INTRODUCTION

The notion that people are rational decision makers has become an important part of the reasoning used for explaining the behavior of individuals in a wide variety of contexts. Early proponents of the use of rationality in understanding economic behavior, most prominently Adam Smith, posited that individuals (and organizations) would find it optimal to make decisions that would be in their self-interest and that acting in such a way would also lead to the optimal allocation of scarce resources within society. As noted by the contemporary economist Herbert Simon, “traditional economic theory postulates an ‘economic man,’ who, in the course of being ‘economic’ is also ‘rational’” in his behavior (1955, p. 99). The conventional definition of rational behavior usually holds that individuals have a well-defined set of preferences, and when faced with a set of choices, they will choose the option that maximizes their satisfaction (or utility). A utilitarian-based definition is offered by Rabin (1998) who states:

“Economics has conventionally assumed that each individual has stable and coherent preferences, and that she maximizes those preferences. Given a set of options and probabilistic beliefs, a person is assumed to maximize the expected value of a utility function . . .” (p. 11)

We would like to thank John Smart, for his assistance in the preparation of this manuscript. Any errors or omissions are, however, our responsibility.

This type of restrictive view of what rational behavior means has been repeated most frequently in classrooms across the nation, and naturally such descriptions have invited criticisms from both within and outside of economics regarding the appropriateness of assuming that individuals act in a rational manner. The debate within economics is summarized by Monaghan (2003) who notes that significant numbers of individuals donate their time and money to charities, help others, give gifts to each other, and act in other ways that appear to violate the notion that individuals are purely self-interested. Also, Rabin (1998) reviewed a large number of studies from psychology, economics, and other fields demonstrating how, under some circumstances, individuals have changing preferences, make errors in judgments, do not pursue their own self-interest, and process information in ways that are not accounted for in typical economic models. More fundamentally, some have criticized the concept of “rational man” on the grounds that individuals do not actually make such formal calculations before acting. They note that rarely has an individual been observed optimizing a specific objective function when deciding what to buy in their local grocery store. Taken together, the argument is that the individual decision-making process is anything but rational, and cannot be adequately described by an economic model of individual behavior.

As applied to education, the concept of rational behavior has often been used as the organizing framework in a myriad of studies. Perhaps the main area where rationality has been used to examine an education issue is with regard to how students make decisions about their education. A considerable body of literature exists on how students determine how much education to acquire (Mincer, 1974; Cohn and Geske, 1990; Becker, 1993; Cohen and Hughes, 1994; Butlin, 1999; Monks, 2000), and for those opting for a postsecondary education, where to attend college (Jackson and Weathersby, 1975; Chapman, 1981; Jackson, 1978, 1982; Manski and Wise, 1983; Hossler and Gallagher, 1987; Leslie and Brinkman, 1987, Young and Reyes, 1987; Hearn, 1988; Paulsen, 1990; DesJardins, Dundar, and Hendel, 1999; Perna, 2000; Toutkoushian, 2001; DesJardins, Ahlburg, and McCall, forthcoming), and once enrolled in college whether to continue to completion or drop out (Spady, 1971; Tinto, 1975; Price, 1977; Bean, 1983; Manski, 1989; Cabrera, Nora, and Castaneda, 1993; DesJardins, Ahlburg, and McCall, 1999; Braxton, 2000).

Those who have conducted such studies typically rely on models of the investment in human capital and the rationality of students to describe how students make these decisions. In a nutshell, the model
posits that students will weigh the expected costs and benefits of pursuing a college education and then choose to go to college if the utility of expected benefits outweighs the expected costs (Schultz, 1961; Becker, 1993; Cohn and Geske, 1990; Cohen and Huches, 1994). Likewise, when selecting a postsecondary institution, the theory posits that students will calculate the expected costs and benefits from each institution under consideration and then choose to enroll in the institution with the highest utility of net expected benefits. These models are used to help explain student choices and yield predictions of how students respond to changes in demand- and supply-related factors such as tuition, financial aid, family income, and opportunity costs. Research into student departure and retention has also been based on the expected benefits model. Although not often cited, Tinto’s seminal research on student retention and departure also assumed that students were rational calculators, he notes, “a person will tend to withdraw from college when he perceives that an alternative form of investment of time, energies, and resources will yield greater benefits, relative to costs, over time than will staying in college” (1975, pp. 97–98).

As economic reasoning has increasingly found its way into the literature on student choice, criticisms have been raised regarding whether it is correct to posit that students act in a rational manner. One reason for this criticism relates to how people use the term “rationality.” Definitions used by some individuals are often not consistent with the definition typically used by social scientists. As one observer has noted, rationality, as it is used “in ordinary language, often means something entirely different from what we [social scientists] have in mind” (Shepsle and Bonchek, 1997, p. 15).

To illustrate, consider the following example: A young woman decides to attend the local community college even though she has also been admitted to Harvard. Based solely on observing her action (her “choice”), some observers might say, “She is behaving quite irrationally.” However, as used by social scientists, rationality does not mean that this woman should act in accordance with the wishes of others, or that she be so well informed as to anticipate all of the consequences of her actions. In their study of student choice, Hearn and Longanecker (1985) assert that “[s]erious questions can be raised about the model’s underlying conception from classical economics of the ‘rational man’” (p. 494).

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We certainly do not want to characterize any deviation from omniscient, godlike behavior as irrational, for then nearly all behavior would fall into this category” (Shepsle and Bonchek, 1997, p. 16).
Olson and Rosenfeld (1984) investigated the role that information has on obtaining access to student financial aid and noted that one of the factors that may limit college opportunity is “[i]f parents do not have the perfect knowledge typically attributed to the ideally rational customer” (p. 476). Hossler, Schmit, and Vesper (1999) state, “students going through a [college choice] process for the first, and possibly only, time must have experience and knowledge of seasoned observers . . . in order to effectively apply decision-making theory” (p. 153). The implication here is that for students to act in a rational manner, they must have perfect information about many facets of their college choice, such as the net price of and return on education. In practice, this is rarely the case due to the complexities with which institutions set financial aid policies and make offers to students, and the timing at which this information is revealed to potential students. However, a more fundamental question was raised by Jackson (1978) and Hearn and Longanecker (1985), when they argued that (for several reasons), students “. . . reactions to various prices and subsidies may not always be economically rational in the classic sense” (p. 496). In short, they observe that students may react differently to the type of financial aid offered by an institution, even if each form of aid resulted in the same reduction in net tuition.

In this chapter we seek to provide a better understanding of the concept of rational behavior and what it implies about student choice. In doing so, we begin by examining the historical development of the concept of rationality and rational behavior. While the phrase “rational behavior” is usually associated with the field of economics, its origins can actually be traced back over 2,000 years to the early days of Greek philosophy. History shows that philosophers intended rationality to be a very general concept. A rational individual was one who could take what they know and use reason to understand the world. This is in contrast to the restrictive view of some who believe rational agents need to have perfect information, or that rational individuals all use information in the same way, or that given the same information individuals will always make the same choices.

We then review the role of rationality in the conceptual models used by economists (especially the theory of rational choice), and highlight some of the common misconceptions that exist regarding rational behavior. We address some of the strengths and weaknesses of these models and discuss what can and cannot be inferred about individual behavior based on observation. We argue that examples of (purported) irrational behavior of students provided by observers may actually be
consistent with rational behavior. Whether behavior is rational, however, is based on the subjective valuations of schooling options of students, and these valuations are unobservable and can vary greatly among students, therefore little can be said about the rationality (or not) of their postsecondary choices. Furthermore, the notion of rationality is in fact much more general than may be implied by descriptions offered by Rabin (1998) and others. For example, rationality does not require decision makers to have perfect information, but rather that they try to make decisions given the information at their disposal. Through an explanation of the historical development of rationality, and what rationality does and does not say about student choice, we hope to enrich the literature on this topic and inform educators on how to apply rational choice theory to understand student decision making.

THE DEVELOPMENT OF THE CONCEPT OF RATIONALITY

The concept of reasoned or rational thought has its roots in ancient Greek philosophy and the development of rationality continues to this day. The literature in this area is voluminous, and an entire book could easily be devoted to its development. The best way to understand the concept of rationality is not to look for a definition in the dictionary; rather one should examine "the specific arguments and theories of the major thinkers who make up the rationalist tradition" (Cottingham, 1984, p. 1). This seems to us to be an effective strategy because "almost every attempt to define rationality tends to ignore the fact that the concept of rationality is an invention of human origin, that it was humankind which, during the process of autocreation, granted itself the criterion that was supposed to be the measure of its humanness" (Niznik, 1998, p. 11).

In this section our aim is not to provide a comprehensive historical account of the development of rational thought. Instead, we discuss a few of the major concepts and the individuals responsible for the development of these theories. By doing so we can illustrate how some of the theoretical problems that have arisen have been "reworked and reinterpreted" (Cottingham, 1984, p. 11) the "ultimate result of which was philosophy" (Niznik, 1998, p. 11). Our review shows that ancient philosophers intended rationality to be a very general concept. A rational individual was one who could take what they know and use reason to understand the world. This is compared to the views of some who believe rational agents need to conform to very restrictive assumptions,
such as having perfect information or being infinitely sensitive to differences in the alternatives presented to them. We will divide the review into four sections: pre-Socratic thought, Athenian philosophers, early modern philosophers, and twentieth century philosophers.

PRE-SOCRATIC THOUGHT

Fifth and sixth century B.C. Greeks lived in an anthropomorphic world in which “mythology was still the only method available either to record history or explain nature” (Brumbaugh, 1981, p. 5). The advent of Greek philosophy took place in a world in which there was “no science, no pure mathematics, no notions of the distinctions we automatically accept today between mind and matter, subject and object, animate and inanimate things, miracles and natural causes” (Brumbaugh, 1981, p. 5). For a variety of reasons, ancient Greek thinkers, such as the Ionians, began to question polytheism and their reliance on mythical explanations of nature. This questioning may have resulted from contact with well-established civilizations such as those in Egypt and Mesopotamia, from whom the Ionians (and others) gained insights about science and nature. It may have arisen from a sense of adventure, given that Ionians lived on the frontier of Greek society (Brumbaugh, 1981).

The genesis of the questioning of the power of myth and the role of the Greek gods may also have arisen from the failure to find moral value in many of the Greek myths. In many of these stories featuring Greek gods, the deities behaved quite badly, precipitating individuals to search for answers about “nature” and how to live a “just life” that were not dependent on polytheism, superstition, and myth (Rauh, no date).

Even though none of his writings survived, as far as we know the first of the Greeks to devote his attention toward a systematic attempt at discovery was Thales of Miletus (624–546 B.C.). An engineer, his thinking was so pervasive that many of his contemporaries considered him to be the father of Greek science, mathematics, philosophy, and physics.3 However, in order to “discover” these new ideas, “mythology had to be abandoned” (Brumbaugh, 1981, p. 11), and this was a real break from tradition.

In his search for an answer to the question, “What are all things?” Thales had to assume there is “enough system among the infinite variety

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3 Also, Thales was identified by his contemporaries as one of the famous Seven Wise Men (Sophoi) of the age of antiquity.
of things in the world to permit some sort of single answer. This assumption marks the beginning of philosophy” (Brumbaugh, 1981, p. 13). For Thales, the factor that was the glue keeping all things together was water. His contention that water was the primary substance of nature may appear to be “primitive” thinking, but it was a real innovation in critical thinking given the period in which Thales lived. He developed and applied a rudimentary inductive-scientific method whereby he observed the environment, analyzed what he saw, and attempted to formulate conclusions from this process of inquiry. In so doing, he was able to make assertions about the state of nature (the “general”) by observing his surroundings (by examining the “specific”), and this system was a precursor to the rules of logic more thoroughly developed by Aristotle two hundred years later. Although Thales made a number of important contributions in the natural sciences (e.g., he’s been noted as the father of Greek astronomy and he produced five important theorems used in geometry), it was his method of inquiry that was novel. He was the first person to try to systematically explain the natural world by the use of reason, rather than by referring to the supernatural as the explanation.

In an attempt to answer Thales’ original question about the nature of all things, Pythagoras of Samos (569–475 B.C.) “held that all things are numbers” (Brumbaugh, 1981, p. 30) and that the world we observe is the product of rational numerical harmony (Mendelson, 2000). Pythagoras developed many of our most important philosophical and mathematical concepts, the most famous of which was the Pythagorean theorem — the square of the hypotenuse of a right triangle is equal to the sum of the squares of the other two sides. Although these discoveries were important, it was the Pythagorean notion that mathematics could be used to explain states of nature that was new. In fact, Pythagoras’ search for “form” (eidos) in all things by the use of mathematics is held by some to be the beginning of the formalist philosophical tradition. This branch of philosophy holds that formal (mathematical and logical) statements have no real meaning but that their symbols have a “form” that is useful for the rational inquiry into epistemological and ethical questions.

The “reasoned” or “rational” (both words have their roots in the Latin word ratio) approach to discovery eventually found its way to
other parts of Greek life. Hippocrates (460–377 B.C.), a priest of the Greek god of healing (Asclepius) and the father of medicine, would typically attempt to ascertain the source of a person’s ailment by analyzing the patient’s dreams. Initially Hippocrates and his colleagues would use this information to try to determine which evil spirits were in possession of the patient, and then they would chant to try to rid the patient of their demons, and thus their pain. Over the course of time Hippocrates and his followers became aware of the newly discovered methods of reasoning and began to apply them to their trade. This led to the discovery that many illnesses previously thought to be caused by evil spirits were actually caused by factors under one’s control (e.g., inadequate nutrition). Thus, through observation and the use of reason, superstition eventually gave way to the use of what we now know as medicine.

This newly discovered method of reasoning also found its way into other intellectual endeavors, and resulted in breakthroughs in other fields (e.g., astronomy, architecture, and sculpture). In sculpture, Polykleitos created the contrapposto pose,\(^5\) which exhibited a relaxed and balanced position. He came to this pose as a result of his search for a rational norm for the structure of the ideal human figure. The rational method of inquiry also found its way to the Greek populace by being incorporated into the tragedies performed in theaters such as Dionysus (Rauh, no date). For instance, the playwright Sophocles’ (495–406 B.C.) tragic hero Oedipus, in his search for truth, was investigative, continually examining and questioning, and he would often make inferences from the evidence he found.\(^6\) One contemporary Greek historian notes, “Oedipus’ method of investigation is that of the critical spirit of the age which he represents” (Knox, 1966, p. 117). These examples demonstrate how reason or rationality was beginning to take root as a way of understanding nature and the human sphere.

Some of these early philosophers were traveling teachers who came to be known as “Sophists” (from the Greek “Sophia”). The Sophists were men who taught students (for a fee) the arts of oratory and rhetoric.\(^7\) They differed from early Greek philosophers in that they thought that

\(^5\) A balanced but asymmetrical stance in which the figure is positioned with most of its weight on one leg.

\(^6\) The actual Greek words used by Sophocles have very precise investigative connotations: “skopein” which means “to contemplate or examine”; “historein” means “to question or inquire”; “tekmairesthai” means “to judge or to infer from evidence” (Knox, 1966, p. 117).

\(^7\) According to Plato (in the Sophist), they seemed more concerned with teaching their students how to succeed in any argument, and in obtaining payment for teaching these skills.
there was too much attention paid to the natural world and not enough concentration on human affairs. They were early “instrumentalists” in that they believed the skills of rhetoric were “the means” by which their students could achieve specified “ends”, the most important of which was thought to be success in Athenian life. Their most important contribution, however, might be that they challenged the traditions of fifth century Athens by the use of rhetoric, and in so doing created an environment that “helped to degrade the influence of myth and superstition and provoke philosophers to a more exact examination of human nature and behavior” (Brumbaugh, 1981, p. 114). Brumbaugh also notes that the Sophists also “redirected the attention of philosophers from the world as observed by man to man as its observer. They began to see that philosophy had implications for everyday social and political practice, and that its pursuit of truth might come into collision with tradition or political expediency” (1981, p. 124). We will see below that the latter observation was truly prophetic.

ATHENIAN PHILOSOPHY

Socrates’ (469–399 B.C.) focus was on the “human self” and an answer to the question “What am I?” Thus, Greek philosophers in his time “were confronted with the new problem of reconciling natural science and human values within a single system of reality” (Brumbaugh, 1981, p. 123, emphasis added). To do this, Socrates used reasoned inquiry as a means of trying to discover the truth about matters of human values by asking questions (elenchus) that were designed to demonstrate the contradictions in one’s argument. This method ultimately gave rise to what we know as the “dialectic,” a system of reasoning in which the search or pursuit of the truth (not necessarily the discovery of the truth) is conducted by the exchange of logical arguments. The dialectic mode of inquiry, of which Socrates was a master, is often times denoted the “Socratic method,” and it is probably one of Socrates’ greatest contributions to science and philosophy.

Focusing on the human sphere, Socrates was also interested in how ethical inquiry could establish justice as one of the cardinal human virtues, noting that these virtues are “states of the soul” (Brown, 2003). In Socratic thought the soul or spirit of living things distinguishes them

They also made practical contributions to Greek society by introducing the adversarial system of law and by applying formal logic to the study of law.
from nonliving things, and different living things have different souls. For instance, all living things have a spirited or nutritive soul, which governs bodily functions like health and growth. Animals and humans are different than plants, however, because the former have an appetitive soul, which governs their movement and impulse. However, the really important distinction for the development of rational thought was that humans differ from animals by virtue of the fact that they have a rational soul (or spirit) that governs human thought and the ability to reason. Thus, it is the presence of the rational soul that provides us with our humanness and by using rational methods of inquiry, Socrates thought that using mind and soul one could discover truth and goodness, and therefore personal happiness (an early “utilitarian” view).

Importantly, Socrates insisted that we must “not be content with popular prejudice or accepted opinion, but must ‘follow the argument where it leads.’ Reason must be used both to analyze our beliefs and concepts and to subject them to critical scrutiny: ‘the unexamined life is not worth living’” (Cottingham, 1984, p. 3). Cottingham also reminds us that Socrates’ famous slogan about the unexamined life was no idle boast: He went to his death in 399 B.C. “rather than give up his commitment to critical inquiry and the independent exercise of reason” (p. 3).

Because Socrates did not put many of his thoughts to paper, in his early Dialogues, his student Plato (427–347 B.C.) laid out the ideas of his mentor. In later years Plato’s writings apparently reflect his own ideas, and much of the conceptual grounding for a more developed concept of rationality. Plato’s “account of the nature and objects of true philosophical knowledge was so influential that he can in many respects be called the father of rationalism” (Cottingham, 1984, p. 13).

Arguably the most important concept developed by Plato was his theory of Forms (or Ideas). This theory was both an epistemological (theory of knowledge) and an ontological (theory of being) thesis, and it is at the roots of much of the formalism underlying the theory of rationality. Regarding Plato’s theory of knowledge, Plato helped us to understand the differences between beliefs and knowledge, the former being important in preference formation, an the latter important in the search for truth. Beliefs, Plato thought, “never possess their properties

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9 Aristotle sees rationality as our telos: in his view, everything exists for a purpose, and the purpose of human life is to develop and exercise our rational soul.

10 As we discuss below, there continues to be much discussion (and some experimentation) about the role of beliefs, their relation to preferences, and their importance in rational choice theory.
in an absolute and unqualified way” (Cottingham, 1984, p. 15) rather than they are always subject to revision and qualification. Regarding the difference between beliefs and knowledge, Plato thought there was big difference between believing something is the case and knowing something is the case. “Knowledge is linked to truth: if someone qualifies as knowing a proposition then this implies that the proposition is true; beliefs, on the other hand, can be, and often are, false” (Cottingham, 1984, p. 14). However, Plato thought that even when a belief is true does not qualify it as knowledge. Knowledge involves “giving some account which justifies or gives grounds for the belief, or explains why it is true” (Cottingham, 1984, p. 14; emphasis in original). Thus, with Plato’s thoughts we see the investigation into causal mechanisms and the beginning of epistemology.

Owing to Wein (1998), Plato also held that it was rational for individuals to pursue their own interests, and that in fact, rationality requires individuals to act in their own interests. This element of self-interest is a very important part of later conceptions of rationality, and a fundamental tenet of theories of rational behavior. Regarding self-interest, rationality, and morality, Wein suggests that Plato thought there was no contradiction between rationality and morality, and that the pursuit of one’s (actual) self interest “never conflicts with the demands of morality” (Wein, 1998, no page).11

Aristotle’s (384–322 B.C.) role in the development of rationalist thought is a complicated one” (Cottingham, 1984, p. 13). His foundational work was in trying to describe and explain what causes change (the aitia or “responsible factor”). He described the “Four Causes” of change as: 1) the material cause, that is, the matter out of which a thing is made; 2) the formal cause or the pattern, model, or structure into which a thing is made; 3) the efficient cause or the means by which a thing comes into existence; 4) the final (telos) cause is the goal, that is, the purpose or reason for which something is made (Adler, 1978), and it was the telos that Aristotle thought was the most important cause of a thing. These Four Causes were a “theory of human nature which made rationality the defining characteristic of man” (Cottingham, 1984, p. 3) and this inquiry into causation became foundational for the development of rationality and scientific thought until the nineteenth century.

Aristotle held that to “understand” or to “know” required an inquiry into causation, and his philosophy was teleological in that everything

11 For more on the difference between actual and perceived self-interest see Wein, 1998.
was done to achieve some end or final cause or purpose. This focus on the “ends” becomes very important when others delve into the logical structure of the “means-ends” relationship. They also relied on Aristotle’s foundational work in what he called “analytics,” or what we know as “logic.” Aristotle demonstrated that it was the task of the philosopher not only to analyze through the use of logic, but also to examine the principles of the process of discovery. An especially important development in logic was his “principle of non-contradiction” that states: “the same person cannot at the same time hold the same to be and not to be.” This principle has often been held up as the origin of all axioms, the foundation of all syllogistic (deductive) analysis, and the ultimate grounding of all scientific knowledge (see Cottingham, 1984 or Kraut, 2003, for more on Aristotle’s writings).

Explorations into the life of the individual and in the ways knowledge was constructed continued during the Hellenistic period (approximately 300 to 50 B.C.) that directly followed the Athenian period. Even though many other important developments took place over the ensuing centuries, we have chosen to “fast-forward” to the Early Modern Period (17th and 18th centuries) because it was in this era that very important advances in rationality and epistemology emerged, and it is during this time that the discipline we know as economics began to take shape. We must always keep in mind, however, that advances in the development of reasoned thought “did not spring out of nothing” (Cottingham, 1984, p. 13); rather the ancient Greeks and their successors laid the foundations for later developments in rational thought and advances in philosophy.

THE EARLY MODERN PERIOD AND THE 18TH CENTURY ENLIGHTENMENT

During the Early Modern Period (1501–1750), philosophers addressing the nature, origin, and scope of epistemology basically fell into two general camps, empiricists and rationalists (Markie, 2004). Empiricism (from the Greek empeiria or “experience”) is a thesis about nature and the origins of human knowledge that (essentially) claims “all human knowledge derives ultimately from sensory experience” (Cottingham, 1984, p. 6). For instance, John Locke (1632–1704), one of the famous “British empiricists” of the Scottish Enlightenment12

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12 As an aside, it was John Locke’s belief that labor’s contribution to the value of finished goods was the most important factor (more so than land and other natural resources) and this concept was the foundation of David Ricardo and Karl Marx’s labor theory of value.
thought the mind of a person was simply a *tabula rasa* or “blank tablet” until experience imprints knowledge on it. Unlike empiricists, rationalists thought “by the light of *reason* we can, independently of experience, come to know certain important and substantive truths about reality, about the nature of the human mind and about the nature of the universe and what it contains” (Cottingham, 1984, p. 7, emphasis added). So we see that empiricists maintained that all knowledge of the world comes from experience, and the rationalists maintained that some concepts, knowledge, or truths are known independent of experience (are “innate”) or can be ascertained by the application of reason.\(^\text{13}\) Descartes (1596 to 1650), the father of modern philosophy (Cottingham, 1984), inventor of the Cartesian coordinate system, and author of the famous epigram, “I think, therefore, I am” was a rationalist. He believed that rationality was a necessary condition for experience, and was therefore “prior” to experience. Descartes saw rationality as the foundation for all inquiries into the workings of the world and the relationship between the mind and the body (known as the “mind-body” problem in philosophy). As was the case in his inquiries into mathematics and science, his philosophical approach was to “demolish everything completely and start again right from the foundations” and in so doing he questioned all that had come before him. Thus, he paved the way for the great philosophers of the Enlightenment, and was seen as “the pivotal figure in the transition from classical to modern philosophy” (Cottingham, 1984, p. 36).

There were further distinctions within the rationalist and empiricist camps. Concept rationalists believed that humans have *concepts* that are independent of experience (innate concepts). Leibniz (1646–1716), the inventor of differential and integral calculus, was a concept rationalist who thought that reasoning could be reduced to a system of thought like calculus, and that calculations could be used to understand the workings of the world and of the “human self.” On the other hand, concept empiricists (such as Locke and David Hume) denied the existence of innate concepts, and held that all concepts were dependent on one’s experience. In particular, Locke used newborn children as an example that concepts were not innate. In *An Essay Concerning Human Understanding*, he stated, “they get no more, nor other, than what experience, and the observation of things that come in their way, furnish them

\(^\text{13}\) Regarding empiricists, Francis Bacon (1561–1626) observed that empiricists are like ants, they collect and put to use, but rationalists, like spiders, “spin threads out of themselves” (Cogitata et Visa, 1607, p. 616).
Although there appears to have been two very distinct camps of thought during this period, as is typically the case there was “a considerable degree of overlap” between empiricists and rationalists (Cottingham, 1984, p. 8), which is probably equally true today.

As noted above, John Locke was one of the three famous “British Empiricists,” the other two being David Hume (1711–1776) and George Berkeley (1685–1753). We will delve into Hume’s writings on philosophy and economic thinking because he had a profound influence on his close friend Adam Smith, who developed many ideas instrumental to the general theory of rational behavior. Hume also significantly influenced Immanuel Kant, who credited Hume with waking him from his “dogmatic slumbers” and motivating Kant to develop an alternative to instrumental rationality.

In *Treatise of Human Nature* (1738) Hume questioned whether it was reason or passion that was the “dominant force in human life” (Morris, 2001, no page). He argued that human behavior and morality were consequences of our passions, which are internal thoughts and not subject to empirical verification. This notion of passions being neither reasonable nor unreasonable is important because it is Hume’s belief that it is our passions that ultimately motivate our behavior. What was rather unique in Hume’s thinking was that he thought both passion and reason were important aspects of human nature, but neither fully explained human nature. It seemed to make sense to him that a theory of nature that integrates both passion and reason would be appropriate. So we see how the integration of philosophical ideas was an important part of Humean thinking, and he used his ideas to describe and explain how social institutions and government policies worked, and how pleasure and pain motivated individuals. His inquiries into the theory of motivation became foundational to the branch of philosophy known as utilitarianism, the fathers of which were Hume’s contemporaries Jeremy Bentham (1748–1832) and John Stuart Mill (1806–1873). Even though most scholars ascribe utilitarianism to Bentham and Mill, the former noted that Hume’s writings were so influential on his own theorizing that he “felt as if scales had fallen from [his] eyes” and he “learned to see that utility was the test and measure of all virtue.” In our discussion of consumer and rational choice theory below, we will demonstrate the central importance of utilitarianism.15

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14 To add a further distinction, judgment rationalists hold that some of knowledge is innate, but judgment empiricists deny this claim.

15 For a more complete treatment of Hume’s work see MacNabb, 1951.
“It would be hard to argue that the standard theory of rational choice owes much to” Immanuel Kant (1724–1804), but “from a philosophical point of view, Kant’s conception of rationality is the most prominent alternative” (Sugden, 1991, p. 755) to instrumental rationality, whose chief proponent was Hume. Kant did not disagree with Hume’s idea that reason was the “slave” of passion, as long as the objective was to explain human action. However, Kant differed with Hume about understanding the underlying causes of action. Kant thought humans were autonomous and capable of “forming beliefs and of reaching conclusions that are not determined for us by outside causes” (such as Hume’s “passion”).

Kant described two forms of rationality: the hypothetical imperative (if you want to achieve a specific goal, choose the best course of action to do so) and the categorical imperative, a non-instrumental approach in which a particular course of action must be followed because of its rightness, and regardless of a person’s desires or passions. Kant’s categorical imperative holds that “reason alone can be a motive for action of the will” (Sugden, 1991, p. 756) and that by using reason, independent actors will arrive (without any logical inconsistency)\(^\text{16}\) at a set of laws that are universal. Thus, Kant’s notion of self-governing reason in individuals is the intellectual basis for the idea that each person is possessed of equal worth and deserving of equal respect (Johnson, 2004). His idea that moral principles should be universal was influential in the thinking of contemporary philosophers such as John Rawls, whose “veil of ignorance” is a formalization of the idea that justice should be universalisable (Sugden, 1991).

Hume’s thinking on economics and moral philosophy greatly influenced his dear friend Adam Smith (1723–1790) and many of Hume’s concepts can be found in The Wealth of Nations (1776), Smith’s seminal work. In The Wealth of Nations Smith laid out his ideas about how individual self-interest, and the workings of the “invisible hand” could lead to desirable social outcomes. Regarding self-interest, Smith noted, “[i]t is not from the benevolence of the butcher, the brewer, or the baker, that we can expect our dinner, but from their regard to their own interest.” This idea of self-interest is one of the cornerstones of the theory of rational behavior and the economic theory of consumer choice.

Although some observers feel Smith’s work was narrowly focused

\(^{16}\)See Sugden, 1991, pages 756 and 757 for an example from game theory about the role of reason and desire in making choices.
on self-interest, this is not the case. Smith also wrote extensively on ethics, theology, and benevolence. On the latter, one of Smith’s most influential pieces was *The Theory of Moral Sentiments* (1759), in which he stated, “[h]ow selfish soever man may be supposed, there are evidently some principles in his nature which interest him in the fortune of others and render their happiness necessary to him though he derives nothing from it except the pleasure of seeing it.” This is evidence of the fact that Smith not only was interested in the role of self-interest, but also helped to develop the foundations upon which philosophers could theorize about the rationality of benevolence.

During Smith’s time some philosophers held that the law and/or the sovereign determined ethical standards, whereas scholars like Smith thought that people are born with a moral sense, that is, morality is innate. However, in addition Smith felt that humans are endowed with what he called “sympathy,” and it is the combination of these two sentiments that “ensure that human beings can and do live together in orderly and beneficial social organizations” (Butler, 2001). This “doctrine of sympathy,” in which individuals are thought to have an innate ability to identify with the situation of other individuals, was thought to be the glue that held societies together. This is important to note because Smith believed a sound theory of economics must take account not only of the way in which rationality and self-interest operated, but also about how non-commercial interaction (like sympathy) can hold societies together. So we see that it was Smith’s theorizing about morality that provides the ethical, philosophical, psychological, and methodological framework used in *The Wealth of Nations* (Morris, 2001).

Many ideas that may be considered contemporary in nature actually have their roots in Smith’s thinking. For example, he believed that individuals who used public works should pay in proportion to their use of these public goods. This notion is the basis of the “benefit principle of taxation,” a concept used increasingly by organizations and governments. As an example from higher education, think of the growth of user fees in institutions of higher education, the rationale for these being “he who benefits pays.” Also, for those of us who think school vouchers and school choice are contemporary concepts, Smith wrote extensively about alternative forms of school finance and organization such as these two hundred years ago! The theorizing of Hume and Smith (particularly

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17 Smith’s “sympathy” is best understood as communication between individuals through which the sentiments of one person are influenced by those of another. Smith also felt that it was sympathy that facilitates moral judgment in people (Morris, 2001).
Smith), also provided the conceptual rationale for many economic theories to follow, particularly those developed by David Ricardo and John Stuart Mill a generation later (The Concise Encyclopedia of Economics, 2004). As testimony to the breadth and staying power of many of Smith’s theories, his ideas have influenced twentieth century economists such as John Maynard Keynes (the father of Keynesian economics) and members of the “Chicago School” of economics, the most famous of which is (arguably) Milton Friedman.

**ADVANCES IN REASONED THOUGHT IN THE TWENTIETH CENTURY**

A number of twentieth century philosophers have made significant contributions in the development of rational thought and in advances in our scientific methods of inquiry. One such philosopher was Karl Popper (1902–1994), whose work on the conceptual foundations of theory testing led to important advances in the development of scientific methods like rational choice theory (Turner, 2000). In contrast to the positivists of his time who believed in the power of empirical verification through inductive methods, Popper argued that what made theories scientific was their falsifiability. This philosophy, called falsificationism or critical rationalism, claimed that theorists should focus on falsifying propositions rather than trying to validate them, because one needs only a single negative instance to refute a theory, whereas validating all possible propositions is impossible.

Central to Popper’s critical-rational approach was that humans could never know anything for certain, a decidedly Socratic philosophy. Popper used this approach to attack a number of well-known twentieth century ideas, including scientific socialism as advocated by Karl Marx, and the psychoanalytic tradition of Sigmund Freud. Poppers critical method is one that continues to have “important consequences for the way we approach the theory of knowledge and critical debate in general” (Turner, 2000, no page).

The concept of rational behavior was a central theme behind Ayn Rand’s (1905–1982) philosophy of objectivism, a mode of thinking based on rational individualism and one that holds that all human knowledge is based on reason (1964; 1990). This philosophy holds that reality is something that is absolute and not subject to interpretation, and that capitalism is the optimal economic system for transactions to occur among individuals. She argues that for this system to work, individuals must act in their self-interest. What makes Rand’s use of rationality
particularly compelling is her assertion that the pursuit of self-interest is justified on moral as well as economic grounds. She was (perhaps) one of the first philosophers to argue that it was the moral purpose of one's life to act in ways that would maximize their happiness, another utilitarian idea. This theme can be seen not only in her nonfiction works, but also in her novels including *Atlas Shrugged* (1957) and *The Fountainhead* (1943).

In *The Methodology of Positive Economics* (1953), Milton Friedman (1912–) lays out his position that can best be described as “an instrumentalist’s argument for instrumentalism” (Boland, 1979, p. 509). Friedman believes the objective of scientific inquiry is to understand the causal mechanisms underlying observable phenomena, and that the instrument used to better understand these mechanisms is empirical investigation. The main tenet of his approach is that the value of a theory can be determined by how well it predicts current and future behavior and phenomena. He disagreed with some of the scholars of the early to mid twentieth century (notably Lionel Robbins and his followers) who held that the significance of a theory is the direct result of the realism of the assumptions underlying that theory (Boland, 1979). In contrast, Friedman developed the “the irrelevance of assumptions thesis,” in which he states, “[t]he relevant question to ask about ‘assumptions’ of theory is not whether they are descriptively ‘realistic,’ for they never are, but whether they are sufficiently good approximations for the purpose at hand” (Friedman, 1953, p. 31). His purpose at hand is not only the search for causal mechanisms, but also to use theory as an instrument of policy making.

Another of Friedman’s ideas presented in his 1953 article is the “as-if” theory of explanation. In defense of the idea that individuals are rational, Friedman does not ask that we believe that people behave according to all the precepts of a formal model of rational behavior. Rather, he thinks we should evaluate the predictions made from such a model when individuals are thought to behave as if they act rationally. Using the metaphor of pool (billiards) playing, he notes that expert pool players do not consult all the laws of Newtonian physics before lining up a pool shot, even though the success or failure of their shot is in many ways dictated by these laws. Rather, successful pool players act “as if” they were using these laws, otherwise they would not be successful! His point here is: criticisms against a model’s complex set of assumptions are irrelevant; it is the outcome that matters. In fact, he argues that if the assumptions of a theory are unrealistic they may be more
desirable because of their parsimony; very complex theories may not be useful precisely because they are so complicated.

Few writings in the contemporary history of economic thought have generated as much discussion as Friedman's *Methodology* piece. For instance, Hausman (1992) takes aim at Friedman's logic that the criterion of good theory is valid and meaningful predictions. Even though Hausman finds Friedman's "a tempting and persuasive argument" (p. 218), he nonetheless thinks Friedman's logical argument is faulty (see Hausman, 1992, pp. 218–219). Others have criticized Friedman's focus on prediction as being "a form of naive and misguided empiricism" (Rotwein, 1959, p. 555). Others still (Bear and Orr, 1967) agree with some of Friedman's contentions (e.g., the "as if" principle) but criticize other aspects of his methodology (e.g., the realism of assumptions discussion). According to Boland, the most celebrated criticism of Friedman's methodology was presented by Paul Samuelson, who dubbed Friedman's methodology the "F-twist" (the "F" standing for "Friedman"; see Wong, 1973, for a discussion). Samuelson used a rather clever logical device to attack this theory: he used Friedman's own principles in an attempt to undermine Friedman's methodology (see Samuelson, 1963, for details). Whether he did so successfully is still being debated.

The criticisms of Friedman have also spurred defenses (Boland, 1979) and the recasting of his positions (Musgrave, 1981). For instance, Boland (1979) notes that most critics do not attack Friedman's instrumentalist foundation (for an exception see Caldwell, 1980). Boland thinks this is because instrumentalism "presents certain obstacles to every critic. When instrumentalists argue by offering a long series of reasons (like Friedman did), each of which is sufficient for their conclusions, it puts the entire onus on the critic to refute each an every reason" (Boland, 1976, p. 521). Musgrave (1981) recasts the realism of assumptions argument by noting that assumptions are often unrealistic, but that what is really important is the extent to which they are unrealistic and the implications this has for discovery. Musgrave categorizes assumptions into three types, each with different implications for a theory's usefulness. The "negligibility assumption" is a type of assumption that does not matter much because it has a negligible effect on the phenomena under consideration. "Domain assumptions" are related to the conditions under which the theory will apply. If the conditions no longer exist (or never existed), then the assumption is irrelevant and the theory is not applicable. Assumptions that are known to be false, but their inclusion in a theory will further scientific exploration or theory building, are known as "heuristic assumptions."
Like the scholars who preceded him, Musgrave's reworking of Friedman's ideas is in the tradition of critical thinking originally developed by the Ionians, refined by the Athenian philosophers, and extended by modern day thinkers. This process of reasoned debate has served man well, leading to advances in epistemology and the philosophical concepts underlying theories of individual choice, like those discussed below.

THE RATIONAL BEHAVIOR OF CONSUMERS

We now turn to a discussion of how economists use rationality to understand consumer behavior. One of the main objectives of microeconomics is to explain the behavior of individuals, and in particular how their behavior might change when they are confronted with changing circumstances. Consumer behavior, for example, addresses how individuals make decisions regarding what goods and services to buy. There are three parts to this analysis: (1) the preferences of the consumer, (2) the constraints faced by the consumer, and (3) the goal/objective of the consumer. We will explain each of these in turn and then show the connection to rational behavior.

Economists use the notion of utility to represent the preferences of consumers. As applied to consumer preference theory, utility is defined as the amount of satisfaction that a person receives from consuming a particular good or service. This requires that individuals can make subjective estimates of the utility that they would receive from different goods and services that they might consume. It is important to understand that utility theory does not presume that each good or service has a fixed worth or value for all consumers. Rather, the utility of a good or service can and will vary from person to person. Likewise, utility is an ordinal rather than a cardinal measure, meaning that the level of utility for each consumer represents the relative and not absolute value to the person. Shepsle and Bonchek (1997) argue that the formation of preferences takes into account an individual's religious values, moral precepts, ideological dispositions, altruistic impulses, and sense of common destiny with family, clan, tribe, ethnic group, or other forms of community. These preferences may change over time as individuals revise their beliefs about the state of the world, as they learn by experience, and as the environments in which they operate change. All of these factors may lead individuals to reevaluate the choices they make, or the instruments they use to help them make choices. It is understood that as experience allows individuals to accumulate additional information, their beliefs
become more established, they revise their preferences and opinions less frequently, and in doing so they eliminate a lot of uncertainty about their preferences and the subsequent choices they make. However, an important point is that economists take preferences as given and do not delve into how they are formed or why they differ across individuals.

As demonstrated above, economists posit that when choosing between different combinations of goods and services, individuals can estimate the utility that they would receive from different combinations of these goods, and that they can rank these combinations in order of preference based on these estimates. It is not required that consumers formally make such calculations, nor that they assign the same values to goods/services, but rather that they act in a way that is consistent with their own preferences. An indifference curve is often used by economists to describe all of the combinations of two goods or services that yield the same level of total utility to an individual. Figure 4.1 depicts three possible indifference curves for a person who must choose how to allocate her income between education (X-axis) and all other goods (Y-axis). The first curve, labeled “U1,” shows all of the combinations of education and all other goods that give her a level of satisfaction represented by U1. She is assumed to be just as satisfied with, or indifferent between, any two points along this curve, such as points A and B. The curve to the right of U1 represents all the combinations of education and all other goods that would increase this person’s satisfaction (represented by the utility curve U2). She would prefer any of the points along this curve, such as point C, to any points on the indifference curve labeled U1. Similarly, the indifference curve labeled U3 contains
all of the combinations of education and all other goods associated with this particular satisfaction level, and any point on $U_3$ is preferred to any point on the other two indifference curves.

Each individual is said to possess an infinite number of such indifference curves for any two goods, with higher levels of satisfaction (and thus preferred combinations) found when moving away from the origin (to the right). In constructing these curves, it is assumed that all goods give a person positive utility, individuals always prefer more of a good (i.e., marginal utility is positive), and that the utility from any good rises at a decreasing rate (known as the “law of diminishing marginal utility”). These three assumptions help give rise to the shape of indifference curves; namely, that they are negatively sloped and are convex to the origin. It is important to emphasize here that for any two goods (such as “education” and “all other goods”), the indifference curves for any two individuals will likely be different. In other words, the economic model of consumer behavior does not presume that all individuals will derive the same utility or satisfaction from a good/service such as education. The model takes these individual preferences as given and does not attempt to determine which are “right” or “wrong” or how they were formed.

The consumption choices that an individual has at their disposal are described by the use of a budget constraint. A budget constraint shows the set of all combinations of two goods or services that a person could choose given their limited resources (typically measured in income). This is depicted in Figure 4.2, where for the sake of illustration the person is assumed to have an income level of $20,000 to allocate between education and all other goods.
The endpoints (where the budget constraint intersects the X and Y axes) indicate the maximum amounts of education and all other goods that could be purchased with the person's income (in this example it is $20,000). Point A shows the situation where the person spends $5,000 on education and $15,000 on all other goods.

The shape and location of this budget constraint is affected by the person's income level and the prices of the two goods/services being shown in the figure. As the person's income increases, the budget line will shift out to the right and vice-versa. Likewise, if the price of education rises, then the budget line will pivot toward the origin on the axis for education indicating that the same $20,000 in income could purchase less education than before (this price change would not, however, affect the maximum amount of all other goods that could be consumed). The budget line is a means of introducing scarce resources into the discussion of consumer behavior. Without such limitations, a consumer would make decisions that would enable them to reach as high an indifference curve as possible. The budget constraint, appropriately named, represents the quantities of the two goods that the person is able to consume given limited resources, but this constraint tells us nothing about which of the possible choices is preferred by the individual.

By combining an individual's preferences (indifference curves) with their opportunities (budget constraints), we can begin to understand what economists mean by the phrase “rational behavior.” The economist's model of optimal individual behavior argues that a rational individual would choose the consumption bundle that yields the highest level of utility given his or her budget. This is reflected in Figure 4.3.

As represented by point A in Figure 4.3, the optimal choice for the individual would be to spend $5,000 on education and $15,000 on all other goods. At this point, the individual is maximizing his or her utility subject to the budget constraint of $20,000. Note that at point B, the individual is also spending all of his/her money on education and all other goods, but is on a lower indifference curve. Therefore, the individual could increase his or her utility (i.e., become happier) by spending less on education and more on all other goods. Given this information, the person would be rational in choosing combinations of these goods that move them to the optimum at point A.

Accordingly, the definition of rationality holds that if given the choice, the person would attempt to act in a way that would maximize his or her utility subject to the resource or budget constraint. It is very important to note that the consumer is acting in a way that would
maximize his or her utility, and the utility obtained from education and all other goods is unique to each person. Since the utility of any given good or service, such as education, can vary across individuals, we may observe two people making very different consumption choices and yet both could be acting in a rational manner. This is illustrated in Figure 4.4, where two individuals (A and B) have the same income level (as represented by their budget constraints) and are faced with the same choice: how to allocate their income between education and all other goods. Person A’s preferences are such that he or she derives relatively little utility from education (their indifference curve is positioned closer to the “All Other Goods” axis), and accordingly might choose to spend $5,000 on education and $15,000 on all other goods. In contrast, Person B obtains considerably more satisfaction from education and thus would be inclined to spend $16,000 on education and $4,000 on all other goods.

Which of these two people is acting in a “rational” manner according to economists? The answer is both. In each instance, the person is using whatever information they have at their disposal and choosing the consumption bundle that would maximize their own utility. The fact that we observe the two individuals making different decisions about how much education to consume does not imply that one is rational and the other isn’t rational. The key for evaluating rationality is whether or not the individual is acting in a manner that is consistent with his or her preferences. As noted by Hirshleifer (1985), “Rationality is an instrumental concept. In light of one’s goals (preferences), if the means chosen (actions) are appropriate the individual is rational; if not, irrational” (p. 59).

This also raises the issue about what can — and cannot — be
inferred regarding rational behavior through observation of individuals. Typically, all that is observed in data are the final consumption choices made by individuals. In this example, we would observe Person A spending $5,000 on education and Person B spending $16,000 on education. As noted above, this tells us nothing about whether Person A or B is acting rationally. A further complication is that if these two consumers face different budget constraints, it may also affect their final consumption choices. For example, differences in income levels would lead to shifts in the budget lines. This is depicted in Figure 4.5, where Person A has $20,000 to allocate between education and all other goods (solid line) while Person B only has $10,000 to allocate (dashed line). Otherwise, let both consumers have the same set of relative preferences for education versus all other goods, and hence the same indifference
curves. Even when both are acting rationally, we might observe Person A spending more money than Person B on education ($5,000 versus $4,000 in this example). Similarly, the two individuals may face different prices for education if they are attending different colleges (e.g., a public versus a private college) and/or they may have received different levels of financial aid so their net prices of attendance are different. If these factors are not controlled for by the researcher, then misleading inferences could be drawn regarding their preferences.

THE RATIONAL BEHAVIOR OF STUDENTS

Economists have used the model of human capital to explain how individuals make decisions regarding the amount of education to acquire. Human capital can be thought of as the collective skills and attributes that enable individuals to become more productive in the workplace. This human capital is either endowed at birth or acquired through training and education; hence the connection between human capital and education is referred to by economists as an investment in human capital. There is a substantial body of literature discussing the theoretical predictions of student choice (see, for example, Radner and Miller, 1975; Kohn, Manski, and Mundel, 1976; Chapman, 1979; Venti and Wise, 1982; 1983; Young and Reyes, 1987; Hossler, Braxton, and Coopersmith, 1989; Paulsen, 1990; Hossler, Schmit, and Vesper, 1999; St. John, Asker, and Hu, 2001; Toutkoushian, 2001; DesJardins, Ahlburg, and McCall, forthcoming).

According to the human capital model, students will first identify
the different educational choices that are feasible for them (it does not assume they evaluate all possible alternatives). The model focuses on the benefits and costs to individuals of acquiring education. On the benefit side, the individual making the investment in education may expect that doing so would lead to higher future incomes. The costs would include direct costs of education (e.g., tuition, fees, and books) as well as the opportunity costs of education (e.g., foregone earnings) that the person has to give up in order to acquire more education. This is depicted in Figure 4.6 where the solid line shows the future income stream that the individual would expect if she did not pursue a college degree. The dashed line shows the future income stream that she would expect if she did attend college. Note that for the first few years, her income is negative because she probably is not working full-time and is also incurring direct costs of education.

Mathematically, a rational person is often described as being one who calculates the present value of the future streams of net benefits from going to college and not going to college which can be depicted by:

\[
PV(\text{college}) = Y_C^0 + \frac{Y_C^1 - E_1}{(1+r)} + \frac{Y_C^2 - E_2}{(1+r)^2} + \cdots + \frac{Y_C^T}{(1+r)^T} \tag{1}
\]

\[
PV(\text{no college}) = Y_{NC}^0 + \frac{Y_{NC}^1}{(1+r)} + \frac{Y_{NC}^2}{(1+r)^2} + \cdots + \frac{Y_{NC}^T}{(1+r)^T} \tag{2}
\]

where \(Y_C^t\) is the income in year \(t\) for college graduate, \(Y_{NC}^t\) is the income
in year $t$ for individuals who do not go to college, $r$ is the annual rate of inflation, and $E_t$ represents the direct educational expenses in year $t$.

It is tempting, but erroneous, to conclude that if the present value of going to college exceeds the present value of not going to college, then the rational person would always opt to go to college (and vice-versa). This rather rigid description of student behavior has naturally led to objections about the validity of the net present value approach for explaining why students decide to pursue a postsecondary education. First, students may not have accurate information about the future income streams from going to college and not going to college. Second, students may not be able to properly calculate the costs of acquiring a college education. For example, students may not include foregone earnings (typically the largest indirect cost) in their estimates of the total cost of attendance. Finally, as written the model assumes that students only consider the net income differential when making decisions about whether or not to go to college, yet we know there are many non-pecuniary reasons why students decide whether or not to attend college.

This model has been extended to study how students choose among postsecondary institutions by allowing college-bound students to make separate calculations of the present value of net benefits from different postsecondary options. Following this line of reasoning one step further, one might infer that the model implies that students make their college choice solely on the basis of net expected benefits and choose the institution with the highest value. The concerns raised above, however, also apply here. For example, some students may have very poor information regarding the future income streams that they might expect from successfully completing their education at different institutions.

These concerns, however, are largely due to misunderstandings regarding what economic models really imply about individual behavior and are not evidence against the use of rationality in examining student choice. While having inaccurate or incomplete information may affect a student's decision, the decision would still be rational provided that it was based on a reasoned reaction to the information available to them at the time that they made the decision. Thus, it is not necessary that a student have perfect information regarding the future income streams from different institutions in order to make a rational decision. All that is required is that the person be able to form estimates of these income streams and act in a manner that is consistent with their calculations and preferences.

Perhaps the most important oversight in the above discussion of student choice is that economic models actually posit that individuals
make postsecondary decisions based on the utility that they would receive from different schooling options, and not simply the net financial benefits. While the utility would certainly be influenced by the net expected monetary benefits from attending each institution, it would also take into account the perceived non-pecuniary benefits of each choice and the satisfaction that students receive from these (e.g., enjoyment of sports programs and student life activities, the beauty of the campus, the proximity to home).

We provide the following example to help illustrate the importance of utility in school choice, and how rationality relates to student choice. Suppose that Adam is a junior in high school, and he has narrowed his college choices down to the University of Minnesota (m), Harvard (h), and Stanford (s). His parents, who are both economists, provide Adam with information on the cost of attending each institution, and the expected earnings that he could receive if he were graduated from each institution. After reviewing this information, Adam announces that he prefers the University of Minnesota when compared to Harvard, and Harvard when compared to Stanford. His preference ordering is therefore represented symbolically as mhs. He also notes that he would rather attend Minnesota than Stanford. Symbolically we can depict the relationship among Adam's preferences by the following: “mPAh” (or m > h in some venues) indicates that Adam prefers (depicted by PA) Minnesota to Harvard. If Adam was indifferent between Minnesota and Harvard, then we could depict this relationship by writing “mIAh”. Thus, we see that PA is indicative of Adam’s “strict preference” relation and Ia is indicative of his “indifference relation.” The three possible college choices (or “outcomes”) discussed above are called alternatives, and rational choice theorists presume that Adam has the capacity to estimate the utility that he would receive from each option, and then make statements such as “I prefer Minnesota to Harvard” or “I prefer Harvard to Stanford.”

There are a number of properties that must be true about preference and indifference relations in order for one’s decision to accord with the principles of rationality. Property 1, known as the “comparability” or “completeness” property, states that alternatives are said to be comparable in terms of preference (and the preference relation complete) if, for any two possible alternatives, either mPAh, hPAm, or mIAh. In English, Adam either prefers Minnesota to Harvard, or Harvard to Minnesota, or he is indifferent between these two options.

Property 2, known as the “transitivity” property states that strict preference relations are transitive if for any three possible alternatives (m,h,s), if mPAh and hPAm, then mPAs. In other words, if Adam prefers
Minnesota to Harvard, and Harvard to Stanford, then he must prefer Minnesota to Stanford. Likewise, but often forgotten in discussions about transitivity, an indifference relation is transitive if \( m I_a h \) and \( h I_a s \), then \( m I_a s \). Putting strict preference and indifference together, we get Adam’s “weak” preference relation (denoted by \( R_a \)) where \( m R_a h \) means that Adam either strictly prefers Minnesota to Harvard, or is indifferent between these options. That is Minnesota is at least as good as Harvard according to Adam's preferences.\(^{18}\) If Adam’s preferences satisfy the comparability and transitivity properties, then he is said to possess a “preference ordering” and the *rational* choice would be the alternative at the top of his preference ordering. Preferences that permit rational choices to be made are, in effect, “ordering principles” that are person specific, permit comparisons a pair at a time, and they are internally consistent.

What if Adam strictly preferred Minnesota to Harvard, and Harvard to Stanford, but Stanford to Minnesota? (The ordering denoted as: \( m P_A h \), \( h P_A s \), \( s P_A m \)). This is an example of the comparability property being satisfied but Adam violating the transitivity principle when comparing his alternatives. This could happen because different criteria could be used to compare different pairs of alternatives. For instance, maybe Adam prefers Minnesota to Harvard because he is interested in Chemical Engineering and Minnesota has the number one ranked program in this area. When Harvard is compared to Stanford, he chooses Harvard because he likes Boston and would rather live in Boston than in California. However, he prefers Stanford to Minnesota if the evaluation is made on the basis of weather. In a case like this it is not possible to order all three alternatives in terms of preferences because he is not using the same approach to calculate the utilities of each option.

Economists do not delve into how Adam arrived at his preferences or whether they are right or wrong; to them, what really matters from an analytic perspective is that Adam can form preferences according to these assumptions and that his final choice is logically related to his preferences. That is, if Adam is given the opportunity to choose among Minnesota, Harvard, and Stanford then we say that his choice is rational if it is consistent with his individual preferences. Suppose that another high school junior, Kevin, is also considering the same three institutions. After reviewing the same data that Adam examined on the cost of

\(^{18}\) As one may note, we could use Boolean operators in this discussion with \( P \) being equivalent to “\( > \)”, and \( I \) being the same as “\( = \)”, and \( R \) defined in terms of “\( > = \)”. 

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attendance and future benefits from each school, he performs his own utility calculations and concludes that he would prefer Stanford to Harvard, Harvard to Minnesota, and thus Stanford to Minnesota. Even though his choice is different from Adam’s when faced with the same costs and benefits, it is also rational according to its usage in economics provided that he would receive the highest utility from attending Stanford. Thus, “a choice is rational if the object chosen is at least as good as any other available object according to the chooser’s preferences. Put differently but equivalently, an object is a rational choice if no other available object is better according to the chooser’s preferences” (Shepsle and Bonchek, 1997, p. 25).

A further complication regarding student choice arises when uncertainty is introduced into the decision making process. This requires that we become more precise about beliefs, their role in the shaping of preferences, and how students respond to uncertainty (for more on the role of beliefs see Lucas, 1987). A belief is “a probability statement relating the effectiveness of a specific action (or instrument) for various outcomes” (Shepsle and Bonchek, 1997, p. 32). Individuals who know for a fact that an action will lead to a particular outcome are operating under conditions of certainty. For instance, Adam may be (nearly) certain that he will be able to graduate from the University of Minnesota if he is admitted, but is less confident that he will be able to graduate from either Harvard or Stanford. Persons who are not so confident that they know what will happen when a particular action is taken, but have some sense of the possibilities and their likelihoods (if I flip a fair coin there is a 50/50 chance it will come up heads), are dealing under conditions that involve uncertainty or risk (also see Bueno de Mesquita and Bennett, 2002).

To be more specific, consider the following example. Grace is considering three college alternatives: the University of Minnesota, St. Cloud State University, and Anoka Community College (she wants to remain near home so she is only considering colleges in Minnesota). She prefers Minnesota to St. Cloud, and St. Cloud to Anoka Community College, and if her being successful in each of these colleges were equally probable, she would therefore choose to attend the University of Minnesota since she believes that a degree from the University of Minnesota would enable her to earn more per year than would be true if she was graduated from either St. Cloud or Anoka Community College. In this situation, the rational choice for Grace is pretty apparent: choose the course of action (or instrument) that leads to the top-ranked alternative.
However, if her probability of succeeding in each of these institutions varies, this would make her choice process more complex. Suppose she also knows that based on her ACT scores and grades in high school, her chance of being graduated from the University of Minnesota is lower than her chances of being graduated from either St. Cloud or Anoka Community College. When beliefs about action-outcome relationships become complex, such as in Grace’s case, the principle of rational behavior requires some additional explanation. One way to deal with this complexity is to assign probabilities to the different possible outcomes from each decision, and attach these weights to the possible outcomes from each college choice.¹⁹ In Grace’s case, her father is a college professor who knows each of the institutions she is interested in attending, and he can help her assign some reasonable probabilities of being graduated from each conditional on attendance. Because her father also knows that there may be lifetime earnings differences depending on whether a student goes to college and the quality of the degree granting institution, he can also help her assign relative valuations of these values.²⁰ When we merge the information about her utility valuations with those of her chances of being admitted and successful in college, we end up with probabilistic statements of her expected utility, defined by:

\[
EU(College_i) = [\Pr(Success\ College_i) \times U(College_i)] \\
+ [1 - \Pr(Success\ College_i) \times U(College)]
\] (3)

where \(EU(.)\) is the expected utility of each alternative, \(\Pr(.)\) is the probability that a student will be graduated from \(College_i\), \(U(College_i)\) is the utility or value placed on being graduated from each college, and \(U(No\ College)\) is the utility derived if the student is not graduated from the college that she attends.

The “principle of expected utility” (owing to Savage, 1954, and others) provides us with one method for assigning a single number to each choice, which then allows us to rank their relative valuations. “Rationality requires a chooser to select the action that maximizes expected utility” (Shepsle and Bonchek, 1997, p. 34; emphasis in original). In our

¹⁹ This example is adapted from a case used by Branislav Slantchev in his International Relations class at the University of California-San Diego.
²⁰ Whether there are “sheepskin” effects, that is, significantly higher returns to more selective schools, is a topic on which there is considerable disagreement (see Jaeger and Page, 1996, or Eide, Brewer, and Ehrenberg, 1998, for a discussion of this issue and recent empirical evidence).
example, Grace's expected utility for each choice is the weighted average of the utilities for each alternative based on their associated probabilities. Table 4.1 provides an illustration of how Grace might assign utility values to the future income estimates and probabilities of being graduated from each institution ("successful") provided by her father. Based on this information, Grace's expected utility is highest at St. Cloud State University, even though she would expect to earn less with a degree from St. Cloud State University than she would with a degree from the University of Minnesota. Assuming that Grace was risk neutral, she would find it optimal to attend St. Cloud State University. Grace would be irrational, however, if she were risk neutral and chose to attend the University of Minnesota based on the information in Table 4.1.

In the example provided above, Grace was able to assign reasonable probabilities to the alternatives under consideration due to having better information. However, even when an individual has poor information about the true probabilities or likelihoods of alternatives, they often have some subjective hunches (judgmental or subjective probabilities) about likelihoods that they can associate with various alternatives. There are a variety of techniques to help individuals determine their subjective probabilities (see Behn and Vaupel, 1982, a very valuable resource for applying decision theory to problem solving), or to assign weights to their preferences. The latter is common in evaluation research that employs multiattribute utility technology (known as MAUT; see Edwards and Newman, 1982 for details). The key for assessing rational behavior is whether students use the probabilities that they have formed to make decisions, and not whether or not their probabilities are accurate.
Table 4.2: Example of Emily's Expected Utility of College Choice

<table>
<thead>
<tr>
<th>College Alternatives</th>
<th>University of Minnesota</th>
<th>St. Cloud State University</th>
<th>Anoka Community College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability of success</td>
<td>0.40</td>
<td>0.85</td>
<td>0.99</td>
</tr>
<tr>
<td>Income if successful</td>
<td>$100,000</td>
<td>$50,000</td>
<td>$25,000</td>
</tr>
<tr>
<td>Utility if successful</td>
<td>8,000</td>
<td>4,500</td>
<td>2,000</td>
</tr>
<tr>
<td>Probability of failure</td>
<td>0.60</td>
<td>0.15</td>
<td>0.01</td>
</tr>
<tr>
<td>Income if unsuccessful</td>
<td>$20,000</td>
<td>$20,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>Utility if unsuccessful</td>
<td>1,500</td>
<td>1,500</td>
<td>1,500</td>
</tr>
<tr>
<td>Expected Utility</td>
<td>4,100</td>
<td>4,050</td>
<td>1,995</td>
</tr>
</tbody>
</table>

An interesting question might be: At what probability of success would it become rational for Grace to choose the University of Minnesota? This can be determined by rearranging the terms from equation (3) as:

$$\Pr(\text{Minnesota}) \geq \frac{EU(\text{St.Cloud}) - U(\text{NoCollege})}{U(\text{MN}) - U(\text{NoCollege})}$$

(4)

Substituting the respective values from Table 4.1, we get:

$$0.30 = \frac{2,200 - 1,000}{5,000 - 1,000}$$

Thus, if Grace thought her chances of being successful at Minnesota were greater than or equal to 30 percent, it would be rational for her to choose the University of Minnesota. Suppose that Emily had the same information as Grace on the incomes that she could earn upon being graduated from each institution, but has higher perceived probabilities of succeeding at each institution (Table 4.2). She could also form her own expected utilities based on this information (note that the utility from each choice may be different for Emily than for Grace), and in this example Emily would be rational in selecting the University of Minnesota, assuming that she is risk-neutral.

We now turn to how a student's preference for risk might affect their decision about where to attend college. Individuals are likely to vary not only in the utilities that they attach to alternatives, but also with regard to their tolerance for risk. In Table 4.2, for example, while Emily's expected utility from attending the University of Minnesota is higher than her expected utility from attending St. Cloud State University,
there is a greater chance that she will not be able to graduate from the University of Minnesota. In this situation, a risk-averse student (one who seeks to avoid risk) may rationally decide to attend St. Cloud State University even though $\text{EU}(\text{Minnesota}) > \text{EU}(\text{St. Cloud State University})$. Returning to Table 4.1, if Grace were a risk seeker, she might be willing to attend the University of Minnesota even though $\text{EU}(\text{Minnesota}) < \text{EU}(\text{St. Cloud State University})$ because there is a chance that she could be successful at Minnesota and receive more income, and hence utility, upon completion of her degree. A person's tolerance for risk is similar to a person's preferences in that they vary across individuals, neither can be observed by outsiders, and differences across individuals can make the decisions of one or both appear to be inconsistent with the notion of rational behavior.

Thus, we see how utility theory can be useful for understanding how students make decisions, even when these decisions appear to be quite complex. There will be some people who would choose not to go to college even though they would expect, on average, to benefit financially from going to college. This would be the case for those individuals who would receive less utility from working in a college-trained occupation than they would in a particular job that does not require a college degree, even though the income may be less. As difficult as it may be for some observers to understand, there are some individuals who dislike the notion of going to college. These individuals may have a very high preference for other types of work rather than the work they could pursue with a college degree. Likewise, they may derive relatively little utility from studying and going to class, and conclude that they would be happier spending this time in other ways. Accordingly, the model suggests that forcing these individuals to go to college would result in moving them to a lower indifference curve and lowering their utility or level of well being.

This discussion points out that it is extremely difficult for analysts to draw conclusions about the rationality of students based on their actions. All that we typically observe of students is whether or not they go to college, and where they choose to enroll. Since we do not observe their individual preferences for education, their tolerances for risk, or the estimates that they made regarding the net expected benefits of each option, we cannot infer from their actions alone whether or not they were behaving in a rational manner. Likewise, since the expected earnings streams will vary across individuals depending on their specific attributes such as ability, two people may make very different decisions even when faced with seemingly similar choices. Students may be
observed enrolling in institutions where the net cost of attendance is higher than seemingly comparable alternatives, or choosing less-reputable institutions when they have been admitted to more selective institutions. These observations do not, however, demonstrate that these students are behaving irrationally.

While the rationality assumption is an important part of the economic model of student choice, economists devote little attention to the appropriateness of this assumption. In contrast, the primary focus of economists who study student choice is on how the postsecondary decisions made by students are affected by factors such as price, family income, and student ability (see Venti and Wise, 1982; 1983; Fuller, Manski, and Wise, 1982; Rouse, 1994). The student choice model is not used to determine if the choices made by students are rational per se, but rather to understand how decisions change when one or more of the factors affecting choice change. As noted by Silberberg (1978), economics focuses on marginal analysis in that it is concerned with explaining how equilibrium might change as compared to how the equilibrium was reached. To see this, economists might express the utility that the i-th student receives from the j-th schooling option as follows:

\[ U(\text{college})_{ij} = U(F_j, F_i, S_i) \]  

where \( F_j \) = finance-related factors for the j-th institution, such as tuition and fees, financial aid, and the estimated value from choosing this option; \( F_i \) = finance-related factors for the i-th student including family income and wealth; and \( S_i \) = non-financial student characteristics that can influence the monetary return to education, including student ability, parental characteristics, and choice of major. This elaboration draws from the theory of human capital in that attending college is a form of investment in human capital, which then affects the return on investment in education.

The focus of the analysis then becomes whether student choice is influenced by changes in factors such as tuition rates, financial aid, family income, educational attainment of parents, and student ability. An economist might assert that as the price of attending the j-th alternative rises, the net monetary return and hence utility from choosing this option would decrease; [i.e., \( \partial U(m)/\partial F_j < 0 \)]. Accordingly, this would reduce the overall utility for the j-th option for students and possibly lead some of them to no longer choose this option. It is recognized that a wide range of financial and non-financial factors influence a student's
choice regarding postsecondary education. Again, the goal is not to explain how all students make their initial postsecondary education choices, or whether or not these choices are rational, but rather how are student decisions influenced by changes in specific factors thought to be related to student choice.

**RANDOM UTILITY MODEL OF STUDENT CHOICE**

As we described above, the uncertainty of outcomes and a person’s willingness to accept risk can complicate the issue when trying to understand the rationality of individual choice. Some economists have expanded the notions described above using what is known as a “random utility model” to explain choice under uncertainty. This model of rational choice has been used to study issues as disparate as developing measurement scales for comparative judgment (Thurstone, 1927), mathematical psychology (Marschak, DeGroot, and Becker, 1963), transportation-mode choices (McFadden, 1976), recreation demand (Parsons, 2000), family labor supply (van Soest, 1995), and brand choice (Abe, 1998). Random utility models have also be used to study student choice (DesJardins, Ahlburg, and McCall, forthcoming), with the underlying assumption being that students have a set of schooling and non-schooling alternatives and they will attempt to maximize their net utility when making their schooling decisions.

Following Manski (1977) and Hanemann (1984), there are two main components of the random utility model: a deterministic component and a stochastic component. The latter accounts for the fact that the researcher has incomplete information (is uncertain) about the utility function of students. The uncertainty can arise from a number of sources: unobserved individual attributes, unobserved attributes of the alternatives available, measurement errors, and the use of instrumental or proxy variables (Manski, 1977). Thus, “the distinguishing feature of this theoretical perspective is that a potential stochastic nature is attributed to individual utility” (Corstjens and Gautschi, 1983, p. 23). Applied to the study of college choice this model can be formally represented by:

$$U_i^t = D_i^t + \epsilon_i^t$$

(6)

where $U_i^t$ is the utility that student $i$ derives from choosing college $a$; $D_i^t$ is the deterministic component and $\epsilon_i^t$ represents the stochastic or uncertainty described above. This can be transformed into a probabilistic
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statement:

\[ P_C(a) = P[U_a = \max_{b \in C} U_b] \]  

(7)

indicating the probability that student i will choose alternative a given choice set C (which may contain labor market and alternative schooling options), and \( U_b \) represents the utilities derived from the alternatives to college a.

As noted above, although a student's utility is strictly unobservable, we infer utility maximization by observing the actual choices made. When a student chooses institution a over other alternatives (represented by b), we infer that a provided the student with greater net benefits (utility) than entering the labor market or attending any other institution. We model the latent or unobserved component using \( y^* \), defined as the difference between the utility derived from choosing college a versus choosing a competing alternative. Formally this is denoted as:

\[ y^* = U_a^i - U_b^i \]  

(8)

such that

\[ y^* = \beta'x + \epsilon \]  

(9)

where \( \beta'x \) is known as the “index function” and \( \epsilon \) is an error term assumed to be logistically distributed. The link between the observable choice (y) and the latent variable (\( y^* \)) is “made with a simple measurement equation” (Long and Freese, 2001, p. 100) where:

\[ y = 1 \text{ if } y^* > 0 \text{ (i.e., } U_a^i > U_b^i) \]  

(10)

\[ y = 0 \text{ if } y^* \leq 0 \text{ (i.e., } U_a^i \leq U_b^i) \]  

(11)

In the context of student choice, this framework provides the theoretical basis for the probability that a student makes a particular choice (denoted by \( y = 1 \)), like whether to send their scores on standardized tests to a particular institution, whether to apply to an institution, and conditional on admission, whether to enroll in an institution (see Manski, 1977 for details on the random utility model and Greene, 1993, for the econometric specification of latent variable models and their assumptions).

DesJardins, Ahlburg, and McCall (forthcoming), used Manski's rational utility model as the conceptual basis of their study that focused on how specific factors influence the sequential nature of the application, admission, aid determination, and enrollment process. Based on rational choice theory and the theory of expectations, their a priori hypothesis was that students make calculative college choice decisions based on
their expectations. For instance, they hypothesized that students tend to apply to institutions where they have a reasonable expectation of being admitted and that students form their choice set based (at least in part) on their expectations of financial aid. They posited that if the latter is the case, then changes in aid packaging not only directly affects enrollments, but could also have an impact on application behavior. The authors also posit that modeling the structure of application, admission, aid determination, and enrollment may provide insights into the sequential nature of the student choice process, thereby adding to our understanding of the structure of student choice.

The authors found that aid expectations have powerful non-linear and asymmetric effects on enrollment and application propensities, and that disappointing students with regard to their aid expectations can have serious negative effects on enrollment. These findings represent a contribution to the student choice literature because although some researchers have argued that students act on the basis of their expectations (Fuller, Manski, and Wise, 1982; Curs and Singell, 2002) few (if any) investigators have developed a model capable of testing these assumptions and some analyst even think that it is impossible to do so (see Glenn, 2004).

DesJardins et al. not only believe their conceptually based integrated model improves “our collective understanding of the interactions among application, admission, financial aid expectations, and enrollment behavior” (p. 32), they also claim that the simulations they conducted based on the statistical results of their study “demonstrate that these models also have practical utility in that they can be used to simulate the impacts of changes in the factors that affect the structure of college choice” (p. 32).

ADDITIONAL CRITIQUES OF RATIONALITY

Criticisms of rational choice theory in the economics literature as well as other fields are numerous. One particular criticism is that the models in utilitarianism and classical economics assume individuals are too materialistic and hedonistic, and not concerned enough with the moral and emotional aspects of life.21 This criticism has been addressed over the years by demonstrating that symbolic qualities, such as a

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21 For critiques of rational choice theory (and responses to these critiques) from a sociological perspective see Coleman and Fararo, 1992 or Colman, 2003. For the same from a political science perspective see Green and Shapiro, 1994 or Friedman, 1996.
person’s good name or a company’s brand name or good will, have value in the same way that commodities and other material goods do. In contemporary economic thinking this is done by treating these “goods” as scarce, just like other goods, and examining whether individuals “treat decision making in the face of ‘scarcity’” (Smelser, 1992, p. 392) in ways that are different than the traditional analysis of scarce goods (see Smelser, 1992, for details). Likewise, there is nothing in the economic view of consumer behavior that would rule out instances where an individual’s preferences take into account the well being of others.22

Others have argued that there are multiple forms of rationality, and that these should be separated when addressing issues such as student choice. Simon (1947), for example, distinguished among a number of different forms of rationality, including “intended rationality,” “subjective rationality,” “conscious rationality,” “deliberate rationality,” and “organizational rationality.” Simon’s most famous work in this area is his concept of “bounded rationality,” a version of rationality in which instead of trying to find the best course of action to achieve one’s goals, individuals actually “forego the aspiration to full optimality, and pursue goals through ‘satisficing’, that is, ‘good enough’ rules-of-thumb that may be suboptimal” (Foley, 2003, p. 3) but move the individual toward his desired goal. The reason individuals use rules-of-thumb and other simplifying strategies is because there are limits to their cognitive capacity and therefore their rationality. Thus, Simon’s proposition is that individuals’ ability to rationalize is “bounded” by their limited cognitive capacity (Simon, 1955) and this limitation can cause problems when social choice is the objective (1978) or in decision making that takes place in business organizations (1979).

In more recent work, Simon also proposed that human behavior might be “procedurally” rational (and this work has been elaborated on by James Buchanan). Under this model the behavior of an individual is thought to be procedurally rational when it “is the outcome of appropriate deliberations” (Simon, 1976, p. 129). This is an important distinction because when “psychologists use the term ‘rational,’ it is usually procedural rationality they have in mind” (Simon, 1976, p. 129). As we shall see below, a relatively new area of economics incorporates ideas about individual decision-making from psychology (particularly experimental psychology) and other disciplines with traditions in studying rational choice.

22 For more information on bounded rationality, particularly from an economics perspective, see Conlisk, 1996.
Others, such as Smelser (1992), argue that when it comes to purposive behavior, "the model of rational calculation is psychologically unrealistic" (p. 388). In recent years this critique has gained acceptance because of studies in the emerging field of behavioral economics and in behavioral psychology. Researchers in these fields have discovered that cognitive anomalies emerge under a variety of experimental choice situations. These anomalies are "circumstances in which individuals exhibit surprising departures from rationality" (McFadden, 1999, p. 79). Many of these studies focus on the “cognitive processes underlying the formation of preferences and belief” and the results often indicate that “the axioms of rational choice are often violated consistently by sophisticated as well as naive respondents, and that violations are often large and highly persistent” (Tversky, 1977; as quoted in McFadden, 1999, p. 79). Much of this research is based on Simon’s theory of bounded rationality (Frank, 1994).

Research in behavioral and experimental economics incorporates many of the traditional assumptions about individual choice behavior, but tests the limits of some of these assumptions (often using traditional econometric methods). For instance, behavioral economists are interested in testing the assumptions about utility maximization, especially whether individuals really maximize expected utility. Much of the research in this field is conducted in laboratory settings in an attempt to ascertain how individuals actually make decisions under a variety of conditions. Behavioral economists also rely heavily on surveys of individuals. For instance, they may want to delve into the beliefs and preferences of individuals in order to better understand how these “primitives” affect decision making (see Simon, 1987, for details).

Another possibility is that some of the decision-making anomalies uncovered are “contextual” such as “framing effects” which occur when “the presentation of information influences how it is processed” and thus effects how decisions are made (McFadden, 1999, p. 84; also see Sugden, 1991 on framing effects; Sen, 1995 for logical antinomies when applying rational choice theory to social choices). Another category of anomalies are known as “reference point effects” such as “asymmetry” that occur when subjects in experiments show risk aversion for gains, risk preferences for losses, and weigh losses more heavily than gains. Applied to student choice, this kind of experiment could help us better understand how individuals interpret changes in tuition and changes in financial aid. That is, are increases in tuition perceived more negatively even when they are accompanied by increases in financial aid?

“Availability effects” are anomalies that arise because of problems
in the “way humans process information to form beliefs” (McFadden, 1999, p. 84). These anomalies are important because they are related to the way individuals estimate outcome probabilities. Another anomaly, known as “superstition,” occurs when individuals are presented with data that contain patterns, but they systematically reject randomness as a possible explanation (patterns can occur from random draws!). “Process effects” have also been discovered where “limits on human computational and information processing ability may lead to the adoption of bounded rational heuristics” that are “different than the process of forming tradeoffs and maximizing utility” typically associated with rational choice (McFadden, 1999, p. 94). Finally there may be “projection effects” — “when an experimenter presents a choice task within a limited context, the subject may interpret the problem within a broader, strategic context” (p. 95). For instance, “in public good valuation surveys, this phenomenon is sometimes called the ‘warm glow’ motivation” (p. 96) for overstating one’s willingness to pay for public goods. That is, individuals may systematically overstate their willingness to pay for public goods because they derive moral satisfaction simply from the act of giving.

Understanding these anomalies and their effects are important advances in the development of how individuals make choices. Although some may argue that these anomalies sound the death knoll for rational choice theory, McFadden, who has conducted a considerable amount of research on extensions to and the limits of rational choice theory is not so pessimistic. He notes, if “the cognitive anomalies that do appear in economic behavior arise mostly from perception errors, then much of the conventional apparatus of economic analysis survives, albeit in a form in which history and experience are far more important than is traditionally allowed” (1999, p. 99).23 Undoubtedly much more research needs to be conducted in this area, and higher education researchers, who have often borrowed concepts from other disciplines, should be looking to behavioral economics for ways in which we can improve our understanding of the complexities of student choice.

DISCUSSION

Are students rational when making decisions regarding their post-secondary education? Unfortunately, for the many reasons discussed in

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23 For more information on attempts to unify theories from economics and other social sciences see Olson, 1990.
this chapter, it is nearly impossible to tell based only on the observation of the choices that students make. Despite the impression in some quarters that students appear to be irrational, a counterargument is that what might appear to be irrational behavior by an individual may not really be the case. It could be that individuals are acting rationally but our inability to observe their beliefs, preferences, and taste for risk masks this fact. As Coleman (1990) noted, social scientists and other observers need to be careful about “imputing objective interests [i.e., those posited by the theorist] to a person which differ from that person’s interests as he perceives them” (p. 511). Quackenbush (2004) also notes, “[m]any critics of rational choice theory have questioned whether actors are really rational. However, we have demonstrated that these questions are based on misunderstandings of the assumption of instrumental rationality. Rational choice theory is consistent with behavior that is constrained by institutions, cultural influences, or psychological limitations” (pp. 101–102).

And as we have detailed above, this theory of rational choice finds its roots in the development of rational thought that began in ancient Greece and has continued to this day. Developments during the Enlightenment linked philosophy and thinking about political economy, which helped formalize the discipline we now know as economics. More recently, twentieth century philosophers, economists and social scientists made great strides in theory building, and especially important were advances in the scientific method that has dominated social science research. Advances in these areas have contributed to a better understanding of the concept of rationality and its application to how individuals make choices.

We hope our chapter has also contributed to an improved understanding of what rational choice theory implies — and does not imply — about student behavior when making decisions regarding their postsecondary education. Particularly noteworthy is that rationality is always defined relative to each person’s preferences and taste for risk. Rationality does not hold that given like information individuals will make the same decisions, or make decisions that an individual observing the situation would have made. Also, data limitations and limitations in our knowledge of students’ beliefs and preferences make it very difficult, if not impossible, to determine if an action they take is consistent with rational behavior. Another point is that circumstances are constantly changing that may affect a student’s decision, and these may not be observed or properly taken into account by researchers (known as the ceteris paribus
problem), thus making inferences about the rationality of behavior problematic. Finally, as demonstrated above, questions often arise about the applicability of strong versions of rationality, particularly when they are applied to social choice and non-cooperative behavior. There is experimental evidence that some of the restrictive assumptions of rationality break down in certain circumstances. Although we have made great gains in our understanding of how individuals choose, there is clearly a need for a better understanding of the limits of rational choice modeling and how it can be improved upon for understanding individual and collective decision-making. In particular, higher education researchers could take a page from behavioral economists and experimental psychologists by learning to apply their methods to study how students make choices. To do so would be consistent with the traditions of the ancient Greeks; to be ever inquiring in our search for answers, to be critical of current conventions, and to strive to improve our understanding so that those who follow will have a solid foundation on which to build.
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