About Rationality, Delusion, Theory, and Life

As midnight approached on the night between the 20th and 21st of December, 1954, the world was on the verge of destruction. Or so believed the homemaker Dorothy Martin of Chicago and her supporters and admirers who packed her home on what they fervently believed would be an apocolyptic night. These cultists had forgone property, jobs, careers, and family ties to confront the terrible fate awaiting the world at that moment. Yet these cultists were convinced that a flying saucer from the imaginary planet Clarion was about to rescue them, and them alone, from Planet Earth.

The famous social psychologist Leon Festinger and his colleagues Henry Riecken and Stanley Schachter managed to infiltrate the group of those believing in the “end of time.” Their purpose was to see how the cult members would respond after their faith collapsed. The response gave rise to the idea of “cognitive dissonance,” a fundamental concept in modern social science ever since. As it transpired, the group members’ faith only grew stronger after their prophecy failed. They immediately found an explanation: the fervency of their faith had induced “divine intervention” that had saved the world’s population. Dorothy Martin had been given the pseudonym “Marian Keech” byFestinger and his associates in their 1956 book *When Prophecy Fails*. Until the failure of her prophecy, Ms. Keech had avoided all contact with the media, but following what others might have considered a debacle, she initiated countless interviews in which she brought the gospel of the salvation to the masses: the world had been saved by the divine light that the group had spread.

In 1959, Leon Festinger and James Carlsmith conducted a relevant experiment on the issue. A number of students took part individually in a particularly boring trial. After it was over, each participant was asked to explain to another potential participant how interesting the experiment had been. Essentially, the participant was asked to tell a bare-faced lie. Twenty students were promised $20 for dissimulating; twenty others were offered only one dollar for doing so. The cognitive dissonance stemmed from the contradiction between the students’ values (“it’s not nice to lie”) and their conduct (lying for pay). After lying as instructed, the students were interviewed. Those who had received the larger payment tended to admit that the experiment had not been interesting, and the lower-paid tended to say the opposite. The latter also tended to affirm their willingness to participate in a similar experiment in the future. The tension between values and behavior was attenuated among the better-paid. A $20 reward ostensibly justified the falsehood. Among the poorly compenstated, in contrast, the dissonance persisted; they convinced themselves of the falsehood and told additional lies. Fittingly, Festinger and Carlsmith’s article was first published in 1959 in the *Journal of Abnormal and Social Psychology*.

The phenomenon of denying and repressing reality when it clashes with a firmly held belief is typical not only of oddball homemakers and their adherents. It seems to typify humankind in general (and, perhaps, the inhabitants of Clarion as well). One of the great philosophers of science, Karl Popper, coined the term “the falsification principle.” Citing religion, Marxism, and psychoanalysis as examples, Popper argued that a so-called body of knowledge that cannot be refuted, no matter what, is not a science. According to Popper, believers in these claims will never accept evidence that contradicts their faith.

Many political prophets among us never cease to proclaim their visions, not even for a moment. For safety’s sake, they often accompany their cocksure declarations with the deceptively modest admission: “Since the day the Temple fell, prophecy has been given to fools.” These experts, however, more commonly preface their pearls of wisdom with “As I said...,” because, of course, “Who are wise? Those who have foresight!”

Dorothy Martin, pseudo-scientists, and political pundits have two alternatives: to retreat into silence and descend into the depths of oblivion, or to take the risk of disseminating their doctrines in the hopes of gaining a chance to achieve everlasting glory. They may prefer taking the risk of spreading their work, especially if they really believe their own prophecies. But even if they entertain some gnawing doubts about their omniscience, the failure of their predictions will spawn two new alternatives—to admit that they were wrong, or to lie. The latter option has much more expected utility, especially if the liar manages to fool him or herself as well. This is what happened, for example, to some of Festinger’s and Carlsmith’s students, who were inadequately remunerated for spreading their falsehoods. And if fooling oneself fails, there is always the option of wallowing in delusion. John Nash often explained that even when he was in his professional prime, he always struggled as best he could to avoid conventional thinking. That is, unconventional thinking may pose more dangers than following the crowd but its expected utility is sometimes far greater.

Truth to tell, the interpretation that game theory appears to have drawn from Dorothy Martin’s apocalyptic tale, Festinger’s and Carlsmith’s experiment, and the mobilization of John Nash’s explanations seems rather dubious. Game theory is a branch of mathematics it is a pure, analytical, deductive and logical investigation. Grappling with cognitive dissonance belongs to the opposite, almost antithetical world of inquiry, which is purely empirical, behavioral and inductive investigation. The great philosophers of science invested much discussion in the difficulty of bridging these two worlds. Some, like Karl Popper, reasoned that theory and the hypotheses derived from it precede their empirical examination. Others, like Thomas Kuhn, see it the other way around: empirical findings not only corroborate or revise theories but may trigger scientific revolutions. Caution in breaching the boundaries between the domains of theory and empiricism is advisable, but a total disconnect is tantamount to blocking creativity.

Many consider game theory the spearhead of “rational thinking.” After all, the essence of the approach is its focus on our craving for maximum utility under given conditions. As we have seen, game theory is very liberal in defining utility. The “measurement of utility” is subjective, relevant at a given moment, inured to problems arising from pretensions of “objectivity” that originate, for example, in comparing different players’ utilities, and even flexible in its definition of “zero utility” (since this, after all, is the meaning of “indifference to positive linear transformations”). Nonetheless, on several occasions when asked about his illness, John Nash explained that rational thinking “imposes a limit.” In his biographical statement for the Nobel Prize site, Nash writes:

[Some] could think of Zarathustra as simply a madman who led millions of naive followers [...].But without his “madness” Zarathustra would necessarily have been only another of the millions or billions of human individuals who have lived and then been forgotten.

For better or worse, adherence to the “rational frame” of game theory does seem to raise several problems.

* Absolute freedom and flexibility in measuring utility may impart a rational overlay to priorities that a “reasonable person” may see as verging on madness. Any of us can offer a detailed review of other people’s bizarre priorities. It is hoped that many of us can subject our own “measurement of utility” to critical inspection. Who among us has never preferred a “rotten and inedible apple” over an “exalted work of art”? We regularly identify with “irrational” decisions.
* Often what is considered irrational by game theorists can be completely understandable to the average person. Should we really judge constantly and harshly anyone whose main goal is not achieving maximum utility, but being able to trounce a rival at any cost? Are we really unable to understand those who stalk out of negotiations empty-handed after turning down 20 gold coins out of 100 in the pot, with 80 of them offered to the counterparty because they are convinced that they are entitled to at least half of the total pot? Generations of eminent authors have inspired our total identification with “vengeance stories.” The unequivocal answer in game theory is that aspirations for revenge and the like may definitely be central in calculating utility.
* Basic rules for applying mathematics to decision-making problems do not always seem reasonable to the average person. One person may accept a single utility point that offers certainty, or may gamble by tossing a coin for zero or two utility points. Another may accept 101 certain utility points or gamble on a lower or higher number of utility points by tossing a coin. Are these problems identical? In terms of game theory, the answer is yes. The average person, however, does not seem to accept the “indifference to positive linear transformations” condition. Most of us yearn to grasp the “zero point,” above which values are positive and under which they are negative. It is the distance from the zero point that influences us. Positive versus negative values are critical for most of us, which is one reason for the differences between game theory and Tversky’s and Kahneman’s prospect theory. Nor should it be forgotten that there are many of us who dabble in lotteries, as well as many others who avoid such games, even if tempted by their “expected utility.”
* There is no way of determining priorities and measuring the utility of the “axioms” that form the mathematical proofs of game theory, such as Van Neumann’s minimax theorem, Nash’s solution of the “bargaining problem,” or Arrow’s theorem. On the one hand, too many axioms may render any problem unsolvable. On the other hand, some axioms are now considered unchallengeable, such as “transitivity,” “indifference to irrelevant alternatives,” and “indifference to positive linear transformations.” The axioms that game theorists use are yes or no. There is no “maybe,” “more than,” “less than,” and so on.
* Most “decisions” made by both the high-and-mighty and by the average person are not the result of meticulous calculations of utility—and that’s a good thing. The title of Dan Ariely’s bestseller, *Predictably Irrational,* tries to make this point: irrationality operates, and not by chance.Would we want a driver who spots a child jumping in front of their car to calculate “expected utility” before slamming on the brakes? Would we want a maiden, offered an engagement ring by a knight, to weigh her available alternatives with painstaking care as the genuflecting knight impatiently awaits her response? In such cases, one gains more utility by refraining from rather than actually calculating the expected utility. (Below we elaborate on the Nobel Laureate Robert Aumann’s important treatment of this issue.)

The controversies over the essence and value of game theory remind us of disputes that have accompanied humankind and science since time immemorial. How valuable are theories and models? Theories, after all, do not accommodate “all factors.” Even if a theory identifies cause and effect accurately, and even if it can predict an outcome down to the last detail, the question remains of what “caused the cause” that yielded the effect. Such questions will always touch upon philosophical or theological ruminations about “ultimate causes.”

The use of models is even more problematic. A successful model is one that awes us with its simple elegance (its “algorithm”) and gets to “the root of it.” To a large extent, game theory may be construed as an orderly and rigorous collection of mathematical models. And it is virtually impossible to argue with the brilliant analyses of the heroes of game theory. These models, however, deal not with a “relatively simple” reality, such as one in the natural sciences, but with human reality and relations among human decision-making units, each carrying nearly a hundred billion multiconnected nerve cells in its brain. We question the importance of game theory due to the immense gap between the precision of mathematics and the infinite complexity of the human reality with which game theory deals. “Formalists” arch their eyebrows as they observe the pretentions of “behavioral economists” who use empirical studies to closely track the regularity of the gap between the behavior of mortal beings and the rational recommendations of game theory.

In 2015, George Akerlof and Robert Shiller, recipients of the Nobel Prize in Economics in 2001 and 2013, respectively, co-published a provocative book in which they claimed that the modern market economy is based foremost on marketing and advertising maneuvers that deliberately and very successfully take advantage of biases—identified by behavioral economists—in consumers’ rational considerations. The subtitle of their 2015 book*, Phishing for* Phools (Princeton University Press)*—:The Economics of Manipulation and Deception,*— reflects its contents. The book is replete with examples, both amusing and depressing. Milk and eggs, the most prosaic of commodities, are placed at the far end of the supermarket, so that you have to walk quite a distance to get to them, passing enticingly stocked shelves along the way. The consumer isn’t actually you, but rather someone whom the authors call “the monkey on your shoulder.” The monkey dictating your imagined needs is the creation of marketers and advertisers who exploit the findings of behavioral economics. As the late comedian George Carlin once observed, America has become “a big [...] shopping mall,” where people run around clutching little plastic cards and “buying things [...] spending money they don’t have on things they don’t need.” The laissez faire economy is an optimal mechanism, but the market is composed not of consumers, but of monkeys.

# It was in 2019 that Robert Aumann published a highly important article, “Publisher Correction: A Synthesis of Behavioural and Mainstream Economics” propounding a synthesis between the Daniel Kahneman and Amos Tversky’s school of behavioral economics and traditional economics, of which game theory has become a foundation. Aumann, a formalist mathematician—empathetically reviews the findings of those in the behavioral camp. Conventional economics, he claims, is underpinned by the assumption that actions are taken rationally. Namely, in any given situation, decision-makers choose to act in a way that maximizes their utility. The findings of behavioral economics appear to challenge this assumption, demonstrating by means of surveys and experiments that decision-makers do not calculate utility, but rather act according to rules of thumb— “biases” or “heuristics”—that sometimes lead to blatantly bad outcomes. According to Aumann, however, even though decision-makers usually do act according to rules of thumb rather than applying a utility calculus, these rules almost always lead to desired outcomes. The exceptions occur in unusual or artificial scenarios. In essence, the *rules* are rational even though, on rare occasions, they can induce irrational *actions.* Hence we obtain the term “*rationality of rules,*” which embodies the synthesis that Aumann proposes.

For example, causing a negotiating session to collapse after receiving a humiliating ultimatum is definitely rational even though it results in an immediate loss of utility. This is because it deters others from engaging in humiliating conduct in the future, thus yielding maximum utility in the long run. The reasons the negotiations topple arise not from a conscious intention to deter such future behavior, but from feelings of insult, vengeance, self-respect, and so on. These ostensibly irrational feelings result in a rule of thumb, expressed as “Don’t let others humiliate you,” that almost always delivers utility over time.

In a famous trial, experimenters seated two subjects in different rooms and had them negotiate by means of computers. Unlike in real negotiations, however, each subject was totally anonymous. It is obvious that in such a situation, torpedoing the negotiations doesn’t create deterrence because no one knows who fired the torpedo and the game is a one-time event. Therefore, the collapse of the negotiations inflicts an immediate loss on the party responsible for the collapse. Nevertheless, nearly all subjects who received a humiliating ultimatum responded by calling off the negotiations. It turns out that instead of calculating utility, they behaved according to the rule of thumb: “Don’t let others humiliate you.” Such a rule is almost always optimal—albeit not in the contrived environment of this experiment.

In his article, Aumann reviews several classic experiments in behavioral economics in which the subjects acted irrationally. He shows that in each of these experiments, the environment was artificial and the subjects acted under the impetus of a rational rule. His explanation is that rules of behavior do not emerge *ex nihilo*, out of nowhere, but, like physiological traits, are products of evolutionary, biological, or social developments. Evolution is based on the principle of “survival of the fittest,” fitness being determined in a practical world that cannot be mirrored in an artificial or unusual scenario.

Aumann’s basic conclusion is that the behavioral economists are correct in claiming that people act in accordance with rules of behavior and do not weigh one action against another in terms of maximizing utility. For the most part, however, these rules do yield maximum utility. Therefore, practical behavior is largely rational—a conclusion that is exactly in accordance with the basic assumption of traditional economics. Consequently, behavioral and traditional economics do not contradict each other; on the contrary, the latter is based on the former.

Aumann’s article is of no less importance than are the analytical contributions that his classical writings provide. It offers an explanation of our foregoing examples of the child who jumps in front of the car and the maiden who contemplates the kneeling knight. Plainly, the rational response in these cases is to refrain from carefully calculating and to apply a rule of thumb. Is the situation significantly different when we decide what to order in a restaurant when the waiter comes around? Using rules of thumb is more rational than painstakingly calculating utility in most decisions that mortal beings—human and other—make. In making this argument, I do not, of course, belittle the meaningful contributions that game theory has made in century that has passed since it first appeared.

We now return to where this book began: the winners of the 1994 Nobel Prize in Economics.

One of those who favored John Nash’s candidacy for the prize, Ariel Rubinstein, has been an acquaintance of mine since my youth. Since then, we have met in the corridors of various academic institutions once every dozen years or so for a few minutes of conversation. More than once, I have expressed my appreciation of Rubinstein’s “formal” command of the theory whose models have accompanied me all my life. In these talks, my interlocutor has emphasized the limits of mathematics and disapproved of invoking game theory to generate a superficial explanation of life. Today he engages, among other things, in experiments that definitely belong to the empirical field of behavioral economics, while tying into the formal models.

The life of John Harsanyi, Nash’s co-winner of the 1994 Nobel Prize in Economics, demonstrates the personal and emotional ability of a game-theory expert to cope with with the games of life. Many details about Harsanyi’s life appear in a lengthy interview that he and his wife gave for an oral history project at the University of California at Berkeley, and Harsanyi summed up his life in a biographical statement that appears on the Nobel Prize site.

Harsanyi (1920–2000) was born to a Jewish family in Budapest that had converted to Catholicism. His parents enrolled him in the Lutheran Gymnasium in that city— “one of the best schools in Hungary”—that turned out such graduates as John von Neumann and Eugene Wigner (a Nobel Prize Laureate in Physics). Under the influence of his parents, who owned a drugstore, Harsanyi studied to be a pharmacist. In 1944, he was inducted into a labor unit by the Germans who had invaded Hungary. The unit was transferred to a concentration camp in November of that year, but Harsanyi managed to escape and survived the war by hiding in the cellar of a Jesuit monastery. After the war, he earned a doctoral degree in philosophy. After briefly teaching at the university in Communist-controlled Hungary where he met his future wife, Anne Klauber, he was forced to stop working due to his anti-Marxist views. Anne, a student of psychology, was also persecuted for her connections with an opponent of the regime. The couple escaped from Hungary by crossing a marshy border area that was somewhat less strictly guarded. “Even so, we were very lucky not to be stopped or shot at by the Hungarian border guards,” Harsanyi recalls. He and Anne emigrated to Australia, where they were married. To make a living, Harsanyi started out as a factory worker because his Hungarian degrees were not recognized in his new country. Reeducating himself by attending night school, he earned a Master’s degree in economics in 1953. He then transferred to Stanford University, where he completed a Ph.D. in economics, with Kenneth Arrow as his advisor. After returning to Australia, he went back to the United States, where he was hired by the University of California at Berkeley in 1964. There Harsanyi made major contributions to many diverse areas of game theory, including threat strategies, game solving with incomplete information, converting mixed-strategy equilibria into pure-strategy equilibria, and utilitarian ethics. In 1988, he co-published *A General Theory of Equilibrium Selection in Games* with Reinhard Selten. “Its title,” he attests, “indicates its content.” It was not their only collaboration.

On the connection and the difference between theory and life, between game theory and real behavior, Reinhard Selten, the third Co-Laureate of the 1994 Nobel Prize in Economics, reflected in a 2004 interview:

Maybe predicting human actions is also a goal of game theory, but it is more the question what would rational players do in a game? Maybe players are not always rational. I mean, we know now that they are far from rational very often. [...] Game theory [is] concerned with the definition of rationality. Regardless of whether people follow rationality or not you have to know what it is, yes? [...] I had done early experimental work and I knew that game theory would not … I mean, sometimes would be predictive certain, other cases it would not predict correctly human behavior [...].

Selten explained that although convinced early on of the necessity of explaining what rationality is, he always took an interest in the implications of the matter for the “real world.” He explained the criticism of mathematicians who distanced themselves from research and empirical application, but did not agree with them. Thus he recounted his collaboration with scientists in other disciplines, including political science and biology. “It’s important [...] to be able to follow your own ideas. [...] If you take an oppositional point of view, people look at it with interest even if they don’t accept it completely. [...] The scientific world is not the enemy of young imaginative people.”

Selten (1930–2016) was also of Jewish origin (on his father’s side) but received a Protestant upbringing. He lost his father, who was blind, when he was eleven, and spent World War II with his family as a refugee. He worked for some time as a farm hand, not completing high school until 1951. Selten, like his father, spoke Esperanto, which is how he met his wife, Elisabeth Langreiner, who was also proficient in the language, and they married in 1959. In his biographical statement for the Nobel Prize site, he relates that, despite their wishes, they remained childless. Both suffered from acute diabetes; the illness cost Elisabeth both of her legs and left her severely vision-impaired. “We have learnt to adjust to our situation,” he writes in conclusion.

In his own brief autobiography, John Nash recalls his lengthy period of illness and his slow recovery:

[...] At the present time I seem to be thinking rationally again in the style that is characteristic of scientists. However, this is not entirely a matter of joy as if someone returned from physical disability to good physical health. One aspect of this is that rationality of thought imposes a limit on a person’s concept of his relation to the cosmos.

At the Budapest railroad station in November 1944, the Nazi guard who watched over John (János) Harsanyi was distracted for a moment, giving young Harsanyi an opportunity to escape. For a moment, Harsanyi considered the possibility of going home to pick up a rucksack in which he kept a beautiful sweater that his mother had knitted for him. He decided to let it go, and thus he survived.

John Nash, John Harsanyi, and Reinhard Selten—winners of the 1994 Nobel Prize in Economics. At first glance, experts in game theory, which sanctifies rational thinking. Did they apply their expertise in their lives? Did they game life, or did life game their fate?