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THE STRANGE HISTORY OF THE ECONOMIC AGENT*

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I What is the "Economic Agent"?

The social phenomena political economy and economics aspire to explain and predict have from the beginning of speculation about these subject presented two aspects.
On the one hand it is clear from our daily experience that economic phenomena (prices, production, consumption, and so forth) arise from individual actions (going to the store and buying something, contracting for the construction of a building and the like). On the other hand, these individual actions always present themselves as aggregate, statistical phenomena (the market price, gross domestic product, etc.) A peculiarity of economics is that the very phenomena it studies take a quantitative form (market transactions, accounts) produced directly from the phenomena. The profit and loss of a company, or the net worth of a household, are quantities that are inherent in the existence of the company of the household. The economist may have to take some trouble to collect this data and organize it, but is not required, like the physicist or biologist, to devise instruments to represent the phenomenon studied (the behavior of the electron or the cell, for example) in a quantitative form.

Theories generated by political economy and economics reflect this duality of their subject matter in one way or another. The theory may begin at the conceptual level of the statistical aggregates (macroeconomics) and seek order directly in the behavior of these aggregates and their relations, or at the level of the imagined underlying individual decision makers who presumably somehow generate this aggregate statistical reality (microeconomics). The microeconomic approach directly requires a conceptualization of economic agents, the decision makers whose behavior generates data, but the macroeconomic approach equally raises the question of the relation of the behavior of economic agents to aggregate data.

The history of political economic and economic speculation thus generates a parallel history of the conceptualization of the economic agent, which is the topic of my remarks here. This history is interesting for several reasons. It exemplifies some of the most fundamental and intractable methodological problems of the social sciences in coming to grips with the complexity of human existence and the self-referential character of social science investigation. The curious history of the economic agent reveals some important aspects of our conception of ourselves as social beings with the passage of time and the spread of capitalist social relations. Economic conceptions also have been very influential as paradigms for philosophical attempts to reconstruct a methodological account of social

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science, and have a way of spreading into allied disciplines such as political science and sociology. The debate over the character of the economic agent has motivated extensive discussions between economists and psychologists, with profound implications for both fields. It turns out, as well, that economics has had a powerful influence on the "hard" sciences, such as physics and biology. The story of the economic agent thus may shed light on issues well beyond the traditional limits of economics and political economy. The extreme instability of the conception of the economic agent also suggests some important questions for the enterprise of social science research.

In telling this story in a highly compressed form I am inevitably going to be forced into a kind of caricature of the theoretical positions I will describe. You should keep in mind at all times that what I will represent here as a sequence of conceptions has led to a much more complex and layered reality. Each of the theoretical positions I will sketch continued to develop and gain adherents even after its "supersession" by other conceptions at the frontier of economic discourse (such as it is). Unlike physics, which either canonizes fundamental theoretical conceptions in textbooks as the foundation for further work, or banishes them to the outer darkness of the history of thought, political economy and economics have preserved each of the stages of conceptualization as more or less living research traditions (often bitterly embattled with each other). The danger in my telling this story as a sequence is that you will think that these conceptions have superseded each other in an orderly manner, whereas the reality is that they remain jumbled together in contemporary economics, which blithely carries on its work in an eclectic fashion that is frequently completely unconscious of its own historical origins.

II CLASSICAL POLITICAL ECONOMY AND MARX

The intellectual triumphs of Classical political economy, which reach their peak in the work of Adam Smith, Thomas Malthus, and David Ricardo, and of Karl Marx who functioned primarily as their critic, rested on the concept of capitalist society as an articulation of classes, Workers, Capitalists, and Landowners. Classical political economy achieved astounding insight into the structure of capitalist society through contemplating the possible interactions of these three meta-actors.

The economic agent of Classical political economy is thus basically a representative of his class, a Worker struggling to survive under the pressure of downward pressure on wages towards subsistence through a hand-to-mouth way of life, a Capitalist boldly building the future by obsessively accumulating the profits won from the exploitation of workers, or a Landowner parasitically and idly consuming rents by maintaining armies of unproductive personal servants and enormous numbers of horses. The individual behavior of these agents, such as they are, is of importance only insofar as they instantiate the social situation of their class. A frugal worker, or a profligate Capitalist is of no theoretical interest, only an aberration to be eliminated in the process of theoretical abstraction. The problem of the aggregation of individual workers or capitalists into the behavior of their class counterparts barely appears, since the identity of the individual and class is so closely maintained.

III THE MARGINALIST / NEOCLASSICAL CONSUMER: HOMO ECONOMICUS

With the rapid development of capitalist institutions and the huge increase in social wealth generated by capitalist economic development through the middle of the nineteenth century, an extraordinary change occurs in the conception of the economic agent, who now becomes the Rational Consumer, or Economic Man of neoclassical economic theory.

This transformation, which sets the stage on which the history of the economic agent in the twentieth century plays itself out, has several aspects. For one thing, the Rational Consumer integrates the roles of the Classical Worker, Capitalist, and Landowner. Everyone is, after all, to some extent a worker supplying labor-power, a capitalist who owns at least some dividend or interest yielding assets, and a landowner. The marginalist revolution obliterates the vigorous class distinction of Classical political economy to create a Representative Economic Agent who is a scale model of the whole society. The link between this representative agent and the concrete individuals who actually make up capitalist society (and who remained just as driven by class distinctions as ever) is simply quantitative: some real individuals have larger relative endowment of capital, or labor-power, or land (or, indeed, larger or smaller absolute endowments), and thus make a correspondingly skewed contribution to the behavior the aggregate Representative Agent.

For another thing, the characteristics problem of the Rational Consumer is different from that of the Worker, Capitalist, or Landowner, who had to fight out their class positions existentially. The Rational Consumer′s function is to Choose. Thus he (or perhaps even she) becomes Sovereign in the neoclassical picture of the function of the capitalist society. The immense investment of resources in productive facilities and infrastructure is simply the most convenient device by which the Rational Consumer can transfer her wealth from the present to the future. Her Tastes govern the allocation of social resources among competing ends. Though to the undiscriminating eye the enormous capitalist firms and trusts of the late nineteenth and early twentieth century might appear as formidable centers of economic and social power, the penetrating economist recognizes that they are actually pussycats under the heel of the Rational Consumer, whose whim expressed as demands on the market bring them to heel. They function only as vehicles for a rational and efficient allocation of resources to satisfy the Consumer′s will.

As twentieth century critics later pointed out, the Rational Consumer also has some extraordinary, even superhuman, capacities, particularly in the area of information processing and computation. She is somehow able, in her role as an investor, to collect and integrate an enormous amount of information about investment opportunities and prospects and management competence of firms so that she can correctly price them on the stock market. She is equally adept at sifting through the properties of millions of perhaps billions of commodities offered on the market to allocate her purchasing power optimally among them. This is all in the day′s work. Actually this is all even before the real day′s work of the Rational Consumer, which is the generation of utility from the actual consumption of her rationally chosen basket of commodities, that being the end of the whole elaborate process of social production.

The Rational Consumer is directly or indirectly the starting point for all the major development in the conception of the economic agent in the twentieth century. But she survives to the present day, having sheltered from various critiques in the Economics Department of the University of Chicago to emerge, among other places, as the icon of the liberal market-oriented development policies of the 1980′s and 1990′s. But the taming of the increasingly complex and even chaotic motions of a rapidly globalizing capitalism turned out to be beyond even the extraordinary powers of the Rational Consumer. She has once again retreated to a highly contested retirement (in an undisclosed location somewhere in Eastern Europe where she is rumored to be negotiating with her own agents for a comeback).

It is worth noting, because many people seem somewhat unaware of this fact, that economists are actually extremely eclectic in their deployment of the Rational Economic Agent in theories. Economists have no attachment to any particular operationalization of the Rational Economic Agent, who is sometimes an individual, sometimes a household, sometimes a firm, sometimes a nation, and so on, depending on the demands of the problem and modeling convenience. Sometimes the concrete person as an individual is even schizophrenically split into contesting sub-agents with conflict preferences in economic models (for example, those investigating possible conflicts between perceived preferences at the present time for future goods and actual preferences when the future moment arrives).

IV THE CRITICS

The Rational Economic Agent has never had an easy time being accepted outside the narrow confines of economics. (This is one of the reasons for the seeming intellectual isolation of economics among the social sciences.) This is not to say that she does not make some intimidating forays into other fields, especially when they face a vacuum of theoretical ideas of their own. Thus Rational Choice theory, of which the Rational economic agent is the emblem, has found beachheads in Political Science and Sociology, especially in the United States.

But the Rational Economic Agent has faced three implacable and powerful adversaries all through the twentieth century: psychology together with evolutionary biology; classical sociology and social theory; and systems theory, a child of thermodynamic methods in the physical sciences.

Psychologists have from the very beginning raised the awkward question of how people actually behave, and what might be the evolutionary sources of regularities in human behavior. There doesn′t seem to be any strong reason to think that Paleolithic human societies, where presumably our DNA was shaped to meet the challenges of the present day, faced evolutionary pressures particularly conducive to the emergence of the Rational Pursuit of Material Gain which is the bedrock of the Rational Economic Agent. Furthermore, even cursory examination of the actual behavior of human beings (or, as my psychology instructor at Swarthmore College used to say, college sophomores) shows glaring and highly replicable deviations from the rationality. Real human beings do all

sorts of irrational things, and make all sorts of cognitive errors, even in experimental situations much simpler than the capitalist market place. Thus lurking in the wings to replace the Rational Consumer as the star of the economics firmament has always been the Behavioral Organism, certainly much stupider and more manipulable and accident-prone than the Rational Consumer. The difficulty for the psychologists has always been to groom the Behavioral Organism to fill the shoes of the Rational Consumer in received economic theory, which is a tall order because of the immense range of roles the Rational Agent plays.

Classical sociology and social theory have on the whole been equally unimpressed by the Rational Economic agent, but on quite different grounds. A major theme of social theory is the social construction of the Subject, who is unimaginable as an entity outside a social and socializing context. But the Rational Economic Agent has to enter the social arena with her Tastes and Knowledge already formed, or else she cannot perform her destined function of exercising Consumer Sovereignty over the economic sphere. The social theorist is more comfortable with the Worker, Capitalist, and Landowner of Classical political economy, who, though they verge on being cartoons, at least convey the idea of a social determination of human action. It has been a good deal easier for neoclassical economics to brush off this critique than to deal with the psychologists. For one thing, the social theory critique tends to be couched in obscure and jargon-ridden long books which students don't much like to read, especially the kind of the problem-solving oriented mathematics students who tend to become economists. For another, the image of the Rational Economic Agent is much more flattering to capitalist society in general, and to wealthy funders of social sciences research, than is the existentially contested, psychoanalytically tortured, historically conditional Subject.

While psychology and social theory besiege their respective sides of the Rational Economics Citadel, powerful forces also have gathered from a completely different quarter, the thermodynamic methods of the physical sciences. There is some historical irony in this, because the origins of thermodynamic reasoning owed a great deal to the social sciences and in particular to economics. Sadi Carnot, the breakthrough genius of classical thermodynamics, modeled his thinking about the flows of heat in steam engines and refrigerators on the double-entry bookkeeping of capitalist firms. Clerk Maxwell, the genius who first penetrated the micro-structure of thermodynamic systems by inventing the methods of statistical mechanics, was much influenced by the vogue for social statistics in the early nineteenth century, and structured statistical mechanics around the notion of a census of the molecules in a gas. Thermodynamics and statistical mechanics have proved to be the most powerful tools of predictive and explanatory science human beings have created. These methods are at the heart of the astonishing successes of quantum physics, and modern astronomy and cosmology.

It is not surprising then, especially given the self-confidence of physicists in the superiority of both their methods and their intellectual powers to those of lesser mortals, that physicists have conceived the project of analyzing complex systems such as the living cell, the brain, and the capitalist economy with the tools of thermodynamics and its daughter systems theory. The great insight of statistical physics is that the relation

between the particles that make up a system (read economic agents) and the aggregate observable behavior of the system (read macroeconomic data) is extremely indirect and subtle. In fact, the aggregate observable behavior of thermodynamics systems is often to a considerable degree independent of the individual behavior of the particles that make it up. Thermodynamic models often represent the laws governing particle behavior in extremely crude approximations and still achieve amazingly precise predictions of the aggregate behavior of their systems. The key to understanding thermodynamic systems is information, which measures their degree of organization.

For the statistical physicist, then, the Rational Economic Agent appears on the one hand to be ridiculously implausible as an information processing system, and on the other hand to be methodologically redundant because they do not expect the behavior of the economy as a whole to be a reflection of the behavior of any Representative Agent.

The story of the economic agent in the twentieth century is largely a story of the interplay of these critical forces as they confronted each other in the crucible of War[1].

V THE ECONOMIC AGENT AFTER WORLD WAR I: KEYNES

As it did the rest of Western Society, the crisis of World War I took the economic Agent completely by surprise and off-balance. Nothing in the calculus of marginal cost and marginal benefit hinted at the unimaginably wasteful destructive fury on which European society embarked in August, 1914.

The next major news we have of the Economic Agent is in the work of John Maynard Keynes, and it presents a sorry picture of decline and dysfunction, presumably the result of traumatic shell shock. In Keynes the economic Agent seems to have lost his grip on all his economic roles. In the place of the implacable "Accumulate, accumulate, that is Moses and the Prophets" (the slogan in which Marx represented the Capitalist in his positive moment) Keynes' capitalist is dispirited and chronically unable to sustain an adequate volume of investment. He has developed Animal Spirits, a kind of neurotic instability of the will to command, and is prone to retreat to Liquidity Preference at the slightest sign of gloomy economic weather.

The decay of the Economic Agent's cognitive powers revealed by Keynes is even more shocking. Whereas the Rational economic agent could routinely make correct evaluations of the objective profitability of real investment indefinitely far into the future and force asset market valuations to conform to her judgment, Keynes' Economic agent has been reduced to a speculator trying to guess what average opinion thinks average opinion will be.

Keynes sees no hope for the rehabilitation of the Economic agent, and proposes instead to replace him in his most important economic functions, particularly determining the volume and direction of social investment, with another figure, the Clever Civil Servant. This public-spirited manipulator, who is brighter and more charming than the Economic Agent, and who bears more than passing resemblance to Keynes himself, can be counted on to provide investment adequate to maintain Full Employment, alleviate human

suffering, and in a generation or so eliminate the Economic Problem by driving the rate of profit down to zero. At this point the average standard of living in industrial capitalist societies will be so high that people will be relieved of most of the anxiety of earning a living and can devote their attention to exploring their sexual identities, following the path pioneered by Keynes and his Bloomsbury friends. As we know, this is largely what has actually happened.

Keynes sees no hope or real use for the Rational Economic Agent, and envisions for him only an extended retirement as a Rentier living off of gradually declining dividends, winding up his miserable existence in the only merciful way, through an Euthanasia.

VI THE ECONOMIC AGENT IN WORLD WAR II: VON NEUMANN AND WIENER

But history had in store for the Economic agent, as for so many others, much stranger transformations, perhaps more suited to the imagination of a Thomas Pynchon or a Joseph Heller to describe.

It is now wartime again, the apocalyptic crisis of the Second World War. The Economic agent is now piloting an airplane, trying desperately to avoid anti-aircraft fire. Curiously enough, in this nightmarish world the economic Agent, or his doppelganger, is also on the ground controlling the anti-aircraft fire trying to shoot down the plane.

This drama catches the attention of the most brilliant mathematicians and physicists of the time, in particular Norbert Wiener and John von Neumann, and leads them to some deep and extraordinary speculations about the nature of human behavior and the possibility of explaining it.

The crucial point about shooting down an airplane with an anti-aircraft gun is that it does no good to point the gun at the place where you see the plane, because by the time the flak has traveled between the ground and sky, the plane will have moved to a new position. What the anti-aircraft gunner must do is to shoot at the place where the airplane will be. The pilot of the airplane, realizing this, has a strong motivation to fly in such a way as to make the position of the plane as unpredictable as possible.

We can make a simple stylized model of this situation by supposing that the pilot actually has only two effective choices, to turn Right or Left, and that the gunner has similarly only two effective choices to direct his fire. Thus the pilot chooses Right or Left, and the gunner chooses Right or Left. If they make the same choice the gunner wins and the plane is shot down; if they make different choices the pilot escapes. John von Neumann analyzed this general type of situation as a Two-person Zero-sum Game. A little thought suggests that the best the pilot can do is to randomize unpredictably and equally between Right and Left Moves, and that the best the gunner can do in response is to randomize equally between shooting Right and Left. Any deviation of either player from the balanced randomized strategy will be punished by a higher probability of loss. If the pilot realizes that the gunner tends to fire Right more often than Left, he will escape more

frequently, and if the gunner realizes that the pilot veers Left more often than Right, he will shot him down more frequently[2].

The great insight von Neumann had about this situation was that it was a case where human behavior was in a certain sense completely determinate. Furthermore, and this leads to an astonishing conclusion about the economic agent, it doesn't matter whether the plane is being piloted by a human being or a computer or a servomechanism. The human pilot in this situation is reduced to a black box in a larger system, and his behavior is determined by systemic considerations that trump any issues of his psychology, tastes, history, or constitution as a subject. The pilot (or the gunner), who is by only a tiny leap of imagination the Economic Agent, has become, in Phillip Mirowski's phrase a "cyborg", short for "cyber-organism". From a methodological point of view this shift in perspective is seismic. Rather than worry about the concrete peculiarities of human behavior as the foundation for social science, von Neumann argues that we should be looking at what human beings have in common with servomechanisms, computers, and the whole class of what he called automata, devices that transform environmental signals into action.

It turns out that it is not possible to generalize the mathematical arguments that von Neumann used to solve the Zero-Sum Game to more general games, particularly those which are not Zero-Sum, in which there is a surplus that can be shared between the players. Von Neumann hoped to finesse this difficulty by treating Non-Zero-Sum games as Zero-Sum games through the device of introducing an additional fictional player whose payoff balances the situation. There are many difficulties in this line of thought, and von Neumann turned his attention to the general theory of automata in the last yeas of his life, presumably with the idea that the only insights to be gained into more general situations of social interaction (which von Neumann saw as simply part of a more general class of system-interaction problems) must lie in general properties of automata as a class. Presumably the Economic Agent inherits these general characteristics.

This transformation of the economic agent into an automation is, as one might expect, completely consistent with the thermodynamic approach to the analysis of social systems. It has led to a vigorous, perhaps the most vigorous, theoretical research program in social science in the last fifty years. This program subsumes human societies conceptually and mathematically as a part of the general class of complex systems, and seeks to find general regularities that characterize this broad category as an explanation of observed regular social phenomena. The key idea in this research program is the notion of self-organization of complex systems, their tendency, despite never setting down to the old-fashioned equilibrium which was the natural home of the Rational Economic Agent, to reproduce robust quantitative regularities in some aspects. The simplest examples of self-organization come from thermodynamic systems, such as confined gases, which have well-defined temperature and pressure, despite the fact that their underlying molecular states are in a constant state of flux. This phenomenon is reminiscent of the tendency of market economies to exhibit well-organized average prices, despite the evidence of considerable chaotic motion in the behavior of households and firms.

Norbert Wiener developed these same insights in another influential direction. When one generalizes the maximally random strategy of veering Right or Left to motion in three (or more) dimensions, one is led to models of Random Walks or Brownian Motions (models which describe the motion of small dust particles in fluids, for example). Wiener laid the mathematical foundation for our understanding of these processes. The problem of shooting down an enemy fighter is not so different, when one comes to think of it, from the problem a speculator faces in trying to beat the market. In both cases the difficulty is to predict where the target is going to be. It is not so surprising, then, that one of the vigorous and successful areas of economic theory in the last fifty years has been Finance, and that center of this theoretical activity is the model of the Random Walk.

The general drift of this line of thought transforms the Economic agent into an information processing algorithm. The cheerful and confident emphasis on the simple and innocent pursuit of self-interest which was so satisfying to marginalist and neoclassical economists has given way to a critical examination of the preconditions for the definition of self-interest in information gathering and processing. Economic Man, as Axel Leijonhufvud has put it, has given way to Algorithmic Man.

VII THE ECONOMIC AGENT IN THE COLD WAR: NASH

As we know, the Cold War came hot on the heels of the Hot War, and the economic Agent had hardly been scraped out of the pilot's seat of his flak-riddled bomber than he had donned a trench coat and snap-brim hat and become a Cold Warrior. In fact only a few years intervened between the appearance of von Neumann and Morgenstern's classic (but almost entirely neglected) Theory of Games and Economic Behavior and the Ph.D. thesis of a brilliant and disturbed Princeton Mathematics student, John Nash. In this thesis Nash proposed an alternative to von Neumann's program for the analysis of general conflict situations.

Nash's (perhaps hopelessly grandiose) idea was to provide a mathematical foundation for the analysis of all cases of strategic interaction. It turns out that Nash's idea resurrects some of the characteristics of the Rational Economic Agent. As Nash viewed the problem of strategic interaction, the difficulty was in figuring out what your opponent was actually going to do. If you knew what he was going to do, you could optimize your own strategy in response (find a best-response). The trouble is that your opponent, imagined to be equally wily and determined, is trying to figure out what you are going to do. Thus your problem becomes one of figuring out what your opponent thinks you are going to do, because then you can figure out what he will actually do, and then cleverly choose the best response to that action. But your wily opponent will see through this maneuver and condition his action on what he thinks you think he thinks… As Mirowski points out, there is something eerily pathological in this way of approaching the problem. (It is an example of Hegel's Bad Infinity of infinite regress.) Nash, in a typical mathematical maneuver, proposed to resolve this problem of infinite regress through a purely formal mathematical argument. He showed that there is always, in a large class of games, at least one pair of strategies (often randomized strategies) which are best-

response to each other, and proposed that these pairs be regarded as the "(Nash) equilibria" of the game.

Nash's idea was pretty much universally rejected. Von Neumann did not like it, on the grounds that it gave away the determinateness of outcome that he sought in an adequate theory. (Many games have multiple Nash equilibria, and Nash gives no clear guide as to how to select which one might actually be observed.) Many economists had trouble seeing what motive there was for a player in a strategic game to choose a Nash equilibrium strategy. It was not until evolutionary biologists in the late 1970's and early 1980's discovered that the formalism of game theory could be applied to evolutionary problems, and that some Nash equilibria had a relationship to the concept of evolutionary stability that Nash's idea caught on in economics. A real effort was made to strengthen the concept of Nash equilibrium through proposing a variety of "selection criteria" that could narrow down the range of behavior consistent with Nash's formal assumptions. In this way the Rational Economic agent has had something of a revival, this time around as a Strategic Analyzer.

VIII THE ECONOMIC AGENT RETREATS TO AMERICAN PRAGMATISM: SIMON

Not everyone was as carried away by the hard exigencies and terrible crimes of wartime as the Princeton Mathematics department. The moderate, balanced, essentially sane voice of American pragmatism in the tradition of John Dewey and William James also found its successor in the in the post-War period in the quasi-universal genius of Herbert Simon. Simon first encountered the Economic agent in the guise of a city bureaucrat in Milwaukee managing public policy during the New Deal[3]. His observations of how people in responsible positions actually made decisions confirmed the suspicions of the inflated cognitive powers of the Rational Economic Agent Simon inherited from the American Institutionalist tradition. Simon contributed to an astounding range of disciplinary literatures, including Economics, Psychology, and Computer science, and what he contributed was a recognizable, but greatly attenuated version of the Economic Agent.

One of the first tasks Simon set his version of the Economic agent was to play chess. (Actually Simon collaborated in the writing of a chess-playing computer program, thus cannily occupying a large chunk of von Neumann's territory with his own insights.) From a game theoretic point of view chess is a trivial game, and Simon's fascination with the real issues raised by chess playing reflects his powerful conviction that game theory was grabbing the wrong end of the stick. If one could compute the whole "game tree" of chess, the succession of all possible positions reachable from the initial position, a mere inspection of the final outcomes would indicate the optimal strategies for white and black. The difficulty is that, unlike tic-tac-toe, it is impossible to compute this game tree even with the most powerful computers anyone can theoretically image in a reasonable time. What Simon's program (and all its successors) did was to compute some part of the game tree from any position and then use a "rule-of-thumb" to judge whether the resulting position was worth further examination. In this way the tree could

be pruned and a decision as to a good move (not necessarily the best move) reached in a useful time-frame.

This was the model of Simon's vision of human behavior. The Economic Agent for Simon was a Problem Solver. He confronts a very complex social reality, one much too complex to hope to unravel through completely rational analysis with full information, using coping strategies: heuristics, good guesses, useful approximations, and the like. Simon referred to this type of goal-oriented but cognitively restricted behavior as Bounded Rationality. The Economic Agent has become a pragmatic information processor with limited aspirations to achieving efficiency or optimality.

Simon's ideas, despite his attempt to differentiate them sharply from von Neumann's much harsher view of the world, have cross-fertilized with the automation program. A significant part of the contemporary economic literature studies models in which boundedly-rational agents are observed interacting as automata in computer simulations to create a laboratory in which economic and social hypotheses can be examined.

IX THE ECONOMIC AGENT SEEKS REFUGE IN EVOLUTION

Yet another incarnation of the Economic Agent has emerged over the last twenty-five years from the experiments of psychology and the speculations of evolutionary socio-biology. In experimental situations of the Economic Agent reveals a firmly held propensity to behavior that economists of the neoclassical and Nash persuasion view as irrational.

One now-famous example is the Ultimatum Game, which has two players, a Proposer and a Responder. The Proposer is given a valuable and divisible prize (say ten dollars) and asked to propose a division of this prize between herself and the Responder, for example a fifty-fifty split, or a much larger share, say ninety-nine percent, for herself. The Responder then has to choice of accepting this offer (in which case they both take their shares) or refusing the offer (in which case neither gets anything). A rational Responder pursuing her own material self-interest should, according to Nash reasoning, accept any share, no matter how small, since it is better than nothing, and a rational Proposer, knowing this, should propose the smallest possible non-zero share for the Responder. But in innumerable tests Responders refuse substantial offers (from twenty to forty percent) and Proposers, evidently aware of this real risk, make rather large offers to Responders.

This is just an example of a general range of experimental findings that seem decisively to falsify the predictions of rational choice theory. Another interesting observation is that people, both in experimental and real social situations, are willing to punish others for the violation of norms of behavior, even when the punishment exacts a net cost from the punisher. The Rational economic agent pursuing her own material advantage will not do this.

This type of finding inspires some theorists to search for a universal principle more general than material rationality on which the behavior of an economic agent can be

founded. At the moment the most favored idea is the Rational Reciprocator, who combines the motives of personal material advancement with an inborn tendency to reward cooperation and fairness and punish defection and unfair behavior in others. The advocates of this vision of the Economic Agent hold out the promise of a unified explanation of economic (and presumably other social behavior). The resemblance of the Rational Reciprocator to the typical kindergarten pupil perhaps just adds more weight to this hope.

X A Future for the Economic Agent?

It would be natural to end these remarks with some discussion of the future of the Economic Agent. But in fact the more interesting question seems to me to be whether the economic Agent has any future at all.

This is much the same question as whether Economics as a theoretically distinctive field of inquiry has any long term future. Of course there will always be work on economic institutions and the data they generate, and attempts to understand and explain economic phenomena using the general statistical and modeling tools of social science and social theory. But Economics has, at least in the minds of some of its leading practitioners, aspired to something much more than this, to the status of a body of knowledge sustained by a characteristic methodology particularly adapted to explain and adumbrate a characteristic class of phenomena. It is this aspiration that the unstable history of the Economic Agent calls into question.

Some of the most ambitious and successful younger American economists appear to be following this path. They have abandoned any pretension to organize explanations of economic phenomena around a definite theoretical program or vision. Instead they look eclectically for interesting problems, and apply the generic tools of statistical analysis to them, staking their changes, like the other social sciences, on the hope of discovering some robust empirical regularity. The Economic Agent seems, like so many others in the world today, to be a migrant in search of a home. As economics offers fewer employment opportunities, the Rational Economic Agent begins to search for new fields in the movement of rational choice theory to Political Science and Sociology.

But perhaps the dissolution of the Economic Agent would not be such a bad thing for social science in general, and even for our understanding of specifically economic phenomena. Perhaps it would help us to overcome the dualism between the economic and social that has tended to obscure our understanding of the deeper relations among economic and other aspects of social behavior. There may be scholarly pay dirt in the ensuing realignments.

END NOTES

1 An excellent version of this story can be found in Philip Mirowski's *Machine Dreams: Economics Becomes a Cyborg Science* (Cambridge University Press, 2002), to which I am deeply indebted both for many of the general perspectives of this talk and for some particular observations.

2 I recall that when I was about ten year old, which was in 1952, my father took me to a lecture at the Franklin Institute in Philadelphia, at which an engineer from Bell Labs demonstrated a machine that played the coin-matching game, as an early demonstration of the power of modern information-processing technology. This machine, a black box about two feet on each side with a couple of switches to input the human player's choice (Heads or Tails) and a couple of lights to indicate the machine's choice, contained circuitry that detected any deviation of the human player from complete randomness and exploited it to gain an advantage in a long run of play.

3 I am indebted to Karaswamy Velupillai for details of Simon's biography.