decision making process and propose ultimatums. They simply decide using System 1.

The AOL and Time warner merger can be considered one of the worst business mergers in history. The merger itself was fueled by overconfident CEOs and an internet bubble which led to overvalued companies. Time Warner CEO at the time, Gerald Levin, was encapsulated by AOL's high stock price and impressive success. Enamored by the obvious bubble, Levin did not question AOL's clear overvaluation. He strongly believed

in market prices and that AOL was not overvalued. This was demonstrated by his decision to not require a collar for the acquisition, in a case that there would be serious fluctuations in stock price between then and the time of the merger's completion (Forbes). Levin allowed his overconfidence in AOL's most recent success, blind his rational perception of the company. He was a victim of the Law of Small Numbers and cognitive easing. This acquisition required Levin to examine AOL's financials and prospective future financials more thoroughly, but instead he did not. "Managers with overconfidence profiles tend to underestimate (overestimate) the risks (synergy gains) associated with mergers and are therefore less likely to postpone an acquisition decision" (Doukas and Petmezas 2). During a period when an internet bubble was clearly present, the decision to go forth with the acquisition of a clearly overvalued internet company is irrational and irresponsible.

More recently, Hewlett Packard (H.P.) was involved in a predicament with a British software developer, Autonomy. H.P. acquired Autonomy for \$11.1 billion, "or an eye-popping multiple of 12.6 times Autonomy's 2010 revenue" (Stewart). H.P. was criticized by analysts and shareholders alike for over paying for the acquisition of Autonomy. In fact, as stated in a New York Times article written by James B. Stewart, *From H.P., a Blunder That Seems to Beat All*, H.P. admitted that "it had overpaid by an astonishing 79 percent" (Stewart). Leo Apotheker, the CEO at the time of the acquisition, was blinded by his own hubris and overconfident behavior. He did not take the time to reconsider the price for autonomy, bearing in mind the immense internal and external opposition. Catherine A. Lesjak, the current CFO at H.P. publically opposed the deal. She allegedly made "an impassioned presentation to the board and argued that

the deal wasn't in the best interests of shareholders" (Stewart). Unfortunately for H.P., Leo Apotheker could not see beyond his pride and utilize System 2 to make the appropriate decision. Instead, he continued to justify the overpayment by stating "together with Autonomy we plan to reinvent how both structured and unstructured data is processed, analyzed, optimized, automated and protected" (Stewart), a clear over justification to a blatant decision that hurt H.P. and can be considered as one of the worst business decisions made in history.

B. Cognitive Easing and Endowment

The endowment effect is a major issue within the financial sector. Professionals are constantly affected by this bias and they are not necessarily aware of it. Cognitive easing and its impact on the decision making process only adds to the detrimental properties of the endowment effect. In most cases, these individuals become endowed because they do not statistically analyze the data and situation at hand. Cognitive easing bars their use of System 2, and in return the endowment effect is triggered or enhanced.

One of the major issues that arise, when an individual falls victim to the endowment effect, is that he/she tends to remain at the status quo. One of the main elements of an effective and successful leader is "overcoming barriers to change" (Dess, Lumpkin and Eisner 401). One major barrier to change is having vested interests in the status quo. CEOs become endowed to certain ideas and investments leading to the resistance of anything that opposes the status quo. This causes an issue because many of these CEOs become endowed to ideas or investments that produce no value to the company and actually hurt the company. If cognitive easing had not initially caused the endowment effect, it could further complicate the situation by dissuading the CEO from

using system two to further analyze the situation and idea. Many CEOs have become vested in the status quo due to both the endowment effect and cognitive easing. One such CEO who demonstrated the detrimental effects of this bias was Jim Keyes, a former CEO of Blockbuster.

During an immense period of technological innovation, when the internet was becoming more and more common, Jim Keyes continued to disregard it. The media rental industry had been changing and innovation was crucial. CEOs such as Reed Hastings, who co-founded Netflix, understood this and took advantage by investing heavily in online streaming. Jim Keyes on the other hand was preoccupied with the status quo and was reluctant to move forward. He actually discontinued Blockbuster's online service and disregarded online streaming entirely. Blockbuster would not reinstate their online and streaming services until about a year before its bankruptcy. Unfortunately, this proved to be too late as key competitors such as Netflix and Cable providers had already saturated the market with similar services. Keyes had fallen victim to cognitive easing. As CEO he failed to use system two to analyze the industry trends and forecast where the markets were heading. Even when it was clear that the internet was becoming an amazing tool for businesses, he vested his interests in what he believed was right for the company, failing to analyze why competitors were performing better.

C. Cognitive Easing and Herding

Unlike the other behavioral biases, herding involves a group of individuals falling victim to cognitive ease rather than one. When individuals herd, they are not using System 2 at all. Instead cognitive easing is causing them to be lazy and simply follow

everyone else. If System 2 had been in effect the individuals would analytically and systematically make a decision based on their own research and data. As was stated earlier, this behavior is a major contributor to asset bubbles and the calamities that ensue thereafter.

In the mid to late 90's, herding played a key role in the internet or dot-com bubble. Internet companies were emerging from all areas. Initially they were not being valued much, but within an instance, almost overnight, their stocks soared. John Cassidy describes the situation well in his book How Markets Fail: The Logic of Economic Calamities:

To Begin with, institutional investors shied away from dot-com stocks, citing a chronic lack of revenues and profits, and it was mainly individual investors who bought them. This divergence didn't last long. As many technology stocks doubled, tripled, and quadrupled, those investment managers who had shunned them struggle to keep pace with the market average (Cassidy 179)

After the stocks exponentially rose, all these investors could not afford to disregard these investments. They watched as everyone else contributed to the hysteria and indulged in the massive returns these investments offered. Many may wonder why this was a problem, considering the profits. The main issue was that these investors were herding and investing based on noise rather than legitimate information. Even worse was that some understood that a bubble was forming, and instead of leaping off of it, they simply rode it to the end, where they could try their luck at evacuating seconds before the burst. "The sight of sophisticated investors knowingly helping to pump up a bubble was doubly destructive to the efficient market hypothesis" (Cassidy 181). Herding is a major contributor to market calamities, and its understanding is important to reduce such destructive instances.

A majority of the companies being invested in were blatantly overvalued. With simple investigation of the company's financial reports and a few calculations it was very clear as to how overvalued they were. Many of these investors refused to look into the data and analyze how exactly so many of these newly established internet companies were reaching record breaking values in record breaking times. These investors were clearly only using System 1. Those who used System 2 would have successfully valued the companies at their true worth and strayed away from what can only be described as ticking time bombs. Unfortunately this was not the case, and as evidenced by history, the bubble did burst and in turn hurt the entire financial sector, economy, and most importantly society.

Unfortunately, the dot-com bubble did not teach most of the world a lesson as demonstrated by the housing crises in 2008. Similarly to the dot-com bubble, the housing bubble was also partially fueled by herding mentality. During the time leading up to the housing crisis, derivative and collateralized debt obligation trading along with the issuing of credit default swaps became the primary business looming over Wall Street. Many financial institutions involved themselves in the activity based on its popularity by others. This was also the case with certain companies and firms issuing mortgages to individuals who were not eligible or capable of taking on such debt. Many of these firms possessed the adequate resources to analyze the risk involved in such activities but refused to pay much if any attention to it. They used System 1 to make a simple decision. Cognitive easing made clear the connection between trading derivatives and issuing mortgages and the very high short term returns they produce. Other firms understood the risk involved in such trading and neglected their own stance to herd and follow the majority. They too

were affected by cognitive easing and their decision to herd reflected their neglect of System 2. Herding in effect led majority of the industry into a risky business that was helping fuel a disastrous bubble. If cognitive easing did not take place, many of the decisions made by investors and executives could have possibly led to avoidance of the crash, or at the very least a softer blow to the economy.

III. Methodology

In order to assess the impact of cognitive ease, I created an experiment in which I tested the presence of cognitive ease in both undergraduate and graduate students. This was done through a series of questions that test the individual's use of either System 1 or System 2. The results to this experiment will help to depict how exposed business professionals, in the field, may be to cognitive ease.

Participants: One hundred and seven undergraduate and graduate students had participated in taking a short questionnaire. Most of the participants who were part of the experiment graduated, or are expected to graduate, with a business or economics degree and/or works in the business sector. The participants were not compensated.

Procedure: The participants were given a short five minute, quiz like, questionnaire testing their thinking pattern. Each question required the individual to channel their mental capacity toward using either System 1 or System 2 thinking. The Questionnaire involved a series of mathematical, word association, and true and false based questions. Many of these questions were taken from Daniel Khaneman's book, Thinking Fast and Slow. The questions used are known as Cognitive Reflection Test questions. These

questions are meant to test an individual's ability to suppress intuitive but wrong answers that are triggered by System 1 rather than the correct but less noticeable answer triggered by System 2.

Questions:

One: A bat and ball cost \$1.10. The bat costs one dollar more than the ball. How much does the ball cost?

Answer: \$.05

This simple mathematical question, devised by Shane Frederick is known as a Cognitive Reflection Test (CRT) question. It tests the individual's use of either System 1 or System 2 thinking. At an initial glance, most individuals will answer this question by stating that the ball costs \$.10. This answer is brought about through System 1 and cognitive ease. When reading the question, the mind picks up that the bat and ball both cost \$1.10, and if the bat is one dollar more than the ball, then through simple subtraction the ball must cost \$.10. The fact of the matter is that subtraction is not even used to derive the correct answer. If the ball cost \$.10, and the bat was a dollar more, then the bat would cost \$1.10 leading to a total price of \$1.20, \$.10 more than what the question indicated the ball and bat were priced together. System 1 does not allow the individual to make that connection.

Using System 2, the subject is more likely to arrive at the correct answer. Since this question requires a little more analysis than initially believed to, System 2 is the appropriate thinking pattern to apply. Whatever the individual prices the ball at, the bat will be one dollar plus that price. Therefore, the only possible answer could be \$.05. If the ball was \$.05, the bat would be \$1.05 resulting in a total cost of \$1.10, as stated in the

question. Another way to arrive at that solution would be to write the question out algebraically. The price of the ball is the unknown or “x”. Therefore the equation would equal: $x + (1 + x) = \$1.10$. This can be re-written to $1 + 2x = \$1.10$, which is simplified to $2x = \$.10$. Simplifying that further will allow one to arrive to the solution of \$.05. As you can see, the question itself requires very simple algebra.

Two: All roses are flowers. Some flowers fade quickly. Therefore some roses fade quickly.

Answer: False

This question presents the participant with a logical argument, and is asked to state whether the argument is true or false. Participants will be expected to state that the argument presented is true, but that is incorrect. The reason that some roses do not fade quickly, is simply due to the fact that there may be no roses among the flowers that do fade quickly. Therefore, some roses do not fade quickly (Khaneman 45). Given the information, most individuals immediately come to the conclusion that it is true, through the use of System 1. They then do not allow System 2 to process the conclusion and simply move on to the next question.

Three: Approximately how many murders occur in the state of Michigan in one year?

Answer: 450-600

Question three is a factual based question, simply asking participants what they believe the murder rate in Michigan is in a typical year. This question challenges the individual’s use of System 2. The focus of this question is to allow System 2 to make a connection between Michigan and one of its major cities, Detroit. Because Detroit is

statistically a high crime city, the connection made would support a higher estimate of murders. This connection is rarely ever made by participants due to the lack of using System 2, because of cognitive ease. In most instances participants will be expected to underestimate the murder rate and give a number far less than what the rate actually is. In this case, the most recent statistic found for the reported number of murders in Michigan was six hundred and thirteen (FBI). Any answer given below four hundred and fifty was considered an underestimation.

Four: If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

Answer: 5 Minutes.

This problem is similar to that of question one. It is also a CRT question devised by Shane Frederick. Most participants answer this question with one hundred, assuming that it takes one minute to make one widget. This is incorrect. If it took one minute to make one widget, five machines would have made five widgets in one minute, assuming each machine was making one widget. System 1 has individuals believe that logic through cognitive ease. It is often the first conclusion that comes to one's mind and therefore it is the least stressful to the mind. It actually takes five minutes for any number of machines to make the same number of widgets.

Five: In a lake there is a patch of lily pads. Every day the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

Answer: 47

Question five is another CRT question devised by Shane Frederick. This question, as do all the others, challenges System 2. The most popular answer to this question is twenty four. Individuals arrive at that answer due to System 1 playing majority of the role in the solution process. Individuals read the question and System 1 takes into consideration two main points, that it takes forty eight days to cover the entire lake and that the question is asking for the amount of days it would take to cover only half of the lake. Therefore, forty eight divided by two is twenty four and that must be the answer. System 1 fails to understand that the patch doubles in size every day. Therefore they disregard it and answer the question wrong. If the patch doubles in size every day, and on the forty eighth day it is completely covered, that means the day prior the patch only covered half the lake.

Word Association

Six: Cottage, Swiss, Cake

Answer: Cheese

Question six involved a simple word association question. Unlike every other question on the survey, this question did not challenge System 2. It was meant to trigger only System 1. In most cases, it is expected that this question will be answered correctly, using the word cheese.

Seven: Dive, Light, Rocket

Answer: Sky

Unlike question six, this word association question is meant to challenge System 2. In order to associate sky to these words, the participant will have to use System 2. The

three words Dive, Light and Rocket do not have a word that is as easily associated with, as did Cottage, Swiss and Cake. Words such as sky dive, skylight and skyrocket are not words often used by the average person. Therefore, these associations will not come to mind as easily. It is expected that most participants will answer this question incorrectly, due to cognitive easing and their lack of utilizing System 2.

IV. Results and Discussion

The results show that my initial hypothesis was correct to some degree. In the following section I will discuss the results of my experiment by specific questions. I will also attempt to reveal possible reasoning for the results. Initially I will discuss the results of questions one, two, four and five. I am grouping these questions together because they are of similar nature. Then I will discuss the results of question three. Finally I will discuss the results regarding the word association questions.

A. *Questions 1, 2, 4 & 5*

Among the undergraduate students, it is quite evident based on my research, that most of them were using System 1 rather than System 2 while solving the questions. On average, more students answered those questions incorrectly than correctly, with 81% answering question one incorrectly, 70% answering question two incorrectly, and 61% answering question five incorrectly (table 1.2¹). Question four had more correct results than incorrect but only by a very small margin with 52% answering the question correctly (table 1.2).

¹Tables are being selected and referenced from the appendix on page 43

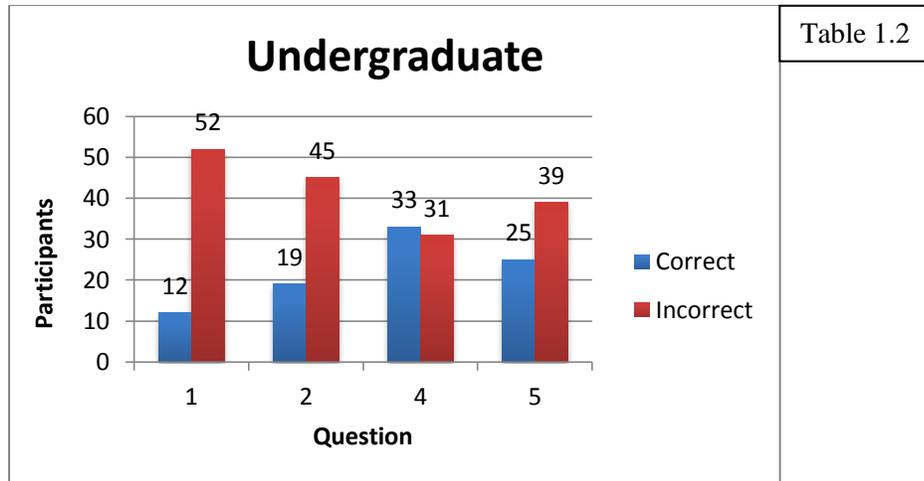
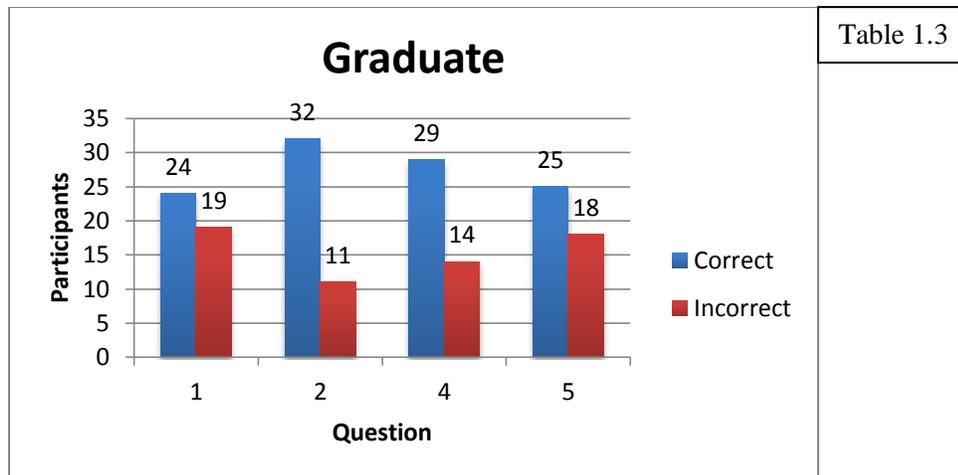


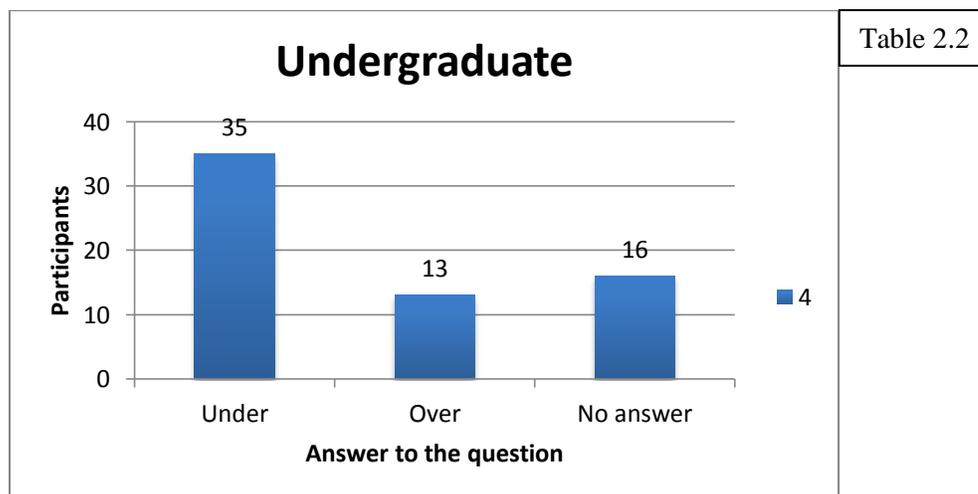
Table 1.2

The results were quite different for the graduate students. As dictated by my research, on average more students answered the questions correctly than incorrectly, with 56% answering question one correctly, 74% answering question two correctly, 67% answering question four correctly, and 58% answering question five correctly (table 1.3). My reasoning behind this may be due to the graduate student's higher degree of education as well as experience. As graduate students, these subjects had more exposure to the field of finance and may have adapted well to such behavioral biases. Their current curriculum may have also included the study and understanding of certain cognitive biases and how to manage them appropriately. Furthermore, it may also be that graduate students take exams more seriously than undergraduate students do. They have a greater amount of investment laid into their graduate programs, which may induce higher levels of cognitive strain. This higher cognitive strain causes the graduate students to take their classes, exams, and projects more seriously, resulting in better performance on this questionnaire than the undergraduate students.



B. Question 3

Question three allowed for a variety of answers and they were judged as correct or incorrect based on the under/overestimation relative to the estimate of Four Hundred Fifty. Some subjects left the question blank and therefore a third “no answer” response was added. Among the undergraduate students, 55% underestimated the murder rate while only 20% correctly or overestimated it, and 25% did not leave an answer (table 2.2). Even with 25% not knowing, there were significantly more subjects underestimating the number leading me to confidently state that System 1 again was being used rather than System 2.



The graduate student results again varied. Among this subject group, 37% underestimated the murder rate while 40% overestimated it, and 23% did not leave an answer (table 2.3). While more individuals on average correctly overestimated the rate, the amount of people who left the answer blank can have a significant effect on the final results. Therefore, it may not be statistically appropriate to make a conclusion regarding the absence of System 2.

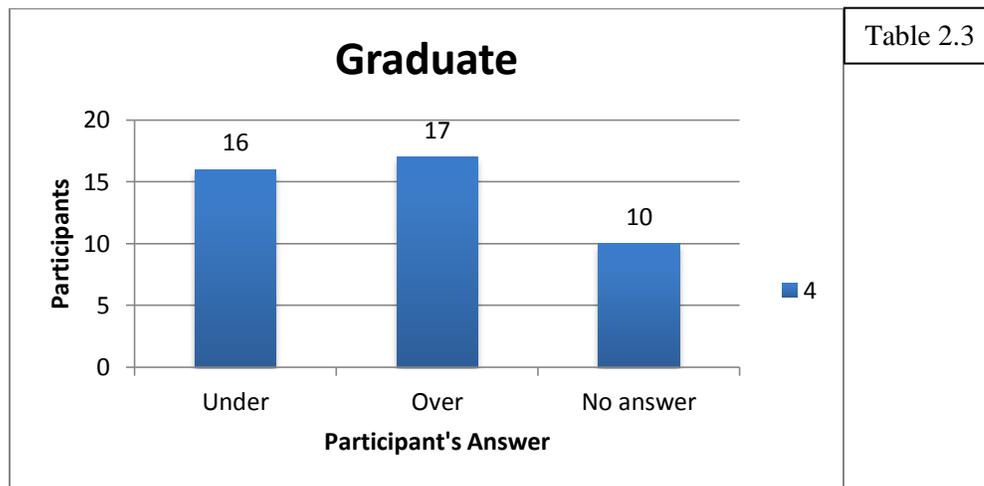
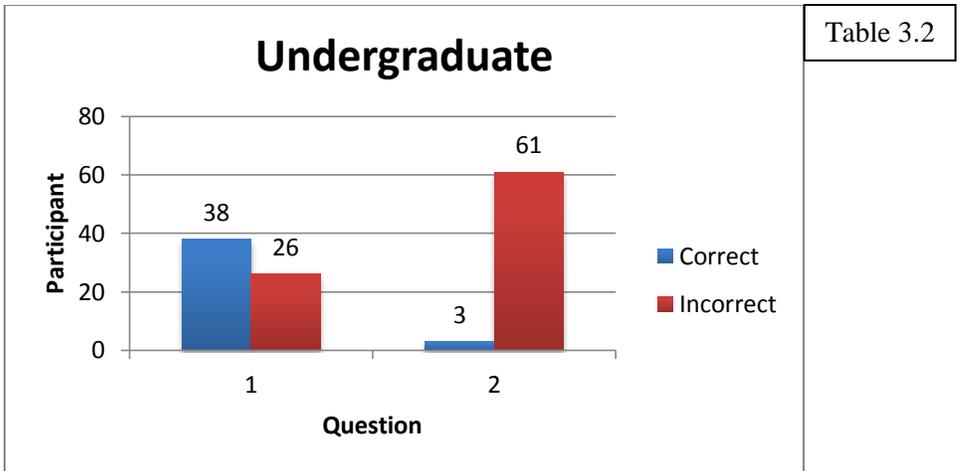


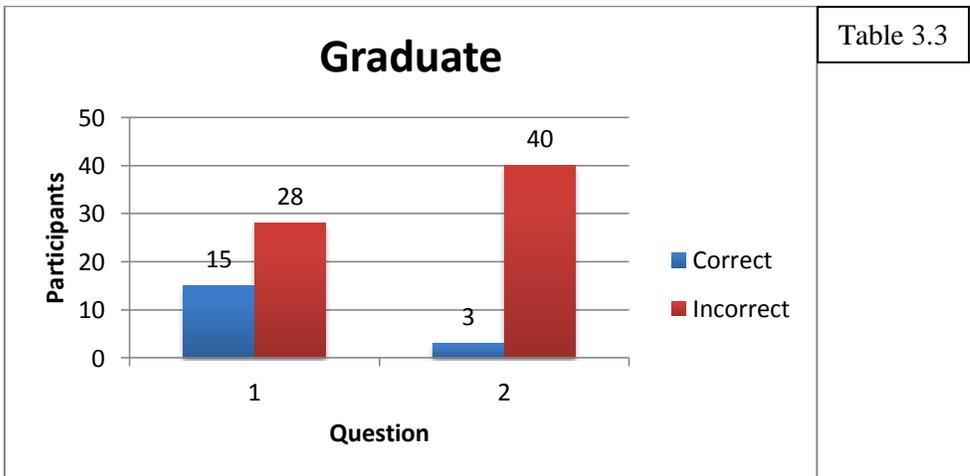
Table 2.3

C. Word Association

The word association questions consisted of two separate questions. Question one adhered to System 1 and question two adhered to System 2. As initially expected, more undergraduate students answered the first question more correctly than the second. On average, 59% answered question one correctly while only 5% answered question two correctly (table 3.2). This depicted the absence of System 2 in the question that needed it.



The graduate students demonstrated similar results, except that on average more students answered question one incorrectly rather than the expected result of answering it correctly. On average 95% answered question one incorrectly and 93% answered question two incorrectly (table 3.3). The skewed results may be caused by the very large portion of international students who were tested within the graduate group. Many of Pace University’s graduate students are international and their first language is not English. That being said, the word association questions may be quite skewed.



V. Conclusion to the Experiment

As mentioned previously, my initial hypothesis was correct to some degree. In regards to the undergraduate students it is quite clear, as depicted in my results, that on average they are not using System 2 when making decisions. On the other hand, many of the graduate students answered more questions correctly than incorrectly, going against my initial hypothesis. As I have stated earlier, this could have occurred due to a few factors. Firstly, graduate students have a higher level of education. This higher education may have had an important impact on their performance on the questions, mainly the mathematical ones. Furthermore, the higher level of education may have exposed them to these very questions elsewhere, as they are not original. Therefore, through their higher education, the individuals were better equipped to control and regulate their use of system 1 and 2. Secondly, graduate students invest heavily in the graduate program they attend and therefore invest more in their assignments, in this case the questionnaire. This is especially true considering the fact that a graduate degree is not as much of a necessity as an undergraduate degree is in today's world. Lastly, many of the graduate students tested were international students. Culturally speaking, test taking skills and education varies geographically. In some cultures exams and tests have higher importance and therefore these students would have more experience taking tests. This extra experience may have allowed them to better control their use of System 2, therefore resulting in more correct answers on this questionnaire.

As my research suggests, students who receive a graduate degree are not affected by cognitive ease as much as those who receive an undergraduate degree. This does not mean that they are immune to the cognitive folly. It only suggests that they are better

equipped, possibly through the higher education, experience, and investment, to deal with the folly and possibility of avoiding irrational behaviors and decisions. That being said, the business world is still plagued with individuals who are affected by cognitive ease. The U.S. Census reports, there were 347,985,000 undergraduate degrees in business compared to the 168,375,000 graduate degrees in business (Bureau 190-191). This poses a problem because there are more individuals in the field who are significantly more exposed to cognitive easing than there are those who may not be. Therefore, a major issue still stands and it must be mitigated.

VI. Conclusion

For years, the financial field has been considered more of a scientific and mathematical field than anything else. It is heavily based on financial, economic, and complex mathematical models. This is expected considering the rationality behind the sector. More recently though, it has become quite apparent that while the field requires rationality for complete efficiency the individuals who dedicate their lives to the financial sector do not always appear to behave in rational ways. Cognitive easing is a major culprit to why irrational behavior may occur, and its detrimental effect on the thinking process further enhances or even creates behavioral biases such as overconfidence, endowment and herding.

As discussed in my research, with minor exceptions, on average most of the business students at Pace University showed high levels of cognitive easing affecting their thinking process. Many of them could not answer simple mathematical questions due to their minds reacting to the question in the least cognitive stressful manner. Instead of analyzing the question further, they assumed the already simple question was far simpler and in turn answered it incorrectly. These results merely show how susceptible individuals are (or in this case individuals in the business sector) to mental biases such as cognitive ease.

This bias is carrying over past the university level and into the professional work place. Therefore, those individuals run the risk of making bad financial decisions for themselves, for their company, and even for society. Aside from cognitive easing directly causing an individual to make irrational decisions, this cognitive bias can also cause an

individual to become overconfident, endowed or partake in herding. These behavioral biases all produce irrational behaviors and in turn irrational decisions. Furthermore, if cognitive easing does not initiate these behavioral biases, it will instead add to the negative effects that result from these biases. In other words if an individual is already a victim of these behavioral biases cognitive easing will only enhance that behavior and all the irrationalities that accompany it.

It is important that within the field of finance, along other business fields, there exists an understanding of the effects of both behavioral and cognitive biases. While the field of finance is based on rationality, those who dictate it unfortunately do not always behave rationally. Humans are flawed in that manner. They have the ability to create concepts of rationality and rules that are dictated by rationality, but they themselves cannot fully grasp rationality. Business professionals, whether they are executives, investors, or advisors, carry many responsibilities. Their decisions effect a wide array of individuals, not just themselves, and in a modern world such as today, where the entire market is interconnected and contagion is always a risk, they need to ensure their decisions are optimal and rational. It is not only important for a business professional to understand the science behind finance, but also the science of human behavior. These professionals need to understand the underlying processes that take place while a decision is being made and they need to understand the detrimental effects cognitive ease will have on the decision making process.

Cognitive easing has clearly been an issue in the business world. Fortunately for professionals there are ways to prevent it from affecting their decision making process.

First and foremost, the business curriculum in all business schools and programs need to educate students about these biases at the undergraduate and graduate level. As stated previously, finance and business are highly affected by human behavior, emotion, and cognition. Therefore, educating future professionals about these biases can help to avoid irrationalities that are caused by them. Secondly, within firms and companies, management should hold monthly meetings, similar to those held regarding sexual abuse and safety, discussing the importance of rational behavior. These meetings will remind professionals that they are capable of making human errors and mistakes and allowing certain behaviors and cognitive biases to get the best of them. Even the most informed individual will sometimes forget, and reminding them, while it may be seen as time consuming, will unconsciously help them. Even a small note stating that $1+1$ is not the same as 17×43 can help an individual realize his or her cognitive limitations. Lastly, when making decisions, professionals and executives should execute them during times when cognitive energy is at its peak. Cognitive ability is a vital resource to the decision making processes as are carbs to a marathon runner. Individuals need to make decisions at the middle of the day or at whatever time of day he or she has enough mental strength and effort. If an individual makes an important decision after a long hard day at work, cognitive ease will easily steer him or her away from using System 2 and only use System 1, resulting in a less optimal decision.

If continued further with this experiment, I would have incorporated many other factors. I would have made a more comprehensive study measuring the effects of cognitive ease between the many disciplines within the business field as well as the differences between genders. Furthermore, studying the different levels of cognitive ease

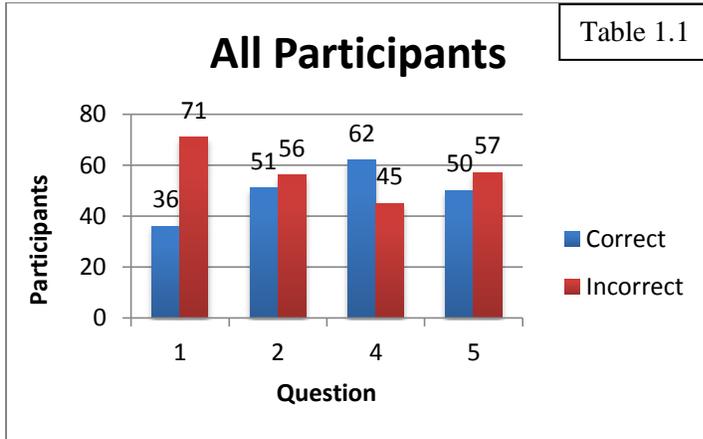
between both international and local students would be interesting. Lastly, I would have liked to see the results of my experiment if a financial incentive had been present. Unfortunately there was not enough time and resources for me to fully incorporate all these extra factors, but it is definitely something to consider if one were to continue this research further.

VII. References

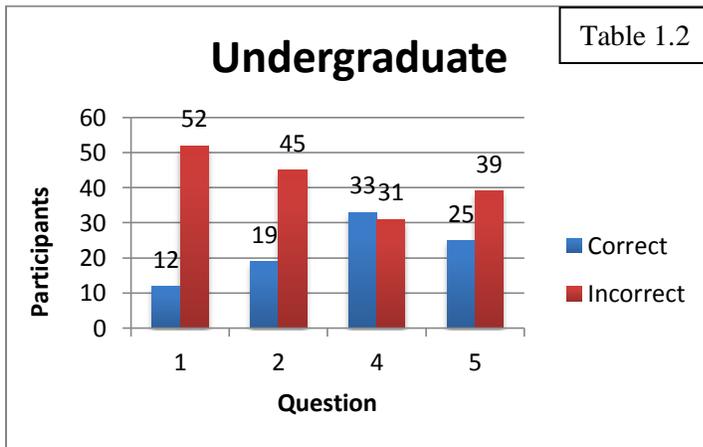
- Malmendier, Ulrike and Geoffrey Tate. "CEO Overconfidence and Corporate Investment." (2002): 76.
- Ariely, Dan. *Predictably Irrational*. New York: HarperCollins, 2008.
- . *The Upside of Irrationality*. New York: HarperCollins, 2010.
- Blasco, Natividad, Pilar Corredor and Sandra Ferreruela. *Ingredients of Herding: Return Performance, Market Sentiment and Imitation Tendency*. Zaragoza, March 2010.
- Bureau, U.S. Census. *Statistical Abstract of the United States: 2012*. 2012.
- Cassidy, John. *How Markets Fail: The Logic of Economic Calamities*. New York: Picador, 2009. Book.
- Dess, Gregory G., et al. *Strategic Management*. New York: McGraw-Hill/Irwin, 2012. Text Book.
- Doukas, John A. and Dimitris Petmezas. "Acquisitions, Overconfident Managers and Self-Attribution Bias." (2006): 48.
- Evanoff, Douglas D., George G. Kaufman and Anastasios G. Malliaris. *Asset price bubbles: What are the causes, consequences, and public policy options?* Chicago Fed Letter. Chicago: The Federal Reserve Bank of Chicago, 2012. Essays on Issues.
- FBI. 2011. Document. 8 February 2013. <<http://www.fbi.gov/about-us/cjis/ucr/crime-in-the-u.s/2011/crime-in-the-u.s.-2011/tables/table-5>>.
- Forbes, Williams. *Behavioural Finance*. West Sussex: John Wiley & Sons, 2009.
- Huck, Steffen, Georg Kirchsteiger and Jorg Oechssler. *Learning to Like What You Have: Explaining the Endowment Effect*. March 2003. Bonn Econ Discussion Paper.
- Kahneman, Daniel, Jack L. Knetsch and Richard H. Thaler. "Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias." *The Journal of Economic Perspective*, Vol. 5, No. 1. (1991): 193-206.
- Khaneman, Daniel. *Thinking Fast and Slow*. New York: Farrar, Straus and Giroux, 2011.
- Moore, Don A. and Jessica A. Kennedy. "A Status-Enhancement Account of Overconfidence." *Journal of Personality and Social Psychology* (2012): 18.
- Otto, Richard Ebil. "Human Capital, Managerial Overconfidence, and Corporate Valuation." (2012): 43.
- Park, Andreas and Daniel SgROI. *Herding, Contrarianism and Delay*. 18 June 2009.
- Pompian, Michael M. *Behavioral Finance and Wealth Managemnt*. Hoboken : John Wiley & Sons, 2006.

Stewart, James B. *From H.P., a Blunder That Seems to Beat All*. New York, 30 November 2012.
Newspaper article.

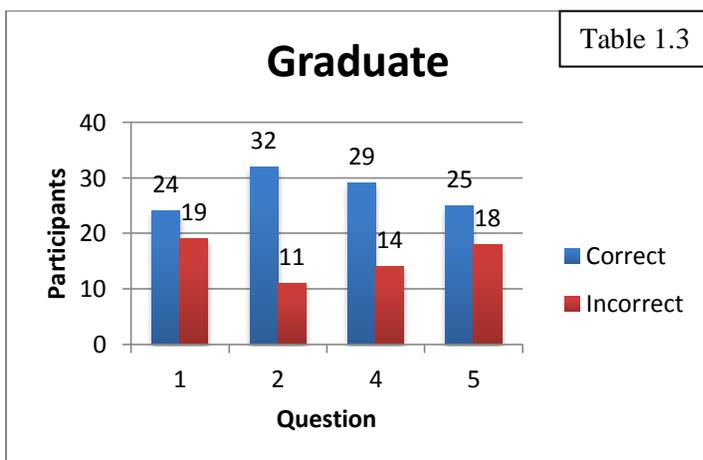
VIII. Appendix



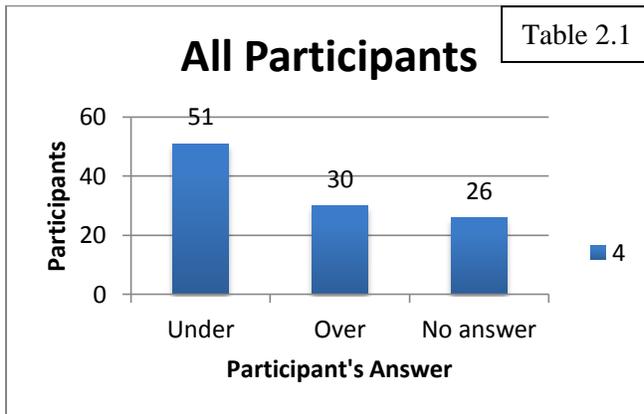
All	107			
Question	Correct		Incorrect	
1	36	34%	71	66%
2	51	48%	56	52%
4	62	58%	45	42%
5	50	47%	57	53%



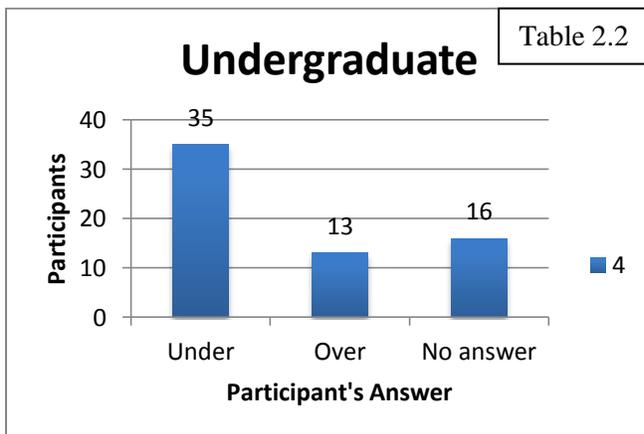
Undergraduate	64			
Question	Correct		Incorrect	
1	12	19%	52	81%
2	19	30%	45	70%
4	33	52%	31	48%
5	25	39%	39	61%



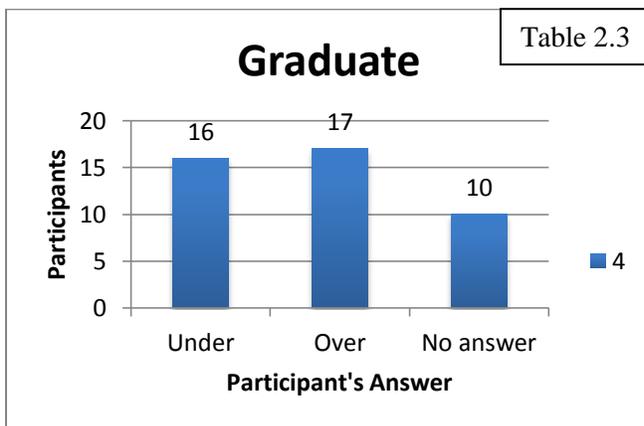
Graduate Students	43			
Question	Correct		Incorrect	
1	24	56%	19	44%
2	32	74%	11	26%
4	29	67%	14	33%
5	25	58%	18	42%



All	107					
Question	Under		Over		No answer	
4	51	48%	30	28%	26	24%



Undergraduate	64					
Question	Under		Over		No answer	
4	35	55%	13	20%	16	25%



Graduate	43					
Question	Under		Over		No answer	
4	16	37%	17	40%	10	23%

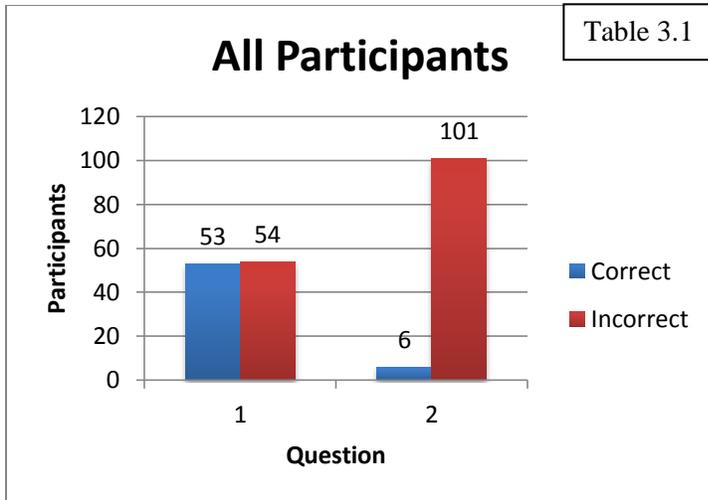


Table 3.1

All	107			
Word Association	Correct		Incorrect	
1	53	50%	54	50%
2	6	6%	101	94%

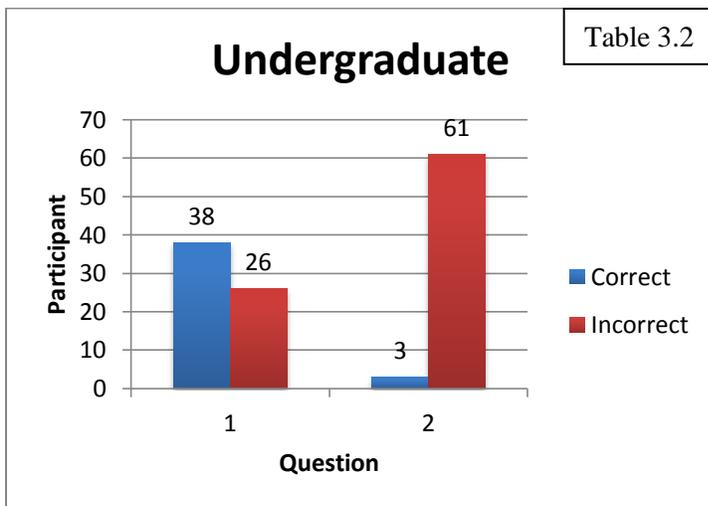


Table 3.2

Undergraduate	64			
Word Association	Correct		Incorrect	
1	38	59%	26	41%
2	3	5%	61	95%

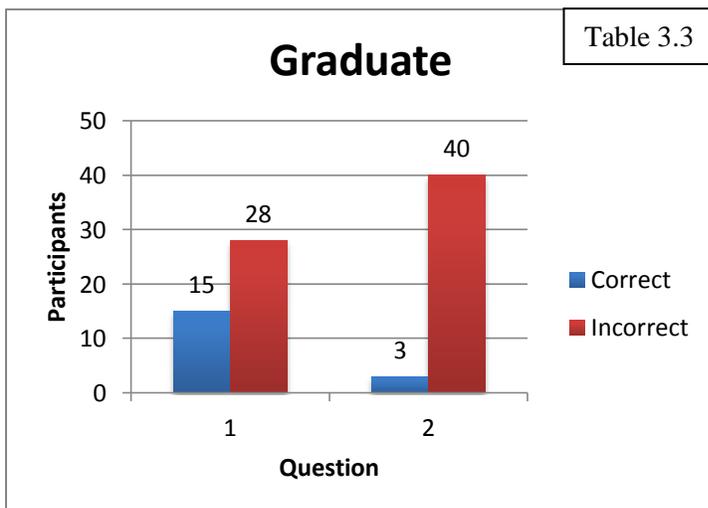


Table 3.3

Graduate	43			
Word Association	Correct		Incorrect	
1	15	35%	28	65%
2	3	7%	40	93%

This Questionnaire will be used as research for a future thesis. No personal information will be made public. Any information collected from this questionnaire will remain anonymous throughout the research, without any knowledge of whom as completed it.

Major: _____ Student Standing: _____

Job Position (if applicable): _____

Questions:

1.

A bat and ball cost \$1.10
The bat costs one dollar more than the ball.
How much does the ball cost?

Answer: _____

2.

All roses are flowers
Some flowers fade quickly
Therefore some roses fade quickly.

True or False? _____

3.

Approximately how many murders occur in the state of Michigan in one year?

Answer: _____

4.

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

- A) 100 Minutes
- B) 5 Minutes

5.

In a lake there is a patch of lily pads. Every day the patch doubles in size.
If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

- A) 24 days
- B) 47 days.

Think of a word that associates with the following three words.

1. Cottage, Swiss, Cake

Answer:

2. Dive, Light, Rocket

Answer:

Thank you for your participation.