Rational After All

Toward an Improved Model of Rationality in Economics

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Abstract

In this paper we critically review the literature on rational choice theory (RCT) and the critical approaches to it. We will present a concise description of the theory as defended by Gary Becker, Richard Posner and James Coleman (as well as others) at the University of Chicago from the mid-1970s to the early 1990s, we will discuss its epistemological assumptions and predictions and we will also examine the most important arguments against it. We will give our main emphasis on the critique coming from behavioral economics and we will try to see if humans' supposed cognitive constraints lead to a failure of rationality or if they constitute rational responses to the scarcity of information, time and energy. In our discussion we will use findings from experimental economics and the sciences of the brain, especially evolutionary psychology and neuroeconomics. Our intention is to present an improved theory of rational choice that, informed from the above discussion, will be descriptively more accurate but without losing its predicting power. Moreover, we will conclude by trying to answer the most important related policy question: when rationality seems to fail, does this necessarily imply that agents should be paternalistically protected against themselves? We will briefly defend the thesis that, in the long-run, it is much better for them and the society at large for the individual decision makers to be let alone to develop rational responses to their cognitive constraints.

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It has been said that man is a rational animal.
All my life I have been searching for evidence which could support this.
Bertrand Russell

Despite widespread claims to the contrary, the human mind
is not worse than rational [...] but may often be better than rational.
Leda Cosmides and John Tooby

1. Introduction

The theory of rational choice (RCT) provides the methodological foundation stone for mainstream neoclassical economics. It was developed in a broader theory of human decision making, applicable not only to the economic market domain but also to the non-economic-market human behavior. Nevertheless, the rationality model or *Homo Economicus* has received a great amount of criticism inside and outside the field of economics, by numerous economists, social scientists, philosophers and others. The criticism was as early as the emergence of classical and neoclassical thinking but it kept growing with the success of economics as the social science *par excellence* (Mäki 2008: 543) a hybrid of semi-hard science occupying an unprecedented status for social sciences and humanities in both the academic curricula and the policy circles.

Therefore, although the neoclassical model offered a powerful methodological tool for economists but also for other social scientists (especially lawyers and political scientists), the controversy over its theoretical grounds is now on its peak. The most problematic aspect for the majority of the critics is the trade-off between the predictive power and the accurate description: the predictive power in neoclassical economics is purchased at the expense of realism in description and quite often of robustness in explanation. The predominance of instrumentalism and positivism after Friedman (1953) and behaviorism after Samuelson (1938) was so overwhelming that led to a most impressive homogenization of the field at least in terms of the hidden methodological agenda for most economists working without bothering themselves with epistemological or philosophical concerns. Furthermore this trade-off was considered by many as ill-advised from the beginning since (for them) the promise of predictive power wasn't fulfilled.

During the years a number of economists and social scientists offered powerful critiques of the economic methodology (see esp. Veblen 1898; Simon 1955; Allais 1953; 1997: 5-6; Sen 1977; Arrow 1987). These critiques were widely discussed, especially by scholars with an interest in philosophy and methodology of economics or the history of economic ideas. However the rest of the profession remained indifferent (as the scarcity of chairs in philosophy and methodology of economics in North America and Europe aptly illustrates) or even hostile to the philosophical and methodological challenges of the neoclassical model despite the growing disillusionment with the economic science after major economic crises or the inability of economists to provide accurate predictions. The main reason for this adherence to decaying neoclassical economics was the absence of a serious alternative and the wide consensus among practicing economists that the tools of neoclassical economists are the only tools available for doing their work.

This consensus was recently being attacked by the emergence of behavioral economics. Behavioral economics do not only dispute the rationality assumption of rational choice theory but for the first time there is a number of mainstream economists who seem to adopt the concepts and tools of behavioral economics (Akerlof and Kranton 2010: 28; Camerer, Loewenstein and Rabin 2004; Diamond and Vartiainen 2007) and some of them even argue that individuals are systematically irrational (Ariely 2008, 2010).

Behavioral economists initially attempted to provide a better descriptive model of decision making, something that the neoclassical economists had purposefully overlooked for the benefit of powerful prediction (Friedman 1953). The former tried to discredit the traditional model of rationality by criticizing mostly its lack of empirical support. They benefited mainly from the useful insights of cognitive psychology (Ross 2005) and they designed tasks of their own in order to examine the process of decision making in the context of economic choices in the laboratory.

In this paper we are going to restate the classical model of rationality as this is accepted by the mainstream (as we will see it’s not an obvious and easy task) and discern its important assumptions and premises (section 2). We are going next to present and assess the critique to this model with an emphasis on behavioral economics (section 3). In the following section we will try to answer some of the arguments against rational choice theory by behavioral economics, in a theoretical level but also in an empirical level using the growing number of data

from alternative approaches, such as experimental economics, field experiments and evolutionary psychology that sufficiently rebut the behavioral economics' model of human behavior and make a strong case for rationality in human behavior. Even though this is a quite different version of rationality, it doesn't seem to discredit neoclassical economics (section 4, 5). Finally (section 6) we will conclude trying to answer briefly the most important related policy question: when rationality seems to fail, does this necessarily imply that agents should be paternalistically protected against themselves (as many behavioral economists argue explicitly or implicitly)?

This, of course, does not mean that the neoclassical model cannot be further improved and applied even more ambitiously (see recently Gilboa 2009; 2010a and 2010b for such an attempt). The discussion about the rationality premise in economics is far from being resolved yet. And despite the epistemological debate, this remains an issue of great overall significance since there are many political implications involved as well (Hatzis 2009). In order to successfully rebut the critiques, the model of rational choice theory requires at least an improved description of rationality, informed by the results in evolutionary psychology, cognitive science, neurosciences, but also of the empirical data on decision making offered by experimental and field economics.

2. Rationality and Rational Choice Theory

Since the ancient times the concept of rationality has engaged the interest of philosophers and scientists of various fields of inquiry making its definition and analysis quite complicated (Sugden 1991; Nozick 1993; Nussbaum 2007; Searle 2001; Zouboulakis 2001; Anand, Pattanaik and Puppe 2009). There is often some misunderstanding about which type of rationality economists are concerned with, and for this reason we will first attempt to briefly distinguish a few basic features of the concept of rationality in philosophy and social sciences in general before moving on to the more specific description of rational choice theory.

The concept of rationality depends enormously on the accompanying normative theory that one chooses to use in order to test whether a behavior is rational or not according to the initial formulation. Accordingly, for instance, philosophers and mathematicians use the principles of

formal logic and statisticians use the theory of probabilities. Economists use the rational choice theory model and the assumption of expected utility maximization. These normative theories are also prescriptive because they simultaneously indicate an optimal way for individuals to think, judge and make decisions in order to be rational (i.e. to realize their preferences). Some descriptive theories, such as the ones found in psychology, make observations about how individuals actually behave. Based on these observations one can discern whether the actual behavior conforms to the assumptions of the specific theory of rationality she chooses to employ and consequently determine if a person or a behavior is indeed rational (Over 2004; Schooler 2001).

Economic rationality is instrumental in its essence. The use of an *instrumental rationality* suggests that we are more concerned with using our model of rationality as a tool to better understand and function in the world rather than with accurately describing how it really is (Hindmoor 2006). So, an individual is rational when she chooses those actions that satisfy her preferences with the employment of the best possible means.

Furthermore, there is a distinction between *epistemic or theoretical rationality* and *rationality of action or practical rationality*. The former has to do with the rationality of an individual's beliefs and reasoning and the latter with the rationality of her actions. The beliefs are supposed to be rational when they are based on reliable cognitive processes that yield information which is provided by memory, perception, learning, observation, experiences and the senses. Our reasoning is supposed to be rational when it arrives to true (or almost true) conclusions given the existing premises which are derived from the beliefs. On the other hand, the actions are rational when they help the individual to achieve the goals she sets, given her beliefs and her reasoning while making decisions based on those (Over 2004; Hogarth and Reder 1987). An instrumental theory, such as rational choice theory, deals with the rationality of action and more specifically with the validity of the means rather than the ends. The rational evaluation of the personal goals (desires/preferences) of an individual is outside the scope of the model of rational choice theory, unlike with other social sciences' theories (Becker and Stigler 1977).

Rational choice theory is both positive and normative. It is positive because, up to a certain degree, it is expected to observe, describe, explain and, most importantly, predict the actual choices people make in economic markets and other environments that involve choice. And it

is normative (prescriptive) because, at the same time, it suggests a set of ideal standards and norms of behavior that best lead to the attainment of individual goals. This normative aspect doesn't have to include any kind of ethical evaluation (Sen 1987; Drakopoulos 1991; Hausman and McPherson 2006). Finally, it must be pointed out that economics is concerned with the aggregate behavior of rational agents, not with the specific choices and actions of single individuals. This means that economists base their assumptions on a "representative" individual behavior and then explain the regularities that will occur on the total population under study as the *average* performance of all the individuals.

The classical model of rationality can be found in seminal form in the texts of classical economists (Smith 1776: IV.2) but it was manifested more clearly after the marginal revolution. However in its current form, the rational choice theory as an all-encompassing theory of human behavior was initially conceived by Gary Becker in the middle of the previous century. Becker (1962; 1976; 1993) was the first economist who consistently and successfully applied the economic approach (i.e. RCT) to a great range of non-market behavior. Since Becker, RCT is an effective set of tools economists have at hand in order to work their assumptions and make their predictions not only in the "everyday business of life" (Marshall 1890) but also on human behavior in general without any visible limits. He was the one to realize Lionel Robbins' (1932) vision of economics as is "the science which studies human behavior as a relationship between scarce means which have alternative uses."

It was evident that such an ambitious imperialistic project would attract all sorts of criticisms from all directions (Stigler 1984; Maki 2008). However, the reason that the model of *Homo Economicus* (or *Econ,* as was more recently caricatured by Richard Thaler and Cass Sunstein 2009), is being so ferociously attacked, is basically threefold: First, because of its questionable epistemological assumption of rationality, second because of its oversimplified and seemingly unrealistic premises, and, third, because of its imperialistic expansion on almost every essential aspect of human behavior. Below follows a concise description of the model as it is generally acknowledged by its major proponents (Gary Becker, Richard Posner, James Coleman, Jack Hirshleifer, Edward Lazear but also Jon Elster, John Harsanyi, John von Neumann, Oskar Morgenstern and Leonard Savage). The fundamental assumption of the theory is perfect rationality. By this it is roughly meant that the individual has:

(a) stable preferences over time which are also ranked on a subjective and ordinal scale, thus defining her utility function, and

(b) a maximizing behavior toward the realization of these ends, given the scarcity of resources, the constraints of means (external or internal), time, social and institutional context and often under conditions of risk and uncertainty.

Also, the rational individual:

(c) thinks at the margin (she constantly compares the costs and benefits of her marginal moves).

(d) maximizes expected net benefit, and

(e) responds to incentives, but not always in a clearly predictable "stimulus-response" manner, but in a more interactive and complicated way.

More particularly, it is assumed that the preferences of the rational individual are *complete*, *transitive* and *continuous*. Complete are the preferences, for example A and B, that the individual may either (i) prefer A to B, or (ii) prefer B to A, or (iii) is indifferent between them. Transitive are the preferences, say A, B and C, where, if the individual prefers A to B and B to C, then she prefers A to C. Note here that this form of rationality admittedly requires some sort of elementary reasoning. Moreover, completeness and transitivity guarantee the ordinal ranking of the preferences (Heap 2004; Hausman and McPherson 2006). Continuous preferences mean that for any bundle of two goods there is at least another bundle of the same goods in different proportions offering the same utility for the individual (see however Drakopoulos 1994). Some economists further assume that preferences should also meet the requirement of *reflexivity*, which means that a bundle is always as good as itself (Hindmoor 2006). Actually this requirement is quite important for the maximization hypothesis since in combination with the non-satiation requirement (x is always < x + y when y is positive) it essentially says that people prefer more to less.

The *utility* of a good is the subjective and relative to the other goods satisfaction that the individual gets from it. This utility is what the rational person is expected to maximize under con-

ditions of risk or uncertainty, i.e. when she is not completely sure of the outcomes of her choices. Nevertheless, the rational individual, while choosing among available alternatives, making decisions and taking actions, she takes under consideration the *marginal utility*; she is not only concerned with the total or average utility of her final choices but with the gains or losses of every step she takes along the way, such as the cost to her of each piece of additional information in comparison to the marginal benefit of a better informed decision. This means that there is not an objective optimal means for someone to arrive to her final end that satisfy her desires, but that the individual uses her personal overall evaluation and understanding of the world and then acts accordingly in order to achieve her goals.

In addition, the rational person (*Homo Economicus*) is supposed to be motivated by self-interest. He sets his goals and he seeks to optimize his wellbeing by satisfying his preferences. His concern is the maximization of his utility with consideration of other people's interests when and if they somehow enter his utility function (i.e. if he has other-regarding preferences). He uses the available resources in order to calculate the costs and benefits of his choices in accordance to his preferences (but he also economizes by investing in information-gathering and decision-making only if it's marginally beneficial). Of course, this is not to say that the rational individual is fundamentally selfish (see Rachels 2003: 71 for a distinction between selfishness and self-interest) or ethically egotistic as the Randian argument on rational egoism goes (Rand 1964). The individual has preferences for altruism, dignity, morality and social norms (that might be quite strong). These preferences have a similar nature with the preferences for goods and services (also see Drakopoulos 1994 for a distinction of wants/needs and substitutability among preferences). Thus, they do not have infinite value for her and they are antagonistic to other more mundane preferences and subject to the above requirements (Becker 1976). In any case rational choice theory has nothing to say about what is the content of people's preferences and so it does not aspire to assess the quality or even the rationality of these preferences (or desires). More simply put, the rational person makes choices consistent with her own preferences, preferring usually more of a good than less. In fact, cognitive psychologists and neuroscientists have established these basic two, very similar to the above, dimensions of human behavior and choice, in order to describe humans' affective experiences, such as preferences and desires in qualitative and quantitative terms: *valence*, which ranges from worse to better states, and *arousal*, which ranges from lower intensity to higher intensity states (Watson et al. 1999; Knutson and Peterson 2005).

These basic and simplistic assumptions about the behavior of the individual, which partly belong to the descriptive aspect of RCT, are quite similar to the notions of folk psychology: behavior is caused by mental processes which are the reasons for the actions. Folk psychology is something humans naturally employ in everyday life when they infer about the beliefs, desires and preferences of other individuals through a bundle of quick and easy – and usually unconscious – specialized cognitive procedures of the brain (Duchaine, Cosmides and Tooby 2001).

A very successful definition which includes almost all the above elements is the one given by the Nobel laureate Reinhard Selten (1990: 3): "Rational economic behavior is the maximization of subjectively expected utility."

This simplified model of human behavior has caused a lot of negative responses by some psychologists and behavioral economists which are almost always accompanied by a plethora of laboratory data contradicting and supposedly discrediting RCT. In the following section we will discuss the primary theoretical critiques against the neoclassical model of rationality and then move on to the description of the critique that emerges mainly from psychology and behavioral economics.

3. A Critique of Rational Choice Theory

Admittedly, it is almost impossible for a scientific model to have both a perfect and realistic description of the facts under study and to offer at the same time accuracy of prediction based on assumptions about the same facts (Hawking 2001: 31). Although Friedman (1953) insisted on the importance of prediction over description and this was welcomed by economists as a desirable trade-off for an ambitiously rigorous science, the lack of a more realistic description of the classical model remains an uncomfortable issue for economists.

Obviously, humans are not perfectly rational in the sense that they never hold erroneous beliefs or never make mistakes at some types of calculations. People can sometimes miss or misunderstand the available information, lack the willpower to attain their goals and/or fail to find the optimal means to achieve their ends (Elster 1986; Wilkinson 2008; Schwartz 2008; also Searle 2001). It is without doubt that the human brain is confined by certain internal con-

straints – neural and broadly cognitive – and has limited mental capacities compared to "perfection." All the above constitute a key aspect of real human decision-making which the classical model deliberately overlooks in order to maintain a parsimonious theory (the *as-if* assumption of Friedman, 1953). Of course it remains a subject in question whether these constraints on rationality are enough in quantity and frequency or even quality as to build a case for universal irrationality (Ariely 2008); a subject that will be a major theme of discussion for the rest of the paper.

Another considerable drawback of the descriptive side of the neoclassical model is that it seems to adopt the stance of psychological behaviorism (a dominant theory in psychology from the early 1930's to the late 1970's) in the sense that it hesitates to infer any mental states from the preferences that are revealed through the choices that the individuals make. Paul Samuelson stated his *revealed preference theory* undoubtedly greatly influenced by his contemporary behaviorist psychologists (esp. John B. Watson and B.F. Skinner) This device is rather instrumental and quite practicable. It suggests that the preferences and their ordering can be inferred merely by the actual choices that individuals make, as these can be observed in actual market behavior, and given the knowledge of the existing constraints that affect them. Thus the preferences are essentially identical to the choices (which are revealed preferences) and there is no need to establish causal links any further. Any further assumption that there are sophisticated internal states (assumed by folk psychology) will only further complicate the simplicity of the model's predictability without any noticeable practical gain.

Evidently, the revealed preference theory sounds unrealistic as it seemingly disregards the mind and almost always treats any mental states as identical to physical behavior. The emergence of cognitive science, neuroscience and modern psychology has long vitiated this claim. Moreover, the revealed preference theory is apparently tautological and it has been accused as effectively trivial. It has no explanatory power whatsoever as far as the internal reasons and causes of actions are concerned. Furthermore, it says little about how the preferences, beliefs and desires are formed. But then again, economics do not profess to address such matters originally. Mainstream economics deal with the rationality of the means not that of the ends. That is to say the classical model is primarily concerned with how ends are achieved and not how those ends have been formed or chosen in the first place (Stigler and Becker 1977, Hogarth and Reder 1987; but see Cowen 1989). Notwithstanding this is an issue of great interest for anyone who pores over the study of human behavior.

Nevertheless, not all the critiques against the revealed preference theory are based on firm scientific arguments. The theory merely suggests that we can infer the preferences from the attitudes. But this is not any novelty as far as the empirical social sciences are concerned. In fact, as we try to collect our data from observing the behavior of people (or even animals), whether by looking, listening, asking or experimenting in general, we are always inferring desires, beliefs and preferences from certain behaviors, i.e. actions and attitudes. Surely, we cannot "read" someone's mind and even the recent technological advances in observation of the neurons' activities in the brain constitute observation of behavior too, only of another kind, that of the physical and chemical behavior of cerebral cells. Seen from this perspective, the mind-body problem of the philosophy of mind remains one the hardest insoluble problems for philosophy and cognitive science and certainly its utter solution is not expected from economists.

The model of perfect rationality has inevitably been the target of many scientists as a false – or a very poor or simplistic at best – hypothesis. Therefore, behavioral economics emerged as an interdisciplinary approach that challenged the rational choice theory, offering at the same time tools that can supposedly replace the analytical tools of the former (Rabin 1998; 2002; see also generally Foka-Kavalieraki 2010 for a critical historical review). Behavioral economists – contrary to neoclassical economics – work almost exclusively in the laboratory, designing tasks in order to study the choices of their subjects in a controlled environment. Their main concerns are the process of preference formation (Slovic 1991) and the process of realizing these preferences (Rizvi 2001). The outcomes of their experiments seem to show that individuals employ certain *heuristic* methods to help themselves with decision making. These heuristics are simple and fast mental mechanisms that surface often intuitively when people are faced with problem-solving. Several cognitive "biases" that have little to do with external constraints and more with the cognitive limitations seem to accompany these heuristics and influence negatively the choices that are made toward the "wrong" way (wrong meaning here away from the set goal).

In 1978 psychologist Herbert A. Simon won the Nobel Prize for his work on *bounded rationality*. He and his colleagues advocated the thesis that people are far from being completely rational in the neoclassical sense. On the contrary their decision making is restricted by certain constraints concerning the acquisition of information and the formulation and solution of

their problems while they make their decisions. He maintained that humans lack the appropriate mental capacities to achieve many of their goals and their behavior is not maximizing. Instead they succeed only in *satisficing* their desires as they're not capable of making the optimal choices but just the "good enough" ones (Simon 1987).

Two other psychologists, Daniel Kahneman and Amos Tversky (1979) working in their laboratory, were the first to study heuristics as a basis of systematic errors in human decision-making. Their *Prospect Theory* (which won Kahneman the Nobel Prize as well) aspires to substitute expected utility theory as it tries to describe the actual behavior of people under situations of risk with known probabilities for each outcome (*prospect*). Their general laboratory findings (Kahneman and Tversky 1986) showed individuals to be (a) risk and loss averse, which means that they are trying to minimize the risk and not to maximize expected net benefit and that they value gains less than no-losses (Tversky and Kahneman 1991), (b) incapable of connecting the right probabilities to the different outcomes (Tversky and Kahneman 1972; Tversky and Fox 1995), and that (c) their decisions are typically affected by the *framing* effect, i.e. the way the information they receive is put before them (Tversky and Kahneman 1986; Kahneman and Tversky 2000).

The economist Richard Thaler popularized the *endowment effect* as a major bias that derives from the inclination of people toward loss-aversion (Kahneman, Knetsch and Thaler 1991). Because of this effect, an individual supposedly asks for a higher price to sell a particular good that she currently owns than the price she would offer for the same good in order to acquire it in the first place. Thaler (1999) further discussed the *mental accounting* which is the general process people practice in their minds while perceiving and evaluating various events and which of course is completely dependent on the particular framing of those events. Kahneman and his colleagues also theorized and tested the *anchoring effect* as an important form of framing, which shows people's responses to be influenced even by phenomena that seem irrelevant to their decisions (Tversky and Kahneman 1974).

Over all these years a vast number of behavioral economists have been recycling the same psychological experiments (or their slightly alternated versions) in their labs in order to test the different "biases" or to discover brand new ones. The verdict they reach *en masse* is that humans are basically and systematically irrational, far incapable of pulling off the hyper rationality of the neoclassical model. So behavioral economists not only reject rational choice

theory as a false and even misleading scientific hypothesis in most cases but they also actually make the overstatement of universal irrationality. Daniel Ariely in his latest books (2008, 2010), which could really be characterized as the ultimate in behavioral economics extremism, "presents a wide range of scientific experiments, findings, and anecdotes" trying to convince his (irrational?) readers that the mistakes people make in almost every area of life are so certain, systematic and global that humans' irrationality is actually completely unavoidable.

In the following sections we will try to rebut these general conclusions of behavioral economics, looking into the logic that underlies their assumptions and their methodological approaches, while we try to establish a stronger case for rationality.

4. A Defense of Rational Choice Theory

Behavioral economists failed ultimately to describe a particular universal pattern of decision making and they definitely did not succeed in providing an alternative unified theory of choice. All that behavioral economists usually point to, is these numerous cognitive "biases" (which actually can be scaled down to no more than four or five – see e.g. Gal 2006), that deviate from RCT and which are supposed to influence subjects while they make specific and limited choices in the lab. These scattered findings and assumptions that can't offer a consistent model of human behavior, seem enough for them to dub humans as basically irrational. The inductive methods of behavioral economics remain as much a disturbing issue as the "abstract deductions" of rational choice theory (Mitchell 2002a; see also Popper 1959). Glaeser (2004: 2) aptly observes that "[e]conomics is neither so weak nor psychology so strong that economists should content themselves with applying psychology to economic problems." (see also Glaeser 2006).

As Vernon Smith has emphasized, behavioral economists, including Kahneman, have only been concerned with attacking the neoclassical model of rationality rather than trying to develop an alternative positive theory. As a result they failed to answer the most critical question: "to what kind of "optimal" decision-making process, if any, have human beings adopted?" (Smith 2008: 151). Behavioral economists seem to set aside the issues of evolution and natural selection. How does *homo sapiens* survived nature's strenuous challenges if a ba-

sic characteristic of his behavior was the failure to accomplish his goals because of the numerous (according to behavioral economists) cognitive limitations and errors in judgments? Moreover, according to Rubin (2002: 156) "humans are deeply competitive with each other [...] In this competition, those who made better decisions would have done better." Could irrationality be an evolutionary survival trait in a competitive world full of constraints where the choice among alternatives comes down often to life or death? We discuss this issue in depth below.

The conditions of the laboratory experiments have a number of well-known, crucial limitations (Gigerenzer 1991; Plott and Zeiler 2005; List 2006; Smith 2008; McKenzie 2010). They also have important framing effects themselves (Ert & Erev 2008), sometimes unintentionally and sometimes deliberately but always unavoidably. If the mainstream assumptions of rationality are accused of having compromised fundamental epistemological principles, so have the behavioral methods as well (Gigerenzer and Berg 2010). Indeed, there is a lot of growing critique against the experimental framing of behavioral economics since it is argued that the way the subjects' choices are elicited has very little to do with real life – actual market settings (Posner 2003; Friedman 2005; Wright 2007; McKenzie 2010). The usual processes of the behavioral tasks have been criticized not only for the artificiality of their environments but also for their incompatibility with the actual cognitive basis and background of humans. More critique of these mistakes that behavioral economists commonly make in their laboratories comes from other sciences as well as we are going to show below in this section.

Many of the "irrational behaviors" that behavioral economists discovered and demonstrate can be explained in terms of rationality and rational choice theory in particular (Posner 2003). Every time, during the experimental procedures, there is an inconsistency of choices which the subjects make, behavioral economists rush to the conclusion that these signify inconsistencies of their preferences as well – something that would make the individuals irrational. But a change in choices could pretty much mean a change in a number of other factors relevant to the choice and often invisible to us, such as constraints, transaction costs, opportunity costs, a deliberate or non-deliberate alteration of the external incentives and in general a twist in the whole subjective cost-benefit calculus of the individual (Hayek 1945; Posner 2003; Weiss 2008). People's preferences and actions will even tend to be more or less benevolent to others depending on the expected costs (Hindmoor 2006). So, while the external factors and variables of the choice environment change, the preferences remain stable over time as it is

assumed by the traditional model and the rationality of the decision makers still stands (Stigler and Becker 1977).

The “hyperrational caricature” of rational choice theory has proved until now a useful tool for economic analysis and modeling, but it’s not the utmost description of reality. The fact that people sometimes make mistakes, have systematically false beliefs about economics (Rubin 2003; Caplan 2002; 2007), misinterpret the available information, do not have the time and the resources to acquire and process infinite information and sometimes fail to attain their goals by using the optimal means, does not necessarily jeopardize their innate rationality. All these constraints of human cognition and the environment that surrounds it are given facts, well-known to economists since Adam Smith (Ashraf, Camerer and Loewenstein 2005) and their observation certainly does not constitute some sort of a breakthrough for the sciences of behavior. That is why, for example, “bounded rationality”, despite its more accurate description of human decision making added little of essence to the explanation of human behavior and almost nothing to the modeling of it (Rubinstein 1998, Glimcher et al. 2005). Furthermore the concept of “satisficing” fails short to offer any real solution to the problems of measuring utility, satisfaction or happiness, since it cannot indicate a particular point as to where the good enough actions would stop – maybe something even more abstract than the maximizing process of rationality (Elster 1986; 1990). It adds an independent variable which is not only subjective but also indeterminate, a moving target. Maximizing can be an unrealistic concept but satisficing is something even worse: it’s elusive and trivial.

Nevertheless, the experiments did not remain for long a methodological advantage for behavioral economics. Many economists have been designing and conducting revised or different experiments not only in the laboratory but also in the field. Similarly successful are the large statistical analyses of already existing and published data that some economists have been using and studying in order to correlate different phenomena. The aggregate findings of these approaches lead to the confirmation of rationality as an existing and strong property of human decision making (Mitchell 2002b; 2003).

Experimental economists, prominently represented by Vernon Smith – another Nobel laureate - and Charles Plott, have refuted the arguments of behavioral economics by recreating much more realistic market, institutional and strategic situation settings in their laboratories which include reward-motivated choices. These simulations has shown that almost all of the behav-

ioral cognitive or even moral “biases” are eliminated over time under strong market forces. Plott’s (Plott and Zeiler 2005) and Smith’s (2008) experiments on the “endowment effect” have repeatedly shown that the relevant risk aversion of the subjects who are not willing to sell a good they possess at the lesser price they would be willing to buy it, depends highly on the experimental procedures and the institutional context. Veronika Grimm amd Friederike Menge (2010) have recently shown that delaying acceptance decisions in the Ultimatum Game drastically increases acceptance rates of low offers. While in standard treatments without delay less than 20% of low offers are accepted, these numbers increase to around 65-75% as they delayed the acceptance decisions by only 10 minutes!

Experimental economists have advanced the concept of *ecological rationality* as an evolving system with survival value that emerges from biological and cultural pressures and accounts for many seemingly “irrational”, intuitive or otherwise nondeliberated and unconscious attitudes (Smith 2008). According to this conception, rationality is an evolving procedure where individuals adopt through trial-and-error processes. Any pre-existing biases and cognitive quirks swoop away sooner or later under the massive pressing forces of the market which will crowd out people who do not adapt swiftly (see also Rachlinski 2006). Individuals will eventually *learn* by their experience to act rationally even when they do not do exactly so in the first place, moving efficiently toward the market equilibria that mainstream economics predict.

The same conclusions are reached by a number of empirical economists who have undertaken in recent years ambitious and original natural field experiments, in an attempt to approximate real life conditions and avoid the well known problems of laboratory experiments (Levitt and List 2007; 2009). In this type of experimentation the subjects are not aware that they are taking part in an experiment and thus the economist can receive naturally occurring data (List 2008; McKenzie 2010; Harford 2008). John List has worked extensively with field experiments and in with his work confirmed the validity of the rationality premise. For example, by studying the endowment effect, he found that while this bias works on inexperienced buyers, it does not apply on the habitual buyers-and-sellers that are used to trades and exchanges (List 2004).

Steven Levitt (1996; 2004; Donohue and Levitt 2001; 2003) recently and Sam Peltzman earlier (1973; 1975) were typical examples of economists who collected massive data from pub-

lic data-bases and analyzed them in order to test their hypotheses about behavior in or beyond economic markets. Their analyses often lead to counter-intuitive conclusions about the causes of various economic, social, political and other phenomena and they are based on the assumption of rationality and the importance of incentives. Levitt's most celebrated work was his research on legalized abortion as a key factor for the decreasing rates of crime (Donohue and Levitt 2001).

Homo Economicus, is the victim of the worst stereotyping in social sciences but also in popular culture (Ribstein 2006). He is something between the aggressive and ruthless Gordon Gekko (*Wall Street* 1987) and the lonely and missing the real meaning of life, Lawrence Garfield (*Other People's Money* 1991). The rational individual of economic theory is supposed to be utterly self-interested in the sense that she only seeks to maximize her profit and profit is by default an evil thing (Cowan and Rizzo 1995).

Typically the maximization of utility function is erroneously identified with the maximization of monetary profit (Kirchgässner 2008: 14). This is obviously a mistake for two reasons. The maximization of monetary profit *per se* is not just another preference that can be represented on an individual's utility function as any other good. Money is only a medium useful for maximizing utility derived from other goods. Money cannot satisfy any preference unless it can be exchanged with goods. It is simply the most common form of currency that has as its main function to simplify transactions and reduce transactions costs. It has no intrinsic value whatsoever – unless you are Scrooge McDuck (another stereotype)! So any amount of money is translated into prices for particular wants and desires.

However, money (and its maximization), because of its universal and value-free form as a medium of exchange, plays another even more important role for the improvement of the model of rational choice theory, in the sense that it can help it overcome the implied theoretical tautology concerning preferences, choices and maximization (Hatzis 2010). The price an individual is willing to pay or forgo for a good is a proxy for how much more or less or equally she values it compared with other goods. This way we can infer more safely the subjective ranking of a single individual's preferences on an ordinal, at least, scale, i.e. her utility function, and also do an intrapersonal comparison of aggregate utility functions. By "good" here we mean, as mentioned earlier above, any sort of preference she has, such as material goods and services or a preference for life, death, altruism, dignity, morality, other persons

and social norms in general. Thus, the maximization of money essentially equals the maximization of most of his preferences.

According to sociologist George Homans (1961: 79-80):

> *The trouble with him [economic man] was not that he was economic, that he used his resources to some advantage, but that he was antisocial and materialistic, interested only in money and material goods and ready to sacrifice even his old mother in order to get them. What was wrong with him were his values: he was only allowed a limited range of values; but the new economic man is not so limited. He may have any values whatever, from altruism to hedonism, but so long as he does not utterly squander his resources in achieving these values, his behavior is still economic. [...]In fact, the new economic man is plain man.*

It is now apparent why rational choice remains a powerful theory, even today after so many attacks. The assumption of rationality proved eventually very difficult to be refuted either theoretically or even based on empirical research. Combined with the relative simplicity and the prodigious predictability of its model, it far outgrows scientifically any suggestions of universal irrationality (Osborne 2003).

Rational choice theory, by advancing the universal assumption of rationality and supporting it with a model of maximizing behavior, still provides us with the best (in terms of efficiency) and more rigorous (in terms of prediction) model of human behavior. As it is most often the case in natural sciences (Rosenberg 2008: 93), rational choice theory model works so well and does account for statistical regularities because it approximates the truth more than any other rival theory. But even if we accept that individuals are characterized by various cognitive or other imperfections, the model is still good enough to help us with our predictions. The rational choice model is the only model in economics with the necessary positivistic element that every scientific theory needs (as it was famously stated by Friedman in his seminal 1953 paper), parsimony of its assumptions and reliance of its predictions.

It could be argued that the supposed “falsifications” (Popper 1959) of rational choice theory, in the form of several “departures” from rational and maximizing behavior that behavioral economists report, could mean that the model is rendered false. However this line of Popperian argument, although popular amongst critics of RCT (Boland 2003; see generally Mäki 2008: 544), isn’t necessarily and always useful. It is widely accepted by contemporary sciences that confirmation of our hypotheses should also play a significant role for the scientific

development. In addition, it is now considered as a common scientific practice for scientists to not get disappointed with any problematic observations that happen to occur and to not immediately abandon their initial assumptions, especially if there is not a credible rival theory (see the discussion in Arabatzis 2008: 165-169). A number of other factors can most likely be responsible for this, such as problems with the collection of data, the measurement methods and tools, the interpretation of the results and of course the existence of variabilities presently unknown or unaccounted for (Hájek and Joyce 2008: 114).

Social science in general has long been plagued by the existence of numerous and scattered disciplines and subdisciplines dealing with the same object of study, i.e. the individual action and the aggregate behavior that stems from it. Undoubtedly, each of these areas of social sciences has much evidence to present concerning human behavior, but they all remain sporadic and they have definitely failed to provide a unified theory offering reliable prediction. Economics is the only social science that scores so high in predictability and this was the reason for the successful borrowing of its methodological tools by other social sciences (see e.g. law and economics, public choice, etc). Furthermore, social sciences have fared poorly with issues of great importance since the antiquity, such as the mind-body problem and the accounting of the reasons for actions or intentionality in general (Hausman and McPherson 2006; Rosenberg 2008).

Another crucial failure of social sciences was their inability to construct a unifying theory of causes and explanations. Within the field of social philosophy and social science, the dilemma of prediction versus explanation has sometimes become a matter of which side to choose rather than an effort to reconcile both (see also Weber 1880 and Zouboulakis 2001: 34-37). Scientists of any field of study should be interested in the predictive power of their hypotheses as much as with the degree of the truth that these hypotheses offer since the ultimate goal of science is knowledge. However we should always keep in mind that knowledge is not limited to a quest for the causes and explanations of an observable phenomenon. The conclusions that can be drawn from successful scientific predictions can be variably insightful and constructive for the study of the phenomena as well.

The emerging fields of experimental economics, field economics and their hybrids, keep supplying economic science with more and stronger evidence of human rationality in decision-making as this has already been described earlier here. However, the concept of rationality

should be appropriately extended so as to include and explain the presence of some seemingly cognitive quirks or "irrationalities". In other words economics needs an integrated theory that will unify its assumptions and empirical evidence into a coherent and more universal theory. This can be accomplished with the help of the modern theory of human evolution. Its powerful laws of variability, inheritability and natural selection have offered the explanatory basis that was lacking in the study of the shape, the change, the various physiological functions and the origin of the living species. We believe that evolution can also provide economics with the unifying explanatory theory it needs when it comes to the behavior of the economic agents and the issue of rationality.

5. Rationality, Evolution and the Brain

Economics and biology have encountered each other before (Marciano 2007; Buss 2009; McKenzie 2010). Darwin himself was inspired from Malthus' ideas about the growth of population and the "struggle of existence" when he grasped his own ideas of evolution and natural selection that he later presented in *The Origin of Species* (1859). It has also long been established that the idea of natural selection was under the influence of the "invisible hand" explanation in economics (Aydinonat 2008). Since then, it worked mostly the other way around: many economists have been inspired by the theory of evolution and the application of its principles in economics (Friedman 2005; Rubin 2002; 2003; Smith 2008; McKenzie 2010). As the prominent evolutionary psychologists Leda Cosmides and John Tooby (1994a: 328) have pointed out: "In other words, natural selection's invisible hand created the structure of the human mind, and the interaction of these minds is what generates the invisible hand of economics: one invisible hand created the other." It can easily be seen why the spontaneous order of nature as well as that of economic markets has stimulated the conjoint interest of biologists and economists alike for search of potential similarities (see also Hayek 1937; 1945 and Nozick 1974; 1994).

It has been strongly suggested by Darwin (1871) himself and more recently shown by contemporary philosophers and scientists that the theory of evolution can contribute decisively to these questions that bedevil social sciences for so many centuries, as it is able to finally account for the causes of individual behavior by providing rigorous explanations (Buss 2009).

We intend to show in the following paragraphs that this can be achieved from an individualistic point of view rather than a holistic one. The philosophical application of Darwinian theory on the behavior of corporate actors (societies, firms, other organizations and groups) supposedly functioning as intelligent and independent agents, has proven very problematic conceptually, methodologically and predictively. In particular, random variation, natural selection and the genes (as natural replicators of organisms), cannot easily find their realistic counterparts in the learned, purposeful and aggregate behaviors and cultural characteristics of societies. A concept of "group mind" or "collective consciousness" is yet more defective. In sum, any notion of "selection", "reproduction", "replicator" or "fitness" on the level of organized groups and societies remains just another argument from analogy (Rosenberg 2008) in which we are not interested here. Also, we do not refer to the sociobiological approach (see Wilson 1975) and we will not discuss at this point the concept of Hayekian evolution of institutions and societies.

We are going to use the theory of evolution by adopting the same approach to the disciplines of psychology and brain sciences with the emerging field of evolutionary psychology. We believe that the idea that evolutionary theory can function as a "metatheory" for all the sciences that deal with human behavior, conjoining them under the umbrella of a single scientific theory, is very promising (Buss 1995a; 1995b; 2009; Tooby and Cosmides 2007; Workman and Reader 2008).

Economics is first in line to claim such a unifying and explanatory theory from evolution as it is concerned with human judgment, decision-making, reasoning and acting within environments of choice, namely, it is concerned with high level human cognition. High level cognition consists of a number of very complicated and sophisticated mental and of course neural processes that consume much of the brain's overall energy. The brain alone consumes a significant amount of the entire body's energy. We now know from contemporary biology and the brain sciences that something so apparently costly must have been strongly selected for (Rubin 2002: 156; Blackmore 2005; Buss 2005; 2009), i.e. it had a surviving value in the evolutionary past and its adaptation came down to us by a very long process of trial and error that has been proven successful and so exists for a reason. If we can find out these reasons then not only will we have shown causality but we'll also be able to better understand and explain how and why human cognition works the way it does.

Eventually we will be able to account for rationality as well, as long as we view the latter as a kind of an evolutionary adaptation. We should then approach rationality as **a dynamic process of an evolutionary adaptation within the limits of equally changing biological and socio-cultural surroundings**, i.e. as the "ecological rationality" according to Gigerenzer (2005, 2006); Tooby and Cosmides (2007) and Smith (2008) or "rational rationality" as proposed by McKenzie (2010). Moreover, we believe that rationality should better be seen as **an underlying mechanism, that may involve conscious as well as unconscious processes, which underlines all actions that involve choice, rather than a trait that can either characterize a specific choice or not** (see also Khalil and Marciano 2010)**. Rationality cannot involve only deliberate and formally logical thinking but every cognitive process that can be employed by the brain, which can help the individual to achieve her goals with the best means available at hand (and given all the constraints of time, space, resources and information)**. Today, the emergence and success of the sciences of the brain are so impressive and has so many repercussions for the study of human behavior that it seems at least a major oversight for a social science to not take seriously into account the study of the brain and the mind while trying to deal with a mental state such as rationality (Shermer 2008).

Evolutionary psychology offers us a theory for the *historical causes* of the brain's states and functions and in this way it can lead our research of decision making and rationality toward the correct direction. At the same time, contemporary cognitive psychology, neuroscience and neurobiology can provide us with the *present causes* of brain functioning. We are able now to literally look into the substrate of mental states, i.e. neurons and neural activities and infer certain mental states. The brain evolved just like every other part of the human body and through a very long period of constant changes and environmental pressures certain cognitive mechanisms have been selected, whereas others have not.

The growing field of neuroeconomics is mostly devoted to studying the brain activity during decision making, using measuring methods of neuroimaging, such as functional magnetic resonance imaging (fMRI), positron emission tomography (PET), eye tracking devices, etc. (Politser 2008; Glimcher et al. 2009). The most amazing recent findings have already shown that there actually exists a physiological utility (and expected utility) function in the brain as particular neural circuits are devoted to utility calculations for various sets of choices. In particular, specific neurons increase their firing as the anticipation of and the actual monetary reward of a choice increases (Knutson and Peterson 2005; Glimcher et al. 2005; Park and Zak

2007; Knutson and Bossaerts 2007). This means that the concept of utility function is not an unrealistic and arbitrary assumption of neoclassical economists, but that such a function really materializes in the form of a neural net of calculating devices that perform combining cost-benefit analyses through the reward and pain associated mechanisms of the brain each time the person has to make a choice. Consequently, these findings can finally help economists attribute subjective values ("utils") to external material and "non-material" goods, allow interpersonal and intrapersonal utility comparisons and even predict behavior under certain circumstances (Park and Zak 2007).

On the other hand, evolutionary psychology possesses the appropriate tools and methodology which can be used to inform the economic model of a utility function. All humans share the same evolutionary past and thus the same physiological and consequently psychological adaptations. This means that up to a significant degree humans share a certain pattern of preferences when it comes to a number of choices they have to face, such as mate selection, parenting care, deception detection, socializing with others, even food appetites, and so forth (Cosmides and Tooby 1992; 1994b; Buss 2005; 2009; Dunbar 2007; *cf.* Stigler and Becker 1977). The findings of evolutionary psychology can be very useful scientific tools for economists, as these findings offer a reliable representation of human behavior to start with when it comes to studying human choice and construct models in social sciences (Buss 1995b). Actually it has been suggested that rational choice theory often makes the same predictions as evolutionary psychology (Harris and Pashler 1995: 45).

The human brain acquired its present neural capacities – its "hardware" material – through an evolutionary period of millions of years, as our ancestors strived to survive in a very different environment than the ones they currently inhabit (Cosmides and Tooby 1992; 1994b). But the fact that humans did make it successfully until today proves that the brain really has surviving properties such as the ability of simple reasoning and the power of conceiving ways to reach its goals most efficiently. Efficient in this context means that the brain adopted in such a way as to be able to assess the gains and losses of every choice with the minimal energy costs (Gigerenzer 2007b). Sometimes this can be achieved consciously but most of the time it takes place unconsciously to the person herself, depending firstly on the time and then on the energy sources there are to spare. Thus many heuristics have evolved as "rules of thumbs" that serve as cost-saving devices (see e.g. Dudey and Todd 2001; see also Gigerenzer 2007a: 66 for a useful list of studies and Mantzavinos 2001) and have been surviving tools that once lit-

erally saved lives instantly but now some of them may seem wrong on the surface and with no purpose at all. But their origin lies rather on rationality and maximization than on systematic and harmful irrationality. And because of the brain's plasticity – a property that allows neurons to increase their synapses and change their functions with each new information input – this procedure improves with new experiences and trial-and-error processes (see also the discussion about the "rational analysis" approach to cognition in Chater and Oaksford 1999). Consequently rationality involves learning to do better and become even more rational over time and experience. Mistakes occur at times but they are neither daunting nor insurmountable.

A few of the most high up observations of behavioral economics, such as the phenomena of "endowment effect," "time- inconsistent–preferences" or "shortsightedness" and "loss aversion" have already been successfully explained away with the help of evolutionary psychology (Heyne 2000; Friedman 2005; McKenzie 2010; Posner 2003). The fact that sometimes we value something that belongs to us more than something that doesn't is considered a successful adaptation in terms of the survival of our distant ancestors. Objects and mainly food were very difficult to earn and once acquired one would have to cling to them strongly and show to everyone else around that she wouldn't give them up easily. This attitude was apparently more successful than other strategies and so through the eons of evolution it was powerfully selected, ending up as an innate tendency or preference. Of course innateness does not mean inescapable behavior and we have already mentioned above how the revised experiments of experimental economists have shown that people tend to improve their judgment and choice performance in settings with more information and less constraints. It has to be reminded here that evolutionary psychology is a rigorous behavioral science that applies specific scientific and experimental methods and tools to test whether any hypotheses and assumptions are valid, as well as collects data from various sources and thus reaching safe scientific conclusions (Buss 2009).

Similarly, the tendency to prefer present gains to slightly increased future gains can be seen as an adaptation selected to enhance fitness. Future, even in terms of a few hours, must have been very doubtful and uncertain in a hostile natural environment, so it comes as no surprise that our ancestors would grab the opportunity to obtain something straightaway than wait and possibly lose it. This uncertainty for the future doesn't seem irrational even in today's free market competitive economics where nobody can really guarantee the stability of future income. Finally, loss aversion – the tendency to strongly prefer avoiding losses to acquiring

gains – makes better sense when viewed from a natural selection's point of view. Extra gain, in the form of more food or commodities, could usually mean more convenience for the individual, but loss of one or more of those things could easily mean depravation, starvation, even death. However according to recent laboratory experiments losses appear to loom larger than gains in some environments, but not in others. The current results reveal no evidence for loss aversion in choice among symmetric two-outcome mixed gambles. A similar pattern was documented in choices among asymmetric multi-outcome gambles, and in the initial choices among asymmetric two-outcome gambles (Ert and Erev 2007; 2008; 2010; see also Harinck et al. 2007; Erev, Ert & Yechiam 2008). In addition Kramer et al. (2006) has shown that when people actually gamble, losses do not have as much of an emotional impact as they predict. People overestimate the hedonic impact of losses because they underestimate their tendency to dwell on losses.

One of the most prevalent conclusions derived from the experimental results of behavioral economists, concerns the inferior performance of subjects when it comes to Bayesian reasoning, i.e. their incapability to manage probabilistic inductions (Kahneman and Tversky 1979; Simon 1955; 1956; 1987). One of the major contributions of both evolutionary psychology and contemporary cognitive science to the study of rationality is that they have proven that the human brain is not selected to function easily with a general probabilistic reasoning, i.e. to infer probabilities from a single event (Cosmides and Tooby 1994a; 1994b; 1996a; Gigerenzer 1991; 1998; Buss 2009). Whenever the experiments are designed to present problems of logic as such, subjects fail to perform. Instead, when exactly the same problems are presented as frequencies of events and require specialized logic, people offer the correct answers. This makes sense from the evolutionary perspective as our ancestors were much more likely to encounter, observe and remember the frequency of occurrence of a certain event rather than imagine its probabilities. It also makes sense because the human brain is most likely selected to function with several specialized modules for each category of problem-solving, rather than with a general processing mechanism for all kinds of problems (Cosmides and Tooby 2005; Tooby and Cosmides 2007). So it becomes clear that many of the "biases" and "fallacies" in judgment reported by behavioral economists are due more to their experimental procedures and unrealistic expectations and much less to the subjects' cognitive incapacities. It should be noted here that although cognitive science has a core representational-computational assumption of how the mind works, it nevertheless consists of several different theoretical approaches of what kind of mental representations and computational procedures exist (Thagard

2005). On the contrary, the rational choice theory model requires a very basic and simple reasoning for the consistency of preferences but has no specific requirements about how these rules are going to be applied in real situations, i.e. how the brain will actually employ this reasoning at each task. For instance, Gigerenzer's (1998: 14) argument about human reasoning has two parts:

> *[E]volutionary (and developmental) primacy of frequency formats, and ease of computation. First, mental algorithms, from color constancy to inductive reasoning, have evolved in an environment with fairly stable characteristics. If there are mental algorithms that perform Bayesian-type inferences from data to hypotheses, these are designed for event frequencies acquired by natural sampling, that is, for frequency formats, and not for probabilities or percentages. Second, when numerical information is represented in a frequency format, Bayesian computations reduce themselves to a minimum. […] The evolutionary part of the argument makes it unlikely that such a neuron has evolved that computes using an information format that was not present in the environment in which our ancestors evolved.*

It seems that humans, probably because of their extremely large and sophisticated mammal brains, have evolved with very common traits, but also with marvelous variability and uniqueness of individual identity (Tooby and Cosmides 1990). Nevertheless, this universal human nature offers economists the statistical regularities they are able to observe in various situations of choice environments in or beyond the economic markets (see for example Becker 1976; 1991 and Posner 1992). We believe that what further unites human nature (and nurture) is the innate property of rationality and its ever-refining character.

6. Concluding Remarks: The Political Implications of (Ir)rationality

In this paper we tried to present a concise description of the model of rational choice theory and to rebut the main critiques against it which comes from "behavioral economics". The basic tenet of these critiques is that RCT holds some very unrealistic assumptions on rationality that have little or nothing to do with actual human behavior. However, we have showed that this is not the case. An abundance of experimental findings and insights from experimental and field economics and, more importantly, evolutionary psychology and the sciences of the brain show that individuals – on aggregate – are potentially and actually far more rational than behavioral economists report from their laboratories. More particularly, we tried to define (a) "rationality" as a universal physiological and psychological adaptation which underlies human choices under constraints and may be derived from evolution and/or learning, and,

(b) a more descriptively informed rational choice theory as the most appropriate scientific model that describes rational behavior so far.

However, the debate over rationality involves serious political implications that should not be dismissed lightly. Social scientists are due to make broader normative evaluations as much as positive ones because the role of the sciences – social or natural – includes also the responsibility to try to improve humans' lives and conditions. Natural sciences do so through the technological progress and social sciences through their "reflexive" character since their theories influence people's behaviors once they become widely known (Rosenberg 2008: 128). Furthermore, rational people seem to respond to incentives in an adoptive way, which is usually unpredictable *a priori*. So the interfusion of descriptive/positive and mainly prescriptive statements in social sciences and particularly economics seems almost inevitable (see also Putnam 2002). So, our thesis goes as following:

If we accept that individuals are systematically irrational, as the behavioral economics presume, and so incapable of making the right decisions for themselves for the most part of their personal or public life, then paternalistic and authoritarian policies seem to be justified in superseding people's choices. Indeed, many behavioral economists have already been suggesting such kinds of policies that they deem as "soft paternalism" or "libertarian paternalism". The most representative work in this direction by Thaler and Sunstein (2009) proposes a number of "nudges" to help individuals make the "right choices." The evidence to support this paternalism is very weak (Rachlinski 2003; 2006).

We believe that the institutional (and social) context should be a set of "rules" that helps rational individuals make the best decisions for themselves by continually reducing information or other transaction costs as much as possible (see e.g. Foka-Kavalieraki and Hatzis 2009 for rationality- and consent-based institutional solutions to market failures). We definitely don't oppose some efficient measures that have such noble aims as long as they don't justify their implementation based on the "irrationality" and "innate incapabilities" of people. The "right" direction that a "nudge" could push someone should be the right direction according to her and not according to the benevolent paternalist (Mitchell 2005). As two leading behavioral economist recently admitted: "Behavioral economics should complement, not substitute for, more substantive economic interventions [...] But that's the most it can do. For all of its in-

sights, behavioral economics alone is not a viable alternative to the kinds of far-reaching policies we need to tackle our nation's challenges." (Loewenstein and Ubel 2010).

Thereby, scientists committed to a concept of rationality, take individuals to be more capable, aware and responsible for their choices. As Adam Smith at first and later F.A. Hayek more powerfully have pointed out, the individual knows her best interest better than anyone else, because ultimately only she has better knowledge of her desires, preferences and skills (Hayek 1945). We strongly believe that as individuals acquire more freedom, they become more prosperous and they have more opportunities to develop their rational behavior. And as they enhance their rationality, they demand more freedom and they better pursue their welfare. Future empirical research on the relation among rationality, freedom and welfare would help to enlighten policy making.

This doesn't mean that the research in social sciences should be dictated by political considerations, not even by the pursuit for liberty, rights and moral autonomy. On the other hand the high political stakes could shift the burden of proof. Behavioral economists should prove the systematic irrationality of *homo sapiens* beyond a reasonable doubt before they can advocate paternalism of any kind. As we saw in this paper they are very far from it.

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