

A Brief Discourse on Human Conduct in Economics

This Thesis Has Been Submitted to the College of Graduate
Studies and Research In Partial Fulfillment of the
Requirements for the Degree of, Masters of Arts, in the
Department of Economics at the University of
Saskatchewan.

By

Ethan F. Hayes

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Abstract

Since the transformation from Political Economy to Economics and from Classical to Neoclassical theory in the late nineteenth century, a theory of human behavior has constituted the initial foundation upon which all economic theory is based and developed. Two main theories of human behavior developed by William Stanley Jevons and Carl Menger have been generally accepted to have ushered in this Marginalist Revolution. Jevons' marginal utility theory popularized by Alfred Marshall is still extensively used today, while the Austrian approach of Menger was effectively removed from academic discussion in the nineteen thirties; mainly as a result of the annexation of Austria and the dissolution of the Austrian School of Economics. Given the inability of economists to fully operationalize the marginal utility theory and realistically explain and resolve a broad range of behavioral anomalies using Neoclassical and Post-Neoclassical Economics, this thesis attempts to examine and address the most fundamental issues of human behavior in economics to explain how utility theory and modern Neoclassical and Post-Neoclassical Economics are flawed and how a realistic theory of human behavior, developed from the scholarly work of the early Austrian Economists, can be used to develop the basis of a scientific economics, derived from observation, that holds the potential to both expand the scope of economic understanding, redirect the focus of the discipline, and possibly unify the many disparate theories in the field.

Acknowledgement

I wish to express my deepest gratitude to my Supervising Professor, Peter C. Dooley, for providing perspective, encouragement, and the freedom and latitude to explore my scholarly interests. I would also like to thank my thesis committee members, Professors Morris Altman, Robert Hudson, and especially Professor Joel Bruneau; who helped me finish this thesis while I was serving in the military.

Common sense is the best distributed thing in the whole world. Everyone thinks that they are well endowed with it, so that even those who are most difficult to please in every other respect do not usually wish to have more than they already possess. It is unlikely that everyone is wrong about this. It shows, rather, that the ability to judge well and to distinguish what is true from what is false – which, strictly speaking, is what is meant by ‘common sense’ or ‘reason’ – is naturally equal in all human beings. Thus the diversity of our views does not result from the fact that some people are more reasonable than others, but simply from the fact that we guide our thoughts along different paths and do not think about the same things. For it is not enough to have a good mind; it is more important to use it well. The greatest souls are just as capable of the greatest vices as of the greatest virtues, and those who move only very slowly may make much greater progress if they always follow the right path than those who run but stray from it.

René Descartes – Discourse on Method

1637

It's a true miracle, that modern education hasn't yet completely smothered the curiosity necessary for scientific study. For without the required encouragement, and especially freedom, this fragile plant will wither. It is a grave mistake to believe that the pleasures of observation and inquiry can be induced by constraint and a sense of duty.

Albert Einstein

1879 - 1955

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Chapter 1. Human Behavior in Economics

In science, too, it is impossible to open up new territory unless one is prepared to leave the safe anchorage of established doctrine and run the risk of a hazardous leap forward....In general, scientific progress calls for no more than the absorption and elaboration of new ideas--and this is a call most scientists are happy to heed. However, when it comes to entering new territory, the very structure of scientific thought may have to be changed, and that is far more than most men are prepared to do.

Isidor Isaac Rabi

I. Hamartia?

More than just looking at particular behaviors, or how certain actions are motivated, this discourse attempts to inquire into the mechanical nature of how human beings conduct themselves. What are the abilities of man? What are the limitations of man? What are the processes of man? These are the questions that need to be resolved to develop a comprehensive theory, not only of human understanding, but of choice, action and human decision making in economics. Great effort was expended over the last century to develop a predictive model of consumer behavior that essentially treats as exogenous those core human characteristics that motivate, discriminate and explain why and how people choose between goods. These tools of logic, however, have led to the segregation of economic theory into numerous specialized sub-disciplines, and have not led to the unification or expansion of insight necessary to expand the scope of economic science.

Because all actions and behaviors seem to originate from the consciousness, the focus of this discourse is directed towards determining the nature of human decision making; especially as it relates to the theory of rational consumer choice. It is hoped that by identifying the source of certain structural errors and irrelevancies in the current microeconomic view, and through providing a more accurate taxonomy of the foundations of human behavior, that it will be possible to treat the human aspect of economic man endogenously and, ultimately, empirically. Because the scope of this

discussion and the scope of human behavior are expansive, it is not possible in this short thesis to articulate fully each point in great depth. Most discussions, as a consequence, will be brief, covering only those concepts that are particularly relevant in clarifying the nature of human behavior in economics.

The principal foundation of modern consumer theory stems from the axioms of choice, which are intended to give formal mathematical expression to the consistency inherent in consumer decisions involving choice. According to Jehle and Reny in *Advanced Microeconomic Theory*: “These axioms are intended to give formal mathematical expression to fundamental aspects of consumer behavior and attitudes towards the objects of choice. Together, they formalize the view that the consumer *can* choose and that choices are consistent in a particular way”. (p. 5) Based on these axioms, the theory of choice suggests that a consumer has stable, well-defined preferences upon which they consistently make rational choices within a market that tends to equilibrium. In this method of modeling, as few meaningful and distinct assumptions as possible are set forth to characterize the structure and properties of preference. All that is required of the consumer is that they are able to make binary comparisons between two certain consumption plans at a time, and that the consistency of their choices obey the mathematical properties of Completeness, Continuity, Transitivity, and Local Non-satiation. To this extent, these axioms represent a rational framework that characterizes those aspects necessary to structure a consistent discriminatory model of choice. These axioms support the development of the indifference curve, the utility function, and ultimately allow for the derivation of a demand curve and a demand function.

A persistent criticism of the rational theory of consumer choice is that it is founded on severely unrealistic assumptions. During his Nobel Prize interview, Nobel Laureate, Daniel Kahneman, remarked that “the definition of rationality that is used in economic theory is a very implausible definition, and it fails descriptively.” This statement is based on his work with Amos Tversky and other economists that have demonstrated empirically how the formal model of consumer choice is unable to take account of certain tendencies in human behavior. According to Vernon Smith, in, “Experimental Economics: Reply,”

who received his Nobel Prize in conjunction with Daniel Kahneman: “Even if preference theory accounts for many agents’ stationary state choices in certain experimental situations, it tells us nothing about the processes that yield these “good” predictions or why some agents’ behavior is not consistent with the theory.” (p. 266)

The criticism directed against the neoclassical theory can largely be considered to derive from the over-simplification of the model and the exclusion of psychological explanations of human behavior. While modern economic theory is loaded with terminology that seems to suggest certain psychological propositions, this terminology remains in the theory principally as a survival of culture from whence these terms were first introduced by the marginalists and early neoclassicists. The modern economic meaning of terms like utility, rationality, preference, value, good, price and choice have very specific meanings and often have very little in common with their corresponding dictionary definition or the definition of the term when it was first introduced into economic discussion. In regards to utility and a utility function, as Hal Varian writes in, *Microeconomic Analysis*, “a utility function is often a very convenient way to describe preferences, but it should not be given any psychological interpretation. The only relevant feature of a utility function is its ordinal character.” (p. 95)

There have always been opponents of neoclassical economics. The successor of Lord Lionel Robbins of the London School of Economics, Friedrich Hayek (perhaps the best-known member of the Austrian School of Economics), has expressed unease with certain aspects of modern economics, but in large part has viewed his work as a complement to, rather than a substitute for the neoclassical approach. Later in his career, Hayek expressed his desire to “avoid giving the impression that I generally reject the mathematical method in economics. I regard it as indeed the great advantage of the mathematical technique that it allows us to describe, by algebraic equations, the general character of a pattern even where we are ignorant of the numerical values determining its particular manifestation.” (p. 28). Other economists such as von Mises and Rothbard have been less forgiving and have set out to develop their own foundations of economic analysis. Von Mises and Rothbard fundamentally reject the core of neoclassical

economics to include utility functions, indifference analysis, continuous preferences, and nearly all of welfare economics. Bryan Caplan's, *The Austrian Search for Realistic Foundations*, details much of this discussion.

Nobel Prize winner, Herbert Simon, and similar critics of the neoclassical model argue that information is expensive, incomplete, and unreliable, and that human rationality is limited. Thus, optimizing, in the sense of considering all possible alternatives and choosing the best option is simply impossible. Any person or organization who has found a rule of conduct whose results they regard as satisfactory, for example 'always tell the truth', or 'always price your product at average cost plus n per cent', will not change their strategy so long as nothing goes seriously wrong. This form of conduct is called satisficing. As Simon suggests, in, "A Behavioral Model of Rational Choice," satisficing consists of two related concepts, namely: (1) satisfying a minimum requirement, and (2) choosing among a subset of behaviors when information-processing or time constraints limit the ability of a decision-maker to make an optimal decision. Satisficers change their rules of conduct only if circumstances change or when the current rules no longer produce satisfactory results. Even then, they do not try to optimize, but search for better rules by trial and error. Once they find an acceptable rule, they settle down to satisfy again. This heuristic view of human behavior is significantly at odds with modern neoclassical theory, specifically the parameters that define preference and the notion of the utility-maximizing consumer. Theories that incorporate constraints on the information-processing capabilities of the actor, or consumer, are known as theories of bounded rationality. The concept of satisficing as applied to the field of economics has received a great deal of attention, and as a result, there exists an extensive literature on the subject with a well developed mathematical foundation. For a cogent summary of the mathematical application of satisficing in economics, see Roy Radnar's, "Satisficing."

One of the great puzzles in economics over the past century revolves around the relevance of utility, whether cardinal or ordinal, as the primary instrument to explain value, choice and ultimately demand. While some economists have effectively abandoned the notion of cardinal utility because it is not amenable to measurement, a

transition from a cardinal measure of utility to ordinal utility in the 1930's significantly affected the development of the modern neoclassical theory. Alternatively, some economists now argue that some types of utility are measurable. As Kahneman, Wakker, and Sarin in, "Back to Bentham? Explorations of Experienced Utility," explain:

In current economics and in decision theory, the utility of outcomes and attributes refers to their weight in decisions: utility is inferred from observed choices and is in turn used to explain these choices. With few exceptions, experienced utility is essentially ignored in modern economic discourse. The rejection of experienced utility is justified by two standard arguments: (i) subjective hedonic experience cannot be observed or measured; (ii) choices provide all necessary information about the utility of outcomes because rational agents who wish to do so will optimize their hedonic experience. (p. 376)

Making a distinction between experienced utility and decision utility, Kahneman et al. argue that experienced utility is both measurable and empirically distinct from decision utility. Following an example first mentioned by Paul Romer, the distinction between the two concepts of utility can be better understood:

A patient suffering from unusually profound amnesia has two toasters in his kitchen. The toaster on the right functions normally. The toaster on the left delivers an electric shock when the toast is removed. The patient's gasp and quick reaction of his hand indicate that the shock is painful. Because the patient does not remember the experience, however, he does not anticipate the shock the next morning, and is consequently indifferent between the toasters. The patient's decision utility for using the toasters is equal, but his experienced utilities are quite different. (p. 376)

The satisfaction that a person experiences from using a useful thing and how they understand the usefulness of a thing is clearly separated in this example. Kahneman et al. argue that in general what a person experiences and what a person takes away from their experiences to guide future decisions is not necessarily consistent. In, "Prospect Theory: An Analysis of Decision under Risk," Tversky and Kahneman suggest that "people rely on a limited number of heuristic principles which reduce the complex tasks ... to simpler judgmental operations. ... These heuristics are quite useful, but sometimes they lead to severe and systematic errors' (p. 1124) Prospect theory, loss aversion, status quo bias, the gambler's fallacy and self-serving bias are all heuristics that have been developed to

explain behavior that is inconsistent with the predictions and explanations of behavior derived from the modern neoclassical theory of choice. The technique of framing, specifically cognitive framing, mental accounting, reference utility, and anchoring were developed to explain other inconsistent behaviors. Framing and heuristic biases are discussed in Kahneman, Knetsch and Thaler's, "The Endowment Effect, Loss Aversion and Status Quo Bias," Tversky and Kahneman's, "The Framing of Decisions and the Psychology of Choice", and Thaler, Tversky, Kahneman, and Schwartz's, "The Effect of Myopia and Loss Aversion on Risk Taking: An Experimental Test."

Extensive criticism of the modern neoclassical approach seemingly has developed from the inclusion of only a few meaningful and distinct assumptions that have led to an oversimplified model that is unable to explain the broad scope of human action and economic pursuits. As the boundaries of economic science are expanded to tackle new economic problems, the syllogistic model of consumer choice is intractable and difficult to expand. Critics of the modern neoclassical approach argue that there are unlimited numbers of different ways of using given resources, that a consumer chooses between a very limited number of possibilities, that people use crude 'rules of thumb' to make decisions, that peoples' tastes change or evolve over time and that the set of available goods and services is continually changing and that knowledge about what is available is partial, expensive and unreliable. Behavioral models typically address particular observed market anomalies and modify standard modern neoclassical models by describing decision makers as using heuristics and being affected by framing effects.

A large number of reported anomalies exist that put into question many of the assumptions of modern neoclassical economics. Richard Thaler and many other economists have written a large number of papers discussing specific market anomalies from a behavioral perspective. A few of these anomalies include preference reversals in Allais', "Le Comportement de l'Homme Rationnel devant le Risque, Critique des Postulats et Axiomes de l'Ecole Americaine," Lichtenstein and Slovic's, "Reversals of Preferences Between Bids and Choices in Gambling Decisions," the Ellsberg paradox in, "Risk, Ambiguity and the Savage Axioms," the part-whole bias, cash valuations of

risk in, Loomes, Dubourg, and Jones-Lee's, "Imprecise Preferences and the WTP-WTA Disparity," the endowment effect in Kahneman, Knetsch, and Thaler's "Experimental Tests of the Endowment Effect and the Coase Theorem," money illusion in Shafir, Diamond and Tversky's, "Money Illusion," and Patinkin's, "Money and Wealth: A Review Article," inequity aversion in Fehr and Schmidt's "A Theory of Fairness, Competition, and Cooperation," reciprocity in Fehr and Gächter's, "Fairness and Retaliation: The Economics of Reciprocity," and present-biased preferences in O'Donoghue and Rabin's, "Choice and Procrastination." While some critics desire to completely overhaul economic theory, others wish only to introduce or modify particular assumptions. What is certain however is that there is a growing discontent amongst economists and a growing collection of evidence to support the conclusion that the modern neoclassical rational consumer choice theory is an ineffective method and model to account realistically for human behavior in economics. Even the most basic of assumptions, for example, Transitivity, which characterizes the consistency in choices of the consumer from one moment to another, may inaccurately depict human behavior. As Jehle and Reny suggest in *Advanced Microeconomic Theory*, experiments have shown that in various situations, the choices of real human beings are not always transitive" (p. 6).

II. Epistemology

In Paul Krugman's, *How I Work*, he poignantly characterizes the sentiment of many economists regarding the reliance on inference based models in economics: "What I began to realize was that in economics we are always making silly assumptions; it's just that some of them have been made so often that they come to seem natural." Rather than using an empirical approach to gather evidence, economists generally rely upon statistical inference. Economists typically begin by describing the terms that are considered the most important in an area under study, and then develop a model that approximates the real world where certain variables are included endogenously and the remainders are treated exogenously. Imposing order by logically abstracting, isolating or simplifying certain variables, a model is manipulated and particular predictions or implications are

derived. At this point, the findings of the model are tested by comparing its predictions to the actual phenomena it describes in the real world.

The central problem of statistical inference is that there is always a degree of uncertainty involved with determining whether a sample is characteristic of the population it is taken from, and if an identified correlation actually depicts a cause and effect relationship between tested variables. This doubt can never be removed, and consequently there is always a degree of uncertainty that surrounds the results of this approach. It is for this reason that economists caveat their findings with ‘a degree of confidence,’ however this degree of confidence only relates to the variance in the data to the hypothesized relationship between the variables. The prolific adoption of statistical inference by economists as a tool of discovery largely derives from Milton Friedman’s argument for the use of the methodology of Positive Economics. Friedman has argued that, “the entirely valid use of ‘assumptions’ in *specifying* the circumstances for which a theory holds is frequently, and erroneously, interpreted to mean that the assumptions can be used to *determine* the circumstances for which a theory holds, and has, in this way, been an important source of the belief that a theory can be tested by its assumptions.” (p. 19) Faced with a general inability to test successfully the assumptions of the neoclassical model against real world behavior in the middle of the twentieth century, Friedman’s Positive Economic approach has bypassed arguments based on assumptions and rather concentrated on examining the relationship between particular phenomena. He has laid the theoretical foundation of econometrics which ignores the relevance of neoclassical theory and the relevance of the assumptions that the model of choice is based upon. Rather, with direct evidence in terms of observable correlations between economic phenomena, the relationship between particular phenomena can be observed and measured. In essence, Friedman has argued that regardless of the problems with the realism of modern neoclassical theory, there exist observable consistent trends in economic variables that economists should not ignore and can use, despite an ignorance of their causes, to make reasonably accurate predictions based on the stability of these observed correlations.

According to Bryan Caplan in, “The Austrian Search for Realistic Foundations,” “Friedman's (1953) reply that unrealistic assumptions are acceptable if they yield correct predictions leaves many unsatisfied” (p. 823). The consequent prolific adoption of the Positive Economic approach and the explosion of interest in econometrics have led to the development of a methodological paradox in economics. On one hand, the inability to test successfully and utilize the neoclassical model has led to the adoption of and reliance on statistical inference (econometrics). On the other hand, economic theory is required to understand and organize data. In *Econometric Analysis*, William Greene stresses the importance of economic theory in guiding econometric analysis: “With no theoretical basis, the result of the exercise is most likely to be an ambiguous catalog of possibilities” (p. 4). Because the interpretation of econometric information depends upon theory, and because econometrics was developed to replace the reliance on theory, the economist is caught in a cycle of analytical stagnation. Consequently, because pursuing the use the neoclassical theory to form predictions was unsuccessful and because the primary method of discovering economic information is dependent upon economic theory, a new method of inquiry is required to identify truth and determine true explanations from false ones.

The core of logic has always been the study of inference. For general clarification, inference is the process of deriving logical conclusions from premises known or assumed true. The classical theory of statistical inference centers on rules for using sample data effectively. These rules are based on the properties of samples and sampling distributions. Whether the form guiding inference is statistical, mathematical or syllogistic, each method of inference is based on the same logical process; however the various methods are different in application. The method of propositional inference is a deductive method that deals with the relations between propositions in terms of their form instead of their content. The main import of logical propositions is that the logical consistency of an argument can be maintained by adhering to the rules of form. Thus, the rules of logic or form, whether they are based on statistical, mathematical or syllogistic theories, serve to provide the consistency framework that allows for logical development of an argument. The primary intent of this logical approach is to provide a mechanism

that guarantees the consistency of an argument, and given that no rules are violated, discussion can be moved from arguments of form to arguments of result.

Given that the rules of logical succession are not violated, the basic propositions of form can be expanded and easily analyzed for accuracy. This technique has proved very effective in developing more advanced mathematical and statistical applications based on a few initial propositions. The usefulness of such methods in deducing the properties of reality was less successful. The imputation behind the use of deductive methods lies in the successful inclusion of content that accurately reflect the phenomenon of concern. Thus, assuming reality is logically consistent, stated premises of a proposition accurately encompass and depict some reality or situation that is in question, and given the correct use of form, then it must be concluded that the logical deductions should conform or correspond to the cause and effect relationships in reality. The uncertainty inherent in determining whether the included premises fully and accurately encompass some reality is the primary limitation of methods of inference. Thus, as inference depends on the accuracy and inclusiveness of its premises, it is in itself a limited and an ineffective tool or method of discovery, as its efficacy depends entirely on the efficacy of those methods that would allow the development of accurate premises.

Syllogistic inference, often referred to as Aristotelian logic, is used to discover the logical consistency that can be drawn from simple true statements concerning nature. The formal neoclassical model is both a mathematical and syllogistic model of consumer choice. The failure of inference based methods can be observed through the often inaccurate and conflicting arguments made using the method. During the 17th century, opponents of the method, such as Galileo Galilei, Francis Bacon, and Tycho Brahe, who while admitting the logical consistency of the method, especially given its success in mathematics, advocated the inadequacy of the method in ascertaining the properties of nature. Axiomatic models require not only that its assumptions are accurate, but that they fully depict the nature of the phenomenon a paradigm approximates. If the initial premises are not true, or if the full nature of the phenomenon is not accurately depicted, the inferences made from the model will not accurately depict reality. The problem with

using methods of inference is that it is enormously difficult to determine the scope and nature of even simple phenomenon, and because it is so difficult, the goal of a science should be focused on discovering these simple true statements, rather than using them as its starting point. As Francis Bacon discovered over four centuries ago, an empirical approach is the most effective in sustaining intellectual development in a field of study:

In forming axioms, we must invent a different form of induction from that hitherto in use; not only for the proof and discovery of principles, (as they are called,) but also of minor intermediate, and in short every kind of axioms. The induction which proceeds by simple enumeration is puerile, leads to uncertain conclusions, and is exposed to danger from one contradictory instance, deciding generally from too small a number of facts, and those only the most obvious. But a really useful induction for the discovery and demonstration of the arts and sciences should separate nature by proper rejections and exclusions, and then conclude for the affirmative, after collection a sufficient number of negatives. Now, this has not been done, or even attempted, except perhaps by Plato, who certainly uses this form of induction in some measure, to sift definitions and ideas. But much of what has never yet entered the thoughts of man, must necessarily be employed to exhibit a good and legitimate mode of induction, or demonstration; so as even to render it essential for us to bestow on syllogisms. (p. 364)

The use and development of econometrics has sustained the growth of economic science and has led to a wealth of correlative studies that have been used to better forecast and predict economic metrics and their fluctuations. Without a theoretical synthesis of how these empirical relationships interrelate, the ability to organize and understand the actual causal relationships between these metrics, the speculative aspects of econometric analysis and the development of theory used to guide new hypotheses, is put in question. Because the factors that lead to the change in and movement of economic metrics are not understood, there is always the possibility that when a system is destabilized that many of the currently accepted relationships between particular metrics may uncouple as other previously unknown factors are discovered to influence the system.

While cyclical fluctuations in economic metrics afford the opportunity to study a greater range of economic phenomena that allows economists the opportunity to measure and discover the extent to which different economic phenomena are more or less causally

related, the economic pain that is likely to ensue from these unpredicted market fluctuations is avoided by predicting and testing the effect of these changes through the development of an empirical or realistic theory of the economy. By developing a taxonomy of economic metrics beforehand, a clearer understanding of the costs and benefits of particular approaches and a greater flexibility will be afforded the leaders of an economy. Jehle and Reny note in, *Advanced Microeconomic Theory*, that consumer theory is the “bedrock foundation on which so many theoretical structures in economics are built”, a clearer understanding of human behavior in economics and a unified economic science may and should derive from discovering these secret causal connections between economic metrics and the human specific causal connections that compose the process of choice.

III. The Way Forward

In this discourse, both the historical analysis and treatment of human behavior in economics and the empirical synthesis of economic human behavior is discussed. At the conclusion of this discourse, sufficient doubt will be cast on the usefulness of the modern neoclassical treatment of human behavior in economics, and the empirical treatment of human behavior in economics, which first developed over a century ago, will be identified as the primary, if not only, method and model to explain human economic or consumer behavior.

Rather than focusing on an econometric or mathematical approach to analyze this subject, which is currently the standard approach used to address human behavior in economics, this discourse is focused on the empirical aspects of an economic science, and illustrates through observation and demonstrable evidence, how the development of a realistic theory of human behavior in economics has become derailed, how the modern rational theory of consumer choice does not realistically account for human behavior, and how human behavior or consumer choice theory can be realistically be addressed and researched in economics. Throughout this discourse, many inconsistencies in the modern neoclassical and post-neoclassical approaches and many arguments detailing consistencies in observed behavior are explained. By utilizing an empirical

methodology, the results of this discussion are developed into a realistic theory of human behavior in economics that integrates a broader scope of economic research and observable behavior than both the neoclassical and post-neoclassical models of choice.

In Chapter Two, after a brief review of the origins of the modern neoclassical model of human behavior, this discourse begins by addressing the question of whether or not there exist typical human characteristics that can be used in economic modeling. Until recent history, the prevailing view in economics proposed by the eminent Frank Knight and Lord Lionel Robbins was that the complexity involved in identifying the root cause of behavior effectively precludes the taxonomy and the accurate accounting of general human characteristics. As was demonstrated by recent research in the fields of Psychology, Neuroscience, Medicine, and even Economics, there now appear to be many typical human characteristics that lend themselves to a systematic study.

The search for consistencies in human behavior begins in Chapter Three with a discussion of Ludwig von Mises' view of rationality. Von Mises has argued that all human behavior is rational in the moment of decision. Due to a misinterpretation of his view by the eminent Lord Robbins and Dr. Knight, rationality was taken only to mean logical consistency. Von Mises' insightful depiction of rationality as a momentary and consistent mental process provides the causal framework upon which an empirical investigation is undertaken. If behavior is not consistent, then there exists no basis upon which to compare and organize observed human choice and action. Von Mises' important contribution of the rationalization of behavior and the momentary process whereby choices are made is of paramount importance to the development of a scientific inquiry into realistic human behavior. Because of a miss-translation of this process of rationalization to mean and refer only to logical consistency, von Mises contribution to economic theory was largely neglected.

Deriving from the marginalist revolution in the late nineteenth century, neoclassical theory as it is generally understood today derives primarily from William Stanley Jevons' *Theory of Political Economy*, and Alfred Marshall's *Principles of Economics*, which is

based on Jevons' work. One of the important contributions of Jevons' theory is his supposed resolution of Adam Smith's Water and Diamond Paradox. As Smith argued in the *Wealth of Nations*, some goods may have a high value in use and a low value in exchange or a high value in exchange but a low value in use. Jevons explained these divergences by the relative scarcity of goods. Goods like water, that are highly useful, but relatively abundant, have a low exchange value because the demand for water is easily satisfied. Diamonds, conversely, according to Jevons, possess very little use value, but a high exchange value because the price of diamonds is bid up by the relatively high demand and diamonds and the scarce supply. Jevons bases his theory of value on the relative scarcity of particular goods, however, he never addresses why goods, whether scarce or not, are desired or are useful in the first place. In Chapter Four, Jevons scarcity explanation of the water and diamond paradox is examined and is demonstrated to be an incomplete explanation of value. By examining the relationship between the characteristics of a good and how these characteristics relate to the resolution of human interests, why goods are chosen and valued over other goods can be determined irrespective of the relative scarcity. By utilizing Carl Menger's empirical approach, a greater understanding of the phenomena relevant to the subject can be identified and it is shown in this chapter that the neoclassical theory does not accurately explain the water and diamond paradox, and is based on a notion of utility that inaccurately depicts the underlying phenomena involved in choice.

In Chapter Five, many of the questions that revolve around the empirical treatment of human behavior are discussed. Historically, attempts to describe and explain human behavior have failed, primarily because their authors did not possess an accurate understanding of reality and the physiological processes of the human body. It was not until 1948 that the sex habits of human beings were even taxonomically and scientifically studied, as described in Dr. Kinsey's, *Sexual Behavior in the Human Male*. The subject of human behavior in economics today is ripe for empirical investigation. In economics, the empirical approach to human behavior began with the publication of Carl Menger's, *Grundsätze der Volkswirtschaftslehre*. Menger's contribution has often been confused with William Stanley Jevons' arguments written in *Theory of Political Economy*. Owing

to certain historical geo-political and socio-political disruptions, the Austrian empirical approach has practically become extinct. The importance of much of the excellent early empirical analysis is now studied by only a handful of economists and many of the early empirical arguments have been distorted and miss-understood. While the empirical analysis of human behavior (specifically the treatment of goods and value), seems to possess a realistic and accurate interpretation of the underlying variables in human behavior. The small number of empirical studies in economics were lost in the large shadow of numerous neoclassical and modern neoclassical studies. By expanding the early empirical research of Carl Menger, it is possible to show how and why many propositions commonly accepted today in neoclassical theory are invalid. The research techniques and evidence gathered by behavioral economists over the last several decades help suggest how human behavior can be integrated into economic analysis and discussion. It is now possible to outline the foundation of an empirical approach, which if researched further may offer a superior theory of consumer behavior.

In Chapter Six, the question of uncertainty as it relates to decision making is discussed. Uncertainty is often modeled using probability theory, which involves a partial understanding of the possibilities and the relative probabilities of particular outcomes. True uncertainty involves an uncertainty regarding what will be the outcome rather than the uncertainty described in probability theory which refers to the hypothetical generalization of the regularity of particular known outcomes or which in a set of known outcomes will occur. The argument is made that “expected utility theory” is irrelevant to human decision making that involves true uncertainty because people are unable to account for what is unknown. Expectation theory as with probability theory involves an illusion, where the causal connections between causes and outcomes are proxied by a hypothetical probability that does not exist in reality.

It is only through assuming that unknown cause and effect relationships can be approximated by some degree of randomness that expectation theory and probability theory are assumed to make sense. While certain outcomes can be observed to recur consistently from one similar period to another, this illusion of consistent randomness

exists merely because of the regularity in the manifestation of the causes that effect these particular outcomes. Probability theory depicts the regularity in the confluence of unknown disparate events and identifiable outcomes and ignores the minutia of what is not generally understood. In the toss of a coin and in the machinations that lead to a consistent number of consumers entering a store at a particular time on particular days, the initial moment of the force and the external forces the coin comes in contact with and the sociological and physiological needs and habits of the customer are ignored and generalized in terms of the relationship between particular preset conditions. While this approach is amenable to the discovery of general patterns and correlations between particular preset conditions, these approaches are incapable of explaining truly uncertain phenomena because truly uncertain phenomena involve an ignorance not of what outcome is likely to occur but an ignorance of the existence of the situation upon which to conceive of possible outcomes. True uncertainty involves ignorance, and it is meaningless to propose that a person weighs what is not known with what is known when making purposeful decisions. The infinity of reality's possible outcomes preclude the notion of even considering what is unknown and if all behavior other than vegetative behavior is purposeful as described in the previous sections, then what cannot be conceived cannot be incorporated in rationales that guide conduct. What is unknown is purposely explored, however, as even with exploration, there must be an element of the thing to be explored that is known for purposeful exploration to occur or else discovery arises blindly through the circumstance and situational relation between the observer and the previously unknown phenomena.

Repeatedly throughout recent history the limitations of probability theory as a method only to describe temporal generalities and consistencies has repeatedly been reinforced. While probabilities can be easily assigned in simple games and theoretical arguments, just how these likelihoods are simulated in reality establishes the limitation of the approach. Even in simple card games, randomness is approximated by hiding the location of a large number of similar cards, or by utilizing the physical properties of a large number of circular balls bounced forcefully in a small container. While the concept

of probability serves as a useful tool to characterize particular regularities it distracts the focus of discussion away from the true causal nature of reality.

Many great thinkers have argued against the relevance of using probability theory to model uncertainty in human decision making. John Maynard Keynes has refuted this proposition in his *Treatise on Probability*, René Descartes has refuted it in his *Discourse on Method*, Henri Poincaré has refuted it in his *Foundations of Science*, and more recently the Nobel Laureate Herbert Simon has rejected the idea. The argument is an old one, dating back to Bernoulli and Condorcet, and each time it was advocated (with the hope that something can be said about that which is uncertain) the inability to derive practical knowledge from its implementation has ultimately led to its irrelevance. The refutation is almost always in the same form. It is simply not possible to know that which is not known. As is discussed in this thesis, it is not possible to model uncertainty with a frequency distribution in the face of real uncertainty because there is no basis on which one can construct such a distribution. The use of a frequency distribution to model uncertainty in simple games is only possible because there is in practice no uncertainty in simple games.

Because people face true uncertainty simple probability games and the predictions of expectation theory do not accurately reflect the process and outcomes of choice. Because purposeful decisions and choice are based on rationales that incorporate known information, simple games are interpreted in terms of the subjective understanding of each respondent. More or less information concerning the benefit of particular courses of action and an understanding of the relevance of the potential outcomes and the nature of the probabilities inherent in the game are involved in the manifestation of a final choice. True uncertainty is not involved in the decision because the decider is unable to take into consideration that which is unknown to them. The divergence in choice of seemingly simple choices derives from this interpretation of the relevance of the simple game to the respondent. Identifying a simple problem and expecting peoples' behavior to follow these simple probabilities requires control of those variables that may affect the respondent's choice. As a result, how a person will react to a simple probability

experiment is not based just on the probabilities inherent in the simple game, but in how they interpret the probabilities and factors they perceive are involved. Deviations in peoples' responses from predicted theory recorded by Kahneman and Tversky in, "Prospect Theory: An Analysis of Decision under Risk," can consequently be explained by the inclusion of additional information that is relevant to the question. By including the interpretation of a simple game's outcomes, for example including the interpretation of the opportunity cost of particular outcomes, the predicted choice that a respondent can be shown to deviate from expectation theory, however, the usefulness of the analysis of simple games with hypothetical probabilities may practically be of little importance to an understanding of the process of choice and a rational consumer theory.

In the final chapter, Chapter Seven, this discourse concludes with a discussion of what characteristic human behaviors can be empirically supported and what neoclassical assumptions are required to be re-evaluated. A brief history of the geo-political effects on the development of the empirical approach is discussed as well as how economic growth can be identified to derive from the development of understanding and the more efficient command of nature. It is apparent that an empirical model of human behavior will require continued research to verify and expand upon the phenomenological processes only generally discussed in this discourse. Many of the currently accepted modern neoclassical assumptions and theories contested in this discourse and the nature of the process of choice and human behavior hypothesized in this discourse are briefly summarized in this chapter. The final section discusses a broadly how additional research and experiment can be used to develop and expand conducted to develop the empirical approach. There appears to be a fairly straightforward path towards developing a general model of human behavior that seems to possess the potential to unify and advance economic theory. It seems evident that through experimentation and the testing of a realistic theory that many of these new explanations will better guide econometric analysis and support future theoretical studies and enable the development of realistic experimental controls in economic science.

This thesis offers a theoretical discussion of human behavior based on an appeal to facts and demonstrable theory. Rigorous empirical verification of the discussion in this thesis could easily be the subject of future studies, however, the intent of this thesis is to address specifically only how the theory of human decision making in economics can be improved by developing and expanding the factual base upon which to establish an economic science of consumer behavior. An appeal to economists is made to move away from neoclassical models of human behavior and to explore the factual development of a realistic theory of consumer behavior that can be used to develop a unified discipline that will form the basis of an economic science that is testable, reproducible and will support future research for understanding the complexities of human behavior in economics.

Chapter 2. The Science of Human Behavior

It is no wonder that these sciences are still in the stage of violent disagreement among their followers as to what they are and what they are about. The first step toward getting out of this slough, we suggest, is to recognize that man's relations with his fellow man are on a totally different footing from his relations with the objects of physical nature and to give up, except within the recognized and rather narrow limits, the naïve project of carrying over a technique which has been successful in the one set of problems and using it to solve another set of a categorically different kind.

Limitations of Scientific Method in Economics, Frank Knight

Inquiry into the nature of human behavior is by no means new, and by no means complete. While certain formularized systems exist and while certain limits are understood, it is an indictment of the difficulty inherent in the subject that mankind has not yet formalized a coherent and comprehensive dissertation on the matter. In the field of economic science, the aspects of human behavior discerned to be amendable to codification are incorporated into the theory of rational consumer choice. The theory of rational beliefs and rational preference in recent history was driven by a desire to move away from the strong psychological laws of the classical utilitarian theory of Edgeworth, and Mill, and to render its foundations as general as possible. Economists have sought to pare away as many of the traditional assumptions as possible so as to retain a streamlined, yet coherent, theory with predictive power.

Derived from the marginal utility revolution and from utilitarian ideals, the theory of behavior developing out of the marginal revolution has gone through many subsequent changes and refinements. In 1896, Vilfredo Pareto published his, *Cours d'Economie Politique*, where he speculated that the reliance on cardinal or measurable "utility" was unnecessary to the theory of demand, as it is sufficient to order preferences ordinally. Evgeny Slutsky, in his article, "Sulla Teoria del Bilancio del Consumatore," which was originally published in the, *Giornale degli Economisti*, expanded on Pareto's suggestion, and derived the first fundamental equation of value that did not rely on an ordinal measure of utility. Sir John Hicks and R. G. D. Allen's famous paper, "A

Reconsideration of the Theory of Value,” published in 1934, introduced the Slutsky decomposition of demand into substitution and income effects, and redefined substitution and complementarity. Sir Hicks reacquainted English-speaking economists with the derivation of demand curves with the use of indifference curves and budget constraints and the equation between marginal rates of substitution and relative prices. Under the encouragement of Lord Lionel Robbins, Sir John Hicks in 1939 published his book, *Value and Capital*, which demonstrated that the principle of marginal utility was neither a necessary or sufficient condition for the law of demand to hold. It was later, in 1959, that Gerard Débreu reduced the standard consumer theory to its core essentials in his book, *Theory of Value*. It is largely this view of the theory of rational consumer choice which will be considered in this discourse.

The principal foundation of modern consumer theory stems from the axioms of choice, which are intended to give formal mathematical expression to the consistency inherent in consumer decisions involving choice. Based on these axioms, the theory of choice suggests that a consumer has stable, well-defined preferences upon which they consistently make rational choices within a market that tends to equilibrium. In this method of modeling, as few meaningful and distinct assumptions as possible are set forth to characterize the structure and properties of preference. All that is required of the consumer is that they are able to make binary comparisons between two certain consumption plans at a time, and that the consistency of their choices obey the mathematical properties of Completeness, Transitivity and Local Non-satiation. These axioms represent a rational framework that characterizes those aspects necessary to structure a consistent discriminatory model of choice. These axioms support the development of the indifference curve, the utility function, and ultimately allow for the derivation of demand curve and function.

The characteristic feature of the standard model of choice assumes that the consumer is fully aware of price and the availability of the objects of choice. To the extent that a consumer is uncertain about these characteristics, it was suggested that decisions can be modeled using von Neumann and Morgenstern’s expected utility theory. John von

Neumann and Oskar Morgenstern's expected utility theory relates the probability of expected outcome to the utility one would derive from obtaining a particular bundle at a particular price. This approach was published in their 1944 book, *Theory of Games and Economic Behavior*. Von Neumann and Morgenstern's theory contains essentially the same axioms of choice as the certain model, however, rather than relating bundles of goods, the expected model relates simple gambles or lotteries. Whereas in the standard model of choice the axioms allow the derivation of a utility function, in the uncertain model, the various probabilities associated with different ventures in a lottery proportionately dissipate the potential utility of an outcome, more so when a likelihood is low, which can be represented by an expected utility function.

It was later in 1954, that Leonard J. Savage synthesized von Neumann and Morgenstern's axiomatization of expected utility with Bruno de Finetti's axiomatization of subjective probability in his book, *The Foundations of Statistics*. Savage's theory was presented as a rational foundation for statistics and decision analysis, which was presented as a normative theory of behavior under uncertainty to which ideally-rational decision makers ought to conform, and which social theorists can use as a modeling tool to explore the implications of the hypothesis of rationality in settings involving uncertainty. Savage's theory essentially revolves around six initial axioms, which are both motivated and discussed, and from these are deduced the existence of a subjective probability and a utility function. It is readily admitted by Savage that he is building a "highly idealized theory of behavior of a 'rational' person with respect to decisions" (p. 7), and that he has certain misgivings in regards to the nature of uncertainty underlying his argument, particularly in regards to the nature of human rationality and its implications in what constitutes logical behavior: "The assumption that a person's behavior is logical is, of course, far from vacuous. In particular, such a person cannot be uncertain about decidable mathematical propositions" (p. 7).

Savage is not convinced that such a framework can lead to a truly formal model, and suggests that George Pólya's tempting theory of the probability of mathematical conjectures, discussed in, "Preliminary Remarks on a Logic of Plausible Inference," on

which he bases his argument, cannot be fully successful as there exists an inconsistency in what can be assumed as uncertain and what must be assumed to be known. Savage, however, cites Bruno de Finetti's optimism towards Pólya's suggestion in, *La 'logica del plausibile' secondo la concezione di Polya*, but clearly reiterates his concern regarding the seemingly arbitrary separation between what can be determined uncertain or certain. He suggests to his readers that "when certain maxims are presented for your consideration, you must ask yourself whether you try to behave in accordance with them, or, to put it differently, how you would react if you noticed yourself violating them" (p. 7). This consideration should be applicable to all aforementioned mathematical or statistical deductive schemas.

While the derivation of the rational model establishes a mathematical framework for the exercise of choice under certainty and uncertainty, the essential feature of discrimination between choices, that being why one thing is preferred over another or how the possibilities of a lottery are identified, is in both models treated exogenously. As a result, the current economic theory of choice abstains from speculating on the root of the derivation of human preference, and thus, is not so much a theory of choice, but a framework of consistency. Given the vast body of literature on the subject and given the current scientific research into the physiology and psychology of human behavior, it is puzzling why the human aspect of human decision making is not more thoroughly incorporated into the micro foundations of economic theory. Given that the core variable which determines the outcome of human decisions is not formularized, there exists a great deal of uncertainty and confusion regarding the application of these models, and their significance. It is perhaps not surprising that certain paradoxes within the axioms of choice have been discerned, as demonstrated by Allais and by Ellsberg, and that the predictive capabilities should be demonstrated to be inconsistent predictors of human behavior. As Tversky and Kahneman demonstrated in their famous article, "Prospect Theory: An Analysis of Decision Under Risk," it is readily apparent that the theory of consumer choice, in its current form, is unable to account for certain scientifically demonstrated tendencies in human behavior.

Whereas the contribution of the theory of consumer choice is of immeasurable importance, it must be admitted that both its greatest strength and greatest weakness stems from its limited inclusion of typical human behavior, particularly in regard to the limited rationality invoked in the axioms of choice, and more significantly in regards to the assumed indefinable nature of the determinants of human preference. The question that needs to be addressed is why such an important aspect is excluded from economic theory, and why such pains should be taken to avoid a subject that has endured significant historical inquiry and which has in the last half of the twentieth century endured significant scientific treatment in the fields of neuroscience, physiology and psychology. For microeconomic theory to progress, it is apparent that the nature of human behavior will have to be resolved, and that the current theory of consumer choice will have to be amended.

The two most often cited reasons for not dealing with the subject of human behavior in economic science are, firstly, that human behavior is not an economic concern, as these problems are under the prevue of sociology and psychology; and, secondly, that the inherent nature of human behavior virtually precludes the possibility of formularization. The first reason refers to the proper classification, or definition, of what constitutes economic science. Taxonomically, it is apparent that a classification encompasses what should and should not be studied within a subject and that, if a subject of concern is outside of these parameters, it is readily apparent that the subject should be naturally excluded. In the case of human conduct, since economics deals specifically with the subject of human decisions in a human economy, it is apparent that it would be useful to understand the nature of choice and preference, and that a classification or definition that excludes the study of this pursuit should necessarily be redefined or amended. As for the second objection, for the claim to be valid, it is apparent that one must possess a clear understanding of human behavior or at least a clear enough understanding so that one can assert with sufficient certainty the apparent futility of the endeavour. Thus, it seems sufficiently important to clarify the historic reasoning behind this objection so that it can be discerned why human behavior is no longer included or speculated upon in the

economic sciences, and to determine both the validity of such an argument and the limits of its censure

Perhaps the most notorious advocate of this position was Frank Knight.¹ In his essay, “The Limitation of Scientific Method in Economics,” he is very clear when he makes the claim that “human phenomena are not amenable to treatment in accordance with the strict canons of science” (p. 129). Knight makes two important distinctions in coming to this conclusion. The first distinction involves his classification of knowledge, and the second distinction involves his view of science. In regards to Knight’s first point, he distinguishes three distinct categories of knowledge. The first field of knowledge is of “the external world,” which encompasses the knowledge of everyday reality; second, the knowledge of the truths of logic and mathematics, and while his view of logic and mathematics is *a priori*, he does note that it is possible that this type of knowledge may actually be of the same objective reality as the first category; third, is knowledge of human behavior. It is clear from such a distinction that Knight discriminates between knowledge that can be obtained concerning human behavior and knowledge that can be obtained concerning “the external world.” Knight establishes the third category to draw attention to the unique problems associated with understanding the root of human behavior. It is in this last category where Knight felt that economic problems lay.

Knight suggests “life is a mere matter of mechanics; what human beings think of as practical problems of conduct are subjective illusions; thinking and planning and all subjectivity are illusions; human actions are a detail in a cosmic panorama of the transformation of motion” (p. 105). In regards to knowledge of human behavior, Knight determined it is impossible to discuss these illusions, such as value, in purely objective terms, and thus recommended that we should simply assume the reality of the conscious

¹ Dr. Knight was one of the twentieth century’s most eclectic economists. While generally Knight’s views were irreducibly neoclassical, his particular brand of economics was largely influenced by his Cornell professor, Herbert J. Davenport, who was at the time associated with the American Psychological School, which sought to ground the Marginalist high theory of Jevons, Wicksteed and the Austrians in the relativist foundations of Thorstein Veblen’s methodology. Like Davenport, the often notoriously opinionated Knight took great opportunity to criticize other schools, while at the same time adopting many of their ideas. Knight’s more notable debates were with Hayek, Mises, and the Austrian School over capital theory, Pigou over welfare theory, with Keynes over his general theory, and with Hutchison’s over his positivist methodology.

data and leave it to philosophy to reconcile the contradiction or to decide whether it can be reconciled. In this regard, Knight suggested that economists “have to accept the common-sense notion of value or worth as our starting-point” (p. 105). It is thus his view that human conduct is a subjective illusion, rather than being objectifiable, which is at the core of his objection. It is, however, as with his view of beauty, which he discerns to be an illusion, that his argument is really based on the vast complexity of the determinants of human behavior, as he notes that even the simplest behaviors are dependent on a multiplicity of previous experiences:

Long before he is adult, a being with man’s sensitiveness to passing experience and his capacity for conscious and unconscious memory has become such a unique aggregation of attitudes toward meanings that there is no use in talking about accurate classification; he has to be treated as an individual. In addition he is highly unstable, and most especially is largely unknowable, since as already observed, the associations which condition his responses are quite inaccessible to observation. No life history could conceivably be detailed and accurate enough to make them available as scientific data. (p. 130)

According to Knight, the difficulty in discerning the manifestation of behavior and determining through observation what experiences contribute to particular behaviors, has forced his conclusion that human behavior “will not yield generalizations which can be used as the basis of prediction and the guidance of policy, because there are no generalizations about them which are true; that is, no generalizations about our observations of them” (p. 129). As far as observations go, “they are simply not uniform; human beings do not maintain their identity as behavior traits and do not fall into a manageable number of behavior classes with objective and measurable identification marks; and this is practically true whether we do or do not attempt to use conscious states or attitudes as data in the classification” (p. 130).

It is this later statement that leads to the second point in Knight’s assertion. The reason that leads Knight to his statement that human phenomena are not amenable to scientific treatment derives from his unique view of science as “merely the technique of prediction” (p. 109). As Knight stated previously, because there do not exist observations concerning human conduct that “yield generalizations which can be used as the basis of prediction,”

and because he considers science as “merely the technique of prediction,” Knight arrives at the conclusion that “human phenomena are not amenable to treatment in accordance with the strict canons of science.” The problem with this line of reasoning is that he assumes away the existence of generalizations as a result of the complexity inherent in human conduct, and then goes on to suggest that because science requires generalizations as the basis for prediction, that human behavior is not amenable to science.

Science in the common meaning does not just deal with prediction. Rather, science is the intellectual and practical activity encompassing the systematic study of the structure of the behavior of the physical and natural world through observation and experiment. In this context, the role of science is to determine the pattern within the complexity of human behavior so that typical human generalizations can be determined. Given that there does not exist a formalized theory of human behavior, it is readily apparent that Knight’s argument is valid, in that one cannot expect to formulate accurate predictions without a formalized base of understanding. This argument, however, only appeals to a static situation where what is known is fixed. If, by some means, a pattern of human behavior is discerned, then it is necessarily the case that within Knight’s view of science, human behavior should be amenable to treatment. Essentially, Knight’s argument is based on the premise that human behavior is too complex to yield generalizations. As was demonstrated in the natural sciences, however, what in one generation has appeared random or insurmountable is often in the next generation simply understood. Consistent with his tendency to categorize knowledge in terms of what is known, he concludes in his essay, “Limitations of Scientific Method In Economics,” not that “prediction and control are impossible in the field of human phenomena, but that the formal methods of science are of very limited application” (p. 132). Perhaps, as Professor Lundberg suggests in his book, *Can Science Save Us?*, the reasoning behind Knight’s argument and others like it, is that human relations are simply not “believed to be proper subjects for serious scientific study” (p. 4).

The effect of Knight’s view has tended to discourage and discredit those who have advocated a scientific treatment of the complexity of human behavior. It is essentially

Knight's particular view of science, and his subsequent views on what can be known about human behavior, which precipitated his critique of Terence Hutchison's book, *Significance & Basic Postulates of Economic Theory*. The principal contentious issue revolves around Hutchison's inductive rather than deductive view of science. In the preamble of the third edition of Hutchison's book, he comments on Knight's erroneous critique:

It is held – (perhaps to a decreasing extent) – that empirical testability and falsifiability may provide a suitable criterion for the statements and theories of the natural sciences, but is quite inapplicable, or distorting, if applied to statements and theories characteristic of the social sciences. These are concerned with purposive, 'rational,' problem-solving, human actions and their motives, statements about which cannot conceivably be tested or falsified empirically, since they rest on intuitive 'understanding,' and introspection. This was the main basis for the criticisms of Professor F. H. Knight, if I have understood him correctly. Of course I cannot re-argue this whole issue here, but it seems to me as definitely as it did twenty years ago that the crucial points in Professor Knight's case should be rejected. (p. xi)

Whereas Knight rejected the efficacy of using empirical techniques to determine certain aspects of human behavior, and thus consequently rejected their use in the broader scope of the social sciences, Hutchison rather attempted to suggest that because of the confusion brought about by the use of a deductive approach, economic propositions should and must become empirically accountable. In Hutchison's, *Significance & Basic Postulates of Economic Theory*, he notes that to "all other scientists apart from logicians, mathematicians, and many economists, scientific laws are regarded as inductive, inferences conceivably falsifiable, though not practically falsifiable, empirically. If they are referred to as, 'hypothetical', what is implied is rather their provisional falsifiable character, and that they may conceivably be abandoned at any moment" (p. 62).

It seems significantly apparent that to understand a subject, a person must know about the subject, and to this point, idle, or even reasoned speculation is no substitute for observed reality. Surely to this extent, this discourse only extends the irony of Knight and Hutchison's argument in that this discourse seeks to deductively argue the merits of Hutchison's deductive argument that advocates the use of inductive inquiry over

deductive inquiry upon which Knight sought deductively to reject. The apparent “violent disagreement” to which Frank Knight speaks in the initial quotation of this chapter is the likely the result of such confusion, which points to Hutchison’s position that the merits of inductive reasoning are not readily supported by deductive argument. Perhaps, the merit of any methodology is best demonstrated through its results and not by its advocacy.

It retrospect, it appears that Frank Knight was wrong, as demonstrated by the research that was carried out in the field of psychology; where many human commonalities have been observed. Within the discipline of neuroscience, and in particular within social, behavioral and cognitive psychology, a vast array of consistent human factors have been unveiled that illuminate how the complex system of cells, tissues and organs regulate the body’s responses to internal and external stimuli. In these fields of study, there currently exists an extensive body of literature concerning: information processing, attention and memory, learning, cognitive development, judgment and decision theory. It is essentially the results born out in these fields that Hutchison objected to shielding. He saw that rigorous inquiry into the nature of a concern should whenever possible be carried through, as it is useful, and perhaps essential to bring about clarification and agreement. Thus, the shortcoming of Knight’s objection to Hutchison’s approach derived from his view that human behavior is a distinctly different concern that is so complex and unobservable, as to defy study.

Chapter 3. Rationality and the Moment of Choice

This is not to argue with von Mises and some of his followers that we must regard human action, if not purely vegetative, as at all times rational in the sense that, given belief in the range of technical knowledge available to individuals or collections of individuals, action must be consistent. I confess that I have never been able to understand this contention: I should have thought that one of the main practical functions of economic science was to enable us to detect inconsistencies in plans, such as, for instance, simultaneous demands for low interest rates brought about by increases in the size of the credit base and a diminution of inflation. ... I would have thought that the contention that explanations of economic relationships must involve considerations of purposes, implicit or explicit was relatively non-controversial.

On the Nature and Significance of Economic Science, Lord Robbins

I. The Post-Neoclassical Rational Theory of Consumer Choice

In, “A Reformation of the Theory of Choice”, Ian Little has suggested that: “a person is, on the whole, likely to be happier the more he is able to have what he would choose”. (p. 98) The underlying mechanism of the choices people make and the desire and understanding that motivates action is formulized in the rational theory of consumer choice, which is considered by Jehle and Reny in, *Advanced Microeconomic Theory*, to be the “bedrock foundation on which so many theoretical structures in economics are built.” (p. 3) In this chapter, the theoretical architecture of human rationality, how people reason and choose, is discussed, particularly in relation to how rationality can be explained empirically to improve the foundations and realistic application of the rational theory of choice.

Human rationality, or human consistency, is the main assumption under which the theory of consumer choice is based. Since the Great Depression and the movement away from psychological explanations and cardinal measures of utility, the rational and consistent aspects of the theory have been transformed into an axiomatically based syllogistic model that bears little resemblance to the models and arguments of the Marginalists who developed neoclassical economics. This modern neoclassicism, or post-neoclassical economics has retained very few of the original ideas that sparked the

transition from the classic labor theory of value. As a result of the rejection of the study of human behavior in economics and the exclusion of behavioral findings, many Nobel Laureates over the past half century have published articles suggesting that the rational theory of consumer choice and expected utility theory are incapable of addressing the broad range of human behavior.

Because so many human aspects of behavior have been removed from economic theory, it should not come as a surprise that important economists questioning the power of the post-neoclassical microeconomic models have been able to discover evidence that contradicts the predictions of the theory. As already discussed, the Allais and Ellsberg paradoxes serve as a lasting example of the rational theory's inability to explain people's preference for certainty over uncertainty, and recently, Kahneman and Tversky's, "Prospect Theory: An Analysis of Decision Under Risk," (1979) has experimentally demonstrated that people's decisions are inconsistent with the predictions of the rational theory of choice. They have found that people choose to underweight risky outcomes in comparison to outcomes that can be obtained with certainty. In, "A Behavioral Model of Rational Choice," Nobel Laureate Herbert Simon suggests that: "Recent developments in economics, and particularly in the theory of the business firm, have raised great doubts as to whether this schematized model of economic man provides a suitable foundation on which to erect a theory – whether it be a theory of how firms do behave, or of how they "should" rationally behave." (p. 99)

Over the past two decades, many important discoveries have been made in regard to the economic-psychology of human behavior. Mathew Rabin's "Psychology and Economics" offers an illuminating account of several instances where the predictions of the post-neoclassical model of consumer choice are inconsistent with the behavior of human beings. It is unfortunate that much of this research is ignored by most mainstream economists, as Mathew Rabin suggests: "many of the arguments invoked against the reality or relevance of behavioural research derive from unfamiliarity with the details of this research. Hence, my hope and guess is that as economists become more familiar with this research, such arguments will dissipate. And as the aggressive uncuriosity

shown in the past toward behavioural research continues to diminish, we can look forward to focusing entirely on its substance”. (p. 41)

A point that is often overlooked in the efficacy of the rational theory of consumer choice is the medium of the argument itself. At its very core, the post-neoclassical model is an expansive mathematical equation logically derived from the axioms of choice. It is not possible to disprove this model, other than appealing to inconsistencies within the logic of the argument, or by demonstrating its irrelevance in describing and predicting accurately human behavior and choices. All mathematical models share this common characteristic, requiring no empirical evidence to validate the structure of their arguments and the validity of their conclusions. While a valid solution derived from such an argument may be true, there is no means inherent in the model to determine if the solution accurately depicts reality other than to compare the result to phenomena that it supposedly predicts. The structure of the argument may lead to logically true conclusions; however, there is no guarantee that these conclusions realistically portray phenomena in reality. Because mathematical models are supported only by the rules of logic that apply to them these models may appear stable over time, however, this illusion of stability should not be mistaken for a tested scientific theory. Without studying the correlation between observations and developing supportable hypothesis with observable and reproducible evidence there is no science. The impracticality of relating pure mathematical statements to empirical observation is illustrated in, “On the Nature of Mathematical Truth,” authored by Carl Hempel:

The statement that $3 + 2 = 5$, then is true for similar reasons as, say, the assertion that no sexagenarian is 45 years of age. Both are true simply by virtue of definitions or of similar stipulations which determine the meaning of the key terms involved. Statements of this kind share certain important characteristics: Their validation naturally requires no empirical evidence; they can be shown to be true by a mere analysis of the meaning attached to the terms which occur in them. ... However, this characteristic ‘theoretical certainty’ of analytic propositions has to be paid for at a high price: An analytic statement conveys no factual information. Our statement about sexagenarians, for example, asserts nothing that could possibly conflict with any factual evidence: it has no factual implications, no empirical content; and it is precisely for this reason that the statement can be validated without recourse to empirical evidence. (p. 544)

Despite certain paradoxes and damaging experimental evidence, as Gary Becker suggests in his *Nobel Lecture: The Economic Way of Looking at Behavior*, there is simply no other widely accepted approach of comparable generality that has yet been developed that offers serious competition to the rational choice theory. Despite the success of the rational choice theory, the exogenous treatment of human biological and psychological behavior has led to a great deal of uncertainty and too many questions regarding the theory's experimental application, which in turn has generated confusion regarding its propositions and axioms. For example, in economic theory, if all that is meant by rationality is logical consistency, then the question must be asked: what is gained by using the broadly defined term rationality? Additionally, when certain behaviors in an experiment contradict the predictions of the 'rational' theory, then what is meant by declaring the behavior 'irrational?' If all that is meant by irrationality is that behavior is inconsistent with the predictions of the theory or the experimental hypothesis, then does it not seem more plausible to assume that the theory is inaccurate or miss-specified, since the hypothesis is intended to model the behavior, rather than the behavior conforming to the theory. People are prudent decision makers, and if people are fallible and capable of making mistakes, then the rational theory of choice needs to take this into account, otherwise, the economic experiments and the theoretical applications it supports will be unrealistic and poor predictors of human choice and action.

The needs of economists have grown beyond the simple mathematical notion of rational consistency. The current economic theory of choice abstains from speculating on the origins of human choice and preference, building only upon the consistency within the structure of static decisions. Namely, that if a choice is made, it is chosen for a reason and it is preferred to all possible and comparable choices. As such, the theory is intractable, imparting little guidance on how the model should be applied in experimental research. In developing a realistic model of human decision making, it is necessary to broaden the scope of the rational theory of consumer choice and include realistic assumptions that model the complexity and dynamic nature of human behavior. It will be necessary to clarify the psychological role and suitable application of the axioms of

choice. Economists are not psychologists, and generally do not possess a tool set that allows them to apply mathematical models to the reality of human behavior, nor should they expect to since historically, economists have sought to exclude this type of understanding from the discipline. In my view, economists will inevitably have to come to terms with the fact that one cannot separate economic behavior from human behavior, and this behavior will have to be eventually understood to improve economic theory.

II. Human Action and Momentary Choice

Human rationality, or human consistency, is the main assumption under which the theory of consumer choice is based. As this theory developed out of the marginal utility revolution, which was heavily influenced by William Stanley Evans's, *Theory of Political Economy*, Carl Menger's, *Principles of Economics*, and Leon Walras', *Elements of Pure Economics*, it has many other derivatives, but it essentially revolved around the notion of utility maximization. It is the base assumption that human beings are rational, that they conduct themselves in a manner consistent with the tenets of logic, which defines the ordered nature of decision making and choice in the post-neoclassical model.

Ludwig von Mises, throughout several essays written in the first half of the twentieth century, later consolidated into the book, *Epistemological Problems Of Economics*, has pointed out that it is not that people are rational or irrational, consistent or inconsistent, but rather that people are rational in the sense that there is a reason behind all conscious human action or lack of action. He has sought to explain the inherent rational or reasoned nature of human action, and has promoted the view that rational behavior is purposeful or teleological. This view implies that irrationality should not refer to inconsistent behavior and rather be defined as purposeless behavior, or as von Mises classifies it, "purely vegetative" behavior. The interpretations of von Mises work by Lord Robbins and Frank Knight, who were primarily responsible for introducing the economic views of the continental Europeans to the West, failed to translate the significance of von Mises concept of rationality. With the subsequent devastation of

Europe, as a result of World War II, and with the decrease in popularity of the Germanic languages, von Mises work has become effectively relegated to obscurity.²

The key reason why Lord Robbins and Professor Knight could not appreciate von Mises analysis was a result of their a priori views of human understanding. While von Mises held this view, he was heavily influenced by the prevailing logical positivism of his day; and, consequently, much of his work conforms to this type of epistemology. Robbins and Knight viewed mathematics and logic in the Aristotelian sense, as essences or universal absolutes, and as a result of this view, they failed to take into consideration that the logical consistency of mathematical logic derives and evolves from an understanding of the nature of the cause and effect relationships that exist in reality.³ The rules of consistency proposed in the modern theory of consumer choice have the same result as being arbitrary distinctions, explaining and integrating only a subset of the possible phenomena that play a role in the process of choice and their effect of human action. Failing to take into consideration all aspects in a system of behavior ultimately leads to arbitrary hypothetical conclusions. It is this point that von Mises argued, that people are always rational or consistent, but that their rationales are limited to what they understand, and to what they understand as their choices. It is a failure to address and recognize the complexity of human behavior, and the need to take into consideration all of its phenomenal aspects, that has limited the application and advancement of the neoclassical approaches and models.

² Lord Robbins was largely a follower of Jevons and Wicksteed and was also influenced by the works of Böhm-Bawerk, Wieser and Wicksell. He was particularly known for his work in developing the prestige of the London School of Economics and for articulating the role of economic science. In his, *On the Nature and Significance of Economic Science*, he defined Economics to be, “the science which studies human behaviour as a relationship between scarce means which have alternative uses” (p. 16). Like Mises and Menger, Robbins was vigorous in his advocacy of a priori theory and with the aid of his counterpart in America, Frank Knight, they contributed in dismantling the influence of Marshallian Empire.

³ In Frank Knight’s later work he begins to alter his a priori view of knowledge. In, “What is Truth in Economics,” in an aside concerning his second category of knowledge, namely, the truths of logic and mathematics, Knight speculates that “the problem here is whether knowledge of this sort is knowledge about the same objective reality as the first category or whether it is about thinking or mind-or what is the relation between the two” (p. 155). In the same article, he later states that: “In fact, most of the content of arithmetic and algebra consists essentially of ‘short cuts’ or procedures for saving time in computation, as compared with the prohibitively slow and costly method of getting results by counting. And the propositions of geometry are also empirically verifiable, to any worthwhile degree of accuracy, by drawing and measuring figures” (p. 157). While it appears that Knight did not come out completely and recant his *a priori* view of knowledge, it is apparent that he was tending towards this direction.

One of the principal reasons for developing his view of rationality was to demonstrate how human action was always motivated by reason. One of the principal views which von Mises attempted to discredit was the social action hypothesis of Max Weber, as Weber suggested that rationality was not the core instrument on which people base their decisions. One of the founding fathers of sociology, Max Weber emphasized the importance of cultural and political factors in determining economic development and individual behavior. It was as a result of the rapid modernization of western society that Weber became concerned with explaining how development and industrialization was affecting human decision making. He attempted to explain how human behavior was becoming increasingly goal-oriented, rather than being motivated by tradition, value, and emotion. In his work, *Wirtschaft und Gesellschaft*, published in 1922, he attempted to identify the social factors that had brought about the ‘rationalization’ of the West, and emphasized that the basic distinguishing feature of modern society was best viewed in terms of a shift in motivation that had resulted from structural and historical forces. Weber’s pursuit of the determinants of human behavior led him to reject the rational view of behavior, and in its place, he hypothesized an “ideal type” of value where he deduced that there were four principal categories of “meaningful action,” of which three were distinctly non-rational.

According to Weber, all “meaningful action” is encompassed in the following four categories:

(1) purposive-rational, i.e., guided by anticipations of the behavior of the objects of the external world and of other men, and using these anticipations as ‘conditions’ or as ‘means’ for the attainment of the *ends* rationally considered and sought by the actor himself; (2) valuational, i.e., guided by conscious belief in the unqualified *intrinsic* value of a definite mode of conduct—ethical, aesthetic, religious, or any other—purely for its own sake and independently of its consequences; (3) affective, especially *emotional*, when it is guided by burning passions and moods; and (4) traditional, when it is guided by the familiarity of custom. (p. 12)

Weber drew another distinction, suggesting that beyond every meaningful action there is “a merely reactive mode of behavior which is not attendant on a subjectively intended

meaning” (p. 12). In this way, Weber referred to those actions seemingly taken automatically without conscious intent.

In an attempt to illustrate the error in Weber’s position, von Mises set about to demonstrate how each of his categories of “meaningful action” was the result of rational motivation. In von Mises, *Epistemological Problems of Economics*, he begins by suggesting that Weber’s “valuational” sub-classification of “meaningful action” differs from rational conduct only in that it regards a definite mode of behavior as having a value. Accordingly, a person arranges these and other values in an order of rank. Von Mises gives the example that a person may forgo “the advantages that a Civil Service career offers because he does not want to renounce his political convictions,” and he suggests that “this is in no way an action that could be termed nonrational” (p. 87). Von Mises notes that Weber makes the classic utilitarian error of mistaking as an “end,” only those things that are material that can be expressed in terms of money. Similarly, he points out that “traditional” views are affected by the same misunderstanding. Being similar to political convictions, honor and integrity, time honored traditions can be seen as an end in themselves. Von Mises gives the example of an old farmer who does not want to sell his land for a profit or use a new type of fertilizer. While von Mises suggests that the old man will not sell his farm or use a new fertilizer because he values the old ways over the new, it is apparent that the cost in terms of finding and moving to a new home, or the cost of learning how to use a new fertilizer may outweigh the extra profit in doing so, especially for an old man. It seems apparent that both “valuational” and “traditional” behavior can be regarded as distinctly rational if a person sees certain views, beliefs or time honored traditions as an end.

In refutation to Weber’s third non-rational category, “affective” action, von Mises makes the interesting observation that while one may act foolishly under the influence of emotion, it is necessarily the case that even under the influence of passion or stress a person still seeks to resolve their desires rationally. The interesting connection he makes is that desires act on, but are not distinctly part of, a person’s rationality; their understanding of cause and effect. Von Mises suggests that when we are under the

impulse of passion “the rank order of ends shifts.” Thus, while the power of the conscious mind to make decisions can become limited under the influence of passion, a person still seeks to rationally achieve their desire. Von Mises suggests that a person “who endangers his own life rushing to the aid of a drowning man is able to do so because he yields to the momentary impulse to help ... It is may be that subsequent reconsideration will lead him to a different judgment. But at the moment—and this is the only thing that matters—even this action was ‘rational’” (p. 88).

Von Mises’ specific purpose in discussing rationality at length was to demonstrate that there was a reason or a rationale behind all meaningful action and thus that all human action is rational. Outside of meaningful action, there was only purely “vegetative action.” In, *Epistemological Problems of Economics*, von Mises notes that in “the behavior of men we can distinguish only two basic forms, between which there is a sharp conceptual division: unconscious behavior, or vegetative reaction, and conscious behavior, or action. ... Action always seeks means to realize ends, and it is in this sense always rational and mindful of utility” (p. 68). He specifically went out of his way to illustrate his understanding of the scope of rationality in human decision making, and as a result alludes to the root of the common misconception of referring to behavior as irrational or inconsistent. Von Mises suggested that action “is, by definition, always rational,” and as such, comments depicting behavior as irrational or inconsistent merely reflect an ethical judgment based on the limited perspective of another person’s situation and understanding. Regarding the manifestation of ones rationale in action, von Mises suggests: “One is unwarranted in calling goals of action irrational simply because they are not worth striving for from the point of view of one’s own valuations. Such a mode of expressions leads to gross misunderstandings. Instead of saying that irrationality plays a role in action, one should accustom oneself to saying merely: There are people who aim at different ends from those that I aim at, and people who employ different means from those I would employ in their situation” (p. 36).

It was largely the result of Lord Robbins and Dr. Knight’s translation, that the work of von Mises was introduced into the western-English speaking world. Both Robbins and Knight, however, failed to grasp the scope on which von Mises sought to explain human

action. Knight's view of knowledge led to his view of what constitutes human intelligence, which influenced how he interpreted von Mises work. Knight viewed intelligent behavior as being in accordance with proper logic, and unintelligent behavior as being inconsistent with proper logic. It is readily apparent in the following quotation from Knight's essay, "On the History and Method of Economics," that he does not see people as being consistently rational in their endeavors:

[A] free economic order must assume that men actually tend to be rational in the use of means, that they try to be and tend to succeed. ... The careful economic theorist does not confuse the abstraction of perfectly economic behavior, or the economic man, with the actual behavior of real men, any more than the physicist or engineer assumes that friction is absent in real machines. Applied economics must try to take account of the role in business life of error and of motives (good or bad), such as prejudice, curiosity, and the various forms of the play interest, which do not conform to the pattern of economic rationality. Competition itself, in the psychological meaning, is a non-economic interest. The economic interest is merely a striving for efficiency in the use of means, whatever means are available and whatever ends are pursued. (p. 25)

Knight interpreted von Mises view of rationality to mean consistency in how people 'tend' to be rational, and how they 'tend' to succeed.

Lord Robbins made a similar distinction noting that, if what von Mises referred to as "rational is taken to mean merely 'consistent', then it is true that an assumption of this sort does enter into certain analytical constructions" (p. 91). It is in this way that Robbins saw rationality as a form of mathematical consistency. In support of his view, he hypothesized essentially what amounts to the rational axiom of transitivity. If a person faces a choice between three different sets of goods, A, B and C, and if the person chooses A over B, and B over C, then they must logically prefer A over C. As a result of his view that behavior could be modeled by mathematical consistency he was led to conclude that "the assumption of perfect rationality in the sense of complete consistency is simply one of a number of assumptions of a psychological nature which are introduced into economic analysis at various stages of approximation to reality" (p. 95). Consequently, Lord Robbins determined it was possible to discuss human behavior in terms of consistency and inconsistency. The structure of his view, however, became

confused as he suggests that at times it “may be not consistent to be consistent,” whereby he means that it “may be irrational to be completely consistent as between commodities, in the sense just described, just because the time and attention which such exact comparisons require are (in the opinion of the economic subject concerned) better spent in other ways” (p. 92).

The difficulty that Lord Robbins and Professor Knight had in understanding the significance of von Mises’ view derives not directly from what von Mises said, but rather from what von Mises implied. For von Mises, it is only in the moment of choice that a person sorts through various means to satisfy some end, and as a result, it is only in the moment that a person’s choices can be seen as being consistent. Von Mises assumed, as in his refutation of Weber, that there could be limits imposed upon the consciousness of man, through stress or passion, and that a person’s ability to formulate decisions can thus be limited to a person’s momentary capacity to interpret their situation and to recall a broad spectrum of means to an end. It is in this context, that there is no inconsistent or unintelligent behavior, because it is impossible for a person to be aware of that which they are not. Subsequently, it is apparent that a person is only able to realize that they have made an error when their understanding has expanded sufficiently so that they can discern their mistake. Thus, the treatment of the consistency of human behavior intertemporally led to misinterpretation of von Mises view, and as a result has led to the current view that human behavior should be treated as consistent over time.

The suggestion that a person acts irrationally is thus a meaningless statement, as it is not compatible with the concept of action. For von Mises, “‘seeking to attain an end’ and the ‘striving after a goal’ cannot be eliminated from the concept of action. Whatever does not strive after goals or seek the attainment of ends reacts with absolute passivity to an external stimulus and is without a will of its own, like an automaton or a stone” (p. 35). Thus, it is in the moment of action that a person is considered rational, because they draw upon reasons or rationales for basing their momentary decision. As a result, von Mises suggests:

It makes no difference whether action springs from altruistic or from egoistic motives, from a noble or from a base disposition; whether it is directed toward the attainment of materialistic or idealistic ends; whether it arises from exhaustive and painstaking deliberation or follows fleeting impulses and passions. The laws of catallactics that economics expounds are valid for every exchange regardless of whether those involved in it have acted wisely or unwisely or whether they were actuated by economic or non-economic motives (p. 36)

As von Mises argues, the assertion of unintelligence or irrationality is then always rooted in a scale of values different from our own, and whoever says that irrationality plays a role in human action is merely saying that his fellow men behave in a way that he does not consider correct.

Many recent economists, like Daniel Kahneman, Amos Tversky, Richard Thaler, and Alan Schwartz have been credited with demonstrating the existence of irrationality or irrational behavior, because they have demonstrated experimentally how observed behavior deviates from the predictions of post-neoclassical models of human behavior. More importantly, these economists have not demonstrated irrationality; they have demonstrated the failures of the post-neoclassical models to accurately explain human behavior. Daniel Kahneman makes this very point in his Nobel Prize Interview:

I never think of myself as having demonstrated irrationality. There is a definition of rationality within the context of economic theory or decision theory more broadly, which is a completely unrealistic conception of a human agent with a complete preference order of all states of the world, with a Bayesian set of beliefs about all possible states, and this defines rationality in the context of economic theory. As a descriptive hypothesis this is a totally implausible hypothesis, and it is fairly easy to show that the hypothesis is not true. We have been able to show many of the ways people have been able to depart from this ideal of rationality, but this is not irrationality. People are reasonable, they are prudent agents. It is just that I think the definition of rationality used in economic theory is a very implausible definition, and it fails descriptively, and we have been able to document some of these failures and explained them.

Knez, Smith, and Williams agree with Kahneman in their paper, *Individual Rationality, Market Rationality, and Value Estimation*: “We would emphasize that such behavior is “irrational” only in the narrow sense of EUT (expected utility theory) as a behavioral

hypothesis which may not only be a poor predictor of individual choice, but may not be a satisfactory guide to action.” (p. 397)

The effect of von Mises argument concerning the nature of human rationality is that conscious volition controls all spheres of human conduct that is accessible to it by tolerating only the reactive, instinctive or cognitive conduct that it sanctions as expedient and would itself have carried out. He suggests that the science of human action aims at something quite different than psychology, as the boundary between meaningful and merely reactive behavior is not at all indeterminate. If the will has the power to become efficacious, there is only meaningful action. The question, however, of how one means is chosen over another and why certain ends are preferred over others is not addressed in von Mises analysis. While he clarifies the extent to which the current theory of rational consumer choice can be considered consistent, he does not explain the nature of human behavior, the motivation to act, and the measure of discrimination in the process of choice. To understand the nature of motivation and discrimination a more detailed examination of the nature of human behavior is required.

Chapter 4. Value and the Water and Diamond Paradox

The word VALUE, it is to be observed, has two different meanings, and sometimes expresses the utility of some particular object, and sometimes the power of purchasing other goods which the possession of that object conveys. The one may be called “value in use;” the other, “value in exchange.” The things which have the greatest value in use have frequently little or no value in exchange; and on the contrary, those which have the greatest value in exchange have frequently little or no value in use. Nothing is more useful than water: but it will purchase scarce any thing; scarce any thing can be had in exchange for it. A diamond on the contrary, may frequently be had in exchange for it.

The Wealth of Nations, Adam Smith

Modern neoclassical theory derived from the Marginalist revolution when the classical labor theory of value was superseded by William Stanley Jevons’ marginal theory of value. Jevons sought to develop an objective theory of value by integrating an objective measure of utility with observable market metrics. He attempted to demonstrate how the usefulness of a good varies as more of a good is consumed, and how a measure of this vacillating utility can be shown to affect prices and quantity demanded. Compared with Jevons’ objective theory, Menger’s ‘subjective’ theory of value derives from an individual’s understanding of the usefulness of a particular thing in satisfying a, or multiple, desires. Usefulness is a constant, derived from understanding, while the impetus or motivation to choose derives from the magnitude of the individual’s many desires. These desires cause demand and limit which goods will be produced based on the relative efficiency in the cost of production which is the cause of price.

A clearer understanding of this difference between these two theories of value can be identified by noting how each theory relates to Adam Smith’s two types of value; value in use and value in exchange. For Jevons, value depends entirely upon utility, the abstract quality whereby an object serves the purposes of its user. A good that may produce pleasure and prevent pain possess utility and consequently possesses value. Jevons suggests that the concept of value is often confused and is not correctly used in economics. He concludes that there are three distinct meanings that are habitually confused together. There is value in regards to esteem, or the desire for more (U), which

he equates to the final degree of utility or the utility derived from the last unit consumed. There is value in use ($M \cdot U$) which he equates to total utility, or the quantity (M) of a good multiplied by the final degree of utility (U). The third meaning, the exchange value or purchasing power of a good, he determines does not refer to value at all:

Value in exchange expresses nothing but a ratio, and the term should not be used in any other sense. To speak simply of the value of an ounce of gold is as absurd as to speak of the *ratio of the number seventeen*. What is the ratio of the number seventeen? The question admits no answer, for there must be another number named to make a ratio; and the ratio will differ according to the number suggested. What is the value of iron compared with that of gold?—is an intelligible question. The answer consists in stating the ratio of the quantities exchanged. (p. 60)

The third meaning of purchasing power refers to a ratio of exchange between two goods ($M^e = M \cdot M^{-1}$). The scientific expression of Smith's exchange value is the ratio of exchange; the ratio of the quantity of one commodity to the quantity of some other commodity exchanged for it. Jevons ultimately determines that value depends solely on the final degree of utility, where the degree of utility depends upon having more or less of a commodity to consume. Because the supply of a good determines how much of a good can be consumed, he ultimately concludes the following tabular form:

Cost of production determines supply.
Supply determines final degree of utility.
Final degree of utility determines value. (p. 101)

The value of a good is consequently determined only by its subjective scarcity; the degree to which peoples' desire for that good exceeds its availability. The price of a good and the quantity demanded is determined jointly and simultaneously by the demand for and supply of the good. Utility determines what is to be supplied and "the degree of utility varies with the quantity of commodity, and ultimately decreases as that quantity increases." (p. 6) Utility, value and price, supply and demand are consequently derived from the relative scarcity of a good. Because the utility of a good determines if a good is to be produced, goods that are overly abundant will not be produced because there is not utility to be gained as all of the utility possible to be derived from that good is completely

realized from free gifts of nature. Plentiful goods, like water or air, are then valueless because there is no utility left to satisfy. Because these goods are so abundant and easily accessible to those who demand them, each consumer can maximize their satisfaction for them without having to go to market. Consequently, because there is no market demand, there is no market exchange price, as each consumer's demand is satisfied by the free gifts from nature. As Jevons writes:

We cannot live without water, and yet in ordinary circumstances we set no value on it. Why is this? Simply because we usually have so much of it that its final degree of utility is reduced nearly to zero. We enjoy, every day, the almost infinite utility of water, but then we do not need to consume more than we have. Let the supply run short by drought, and we begin to feel the higher degrees of utility, of which we think but little at other times. (p. 7)

Utility and price develop from scarcity, when more of a particular good is desired than is available in quantity. The equilibrium price and quantity supplied are dependent upon a goods scarcity, the law of demand (where demand increases with a decrease in price) and the marginal utility theory (marginal utility increases as the per-unit of quantity consumed decreases). The use value of a good is consequently higher when a good is relatively scarcer and is valueless when a good is overly abundant. The exchange value is effectively the same thing as use value where goods that possess a value in exchange or price are those that are relatively scarce, compared to demand, and which require production. The exchange value or equilibrium price is determined at the equilibrium point between supply and demand. While water may have the potential to be more useful than a diamond, because it is overly abundant, the supply is so great that the demand is always met so that there is no reason for production and consequently no reason for exchange and no exchange value. For a diamond on the other hand, because it is so scarce relative to the demand for diamonds, the utility for a diamond is not satisfied so the price of the diamond is bid up. Scarcity consequently explains why relatively more abundant goods like water and food are cheaper than scarce goods that are generally less useful. In the neoclassical theory, whether a good has the potential to be more useful is irrelevant to its value, because utility is reduced through consumption or it is not, and value is ultimately determined by the scarcity of supply relative to the amount demanded.

The importance of scarcity in the neoclassical model is what led Lord Lionel Robbins to declare that economics is the science which studies human behavior as a relationship between ends and scarce means which have alternative uses.

For Menger, value refers to an individual's understanding of how useful a thing is in the satisfaction of need or desire. Use value refers to and is defined as the value of those goods that directly satisfy desire, whereas exchange value refers to and is defined as the value of those goods that are used to indirectly satisfy desire:

Use value, therefore, is the importance that goods acquire for us because they *directly* assure us the satisfaction of needs that would not be provided for if we did not have the goods at our command. Exchange value is the importance that goods acquire for us because their possession assures the same result *indirectly*. (p. 228)

While a good is directly used or indirectly used to satisfy desire, it is valued based on the individual's understanding of how any particular thing can be used to satisfy desire, whether this is from a knowledge of the causal connections or in the ability to command a particular thing to satisfy desire. Exchange value, consequently, is practically identical to the value of all other second or higher order goods that are indirectly used to ultimately satisfy desire:

It is true, as we have seen, that the importances of goods to us with respect to a direct employment and with respect to an indirect employment for the satisfaction of our needs are only different forms of a single general phenomenon of value. But their importance to us may simultaneously be very different in degree in the two forms. (pp. 229-230)

As people attempt to maximize their wellbeing, they economize those goods under their command, using these goods to satisfy their desires. When desires are satisfied the value of a previously used useful thing is zero or low enough that it is in the interest of the person to trade these goods that are now valued less for those goods that are valued more. As the use value of a good varies relative to a person's need for it to satisfy desire, the exchange value of the good is the use value that can be obtained indirectly through the ultimate acquisition of another good that can directly satisfy a need or desire. Whether a

good is ultimately more useful or valuable when directly used or indirectly used, determines if a good is used or exchanged:

The owner of a forest, for example, to whom the yearly cut of timber has only exchange value, will probably immediately discontinue exchanging his timber for other goods if he constructs a blast furnace to melt iron and needs the full output of his timberland for its operation. An author who previously sold his work to publishers will not do so in the future if he founds his own magazine, and so on. (p. 233)

Menger treats the development of price very similarly to the neoclassical equilibrium approach, but stresses the idea that prices and quantities are not objective and are incomparable because exchanges are not reversible; the reason for exchange derives from an inverse value relationship: “an economic exchange of goods is dependent on an economizing individual having command of goods that have a smaller value to him than other goods at the command of another economizing individual who values the two goods in reverse fashion.” (p. 194) Price derives from bargaining or as Menger calls it, ‘the price duel.’ Each bargainer attempts to acquire as large a portion as possible of the economic gain that can be derived from the exploitation of the exchange opportunity, and the opposing efforts of the bargainers to derive the greatest possible gain from the transaction will balance or average the final ratio of exchanged goods or price between the extreme possible limits. Price is determined similarly to the neoclassical supply and demand model, however, rather than consumers and producers, the actors exchange goods because each bargainer identifies that indirectly the trade will lead to greater wellbeing. Value is related to price or the ratio of goods exchanged. A particular ratio of goods exchanged, or price, reflects only an intermediate relationship between the perspective values the bargainers relate to each of the goods traded. Price, consequently, is an arbitrary measure that relates the ratio of goods that can be traded and outside of this relationship price possesses no value or meaning.

The divergence between water and a diamond in value is related to how each of these useful things is causally related to the satisfaction of desire. Water possesses a high value because water is useful in satisfying thirst and is generally required and desired

physiologically. Water possesses a low price because it is so abundant that it is unnecessary to exchange for it. If water became scarce, those in control of it would be able to trade it to those who value it more than the other goods they are willing to trade. Ultimately, as the desire for water goes unsatisfied and the need to acquire water increases, those other goods that a person commands that are less effective in satisfying desire will be traded for water. Those who can least afford to trade for water (i.e., those who are least productive) will either go without or will sacrifice a significant portion of the goods that they would otherwise have used to satisfy their other desires. Those less able to afford the more basic goods will be significantly more dissatisfied than those who are more able.

Diamonds, like gold, were thought to not possess direct use value, but primarily because of their physical properties (durability and scarcity) diamonds and gold are used indirectly as a medium of exchange. Whatever the social rate of exchange is set at for such goods determines the goods relative value to other goods. Similar to fiat money, these goods are useful because they embody a durable contractual standard of value that all goods can be exchanged into, whereby the exchange value of perishable goods can be stored for use at some future time. Like fiat money, if too much of the standard exists relative to the amount of goods that are traded, the price or relative value of the currency will decrease. Conversely, if not enough of the medium of exchange exists relative to the number of goods traded, the price will increase. The value derived from diamonds and gold is derived from a social contract and the general acceptance of the goods use as a medium of exchange. Like Fiat money, the money itself is practically worthless (no use value), but through social arrangement, the good serves indirectly as a standard of value that generates its relatively high exchange price.

The primary divergence between the two approaches derives from different interpretations of how goods are valued. For Jevons, value depends solely on the final degree of utility and scarcity, where the degree of utility depends upon having more or less of a commodity to consume. Menger on the other hand writes that “The value of goods arises from their relationship to our needs, and is not inherent in the goods

themselves. With *changes in this relationship*, value arises and disappears.” (p. 120) Jevons’ view of utility determining value is inconsistent with Menger’s version and fails to address the motivation for choosing and the causal connection between particular goods and the desires themselves.

The difference between Jevons’ and Menger’s treatment of the process of choice is distinct, but is confused by the use of similar terminology and the subtle, yet important, difference between the two treatments. F.A Hayek, in his 1976 Introduction to the English version of Menger’s *Principles of Economics*, refers to Jevons and Menger’s “independent and practically simultaneous discovery of the principle of marginal utility” (p. 12), however, he admits that Menger never uses the term utility, and comments on Menger’s description of value as a “clumsy but precise phrase”. Each researcher attempts to discuss the process of choice, and describe the same phenomena using similar terminology with different meanings and emphasis, and each theory is inconsistent, specifically as Menger rejects Jevons’ concept of utility.

When Jevons refers to the determinant of value he equates the final degree of utility or the satisfaction derived from the last unit of a good consumed to equal value. Menger refers to value as the understood usefulness or efficiency of a particular thing used to satisfy a desire. Jevons refers to degree of utility as the magnitude of satisfaction derived through the consumption or use of a unit of a particular good from one moment of consumption to the next, where a single good’s utility changes to a degree based on the quantity of the good consumed or used. Menger views utility, or as he calls it, the ‘use value’, as a constant, and describes different degrees of usefulness as the difference between particular things in their ability to satisfy a desire; meaning different types of wood are more or less efficient (more or less useful to a degree) when used as fuel. Jevons describes how goods possess little or no value as a result of a lack of scarcity or in terms of quantity consumed, and suggests that as more is consumed the marginal utility of the last unit consumed decreases until the person can no longer be satisfied. Menger on the other hand describes how value is derived only from those things that can be used to satisfy desire. Consequently, a thing becomes valueless once a desire or need is

satisfied, or if no need exists. With each interpretation, the same phenomena are described differently.

The problem is that Jevons' concept of utility is intended to encapsulate many specific variables into a very ambiguous and overly simplified term. The magnitude of satisfaction, the difference between desires, the causal connections between goods and desires, the physical nature of particular goods, the changing magnitudes of desire, a person's understanding of the usefulness of a good, and the relationship or effect between quantity and satisfaction are all attempted to be consolidated into the single term 'utility.' Menger, on the other hand, focuses on isolating the causal relationships between the many variables that when combined effect human behavior and choice. Menger recognizes the folly of over-simplification and rejects the concept of utility as it is commonly used. Instead of marginal utility, Menger addresses marginal satisfaction and wellbeing maximization rather than utility maximization. Each theorist addresses the key concepts involved in the process of choice but combines them differently to create two distinctly different theories. As was demonstrated by the failure of the utility approach over the last century, an empirical approach that simplifies only for the sake of clarity, rather than for syllogistic or mathematical malleability, should be adopted to develop a realistic theory of choice, which should provide a solid foundation for an economic science.

Chapter 5. Empirical Foundations of a New Consumer Theory

Pure economics has a remarkable way of producing rabbits out of a hat – apparently *a priori* propositions which apparently refer to reality. It is fascinating to try to discover how the rabbits got in; for those of us who do not believe in magic must be convinced that they got in somehow. I have become convinced myself that they get in two ways. One is by the assumption, at the beginning of every economic argument, that the things to be dealt with in the argument are the only things that matter in some practical problem. (This is always a dangerous assumption, and nearly always more or less wrong-which is why the application of economic theory is such a ticklish matter.) That takes us much of the way, but it does not take us the whole way. The other assumption is that which we have just isolated, an assumption that kinks can be neglected that there is a sufficient degree of regularity in the system of wants also, as we shall see later, in the productive system) for any set of quantities in the neighborhood of those with which we are concerned to be a possible position of equilibrium at some system of prices. Again, this assumption may be wrong; but being the simplest assumption possible, it is a good assumption to start with; and in fact its accordance with experience seems definitely good.

Value and Capital, Sir John Richard Hicks

I. Basic Assumptions - The Consumer

Rational Action (Rationality and Irrationality)

As discussed in Chapter Three, the assumption of rationality is not stated strongly enough in consumer theory. In economic theory, rational behavior is often referred to as a deliberative process where a consumer weighs the expected cost and benefits prior to making a decision. While people certainly act in this way, what is often neglected is that the entire process of consciousness in general revolves around the development of an understanding of reality and its use as the instrument in making decisions and directing action. In the post-neoclassical approach, rational behavior refers to the cross-wise comparison of all baskets of goods and the ordinal ranking of preference between these different baskets of goods. This definition is not what is meant by the broader definition of rationality. Human behavior, which is always rational because human action is always purposeful, involves the consideration of correlating an understanding of reality to the effectiveness of particular means and actions to satisfying particular desires or achieving desired objectives. In this sense, the consistency in human behavior would be the ability

to consider different cause and effect relationships and rationalize a course of action that is consistent with a person's objectives. While this treatment of rationality may appear to be less precise than the rational axiomatic view, the rationality described in the axiomatic model gains its so called 'precision' by eliminating from discussion and its definition the majority of those essential factors that combine in the process of choice to manifest human behavior. A broader more robust empirical treatment of rationality will ultimately lead to a superior model of consumer behavior that will be able to realistically address both what the post-neoclassical model currently attempts to explain and will be able to address the majority of other human behaviors that are currently treated exogenously and which are relevant to the science of economics.

People are always rational because human action is always purposeful and consequently supported by rationales that guide choice. Suggesting that a person's choices or behavior is irrational demonstrates a failure in the understanding or model used by the researcher to analyze the behavior. Because models are designed to explain behavior and not the other way around, statements of irrationality should always be taken as a sign that the underlying model or paradigm used to explain the behavior is inadequate, rather than to suggest that people prefer to choose what they know is not in their interest. From Chapter Four, people who have different experiences will base their decisions on different information and consequently will have different understandings of reality. The variance in peoples' choices derives from differences in understanding, differences in motivation or desire, and differences in current capability and situation. Far from contradicting rational behavior, the identification of irrationality merely demonstrates ignorance on behalf of the observer of these root causes.

It is essential to an empirical analysis of human behavior that all behavior is rational. If there is no reason or rationale behind behavior then there is no basis, no cause and effect relationship, no empirical data upon which to base and develop an empirical theory of consumer choice. The argument of rational behavior developed in the previous chapter is of crucial importance because it establishes that human behavior can be scientifically analyzed and quantifiably measured. While the process of choice is limited by a number

of factors, and the rationality in human decision making is significantly different than the post-neoclassical formal rational assumptions, there appears to be empirical evidence supporting the claim that all behavior is rational. As suggested by von Mises, while particular choices or actions may be poorly thought out or ill conceived, this does not mean that the process of choice is not rational. Rationality only means that the process of choice and the consistency through which it manifests is more complicated than originally thought. Whether people use heuristics or framing as Kahneman and Tversky have suggested, or satisfice, as Herbert Simon has suggested, what people choose and how they formulate their decisions is by no means random, or in violation of the laws of nature.

Through understanding and consequently removing the relevance of the proposition of irrational behavior from economic discussion, the unknown design of seemingly erratic behavior must be accepted to be rational. The focus of scientific inquiry should then be directed in understanding the root causes of these erratic behaviors. Situational factors, physiological constraints, memory limitations, emotional demands, limitations of consciousness, and other uncharacteristically economic discussions may be found to affect the decision making of people seeking to acquire consumer goods, and may be of significant importance to researchers attempting to control the heteroscedasticity in their studies of consumer behavior. In a more empirical science, the economist is required to learn many of the techniques that are used in psychology. By utilizing Ockham's Razor, the experienced observer should be able to distinguish the root cause of choice and action and be able to record and compare these causes to develop a clearer understanding of the process of choice and more generally the nature of consumer behavior.⁴ With an understanding and record of actual consumer rationales, accurate prediction of future consumer choice will improve, and with each improvement, the science of consumer behavior and the process of choice will become more refined and realistic.

⁴ A logical principle attributed to the medieval philosopher William of Ockham: "A rule in science and philosophy stating that entities should not be multiplied needlessly. This rule is interpreted to mean that the simplest of two or more competing theories is preferable and that an explanation for unknown phenomena should first be attempted in terms of what is already known. Also called law of parsimony." Quoted from, *The American Heritage Dictionary of the English Language, Fourth Edition*.

Pursuit of a Perceived Best Interest in the Moment

One of the basic assumptions economists make concerning human behavior is that buyers and sellers are goal-oriented; that is people are interested in fulfilling their own personal goals. The assumption of goal-orientated behavior is often taken to indicate that individuals are self-interested. In economic models, this goal orientated behavior that economists propose is often thought to be selfish because goal oriented behavior is generally discussed in terms of utility maximization. To maximize utility, the consumer chooses goods in quantities where the marginal utility or the marginal benefit from each good chosen is proportional to the marginal disutility, the marginal cost or price of the good. Given the assumption that consumers can always benefit from having additional spending power or always benefit from additional goods or services, goal seeking behavior suggests that the goal of consumer behavior is the attainment of greater wealth and consequently the consumption of a greater number of goods and services.

What is often misperceived by those unfamiliar with economic theory is that economic theory deals only with a subset of human behavior, or as Lord Robbins has emphasized in, *An Essay on the Nature & Significance of Economic Science*, economics is “the science which studies human behavior as a relationship between scarce means which have alternative uses.” (p. 16) As discussed previously, the exclusion of ‘non-economic’ behavior was the result of a view that human behavior is subjective and not fit for scientific inquiry, as it is psychological or physiological in nature, and should be handled by psychologists and physiologists. Underscoring this separation, human economic behavior is often euphemized, using terminology like consumer and homo-economicus to designate the distinction between economic behavior and human behavior. The problem with this distinction is the difficulty in studying economic behavior without first understanding human behavior more broadly, and the difficulty in determining how to accurately describe economic behavior without addressing its psychological or physiological nature. The difficulty for economists and some non-economists was to separate the limitations of economic explanations and predictions of human behavior while attempting to push the limits of the theory to explain psychological choices.

Suggesting that people exhibit goal-seeking behavior only vaguely addresses the issue of what motivates behavior. The theory of motivation in economics is purposely vague and generally avoided, because economists are hesitant to accept a new theory of motivation after spending most of the past century attempting to work around utility theory. Consequently, modern neoclassical theory is still tied to Sir Hicks' ordinal approach. According to the ordinal approach or the ordinal ranking of preference, a consumer prefers the utility-maximizing group of goods where the consumer's highest indifference curve attainable is the one that just touches, or is tangent to the budget line, or where the marginal rate of substitution between all goods is equal to the ratio of the chosen goods' prices ($MRS_{ab} = P_a/P_b$). While this approach describes relationships that could potentially describe the logic within a consumer's choice, it does not address why goods are preferred, it does not address how a consumer discriminates between alternatives, and it is not based on empirical evidence. Because utility and indifference cannot, or more accurately, has not been measured, there is no empirical evidence upon which to develop a test to support the formal conclusions of the ordinal theory of consumer choice. The rejection of psychological and physiological research in economics has significantly affected the development of economics because it prevents the development of a scientific theory of consumer choice. As Amartya Sen has suggested in response to objections that psychological assumptions should not be and are not included in the neoclassical theory, it is "not because no psychological assumptions are used but because the psychological assumptions used are sensibly chosen." (243)

Presuming people are always rational in their decisions, people will pursue their perceived interest in the moment of decision. It does not make sense to assume that a person will pursue an interest that they do not understand or one outside of their interest. A person would not be lazy if they perceive it is in their interest to not work so hard. People should be characterized as pursuing their perceived best interest in the maximization of their welfare, regardless of how other people interpret their chosen actions. The key to this discussion is that the chooser chooses because they rationalize or identify that a particular course of action is in their best interest. While this particular

distinction may appear unnecessary, it is important because it now describes all choices as being perceived to be in the perceived best interest of the chooser. Laziness is not a necessarily a market inefficiency, it is a mode of behavior understood by some to lead to the maximization of their wellbeing. What is important in why people choose is not that they take action in accordance with some universal best course of action, but that they choose the best course of action given the limits of their understanding. All human action or inaction can consequently be described in terms of a pursuit to maximize welfare. While decisions and actions made in exchange markets are generally considered economic in nature, decisions and actions made outside of exchange markets are directed towards the same desire to maximize satisfaction or wellbeing. Suggestion that a consumer's welfare or wellbeing is only a function of their income and the quantity of goods and services they can acquire only encompasses a fraction of the total number of choices and actions carried out day-to-day that are directed toward the improvement of their wellbeing. Shifting one's body-weight from an uncomfortable to a comfortable position, while sitting in a chair, is identical in intent to acquiring a consumer good to improve wellbeing. While practically this distinction is meaningless in a discussion of economics because a consumer is still limited by their income in procuring goods and services in an exchange market, the distinction is relevant because it defines and expands the scope of the process of choice and emphasizes the importance of non-market factors in the pursuit of increasing wellbeing.

The primary motivation for behavior is physiological desire. In the pursuit of a person's perceived best interest a person seeks to best satisfy their desires. If this is true, human and consumer behavior should be consistent to the extent that all homo-sapiens possess similar physiological needs and manifest similar desires. By accounting for physical and environmental limitations and by accounting for the different experiences, understanding and consequent rationales people use to satisfy their desires, a significant portion of the variability in human behavior could be explained and these explanations could be used to increase the accuracy in predicting future behavior. As von Mises has argued, just because a person is motivated to satisfy their personal desires does not mean that a person cannot act altruistically or greedily. If a person perceives that it is easier to

satisfy their desires or seek their best interest through greed, through cooperation or through altruistic pursuits, then they will pursue courses of action in accordance with this guiding philosophy. An environment that allows or facilitates the benefits of greed will perpetuate greed as a guiding philosophy because it will be in the interest of those in such an environment to not cooperate, where conversely, in an environment that promotes cooperation and penalizes greed, greed will be less prevalent as a guiding philosophy because greedy behavior will be less effective in facilitating the satisfaction of desire. To an extent, cooperation or altruism favors long term greed, whereas selfishness favors short term greed.

In the moment, a consumer is faced with numerous competing desires, but is limited in time and physical capability to pursue all of these desires simultaneously. While some desires may be satisfied simultaneously with others, for example eating a meal while socializing, each conscious moment is the product of a synthesis of interpreting the environment a person finds themselves in and choosing what to do next. When eating a meal, momentary decisions are made based on the guidance of one's physiological desires on which part of the meal to eat first; whether it be take a drink of water, to quench a dry throat or to choose between a piece of chicken or a bean. Observance of such details may seem unnecessary, but decisions made from second to second stream together to form consciousness and connect larger more complicated ideas and rationales. Many of these details once understood, much like learning how to tie one's shoe laces become autonomous motor responses. They become routine and are never thought of again in terms of the complicated process that was discovered when the course of action was first developed. Just how these momentary thoughts develop and fit together to produce choice and ultimately action in accordance with a person's desires is beyond the scope of this discussion. Suffice it to say that these momentary decisions are the basis of a more complicated system of discrimination whereby the usefulness' of particular alternatives are chosen in favor of others.

As Kahneman, Wakker and Sarin report in "Back to Bentham? Explorations of Experienced Utility," the strengths of desires are reflected in the moment: "The

palatability of salt, for example, increases in conditions of sodium depletion. On a different time scale, the hedonic value of food changes substantially during a single feeding episode, and normally drops to zero or becomes negative when feeding continues beyond satiation.” (p. 379) Schelling, on the other hand, in, *Choice and Consequence*, suggests that not all pleasures and pains are biologically programmed. Prior consumption experiences and various social influences can alter the effect of particular stimuli. For example, people learn to like coffee or chili peppers, develop a dislike for rich deserts, or acquire a passion for opera. Positive or negative wellbeing can be evoked by social stimuli, such as smiles or frowns, or by purely internal events such as memories of embarrassment or amusing thoughts. Again, according to Kahneman, Wakker and Sarin: “In spite of the immense diversity in the occasions that evoke pleasure (or displeasure) in the human adult, the hedonic attribute that they share is salient and readily recognized.” (p. 379) Despite how a person physiologically reacts to particular internal or external phenomena, people react to these manifestations rationally seeking their perceived best interest from moment to moment in an attempt to maximize their overall wellbeing.

II. Basic Assumptions – Goods

Theories of Value and Useful Things

One of the great features in the writings of the early Marginalists is their expansive treatment of the most fundamental theoretical propositions in economics. The classical economists, Smith, Ricardo and Marx, had referred to a Political Economy, however, with the neoclassical movement, the term economics was coined around 1870 and was popularized during the neoclassical movement, principally by Alfred Marshall. Both economy and economics derive from the Greek *oikos*, meaning ‘house’ or ‘settlement’, and ‘nomos’, meaning ‘laws’ or ‘norms’. The new economics of the Marginalists disconnected itself from politics and other subjective concerns and began to concentrate on developing the theoretical foundation of a science of human behavior. As Carl Menger has written in the preface of his, *Principles of Economics*:

Economic theory is related to the practical activities of economizing men in much the same way that chemistry is related to the operations of the practical chemist. Although reference to freedom of the human will may well be legitimate as an

objection to the complete predictability of economic activity, it can never have force as a denial of the conformity to definite laws of phenomena that condition the outcome of the economic activity of men and are entirely independent of the human will. It is precisely phenomena of this description, however, which are the objects of study in our science. (p. 48)

To a significant extent, a detailed discussion of the terminology and many of the important concepts used in economics are not adequately addressed. This is the result of economic thinking pervading the social landscape much more than it did in the nineteenth century. Perhaps one of the most important concepts in economics, the theory of the good, is usually only addressed cursorily, restricted to a sentence or two in most basic economics texts, and virtually absent in most advanced economics texts.

Many of the basic definitions of economic terms were developed over a century ago and possessed very specific meanings. Because much of the psychological import in economics has been removed, there has been little need to define these propositions. Many of these propositions can be found empirically discussed in Carl Menger's, *Principles of Economics*, but much of this theory today remains unknown or forgotten. In the introduction to the 1981 publication of Carl Menger's, *Principles of Economics*, F.A. Hayek writes: "But there must be few instances, in economics or any other branch of knowledge, where the works of an author who revolutionized the body of an already well-developed science and who was generally recognized to have done so, have remained so little known as those of Carl Menger." (p. 11) First published in German in 1871, it was not until 1950 with a forward by Frank Knight, that Carl Menger's *Grundsätze der Volkswirtschaftslehre*, was first published in English; almost 80 years after its first publication it finally became available to English economists.

It was in 1871 when both William Stanley Jevons', *Theory of Political Economy*, and Menger's, *Principles of Economics*, were published that is now generally regarded as the beginning of the modern period in the development of economics. The *Grundsätze der Volkswirtschaftslehre*, is important because it develops the empirical foundation of several important economic concepts. In it, Menger discusses a general theory of the good, a theory of value, a theory of exchange, a theory of price, a theory of the

commodity, and a theory of money. Menger's ideas are of tremendous importance because he empirically defines the basic foundation and terminology of an empirical economic theory. While Jevons' marginal theory ultimately led to Marshall's, *Principles of Economics*, and to the development of neoclassical economics, Menger's distinctly different approach never developed because of the limited exposure of the Austrians to the rest of the world, the attacks from the German Historicists, the geo-political climate in the world after his discovery, and the ultimate disintegration of the Austrian school and Austrian State in the early 1930's.

The Nature of a Good – Incomparable and Mutually Exclusive

Carl Menger's 'General Theory of the Good' develops not only the foundation of how goods should be considered, but also addresses scientifically the relationship between goods and the satisfaction of human desire. Menger's analysis of the good is comprehensive and the clarity of his empirical analysis easily illustrates how the current theoretical assumptions of the formal neoclassical model and the theory of consumer choice in general may need to be improved. Interestingly, while credited with the discovery of marginal utility as with William Stanley Jevons in 1871, Menger never uses the terminology and quite contrarily maintains a very different and distinct conception of utility which is empirically based and significantly more accurate than Jevons' view that utility is the value to a consumer of an additional unit of a product that is inversely related to the number of units of that product a consumer has already consumed.

According to Menger, things that are causally connected with the satisfaction of human needs should be considered useful things, and those useful things that are both understood to be useful and are used to direct the satisfaction of needs are called goods. To designate this very specific view, he suggests that there are four prerequisites that must simultaneously exist before a useful thing can be considered a good:

1. A human need.
2. Such properties as render the thing capable of being brought into a causal connection with the satisfaction of this need.

3. Human knowledge of this causal connection.
 4. Command of the thing sufficient to direct it to the satisfaction of the need.
- (p. 52)

Hence, a useful thing loses its quality of being a good if any of these four requirements are violated:

(1) if, owing to a change in human needs, the particular needs disappear that the thing is capable of satisfying, (2) whenever the capacity of the thing to be placed in a causal connection with the satisfaction of human needs is lost as the result of a change in its own properties, (3) if knowledge of the causal connection between the thing and the satisfaction of human needs disappears, or (4) if men lose command of it so completely that they can no longer apply it directly to the satisfaction of their needs and have no means of reestablishing their power to do so. (p. 53)

Menger carefully interprets the usefulness of each good in terms of its causal connection with the satisfaction of need, or as discussed in this discourse, desire. This causal connection which determines the characteristic nature of a good, as he explains, can directly or indirectly satisfy a desire. He designates that goods that directly satisfy desires, like clothes, beverages, and jewelry, are of a first order, while tools and equipment are of a second order. The more indirectly causally related a useful thing is to the satisfaction of desire, the higher the order. In this way, all goods are useful things that are understood to be useful and can be used to directly or indirectly lead to the satisfaction of human desire. As Menger suggests: “As a people attains higher levels of civilization, and as men penetrate more deeply into the true constitution of things and of their own nature, the number of true goods becomes constantly larger”. (p. 53)

A thing is a ‘useful thing’ if it can satisfy human desire, and it is a ‘good’ if it is understood to be useful in satisfying a desire. Because there is a causal connection between goods and desires, there must be at least as many desires as there are first order goods. Each of these different desires, or as Menger refers to them, needs, can be satisfied to a degree by a good that has the physical properties or unique characteristics that facilitate the satisfaction of the desire. For example, when hungry, only those things which are nourishing will be useful and can satisfy the desire. Each good is consequently different in its usefulness as each desire is different in its requirements for satiation.

Those goods that satisfy a similar desire are substitutes, and those goods that must be combined to satisfy a particular desire are compliments.

Beer and Nuts are often considered complements, but in fact are not unless the term complement is used to refer to goods that are generally consumed together because their affected desires are correlated (eating salty food increases the desire for refreshment). By not carefully distinguishing the difference, there is a risk that the causal relationship between a good and the desire it satisfies and the useful properties of a good become confused. For example, the parts of a bicycle by themselves are second order goods, but when combined are a first order good that satisfies a desire for quicker movement. When combined together, these useful things are compliments; whereas, beer satisfies thirst, nuts satisfy hunger, and when combined they form mush.

The usefulness of a good is consequently a function of desire, as a good is only useful when it satisfies a desire, and each good is only comparable to other goods through its ability to satisfy a particular desire. Because useful qualities are different, for example, pancakes can be substituted and replace an omelet to satisfy hunger but can not be substituted for a bicycle (a faster mode of transportation), the usefulness of goods that satisfy different needs cannot be compared. The only measure of comparison between goods is the level of satisfaction a good is capable of effecting, and this comparison of satisfaction is dependent upon the relative magnitude of the desire for the useful thing in a particular moment. Even with this measure, because desires are different and can only be satisfied by particular goods, the satisfaction gained from using a particular good may fluctuate as the specific magnitude of need or desire changes over time. Overall total desire is the sum of the want for satisfaction of all of the different competing mutually exclusive desires. A general level of welfare is said to exist, and is generally related to the degree to which a person's many needs and desires are generally satisfied, and a person's overall satisfaction or a person's wellbeing develops derives from how well the person was able to satisfy these desires in any one moment, or over a particular period of time. Goods consequently can be characterized as being comparable in use if they can satisfy the same desire, or must be characterized as being mutually exclusive in use if

they can only be used to satisfy different desires. Each mutually exclusive good is consequently only comparable to other goods through the relative degree of wellbeing or satisfaction that goods are capable of producing when it is used.

III. Basic Assumptions – Diminishing Marginal Utility and Non-Satiation

If a useful thing is a good if it is perceived to be useful and can be used in the satisfaction of desire, then a useful thing is valuable or is valued based on how it is perceived to be useful in satisfying desire. As Menger points out: “Value is thus nothing inherent in goods, no property of them, nor an independent thing existing by itself. It is a judgment economizing men make about the importance of the goods at their disposal for the maintenance of their lives and well-being.” (p. 120) While people’s understanding of a useful thing relates to the objective qualities and causal connection between satisfaction and a useful things physical properties, whether value is a subjective characteristic, in that people form different views of a things usefulness that can not be measured directly between goods, the objective characteristics of the good effectively limit the good’s actual usefulness. Regardless of whether people understand the usefulness of a good in satisfying desire or value the good similarly or not, the objective qualities of the good should create the same effect, unless through insight or ignorance the thing is more or less efficiently used. Because value is a function of understanding, it is possible for non-economic goods, or those things that are not useful in satisfying desire, to be perceived as possessing value, or ‘imaginary value’. Menger writes: “Regarding this *knowledge*, however, men can be in error about the value of goods just as they can be in error with respect to all other objects of human knowledge.” (p. 120)

Confusion in clearly defining the key terminology used to discuss economic issues has contributed greatly to confusion about the basic principles of economics. Perhaps the most significant confusion over the last century regards the importance and nature of utility. While both are credited with the discovery of marginal utility, there is a key difference between Jevons and Menger’s interpretation of the phenomenon they discuss in their theories of value. A good discussion of difference between Jevons and Menger’s theory of value can be found in Maurice Lagueux’s paper, “Menger and Jevons on Value:

A Crucial Difference”. The key variable in Jevons’ analysis of choice is the usefulness of a good, whereas the key variable in Menger’s analysis is the satisfaction derived from a good. According to Menger, utility is the capacity of a thing to serve for the satisfaction of human needs. It is this capacity of a useful thing, its physical properties, that are useful and causally connected in a particular way that satisfy human needs or desires. Menger does not use the same definition of utility that Jevons uses and argues that “a large number of economists attribute use value (though not exchange value) to non-economic goods, and if some recent English and French economists even wish to banish the concept of use value entirely from our science and see it replaced with the concept utility, their desire rests on a misunderstanding of the important difference between the two concepts and the actual phenomena underlying them.” (p. 118)

Jevons on the other hand uses Senior’s view of utility, where “Utility denotes no intrinsic quality in the things which we call useful; it merely expresses their relations to the pains and pleasures of mankind.” (III) The difference between these views is subtle and significant. For Jevons: “Utility may be treated as *a quantity of two dimensions*, one dimension consisting in the quantity of the commodity, and another in the intensity of the effect produced upon the consumer.” (III) Based on this view he states as a general law, that “*the degree of utility varies with the quantity of commodity, and ultimately decreases as that quantity increases.*” (III) He continues: “No commodity can be named which we continue to desire with the same force, whatever be the quantity already in use or possession. All our appetites are capable of *satisfaction* or *satiety* sooner or later, in fact, both these words mean, etymologically, that we have had *enough*, so that more is of no use to us” (III) Based on this understanding, Jevons conceives of what is now regarded as the marginal utility theory and the law of diminishing marginal returns. What is most important about Jevons’ distinction is his assertion that the ‘degree’ or the level of utility varies with the quantity consumed. From this point forward in Neoclassical theory, value is thought to derive from utility, and utility is defined as a two dimensional quality that equates the diminishing usefulness of a good in satisfying desire with an increase in the amount of a good consumed.

In Sir John Hicks (1939) book *Value and Capital: An Inquiry into Some Fundamental Principles of Economic Theory*, he reworked the theory of utility-based demand and demonstrated that the Principle of Diminishing Marginal Utility was neither necessary, nor sufficient, for the Law of Demand to hold. Concerned that the procedure used to discover the law of diminishing marginal utility was not very scientific, and seeking to eliminate the need for a quantitative measure of utility (because no empirical measure of utility was discovered), Sir Hicks replaced marginal utility with the marginal rate of substitution. The marginal rate of substitution is defined as the quantity of Y which would just compensate the consumer for the loss of a marginal unit of X. Sir Hicks noted that there was a logical inconsistency in Alfred Marshall's treatment of Jevons' utility maximizing consumer. According to Sir Hicks, Marshall's view that a consumer seeks to maximize their utility by acquiring goods that possess utility functionally in relation to the quantity acquired is inaccurate because if utility is maximized between goods, then utility will be maximized when the marginal unit of expenditure for each good brings the same increment of utility:

Let us first remind ourselves of the bare outline of Marshall's main argument. A consumer with a given money income is confronted with a market for consumption goods, on which the prices of those goods are already determined; the question is, How will he divide his expenditure among the different goods? It is supposed, for convenience, that the goods are available in very small units. It is assumed that the consumer derives from the goods he purchases so much 'utility', the amount of utility being a function of the quantities of goods acquired; and that he will spend his income in such a way as to bring in the maximum possible amount of utility. But utility will be maximized when the marginal unit of expenditure in each direction brings in the same increment of utility. For, if this is so, a transference of expenditure from one direction to another will involve a greater loss of utility in the direction where expenditure is reduced than will be compensated by the gain in utility in the direction where expenditure is increased (from the principle of diminishing marginal utility). Total utility must therefore be diminished, whatever transfer is made. Since, with small units, the differences between the marginal utilities of two successive units of a commodity may be neglected, we can express the conclusion in another way: the marginal utilities of the various commodities bought must be proportional to their prices. (p. 1)

In 1932, Sir Hicks eliminated a need for a discussion of measurable utility by developing a theoretical model that uses an ordinal rather than cardinal measure of utility,

where the ordinal measure is based on the marginal rate of substitution between goods or the ranking rather than the measure of different goods usefulness to a consumer. Over sixty years earlier, Menger had objected to the same cardinal measure, suggesting that utility is a subjective quality of the state of peoples understanding of goods. While Sir Hicks identifies this limitation, and substitutes an indifference curve for Marshall's utility curve, he as Bishop Berkley arguing Locke's disjunction, as discussed in Chapter Three, succumbs to the same logical trap of arguing the logical consistency of an argument and basing his theory on the remaining assumptions; rather than developing a new empirical model that explains the inclusion of new empirical evidence, which more accurately describes reality.

In his refutation of Marshall's marginal utility theory, Sir Hicks admits that his own theory is essentially built on the same evidence as Marshall's, be it however that it requires only an ordinal scale of preference which Sir Hicks borrows from Pareto's, *Manuel d'economie politique*, (1909), and not a quantitative measure of utility:

If, however, we throw over diminishing marginal utility as being in any case dubious, and now certainly irrelevant, can we base upon similar 'experience' a general principle of diminishing marginal rate of substitution? Again, I suppose, we might get away without being challenged; but one would like a surer foundation. (p. 9)

While developing a brilliant new approach to analyzing consumer choice, his uneasiness with the foundation of his theory of the diminishing marginal rate of substitution is apparent. His theory offers a less erroneous analysis of the choice problem, but because he upholds the role of utility as the primary measure of value in choice, he is forced to make particular assumptions that he identifies as being unrealistic. If Sir Hicks had the opportunity to read Menger's *Principles of Economics* prior to the development of his marginal substitution theory, economic theory today may have been completely different:

We can, I think, get a surer foundation if we reflect on the purpose for which we require our principle. We want to deduce from it laws of market conduct –laws, that is, which deal with the reaction of the consumer to changes in market

conditions. When market conditions change, the consumer moves from one point of equilibrium to another point of equilibrium; at each of these positions the condition of diminishing marginal rate of substitution must hold, or he could not take up such a position at all. So much is clear directly; but to proceed from this to the law of diminishing marginal rate of substitution, as we need it in economic theory, an assumption is necessary. We have to assume that the condition holds at all intermediate points, so that there are no kinks in the curves between the two positions of equilibrium. ... The general principle of diminishing marginal rate of substitution merely rules out these oddities; by that principle we select the simplest of the various possibilities before us. (p. 9)

To Menger, utility is objective, lacking in psychological content, and has no quantitative relationship to value. What is considered valuable to the consumer is determined from a judgment based on a person's understanding of the usefulness of a good. Once a person understands this usefulness, the usefulness they conceive does not change, unless their understanding of its usefulness changes. What changes and what is variable in a consumer's choices is the relative strength of a person's particular desires as they become satisfied or as they grow or fester. In Jevons' two dimensional view of utility he viewed the usefulness of a good as changing as desire becomes satisfied. When a desire increasingly becomes satisfied, there is less desire and consequently goods that are useful in satisfying that desire are less useful or possess less utility than when the desire for the good was stronger. Jevons confuses the changing degree of satisfaction with a change in the usefulness of a good because he considers all goods as homogenous in usefulness; not taking into account the causal connections between a good and the need or desire it satisfies. By combining a consumer's perception of the usefulness of a good and the consumer's changing desires into one term (utility), the change in desire for a good can not be measured, nor compared between two people without explaining both the difference between the two peoples understanding of value, and taking into consideration the differences in strength of their many desires. There is no standard measure, because the usefulness of any good is subject to interpretation as each person determines value based on their understanding. By suggesting that a good's usefulness is directly proportional to the strength of a person's desire for a particular good, he establishes a relationship between satisfaction and quantity, where an additional unit of a good will always lead, even if marginally, to increased satisfaction. This is an entirely unrealistic

proposition and can be demonstrated in an enormous number of situations, for example, in the refusal of food when stuffed. Jevons admits that people can become satiated, although his model of choice is incapable of leading to this conclusion.

It is not that the same unit of a good becomes less useful. It is rather that there is less need for its useful qualities. Using usefulness in this way confuses the useful qualities of a good with its momentary usefulness. As a person becomes more satisfied, a particular good that satisfies the desire becomes relatively less useful, meaning relatively less able to satisfy desire, as there is less desire to satisfy, however, this is not to mean that the useful properties of the good have diminished in any way. For the useful properties of a good to diminish, the physical qualities of the good that make it useful would have to be affected, as when the handle of an axe breaks. The error in utility theory was to assume that these two qualities of usefulness are identical. In Kahneman and Tversky's, "Prospect Theory, A Theory of Decision under Risk," they identify these same two properties; however they refer to them as experienced utility and decision utility. Experienced utility merely refers to the amount of satisfaction that a good can actually provide in the moment, whereas, decision utility refers to the understanding of the useful qualities of a thing. Confusion in regards to the separate nature of these two distinct phenomena can be found in all discussions of utility.

The confusion and the irrelevance of utility as the proper focus of a theory of choice is no more apparent than in Senior's "Law of Variety":

It is obvious that our desires do not aim so much at quantity as at diversity. Not only are there limits to the pleasure which commodities of any given class can afford, but the pleasure diminishes in a rapidly increasing ratio long before those limits are reached. Two articles of the same kind will seldom afford twice the pleasure of one, and still less will ten give five times the pleasure of two. In proportion, therefore, as any article is abundant, the number of those who are provided with it, and do not wish, or wish but little, to increase their provision, is likely to be great; and, so far as they are concerned, the additional supply loses all, or nearly all, its utility. And, in proportion to its scarcity, the number of those who are in want of it, and the degree in which they want it, are likely to be

increased; and its utility, or, in other words, the pleasure which the possession of a given quantity of it will afford, increases proportionally. (p. 49)⁵

Because Senior was focused on using utility to explain how many different goods are preferred rather than just one specific good being chosen over and over, he confuses the causal relationship between goods and the desires they satisfy and assumes that all goods are comparable in usefulness. He does not recognize the fact that people have many different desires that cannot be satisfied by the same good. It goes without saying that a fish does not make for good reading, a bed does not make for good eating, and a book does not make for good sleeping. The belief that all goods can be compared in use (measurable utility) is the primary flaw in utility theory. It assumes that there is no causal relationship between useful things and their capability in satisfying desires, and prevents simple empirical explanations for variety in use, demand, and equilibrium.

The natural extension of the differences between Jevons and Menger's theory of value is that the people Jevons describes maximize utility or the usefulness of goods, while the people for Menger describes maximize their satisfaction. Utility theory focuses the discussion of human pursuits on the relative effectiveness of things, whereas, empirical economics focuses the discussion of human pursuits on the satisfaction of human desires. Rather than balancing the marginal utility of particular goods to maximize welfare, people focus on completely satisfying desires which leads to the maximization of satisfaction over time. Menger similarly maintains that people have requirements for particular useful things and that there is a direct quantitative relationship between the amount of a good that is required to satisfy any particular desire:

The quantity of a good of first order necessary to satisfy a concrete human need (and hence also the quantity necessary to satisfy all the needs for a good of first order arising in a certain period of time) is determined directly by the need itself (by the needs themselves) and bears a direct quantitative relationship to it (them). (p. 81)

⁵ This quotation was taken from William Stanley Jevons', *The Theory of Political Economy*. Jevons' original citation is: *Encyclopædia Metropolitana*, art. "Political Economy," p. 133. 5th ed. of Reprint, p. 11.

Satisfaction is still a function of quantity; however, it is not a continuous function. Once satisfied, those useful things that are causally related to the satisfied desire are no longer goods, or are no longer first order goods for that desire. The satisfaction of desire is the primary condition that underlies exchange, as once satisfied, those useful things in excess can become higher order goods if they can be exchanged for first order goods that can satisfy other unsatisfied desires. Unlike with 'utility theory,' because the properties of useful things do not change, differences in demand derive from different desires and different magnitudes of desire, which can be observed and measured. Unlike the inability to measure utility in terms of the 'util,' satisfaction can be measured as the inverse of dissatisfaction which is the magnitude of the desire for satisfaction.

As Tversky and Kahneman suggest, the view that hedonic states, or desires, cannot be measured because they are private events is widely held but incorrect. The measurement of subjective experiences and the determination of the functions that relate subjective variables to features of present and past stimuli are topics in the well-established field of psycho-physical research. An interesting treatment of this research can be found in Stanley Stevens', *Psychophysics: Introduction to its Perceptual, Neural, and Social Prospects*, or Wegner et al.'s, *Social Attitudes and Psychophysical Measurements*. The loudness of a noise and the felt temperature of a limb are no less subjective than pleasure and pain. The main argument for considering these experiences measurable is that the functions that relate subjective intensity to physical variables are quantitatively similar for different people. Subjective intensity is often a power function of physical magnitude, with an exponent that varies for different sensory dimensions. In Stevens' book, pleasure and distress are shown to have the same status: the psychophysical functions that govern the pleasure of drinking sugar solutions and the pain of electric shock are orderly and interpersonally similar. Verbal and numerical reports of hedonic value can be supplemented by physiological indicators of emotional quality and intensity, including objective measurements of subtle facial expressions as described in Robert Frank's, *Passions within Reason: The Strategic Value of the Emotions*. As Kahneman and Tversky conclude, the correlations among these measures are imperfect; however, the

variance they share can serve to operationalize the concept of instant experienced utility, which is seemingly just another term that refers to satisfaction.

If, as asserted in the previous section, it is true that people pursue their perceived best interest in the moment for the purpose of increasing their welfare or wellbeing, then it follows that people pursue their perceived best interest in the moment by maximizing their satisfaction, or inversely, by minimizing their dissatisfaction. Given that people possess different desires with different magnitudes of desire in each moment, they will seek to satisfy those desires which they perceive best lead to their wellbeing. Intuitively, a person's wellbeing must be considered inter-temporally, for what is conceived in one moment is executed in another, and the effect of satisfaction continues as long as the desire remains satisfied. Consequently, wellbeing should be thought of as a temporal phenomenon, where the amount of dissatisfaction removed until the desire manifests again is the amount of satisfaction gained or dissatisfaction removed over a period of time. Depending upon how an individual understands their ability to satisfy their desires and depending on their understanding of how their desires manifest, choices will be made in the moment that take into consideration the expected flux of their desires over time that are perceived to maximize their wellbeing. Because the total satisfaction from actions taken now may continually contribute to wellbeing over time, longer or shorter term perspectives should affect what choices a person will make in the moment and should be based on their previous experience and understanding of the benefits and negatives of particular actions they have observed in their past.

Generally, the number of active desires a person possesses should aggregate to a general level of dissatisfaction; dissatisfaction meaning want to satisfy particular desires, whether to remove discomfort, or to obtain pleasure. If satisfaction can be measured, or understood intuitively, as it may be too time consuming to measure every individual person's range of desires, the changes in and the total wellbeing of a person should be able to be mapped as the inverse of their reported dissatisfaction. As the dissatisfaction in their desires is increasingly satisfied, their wellbeing increases, and as desires manifest or grow stronger, their wellbeing decreases.

To maximize satisfaction, as a general rule, people will satisfy those desires that they identify lead to the greatest decrease in dissatisfaction over a period of time. This period of time is chosen based on a person's understanding of their ability to satisfy their desires and the person's understanding of how quickly their desires manifest. The individual will maximize their welfare by concentrating on satisfying those desires that best reduce the most amount of dissatisfaction over this period of time as is perceived to be possible. Consequently, if the general dissatisfaction between desires is comparable, then total dissatisfaction satisfied over a period of time is the only criterion for choice, whether it is just a measure of momentary dissatisfaction or a measure of momentary and future expected dissatisfaction. Those goods or means that are most efficiently employed will be used until the corresponding desire is completely satisfied. This analysis contradicts the post-neoclassical assumption of non-satiation, as it assumes that particular desires can be completely satisfied if the satisfaction per unit of time (efficiency) in the use of the means to satisfy a particular desire is greater than the opportunity cost of their ability to satisfy the growing dissatisfaction in their other desires. Additionally, because it takes time and effort to switch between the satisfaction of different desires, by using different means, techniques, or goods, there is an added benefit in maintaining the satisfaction of any particular desire until it is satisfied.

Over a period of time, there is a limit to the quantity and benefit of a useful thing that is used to satisfy a particular desire. A saturation level exists where consuming more becomes impossible, unnecessary or even harmful. Over-consumption can even be dangerous and unnecessary, and diverts a person's vital energy away from more important concerns. Drinking too much water may lead to hyponatremia and drinking too much alcohol may lead to alcohol poisoning, both of which can lead to death. There is an interesting treatment of saturation in R.D.G. Allen's, *Mathematical Analysis for Economists*. While the consumer must satisfy their desires in accordance with their understanding of how best to improve their welfare, given their ability to satisfy their desires and the regularity in the increase in their dissatisfaction for each desire, Sir Hicks' dilemma, or the argument that "a transference of expenditure from one direction to another will involve a greater loss of utility in the direction where expenditure is reduced

than will be compensated by the gain in utility in the direction where expenditure is increased” (p. 1), can be avoided because the usefulness of a useful thing does not change. All levels of satisfaction derived from any good are comparable and the quantifiable relationship between an increase in desire or the ratio of the satisfaction possible, per unit of time, taking into consideration cost, is the primary determinant of how long a good is used to satisfy a particular desire and how satiated a particular desire becomes.

A more important consideration than usefulness is how long a particular desire will remain satisfied and how persistent or how much more dissatisfaction will develop if a desire is not satisfied. Neither of these considerations is discussed in utility theory because the focus of consideration revolves around the usefulness of things rather than the properties of motivation. A desire is satiated because the last unit consumed satisfies not just the momentary desire, but the desire that would have existed in all future periods had the person not satisfied it. In this way, all decisions are temporal.

Consequently, the introduction of goods that are more efficient in the satisfaction of particular desires can increase productivity, and lead to an increase in wellbeing and a decrease in dissatisfaction. Vague desires, like a desire for security or increased opportunity are harder to achieve, especially emotionally, and are more difficult to satisfy. Because the scope of these desires are broad, and there is uncertainty in how they can be satisfied, the length of time required to satisfy, or at least the amount of time required to attempt to satisfy these desires, must be greater and consequently, given the opportunity cost in satisfying their more immediately satisfiable desires, these desires will likely only be sought to be satisfied only when a person’s more easily satisfied desires are satisfied. A similar explanation of behavior is described in Abraham Maslow’s book, *Motivation and Personality*, where people seeking homeostasis are most affected first by their most basic needs, like a need for air and food, and then as their more basic needs become satisfied they move up a hierarchy of needs, which he defines in terms of different stages. After the basic physical needs are satisfied, people move on to satisfying desires for stability and safety, then love and belongingness, esteem, and

finally self actualization. Interestingly, how these more advanced, or higher order, desires are to be satisfied is vague, and may not be pursued as readily as the more basic desires because they are not as well understood and as easily satisfiable. Many of the ideas discussed in this section may lend greater fidelity and possibly some credibility to the Maslow's Hierarchy of Needs.

If the process of choice is characterized by the pursuit of the maximization of wellbeing, then the motivation in choice is the minimization of dissatisfaction, and its inverse the maximization of satisfaction. While generally there always are particular desires that are not satisfied, it is possible to satisfy a desire, as this is the goal of consumption. While the satisfaction of each desire is quantitatively related to the amount of particular goods required to satisfy the desire, more for stronger, and less for weaker desires, there is a limit to the amount of any one particular good required to satisfy a desire over a period of time. This contradicts the diminishing marginal utility theory. Utility theory is flawed in that it assumes that the usefulness of a good is variable rather than desire. Consequently, the motivation behind the process of choice is the maximization of satisfaction or the minimization of dissatisfaction. While the formal model of consumer choice theory assumes that people are never satiated in their desires, which develops from the theory of diminishing marginal utility, and the theory of diminishing marginal rate of substitution, there is no actual empirical evidence for either of these propositions, and by using Ockham's Razor, the simpler solution is that people are motivated in their choice by a desire to maximize their wellbeing or satisfaction, although this maximization is in accordance with how they understand or perceive how to best be able to do this.

IV. Basic Assumptions – Transitivity

The assumption of transitivity is generally taken to mean that if a consumer prefers good A to good B, and good B to good C, then logically good A will be preferred to good C. In the formal model, the axiom of transitivity is combined with the axiom of completeness to model how a consumer can completely rank any finite number of goods in a consumption set. A consumer is considered to be able to make binary comparisons

between different sets or baskets of goods and can determine if one basket is preferred or is at least as good as another, or at least as good as another if they are indifferent between two baskets. The axiom of completeness says that a consumer can examine any two consumption plans, x_1 and x_2 , and determine if one is at least as good as the other, and axiom of transitivity says that for any three consumption plans, if x_1 is at least as good as x_2 , and x_2 is at least as good as x_3 , then x_1 will be at least as good as x_3 . This preference relationship enables the consumer to construct preference ranking because their preferences can be represented ordinally as binary comparisons.

Because the casual connections between useful things and the desires that they are able to satisfy are not addressed in modern post-neoclassical economics, and because goods are thought to be comparable in usefulness, a good or a basket of goods chosen in one moment is thought to be always preferred over all other alternative individual goods or combinations of goods. The problem with this analysis, as discussed in the previous section, is that the usefulness of a type of thing is not variable from one moment to another. The usefulness of a particular good may change physically if for example it was melted, and may change subjectively if its application in the satisfaction of particular desires is more or less understood by the consumer, but the usefulness of a useful thing is dependent on its physical properties and capacity for satisfaction, which does not change from one moment to another. Rather what does change from moment to moment is the magnitude of each of a consumer's many desires. Assuming a consumer has the exact same spectrum of desires from one shopping trip to another, everything else held constant (no left over goods from the first trip, no change in prices, no change in income, no change in understanding of the usefulness of any of the goods, no change in the magnitude of any desire, etc...), then the consumer should pick the exact same basket of goods as the first time.

What becomes immediately apparent is that the re-choosing of the exact same basket of goods, which is the suggested norm in the post-neoclassical model, is highly unlikely to occur again; even if prices and income are held constant. Additionally, because the purpose of consumption is to satisfy a desire, a good is more likely to not be chosen again

amongst other goods because it has already been used or will be used to satisfy the desire that motivated the consumer to choose the good in the first place; consequently the motivation for choosing was satisfied or reduced. If the utility of goods can not be compared, then we must ask again Sir Hicks question to Marshall; how will the consumer divide their expenditure among different goods? There must be a relationship between the dissatisfaction a good can satisfy, the quantity of the good needed to satisfy the desire, and the dissatisfaction generated in the acquisition of this quantity. While this relationship may not be comparable to other goods, it is comparable in choice, as for those goods where the ratio between the dissatisfaction satisfied to the dissatisfaction incurred is higher, the good will be preferred to similar goods and will be chosen first over other goods that are useful in satisfying other desires because a greater amount of dissatisfaction can be reduced per unit of time which leads to maximization of welfare.

The question then arises how able are people to understand and predict with any certainty when they will need to satisfy a particular desire. The longer it takes to satisfy a desire the greater dissatisfaction a person will endure and the lower their total wellbeing. In a book that was influential outside of economics, *The Joyless Economy: An Inquiry into Human Satisfaction and Consumer Dissatisfaction*, Tibor Scitovsky suggests that people are not generally able to solve the problem of maximizing experienced utility subject to a budget constraint, at least in part because of their limited understanding and ability to predict their own enjoyment of goods and activities. He argues that American consumers tend to over-invest in comforts and to under-invest in pleasures. In Gary Becker's analysis of individual behavior in *Accounting for Tastes*, on the other hand, he argues that people correctly anticipate the effects of consumption on future preferences and correctly incorporate these predictions in their choices. In, "Predicting a Changing Taste: Do People Know What They Will Like?" Kahneman and Snell have experimented on whether people are able to predict specific future desires and have demonstrated that people are generally not able to predict how their own taste for ice-cream, low-fat yogurt, or music will change over a week of repeated consumption. In Itamar Simonson's, "The Effect of Purchase Quantity and Timing on Variety-Seeking Behavior," and in

Lowenstein and Adler's, "A Bias in the Predictions of Tastes," they have published similar results.

It is currently uncertain whether the guiding utility based theory or whether unrecognized and uncontrolled variables are biasing these studies. Empirically, and theoretically, the evidence seems to support the view that people use past trends in their consumption habits to guide and predict their present and future consumption, which is the focus of Gary Becker's work, however, people are generally unable to predict with any accuracy what the magnitude of any particular desire will be in a future period of time. People appear to develop preventive strategies, where desires can be quickly satisfied by readily available means if a particular desire should manifest. In this way, a person maximizes their wellbeing by quickly satisfying a desire that would otherwise continue to add to total dissatisfaction moment after moment until it is satisfied. The total dissatisfaction is then reduced and wellbeing is maximized over a period of time in consideration. This possibility suggests that people may satisfice, knowing only that desires tend to increase over time, but not knowing specifically or exactly how they will manifest.

As for the assumption of transitivity, there seem to be effectively only four different ways the proposition can be used in describing choices and only two of them accurately describe human behavior. Transitivity can be considered momentarily, temporally, in regard to goods that are useful in satisfying other desires and in regard to substitutes. Momentarily, or in the moment, the transitivity assumption as described in the theory of consumer choice holds, because all variable factors, magnitudes of desires, circumstance and cost, perception and understanding are all constant. It appears that good X is preferred to good Y, good Y preferred to good Z, and good X preferred to good Z. As soon as the moment is over however, the choice in consumption affects the spectrum of motivation that existed when the choice was made in the first moment. In proceeding moments the relationship between the goods may still be the same, however, this is not necessarily so.

Inter-temporally, the transitivity assumption is violated. This is not surprising, as Jehle and Reny note in “Advanced Microeconomics,” “Experiments have shown that in various situations, the choices of real human beings are not always transitive” (p. 6). Other propositions that are based on transitivity, like revealed preference, must be rejected or re-evaluated. While revealed preference is no longer an indirect proof that one set of goods is preferred to another from moment to another (this was never empirically proven to begin with), a person's preferences from moment to moment are revealed, because people cannot help but seek to maximize their own best interest. By analyzing people's choices from one moment to another, a person's choices will causally reflect changes in their methods of maximizing wellbeing and changes in the magnitude of their desires.

If temporal transitivity or revealed preference accurately described temporal choices, nowhere would it be more observable than during a shopping trip in a grocery store. No more poignantly is the assumption of transitivity and revealed preference violated than in the act of the shopper choosing different goods in a store, one after another. If particular goods from one moment to another are really consistently preferred, then the shopper would consistently pick their most preferred good over and over again. The fundamental error in the utility theory is the assumption that all goods are comparable in usefulness and the failure to address the causal nature of goods and the mutually exclusive desires they are used to satisfy. In the act of placing a useful thing in a cart, the conditions for minimizing disutility have changed, and consequently affected the future choice of the shopper, even if a previously chosen item is knowingly removed from a person's cart, the person will seek to replace it, but would not add another over the amount they have already chosen without a corresponding change in desire or understanding. Interestingly, shoppers will choose to drink a beverage or eat food that they have not paid for while shopping, apparently to maximize their wellbeing by quickly reducing a growing hunger or thirst that would over the course of their shopping trip lead to unnecessary unpleasantness or dissatisfaction.

Thirdly, to suggest that people are transitive between baskets of goods is false and can be easily demonstrated. A person rarely if ever purchases the same quantities of goods

from one shopping trip to another. This is because the magnitudes of the person's many needs and desires are different on these trips. The post-neoclassical model ignores this purposeful behavior and assumes away the behavioral substance that explains why and how people choose to consume things. As desires change, what will motivate action and be chosen and consequently preferred changes. Preferences between dissimilar goods are not transitive unless the structure of a person's situation, desires and understanding are identical in separate moments of choice.

The fourth way the transitivity assumption can be considered is between substitutes. Because substitute goods satisfy the same desire, the preference ranking amongst substitute goods will only change if the understanding of a good's usefulness changes, or if the effectiveness in employing a good (the ratio of dissatisfaction removed to dissatisfaction incurred in use) changes over time. An increase in the price of a good will lead to greater dissatisfaction incurred, as the additional cost could have been expended on other goods that could have, but no longer will, decrease dissatisfaction. As long as a person's understanding of the usefulness of a useful thing (value), and the relative ratios of effectiveness between substitutes does not change, the rank order of preference between substitutes will not change over time. For example, if the desire is to get from point A to point B quickly, and a person has roller skates, a bicycle, public transit, a motor cycle and a car to choose from, they will consistently pick the good they perceive will most effectively get them from A to B. The chooser must balance the trade off between cost and benefit. Whereas the car goes the fastest, enables hauling, and protects the driver from the elements, it is costly to run, and time consuming to start up and park. While the car is the preferred mode of transportation over a long distance and when it is raining, a motorcycle may be preferred to a car when it is not raining because it is cheaper to run and easier to park. Similarly, when moving only a short distance, walking or bicycling may be preferred to driving. While each is a substitute for moving faster, the effectiveness of each depends on the conditions in which it will be used. In any particular situation however, the chooser will consistently choose the same means in order of preference from one moment to another; for example, for short distances always

walk. If a person changes their routine than their understanding of their situation has changed.

V. Basic Assumptions – Motivation, Discrimination and Choice

Human behavior and choice is characterized by an attempt to resolve numerous simultaneously disparate desires. People pursuing their perceived best interest in attempting to maximize their wellbeing in the moment are motivated by their desires to choose, and they discriminate in their choice by choosing those courses of action that they understand best reduce their dissatisfaction given their understanding of how their many desires will change over time. Because people are able to generally predict that particular desires will occur in the future, but are unable to accurately predict the magnitude of specific desires in the future, people may develop preemptive strategies designed to promote quick satisfaction of particular desires when they occur. It is for this reason that many peoples' homes are likely filled with numerous gadgets and unconsumed useful things. For each useful thing or course of action, a person understands a relationship between its effectiveness in reducing dissatisfaction and the cost in dissatisfaction that is incurred through its consumption, use or pursuit. This represents the classic cost benefit analysis. While there are numerous useful things, not all may be appreciated as a 'good', as the usefulness of a thing in satisfying a particular desire may not be understood.

Because people do not make decisions isolated from their past or from their expectations of what the future will hold wellbeing is an inter-temporal concept. While all actions and decisions are momentary, they are the manifestation of a person's conscious understanding of consequence and their perception of what will happen in the future. It is the induction of the many choices a person makes that seems to define a person's personality, and consequently, human behavior is characterized by peoples' desires and how people react to them based on their understanding of past experience. If over a period of time, the multiplicity of a person's choices can be recorded, and if there is consistency in their recurring desires, then as Alfred Marshal has suggested, a demand schedule can be developed. If each individual in an economy's demand schedule is

added together, the total demand schedule for the economy should be obtained. Further fidelity could be reached by examining when particular desires occur and how much of particular goods are required to satisfy them. In doing so, an empirical study would likely reveal significant consistency between the frequency and requirement for satisfaction between all people. By recording and tracking the objective qualities of these physical characteristics and social behaviors, many consistencies in human behavior will be likely discovered.

While people likely face similar physiological requirements, the decisions people make are certainly affected by their relative wage, income and general wealth. While most people who understand the usefulness of a thing will generally intuit a similar efficiency in the reduction of dissatisfaction per unit of a thing, if they discriminate in their choice based on their understanding of the effectiveness of particular useful things in satisfying particular desires, then they will base their understanding of the dissatisfaction incurred through its obtainment for consumption on the relative dissatisfaction that develops from the labor or equivalent costs required to obtain it. Those who are relatively more productive relative to the acquisition of the medium of exchange will labor less and consequently associate a lower dissatisfaction incurred in a standard amounts obtainment and use. Consequently, those who are more productive will be more inclined to spend relatively more of their procured medium of exchange to obtain a useful thing than those who are less productive and who associate a higher level of dissatisfaction to the same price. Because people will determine what to choose based on the ratio of dissatisfaction removed to the dissatisfaction incurred when making decisions to maximize utility, they will make different choices, preferring cheaper substitutes or possibly forgoing the satisfaction of particular desires. Those who are relatively more productive are more able to satisfy their many desires and when able will seek to acquire goods of a higher quality, for example food that is more flavorful and that is eaten in a location with a richer ambiance, or products that are made from more durable or useful materials.

The longer it takes, or the higher the cost in satisfying a desire, the fewer number of desires can be satisfied over a period of time. Those people who are better able to satisfy

their desires consequently should possess lower levels of dissatisfaction and higher levels of wellbeing, while those who are less able to satisfy their desires should be relatively less dissatisfied and be less satisfied with their wellbeing. In Richard Easterlin's articles, *Income and Happiness: Towards a Unified Theory*, and "Happiness and Economics: How the Economy and Institutions Affect Wellbeing," he finds that people with a higher income generally report a higher wellbeing than those with lower incomes. He notes that there exists a trend that material aspirations increase as wealth increases. Whether this is the result of an increased ability to procure more goods, or some other psychological factor, he concludes that while increased material aspirations constitutes a negative effect on peoples' overall wellbeing, they do not alter the trend that increased wellbeing is positively correlated to higher levels of income.

Generally, as an increased understanding of the casual nature between things and human welfare develops, people are better able to use their understanding to be more productive and take advantage of the capability particular goods possess in the satisfaction of desire. Historically, the progression of the development of civilization is similar to the progression of the development of an individual's understanding and increased ability to satisfy their desires. As Menger writes:

Consumption goods, which before were the product of an accidental concurrence of the circumstances of their origin, become products of human will, within the limits set by natural laws, as soon as men have recognized these circumstances and have achieved control of them. The quantities of consumption goods at human disposal are limited only by the extent of human knowledge of the causal connections between things, and by the extent of human control over these things. Increasing understanding of the causal connections between things and human welfare, and increasing control of the less proximate conditions responsible for human welfare, have led mankind, therefore, from a state of barbarism and the deepest misery to its present stage of civilization and wellbeing, and have changed vast regions inhabited by a few miserable, excessively poor, men into densely populated civilized countries. Nothing is more certain than that the degree of economic progress of mankind will still, in future epochs, be commensurate with the degree of progress of human knowledge. (p. 74)

Chapter 6. The Unknown and Human Decision Making

God does not play dice.

Albert Einstein

I. Uncertainty and Economics

In the previous chapter, a person's choice is discussed in terms of how different goods or actions are more or less useful in satisfying particular interests and desires. A scale of preference can be constructed based on the relative effectiveness of the many possible means to a particular end, where the preferred mean chosen or action taken is that which appears most effective in satisfying a particular end or desire. The usefulness of particular goods and actions is suggested to be dependent upon several factors. The situation a person is in when they make their choice, the concern a person is focused on, and the understanding of potential means to resolve a concern effect what good or action is chosen in the moment of decision. Uncertainty in what and how particular means are able to reach a desired outcome is an important factor in what a person will prefer and in what choices they will make.

As discussed previously, both the options and the relative usefulness of a means to an end are limited in the decision making process by the chooser's understanding of reality. If the chooser is very knowledgeable they will be able to conceive of more options and understand the nature of those options more clearly than a chooser who is less knowledgeable. Regardless of how knowledgeable the chooser is, as a mortal human, their understanding will always be subject to degrees of uncertainty. How uncertainty affects the process of decision making and why particular goods are preferred over others is the subject of this chapter.

It might be said that the formal incorporation of risk and uncertainty into economic theory began in 1944, when von Neumann and Morgenstern published their, *Theory of Games and Economic Behavior*; however, the foundation of modern neoclassical economics was introduced long before by Daniel Bernoulli in 1738. Bernoulli introduced

the idea of expected utility, which decomposed the valuation of a risky venture as the sum of utilities from outcomes weighted by the probabilities of outcomes, which is the essential notion supporting von Neumann and Morgenstern's Game Theory. When he introduced the idea it did not seem sensible for rational agents to maximize expected utility. Bernoulli's assumption of diminishing marginal utility seemed to imply that, in a gamble, a gain would increase utility less than a decline would reduce it. Consequently many concluded, the willingness to take on risk must be "irrational", and thus the issue of choice under risk or uncertainty was viewed suspiciously, or at least considered to be outside the realm of an economic theory which assumed rational actors.

The great task of von Neumann and Oskar Morgenstern (1944) was to lay a rational foundation for decision-making under risk according to the rules of expected utility theory. Once this was done, the floodgates opened. The novelty of the axiomatic method, combining sparse explanation with often obtuse axioms, ensured that most economists of the time would find their contribution inaccessible and bewildering. Indeed, there was substantial confusion regarding the structure and meaning of the von Neumann and Morgenstern utility hypothesis itself. Restatements and re-axiomatization by Jacob Marschak in, "Rational Behavior, Uncertain Prospects, and Measurable Utility," Paul Samuelson in, "Probability, Utility, and the Independence Axiom," and Israel Herstein and John Milnor in, "An Axiomatic Approach to Measurable Utility," did much to improve the situation.

Inspired by Frank P. Ramsey's, "Truth and Probability," Bruno de Finetti's, *Theory of Probability: A Critical Introductory Treatment*, and Leonard J. Savage's, *The Foundations of Statistics*, the expected utility hypothesis was derived without imposing objective probabilities but rather by allowing subjective probabilities to be determined jointly. Francis Anscombe and Robert Aumann in, "A Definition of Subjective Probability," modified Savage's approach to develop the Savage-Anscombe-Aumann "subjective" approach to expected utility which is considered more "general" than the older von Neumann and Morgenstern concept. During this time, Kenneth J. Arrow in, "Admissible Points of Convex Sets," and Gerard Debreu in, *Theory of Value*, introduced

the “state-preference” approach to uncertainty. Although not necessarily “opposed” to the expected utility hypothesis, the state-preference approach does not involve assignment of mathematical probabilities, whether objective or subjective. The structure of the state-preference approach is more amenable to Walrasian general equilibrium theory where “payoffs” are not merely money amounts but actual bundles of goods. The method became popular after useful applications were pursued by Jack Hirshleifer in, “Investment Decision Under Uncertainty: Choice-Theoretic Approaches,” and, “Investment Decision under Uncertainty: Applications of the State-Preference-Approach,” Peter Diamond in, “The Role of a Stock Market in a General Equilibrium Model with Technological Uncertainty,” and Roy Radner in, “Competitive Equilibrium Under Uncertainty,” and, “Existence of Equilibrium of Plans, Prices, and Price Expectations in a Sequence of Markets,” and has since become the dominant method of incorporating uncertainty in general equilibrium contexts.

The current economic tool kit of economic techniques and models used to understand how human decision makers incorporate uncertainty in their decision making is seemingly incomplete. George L.S. Shackle in, *Expectations in Economics*, Maurice Allais in, “Le Comportement de l’Homme Rationnel devant le Risque, Critique des Postulats et Axiomes de l’Ecole Americaine,” and Daniel Ellsberg in, “Risk, Ambiguity and the Savage Axioms,” were among the first to challenge the expected utility decomposition of choice under risk or uncertainty and to suggest substantial modifications. Influential experimental studies, such as those by Daniel Kahneman and Amos Tversky in, “Prospect Theory: An Analysis of Decision Under Risk,” have reinforced the need to rethink much of the theory. Towards this end in recent years, many attempts have been made to re-axiomatize the theory of choice under uncertainty, with weighted expected utility in John Quiggin’s, “A Theory of Anticipated Utility,” and Menahem Yaari’s, “The Dual Theory of Choice Under Risk, regret theory in Graham Loomes and Robert Sugden’s, “Regret Theory: An Alternative Theory of Rational Choice Under Uncertainty,” non-additive expected utility in George Shackle’s, *Expectations in Economics*, and David Schmeidler’s, “Subjective Probability and Expected Utility Without Additivity,” and state-dependent preference in Edi Karni’s,

Decision Making Under Uncertainty: The Case of State-Dependent Preferences. The systemic problems with economic theory today are not the result of a lack of intelligence, not the result of fanaticism or a lack of skill and logic, rather, as demonstrated with each of the above abridgments to Bernoulli's expected utility hypothesis, the problem with economic theory today appears to reside in the reluctance to go back to basics and to re-conceptualize the foundations of human behavior, and develop an empirical behavioral theory of uncertainty.

II. The Nature of Uncertainty and Models of Human Decision Making

The nature of reality and the application of logic to improve understanding are the key elements that must be understood to remove confusion from any discussion concerned with clarifying the role of uncertainty in human decision making. If scientific evidence supporting the Law of Causality, the Indestructibility of Matter, the Conservation of Energy, and other physical properties and principles of reality are to be accepted, then it is clear that the nature of reality is structured and predictable. How this reality is understood and how this understanding is used to inform choice is the subject of this chapter. Unlike God, people are not omniscient, and as a result make decisions based on ignorance and ambiguous information. People do not know what they do not know, and it is not possible for a person to know for certain that any of their understandings accurately and fully depict reality. What people are able to do is to develop an expectation based on previous experience, establishing relative certainty based on observed consistency in outcome. How detailed or accurate these expectations are, as discussed in Chapter Three, depends upon perceived experience.

Confusion regarding the nature of uncertainty derives back to Frank Knight's doctoral dissertation, *Risk Uncertainty & Profit*, where he examined the relation between knowledge and changes in an economy. Knight suggested that future trends could be approximated by past trends, if the underlying system supporting the trend remains constant. Businesses could then join together to mitigate the consistent average cost of particular events over a period of time by pooling their resources. The risk Knight refers

to is the consistency in the occurrence of particular phenomenon over time. Knight makes the argument that there is a difference between uncertainty, situations when “randomness” cannot be expressed in terms of specific mathematical probabilities, and risk, situations where the decision-maker can assign mathematical probabilities to the randomness which they are faced with. Randomness is an illusion or property of probability that derives from confusion or the irrelevance of the minutia of the innumerable cause and effect relationships that lead to particular outcomes. By restricting the focus of concern, certain outcomes will be inevitable. For example, a coin will land on one of its sides when tossed, accidents will happen, a particular card will eventually be drawn from a deck, and the conflagration of events that ultimately will lead to these occurrences are insignificant to the likelihood that they will ultimately occur. What Knight refers to as risk, however, is really a combination of understanding and uncertainty. The average number of car accidents or house fires from one period to the next, *ceteris paribus*, can be generally discovered by tracking the pattern or number of accidents over time. This pattern of consistency and these averages constitute an understanding of the nature of the extent to which these particular incidents can occur. While this number of incidents may fluctuate, as the phenomena that cause them are affected by unknown forces, the uncertainty in regards to the likelihood of these incidents occurring derives from an ignorance of their causes and what is unknown. Chance, or risk comes into play only in relation to the uncertainty in regards to the innumerable factors that lead to the average, and the uncertainty that from one period to the next that these tendencies will change or continue in the same pattern. Knight’s risk really represents an educated guess based on the stability of certain factors and as a result of certain uncertainties and certain knowledge.

Knight’s notion of risk is in essence the concept underlying Expected Utility Theory which stems from Daniel Bernoulli’s expected utility solution to the St. Petersburg paradox. The paradox challenges the idea that people value random ventures according to their expected return.⁶ Daniel Bernoulli suggested that the valuation of a risky venture

⁶ Posed by Nicholas Bernoulli, the St Petersburg paradox poses the following situation: a fair coin will be tossed until a head appears; if the first head appears on the n th toss, then the payoff is 2^n ducats. How

is not the expected return of that venture, but rather the expected utility from that venture. By Bernoulli's logic, the valuation of any risky venture takes the expected utility form: $E(u|p, X) = \sum_{x \in X} p(x)u(x)$ where X is the set of possible outcomes, $p(x)$ is the probability of a particular outcome $x \in X$ and $u: X \rightarrow \mathbb{R}$ is a utility function over outcomes. What people expect to happen is based on their understanding of the past, and on their understanding of the cause and effect relationships that lead to particular outcomes. Many of the relationships that lead to particular outcomes are uncertain or unknown. Because all understanding is developed from experience, each understanding is conditioned on a degree of certainty. How certain is a person that gravity will always keep their feet on the ground, how certain is a person that they will need food and water to survive, how certain is a person that a trend in automobile accidents will continue into the next quarter? The certainty of any outcome is understood in terms of past experience to include knowledge of the cause and effects that lead to that outcome. Every action and every choice is a risk, however, familiarity and greater understanding increases the likelihood that our expectations are accurate and will occur.

Because all understanding is conditional in its certainty, all decisions and the options considered in the process of deciding are conditional in their likelihood. Psychological research has suggested that memory is imperfect and susceptible to bias. How past experiences are interpreted and remembered greatly effects what people choose. In particular, experience appears to be represented in memory by the features of particular moments, and the overall evaluation of a memory is determined mainly by the characteristics observed in similar moments. This subject is discussed in Carol Varey and Daniel Kahneman's, "Experiences Extended across Time: Evaluation of Moments and Episodes," Kahneman, Fredrickson, Schreiber, and Redelmeier's, "When more pain is preferred to less: Adding a better end," and Redelmeier and Kahneman's, "Patients' Memories of Painful Medical Treatments: Real-Time and Retrospective Evaluations of Two Minimally Invasive Procedures." Interpretation of experience is an uncertain process and is limited to our assessment and memory of it.

much should one pay to play this game? The paradox, of course, is that the expected return is infinite. While the expected payoff is infinite, one would not suppose, at least intuitively, that anyone would be willing to pay an infinite amount of money to play this game.

In Redelmeier et al.'s, *Memories of Colonoscopy: A Randomized Trial*, the process of human understanding was manipulated in the hopes of improving the return rate of patients who have undertaken a colonoscopy. "The goal was to minimize the level of pain during the final minutes of the procedure and thereby allow the patient to retain a more positive memory of the experience." (p. 188) In agreement with theory, the addition of a short interval of minimal discomfort to the final moments of the procedure caused patients to retain a more favorable (less aversive) overall memory of the experience. Taking into account a patient's prior history, specific indications, and abnormal findings (three significant predictors in step-wise regression) the procedure produced a 41% increase in the odds that a patient would return after the procedure (95% confidence interval: 2-96, $P = 0.038$). Additionally, the intervention caused about a 10% relative decrease in the overall memory of pain and a 10% relative increase in the number of patients who returned for follow-up visits. The fallibility of memory was documented for decades in psychological science, even under brief conditions. Past research indicates that the distortions in memory are not entirely random; instead, systematic failures occur that are repeated by most people and are predictable in advance. According to Redelmeier et al:

Our findings support past research that overall memory is created by recalling selected moments rather than an exact running total of experience. The duration of an episode has relatively small influence unless it is highly salient (e.g. the wait for surgery) or correlated with intensity (e.g. the duration of labor). Last impressions may be lasting impressions when people reflect on past life experiences. (p. 193)

Uncertainty in decision making, in the last half century was modeled in economic theory from von Neumann and Morgenstern's expected utility hypothesis and Leonard Savage's synthesis of expected utility with subjective probability. In, *Theory of Games and Economic Behavior*, von Neumann and Morgenstern suggest that preference is not determined in terms of outcomes, but rather in terms of the expected return over lotteries. The model assumes people will choose the lottery that has the largest randomized return. For example, a person will be indifferent between a lottery that rewards a gambler 100% of the time with \$5 and a lottery that rewards a gambler 1% of the time with \$500. This

is because both lotteries if repeatedly played will in the long run provide an average \$5 return per play. Incorporating the above discussion into the expected utility hypothesis, each course of action considered in a decision can be thought of as a lottery. There is the perceived reward, the satiation of hunger by eating a sandwich, and the perceived probability that a sandwich will satiate hunger. What is won is an increase in satisfaction or happiness, which is the ultimate goal of winning a lottery and exchanging money for goods and services. In this manner, each option is a lottery, with a probability dependent not only on the ability to understanding the option, but also on the ability to understanding how the option will resolve concern. A series of options can be compared, as with a series of lotteries to determine the lottery or option that maximizes a person's wellbeing. Von Neumann and Morgenstern make the assumption that probabilities cannot be influenced by the chooser in simple lotteries, however, how a person understands the likelihood in simple lotteries and how a person interprets the effect of particular outcomes in the lottery will determine what a person will choose. Because people interpret reality in terms of their understanding, there are a multitude of different concerns and factors that influence a person's decision. For example, if a person has to pick between two lotteries where they have a 25% chance to win a glass of water in one lottery and a 75% chance to win a sandwich in another, if they are very thirsty and not hungry, they may choose the first lottery, even though the expected market return of the second lottery may be much greater.

To illustrate the importance between reality and the perception of reality it is necessary to discuss the nature of probability. Probability is the numerical assessment of likelihood on a scale from 0 (impossibility) to 1 (absolute certainty). Probability is usually expressed as the ratio between the number of ways an event can happen and the total number of things that can happen (e.g., there are 13 ways of picking a card with a diamond on it from a standard deck of 52 cards, so the probability of picking a card with a diamond on it is $13/52$, or 25%). Probability theory originally grew out of attempts to understand card games and gambling. As comparisons between certain biological, physical, and social phenomena became more evident probability theory was adopted to explain the regularity in particular outcomes of phenomenological processes that were relatively

unknown (e.g., the sexes of newborn infants follow sequences similar to those of coin tosses). In *A Philosophical Essay on Probabilities*, Pierre de Laplace explains how probabilities are conceived. However, this gambling theory does not apply to those phenomenological probabilities that are identified by recording the consistency of particular outcomes that manifest from particular unknown organic processes:

The theory of chance consists in reducing all the events of the same kind to a certain number of cases equally possible, that is to say, to such as we may be equally undecided about in regard to their existence, and in determining the number of cases favorable to the event whose probability is sought. The ratio of this number to that of all the cases possible is the measure of this probability, which is thus simply the fraction whose numerator is the number of favorable cases and whose denominator is the number of all the cases possible (pp. 6-7).

The notion of probability or chance is commonly misconceived as it is an abstraction from reality based on particular circumstances where a trend can be identified amongst innumerable causes and effects. In, *Foundations of Science*, Henri Poincaré demystifies the notion of probability and offers the following suggestion:

Every phenomenon, however minute, has a cause; and a mind infinitely powerful, infinitely well-informed about the laws of nature, could have foreseen it from the beginning of the centuries. If such a mind existed, we could not play with it at any game of chance; we should always lose. In this instance the word chance would not have any meaning or rather there would be no chance. It is because of our weakness and our ignorance that the word has a meaning for us. And, even without going beyond our feeble humanity, what is chance for the ignorant is not chance for the scientist. Chance is only the measure of our ignorance. Fortuitous phenomena are, by definition, those whose laws we do not know. (p. 395)

Probability and the notion of randomness is based on the relative inconsequence of infinitesimal increments, as illustrated by the 50% probability that a flipped coin will land on one side, or the 1.9% probability or 1/52 chance that a Queen of Spades will be pulled from a full deck of cards. What is assumed away is just how the coin is flipped and just how the cards in the deck are stacked. To deal with the multiplicity of cause and effect relationships in particular systems that are not well understood, the underlying phenomena that lead to particular outcomes are substituted or replaced by the theoretical concept of randomness, which assumes that each element or outcome in a set has an

equal possibility of occurrence. Randomness therefore proxies what is uncertain in regards to the nature of the causal system that manifests particular outcomes.

The formation of expectation is dependent on multiple interpretations of similar experiences. This collage of memory develops into an expectation with an associated likelihood of certainty. In reality the nature of a phenomenon is certain and is dependent upon certain causes. A limited understanding of these certain systems leads to uncertainty and the conditional nature of perception and understanding. In this way, all understanding is expected, and all options are subject to a degree of uncertainty which can be approximated using expected utility theory. While randomness does not actually exist in reality, it does serve as a useful proposition to organize incompletely understood outcomes. Additionally, while there is no corresponding phenomenon of probability in reality, the assumption of probability serves as a useful tool to explain trends that exist between relatively poorly understood phenomena. Uncertainty plays a large role in human decision making and each decision should be thought of as a choice between the best means to an end, where the best mean is that which is expected to return the most satisfaction, or best resolve a person's needs or desires.

III. The Complexity of Simple Gambles

Strict adherence to expected utility theory and modern decision theory has lead to inadequate results and inaccurate descriptions of human economic behavior, and has been demonstrated to be of limited use in application. In, "Experimental Economics: A Reply", Vernon Smith suggests that theories of decision under uncertainty are inconsistent with experimental evidence:

the numerous direct studies of individual decision making under uncertainty, over the past 25 years (see the recent papers by David Grether, 1980; Grether and Charles Plott, 1979; and especially the survey and evaluation by Paul Slovic and Sarah Lichtenstein, 1983), suggest that our theories of decision under uncertainty are in several respects inconsistent with controlled evidence. The results of these experiments are robust under replication, and various anti-factual explanations of the results (that might have rescued the theory) have been systematically eliminated. The results are not to be idly dismissed by anyone with the slightest

interest in evidence. ...the results of direct tests are inconsistent with the expected utility hypothesis (EUH). (pp. 266-267)

According to Herbert Simon, in, “A Behavioral Model of Rational Choice,” the problem with the post-neoclassical economic view of decision making is the severe demands that are put upon the choosing organism:

The organism must be able to attach definite pay-offs (or at least a definite range of pay-offs) to each possible outcome. This, of course, involves also the ability to specify the exact nature of the outcomes – there is no room in the scheme for “unanticipated consequences.” The pay-offs must be completely ordered – it must always be possible to specify, in a consistent way, that one outcome is better than, as good as, or worse than any other. And, if the certainty or probabilistic rules are employed, either the outcomes of particular alternatives must be known with certainty, or at least it must be possible to attach definite probabilities to outcomes. (p. 103)

Simon suggests that there is a complete lack of evidence, in actual human choice situations of any complexity, that these computations can be made or are in fact performed:

The introspective evidence is certainly clear enough, but we cannot, of course, rule out the possibility that the unconscious is a better decision-maker than the conscious. Nevertheless, in the absence of evidence that the classical concepts do describe the decision-making process, it seems reasonable to examine the possibility that the actual process is quite different from the ones the rules describe. (p. 104)

In “Individual Rationality, Market Rationality, and Value Estimation,” Knez, Smith and Williams demonstrate that in direct experimental tests of expected utility theory, in which subjects are asked to choose among alternative gambles, or to make judgments as to their willingness to pay, and/or their willingness to accept payment for a gamble, the behavior of the respondents is inconsistent with the predictions of expected utility theory. While Knez et al note that in surveys conducted by Paul Slovic and Sarah Lichtenstein that are published in “Preference Rehearsals: A Broader Perspective” demonstrate that people’s behavior is remarkably consistent in a wide variety of contexts and are robust under examinations designed to determine the effect of monetary incentives, experience, and other factors that might have accounted for the discrepancy between subject responses

and the predictions of expected utility theory. Experimental studies of market behavior, on the other hand, based upon expected utility theory models of market decision making, have yielded results showing high consistency with the predictions of these models as can be found in Vernon Smith's "Experimental Economics: Reply." The question Knez, Smith and Williams pose is, "are individual revealed preference in some market contexts more likely to be 'rational' than individual responses to choices among alternative prospects?" (p. 397)

Expected utility theory proposes that all probabilities within a series of lotteries are universal in nature, meaning each likelihood in a decision is universal to all people confronted by a particular set of gambles. The problem with this broad generalization is that it is false. As discussed previously, how people form an understanding of likelihood is dependent upon their understanding of a problem, and each person's understanding, while conforming to the universal truth in reality, is by no means identical. To suggest that each person will understand a problem similarly, let alone all probabilities in a problem identically, is tantamount to suggesting that all people will always agree; which is certainly not true. As discussed by John Maynard Keynes in *A Treatise on Probability*, it is not always possible, even when given a simple set of probabilities, to determine which alternative should be chosen:

only in a strictly limited class of cases are degrees of probability numerically measurable. It follows from this that the 'mathematical expectations' of goods or advantages are not always numerically measurable; and hence, that even if a meaning can be given to the sum of a series of non-numerical 'mathematical expectations,' not every pair of such sums are numerically comparable in respect of more and less. Thus, even if we know the degree of advantage which might be obtained from each of a series of alternative courses of actions and know also the probability in each case of obtaining the advantage in question, it is not always possible by a mere process of arithmetic to determine which of the alternatives ought to be chosen. ... It may be remarked, further, that the difficulty exists, whether its numerical indeterminateness of the probability is intrinsic or whether its numerical value is, as it is according to the Frequency Theory and most other theories, simply known (p. 312)

Mathematical probability is a conceptual technique of making explicit what is implicitly contained in a set of premises. The conclusions to which this technique leads

asserts nothing that is new in the sense of not being contained in the content of the premises, however, the results obtained are psychologically new. A person may not be aware, before using the techniques of logic and mathematics, what they committed themselves to in accepting a particular set of assumptions or assertions. Unconsciously a person will keep a mental tally of events and use this information in a subliminal way to judge the likelihood of particular options and outcomes. Far from being scientific, this unconscious accounting will be biased by their experience and may reflect a distorted assessment of the true cause and effect relationships in reality. Similarly, how a person interprets a standardized set of probabilities and rewards in a series of lotteries will be affected by this same unconscious understanding of reality. Consciously examining and interpreting each gamble, people will consider what variables are important based on their understanding and how they interpret the probabilities and outcomes in a gamble relate to their perceived best interest. Given particular parameters placed on determining which lottery in a series is the best may lead to a best answer, however, there is no guarantee that all people will agree on how to interpret these parameters. Consequently, different people may choose differently based on their understanding of the same lottery or simple game. Expected utility is a tool, and like all tools, how it is used and what it can do is heavily dependent upon the goal, skill and imagination of the person who commands it.

Even in well defined gambles, the understanding a person draws from to analyze a problem effects how a person assesses potential outcomes. Exogenous to any predefined scheme is the likelihood that a person will interpret the scheme in the same way as it was intended. In *A Philosophical Essay on Probabilities*, Laplace suggests that the “difference of opinions depends, however, upon the manner in which the influence of known data is determined. The theory of probabilities holds to considerations so delicate that it is not surprising that with the same data two persons arrive at different results, especially in very complicated questions” (p. 10). To demonstrate the potential difficulty in determining probabilities take as an example the “Monte Hall” puzzle, which was printed in the September, 1990, issue of Parade magazine:

Suppose you're on a game show, and you're given the choice of three doors: Behind one door is a car; behind the others, goats. You pick a door, say number 1, and the host, who knows what's behind the doors, opens another door, say number 3, which has a goat. He then asks to you, 'Do you want to pick door number 2? Is it to your advantage to pick door number 2 or to stay with your original choice, door number 1?

Intuitively, a person may expect that there is an identical chance of picking the car behind the two doors, but they would be wrong. The best answer to the question involves understanding that it is in your interest to switch your choice to door number 2. By picking the other door, the probability of winning the car rises from $1/3$ to $2/3$. The trick to the gamble is in identifying that the only way to lose the game is by picking the car on the first guess; a $1/3$ probability. The effect of this example illustrates how the determination of probabilities depends on a person's understanding and interpretation of a problem; even in simple games. Using particular heuristics to analyze a problem, people will arrive at different conclusions. The Monty Hall puzzle offers an excellent example of this, which becomes no more obvious when one try's to explain the nature of the probabilities in the game to someone who has not previously experienced or had the opportunity to examine the game.

What probabilities mean outside of simple games, and determining what probabilities mean in more complicated situations is a much more complicated problem. Take for example the following hypothetical situation: John, who enjoys walking through the park, walks through the park each day and each week he runs into his friend James, striking up a great conversation. What is the probability that John will run into James on Tuesday? To answer this question, an assessment must be made in regard to what is known and to how this information applies to the question posed. Given that one out of seven days John runs into James, and given that Tuesday is identical to the other six days in a week, we can suggest that there is roughly a $1/7$ or 14% chance that John will run into James on a Tuesday. While the rationale used in this conclusion is correct, the conclusion may not accurately reflect reality. The question of how accurate and useful this conclusion is must be considered. Is there enough information to answer this question? Is using probability theory appropriate or are we just guessing? Should the

respondent not answer the question as they really do not know what the probabilities are? What unrealistic assumptions must be made to apply probability theory to this example? If Tuesday is the day that John always runs into James, or alternatively, if James never goes to the park on Tuesdays and this information is unknown when the probabilities are determined in the first question, then what is the relevance of the first probability prediction? It is easy to change the probability given the new information, however, what is the significance of these hypothetical probabilities when the pattern in the unknown which is modeled by randomness is never known or understood, and should scientists be concerned with likelihoods that are any less than certain?

Because people do not know what they do not know, expectations framed by present understanding are formed, which reflect a person's best guess or expectation of what is likely. Neglected in discussions of expectation and probability theory is just what understanding is required to know what the correct probabilities are in a gamble, and given that probabilities are not contrived, perhaps the best course of action is to search for more information. Given the diversity of experience, understanding and opinions people exhibit, it is unlikely that the subjects in an experiment when presented with an identical set of lotteries will all identify the same lottery as being the best, unless all variables relevant to the query are controlled for or if there is a significant difference between the possible choices.

The expected utility theory is a useful way to think of how people make decisions when the outcome of a choice is unknown. People will base their decision on what they know or can infer from their experience. They will identify an expected utility with a certain choice, and they will identify an expected likelihood to their confidence in that choice. Because a person can think of only one thing at a time, much of a person's understanding is stored in their subconscious, and people subconsciously establish likelihoods in accordance with their expectations. Not having to expend conscious energy on which utensil or how to use the utensil frees up conscious thought for more pressing concerns. Most decisions will have been considered so often in the past that most day to day choices are automatic.

If all decisions are based on a degree of uncertainty, then expectation theory that takes into consideration the subjectivity in particular peoples' decisions could be a powerful tool to analyze a broad range of human behavior. However, as John Maynard Keynes suggests in, *A Treatise on Probability*, choices that are relatively less certain are avoided in favor of choices where the likelihood of outcome is practically certain:

There seems, at any rate, a good deal to be said for the conclusion that, other things being equal, that course of action is preferable which involves least risk, and about the results of which we have the most complete knowledge. In marginal cases, therefore, the coefficients of weight and risk as well as that of probability are relevant to our conclusion. It seems natural to suppose that they should exert some influence in other cases also, the only difficulty in this being the lack of any principle for the calculation of the degree of their influence. A high weight and the absence of risk increase *pro tanto* the desirability of the action to which they refer, but we cannot measure the amount of the increase (p. 313)

People interpret situations based on their understanding and consequently all decisions are based on a degree of uncertainty, however, because people do not understand what they do not know, particular rationales may be viewed as being more certain than they may actually be. Completely accurate rationales may never be known with complete certainty, however, through continued exposure to a particular phenomenon, the majority of the cause and effect relationships that constitute the phenomenon may be observed and may eventually be generally understood. Those cause and effect relationships that are more consistent, observed more often, will be better understood and rationales based on these observances will involve less risk than rationales based on less understood phenomena. Courses of action based on rationales that are not well understood pose a risk that the result sought may not occur. In these situations, the expectation of return is lower than the potential return and consequently uncertain rationales are less likely to be used to develop courses of action than those rationales that are relatively certain. In short, people will tend to do what they know.

Because the likelihood of an outcome is dependent upon how a person understands the nature the cause and effect relationships in a problem, a person will interpret even simple

games in terms of a much broader realm of understanding and motivation. The differences in how a simple game or a lottery is perceived, understood and differences in motivation will create variability in what people generally choose because these variables are not temporally consistent, and not consistent between different people. Differences in experience and consequently understanding and differences in momentary desires and needs will focus a person's actions towards goals that appear subjective. Choice, however, derives from the objective qualities of the many factors that manifest into action. Choice and action are consequently objective, albeit this objectivity involves an understanding of the causal processes that effect them. Even if different people understand probability theory and the probabilities in different lotteries, how people choose to use these lotteries and which lottery they will choose depends not just upon the information contained in the lottery, but on how the person perceive the outcomes of these lotteries leading to their best interest and the maximization of their wellbeing.

IV. Explaining Prospect Theory with Opportunity Cost

It was demonstrated that even in simple lottery examples, as discussed in Kahneman and Tversky's, *Prospect Theory: An Analysis of Decision Under Risk* (1979), that people will not base decisions solely on the outcome of different lotteries. Rather, people will underweight outcomes that are probable in comparison with outcomes that are obtained with certainty. According to Prospect Theory, \$5 should generally be preferred to a 50% likelihood of winning \$10, which contradicts the expected utility approach that a chooser should be generally be indifferent between two outcomes with the same expected return. In Prospect theory, Kahneman and Tversky, demonstrate through a series of surveys that people consistently overweight certain outcomes relative to those that are probable, a phenomenon that they refer to as the Certainty Effect. Experimental evidence published in Thaler et al.'s, *The Effects of Myopia in Risk Aversion*, confirms the certainty effect and proposes that people will generally prefer a gamble to a certain return only if the expected return from a gamble is twice that of a certain return. While the results of many direct tests demonstrate inconsistency between experimental evidence and the expected utility hypothesis, many of these tests are limited to a narrow range of comparisons where the expected difference between a certain return and a gamble is relatively small.

Paul Samuelson once offered a colleague the following bet: flip a coin and if the coin lands on heads you win \$200.00 and if it lands on tails you lose \$100. Samuelson reported that his colleague turned the bet down but said that he would be happy to take 100 such bets. Samuelson then proved a theorem that demonstrated that the pair of choices are inconsistent, that is, someone should not be willing to play a bet many times if they are not willing to play just once. Expected utility theory as utilized by von Neumann and Morgenstern in their 1944 *Theory of Games and Economic Behavior*, set the rational foundation for decision-making under risk. In expected utility theory, the utilities of outcomes are weighted by their probabilities and choices are based on competing lotteries rather than outcomes.

As with the Monty Hall puzzle, the difficulty in understanding why the colleague would make such a statement is the result of not understanding the true nature of the offer. An answer to the Allais paradox and to Paul Samuelson's dilemma is that the opportunity cost of playing a lottery is sometimes higher than the expected return of a lottery. What does this mean exactly? As with the Monty Hall example, most of the in-between steps serve only to confuse the chooser. What is Samuelson's colleague really risking if he chooses to play Samuelson's gamble? If he gambles and the coin lands on tails he loses \$100.00 and if it lands on heads he wins \$200.00. Alternatively, if he does not play at all, he does not win \$200.00, nor does he lose \$100.00. The true cost stopping him from gambling is the potential loss of $U(\$100.00)$, and therefore the gamble must be expected to provide an expected return at least as great as the potential loss, otherwise there is no reason to gamble. Because the gamble is played only once, the expected return from the gamble is $U(\$50.00) = .50U(\$200.00) - .50U(\$100.00)$, which is less than the opportunity cost of making the gamble. Consequently, if the lottery is played out 100 times, as the colleague suggests, the opportunity cost or potential loss will be $U(\$5000.00)$, and the expected return would be $U(\$5000.00) = 100 \cdot .50U(\$200.00) - 100 \cdot .50U(\$100.00)$. Given that the opportunity cost of the gamble is equal to the expected return of the gamble after 100 plays, the colleague might save himself the time and effort and choose not to accept the gamble anyway. People that are asked these types of questions unconsciously understand the intuition behind them. However, consciously

the difficulty in understanding the nature of these problems is in identifying that the expected return from playing a lottery once is different from the expected return in playing the same lottery a repeated number of times.

Expanding this discussion further, the Allais Paradox can be explained by comparing the classic expected utility approach to the opportunity cost and expected utility approach. The following pair of choice problems discussed in Kahneman and Tversky's, "Prospect Theory: An Analysis of Decision Under Risk," are a variation of the problems Allais uses to describe his paradox; and differ from the original choice problems in that they refer to moderate rather than to extremely large gains. The number of respondents who answered each problem is denoted by N, and the percentage that chose each option is given in brackets.

Allais Paradox Example: (Tversky and Kahneman, 1979, p. 265)

Problem 1: Choose between

A:	2,500 with probability 0.33,	B: 2,400 with certainty.
	2,400 with probability .066,	
	0 with probability 0.01;	
N = 72	[18]	[82]*

Classic Model⁷

$$.33 \cdot U(\$2,500) + .66 \cdot U(\$2,400) + .01 \cdot U(0) = U(\$2409)_{\text{gamble A}} > U(\$2,400)_{\text{certain B}}$$

Opportunity Cost Model

$$.33 \cdot U(\$2,500) + .66 \cdot U(\$2,400) + .01 \cdot U(-\$2,400) = U(\$2385)_{\text{gamble A}} < U(\$2,400)_{\text{certain B}}$$

Problem 2 (Tversky and Kahneman, 1979, p. 266): Choose between

C:	2,500 with probability .33,	D: 2,400 with probability .34,
	0 with probability .67;	0 with probability .66.
N = 72	[83]*	[17]

Classic Model

$$.33 \cdot U(\$2,500) + .67 \cdot U(0) = U(\$825)_{\text{gamble C}} > U(\$816)_{\text{certain D}} = .34 \cdot U(\$2,400) + .66 \cdot U(0)$$

Opportunity Cost Model

$$.33 \cdot U(\$2,500) + .67 \cdot U(.34 \cdot U(-\$2,400)) = U(\$278.28)_{\text{gamble C}} > U(\$272.16)_{\text{certain D}}$$

$$.34 \cdot U(\$2,400) + .66 \cdot U(.33 \cdot U(\$2,500))$$

⁷ In this example, for the purpose of simplicity it is assumed that each dollar, no matter how many are added together, leads to the same utility as any other dollar. The result is that a .50 likelihood will decrease the expected utility in half.

Which do you prefer? Many experimenters find that a substantial fraction of subjects prefer A to B and D to C. While these preference choices do not seem counter intuitive, they turn out to violate expected utility theory. If we accept that people prefer the certain choice in problem 1, then by logically manipulating the expected utility equation, we determine that the same people in problem 2 should prefer gamble D over gamble C. The problem with expected utility theory is that, in reality, people generally prefer gamble C to gamble D, which leads to the conclusion that the expected utility hypothesis is an incorrect hypothesis because it does not accurately predict human behavior. The expectation of the Allais paradox is that people should prefer gambles A and C, or gambles B and D. The results of the Allais paradox have led to serious concerns whether or not expected utility theory is broadly applicable to human decision making.

Classic Model

If $(B > A)$, then:

$$U(\$2,400)_{\text{certain B}} > .33 \cdot U(\$2,500) + .66 \cdot U(\$2,400) + .01 \cdot U(0)$$

This implies,

$$\Rightarrow U(\$2,400)_{\text{certain B}} - .66 \cdot U(\$2,400) > .33 \cdot U(\$2,500) + .01 \cdot U(0)$$

$$\Rightarrow .34 \cdot U(\$2,400) > .33 \cdot U(\$2,500) + .01 \cdot U(0)$$

Which in turn implies:

$$\Rightarrow .34 \cdot U(\$2,400) + .66 \cdot U(0) = \text{Gamble D} > \text{Gamble C} = .33 \cdot U(\$2,500) + .67 \cdot U(0)$$

$$\Rightarrow U(\$816) < U(\$825)$$

Then logically, gamble D should be preferred to gamble C ($D > C$).

Opportunity Cost Model

If $B > A$, then:

$$U(\$2,400) > .33 \cdot U(\$2,500) + .66 \cdot U(\$2,400) + .01 \cdot U(-\$2,400)$$

This implies,

$$\Rightarrow U(\$2,400) - .66 \cdot U(\$2,400) > .33 \cdot U(\$2,500) + .01 \cdot U(-\$2,400)$$

$$\Rightarrow .34 \cdot U(\$2,400) > .33 \cdot U(\$2,500) + .01 \cdot U(-\$2,400)$$

$$\Rightarrow U(\$816) > U(\$801)$$

While the Allais paradox suggests that expected utility theory is flawed, the paradox possesses several flaws which may invalidate it as evidence. For example, the Allais paradox is a purely mathematical or logical manipulation of the equations that represent the comparison between two lotteries. What is assumed in the Allais paradox is that the utility per dollar is additive and that the utility derived from \$1,000,000 is equal to the product of the utility derived from \$100 multiplied by 10,000, or any similar re-

arrangement. Assumed, is that the utility from winning nothing in a gamble is equal to the mathematical equivalent of zero. Experimental evidence suggests that both these propositions are false. Daniel Bernoulli's 1738 solution to the St. Petersburg paradox introduced the idea of diminishing marginal utility, where he proposed that the utility from wealth, $U(w)$, is not linearly related to wealth (w), but rather increases at a decreasing rate. Significant evidence exists to support the prevalence of phenomena similar to diminishing marginal utility, and several studies where reported general happiness is compared with salary support this phenomenon. Additionally, while it is generally said to be true that there is no positive utility gained from losing, it is possible that a person is negatively affected by not winning. Psychologically, missing the chance to win \$1000.00, especially when there was only a 1% chance of losing is generally going to lead to unhappiness. As discussed in Schlomo Benartzi and Richard Thaler's, "Myopic Loss Aversion and the Equity Premium Puzzle," and in Thaler et al.'s, "Probabilistic Insurance," people tend to have a greater sensitivity to losses than gains. This loss aversion was shown to effect decisions merely in how particular opportunities are described. In Tversky and Kahneman's, "Advances in Prospect Theory: Cumulative Representation of Uncertainty," Kahneman, Knetsch, and Thaler's, "Experimental Tests of the Endowment Effect and the Coase Theorem," describe how losses are generally found to be weighted about twice as strongly as gains, where the disutility of losing \$100 is roughly twice the utility of gaining \$100. In the Allais paradox, $.01 \cdot U(0) = 0$, which, out of the context of the gamble may be true. In the context of a gamble, this mathematical statement represents losing the gamble, which suggests that $.01 \cdot U(0) = 0$ psychologically can not be removed from the equation merely because it equates mathematically to zero.

Original versions of the Allais paradox use extremely large gains, for example, in the first problem a person can choose between a certain \$1,000,000 and a gamble where they have a 10% probability of winning \$5,000,000, a 89% probability of winning \$1,000,000 and a 1% probability of winning nothing. In the second problem, a person can choose between a 10% probability of winning \$5,000,000 and an 11% probability of winning \$1,000,000. By incorporating opportunity cost in the Kahneman and Tversky moderate

gain example, an accurate prediction can be made in how people will choose between gambles. With extremely large gains however, the model is unable to pick what choice people will generally make. Expected utility theory is not a comparison of outcomes, it is a comparison of psychological associations in relation to outcomes. This was the original intent of the theory, as Bernoulli sought to use the concept of diminishing marginal utility to solve the St. Petersburg paradox.

As discussed previously in this discourse, satisfaction derives from the satisfaction of desire, and consequently, the total amount of satisfaction obtainable is equivalent to the extent of a person's desires. While an increased ability to procure useful things may lead to a higher level of wellbeing, eventually, all goods that are useful in satisfying a person's desires will be acquired and the remaining purchasing power becomes ineffective in providing further satisfaction during these moments. Just how much purchasing power is required to practically satisfy a person's desires likely depends on many subjective factors. As a person becomes accustomed to a higher standard of living they can become aware of particular luxuries that they previously would not have understood existed and consequently would have desired. The utility, or more appropriately, the satisfaction that is expected to derive from spending larger amounts of money is subjective, and consequently a general average utility or expected satisfaction equated to a particular amount of money does not seem to accurately reflect the underlying phenomena the notion is used to model.

By incorporating the psychological effect that different aspects of a gamble have on a chooser, expectation theory can be used to explain the Allais paradox and other experimental findings; for example, anomalies that are inconsistent with the post-neoclassical or mathematical expectations models. The failures of expected utility are not logical or mathematical ones, rather, they are symptoms of the failure to identify, quantify and include the psychological aspects of human behavior into the theory. For example, given diminishing marginal returns and a general psychological aversion to losses, expectations theory can be used to demonstrate that there is not a paradox, only a failure to include relevant considerations.

In the following hypothetical example, by decreasing the amount of utility or satisfaction that is derived from larger winnings and incorporating the psychological opportunity cost of potentially losing a certainly obtainable amount of money, a consumer may be modeled to prefer a choice that is contrary to the preferred choice predicted by expected utility theory. The main problem of the expected utility approach is not in its conceptualization and applicability, but rather in the exclusion of the psychological interpretation of the value of possible outcomes and the value of money. While the numbers picked in this example are arbitrary, this diminution in satisfaction from larger sums of money and the inclusion of a much greater disutility from the possibility of losing a million dollars more accurately addresses the actual factors affecting the choice people make when faced with this problem.

Original Allais Paradox

Situation A.

Gamble or Certainty: Choose Between

A: \$5,000,000 with probability .10, B: \$1,000,000 with certainty.
 \$1,000,000 with probability .89,
 \$0 with probability .01;

Expected Utility Model with Psychological Integration

$.10 \cdot U(\$5,000,000) + .89 \cdot U(\$1,000,000) + .01 \cdot U(-\$1,000,000) \quad ? \quad U(\$1,000,000)$

$10 \cdot 1200 \text{ utile} + .89 \cdot 1000 \text{ utile} + .01 \cdot (-2000) \text{ utile} \quad ? \quad 1000 \text{ utile}$

990 utile < 1000 utile⁸ (B is preferred to A)

Depending on how people frame their decision and understand their options, it is possible to rationally develop a different preferred option based on the same lottery. In the end, a person will prefer to choose that option which they perceive will lead to their best interest. By utilizing the opportunity cost approach and the psychological understanding developed so far, the expected utility approach can be demonstrated to accurately predict which gamble people will generally prefer in each of the 14 problems discussed in Kahneman and Tversky's, "Prospect Theory: An Analysis of Decision Under Risk". The previous failure of prediction can be explained by not taking into account the psychological impact that each of the elements in a gamble presents.

⁸ Utilities are chosen according to the psychological properties of choice previously discussed. Diminishing marginal utility reduces much of the value of the extra \$4,000,000 that could be won, and peoples' aversion to loss increases the disutility of losing \$1,000,000 with certainty. A utile is a hypothetical generic unit of comparable monetary utility.

Incorporating the causal effect between the medium of exchange and satisfaction and the potential opportunity cost of winning nothing into expectations model increases the accuracy of the model to predict currently anomalous behaviors, and replaces the need for decision weights and a weighting function. The following example further illustrates how the opportunity cost approach can be used to accurately predict which gamble a person will choose.

(Tversky and Kahneman, 1979, p. 267)

Problem 7:

	A:	(6,000, .45)	B:	(3,000, .90)
N=66		[14]		[86] *

Classical Model

A: $U(\$6,000 \cdot .45) + U(0 \cdot .55)$

B: $U(\$3,000 \cdot .90) + U(0 \cdot .10)$

U(\$2700.00) gamble A = U(\$2700.00) gamble B (*Gamble A and B are equal*)

Opportunity Cost Model

A: $U(\$6,000 \cdot .45) + U(U(-\$3,000 \cdot .90) \cdot .55) = U(\$2700.00) - U(\$1485) = U(\$1215)$ gamble A

B: $U(\$3,000 \cdot .90) + U(U(-\$6,000 \cdot .45) \cdot .10) = U(\$2700.00) - U(\$270) = U(\$2430)$ gamble B

U(\$1215)gamble A < U(\$2430)gamble B (*Gamble B is clearly preferred to gamble A*)

Kahneman and Tversky's critique of expected utility theory suggests that when people face uncertain or risky prospects, they consistently take actions that are inconsistent with the tenets of utility theory. They found that people tend to underweight outcomes that are merely probable in comparison with outcomes that are obtained with certainty. This tendency called the "certainty effect" contributes to risk aversion in choices involving sure gains and to risk seeking in choices involving sure losses. In addition, they suggest that people generally reduce and simplify more complex problems by subtracting common probabilities and outcomes under consideration. This tendency is called the "isolation effect," which is suggested to lead to inconsistent preferences when the same choice is presented in different forms. These psychological effects and many others that are being discovered today will play a large role in how the psychological aspects of decision processes can be used to modify a formal model like expected utility theory. The expectation theory seems to characterize the fundamental process of choice involving uncertainty, however, the exclusion of the psychology or heuristics people use

to deal with uncertainty and frame decisions must be ultimately incorporated into expectation theories to improve the accuracy of economic predictions of choice and consumer behavior.

Chapter 7. Synopsis

A scientific theory is usually felt to be better than its predecessors not only in the sense that it is a better instrument for discovering and solving puzzles but also because it is somehow a better representation of what nature is really like. One often hears that successive theories grow ever closer to, or approximate more and more closely to, the truth. Apparently generalizations like that refer not to the puzzle-solutions and the concrete predictions derived from a theory but rather to its ontology, to the match, that is, between the entities with which the theory populates nature and what is “really there.”

The Structure of Scientific Revolutions, Thomas Kuhn

I. The History of Human Behavior in Economics

Neoclassical Economics and the Marginalist Revolution

Prior to the study of economics was the study of political economy. During the Marginalist Revolution, in the late nineteenth century, scientific inquiry began to focus on explaining human behavior as the primary determinant of political economizing. Deriving from Greek words ‘oikos’ and ‘nomos’, Economics literally means, ‘laws or norms of man’. Economics was intended to be the study of the practical activities of economizing men in the same way that chemists study the properties of chemicals. The classical economists were already leaning towards the idea that value derived from the labor embodied in particular things, and the marginalists extended this idea to explain how value derived from the relative supply and demand of the product of labor in exchange markets.

While it is practically impossible to briefly describe the enormous amount of work that constitutes the history of economic thought, there exist particular undercurrents over the past two centuries that have guided and impeded the development of a realistic paradigm of human behavior in economic science. Perhaps the most significant development during this period of time was the discovery of neoclassical economics. Developing out of the Marginalist Revolution, which derived from the simultaneous publication of William Stanley Jevons’, *The Theory of Political Economy*, and Carl Menger’s, *Principles of Economics*, in 1871, the Marginalist Revolution led to an ideological

transformation where the dominant ‘classical’ labor theory of value described by Adam Smith, David Ricardo and Karl Marx was replaced by a new classical approach, where value is based on exchange rather than production and distribution. While both Jevons and Menger’s revolutionary treatises were published simultaneously and addressed similar improvements, it was only William Stanley Jevons’ arguments, later popularized by Alfred Marshall, which served to develop what is now generally regarded as neoclassical economics. In this neoclassical theory, rather than labor being the primary determinant of value, the ‘natural value’ of a good is determined according to its subjective scarcity, or the degree to which peoples’ desire for that good exceeds its availability.

Within two decades, from eighteen eighty to nineteen hundred, economic theory significantly changed. From Jevons’, *Theory of Political Economy*, to Enrico Barone’s 1896 publication, *Studi Sulla Distribuzione*, the theoretical foundation of neoclassical economics was consolidated. Developing upon William Stanley Jevons arguments, Alfred Marshall significantly improved both the scope and applicability of the marginalist doctrine. In his, *Principles of Economics*, published in 1890, he develops and defines much of the terminology and many of the economic processes that are still used in economics today. In this treatise he discusses demand and consumption and defines the law of satiable wants or diminishing utility, marginal utility, demand price, marginal demand price, the law of demand, elasticity of wants or demand elasticity and establishes the demand schedule and the process of demand that generally characterizes the process of demand used today. Jevons’ treatment of utility as the defining property of value became the basis of Marshall’s new utilitarian system, which became the dominant economic approach and was used to direct economic and domestic policy in many of the world’s most powerful countries for almost half a century. The marginal utility approach supplanted the classic labor theory of value, and utility, notably measurable or cardinal utility, became the key instrument to incorporate human behavior into economic discussion.

Other less economic social trends emerged and grew stronger during this period of history. An epistemological revolution inspired by Charles Darwin and Herbert Spencer led to an evolutionary movement in economics that was popularized in Social Darwinism. Karl Marx had immediately picked up upon this idea and in his correspondence with Friedrich Engels he considers Social Darwinism as the “natural-scientific basis for the class struggle in history”. (p. 123) Spencer’s “survival of the fittest” mantra led to a socio-cultural movement towards free market system capitalism, where government intervention was discouraged so that the weak and unfit would be weeded out of the economy. This evolutionist mode of thinking influenced the work of many economists at the time; namely, Pareto, Mises and Veblen. Advancing quickly, science and the power of new ideas swept across the world.

The end of the nineteenth century also marked the beginning of scientific psychology. In 1879 Wilhelm Wundt founded the first laboratory dedicated to psychological research at the University of Leipzig. In 1890, William James published his book, *The Principles of Psychology*, which laid many of the foundations for the sorts of questions that psychologists would focus on for years to come. By not using metaphysical or religious explanations of human thought and behavior, Wundt and James established the foundation of the modern science of psychology and freed investigations focused on determining the nature of human behavior from the realms of philosophy and theology. During this time, the Jewish physician Sigmund Freud developed his techniques of psychoanalysis which postulated the existence of various unconscious and instinctive ‘drives,’ and the existence of a, ‘self,’ which was presumed to exist as an internal perpetual struggle between the desires and demands of the id, ego and superego. The scientific classification of human behavior was developed by many other important scientists during this period of time; including Hermann Ebbinghaus and his pioneering studies on memory and Ivan Pavlov’s discovery of classical conditioning.

Partly as a reaction to the difficulty in quantifying the subjective and introspective hypotheses developed in these early psychological studies, psychologists, and with them many economists, began to reject studies of the mind in the early twentieth century,

arguing that the sciences should only study what is observable; namely behavior. While many of the psychological ideas developed during this time were rejected as unscientific, the new behavioral and experimental approach to studying human behavior established a guiding epistemology that has led to the development of modern psychology and the behavioral and experimental approaches now being used in economics to demonstrate behavioral inconsistencies or anomalies in the post-neoclassical rational theory of consumer behavior.

Led by B. F. Skinner, and later John B. Watson, Behaviorism was developed, which advocated restricting psychological studies to the manifestation of human action. Skinner and Watson rejected the idea of internal mental states such as beliefs, desires and goals, believing that all behavior and learning is a reaction to the environment. In Watson's 1913 paper, "Psychology as the Behaviorist Views It", he argues that Psychology "is a purely objective experimental branch of natural science," and that, "introspection forms no essential part of its method". (p. 158) Because scientific knowledge of the 'mind' was considered too metaphysical and impossible to achieve, many of the subjective theories advanced near the end of the nineteenth century were latter abandoned. It was not until late in the twentieth century with the development of cognitive science, which uses tools of evolutionary psychology, linguistics, computer science, philosophy and neurobiology, that the 'mind' was again considered to be a subject for serious scientific investigation.

In the late nineteenth century, appeals to hedonic measures of behavior that formed the foundation of human behavior in economics succumbed to the same subjective epistemological turmoil. With the rejection of the labor theory of value, the neoclassical theory became heavily dependent upon the existence of utility to explain the law of demand. Married to utilitarianism, economic theory became an instrument of Bentham and Mills theory of ethics, which prescribed the quantitative maximization of good consequences for a population. Difficulties in ascertaining the nature and measure of utility quickly led many economists to undertake an examination of demand theory without addressing measurable utility. As early as 1906, Vilfred Pareto published his, *Manual of Political Economy*, which focused on formulating equilibrium in terms of

“objectives and constraints”, rather than behavioral psychology. Focusing on preferences and substituting ophelimity, or economic satisfaction, for utility, Pareto relied on indifference curves developed by Edgeworth in, *Mathematical Psychics: An Essay on the Application of Mathematics to the Moral Sciences*, to develop a theory of the consumer and producer that did not require a cardinal measure of utility. Developing a counter model to the utilitarian equilibrium, Pareto introduced the notion of Pareto-optimality; the idea that a society enjoys maximum ophelimity when no single person can be made better off without making someone else worse off.

During the first half of the twentieth century, the scientific treatment of human behavior was significantly affected by the epistemological debate over what constitutes proper scientific evidence, what variables should be used to explain behavior, and how these variables should be defined and measured. While both William Stanley Jevons and Carl Menger are credited with the discovery of marginal utility, only Jevons used the term in his analysis. Menger specifically objected to the concept of utility and developed an empirical subjective theory of value based on satisfaction maximization. The key difference between the two approaches revolves around the nature of the variables used to describe the process of choice. Jevons determined that utility, or usefulness, is variable while desire is a constant that is dependent upon usefulness. Menger, alternatively, determined that the usefulness of a thing is constant and that desire is what is variable. While Jevons’ theory became popularized in the English speaking world and ultimately formed the foundation of the now dominant neoclassical approach, Menger’s empirical approach was effectively relegated from international consideration by the inaccessibility to his research, by early attacks from the dominant German Historical School led by Gustav Schmoller and by many other geo-political factors.⁹

While Jevons and Menger are both generally credited with the transformation of economic theory from the classical labor theory to the neoclassical exchange theory of

⁹ Gustav Schmoller, one of the principal advocates of the German Historicist movement, led an intellectual attack on the epistemology used by the Austrian Economists, which was later referred to as the ‘methodenstreit.’ The methodenstreit divided Austria and Germany intellectually and resulted in the development of the two distinct economic schools of thought; the German Historical School and the Austrian School of Economics.

value, both theories are not identical, and in fact, Menger specifically disputes approaches similar to Jevons' that are dependent upon the notion of utility. While the history and development of the utility based neoclassical approach is relatively well known, Menger's marginal approach was never widely explored or generally accepted. Given the difficulty with defining, measuring or incorporating utility into a unified economic theory, further examination of Menger's research should be useful; as he identified the failure of the utility approach over a century ago and fifty years before Sir John Hicks. While Menger's *Principles of Economics* is generally regarded to have helped issue in the marginalist revolution, knowledge and familiarity with this work did not develop outside of Austria and Germany until German and Austrian economists began relocating to the Western Countries at the beginning of the 1930s. It was not until almost a century later that Menger's, *Principles of Economics*, was translated into English and published in an English speaking country. The first English publication was printed in 1950, with a forward by Frank Knight, and then later in 1976, with a forward by F.A. Hayek. It was effectively not until after Jevons and Marshall's neoclassical economics was effectively discredited that Menger's contribution became accessible to English speaking scholars and was generally determined to have paralleled Jevons' *The Theory of Political Economy*.

International Conflict and the Rejection of Neoclassical Economics

While the neoclassical approach was once thought to be the paradigm that could unify economic theory, over a century later, the neoclassical theory and economic theory in general is still incapable of fully addressing a broad range of human economic behavior. The empirical and marginal approach developed by Carl Menger constitutes a methodology and body of research that is significantly different than the currently accepted post-neoclassical approach that offers a scientific foundation to the approach and research currently being conducted by behavioral economists. Menger had developed a new type of economics in Austria and had begun teaching and proliferating what was later to be referred to as Austrian Economics. He taught two generations of Austrian economists, two of which were Eugen von Böhm-Bawerk and Friedrich von Wieser, who continued Menger's work and who helped train the next generation of

Austrian economists. The most famous of these later economists were von Hayek, von Mises and Schumpeter, whose ideas have been adopted into mainstream Anglo-Saxon economics; as exemplified by Lord Robbins and Frank Knight's use of von Mises views on rationality and human action to dispute Marshallian economics, Wicksell and Fisher adoption of the Austrian theory of capital, and Wicksteed, Robbins and Knight's adoption of the alternative cost doctrine.

Within the English-speaking world, Marshallian or neoclassical economics became the dominant form of economics from the eighteen-nineties to the nineteen-thirties. Much of the other economic research developed during this time was incapable of escaping the regions in which it was discovered. Research conducted by the Lausanne School, primarily made up of French and Italian economists following the mathematical economics of Walras and Pareto, research conducted by the German Historical School of Schmoller, and research conducted by the Austrian School of Wieser and von Böhm-Bawerk slowly diffused across their respective borders, however, very few of these ideas eventually reached a global audience or a universal acclaim during the lifespan of their creators. While each school took a different theoretical stance or focus, the lack of translation and the obscure access to many of the different schools publications posed perhaps the greatest obstacle to the expansion of their ideas. The Marshallian approach, however, possessed advocates in many different countries. In Italy and the United States, for example, the Marshallian principles were elucidated by Maffeo Pantaleoni, and by Frank Taussig, an influential economist in the Harvard School. International conflict and social upheaval during this progressive time also contributed to the fragmentation of cooperation and the international exchange of economic ideas.

Almost at the same time the Marginalist Revolution began, the Franco-Prussian war erupted; marking the culmination of tension between France and the Prussia dominated loosely federated quasi-independent territories in Germany. Otto von Bismarck quickly defeated the French and broke France's supremacy over continental Europe. Bismarck carefully built the external security of the new German state over the next twenty years and worked to isolate France internationally. Growing instability in the Ottoman and

Russian empires and an escalating imperialistic race to colonialize Africa led to growing tensions and conflict between the world powers which ultimately culminated in The Great War. At the same time, Britain had grown in power and at this time controlled over a third of the world's land mass and a quarter of the world's population. As a result, renowned English economists possessed a world wide audience and an undisputed sway over world economic policy. Alfred Marshall's neoclassical economics consequently became widely regarded as the international standard while other economic ideas developed in less stable and politically isolated regions were effectively contained by geo-political tension, social upheaval and war.

Starting in August 1914 and ending with the signing of Armistice on November 11th, 1918, an estimated 8.5 million people were killed and an estimated 21 million people were wounded during the First World War. After the war, David Lloyd George, the leader of Great Britain, argued that they should, "Hang the Kaiser," and that they should, "Make Germany Pay," while Georges Clemenceau, the leader of France, argued, "that Germany should be brought to its knees so that she could never start a war again". Coupled with the punitive measures placed on Germany as stipulated in the Treaty of Versailles, signed on June 28th, 1919, a divisive and isolationist attitude engulfed world politics which ultimately contributed to the international environment that led to the Second World War.¹⁰ In, *On European Civilization and the European Mind*, Paul Valéry describes the effect of the First World War:

One can say that all the fundamentals of the world have been affected by the war, or more exactly, by the circumstances of the war; something deeper has been worn away than the renewable parts of the machine. You know how greatly the general economic situation has been disturbed, and the polity of states, and the very life of the individual; you are familiar with the universal discomfort, hesitation, apprehension. But among all these injured things is the Mind. The Mind has indeed been cruelly wounded; its complaint is heard in the hearts of intellectual man; it passes a mournful judgment on itself. It doubts itself profoundly. (1922)

In an article in the Hearst Newspaper (20 July 1932) titled, "On Modern Uncertainty", Bertrand Russell describes a new era of uncertainty where:

¹⁰ It is estimated that over 62 million people lost their lives as a result of the Second World War.

Men of science like Eddington are doubtful whether science really knows anything. Economists perceive that the accepted methods of doing the world's business are making everybody poor. Statesmen cannot find any way of securing international co-operation or preventing war. Philosophers have no guidance to offer mankind. The only people left with positive opinions are those who are too stupid to know when their opinions are absurd. (p. iv)

Two main political changes rocked the world after the war: a greater number of countries began to adopt more liberal forms of government, and an angered Germany tried to cope with the punishments doled out to them by the Allied Nations. Many citizens were angered that peacemakers had not expressed their ideals fervently enough, and people began to wonder why war was fought at all. A feeling of disillusionment had spread across the world and people began to view their governments as being unable to serve the best interests of the people. The turbulent period after the First World War called for a major readjustment of politics and economic policy; especially in the German state.

In October 1929 the stock market crash in New York heralded the Great Depression. The ensuing U.S. economic collapse caused a ripple effect across the world. World trade contracted, prices fell and governments faced financial crises as the supply of American credit dried up. Many countries responded by erecting trade barriers and tariffs, which only worsened the crisis by further hindering global trade. Internationally, unemployment surged and a growing public frustration with current economic and political policies led to a reevaluation of the current systems of government and economics. In economic science in the nineteen-thirties, growing social discontent with the effect of economic policies and an academic inability to operationalize Marshall's marginal theory, specifically proceeding from an inability to derive an objective measure of utility, led to a general revolt against the Marshallian empire.

Geo-political turmoil also led to the eradication of the Austrian School of Economics. In Austria, after the collapse of the largest bank in 1926, the dissolution of the Austrian parliament in 1930, and with the possibility of civil war and annexation by Germany,

many of the members of the Austrian School of Economics either moved or where eventually exiled to Great Britain and the United States. In nineteen thirty one, both von Mises and Schumpeter left Austria and eventually found their way to the United States, while von Hayek fled to England in 1932 later being appointed by Lord Robbins to head up the London School of Economics. After the international fragmentation of the Austrian economists, Menger's empirical approach and many of the ideas of his followers were patchworked into the prevailing academic movement away from the early marginalists and were synthesized into a new or post-neoclassical approach.

Primarily as a result of the mounting pressure to develop new economic policies to lead the great powers out of the Great Depression, economic theory took a significant turn away from the marginalists attempts to scientifically account for human behavior in economics. A trend away from the often lofty and unsupportable hypothetical propositions concerning the nature of mind resonated in all of the social sciences as discontent emerged from the failure of the utilitarian and neoclassicist based economic policies which were unable to prevent and which were ultimately used to antagonize global recession. Economists as well as psychologists began to limit and restrict the study in their disciplines to strictly observable behavior and evidence, and many of the theoretical propositions of the early marginalists were discarded or outright discredited.

The general removal of psychological interpretations of human behavior in favor of a New-Walrasian mathematical approach, later marked by Debreu's 1956 paper, "Market Equilibrium," led to a divisive academic environment where arguments based on the subtle differences between the disintegrating neoclassical approach and Menger's empirical approach were not welcome. What was desired was a purely quantitative science that relied on fundamentally sound assumptions that were definite and not easily misinterpreted or refuted. While many of the ideas of the Austrians were incorporated into the new post-neoclassical economics, the empirical foundation of the Austrian approach was effectively discarded in favor of a highly formal mathematical approach that abandoned explanations of the causal connection between goods and peoples needs or desires. In the early nineteen-thirties to the late nineteen-forties, it was in this

transforming academic environment that the Austrian economists were integrated into western culture. With the disintegration of the Austrian School of Economics and the diffusion of its academic descendents, the empirical approach eventually dissolved and has since been mostly forgotten; if it was known to begin with.

Post-Neoclassical Economics

The last century of economic thought can be broadly described as the struggle to operationalize, then circumvent, and finally ignore the measurable marginal utility theory and more generally the underlying foundations of the neoclassical approach developed in the late nineteenth century. For most economists, a theory of value is important because value is generally conceived as the cause which determines price levels. Jevons conceived of price as a ratio of exchange, where price is the phenomenal manifestation of the value of a good. Jevons had rejected the classical view that only the costs of production, namely labor, determine value, and argued that value is a magnitude which is determined by the interaction of two objective qualities, namely the cost of production and the degree of utility in the satisfaction of a person's needs. Alfred Marshall refers to this duality in his *Principles* as:

Utility determines the amount that has to be supplied,
The amount that has to be supplied determines cost of production,
Cost of production determines value (p. 674)

Early neoclassical theory proposed that because the two determinants of value were objective (utility and cost in production), then a logical and mathematical analysis of these objective qualities could be used to develop a realistic model of an economy. While an analysis of the connections between income, price and quantity have still remained, a cardinal or objective measure of utility has never been discovered.

In early works, like Pareto's integration of ordinality in, *Manual of Political Economy*, and Sraffa's 1926 critique of the Marshallian theory of the firm, in, "The Laws of Returns under Competitive Conditions," the foundation of the neoclassical approach began to fracture. It was not until the nineteen thirties, however, that overwhelming

pressure was brought on by a public need for new tools to re-evaluate economics that the Marshallian approach was ultimately rejected and widely discredited. A former Marshallian, John Maynard Keynes, led the Cambridge economists and most of the rest of the world against the old Marshallian establishment. In his now famous book, *The General Theory of Employment Interest and Money*, Keynes writes:

Our criticism of the accepted classical theory of economics has consisted not so much in finding logical flaws in its analysis as in pointing out that its tacit assumptions are seldom or never satisfied, with the result that it cannot solve the economic problems of the actual world. (p. 378)

Aided by many economists, including Lord Robbins, Frank Knight, Sir Hicks, and many of the fleeing Austrian economists, the neoclassical economics that developed out of the marginalist revolution came to an end.

The difficulty in ascertaining the nature of and measuring utility led Sir John Hicks to publish his 1934 papers, written with R.G. D. Allen, “A Reconsideration of the Theory of Value” (Part I and Part II), and later, his 1939 book, *Value and Capital: An Inquiry Into Some Fundamental Principles of Economic Theory*; in which he develops an alternate theory of choice that uses an ordinal measure of utility that replaces marginal utility with a marginal rate of substitution. Building on Pareto’s general equilibrium, Sir Hicks demonstrated how a theory of demand could be conceived without using anything but an ordinal utility function. A measure of utility, in ‘utils,’ consequently became unnecessary and was replaced by a rank ordering of preference.

While the Cambridge Marshallians led by Arthur C. Pigou still defended the utilitarian tradition in economics, many others like Lionel Robbins in his 1932 book, *An Essay on the Nature & Significance of Economic Science*, led an assault against cardinal utility arguing the Pigovian defense of “equal capacities for satisfaction”. Robbins argued that social welfare should not be a subject of economic study at all, because if utility is not comparable across individuals, then the choice of social optimum is necessarily a normative concern or a value judgment, which is not within the scope of economic

science. According to Robbins, while economics “is incapable of deciding as between the desirability of different ends. It is fundamentally distinct from Ethics.” (p. 152)

Similar to the abolition of subjectivism in psychology by the Behaviorists, Robbins’ rejection of utility and psychological hedonism as unscientific led him to redefine the scope of economics to similarly include only what could be observed and quantified. Seeking to reduce the prestige of the Marshallians, he advocated that utility and a subjective or psychological theory of value could not play a role in an economic science because it was untenable to scientific interpretation and inquiry:

In recent years, however partly as a result of the influence of Behaviorism, partly as a result of a desire to secure the maximum possible austerity in analytical exposition, there have arisen voices urging that this framework of subjectivity should be discarded. Scientific method is urged, and demands that we should leave out of account anything which is incapable of direct observation. We may take account of demand as it shows itself in observable behaviour in the market. But beyond this we may not go. Valuation is a subjective process. We cannot *observe* valuation. It is therefore out of place in a scientific explanation. Our theoretical constructions must assume observable data (p. 87)

In, *The Nature and Significance of Economic Science*, Lord Robbins redefines the scope of economics to be “the science which studies human behavior as a relationship between scarce means which have alternative uses”. (p. 16) Similar to John Hicks argument for replacing marginal utility with a marginal rate of substitution, Robbins writes that in economic science:

all that is assumed in the scales of valuation is that different goods have different uses and that these different uses have different significances for action, such that in a given situation one use will be preferred before another and one good before another. Why the human animal attaches particular values in this sense to particular things, is a question which we do not discuss. That is quite properly a question for psychologists or perhaps even physiologists. All that we need to assume as economists is the obvious fact that different possibilities offer different incentives, and that these incentives can be arranged in order of their intensity. (p. 85)

Robbins’ rejection of the inclusion of subjective and normative arguments troubled some of his contemporaries. Roy Harrod posed the question in his 1938 essay, “Scope

and Method of Economics,” as to whether Robbins' argument would allow any policy recommendations at all. As long as somebody suffers from a policy measure, Harrod argued, the Pareto-improvement criteria (everyone better off, nobody made worse off) does not apply and thus, by Robbins's argument, economists are not in a position to judge such a measure. There are very few, if any instances, where a policy proposal is clearly Pareto-improving. Harrod proposed an interesting exercise to Robbins: how would one defend policy measures long advocated by economists, such as the repeal of the Corn Laws or free trade: “If the incomparability of utility to different individuals is strictly pressed, not only are the prescriptions of the welfare school ruled out, but all prescriptions whatever. The economist as an advisor is completely stultified” (p. 396). Later in, “Economics and Political Economy,” Lord Robbins replies:

I should not attempt to justify (the repeal of the Corn Laws) in terms of the gain in utility at the expense of the producers. I should not know how to do this without comparisons which, to put it mildly, would be highly conjectural. I should base my vindication on the general utility of the extension of markets and the resulting enlargement of liberty of choice. (p. 196)

Many Paretians were dissatisfied with Robbins conclusions and launched the "New Welfare Economics" movement in the nineteen-thirties. New Welfare Economics accepted the argument that utility is not comparable across people, but nonetheless thought that welfare judgments could be made with appropriate modifications to the concept of Pareto-optimality. While many economists agreed with Lord Robbins that social optimality is a normative issue and that individual utilities are not comparable, many economists representing the new approach disagreed that normative social issues lied outside the purview of economics. Other Economists like Nicholas Kaldor in, “Welfare Propositions in Economics and Interpersonal Comparisons of Utility”, John Hicks in, *Value and Capital*, and Tibor Scitovsky in, “A Note on Welfare Propositions in Economics”, also did not regard social choice as a normative issue.

Relabeled the “Distributists,” proponents of a modern utilitarianism like Ian Little in, “The Foundations of Welfare Economics”, and, *A Critique of Welfare Economics*, led the charge against New Welfare Economics. In, *A Critique of Welfare Economics*, Little

argued that individual utilities are comparable in a scientific manner, and as a result, the choice of a social optimum is a positive issue which economists must analyze. As he writes: “interpersonal comparisons of satisfaction are *empirical* judgments about the real world, and are not, in any normal context, value judgments” (p. 66). Little's basic argument is reiterated by Dennis Robertson in, “A Revolutionist's Handbook”, and in, “Utility and All That”. According to Robertson:

We need not worry so much about “utility and all that” but concentrate instead on things we can empirically see, such as peoples’ reactions to income. We can safely say that a dollar to a poor man means more than a dollar to rich man. This does not rely on “interpersonal comparisons of utility” in a formal sense, but it is plain common sense, i.e. an empirically-validated hypothesis. (p. 39)

Since the Marginalist Revolution and the rejection of the labor theory of value, the progression of economic thought has proceeded to reduce and eliminate, step by step, the relevance and need for utility as both a measure and a conceptual requirement to explain consumer behavior, demand and market equilibrium. No more is this apparent than in the work of the Neo-Walrasian economists, who have sought to recast the Paretian consumer, production and welfare theories into a formal axiomatic model of general equilibrium. Led by Tjalling Koopmans in, “Efficient Allocation of Resources,” and in, *Three Essays on the State of Economic Science*, Kenneth Arrow in, *Social Choice and Individual Values*, and Gérard Debreu in, “The Coefficient of Resource Utilization,” and, “Existence of an Equilibrium for a Competitive Economy,” mathematical economics developed and emerged into a model of human behavior in economics that relies on only a few simple humanistic axioms that are combined with several mathematical assumptions. For example, the separation hyper-plane and fixed point theorems, which are used to establish the first and second welfare theorems, which set the conditions for equilibrium and the conditions under which a utility function can represent the preference ordering of a consumer. Over the past century, most of the original neoclassical analysis and research, exemplified by, “On Wants and Their Satisfaction,” Book III of Alfred Marshall’s, *Principles of Economics*, has slowly been purged from economic theory. A richer interpretation of human behavior was replaced by a narrower subset of behavior

that is characterized by the selective exclusion of controversial and supposedly subjective propositions.

Because of the increasingly restricted view of consumer behavior, the limited inclusion of empirical evidence, the inability to synthesize new empirical observations, and the development of techniques that permit a scientific study of cognitive psychology, many economists have begun to question the efficacy of the rational theory of consumer choice. Herbert Simon and other critics of the neoclassical model argue that information is expensive, incomplete, and unreliable, and consequently that human rationality is limited. He argues that a consumer attempting to optimize their utility can't possibly consider all possible alternatives (likewise comparisons) and choose the best. To counter this view he has proposed a form of conduct called satisficing. Rather than optimizing behavior, satisficers change their rules of conduct only if circumstances change so that the current rules no longer produce satisfactory results. Even then, people do not try to optimize, but search for better rules by trial and error. Because satisficing has received a great deal of attention, there exists a solid mathematical foundation for it and other theories of bounded rationality that can be found summarized in Roy Radner's 1975 article, "Satisficing."

The view that utility is not amenable to measurement has recently been disputed. In Kahneman, Wakker and Sarin's, "Back to Bentham? Explorations of Experienced Utility," they argue that experienced utility is both measurable and empirically distinct from decision utility. Tversky and Kahneman, have been able to show in, "Judgement Under Uncertainty: Heuristics and Biases," and in, "Prospect Theory: An Analysis of Decision Under Risk," certain inconsistencies in the formal axiomatic model of consumer choice, and have demonstrated how people utilizing heuristics and framing techniques "rely on a limited number of heuristic principles which reduce the complex tasks ... to simpler judgmental operations". (p. 1124) The technique of framing, specifically cognitive framing, mental accounting, reference utility, and anchoring were developed to explain other inconsistent behaviors.

While the “subjective” approach requires considerably more empirical research and is much broader in scope than the mathematical models of human behavior currently utilized, it possesses the potential to establish a scientific foundation of human behavior in economics that will enable the empirical treatment and explanation of economic metrics which could be used to expand the scope of economic theory, synthesize the current morass of economic literature into a cogent discipline, develop a realistic theory of the process of choice, resolve the deductive paradox with econometrics, and realistically explain the phenomena that affect people in their ordinary business of life. The story of the empirical approach was one of adversity and tragedy, however, it seems apparent that there is a great potential in its epistemology that may lead to the development of a clearer and more accurate consumer theory that could be used to identify the inconsistencies in the current neoclassical approach, and which could be used to better guide econometric studies and develop a unified theory; or at least a broader more inclusive economic science

II. A Summary of Human Behavior in Economics

Human Behavior in Economics

The thesis of this discussion is directed towards investigating the existence of a foundation upon which to develop a realistic treatment and explanation of human behavior in economics. Throughout this discussion, a large number of anomalous behaviors have been identified which cannot be explained using the current post-neoclassical theory and models. Many of these anomalous behaviors have been discovered using empirical techniques and studies that develop conclusions based on actual observed behavior, rather than the technique of arguing the internal logical consistency of particular assumptions within a formal hypothetical framework. Despite the elegance and reasonableness of the hypothetical mathematical approach, the true test of a scientific model’s efficacy must be based upon its relevance to the phenomena it describes, and through the accurate comparison of its foundations and predictions with the true catalytics, processes and phenomena observed in reality.

As described in the preceding discourse, the highly stylized models of the post-neoclassical theory are based on inaccurate assumptions and from their inception, these models admittedly are incapable of accurately addressing human behavior; given that these models rely extensively upon the *ceteris paribus* assumption, meaning that relevant variables are initially systematically excluded or variables that may either contradict or affect the model in some unknown fashion are ignored. One of the main focuses of this discussion was to address these issues without arguing the internal logic of the modern neoclassical approach, as this approach has failed to resolve many of the core issues regarding motivation, discrimination and the general process of choice that seemingly must be understood to advance and unify the disparate subjects currently studied in economic science. Because behavioral economists, those economists utilizing demonstrable experimental evidence, have been able to demonstrate many inconsistencies in modern economic theory, it was hoped that by researching and using a similar methodology, and by incorporating more information and more observations to broaden the scope of discussion, that it would be possible to realistically address human behavior in economics and that this approach would reveal a way forward in the science.

Since the nineteen-thirties, psychological aspects of human behavior have been systematically rejected in economic discussion. Because human behavior transcends into all economic activity, a realistic or cogent theory of human behavior is needed to develop the science, and consequently a realistic theory of human behavior requires an analysis of all relevant aspects of this behavior to include physiological and psychological explanations of the root causes of motivation, discrimination and the process of choice. In Chapter Two, the historical reason why human behavior is not more extensively addressed in economics is explained. While there have been many contributing factors that have led to the exclusion of using human behavior to explain economic principles, this mode of analysis was principally eliminated from scholarly study in the nineteen-thirties as a result of an inability to accurately develop a coherent model of human behavior. In effect, economists, tired of centuries of fruitless debate, began to search for other means and methods to address economic behavior. As a result, many of the early

psychological assumptions were removed in favor of specific theories and models that relate the logical consistency faced by a consumer in particular situations and under different conditions.

Using the rational theory of consumer choice, the logical consistency within certainly defined scenarios can be explored, and questions in regards to how much a person will choose if they have higher or lower income or if they face higher or lower prices are addressed. The principal failure of this approach has derived from a failure to explain the causal connection between goods and the reason why any particular good is chosen. Generally, the rational theory of consumer choice is incapable of explaining a broad range of economic behavior; specifically, because it excludes discussion of human behavior. The restricted incorporation and explanation of human behavior in terms of a few behavioral axioms, establishes the foundation of a hypothetical syllogistic model that neither needs experimental evidence to prove its logical consistency nor requires or is capable of integrating experimental evidence without modifying the model. The only way to judge the effectiveness of this type of model is through the models capability to accurately explain and predict reality, and admittedly, models based on the rational theory of consumer choice are incapable of accurately addressing a broad range of human economic behavior. Regardless of the elegance of these highly stylized models, and their often clear but allegorical assertions, the work that is required to accurately understand and explain economic behavior can only be discovered by integrating more observations of behavior; not less. Only through an inductive empirical approach, where behavior is analyzed and tested experimentally, will economists be able to develop a detailed and demonstrable understanding of the causal forces in human behavior that manifest choice. There already exists a considerable amount of scientific research, both in and outside of economics, which can be used to develop a scientific foundation of human behavior in economics.

The two main arguments for rejecting the discussion of human behavior in economics, popularized in the nineteen-thirties, involved firstly identifying human behavior as a non-economic concern, supposing that human behavior should only be studied in sociology

and psychology, and secondly, that the inherent nature of human behavior precludes generalization. In regards to the first reason, the unavoidable fact that economics at its most basic level discusses the nature of and the interaction between consumers and producers, requires that the censorship or suppression of the subject of human behavior in economics will retard the development of the science. Generally, psychological assumptions are made in economic theory; however, these assumptions are rarely stated and are generally only tacitly assumed. The un-scientific treatment of these subconscious psychological assumptions that guide economic research and economic interpretation, invariably escape calculated examination and potentially lead to the misapplication and misunderstanding of the relevance and applicability of the numerous parameter based hypothetical propositions and models in economics.

While in the nineteen-thirties much of the early behavioral research was suppressed, and the definition of economics was re-defined by Lord Robbins to include only the study of how scarce resources are or should be allocated, a detailed understanding of value, motivation, preference, demand, choice and exchange are all behavioral characteristics that must be understood in order to develop a science that attempts to realistically address economic phenomena. While the argument to exclude behavioral data and analysis from economics is largely based upon the assumption that value judgments and other subjective concerns should not be the focus of economic inquiry, the primary motivation for abandoning the study of behavior in economics derives primarily from the geopolitical and social concerns that developed at the beginning of the twentieth century. This trend away from Utilitarianism resulted from the rejection of the conditional economic policies that led to the First World War, the Marshallian based policies that exasperated the Great Depression, the increased development and intellectual support for socialist or communist economic policies, and more generally from a failure to develop a realistic theory and model of human economic behavior based on utility and utility maximization. These factors played a significant role in the support for and motivation to develop a post-neoclassical economic theory.

Similarly, the second objection that human behavior is subjective and not amendable to generalization can now generally be regarded as incorrect. Since the marginalist revolution, the new science of economics was devised to concentrate on developing the theoretical foundations of a science of human behavior. In the late nineteenth century, economists sought to explain the general qualities of human behavior, and sought to explain how these qualities form the foundation of a unified economic understanding. Jevons, Menger, Walras, Pareto, and later Marshall, all developed a theory of human behavior upon which they developed their economic theories and models. The notion that human behavior is not amendable to generalization derived mainly from a failure to discover a measure of utility, and it is generally this rejection of utility that took place in the nineteen-thirties that marks the transformation away from the economics of the early marginalists. Rather than studying the nature of the economic phenomena, a general theory of economic behavior and consequently a scientific foundation of economics was abandoned. Today, the argument that it is not possible to develop accurate and useful generalizations of human behavior is demonstrably false.

With the development of cognitive psychology and advancements in general psychology, medical research, physiology, and a detailed understanding of the relationship between particular physiological systems and motivation, preference, choice and personality, many of the questions that could not be adequately addressed approximately a century ago can now be scientifically demonstrated and incorporated into economic science to realistically model the process of choice and to develop a realistic theory and model human economic behavior. It is now possible to objectively quantify behavioral phenomena and incorporate this understanding into economic theory. While human behavior is complex and choices and preferences are not necessarily identical between individuals, the physiological and environmental systems and forces that work together to manifest preference and choice can now be identified and studied. As I. M. D. Little argues in, *A Critique of Welfare Economics*, “interpersonal comparisons of satisfaction are *empirical* judgments about the real world, and are not, in any normal context, value judgments”. (p. 66)

Emphasizing consistency rather than an improved analysis of the core variables of human behavior, many of the arguments and terminology used by the neoclassicists was redefined in terms of a logical and mathematical framework. Perhaps the most unfortunate transformation was the adjustment of rationality to mean only logical consistency. Rather than relating the purposeful and reasoned nature of behavior in the rational theory of consumer choice, rational behavior refers only to the transitivity in peoples' decisions. In, "Rational Expectations and Macroeconomics in 1984," Robert Barro comments on the clever interpretation of rationality used in post-neoclassical economics:

One of the cleverest features of the rational expectations revolution was the application of the term 'rational'. Thereby, the opponents of this approach were forced into the defensive position of either being irrational or of modeling others as irrational, neither of which are comfortable positions for an economist (p. 179)

The argument that people can be either irrational or rational has contributed to the inability to develop a realistic theory. As discussed in Chapter Three, the suggestion that people act rationally involves more than an argument involving the consistency between choices. In post-neoclassical economics, behavior that is inconsistent with particular economic hypotheses is often considered irrational, when in fact, it is not that the behavior is inconsistent; it is rather that these models fail to adequately explain and predict the outcome of particular behavioral phenomena. As von Mises has suggested in, *Epistemological Problems in Economics*, it is not that peoples' choices are rational or irrational, consistent or inconsistent, it is rather that peoples' behavior and actions are always purposeful; there being always a rationale directing action. The failure to distinguish the difference between these two concepts of rationality has led to many inaccuracies and to a science based on syllogistic models that reject and judge particular behaviors rather than a science that rejects those hypotheses that are incapable of accurately explaining or predicting human behavior.

Because of the reliance on syllogistic reasoning rather than scientific inquiry, in Chapter Four, an attempt has been made to empirically re-address the basic characteristics and basic properties generally known today concerning the mechanical

nature of human behavior. While many people may reject the mechanical or empirical nature of this discussion, the volumes of medical and psychological research conducted on the nature of human behavior demonstrates that human beings are biological machines that are constituted by a multitude of internal causal systems that are affected by a multiplicity of causal external forces. Given this causal environment, all existing phenomena must be interconnected and it is in this chapter that the physiological foundation of understanding, motivation and the basis for discrimination are hypothesized. Neither the neoclassical, nor the post-neoclassical theory of consumer behavior attempt to address the derivation of motivation and discrimination here hypothesized to derive causally from differing desires and differing physiological needs that are guided by the body's ideas and genetic programming.

While there are many important human characteristics that are not addressed in modern economics, there also exist a number of important human characteristics that are misspecified or inaccurately depicted in modern economics. In Chapter Five, Jevons' theory of value based on scarcity and 'utility' is demonstrated to both improperly explain how people value and choose goods and inadequately resolve Adam Smith's water and diamond paradox. According to the neoclassical theory derived from Jevons', *The Theory of Political Economy*, Smith's supposed value-paradox is resolved by taking into account the relative scarcity of a good in relation to its demand. According to Jevons, value in use is equivalent to the total utility derived from a good, which is equal to the sum of the final utility derived from each successive unit of a similar goods consumed. Exchange value, or price, is equivalent to the final degree of utility, which is represented as the ratio of the quantities in which different goods are exchanged. Water has no price because all desire for water is satisfied and consequently the final degree of utility for water is zero. Because diamonds are scarce, a limited number of diamonds cannot be used to satisfy the total demand for diamonds and consequently the final degree of utility from consuming a diamond is much higher. Based on this logic, increased scarcity, relative to demand, leads to a higher price or exchange value, while an increased ability to use a good, whether cheaply obtainable through relative abundance, leads to a higher use value or total utility.

In Jevons' approach to resolving Smith's paradox, he redefines the nature of value in terms of the quantity of a good consumed relative to its demand. The total value of a mass of a good is consequently equivalent to its exchange price multiplied by its quantity. Alternatively, Smith's original discussion of use and exchange value revolves around his attempt to explain his labor theory of value and the real and nominal price of things:

The real price of every thing, what every thing really costs to the man who wants to acquire it, is the toil and trouble of acquiring it. What every thing is really worth to the man who has acquired it, and who wants to dispose of it or exchange it for something else, is the toil and trouble which it can save to himself, and which it can impose upon other people. (p. 33)

According to Smith, "Labor, therefore, it appears evidently, is the only universal, as well as the only accurate measure of value, or the only standard by which we can compare the values of different commodities at all times and at all places." (p. 41)

The difficulty in Jevons' approach derives from his reliance on utility, whereby he means the desire or demand for more of a good. Where Smith attributes the toil and trouble of labor as the psychological root of value, Jevons attributes utility, or the desire for more, as the psychological root of value. Jevons, however, never explains the characteristics of how this desire manifests, other than to suggest disjointedly that consuming more leads to a greater total utility, if only marginally. What is completely ignored in both theories (the labor theory of value and the marginal utility theory) is the causal connection between the intrinsic usefulness of the physical properties of a good and how these properties are understood and can be commanded to satisfy 'desire'.

Neither theory argues with the idea that people demand goods because they satisfy a person's needs or desires, however, neither theory explains how this desire relates to the pursuit and interests of people and why they choose to acquire a particular thing. According to Adam Smith, people value goods based on the cost of production, and Jevons argues that people value goods based on the relative supply in relation to demand. Why people desire things is not dependent upon their cost in production, nor their relative

availability. Why people desire things is dependent upon a person's understanding of how a particular thing can be used to improve a person's wellbeing. Because people desire things that they understand improve their wellbeing, they will value more those things that can better be used to improve their wellbeing. If there was no cost in production and all goods were freely abundant, how would a person discriminate in their choice, and what goods would a person value over others? As constraints to obtaining this value are imposed, whether through the cost of production, or through relative scarcity, the capability to obtain the true value of a good is limited, and a person must negotiate between these constraints to best obtain this true value; the properties of things that can be used to improve wellbeing.

Both the labor theory of value and the marginal utility theory inaccurately or incompletely address the motivation to acquire and the subsequent process whereby useful things are valued. The value of any good, as Carl Menger has argued in, *Principles of Economics*, is dependent on the causal connection between the physical properties of a thing and how a useful thing is understood and can be commanded to lead to a person's wellbeing. The value in use is consequently the degree to which a good can be used to lead to an improvement in wellbeing, and consequently is dependent upon the corresponding momentary degree of desire for a particular thing. Exchange value, on the other hand, is not so much a measure of value, but a measure of the relative cost to produce and acquire particular things. The perverse, or inverse, idea that a cost should relate to value derives primarily from the perspective of the producer or the seller, as they compare what 'value' (the physical properties of things that can be used to improve welfare) can be exchanged for with their produce. Exchange consequently revolves around the interaction between an understanding of and demand for value and the constraints in acquiring value. In an exchange market, only those useful things that best deliver value relative to their cost will be exchanged. The opportunity cost of acquiring relatively less useful things at a higher relative cost will eliminate the marketability of potentially useful things.

In Chapter Six and Chapter Seven, the basic assumptions and parameters that define consumer choice under relative certainty and uncertainty are examined. In many cases, by simply defining empirically the most basic economic properties and by introducing the physiological and psychological lessons learned in the previous chapters, the causal connections between many economic assumptions and arguments can be identified and can be used to demonstrate how most of the basic economic assumptions currently used in modern neoclassical and post-neoclassical economics inaccurately model human economic behavior. Many of the initial assumptions used in the rational theory of consumer choice can be demonstrated to be flawed, including the axiom of transitivity, the axiom of non-satiation, and rationality. While the rational theory of choice and welfare economics establish a logical structure upon which to model economic behavior, these theories and models are: incapable of integrating new observations, unable to fully explain why people consume, unable to explain why people discriminate, unable to explain utility, unable to explain how desires regenerate, unable to explain anomalous behavior, and generally are unable to interpret, integrate, or explain any behavioral characteristics that are not specifically modeled into the syllogistic paradigm.

Choice and action as discussed in this thesis are primarily dependent upon the quality of a person's understanding of reality. As this understanding evolves, people are able to identify usefulness in things that previously were not perceived to have value. Solow and Romer's growth theories based on the development of human capital and technological expansion parallel how people, societies and nations increase their wellbeing by developing an improved understanding and capability to more efficiently satisfy their desires and improve their general wellbeing. Similar also to the development of an economic science, what is required is a greater understanding of the actual phenomena that are involved to improve understanding, rather than protecting inquiry by forming an insulated syllogistic paradigm. Growth in economics like growth in an economy requires a mastery of nature, which develops from a greater understanding of reality.

Human Behavior

Why I do something, why I choose this over that, why I choose anything at all, what motivates me, how does it affect me, why does it affect me, how much does it affects me, how much do I want it, why do I want it, how do I use it, how do I understand it, how do I understand, why do I understand, how do we interpret and understand these things and what are they and what do they mean to me? There are many questions that must be resolved in order to develop a realistic model of human behavior in economics. In Herbert Simon's Richard T. Ely Lecture, "Rationality as Process and as Product of Thought," he makes three suggestions that address a proper starting point to develop a realistic theory of consumer behavior. First, he suggests that "all human behavior has a large rational component, but only in terms of the broader everyday sense of rationality, not the economists' more specialized sense of maximization." Second, he recommends that using a stronger, not a weaker, definition of rationality would improve upon economic theory and analysis. Lastly, he advocates the study of choice processes rather than static scenarios:

economics has largely been preoccupied with the results of rational choice rather than the process of choice. Yet as economic analysis acquires a broader concern with the dynamics of choice under uncertainty, it will become more and more essential to consider choice processes. (p. 2)

Each of these suggestions has in common a methodological transition from a syllogistic to an empirical epistemology. Herbert Simon does not just advocate the redefinition of rationality, he, and many others, advocate an epistemological transformation in the how economics phenomena should be studied. The causes and connections between the phenomena that effectuate choice must be understood and the best way to do this, as has been discovered hundreds of years ago, is to concentrate on expanding the scope of observed experience and to continually experimentally develop and test the science's most basic assumptions. In this discourse, many of the most basic assumptions in modern economics have been discussed and many of them have been shown to inaccurately model reality. While it is quite likely that many of the ideas presented in this discourse may not be completely accurate, the ideas in this discourse are based on observations that can be demonstrated to be accurate or be rejected by experimental

testing, whereas, many of the assumptions and arguments in the neoclassical and post-neoclassical models are syllogistic hypotheses that can only be tested in relation to the accuracy of the models predictions. If the predictions are wrong, the only course of action to fix these models is through modifying their initial assumptions or by expanding the internal logical consistency in their arguments. The empirical approach, alternatively, establishes a scientific foundation upon which to develop an inquiry based on observable evidence derived from actual investigations of human economic behavior that can be tested at any level; this is because each assertion in the empirical model is derived from observable phenomena.

In modern economics, human beings are generally considered to be rational, however, this rationality means only that a person is consistent in their decision making, rather than relating the purposeful or reasoned nature of human choice and action. In chapter three, rationality is determined to be momentary and causal, referring to the use of and awareness of rationales. A person's understanding is hypothesized to be constituted from a large number of rationales that derive from the cause and effect relationships a person observes or experiences in reality. This remembered understanding forms the basic collection or repository of ideas that a person draws from to guide decisions directed towards their interests. Because action is purposeful and based upon the same logical consistency in reality that all people generally observe, there exists a significant degree of commonality in how different people will generally respond to similar desires. Combined with autonomous physiological responses, and the physiological manifestation of need or desire in terms of feelings and emotions, value is derived as a consequence of the identification that particular things are useful in satisfying these human feelings, and consequently through the combination of a person's understanding and their feelings, a person chooses and acts purposefully to improve their wellbeing by satisfying their internal desires or physiological needs.

A person's senses or specifically a person's ability to detect the bodies chemistry and external phenomena are translated through a person's understanding. This understanding manifests into preferences for particular things and courses of action.

Based on a preference for the state of being identified to result from utilizing particular means or taking or not taking a particular action, a person is motivated to acquire or act in such a way that their preferred state of being can be realized. This preference for one thing, or one action, over another, forms the basis for discrimination in choice. Choice, as a cognitive function, is consequently motivated by an attempt to effect the conditions that lead to previously experienced states of being. Choosing to eat food, for example, is motivated causally by a desire to move from the state of hunger to a state of fullness; which is a preferred state of being. How a person understands the conditions that must be met to achieve particular states of being, and how they understand the tools, actions and general means of achieving them will ultimately determine what a person will value, and consequently will determine what choices they will make.

All behavior, other than autonomous or involuntary response, is rational, in that it is the product of a choice that is conceived from a rationale, or an understanding of consequence. What a person understands effects how they plan to effect particular courses of action and determines why a person acts in a particular way. Laziness or altruism, are often thought to be irrational behaviors. These behaviors are rational in that they reflect a person's perceived best interest in their pursuit of maximizing their wellbeing. Obviously, those who do not understand how reduced effort or giving unconditionally to others leads to a positive outcome will not engage in these courses of action. Gary Becker has expressed in his Nobel Lecture, "The Economic Way of Looking at Behavior," that there has been a concerted effort to, "pry economists away from narrow assumptions about self-interest." (p. 384) According to Becker, behavior is driven by a much richer set of values and preferences where, "individuals maximize welfare as they conceive it, whether they be selfish, altruistic, loyal, spiteful, or masochistic." (p. 385)

Because people are purposeful in their conduct, their choices and actions are limited temporally to what can be interpreted and considered in momentary situations. Whether many moments are used to formulate one or many possible courses of action, decisions

are ultimately momentary and consequently affected by momentary considerations and momentary desires. A person's current state of being, capabilities, environment, understanding and opportunity will affect what a person will choose and define the limitations of choice. In the modern consumer theory, consumers are thought to be able to make all crosswise binary comparisons between all goods and determine what goods they prefer. This assumption is apparently false, as a person can be demonstrated to be guided by their momentary desires and limited in their choice of action by their current understanding and ability to command the cause and effect conditions that lead to the satisfaction of their desires.

The motivation for choice is hypothesized to derive individually from the relative magnitude of a person's many mutually exclusive desires, and the discrimination between particular choices is hypothesized to derive from the perceived differences in the degree and duration of dissatisfaction that will be satisfied. The preferred choice is the one with the lowest opportunity cost that leads to the most dissatisfaction being reduced. Desire is consequently the motivator of choice and economic usefulness in satisfaction of current desire is the measure of discrimination. Because a person possesses many mutually exclusive desires that fluctuate, growing stronger as time passes, or becoming satiated through action, a person requires many different useful things to satisfy their many desires. Just because a thing possesses particular properties that may be used to satisfy particular needs or desires, does not guarantee that the thing will be valued or chosen. A person must have a desire that can be satisfied by a thing or action before they are motivated or interested in acting. Additionally, those things that are more economical (more effective at a lower cost), will reduce the marketability of useful things that are, per unit of cost, relatively less effective.

Rather than maximizing utility, people attempt to maximize their wellbeing, which is equivalent to minimizing their dissatisfaction over time. Interestingly, because people maximize wellbeing over time, the longer the period in consideration, the greater will be the expected dissatisfaction that will result from not satisfying particular desires. The total dissatisfaction felt in any one moment is equivalent to the sum of all current

unsatisfied desires, and each of these mutually exclusive desires are chosen to be satisfied in priority relative to the expected total dissatisfaction expected to occur over a period of time if the desire is not currently satisfied. In this way, of the two desires that in a moment dissatisfy a person equally, the desire that will be satisfied first will be the desire that grows more quickly in dissatisfaction over time. Choice and action consequently revolve around the temporal satisfaction of as many desires as possible, as the benefit over time of satisfying desires sooner than later leads to increased wellbeing as the same dissatisfaction, or unsatisfied desire, is not felt in each consecutive moment. Because choices are based on temporal considerations, there is a greater benefit in completely satisfying a particular desire than attempting to satisfy many different desires incompletely where the marginal 'utility', or more accurately, the marginal satisfaction, from the consumption of each unit of a good is equal. Because of the additional cost in effort and time from switching between different means to satisfy different desires, desires should tend to be completely satisfied, and this tendency should become more prevalent as the cost of transition, or opportunity cost, is higher.

Choice and action derive from the pursuit of a person's perceived best interest in the moment, as people seek to maximize their wellbeing temporally. Things that are understood to be useful and can be commanded in the satisfaction of desire have value and are considered goods. A thing that is not useful in directly or indirectly satisfying a desire does not possess value and is not considered a good. This can result from a lack of understanding how to use a thing, can result once a desire is satisfied, can develop from an inability to command a good, or can result from a change in technology. A person consequently may not know how to operate a computer, may no longer desire food once full, may no longer be able to ride a motorcycle losing their legs in war, or higher order goods that are used in one form of production may become obsolete as the method of production changes. Goods like desires are relatively mutually exclusive. Unlike desires, a good may be useful in satisfying different desires. For example, a knife may be used as a weapon, as an eating utensil, as a crampon, used to tell time and direction and may be useful in satisfying many desires. Some things, however, may be perceived to possess value, but may not lead to satisfaction. Value while based on reality is subject to

a person's understanding of usefulness. An inaccurate or incomplete understanding of reality may lead to a failure to identify value and may lead to the consumption of bogus goods, which are later discovered to not satisfy desire.

In order for a person to form an expectation, they must understand to a degree the causal relationships between particular phenomena. In simple games, they must understand the possibilities and possess an understanding of likelihood. True uncertainty in a person's understanding refers to phenomena not experienced or understood. People are not able to take into consideration what they do not know, and are unable to intuit probabilities as there is no understanding upon which to expect or interpret particular outcomes or what outcomes are possible. Rationales contain an understanding of cause and effect, but when particular connections are less understood or are more abstract, the understood probabilities of occurrence are determined by the a person's experience of outcome. Because reality must be experienced to be understood, an understanding of the causal connection between things derives from the consistency in occurrence observed and consequently all expectations contain a degree of risk.

People will tend to favor less risky choices, because these choices are expected to lead to a higher degree of satisfaction because the potential outcome is not diminished by the probability that the course of action will not lead to satisfaction. Between a risky choice and a relatively certain choice with the same potential outcome, the certain choice will always be preferred. Because understanding plays such an important role in what a person chooses, how a person understands a particular situation will determine what choice a person will make. In experiments with simple games, the respondent is generally assumed to make a decision based only on the probabilities in the game. They are usually not asked what they think the probabilities are in a simple game. When people choose differently than how they are hypothesized to act, they are assumed to have acted irrationally or acted mistakenly. As discussed in chapter six, sometimes interpreting what the true probabilities are, even in simple games is not always simple or easy.

Because people base their decisions on how particular phenomena and particular courses of action affect their wellbeing, a simple game and the logic inherent in the game are interpreted in relation to the interests of the respondent. A person's momentary understanding and desires will determine how they respond. A person interested in other activities other than thinking about the game may quickly and arbitrarily answer which of several lotteries they would prefer, so as to reduce the amount of time they would otherwise waste considering the choice. Other respondents may empathically choose a particular outcome, but may interpret more into the simple game and may rely on guiding rules that they have experienced work well to derive a positive outcome from uncertain situations. In these simple games, how a person understands the choices in relation to their interests determines how they will frame their decision and what choice they will make. While a game provides a basic probability scheme, how this scheme is interpreted determines the basis for choice. For example, Paul Samuelson's bet against his friend, where if a coin lands on heads his friend wins \$200 and if it lands on tails he loses \$100. Samuelson's friend rejects the bet, which violates the expectations hypothesis; however, his friend is interpreting more information into the game than is simply represented by the probabilities. In the short term, Samuelson's friend faces the possibility of being worse off than they currently are which is not articulated in the expectation equation. Repeatedly playing the game would reduce this potential problem. By incorporating the opportunity cost of both possible outcomes into the expectation, it can be shown that in the short run the simple game is expected to not be in the interest of a person who makes only one gamble, but over time, the expected return will be equal to zero.

Many economic experiments suffer from a similar problem of not taking into account patterns that affects what a person chooses. People draw from their understanding and integrate their desires with the probabilities in simple games when they decide which choice they will make. People reveal what they prefer when they choose, however, this does not mean that people are transitive in their decision-making. Rather, this only means that people relate means to ends and choose courses of action or useful things because they are perceived to best lead to the maximization of a person's wellbeing. People reveal their preferences when they choose, however, because there is not a

realistic framework or model to explain the process of choice, peoples' choice are often confused by economists and some behaviors are categorized inaccurately. The empirical approach discussed in this discourse can alleviate many of these problems.

Whether through explaining rationality, understanding, motivation, discrimination, value, the mutually exclusive nature of desires and goods, how choices are momentary considerations of temporal considerations, how desires can be satisfied, how numerous economic assumptions are inaccurate, the nature of certain and uncertain decisions, or explaining how improved understanding leads to economic growth, the empirical approach, while only briefly examined in this discourse, can be utilized to effectively guide future economic research and experimentally test future hypotheses of human behavior in economics. It seems relatively certain that there will be a great benefit from developing a more experimental and empirical study of economic behavior, rather than concentrating on the development of syllogistic models. A reliance on mathematical manipulation has done little to expand and develop a realistic unifying theory, primarily because it is not focused on identifying observable evidence and integrating this evidence into a coherent theory. While economics is largely considered to be the study of how scarce resources are or should be allocated, economics is exceedingly more vibrant and psychological than is currently accepted. Given the importance of human behavior and the psychological and physiological underpinnings of the foundations of consumer theory, it seems practical to reintroduce Alfred Marshall's definition of economics:

Economics is a study of mankind in the ordinary business of life; it examines that part of individual and social action which is most closely connected with the attainment and with the use of the material requisites of wellbeing. (p. 1)

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