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Are We Equally Irrational in Financial and Everyday Decisions?

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Finance 495
Advisor: Dr. Teall
2005

Abstract

This paper investigates whether people are equally irrational in finance and everyday decisions by examining the responses of a 20-question survey conducted at Pace University. Results from our data indicated that we could not conclude that people are more irrational in one area than the other. People appear to be equally overconfident in both. Testing for frame versus substance, the second set of data, the t-test signifies that people are more irrational in their finance decisions than they are in their everyday decisions with more than 99% certainty. The third and final category of responses were tested for problem solving; in other words are people more rational in solving problems, such as "Monty Hall" questions, in finance or everyday? From the t-test results we were not able to conclude that people are more irrational in their finance decisions than they are in their everyday decisions. The tests did however confirm previous research that people, given a second opportunity, usually do not choose to change their first response even if by calculating the probability it is the more rational decision. It seems reasonable to obtain different results for different decisions making traits. On the basis of these results we conclude that although people are irrational in general they may be more irrational in finance or everyday depending on the irrational behavior being examined.

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I. Introduction and Literature Review

A. Research Motivation and Design

Twenty years ago, empirical and theoretical research in finance tended to neglect the human component of decision-making. Because of recent advances in arbitrage pricing techniques and other powerful valuation techniques based on the assumption of investor rationality, some people still think that psychology and finance are two entirely separate fields and should not be combined. However, extraordinary events in the recent past have convinced many that finance does in fact include a psychological component to it. There is substantial research suggesting that investors and people in general are not rational. I intend to examine these issues and their implications. The purpose of my study is to explore whether business students and professors exhibit rationality in their everyday decision-making processes to the same extent as with their investment decision-making processes. Research has shown that we are not rational in many of our decisions; my thesis seeks to examine this and to examine the difference in finance and everyday decision-making. The subjects of the study are students and faculty in the Lubin School of Business at Pace University. These subjects were selected at random and from a few specific course sections. Survey participants were asked to complete forms consisting of 20 questions. The questions seem to test their knowledge of issues related to finance, history, art, science and miscellaneous other subjects. The responses were examined to determine their consistency and the extent to which subjects exhibited confidence in their abilities to answer the questions and to make decisions of various types. I hope that this thesis will contribute to the financial literature by offering a unique perspective on the decision-making capabilities of investors relative to their every-day decision-making.

B. Introduction to Behavioral Finance

Not too long ago the psychology of money was seen as a fascinating topic, primarily for psychologists, but one that may be "too interesting" for economists and one that may distract them "from the pervasive market forces that should be [their] principal concern"[1]. Many think that psychology and finance are two entirely separate fields and should not be combined. However, the extraordinary events of the 1980's and 1990's, such as the 1987 crash and the Nasdaq bubble, have convinced many that finance does in fact include a psychological, a human behavior, component to it. Behavioral finance thinks about financial issues with the help of ideas borrowed from psychology. Psychology is in part the study of human behavior, which includes perception, decision-making, goal setting, motivation, and social interaction in addition to emotional expression and adjustment[2]. For most of us there is an intertwining of reason and emotion. Money has a way of stirring emotions and clouding the decision making process. Therefore, psychology does play a major role in finance.

Much of economic and financial theory is based on the notion that individuals act rationally, and consider all available information in the decision-making process. However, research has shown that this is frequently not the case. Many examples of irrational behavior and repeated errors in judgment have been studied, and much evidence reveals "repeated patterns of irrationality, inconsistency, and incompetence in the ways human beings arrive at decisions and choices when faced with uncertainty" [3]. The field of behavioral finance has evolved in attempts to better understand and explain

[1] Miller, M.H., 1986. Behavioral rationality in finance: the case of dividends. Journal of Business 59, 267-284
[2] Harry Gunn. Investment Euphoria and Money Madness, (New York, NY: Glenlake Publishing Company, Ltd, 2000, pg. IX
[3] www.investorhome.com

how emotions and cognitive errors influence investors and their decision-making process. Behavioral finance is based on the study of behavioral biases and their effects on financial markets, such as anomalies and inefficiencies on prices and returns. Behavioral finance tries to identify and understand those biases and anomalies, and if possible use them in investment strategies. Research in behavioral finance is relatively new. Most of it has taken place since 1985.

A number of researchers believe that the study of psychology can shed considerable light on the efficiency of financial markets as well as explain many stock market anomalies, market bubbles, and crashes. Behavioral finance casts much doubt on the predictions of modern finance, such as the notion of efficient markets. One of the most controversial topics in finance is market efficiency. Market efficiency is characterized as existing when market prices reflect information. Tests of market efficiency are concerned with what type of information is reflected in security prices and the length of time required for new information to be reflected in security prices. There are three forms of market efficiency. Traditional finance believed that market efficiency should hold, where as behavioral finance casts its doubt on that hypothesis. The first form of market efficiency is the weak form. The weak form efficiency is concerned with whether market prices reflect historical price sequences. The second form is the semi-strong. The semi-strong form efficiency is concerned with whether market prices reflect all publicly available information. And, the third form is the strong form. The strong form efficient is concerned with whether security prices reflect all information, including all public and private information.

Weak form efficiency argues that current prices of financial assets contain all information that buyers and sellers have been able to obtain on the past trading of those assets: "their price history and past volume of trading"[4]. In addition this past price and trading information is publicly available and the cost of obtaining the information is negligible. No one buyer or seller can earn above normal returns, excess profits, for the amount of risk taken on from trading on this historical price and volume information. If this did not hold then investors would have figured out long ago how to profit from such historical data and asset prices would have been adjusted accordingly, eliminating further opportunities for above normal returns.

The semi-strong form efficiency argues that the current prices of financial assets already reflect all publicly available information affecting the value of these financial assets, including information about historical prices and volume, the financial condition and credit rating of each issuer, any published forecasts, the condition of the economy, and all other relevant information[5]. This form of efficiency assumes that all buyers and sellers are rational and use all publicly available information to help them value financial assets. Therefore, no one buyer or seller will find opportunities for exceptional (above normal) profits by trading on publicly available information.

The third form of efficient market hypothesis is the strong form. The strong form efficiency argues that the current prices of financial assets reflect all the information, both public and private, that is relevant to the value of financial assets. This includes the information possessed by insiders, such as principal owners, officers, and senior

[4] Peter Rose. Money and Capital Markets, (New York: McGraw-Hill, 2003), Pg. 57.
[5] Ibid.

management of a corporation issuing the stocks or bonds. This assumes that there is no asymmetric information.

Repeated research studies have significantly confirmed the weak and semi-strong form efficiency. Few opportunities for excess returns exist based on past or present publicly available information. However, the strong form efficiency is the one that has raised the most controversy because of the mixed research findings, especially because of existence of insider trading activities and the apparent presence of pockets of special information asymmetrically distributed throughout the financial system[6].

Behavioral finance is the field of finance that proposes psychology-based theories to explain stock market anomalies. Within behavioral finance it is assumed that the information structure and the characteristics of market participants influence individuals' investment decisions as well as market outcomes. Numerous studies have documented long-term historical phenomena in security markets that contradict the efficient market hypothesis and cannot be captured reasonably in models based on perfect investor rationality. Behavioral finance attempts to fill the void.

Behavioral finance also enlightens the area of asset pricing, where it has been used to interpret and/or discover empirical anomalies in the speculative dynamics of stock returns, such as under and overreaction to news. In addition to that, behavioral finance has led the way to many detailed surveys and studies of trading behavior, through which a lot has been learned about the conduct of investors, analysts, and money managers. Furthermore, because of behavioral finance, prospect theory offered the first significant alternative to the expected utility paradigm that dominated research in finance until then. Prospect theory was based on experimental evidence about human behavior

[6] Ibid.

under uncertainty, and was built to fit the evidence rather than represent an abstract sense of rationality [7]. Prospect theory relies on evidence that when making economic decisions people are easily influenced by framing, that is by the context and ambience that go with the decision problem. Part of this context is generated by the people themselves, such as when they adopt arbitrary "mental accounting of their financial circumstances" [8]. Moreover, in the field of corporate finance, behavioral finance has stimulated interest in the factors that determine the quality of executive decision making, such as excessive risk aversion, unjustified optimism, hubris, and so on. Other psychological theories that have been applied successfully to understanding phenomena in financial markets is through the extensive psychological research that has shown that people tend to be overconfident in their judgments. People tend to illustrate wishful thinking bias, believing whatever it is they want to believe. They also indicate problems of self-control. People often make judgments using the "representative heuristic", that is when judging the probability that a model is true, they base their estimate on the degree to which the data resembles the model, rather than do appropriate probability calculations. In addition, they are inclined to exhibit "belief perseverance", which is hanging on to past beliefs long after they should have been abandoned. Individuals are apt to make the mistake of "anchoring", meaning when making difficult quantitative judgments they tend to start from some arbitrary initial estimate and then allow that initial estimate to influence their judgments. People have a propensity to demonstrate availability bias, overweighing evidence that comes easily to mind, thereby allowing their decisions to be over-influenced by evidence

[7] www.cowles.econ.yale.edu
[8] Ibid.

that is more salient and attention-grabbing[9]. All of these have been major factors in explaining and understanding investors' behavior and financial markets in general.

Although many used to believe that psychology and finance really have nothing to do with one another, research has shown otherwise. The psychology aspect has helped the area of finance tremendously, hence creating a single field of the two areas combined, which is known as behavioral finance. Research in behavioral finance has essential applications. The research can help guide portfolio allocation decisions, both by helping us understand the kinds of errors investors tend to make in managing their portfolios, as well as by allowing us to better understand how to discover profit opportunities for investment managers. Beyond this, understating the psychological foundation of human behavior in financial markets "facilitates the formulation of macroeconomic policy and the devising of new financial institutions"[10]

C. Behavioral Finance Literature Review

A number of experiments and studies in finance have been conducted in order to understand investing and security markets in general. Most financial models assume that all investors and all corporate executives rationally process information and seek investor wealth maximization. Experiments by psychologists as well as past experience and observation of market behavior suggest that investors may not be entirely rational. Many financial models fail when applied to the real world because of this assumption of investor rationality. Anomalies such as the January effect, the small firm and P/E effects, the value premium effect, and many others cannot be explained with rationality-based

[9] Ibid.
[10] Ibid.

financial models; however, behavioral finance might offer an alternative. Behavioral finance reconsiders the rational investor assumption in light of what we know from experimental evidence from psychology where people tend to act irrationally.

Experimental psychology offers many studies concerning individual and investor rationality. In addition to these experimental studies, there are supporting studies based on statistical analyses of financial data. Amos Tversky and Daniel Kahneman have conducted many pioneering experiments on subjects testing their decision-making characteristics. In general all of the experiments suggest that most subjects are quite irrational and inconsistent in their decision-making processes. Tversky and Kahneman used their results in application to financial decision-making, suggesting that investors may actually be very different from the theoretical "rational economic man," which many financial models are based on. For example, there is a particular type of bias to maintain the status quo, which is sometimes referred to as the endowment effect. This can be seen in the example given in an article from the *Wall Street Journal*, Joe and his opera tickets:

> "On the way to the opera, Joe loses his pair of $50 tickets. Most likely, he will not buy another pair, spending (a total of) $200 (including $100 on the lost tickets) to hear "La Boheme" seems a bit much. But suppose, instead, he arrives at the theater tickets-in-hand, but discovers he has lost a $100 bill. He could sell his tickets, which would net him the same result as in the first case-out $100 and out the tickets. But he probably won't sell. …Joe may think he is entirely rational, but he leans consistently toward the status quo" (Lowenstein, June 6 1996 issue).

The endowment effect causes losses or what is given up to weigh more heavily in the decision-making process than gains or what is acquired. This is very applicable to finance and how people are very reluctant to sell stocks, particularly stocks that have lost value. A rational investor, after considering the

tax write-off implications of selling stock that has lost value, would sell "losers" before year's end. However, most investors show reluctance to do so, hence being irrational.

Kahneman and Tversky also show how individuals form decisions when identical questions are phrased differently. This is known as the frames vs. substance effect. For example, when individuals are asked from two different perspectives to select from radiation or surgery for cancer treatment their decisions vary based on how the information is presented. Although the information in the "Survival frame" is exactly the same as the information in the "Mortality Frame", 18% of respondents preferred radiation therapy when presented with the "Survival Frame", compared to 44% when presented with the "Mortality Frame". Therefore, not only does this show evidence that decision-making is inconsistent, but preferences may be inconsistent and individuals irrational as well.

Most observers of the stock market agree that many market swings cannot be explained by substance or value. In addition, they often argue that stocks are too frequently over-valued. There is some empirical research that shows stocks which experience great short term price swings reverse those swings in the intermediate-term. This behavior shows that investors may over-react to information. Experiments by Lichtenstein, Fischoff and Phillips show that people have a tendency to be overconfident in their own judgments. According to Kyle and Wang, some of this overconfidence may even enable overconfident traders to generate higher profits than their more rational counterparts. Griffin and Tversky

[1992] argue that experts tend to be more prone to overconfidence than novices. Overconfident traders tend to be more aggressive in their trading strategies, which may lead to the more profitable conclusion by Kyle and Wang.

From 1925-1997, intermediate term government bond returns have averaged approximately 5.2%, while stock returns have averaged 10.7%. A rational investor would buy stocks over bonds, however research by Benartzi and Thaler shows that investors are more reluctant to invest in stocks, even though from almost every intermediate to long term period, investors could expect much more return in stocks. Benartzi and Thaler argue that even long-term investors have a myopic outlook, causing them to make every effort to avoid short-term losses and risks. For example, the experiments conducted by Benartzi and Thaler on university employees showed that when people are presented with the 30-year returns on stocks and bonds, they preferred to hold more stock in their pension plans. However, when presented with year-by-year returns over the 30-year period, employees preferred to hold less stock in their plans. Therefore, investors with long term strategy still have a myopic aversion to risk.

Experiments by Kahneman and Tversky also show that individuals tend to overemphasize recent information and trends and underemphasize prior information. DeBondt's research shows that even professional analysts tend to overreact to new information. Arrow's conclusion from his research suggests that this extreme dependence on recent information leads the market to overreact to new information, and may even explain the P/E ratio anomaly. Shiller's research shows that volatility in stock markets cannot be explained by the volatility of cash

flows (dividends) associated with stocks, signifying that investors may overreact to risk.

Many experiments and much of the research in both psychology and finance have indicated that apparently irrational decision-making frequently governs actions of consumers and investors, especially in cases when losses are involved.

Applying some of the experiments from psychology to finance we see why some of the finance anomalies occur. DeBondt and Thaler argue that the market overreacts to information and that abnormal returns can be realized by buying losers and selling winners. Their study indicated that buying stocks which performed poorly in a prior 3-5 year period and selling those which performed well would have generated higher than normal returns in subsequent 3-5 year periods. Most significant mean reversion tendencies seem to hold for the month of January. Richards' research shows similar results for market indices in various countries. Lo and MacKinlay argue that market contrarians may generate higher than normal returns due to market overreactions. They also found that the level of short-term inactivity displayed by stocks is inversely related to firm size. Therefore, if smaller firms have smaller investor followings and more restricted information availability, this apparent inertia might suggest that the market is relatively slow to react to information. Fama and French found evidence of negative correlations in 3-5 year stock returns while Porteba and Summers found evidence of long term mean aversion in security prices. Their results suggest that

investors overreact to new information regarding stocks, though in the longer term, trends reverse as investors come to realize that they have overreacted.

The academic field of finance has had a behavioral side for quite some time. One of the classic observations of irrational investor behavior, *Extraordinary Popular Delusions and the Madness of Crowds,* goes back to the 19th century. In the 1930's, John Keynes and Benjamin Graham emphasized the effect of investors' emotions on stock prices. More recently, experts like David Dreman published *The New Contrarian Investment Strategy* in 1982, which suggested that investors could outperform by not following market fads [11]. Behavioral finance has discovered many common behaviors, which prove that most investors are not so rational. The first behavior is overconfidence. Overconfidence refers to our belief as human beings to think that we are smarter or more capable than we really are. One study found that 90% of the car drivers in Sweden rated themselves as above average drivers. Also, when people say that they are 90% sure of something, 90% confidence interval, studies show that they are right only about 70% of the time[12]. Overconfidence may hurt you as an investor when you believe you know what the next big thing is, because the odds are, you don't. Studies show that overconfident investors trade more rapidly, because they think they know more than the person on the other side of the trade. Trading rapidly costs a lot, and is rarely rewarding. Many investors have a tendency to be too quick to trade. One of Kahneman's studies shows that when an investor sells one stock and immediately buys another, the one that was sold

[11] www.morningstar.com
[12] Ibid.

does better by an average of 3.4% in the following year. People like to feel that they are actively improving their financial situation, but Kahneman notes "if you hold onto a stock for a while, your chances of making money on it are greater" [13]. The second irrational behavior that is very common among investors is mental accounting. A simple example of mental accounting is when someone says they can't spend a certain pool of money because they are planning to use it for their vacation. Most people separate their money into segments, college education, retirement, money for the house, vacation, and so on. Mental accounting becomes a problem when investors randomly divide the components of total return: income and capital appreciation[14]. Many investors believe that they cannot spend capital appreciation, that's principal, but they can spend income. The third common behavior is anchoring. Anchoring is when you estimate the unknown based on what you do know. Securities analysts often fall into anchoring. They get anchored on their own estimates of a company's earnings, or on last year's earnings. For example, if an analyst "had previously forecast that a firm would post quarterly earnings of $.50/share, and the firm posted actual earnings of $.60/share. The analyst would then raise his forecast for next quarter earnings, but not by enough"[15]. For investors, anchoring behavior presents an unwillingness to part with laggard investments. Too often investors will hold on to an investment waiting for it to break even. It's costly to hold on to losers. The rational behavior would be even if you realize a loss, dump it and make new investments and in terms of taxes you can at least use realized loss to offset

[13] www.cms.psychologytoday.com
[14] www.morningstar.com
[15] Ibid.

realized gains. The fourth common irrational behavior investors show is representativeness. This is a mental shortcut that causes one to give too much weight to recent evidence and too little weight to evidence from the past. As a result, there is too little weight given to the real odds of an event actually happening. The fifth behavior is regret. One may not distinguish between a bad decision and a bad outcome. One will feel regret after a bad outcome, even if you chose the investment for all the right reasons. Regret can lead to bad sell decisions. The sixth behavior has to do with fashion and fads. Most people feel comfortable investing with the crowd; however research shows that such behavior can lead to fading performance or inappropriate investments, as everyone has individualized goals. Another characteristic of irrational investors is being too bold. Professional and amateur investors both have a tendency to be optimistic, there is a common belief that their chances are better than "the next guy's"[16]. "This bias is the foundation of the whole stock-trading industry. Traders know that 50% of them must be below the median, but they all think that they're above average", says Kahneman[17]. Another characteristic among irrational investors is being too timid. Kahneman notes that "the average investor makes bold forecasts, but he is also risk-averse and makes timid decisions. His choices are unstable and he is quick to bail out of a situation"[18]. The final characteristic that Kahneman notes of irrational investors is being too afraid of loss. Kahneman says, "How much a stock costs shouldn't affect your decision to sell it, according to the traditional model, but for real investors how much they paid is very important.

[16] www.cms.psychologytoday.com
[17] Ibid.
[18] Ibid.

People hang onto their losing stocks because they don't want to feel the pain of admitting that they were wrong"[19].

One of the classic examples of irrational behavior is the Monty Hall Problem. The Monty Hall problem involves a classical game show situation from the TV game show, Lets Make a Deal. There are three doors, number 1, number 2, and number 3. a car is behind one door, while goats are behind the other two doors. First the player selects a door then the host selects a different door and opens it. The host gives the player the option of switching from the original choice to the remaining closed door. Then the door selected by the player is opened and it's either a car or a goat. Those are the basic rules of the game. The Monty hall problem became very controversial in the *Ask Marilyn* column of *Parade* magazine[20]. When a reader posed the question of whether it is to your advantage to switch or not, Marilyn's response was that all contestants should switch doors because there is a 1/3 chance that car is behind door number 1, while 2/3 chance there is a car behind door number 2 (if the host opens door number 3 and it's a goat). The responses to Marilyn claim were all of anger claiming that there are equal chances that car is behind 1 or 2. However after much statistical analysis that has been done on this issue as well as simply considering the fact that if the player switches, then he/she wins if and only if his/her first choice is incorrect, an event that obviously has probability of 2/3. However, if the player never switches, then he/she wins if and only if his/her first choice is correct, an event with a probability of 1/3. Although this seems quite obvious most people seem to stay with their first choice. This shows that people are not really rational. If they would be they would change their choice to the one

[19] Ibid.
[20] Source: www.ds.unifi.it/vl/vl_en/games/games6.html

with the better probability of winning. Much research has shown that people are not so rational.

Hersh Shefrin in his book, *Beyond Greed and Fear: understanding Behavioral Finance and the Psychology of Investing*, examines three frames of behavioral finance and how they are treated differently by behavioral finance versus traditional finance. The first frame focuses on whether financial practitioners make errors because they rely on rules of thumb. Behavioral finance answers yes, while traditional finance answers no. "Behavioral finance recognizes that practitioners use rules of thumb called heuristics to process data"[21]. Practitioners hold biased beliefs that influence them to make errors. Therefore, the first behavioral theme according to Shefrin is called heuristic-driven bias. In contrast to behavioral finance, traditional finance assumes that when processing data, practitioners use statistical tools. The second behavioral theme is concerned with whether form and substance influence practitioners. By form, Shefrin means frame. Behavioral finance postulates that decisions are based on how problems are framed. Therefore, this behavioral theme is known as frame dependence. In contrast, traditional finance assumes frame independence, meaning practitioners view all decisions clearly and objectively. The third behavioral theme has to do with how errors and decision frames affect prices established in the market. Behavioral finance argues that heuristic-driven bias and framing effects cause market prices to deviate from fundamental values. Therefore this theme is called inefficient markets. In contrast, traditional finance

[21] Hersh Shefrin. Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing, (Boston, Massachusetts: Harvard Business School Press, 2000) Pg. 4.

argues that markets are efficient. Efficient, meaning that the price of each security matches its fundamental value, even if some practitioners suffer from heuristic-driven bias or frame dependence[22].

The first frame of heuristic-driven bias, examines availability bias, representativeness, regression to the mean and stock market prediction, overconfidence and expert judgment, anchoring and adjustment, and aversion ambiguity. First the availability bias, Shefrin illustrates an example of a simple question: Which is the more frequent cause of death in the U.S., homicide or stroke? How does one go about answering the question? Shefrin suggests that we answer based on what we recall. If we can recall more homicides than strokes, then we answer homicides. This rule shows principle of availability, the degree to which information is readily available. "A rule based on this principle is called availability heuristic"[23]. However, heuristics, including availability heuristic, may be biased. Back to the homicide, stroke question, most people tend to rely on the media for their information on homicides and strokes. What if the media reports one cause of death more than the other, simply because one may be more entertaining or newsworthy than the other. Then people who rely on availability heuristic may recall instances of one type of death more than the other. Therefore, media presents a bias to the rule based on recall. The four statements that really define heuristic driven bias are as follows:

> "People develop general principles as they find things out for themselves;
>
> They rely on heuristics, rules of thumb, to draw inferences from the

[22] Ibid. Pg. 5
[23] Ibid. Pg. 13

> information at their disposal; People are susceptible to particular errors because the heuristics they use are imperfect; and people actually commit errors in particular situations"[24].

One of the most important elements affecting financial decisions is known as representativeness. The principle of representativenss was proposed by psychologists Daniel Kahneman and Amos Tversky (1972). Representativeness is about reliance on stereotypes. A simple example Shefrin illustrates is predicting college GPA based on High School GPA. People base their predictions of how representative a student appears to be. Therefore, a student with a high GPA in High School will be seen as representative of a good student, whereas a student with a low GPA in High School will suffer the consequences. Most people will not consider that the student with a low GPA might have experienced some bad luck and might do much better in college. People fail to "recognize regression to the mean. Therefore, they are predisposed to making errors when they predict the future GPA of particular individuals"[25]. DeBondt and Thaler transferred this example into a more financial one by illustrating representativeness in the winner-loser effect. As mentioned earlier DeBondt and Thaler found that stocks that have been extreme past losers in previous three years do much better than extreme winners in the next three years. Analysts tend to overreact in that they are much more optimistic about recent winners than they are about recent losers. Overconfidence and anchoring are common problems examined in the decision making process. Much research has shown that

[24] Ibid. Pg. 14
[25] Ibid. Pg. 16

practitioners demonstrate behaviors of overconfidence and anchoring all the time. Most people are also averse to ambiguity. Research has shown that even people who are willing to gamble still prefer to play it safe and take the sure money, when the odds are unknown. This phenomenon is known as the aversion to ambiguity. People prefer the familiar to the unfamiliar.

Frame dependence is another important theme. Frame dependence suggests "If you transfer a dollar from your right pocket to your left, you are no wealthier"[26]. The form used to describe a decision problem is what is known as the frame. Frame independence means that form is irrelevant to the decision making process. Traditional finance assumes that framing is transparent, meaning you can see through all the different ways a problem is described. Behavioral finance suggests that many frames are not transparent in fact they are opaque. An opaque frame will cause a person's decision to be based on the particular frame that is used. Therefore, a difference in form creates a difference in substance hence behavior reflects frame dependence. Kanheman and Tversky provide evidence of frame dependence through their study of loss aversion. When people are asked to choose between "1. Accepting a sure loss of $7,500, or 2. Taking a chance where there is a 75% chance you will lose $10,000 and a 25 % chance you will lose nothing (the expected loss in both cases is $7,500), most people opt for the latter"[27]. The reason being is that people hate to lose. The uncertain option holds the chance that they won't have to lose. This is what is known as loss aversion. Kahneman and Tversky found that "a loss has about two and a half

[26] Ibid. Pg. 23
[27] Ibid. Pg. 24

times the impact of a gain of the same magnitude"[28]. In the investor world this is known as "get evenitis". Investors will not sell anything at a loss in hopes of making money or at least breaking even. Gross (1982) in his stockbroker manual, raises the issue of frame dependence within the context of realizing a loss. His key point is that investors prefer some frames over others, this is known as hedonic editing[29]. Therefore Gross used the phrase "transfer your assets" as his magic selling words[30]. These words tend to induce the client to use a frame in which they reallocate their assets from one mental account to another, instead of closing a mental account at a loss. Shefrin proposes that people who show frame dependence do so for both cognitive and emotional reasons. "The cognitive aspects concern the way people organize their information, while the emotional aspects deal with the way people feel as they register the information"[31]. Self-control is another aspect that Shefrin proposes in his frame dependence theme. By self-control Shefrin means being able to control ones emotions. For example, some people value dividends for self-control reasons as well as for reason that originate from hedonic editing. Investors tend to frame dividends as income not capital. Reason being is that you are not suppose to "dip into capital. Don't kill the goose that lays the golden eggs"[32]. Therefore, what investors are doing is using frame dependence. Frame dependence also impacts the way people deal with inflation, both emotionally and cognitively. This issue is known as money illusion. People's emotional reaction is to consider nominal values, as opposed to

[28] Ibid. Pg. 24
[29] Ibid. Pg. 26
[30] Ibid.
[31] Ibid.
[32] Ibid.

real values. A higher nominal value will appear more favorable then a higher real value to most people. Therefore, frame dependence can have a great negative impact on investing in many different ways.

The third behavioral theme is inefficient markets. One of the most controversial topics in finance is whether the market is efficient or inefficient. DeBondt and Thaler argue that investors who rely on the representativeness heuristic become overly pessimistic about the past losers and overly optimistic about past winners. This heuristic-driven bias causes prices to deviate from fundamental value. Therefore, past losers tend to be undervalued and past winners overvalued. However, mispricing is not forever. Over time the mispricing corrects itself. Hence, losers will outperform the general market, whereas winners will underperform. Another aspect of inefficient markets is conservatism. Analysts who fall to conservatism due to anchoring-and-adjustment do not adjust their earnings prediction sufficiently in response to new information that is enclosed in earnings announcements. Therefore, they find themselves surprised by subsequent earnings announcements. Conservatism in earnings predictions means that "positive surprises tend to be followed by positive surprises and negative surprises tend to be followed by negative surprises"[33]. According to research by Bernard and Thomas (1989) stocks associated with recent positive earnings surprises experience higher returns than the overall market, while stocks associated with recent negative earnings surprises earn lower than the overall market. This suggests that conservatism in analyst earnings

[33] Ibid.

predictions cause mispricing in the market[34]. Also research in overconfidence and frame dependence does suggest mispricing in the market. However, it should be noted that the deviation in price from fundamental value does not automatically lead to risk-free profit opportunities.

[34] Ibid.

II. Methodology

A. *Methodology Overview*

The purpose of my study is to explore whether business students and professors exhibit rationality in their everyday decision-making processes to the same extent as with their investment decision-making processes. The participants of the study were students and faculty in the Lubin School of Business at Pace University. These subjects were selected at random and from a few specific course sections. Survey participants were asked to complete forms consisting of 20 questions. The questions appear to test their knowledge of issues related to finance, history, art, science and miscellaneous other subjects. Each question was designed to test some kind of irrationality related to framing, overconfidence, and probability assessment. The responses were examined to determine their consistency and the extent to which subjects exhibited confidence in their abilities to answer the questions and to make decisions of various types. The questions were mixed up so that the respondents did not realize that some pertain to finance whereas others pertain to everyday decisions. Out of the 20 questions, half pertained to finance, the other half dealt with everyday decisions. There were 4 questions pertaining to overconfidence, 2 to probability, 3 concerning framing versus substance, and 1 recent versus past information question, for total of 20 questions. All the questions seek to examine whether the irrational decision-making that has been indicated by various research holds for both finance and everyday decisions.

B. Survey

Of the 20 questions that were in the survey, each played a specific role in its own particular category. The categories were divided according to irrationality types as follows:

1. In the overconfidence questions, if the respondents were not within the 75% range, they were overconfident, and hence irrational. The overconfidence questions are randomly distributed throughout the survey. The questions relating to finance are numbers 6, 12, 13, and 15 (see Appendix 1). The ones relating to everyday are numbers 1, 4, 7, and 10. I chose questions relating to finance and everyday that were not difficult to answer but ones that you were not 100% sure of.
2. In the probability category, if the respondents changed their first choice after knowing that one of the three choices is worthless, they would be considered rational. However, if they did not switch they were considered irrational, because if you assume the respondents can calculate probability the probability clearly shows that one should switch, but as research does suggest most people are persistent and will stay with their first choice regardless of the probability, hence showing irrationality. The probability questions pertaining to finance are numbers16 and 17. The ones pertaining to everyday decisions are numbers 2, and 3. These questions reflect the Monty Hall experiment. For everyday I chose something as simple as choosing between boxes and for finance I did a similar scenario but with stocks.

3. In the past versus recent information questions, if the respondents gave more weight to recent information, they were considered irrational, because both past and more recent information should have the same weight. The recent versus past information question relating to finance is number 18 and the one relating to everyday decisions is number 5. I chose a football team to represent something random and to illustrate that a recent winning streak might be just as important as a past winning streak. More importantly I was interested in seeing whether there was a consistency in giving more weight to recent information in both everyday and finance decisions.

4. In the frames vs. substance questions, if the respondents chose different answers to the exact same questions, just framed differently, they were considered irrational because the substance did remain the same. The frames vs. substance questions relating to finance are numbers 8, 9, 19, 20 and the ones relating to everyday are numbers 11 and 14. I selected questions such as two routes to test the respondents consistency in answering questions which have the exact same outcomes but are just phrased differently. I did the same for finance questions, just using a choice of keeping or returning money which had the exact same outcome but depending on how it was phrased some people may select different answers.

The answers of the respondents were evaluated in both (finance and everyday decisions) categories to see whether there is a significant difference between the two categories in

each of the "irrational" areas. Once the data had been gathered, we realized it would be too difficult to examine irrationality in each category so the survey was divided into overconfidence questions and general questions, meaning questions that examined consistency in answering (frame versus substance). The four overconfidence finance questions were numbers 6, 12, 13, and 15. The four overconfidence everyday questions were numbers 1, 4, 7, and 10. The frame versus substance finance questions were numbers 8, 9, and 17 and the everyday frame versus substance were numbers 3 and 11. Since there were three questions for finance and two for everyday, we made them equal by multiplying the finance responses by 2/3. The focus of the thesis was to examine whether there is significant difference between peoples' rationality in everyday and finance decision making.

C. Research Hypotheses

The research was divided into three separate categories, each having its own hypothesis and results. Based on research discussed earlier, there are three groupings of irrational behaviors commonly exhibited in investing. The general research hypothesis for each of the categories is that people are equally irrational in their investment decisions as in their everyday decisions. Therefore, this will be the general form of each of the null hypotheses.

Research Hypothesis One:

People are equally overconfident in their everyday and finance decisions.

H_O: $\mu_1 = \mu_2$

H_A: $\mu_1 \neq \mu_2$

That is, the mean score for the proportion of correct answers in this category μ_1 for everyday decision-making equals the mean score μ_2 for financial decision-making.

Research Hypothesis Two:

With respect to framing, people are equally irrational in their everyday and finance decision-making.

H_O: $\mu_1 = \mu_2$

H_A: $\mu_1 \neq \mu_2$

That is, the mean score for the proportion of correct answers in this category μ_1 for everyday decision-making equals the mean score μ_2 for financial decision-making.

Research Hypothesis Three:

With respect to problem solving, people are equally irrational in their everyday and finance decision making.

H_O: $\mu_1 = \mu_2$

H_A: $\mu_1 \neq \mu_2$

That is, the mean score for the proportion of correct answers in this category μ_1 for everyday decision-making equals the mean score μ_2 for financial decision-making.

D. Data

From a single survey we were able to gather data to test various irrationalities. The first group of data represents a sample of 78 participants who responded to the overconfidence set of questions. Three people had to be omitted because there was

missing data. One of the overconfidence questions, which participants were asked to rate themselves as drivers, had to be given a scale for each response. In other words it could not be graded as simply right or wrong. A scale of +1 for the below average answer, and zero for all other answers was assigned. The below average response was considered to be the rational one**.** The financial question concerning how many shares of stock were traded on the NYSE yesterday got an overwhelmingly number of wrong answers. It might have been too difficult of a question to ask college students**.** However, the participants were asked to provide a range, thus there should not have been such an overwhelming amount of wrong answers. For the most part people were overconfident in both their finance decisions as well as their everyday decisions.

The second set of data represents the responses for the frame versus substance questions. Once again some people were omitted from the data because of missing responses. The third set of data was gathered to test peoples' problem solving ability. These were the Monty Hall type questions. It was very rare to see someone actually make the switch from his or her initial selection in both everyday and finance questions. After gathering all of the data, a mean and a standard deviation were calculated. Each question had an equal weight. See Appendix 2 for all research data compiled.

E. Statistical Test

After inputting all of the responses of the survey on a spreadsheet it was necessary to analyze the data. The analyses consisted of calculating the mean, standard deviation, and doing a t-test. From the t-test it is apparent whether we should reject the null hypothesis, which is that people are just as irrational in their finance decisions as they are

in their everyday decisions, or fail to reject the null hypothesis. By treating the overconfidence set of questions as one sample and one test and the general (frame versus substance) as a separate set of questions and another test, we can examine whether or not to accept the null hypothesis for each category and how statistically significant it is. Since we are unsure of whether people are more rational in finance or more rational in everyday decisions, we will attempt to do a two-tail test with the confidence interval of approximately 95%. When a 95% confidence interval is constructed, all values in the interval are considered plausible values for the constraint being estimated. Values outside the interval are rejected as implausible. If the value of the parameter specified by the null hypothesis is contained in the 95% interval then the null hypothesis cannot be rejected at the .05 level[35]. Hypothesis tests done by using a t-test are procedures for making rational decisions about the reality of effects.

[35] http://www.ruf.rice.edu/~lane/hyperstat/B15183.html

III. Results

A. Overconfidence

To analyze the data of the 78 participants in the survey several t-tests were conducted. The t-test examined whether people were equally overconfident in their finance decisions as in their everyday decisions. Our obtained t-statistic relative to the critical t value as well as the probability of getting our calculated t value by chance alone (63%), lead us to FAIL to reject the Null Hypothesis. The probability is relatively high, so the means are not statistically significantly different. Also, the t-statistic does *not* exceed the critical t value therefore we cannot conclude that people are more irrational in their finance decisions or that they are more irrational in their everyday decisions.

Table One

T-test: Two-Sample Assuming Unequal Variances

	Finance	*Everyday*
Mean	0.346153846	0.365384615
Variance	0.073426573	0.053071928
Observations	78	78
Hypothesized Mean Difference	0	
Df	150	
t Stat	-0.477530667	
P(T<=t) one-tail	0.31683969	
t Critical one-tail	1.655075501	
P(T<=t) two-tail	0.63367938	
t Critical two-tail	1.975905298	

B. Frame versus Substance

To analyze the data of the 77 participants in the survey a t-test was conducted once again. One participant was excluded because of missing responses. The t-test examined the decision making process in finance and everyday in regards to people being able to identify the substance of the questions and not be fooled by its phrasing. The obtained t-statistic relative to the critical t value as well as the probability of getting our calculated t value by chance alone (.6%), lead us to REJECT the Null Hypothesis with greater than 99% certainty. The probability of chance is extremely low, so the means are statistically significantly different. The t-statistic exceeds the critical t value also showing the means to be statistically significantly different. Therefore we may conclude that people are more irrational in their finance decisions than they are in their everyday decisions. The mean represents the average number of responses they got correct to the questions asked, hence a higher score means more rational. Therefore a higher mean for everyday means people are more rational with their everyday decisions than they are with their finance decisions.

Table Two

T-test: Two-Sample Assuming Unequal Variances

	Fin	*Everyday*
Mean	0.406926407	0.525974026
Variance	0.042108639	0.098000684
Observations	77	77
Hypothesized Mean Difference	0	
Df	131	
t Stat	-2.790824716	
P(T<=t) one-tail	0.003021786	
t Critical one-tail	1.656568649	
P(T<=t) two-tail	0.006043572	
T Critical two-tail	1.978238512	

C. Problem Solving

To analyze the data of the 81 participants in the survey a t-test was conducted once more. All of the participants were included in this test because there was no missing data. The t-test examined the decision making process in finance and everyday in regards to problem solving. Are people more rational in their decision-making in problems such as the Monty Hall in finance or everyday? Examining the t-statistic relative to the critical t value as well as the probability of getting our calculated t value by chance alone, which is 46%, lead us to FAIL to reject the Null Hypothesis. The probability of chance is fairly high, so the means are not statistically significantly different. The t-statistic does not exceed the critical t value also showing that the means are not statistically significantly different. Therefore we may not conclude that people are more irrational in their finance decisions than they are in their everyday decisions. These questions resemble those of a Monty Hall problem. The tests confirmed previous research that people usually do not choose to change their answer even if by calculating the probability it is the more rational thing to do. Most people regardless of probability stay with their first choice. The additional aspect of my test was to examine whether people are more rational in making their finance decisions or their everyday decisions. The tests showed that people are almost equally irrational in both cases. There is no significant difference between the two.

Table Three

T-test: Two-Sample Assuming Unequal Variances

	Finance	*Everyday*
Mean	0.209876543	0.25925926

Variance	0.167901235	0.19444444
Observations	81	81
Hypothesized Mean Difference	0	
Df	159	
t Stat	-0.73833922	
P(T<=t) one-tail	0.230698372	
t Critical one-tail	1.654493644	
P(T<=t) two-tail	0.461396743	
t Critical two-tail	1.97499503	

IV. Conclusion

Each category of tests has its own results. For overconfidence people are not any more rational in their everyday decisions than they are in their finance decisions. However, for frame versus substance, people appear to be more rational in their everyday decisions. It seems reasonable to obtain different results for different decisions making traits. It also seems reasonable to find that people are equally irrational because of the mix of people selected to participate in the study. Although participants were chosen from the Lubin School of Business, it may be assumed that some people have a better sense of everyday material, and others are more knowledgeable in finance material. Therefore even if some people may be more rational in everyday, and others may be more rational in finance, as a whole because people are generally irrational, the participants were equally irrational in both finance and everyday. Various research has shown much of this irrationality in each of the two categories, everyday and finance, and my research has confirmed it.

The first test shows that people in general are overconfident. Confidence only becomes a real problem when it becomes overconfidence. People are overconfident in their own abilities, which lead to investors and analysts being particularly overconfident in areas where they have some knowledge. However, from previous research increasing levels of confidence frequently show no correlation with greater success[36]. For example, studies show that men consistently overestimate their own abilities in many areas including athletic skills, abilities as a leader, and ability to get along with others. Money managers, advisors, and investors are consistently overconfident in their ability to

[36] http://www.geocities.com/t_ride9/psychology.html

outperform the market, however, most fail to do so. The simple example of the overwhelming majority of people, when asked, will tell you that they are outstanding drivers, and yet it doesn't take much thinking to realize that in every sample, at least half of all drivers will be below average. The same applies for traders. "While the argument against the efficient market hypothesis is that the market actually doesn't process data very well, and that an ignorant herd do all the short-term price setting, it is interesting that everyone in that herd believes that they are privy to some sort of special information, perhaps derived from technical analysis, that enables them to out smart all the other investors"[37]. Traders by nature are often extremely confident, they see themselves in a rather glamorous light as entrepreneurs making money by pure brain power. They do vast amounts of analysis, and forecast the market like masters, when all players think they have such special information, which the others do not, the result is a lot of trading. "Overconfidence is the basis of "irrational exuberance", the famous cautionary message by Alan Greenspan, and despite analysts warnings about overpriced valuations, investors stampeded right back into stocks"[38].

In the second test the mean response was indicative of people being more rational in everyday decisions than financial ones. This may have a great impact on investment performance and the market as whole. Much of economic and financial theory is based on the notion that individuals act rationally and consider all available information in the decision-making process. If this is not so, then various difficulties arise. People may trade and select stocks for reasons that may not be explained by theories and models.

[37] http://www.travismorien.com/FAQ/psychology/overconfidence.htm
[38] Ibid.

This of course complicates things not only for investors, but also for the advisors, analysts, and institutions.

The results of the research may have been skewed by various implications. The first implications that might have had a significant affect on the outcome of the tests was the sample size. Given more time, if there were 200 people or more who responded to the survey the results might have been more accurate. Also, the sample size consisted of many more students than faculty. If the sample would have been more equal than the result might have been more precise because faculty is most likely more knowledgeable in the finance field, but not necessarily more rational. Just like any other survey its validity depends on the representativeness of the people surveyed. One of the major implications that might have impacted the results of the tests was a particular class, which was introduced to the material such as overconfidence and frame versus substance before taking the survey. Being that they were aware of being irrational, they might have distorted the results. Some people also might have felt the survey was a bit too long or too difficult and just gave answers without giving them much thought. Surveys have their limitations but they provide a relatively efficient way to gather large amounts of data.

There is a lot of research that can be done further from this simple survey. For example examining whether women are more rational than men? Are professors more rational than students? Focusing even more closely on some of the questions like the Monty Hall question and testing whether there is a significant difference between people selecting box 1, 2, or 3. From my research I could see that one of the boxes was selected more frequently than the other two, is there anything significant about that?

In revising my research I would consider making 2 smaller surveys. Shorter surveys may allow for more accurate responses because the participants would not have to answer as many questions. There is a point where people may just start answering questions just to answer them. With two smaller surveys I would consider a much larger sample size so that the responses are representative. I believe this would greatly improve the results.

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Appendix 1

Survey Form:

Directions: Please fill in the blank or circle **one** of the answers in each question.

1. What year was the Chrysler Building built? Pick a *range* within which you believe there is a **75 %** probability that your answer is right.

   lower end of date range _____

   upper end of date range _____

2. If you had a choice between box numbers 1, 2, or 3, and two of the boxes were worth nothing, but one was worth $1 Million, which box number would you choose?

   1 2 3

3. If you now know that one of the 3 boxes is worth nothing, would you change your 1st choice or stay with it?

   Change Choice Stay with choice in Question #3

4. What year was the Mona Lisa painted? Pick a *range* within which you believe there is a **75 %** probability that your answer is right.

   lower end of date range _____

   upper end of date range _____

5. If football team "A" lost 10 games, but has now won the last 3 games, and football team "B" won 10 games and has now lost the last 3 games. Which team would you bet on if Team "A" competes against Team "B"?

   A B

6. What is MSFT (Microsoft) trading at? Pick a *range* within which you believe there is a 75 % probability that your answer is right.

   lower end of price range _____

   upper end of price range _____

7. How would you rate yourself as a driver?

   Below average average above average N/A

8. Suppose that you have been given $8,000 to keep. You now have to choose between returning $2,000 and tossing a coin. If you choose to toss a coin and you toss a head, you must give back $4,000; if you toss a tail, you keep all $8,000. Do you choose to give back $2,000 or toss the coin? *(1st case sure win 6k, 2nd either 4 or 8)*

   Give back $2,000 Toss a coin

9. "Could you comfortably save 20 percent of your income at this point in your life?"

   Yes No

10. What is the cruising altitude of a Boeing 747? Pick a *range* within which you believe there is a **75 %** probability that your answer is right.

    lower end of altitude range _____ (in feet or meters)

    upper end of altitude range _____ (in feet or meters)

11. You embark on what could be a16 hour trip. If you take route A, you are guaranteed to save 2 hours from your trip. Instead, if you pick route B, it is equally likely that you would either save 4 hours or save no hours. Which route do you choose?

    Route A Route B

12. What is today's rate on a 15 year T-Bill? Pick a *range* within which you believe there is a **75 %** probability that your answer is right.

    lower end of % range _____

    upper end of % range _____

13. What did the Dow close at yesterday? Pick a *range* within which you believe there is a **75 %** probability that your answer is right.

    lower end of range _____

    upper end of range _____

14. You start a trip that should take you approximately 12 hours. If you take the 1st route your trip is guaranteed to be 14 hours, however if you take the 2nd route, it

will take an extra 4 hours or nothing extra (12 hour trip). Which route do you choose 1st or 2nd?

1st Route 2nd Route

15. How many shares of stock were traded on the NYSE yesterday? Pick a *range* within which you believe there is a **75 %** probability that your answer is right.

lower end of range _____

upper end of range _____

16. You have a choice between stock X, stock Y, and stock Z. Which one would you choose?

X Y Z

17. One of the stocks is now worthless, would you stay with the one you already chose or change your stock?

Change Choice Stay with choice in Question #16

18. Stock "A" has been performing well in the past three years, but is now declining, Stock "B" has been performing poorly the past three years but is now increasing, which stock would you invest in?

Stock A Stock B

19. Could you comfortably live on 80 percent of your income today?

Yes No

20. You are given $4,000 to keep. In addition you either get $2,000 more or toss a coin. If you toss a coin, heads is an additional $4,000, if you get tails you get no additional money. *(So, in first case you get sure $6,000, second case either $4,000 or $8,000 depending on coin result).*

Take $2,000 Toss a coin

Appendix 2

Data:

Overconfidence Questions

	FIN: #6, 12, 13, 15	Mean	SD	Everyday: #1, 4, 7, 10	Mean	SD
Person 1	0.00	0.34	0.27	0.25	0.36	0.22926
2	0.00			0.25		
3	0.50			0.75		
4	0.25			0.25		
5	0.25			0.00		
6	0.00			0.50		
7	0.00			0.50		
8	0.50			0.25		
9	0.00			0.75		
10	0.00			0.25		
11	0.25			0.50		
12	0.00			0.50		
13	0.00			0.50		
14	0.50			0.75		
15	0.50			0.75		
16	0.25			0.25		
17	0.25			0.50		
18	0.50			0.50		
19	0.75			0.25		
20	0.50			0.00		
21	0.50			1.00		
22	0.50			0.00		
23	0.00			0.25		
24	0.00			0.00		
25	0.00			0.50		
26	0.75			0.25		
27	0.50			0.50		
28	0.25			0.25		
29	0.25			0.50		
30	0.25			0.50		
31	0.50			0.50		
32	0.25			0.25		
33	0.25			0.25		
34	0.25			0.50		
35	0.25			0.25		
36	0.50			0.50		
37	0.25			0.25		
38	0.00			0.25		
39	0.25			0.25		
40	0.50			0.50		
41	0.75			0.50		

42	0.25	0.25
43	0.25	0.50
44	0.75	0.25
45	0.00	0.00
46	0.75	0.50
47	1.00	0.75
48	0.00	0.00
49	0.75	0.25
50	0.50	0.50
51	0.75	0.75
52	0.75	0.25
53	0.00	0.50
54	0.25	0.25
55	0.75	0.25
56	0.25	0.75
57	0.00	0.50
58	0.25	0.50
59	0.50	0.50
60	0.25	0.50
61	0.00	0.00
62	0.50	0.75
63	0.50	0.00
64	0.00	0.00
65	0.25	0.50
66	0.50	0.25
67	0.25	0.25
68	0.75	0.25
69	0.00	0.25
70	0.00	0.00
71	0.50	0.25
72	0.50	0.50
73	0.25	0.50
74	0.50	0.00
75	0.25	0.00
76	0.25	0.50
77	0.50	0.25
78	1.00	0.25
79	0.75	0.50

General, Frame versus Substance Questions

	Fin: #8,9,17	* 2/3	Mean	SD	Everyday: #3,11	Mean	SD
Person 1	0.67	0.44	0.41	0.20	0.50	0.53	0.311025
2	0.33	0.22			0.50		
3	0.33	0.22			0.50		
4	0.67	0.44			0.50		
5	1.00	0.67			0.00		
6	0.67	0.44			1.00		
7	1.00	0.67			1.00		
8	0.33	0.22			0.50		
9	1.00	0.67			1.00		
10	0.67	0.44			1.00		
11	1.00	0.67			1.00		
12	0.00	0.00			0.50		
13	0.33	0.22			0.50		
14	1.00	0.67			1.00		
15	0.33	0.22			0.50		
16	1.00	0.67			1.00		
17	1.00	0.67			0.50		
18	1.00	0.67			1.00		
19	1.00	0.67			1.00		
20	1.00	0.67			1.00		
21	0.33	0.22			0.50		
22	0.33	0.22			0.50		
23	1.00	0.67			0.50		
24	0.67	0.44			1.00		
25	0.33	0.22			0.50		
26	0.67	0.44			0.50		
27	0.67	0.44			0.00		
28	0.00	0.00			0.00		
29	0.00	0.00			0.50		
30	0.33	0.22			0.50		
31	0.33	0.22			0.50		
32	0.00	0.00			0.50		
33	0.00	0.00			0.50		
34	0.33	0.22			0.50		
35	0.67	0.44			0.50		
36	0.67	0.44			0.50		
37	0.33	0.22			0.50		
38	1.00	0.67			0.50		
39	1.00	0.67			1.00		
40	0.67	0.44			0.00		
41	0.67	0.44			0.50		
42	1.00	0.67			0.50		

43	0.67	0.44	0.00
44	0.67	0.44	1.00
45	0.67	0.44	0.50
46	0.67	0.44	0.50
47	0.00	0.00	1.00
48	0.00	0.00	0.50
49	1.00	0.67	0.50
50	0.33	0.22	0.50
51	0.67	0.44	0.00
52	0.67	0.44	1.00
53	1.00	0.67	1.00
54	0.67	0.44	0.50
55	0.67	0.44	0.50
56	0.67	0.44	0.50
57	0.67	0.44	0.00
58	0.67	0.44	0.50
59	0.67	0.44	0.50
60	0.67	0.44	0.50
61	0.67	0.44	0.00
62	1.00	0.67	1.00
63	0.33	0.22	0.50
64	0.33	0.22	0.50
65	0.67	0.44	0.50
66	0.67	0.44	0.00
67	1.00	0.67	0.50
68	0.33	0.22	0.00
69	0.33	0.22	0.50
70	0.67	0.44	0.00
71	0.67	0.44	0.50
72	0.33	0.22	0.00
73	1.00	0.67	0.00
74	0.67	0.44	0.50
75	1.00	0.67	0.50
76	0.33	0.22	0.50
77	0.67	0.44	0.50
78	0.67	0.44	0.50

Problem Solving Questions

	Everyday	Mean	SD	Fin	Mean	SD
Person 1	0	0.207317	0.407879	1	0.268293	0.445797
2	0			0		
3	0			0		
4	0			0		
5	0			0		
6	0			0		
7	0			0		
8	0			1		
9	0			1		
10	0			0		
11	0			0		
12	0			0		
13	1			0		
14	0			0		
15	0			0		
16	0			0		
17	0			0		
18	1			0		
19	0			0		
20	0			0		
21	0			0		
22	0			0		
23	0			1		
24	0			0		
25	1			1		
26	0			1		
27	1			1		
28	0			0		
29	1			1		
30	1			0		
31	0			0		
32	1			1		
33	0			0		
34	0			0		
35	0			0		
36	0			0		
37	0			0		
38	0			0		
39	0			0		
40	0			0		
41	0			0		
42	0			0		
43	0			0		
44	0			0		

45	1	0
46	0	1
47	1	1
48	0	0
49	0	0
50	0	1
51	0	0
52	1	1
53	0	0
54	0	1
55	1	0
56	0	0
57	0	0
58	1	1
59	0	0
60	1	1
61	1	1
62	0	0
63	0	0
64	0	0
65	0	0
66	0	0
67	0	0
68	0	0
69	1	1
70	0	0
71	0	0
72	0	0
73	0	0
74	1	1
75	0	0
76	0	1
77	0	0
78	0	0
79	0	0
80	0	1
81	1	0
82	0	1