ABSTRACT

Standard economic theory assumes rational agents. Individuals are expected to have rational expectations and constantly optimize their choices. Modern economic and financial theory is built under the assumption of rationality. There is plenty of evidence from psychology, however, that individuals are biased and rely heavily on heuristics in order to make decisions. Yet, this is not a mere fluke, a behavioral oddity. Because the social and economic environment in which individuals evolve is complex, behavioral biases represent evolutionary adaptations allowing economic agents to deal with undecidability and computational irreducibility.

Keywords: Complexity, Evolutionary Adaptations, Heuristics, Undecidability, Rational Behavior.

1. INTRODUCTION

How do economic agents make decisions? Standard economic theory assumes rationality by default. Western culture in general embraces a world-view based on knowledge and Aristotelian logic. Logic is obviously a process that preserves the truth value of a proposition. This raises the question: how come there are so many differences of opinions? When human action is based on knowledge and logic, we should all end up with very similar attitudes and behavior, starting from very similar assumptions. In mainstream hard sciences, nobody really doubts the fact that coal and diamonds are made of carbon; or that the Earth is orbiting the Sun; or that black holes are real. In sciences, the
agreement starts with a set of premises held as true and uses logically valid arguments to draw valid conclusions, verified by empirical observations.

Yet, whenever human behavior is involved, this does not seem to be the case, in spite of arguments that appear foolproof. Just like in physics or chemistry, one starts with a set of common assumptions and principles; one looks at the facts; one applies sound logical reasoning; and one ends with economic and social decisions that should be consistent with what everyone else thinks and wants. If economics is about optimizing choices, one can argue it has to be based on solid knowledge of each particular situation and sound logical argumentation.

In principle, this approach is widely embraced by a majority of people, because it makes sense. There is no better way that one can envision deciding on a practical questions. Yet again, how come we disagree so wildly about practical implications to real-life problems? When the reasoning is valid there is not much room for differences of opinions in the end. This process should be independent of individual preferences, desires, and tastes.

Most of us are not at all troubled by disagreements and differences of opinions when it comes to practical solutions. We take them to be self-evident. We tend to dismiss the non-sequitur between the systematic process of rational debate which implies the absence of differences of opinions and our differences of opinions. There is a glaring contradiction between rational debates and the ensuing disagreements. And yet, nobody seems shaken by this. Why cannot people agree on things when using logic? The question is not trivial and the answer requires some serious thought.

2. LOGICAL PARADOXES: CONSISTENCY VS. COMPLETENESS

In 1902, British mathematician Bertrand Russell proposed a paradox that shook the foundations of logic (Russell, 1902). Initially, the paradox made reference to the set of sets who are not members of themselves. Because the paradox was popularized with the help of a charade it became commonly referred to as the barber’s paradox: Consider a small town barber who only shaves the men who do not shave themselves. But what about the barber? He could not shave himself, as already explained, because he only shaves those men who do not shave themselves. Perhaps he is shaved by the barber. But then, this could not be, because he would be shaving himself and one already knows he only shaves men who do not shave themselves. Perhaps he is shaved by the barber. But then, this could not be, because he would be shaving himself and one already knows he only shaves men who do not shave themselves. And so on. Obviously, one cannot use reason to answer this question.

In antiquity, this paradox was known as the liar’s paradox (Barwise & Etchemendy, 1987), and for centuries it was treated as an amusing, yet innocent puzzle by philosophers and moralists. In 1931, however, German mathematician and logician Kurt Gödel dropped a bombshell. Gödel approached Russell’s paradox from a different angle and showed that in a system of formal
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