Basu, Kaushik **The Traveler's Dilemma.** *Scientific American,* May 20, 2007.
http://www.sciam.com/print_version.cfm?articleID=7750A576-E7F2-99DF-3824E0B1C2540D47

EXTRACT

Lucy and Pete, returning from a remote Pacific island, find that the airline has damaged the identical antiques that each had purchased. An airline manager says that he is happy to compensate them but is handicapped by being clueless about the value of these strange objects. Simply asking the travelers for the price is hopeless, he figures, for they will inflate it.

Instead he devises a more complicated scheme. He asks each of them to write down the price of the antique as any dollar integer between 2 and 100 without conferring together. If both write the same number, he will take that to be the true price, and he will pay each of them that amount. But if they write different numbers, he will assume that the lower one is the actual price and that the person writing the higher number is cheating. In that case, he will pay both of them the lower number along with a bonus and a penalty--the person who wrote the lower number will get $2 more as a reward for honesty and the one who wrote the higher number will get $2 less as a punishment. For instance, if Lucy writes 46 and Pete writes 100, Lucy will get $48 and Pete will get $44.

What numbers will Lucy and Pete write? What number would you write?

Scenarios of this kind, in which one or more individuals have choices to make and will be rewarded according to those choices, are known as games by the people who study them (game theorists). I crafted this game, “Traveler's Dilemma,” in 1994 with several objectives in mind: to contest the narrow view of rational behavior and cognitive processes taken by economists and many political scientists, to challenge the libertarian presumptions of traditional economics and to highlight a logical paradox of rationality….

To see why 2 is the logical choice, consider a plausible line of thought that Lucy might pursue: her first idea is that she should write the largest possible number, 100, which will earn her $100 if Pete is similarly greedy…Soon, however, it strikes her that if she wrote 99 instead, she would make a little more money, because in that case she would get $101. But surely this insight will also occur to Pete, and if both wrote 99, Lucy would get $99. If Pete wrote 99, then she could do better by writing 98, in which case she would get $100. Yet the same logic would lead Pete to choose 98 as well. In that case, she could deviate to 97 and earn $99. And so on. Continuing with this line of reasoning would take the travelers spiraling down to the smallest permissible number, namely, 2. It may seem highly implausible that Lucy would really go all the way down to 2 in this fashion. That does not matter (and is, in fact, the whole point)—this is where the logic leads us.

Rationality and Process

There is a philosophical (or perhaps definitional) problem with the analysis so engagingly presented by Kaushik Basu (*SA*, May 20, 2007). Definition: The rational choice is the one that (for defensible reasons) gains the most payoff. Thus, buying a lottery ticket on a hunch is not rational even if you win. But following a maximizing strategy at blackjack — and winning — is rational. Thus a rational, maximizing, strategy with the traveler’s-dilemma rules, is to choose 100.

Basu contrasts this outcome — which is close to what most people actually do — with an optimizing process that attains the Nash equilibrium, which is 2, 2. But the Nash equilibrium is not rational if we define rational as maximizing payoff. Indeed, it is best not thought of in those terms at all. The Nash equilibrium is the outcome (I would argue) of a particularly simple maximizing process called hill-climbing[1] or steepest ascent. Hill climbing is prone to settle at the hillock of a local maximum and miss the mountain of global maximization sitting nearby.

The process (the word process is used in many ways in science, but here all I mean is computation, a well-defined rule or set of rules or algorithms) that yields the Nash solution here proceeds iteratively, comparing each payoff with the one associated with reducing the number chosen by one (see the highlighted passage above). Many deviations from this process — subtracting 5 each time instead of one, for example —would fail to yield the Nash answer. (If you

[1] http://en.wikipedia.org/wiki/Hill_climbing

replace “one” by “five”, hence “99” by “95,” in the highlighted passage, Basu’s argument fails.) Details matter; there is nothing absolute about the 2,2 outcome, even within the hill-climbing Nash framework.

The Nash equilibrium works in many evolutionary examples (“evolutionarily stable strategies:” ESSs[2]) because natural selection usually (if not invariably) works through small changes from generation to generation. In other words, the Nash equilibrium is the outcome for a plausible evolutionary process, a process without foresight. The success of the Nash analysis in the evolutionary case shows that the notion of *rationality* in the conventional sense — choosing a strategy from among a set of well-defined possibilities — doesn’t even apply.

Conversely, a rational human being can understand both the Nash argument and its superior alternative, which is more complicated and involves the further step of seeing that a hill-climbing strategy leads to disaster for both parties. The player with foresight can see that 100,100 is probably the best attainable outcome. In this case, both instinct and reason converge, which is presumably why most people choose this strategy.

The philosophical issue here is that “rationality” has no absolute meaning. It is relative to *knowledge* and *computation*[3]. If, in the “traveler” case, the subject can only compare the present situation (value) with values one greater or less, then hill climbing drives the value chosen down to the minimum possible. But if he knows that the best he can do in this situation is say 100 (not worrying about the fact that he might make 101 if the other person says something different), then he will do what most people do. His behavior is not so much more or less rational than the Nash guy (well, if rationality is defined in terms of outcomes it *is* more rational), it’s simply the outcome of a different process.

Nor is the issue a political one — libertarian/selfish vs. altruistic — as Basu suggests. The difference is one of intelligence not politics: the hill climber is myopic, most people are not. But all may be self-interested.

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[2] http://en.wikipedia.org/wiki/Evolutionarily_stable_strategy
[3] *Constraints*and *objective function* in the jargon of optimality theory.