HAS THE WHOLE WORLD LOST ITS HEAD?

BY GERALD E. MARSH

"While we surely have the means to deal with the locally rational but globally nuts problem, the question is whether we collectively have the will to do so."

THE METAPHOR of the "invisible hand" is used by Adam Smith in *The Wealth of Nations* to argue that people, following their own economic self-interest, promote the interests of society as a whole:

"As every individual, therefore, endeavours as much as he can both to employ his capital in the support of domestic industry, and so to direct that industry that its produce may be of the greatest value; every individual necessarily labours to render the annual revenue of the society as great as he can. He generally, indeed, neither intends to promote the public interest, nor knows how much he is promoting it. By preferring the support of domestic to that of foreign industry, he intends only his own security; and by directing that industry in such a manner as its produce may be of the greatest value, he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always the worse for the society that it was no part of it. By pursuing his own interest he frequently promotes that of the society more effectually than when he really intends to promote it."

Note that Smith talks about the "support of domestic to that of foreign industry," which raises serious questions about the "invisible hand" and its efficacy in a global economy of states having vastly different development and wealth. The paragraph above often is taken to mean, as put by Garrett Hardin in his famous 1968 article "The Tragedy of the Commons":

"In economic affairs, *The Wealth of Nations* (1776) popularized the 'invisible hand,' the idea that an individual who 'intends only his own gain,' is, as it were, 'led by an invisible hand to promote . . . the public interest.' Adam Smith did not assert that this was invariably true, and perhaps neither did any of his followers. But he contributed to a dominant tendency of thought that has ever since interfered with positive action based on rational analysis, namely, the tendency to assume that decisions reached individually will, in fact, be the best decisions for an entire society."

This idea that economic decisions reached individually collectively will benefit society as a whole has been extended to many other areas of human thought and endeavor. It even has entered into evolutionary theory in biology: Stephen Jay Gould, in his monumental work, *The Structure of Evolutionary Theory*, states that Charles Darwin constructed the theory of natural selection "in conscious analogy with the laissez-faire theories of Adam Smith and the Scottish economic school. Darwin, without the impetus and challenge of the intellectual environment, might have become a country parson, with a beetle collection maintained by an ecclesiastical sinecure as the remnant of a childhood passion for natural history."

Jeremy Bentham (1748-1832) thought that the purpose of social effort is to achieve the "greatest possible good for the greatest possible number." Many have come to believe that Smith's "hidden hand" will achieve this for a market economy, and this belief is implicit in mathematical models of the economy, but there is a problem with the basic approach used to construct these models.

Mathematics long has played a role in economics. Every introductory economics class shows how, in a free market economy, graphs of the aggregate supply and demand are curves, which depend on price, and can be plotted so as to determine the optimal price. These curves are "functions" of the single variable of price: the higher the price, the more manufacturers are willing to increase the supply—but, of course, the demand from consumers decreases with increasing price. Thus, there is an optimum price (the supply and demand curves will cross at this price). The role of mathematical models in economics has grown dramatically in the last 50 or so years with the rapid development of computers able to host large and complicated models, and the migration of physicists—who could not find academic positions in the 1960s and after—into economics.

Participants in an exchange economy can be viewed as "functions" of many variables, some of which the participants do not control and may not be aware of. Achieving the greatest possible good for the greatest possible number of people by means of economic exchange means that each of the functions (each of the individuals who intend only their own gain) need to be maximized simultaneously to achieve some predefined "good."

However, there is no known way to achieve this result in mathematics or by use of mathematical models in economics. As put by John von Neuman and Oskar Morgenstern in their seminal 1953 work, *Theory of Games and Economic Behavior*: "This kind of problem is nowhere dealt with in classical mathematics. . . . This is no conditional maximum problem, no problem of the calculus of variations of functional analysis, etc. It arises in full clarity, even in the most 'elementary' situations, *e.g.*, when all variables can assume only a finite number of values.

"A particularly striking expression of the popular misunderstanding about this pseudo-maximum problem is the famous statement according to which the purpose of social effort is the 'greatest possible good for the greatest possible number.' A guiding principle cannot be formulated by the requirement of maximizing two (or more) functions at once."

Von Neuman and Morgenstern hoped to deal with this fundamental problem in building mathematical models of the economy by introducing the theory of games into economic theory. A great deal of effort went into this program, but real markets and economic behavior generally are nonlinear. The equations of nonlinear models of any complexity generally are impossible to solve so that the equations that comprise the models usually are linearized, thereby making them useful only when the economy is in near equilibrium. Useful in day-to-day trading, but—as recent history has shown—very dangerous if they continue to be used when there is a significant economic perturbation.

While it may not be possible to construct a mathematical model that can represent a real economy faithfully, this does not mean that markets, in the context of the invisible hand, cannot optimize—in some sense—the distribution of goods and allocation of capital. Yet, there is no guarantee. When rational decisions made by individuals, whether they are economic or of another nature, taken in aggregate result in a social outcomes that not only fail to represent the best interests of all, but seriously damage the well being of all, we have a situation

that I call "locally rational but globally nuts."

First and foremost, there is the venerable example of the tragedy of the commons. The basic idea is that, if a finite resource is held in common for use by all, then that resource ultimately will be destroyed—this outcome is inevitable and that is the tragedy.

The now-classic example is provided by Hardin: "Picture a pasture open to all. It is to be expected that each herdsman will try to keep as many cattle as possible on the commons. . . . As a rational being, each herdsman seeks to maximize his gain. Explicitly or implicitly, more or less consciously, he asks, 'What is the utility to me of adding one more animal to my herd?' This utility has one negative and one positive component. . . .

"The positive component is a function of the increment of one animal. Since the herdsman receives all the proceeds from the sale of the additional animal, the positive utility is nearly +1. . . . The negative component is a function of the additional overgrazing created by one more animal. Since, however, the effects of overgrazing are shared by all the herdsmen, the negative utility for any particular decisionmaking herdsman is only a fraction of -1.

"Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd—and another and another. . . . This is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit—in a world that is limited."

This example is in a class of human problems for which there are no obvious, workable solutions. They occur today not only with regard to land use but concerning pollution of the atmosphere and the overexploitation of ocean fisheries. Pollution and destruction of ocean ecosystems affects the whole world, including many of the species inhabiting it as well as human beings.

Modern real-world economics calls the unpriced effects of pollution and overexploitation of natural resources "externalities," meaning they are not in-house costs. They cannot be dealt with sans regulation, which is impossible globally and, if imposed regionally, will distort markets and the working of the invisible hand. The subsidies by the public through these externalities are not small. For instance, the pollution caused by the burning of coal for electricity leads to some 20,000 excess deaths per year in the U.S. alone, even with emission controls. How much is a human life worth?

One approach to solving the problem of the tragedy of the commons is to place as many resources as possible in private hands where there is an incentive to preserve the assets. Doing so, however, does not always lead to the public as a whole benefiting. As put by Hardin: "We must admit that our legal system of private property plus inheritance is unjust—but we put up with it because we are not convinced, at the moment, that anyone has invented a better system. The alternative of the commons is too horrifying to contemplate. Injustice is preferable to total ruin." Later, he introduces the concept of "mutual coercion, mutually agreed upon by the majority of the people affected."

The phrase "by the majority of the people affected" to a large extent answers some of the objections to Hardin's essay raised by Lin Ostrom, who showed in her PhD thesis and elsewhere that communal property could be managed successfully by private individuals or local associations who established rules and got state authorities to enforce them. Yet, Hardin never seemed to appreciate Ostrom's approach to the tragedy of the commons. On an international scale, it is not entirely clear how this tact could work since there are no international bodies to whom one could appeal to pass laws that would bind all nations and have real enforcement powers.

Hardin gave the solution to the locally rational but globally nuts dilemma as mutually agreed upon coercion. That, after all, is what the rule of law means. At least in principle this already exists since, in the real world, Hardin's commons would not exist in a social vacuum, but rather as part of civil society, from which

the herdsmen benefit—but civil society only can exist under the rule of law (mutually agreed upon coercion).

The real problem we face today is getting those who make the laws to do so in the best interests of all rather than that of the special interests who have the resources to dominate the political process through the media and lobbying. Even if appropriate laws could be formulated and passed, there may be international, national, or societal restraints that prevent their effective application and enforcement.

Of course, the case of a commons that is not under some national jurisdiction, such as the open ocean or the atmosphere, is a separate, much more difficult problem. While there are some international agreements regulating this type of commons, there generally is—and one might add deliberately—no effective enforcement of these agreements. This also is true of some types of commons that do fall under national jurisdiction, such as lakes and rivers, some of the worst modern examples being found in China.

If the tragedy of the commons somehow is to be addressed, we first must ask if this type of human behavior is innate or learned. If it is innate, then the destruction of the commons must be thought of as an integral part of the human condition, and cannot be changed. If it is learned, there may be hope that other approaches could be used to solve the problem.

The argument to be made here is that the conclusion by the rational herdsman that he should add another animal to the herd is a rational economic one, but that making such a decision with the knowledge that the commons will be destroyed is value based; that is, the herdsman decides that his marginal short-term gain outweighs the long-term interest of the many and, indeed, even his own. Following the economic imperative makes perfect sense for an unlimited commons, but is senseless for a finite one. With a finite commons, the idea that an individual who "intends only his own gain," is, as it were, "led by an invisible hand to promote . . . the public interest" simply is false. On the other hand, preservation of a finite commons would occur if the herdsmen mutually agreed to coercion in the form of a law limiting the number of animals each herdsman could introduce to the commons. Still, even this would be insufficient unless the herdsmen believed the law would be enforced strictly by an outside, independent agency.

In the absence of effective and enforced laws regulating the Commons, the decision to increase one's own gain at the expense of the many, while it may be economically rational, clearly violates moral strictures shared by most people. Crime, in the form of robbery or theft, generally is committed by people making what for them are short-term rational economic decisions. Civilized societies put such people in jail. The destruction of a Commons (such as ocean fisheries, rivers, lakes, and the atmosphere through pollution) also is viewed by most people as a crime, but in the absence of a sheriff backed by effective laws, there is little that can be done.

Smith clearly understood the tension between economic and moral decisions. In *The Wealth of Nations*, he writes: " . . . Man has almost constant occasion for the help of his brethren, and it is in vain for him to expect it from their benevolence only. He will be more likely to prevail if he can interest their self-love in his favour, and show them that it is for their own advantage to do for him what he requires of them. . . . It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their interest. We address ourselves, not to their humanity but to their self-love, and never talk to them of our own necessities but of their advantages."

In *The Theory of Moral Sentiments* (1759), meanwhile, he states, "How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it except the pleasure of seeing it."

As put by Dogan Göçmen in his 2007 book, *The Adam Smith Problem*, " . . . This contradiction should not be ascribed conceptually to Smith. Rather, it is a real problem arising from social relations in commercial society, which is both embedded and critically considered in Smith's work."

Economics as morality

The moral dimension inherent in the tragedy of the commons suggests we ask how accepted moral values are passed from generation to generation, how the individual absorbs them, and whether stronger moral strictures could play a role in preserving the commons. The transmission of culture—which includes patterns of behavior, values, and so much more—has been a subject of much study over many years by many people. A sense of this can be had from, for example, the now-classic *Culture and the Evolutionary Process* (1985) by Robert Boyd and Peter Richerson, putting forth the "Dual Inheritance Model," as well as by Eva Jablonka and Marion Lamb in *Evolution in Four Dimensions* (2005).

What has been discovered is that direct imitation or observational learning is a very effective means of transmitting culture from one generation to the next. According to Boyd and Richerson, "The key feature of the system is the observer's ability to collect and organize the information about behavior in the absence of immediate reinforcement. The fact that observational learning does not require such reinforcement enhances the resemblance between cultural and genetic transmission."

The idea that there is an analogy between cultural and genetic transmission became popular after Richard Dawkins' *The Selfish Gene* appeared in 1976. One began to speak of "memes" as the discrete elements of cultural inheritance passed from generation to generation. These would be selected for or against in the "cultural environment." This analogical attempt to explain the evolution of human behavior and culture in Darwinian terms seems rather strained at best and simply fails, in the view of Jablonka and Lamb, because "cultural evolution cannot be explained in purely neo-Darwinian terms. . . . We need a far richer concept of the environment than is used in Darwinian theory, and a different concept of variation."

This is not to say that some behaviors are not inherited or "wired in." Infants do not have to be taught how to nurse. A pacifier or the end of a little finger placed between a baby's lips will result in the baby attempting to nurse. This usually is called an "instinct," but one could just as well view it as an inherited behavior. Perhaps the greatest problem with describing the evolution of culture in Darwinian terms is that acquired cultural elements can be passed through following generations by symbolic means so that cultural evolution has a distinctly Lamarckian component. This is completely unacceptable in pure Darwinian theory. Of course, epigenetic inheritance was unknown to Darwin or Dawkins at the time their work appeared.

Social observation and feedback then form the primary means by which individuals learn and alter behavior. As put by Ted L. Rosenthal and Barry J. Zimmerman in *Social Learning and Cognition* (1978): "Tradition and knowledge can be transmitted to the youth who observes the rituals as well as the less formal behavioral practices of adults. From these modeling sequences, concepts or rules can be abstracted and refined by social consequences; these cognitions in turn guide the observer when he reaches adulthood. Witnessed by the next generation, his actions aid in perpetuating this socially mediated cycle for passing on important information."

One can conclude from all of this that it is far better to teach children through one's own behavior rather than by trying to tell them what to do: practice what you preach.

The behavior that leads to the tragedy of the commons is not then an aspect of the human condition that is innate to humanity; it therefore is alterable. How to do so will involve the imposition of enhanced moral strictures, additional mutually agreed upon coercion in the form of appropriate laws, and effective enforcement of those laws. While we surely have the means to deal with the locally rational but globally nuts dilemma, the question is whether we collectively have the will to do so. This perhaps is the most important problem we face in the 21st century. ★

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