

RICARDO'S DIFFICULT IDEA

By Paul Krugman

<http://web.mit.edu/krugman/www/ricardo.htm>

The title of this paper is a play on that of an admirable recent book by the philosopher Daniel Dennett, *Darwin's Dangerous Idea: Evolution and the Meanings of Life* (1995). Dennett's book is an examination of the reasons why so many intellectuals remain hostile to the idea of evolution through natural selection -- an idea that seems simple and compelling to those who understand it, but about which intelligent people somehow manage to get confused time and time again.

The idea of comparative advantage -- with its implication that trade between two nations normally raises the real incomes of both -- is, like evolution via natural selection, a concept that seems simple and compelling to those who understand it. Yet anyone who becomes involved in discussions of international trade beyond the narrow circle of academic economists quickly realizes that it must be, in some sense, a very difficult concept indeed. I am not talking here about the problem of communicating the case for free trade to crudely anti-intellectual opponents, people who simply dislike the idea of ideas. The persistence of that sort of opposition, like the persistence of creationism, is a different sort of question, and requires a different sort of discussion. What I am concerned with here are the views of intellectuals, people who do value ideas, but somehow find this particular idea impossible to grasp.

My objective in this essay is to try to explain why intellectuals who are interested in economic issues so consistently balk at the concept of comparative advantage. Why do journalists who have a reputation as deep thinkers about world affairs begin squirming in their seats if you try to explain how trade can lead to mutually beneficial specialization? Why is it virtually impossible to get a discussion of comparative advantage, not only onto newspaper op-ed pages, but even into magazines that cheerfully publish long discussions of the work of Jacques Derrida? Why do policy wonks who will happily watch hundreds of hours of talking heads droning on about the global economy refuse to sit still for the ten minutes or so it takes to explain Ricardo?

In this essay, I will try to offer answers to these questions. The first thing I need to do is to make clear how few people really do understand Ricardo's difficult idea -- since the response of many intellectuals, challenged on this point, is to insist that of course they understand the concept, but they regard it as oversimplified or invalid in the modern world. Once this point has been established, I will try to defend the following hypothesis:

(i) At the shallowest level, some intellectuals reject comparative advantage simply out of a desire to be intellectually fashionable. Free trade, they are aware, has some sort of iconic status among economists; so, in a culture that always prizes the avant-garde, attacking that icon is seen as a way to seem daring and unconventional.

(ii) At a deeper level, comparative advantage is a harder concept than it seems, because like any scientific concept it is actually part of a dense web of linked ideas. A trained economist looks at the simple Ricardian model and sees a story that can be told in a few minutes; but in fact to tell that story so quickly one must presume that one's audience understands a number of other stories involving how competitive markets work, what determines wages, how the balance of payments adds up, and so on.

(iii) At the deepest level, opposition to comparative advantage -- like opposition to the theory of evolution -- reflects the aversion of many intellectuals to an essentially mathematical way of understanding the world. Both comparative advantage and natural selection are ideas grounded, at base, in mathematical models -- simple models that can be stated without actually writing down any equations, but mathematical models all the same. The hostility that both evolutionary theorists and economists encounter from humanists arises from the fact that both fields lie on the front line of the war between C.P. Snow's two cultures: territory that humanists feel is rightfully theirs, but which has been invaded by aliens armed with equations and computers.

1. You just don't understand

In scholarly discourse, it is a normal courtesy to give one's debating opponents the benefit of the doubt. If they say something that seems confused, one tries to find a charitable interpretation -- although it may seem that they are saying X, which is patently wrong, perhaps they are merely badly expressing their belief in Y, which could be right in principle (although it is inconsistent with the data).

Many economists -- myself included -- have tried to extend this same courtesy to people who seem, on a casual reading, not to understand comparative advantage. Surely, we have argued, the problem is one of different dialects or jargon, not sheer lack of comprehension. What these critics must be trying to do is draw attention to the ways in which comparative advantage may fail to work out in practice. After all, economists are familiar with a number of reasons why the gains from free trade may not work out quite as easily as in the simplest Ricardian model. External economies may mean underinvestment in import-competing sectors; imperfect competition may lead to a strategic competition over industry rents; because of distortions in domestic labor markets, imports may reduce wages or cause unemployment; and so on. And even if national income rises as a result of trade, the distribution of income within a country may shift in a way that hurts large groups. In short, there are a number of sophisticated extensions to and qualifications of the model introduced in the first few chapters of the undergraduate textbook (typically covered later in the book -- for example, in Chapters 10-12 of Krugman and Obstfeld (1994)).

And so one is prepared to be sympathetic after reading a passage like the following, on the first page of Sir James Goldsmith's *The Trap*: "The principal theoretician of free trade was David Ricardo, a British economist of the early nineteenth century. He believed in two interrelated concepts: specialization and comparative advantage. According to Ricardo, each nation should specialize in those activities in which it excels, so that it can have the greatest advantage relative to other countries. Thus, a nation should narrow its focus of activity, abandoning certain industries and developing those in which it has the largest comparative advantage. As a result, international trade would grow as nations export their surpluses and import the products that they no

longer manufacture, efficiency and productivity would increase in line with economies of scale and prosperity would be enhanced. But these ideas are not valid in today's world." (Goldsmith 1994:1). On close reading, the passage seems a bit garbled; but maybe he is just a careless writer (or the translation from the original French is imperfect). One expects him to follow with a discussion of some of the valid reasons why one might want to qualify Ricardo's idea -- for example, by referring to the importance of external economies in a high-technology world.

But this expectation is utterly disappointed. What is different, according to Goldsmith, is that there are all these countries out there that pay wages that are much lower than those in the West -- and that, he claims, makes Ricardo's idea invalid. That's all there is to his argument; there is no hint of any more subtle content. In short, he offers us no more than the classic "pauper labor" fallacy, the fallacy that Ricardo dealt with when he first stated the idea, and which is a staple of even first-year courses in economics. In fact, one never teaches the Ricardian model without emphasizing precisely the way that model refutes the claim that competition from low-wage countries is necessarily a bad thing, that it shows how trade can be mutually beneficial regardless of differences in wage rates. The point is not that low-wage competition never poses a problem. Rather, what is significant is that despite ostentatiously citing Ricardo, Goldsmith completely misses one of the essential lessons of his argument.

One might argue that Goldsmith is a straw man, that he is an intellectual lightweight whom nobody would take seriously as a commentator on these issues. But *The Trap* is structured as a discussion with Yves Messarovitch, the economics editor of *Le Figaro*; Mr. Messarovitch certainly took Sir James seriously (never raising any objections to his version of international trade theory), and the book became a best-seller in France. In the United States, Goldsmith did not sell as many books, but his views were featured in intellectual magazines like *New Perspectives Quarterly*; he was invited to speak to the US Congress; and the Clinton Administration took his views seriously enough to send its chief economist, Laura Tyson, to debate him on television. In short, while Goldsmith's failure to understand the basic idea of comparative advantage may seem stunningly obvious to any trained economist, other intellectuals -- including editors and journalists who specialize on economic matters -- regarded his views as, at the very least, a valuable addition to the debate.

Or consider the recent anti-free-trade writings of James Fallows, the Washington editor of *The Atlantic Monthly* and one of America's most prominent intellectuals. In his book *Looking at the Sun* (1994), Fallows argues that Asian success proves the effectiveness of protectionist policies in promoting economic growth. One might have expected him to offer some intellectually cutting-edge explanation of why this might be so, of why comparative advantage is invalid in the modern world economy. But instead he claims that economists have gone astray by ignoring the nineteenth-century ideas of Friedrich List! One must assume that Fallows actually read List; in which case his praise for List shows clearly that he does not understand Ricardo. For List's old book, like Goldsmith's new one, is the work of a man who, right from the beginning, just didn't get it; who could not get straight in his mind how trade between two countries could raise incomes in both. (A sample List argument: he points out that agricultural land near cities is more valuable than that far away, and concludes that tariffs on manufactured goods will help farmers as well as industrialists).

While the ideas of both Fallows and Goldsmith have been well received in intellectual circles, they have not by any means persuaded everyone. What is striking, however, is that virtually none of the reviews of their books have pointed out that they appear not to understand comparative advantage. (Indeed, reviews of Fallows's book tended to praise his economic sophistication and question his political and cultural analysis). The explanation, of course, is that the reviewers don't understand it either -- or, in some cases, that editors who didn't understand the concept refused to allow it to be mentioned in the reviews. (I speak from personal experience). I believe that much of the ineffectiveness of economists in public debate comes from their false supposition that intelligent people who read and even write about world trade must grasp the idea of comparative advantage. With very few exceptions, they don't -- and they don't even want to hear about it. Why?

2. The cult of the new

One of America's new intellectual stars is a young writer named Michael Lind, whose contrarian essays on politics have given him a reputation as a brilliant enfant terrible. In 1994 Lind published an article in *Harper's* about international trade, which contained the following remarkable passage:

"Many advocates of free trade claim that higher productivity growth in the United States will offset pressure on wages caused by the global sweatshop economy, but the appealing theory falls victim to an unpleasant fact. Productivity has been going up, without resulting wage gains for American workers. Between 1977 and 1992, the average productivity of American workers increased by more than 30 percent, while the average real wage fell by 13 percent. The logic is inescapable. No matter how much productivity increases, wages will fall if there is an abundance of workers competing for a scarcity of jobs -- an abundance of the sort created by the globalization of the labor pool for US-based corporations." (Lind 1994:)

What is so remarkable about this passage? It is certainly a very abrupt, confident rejection of the case for free trade; it is also noticeable that the passage could almost have come out of a campaign speech by Patrick Buchanan. But the really striking thing, if you are an economist with any familiarity with this area, is that when Lind writes about how the beautiful theory of free trade is refuted by an unpleasant fact, *the fact he cites is completely untrue*.

More specifically: the 30 percent productivity increase he cites was achieved only in the manufacturing sector; in the business sector as a whole the increase was only 13 percent. The 13 percent decline in real wages was true only for production workers, and ignores the increase in their benefits: total compensation of the average worker actually rose 2 percent. And even that remaining gap turns out to be a statistical quirk: it is entirely due to a difference in the price indexes used to deflate business output and consumption (probably reflecting overstatement of both productivity growth and consumer price inflation). When the same price index is used, the increases in productivity and compensation have been almost exactly equal. But then how could it be otherwise? Any difference in the rates of growth of productivity and compensation would necessarily show up as a fall in labor's share of national income -- and as everyone who is even slightly familiar with the numbers knows, the share of

compensation in U.S. national income has been quite stable in recent decades, and actually rose slightly over the period Lind describes.

The question here is not why Lind got these numbers wrong. It takes considerable experience to know where to look and what to worry about in economic statistics, and one should not expect someone who does not work in the field to be able to get it right without some guidance. The question is, instead, why Mr. Lind felt that it was a good idea to make sweeping pronouncements about this subject, when he clearly was unwilling to invest time and energy in actually understanding it. The short answer in this case is surely that Mr. Lind, who is always looking for ways to enhance his enfant terrible status, saw this as a perfect opportunity. Free trade is a sacred cow of economists, who are well-known to be boring, stuffy types; what could be a better way to reinforce one's credentials as a radical, innovative thinker than to skewer their most beloved doctrine? (It seems not to have occurred to him that there might be a reason other than ideological rigidity that the striking fact he thought he knew has not been noticed by economists).

This is a fairly extreme case, but by no means unique. Modern intellectuals are supposed to be daring innovators, not respecters of tradition. As any publisher will tell you, books about startling new scientific discoveries always sell better than books about known areas of science, even though the things science already knows are in many ways stranger than any of the speculations in the latest cosmological best-seller. Old ideas are viewed as boring, even if few people have heard of them; new ideas, even if they are probably wrong and not terribly important, are far more attractive. And books that say (or seem to say) that the experts have all been wrong are far more likely to attract a wide audience than books that explain why the experts are probably right. Stephen Jay Gould's *Wonderful Life* (Gould 1989) which to many readers seemed to say that recent discoveries refute Darwinian orthodoxy, attracted far more attention than Richard Dawkins' equally well-written *The Blind Watchmaker* (Dawkins 1986), which explained the astonishing implications of that orthodoxy. (See Dennett for an eye-opening discussion of Gould). Roger Penrose's *The Emperor's New Mind*, which rejects the possibility of explaining intelligence in terms of computational processes, attracted far more attention than any of the exciting discoveries of cognitive scientists who are actually trying to understand the nature of intelligence.

The same principle applies to international economics. Comparative advantage is an old idea; intellectuals who want to read about international trade want to hear radical new ideas, not boring old doctrines, even if they are quite blurry about what those doctrines actually say. Robert Reich, now Secretary of Labor, understood this point perfectly when he wrote an essay for *Foreign Affairs* entitled "Beyond free trade". (Reich 1983). The article received wide attention, even though it was fairly unclear exactly how Reich proposed to go beyond free trade (there is a certain similarity between Reich and Gould in this respect: they make a great show of offering new ideas, but it is quite hard to pin down just what those new ideas really are). The great selling point was, clearly, the article's title: free trade is old hat, it is something we must go beyond. In this sort of intellectual environment, it is quite hard to get anyone other than an economics student to sit still for an explanation of the concept of comparative advantage. Just imagine trying to tell an ambitious, energetic, forward-looking intellectual who is interested in economics -- William Jefferson Clinton comes to mind -- that before he can start talking knowledgeably about globalization and the information economy he must wrap his

mind around a difficult concept that was devised by a frock-coated banker 180 years ago!

3. A harder concept than it seems

To a trained economist, the basic Ricardian model seems almost trivial. Two goods, two countries, one productive factor, perfect competition: what could be simpler? Indeed, one of the fierce joys of being an international trade economist is that so many seemingly sophisticated tracts can be revealed as nonsense, so many self-important men unmasked as poseurs, using such a minimalist framework.

And yet if one tries to explain the basic model to a non-economist, it soon becomes clear that it really isn't that simple after all. Teaching the model, to docile students, is one thing: they get the model in the course of a broader study of economics, and in any case they are obliged to pay attention and learn it the way you teach it if they want to pass the exam. But try to explain the model to an adult, especially one who already has opinions about the subject, and you continually find yourself obliged to backtrack, realizing that yet another proposition you thought was obvious actually isn't. Just before this paper was written, I was trying to explain to an editorial writer for a major U.S. newspaper why international trade is probably not the main cause of the country's ills. After a confused interlude, it became clear what one of the blocks was: he just didn't understand, even after being told the numbers, why a situation in which productivity increases were not being shared with workers would necessarily be reflected in a decline in the labor share of income -- and therefore why the stability of that share in practice is a crucial piece of evidence. Eventually I was reduced nearly to baby-talk ("suppose the factory produces 10 tons of cheese, and pays out wages equal in value to 6 tons; now suppose that the workers become more productive and turn out 12 tons of cheese, but that wages haven't changed ..."). This was not a successful conversation: he wanted to talk about global trends, and instead I was teaching him first-grade arithmetic.

That particular confusion is more common than one might expect. But even at a somewhat higher level, there are, I believe, at least three implicit assumptions that underlie the most basic Ricardian model, assumptions that are justified by the whole fabric of economic understanding but are not at all obvious to non-economists. Here they are:

- *Wages are determined in a national labor market:* The basic Ricardian model envisages a single factor, labor, which can move freely between industries. When one tries to talk about trade with laymen, however, one at least sometimes realizes that they do not think about things that way at all. They think about steelworkers, textile workers, and so on; there is no such thing as a national labor market. It does not occur to them that the wages earned in one industry are largely determined by the wages similar workers are earning in other industries. This has several consequences. First, unless it is carefully explained, the standard demonstration of the gains from trade in a Ricardian model -- workers can earn more by moving into the industries in which you have a comparative advantage -- simply fails to register with lay intellectuals. Their picture is of aircraft workers gaining and textile workers losing, and the idea that it is useful even for the sake of argument to imagine that workers can move from one industry to the other is foreign to them. Second, the link between productivity and wages is thoroughly misunderstood. Non-economists typically think that wages should reflect productivity at

the level of the individual company. So if Xerox manages to increase its productivity 20 percent, it should raise the wages it pays by the same amount; if overall manufacturing productivity has risen 30 percent, the real wages of manufacturing workers should have risen 30 percent, even if service productivity has been stagnant; if this doesn't happen, it is a sign that something has gone wrong. In other words, my criticism of Michael Lind would baffle many non-economists.

Associated with this problem is the misunderstanding of what international trade should do to wage rates. It is a fact that some Bangladeshi apparel factories manage to achieve labor productivity close to half those of comparable installations in the United States, although overall Bangladeshi manufacturing productivity is probably only about 5 percent of the US level. Non-economists find it extremely disturbing and puzzling that wages in those productive factories are only 10 percent of US standards.

Finally, and most importantly, it is not obvious to non-economists that wages are endogenous. Someone like Goldsmith looks at Vietnam and asks, "what would happen if people who work for such low wages manage to achieve Western productivity?" The economist's answer is, "if they achieve Western productivity, they will be paid Western wages" -- as has in fact happened in Japan. But to the non-economist this conclusion is neither natural nor plausible. (And he is likely to offer those Bangladeshi factories as a counterexample, missing the distinction between factory-level and national-level productivity).

- *Constant employment is a reasonable approximation:* The standard textbook version of the Ricardian model assumes full employment in both countries. But in reality unemployment is constantly a concern of economic policy -- so why is this the usual assumption? There are two answers. One -- the answer that Ricardo would have given -- is that international trade is a long-run issue, and that in the long run the economy has a natural self-correcting tendency to return to full employment. The other, more modern answer is that countries have central banks, which try to stabilize employment around the NAIRU; so that it makes sense to think of the Federal Reserve and its counterparts acting in the background to hold employment constant. This is not at all the way that non-economists think about the issue. Both supporters and opponents of free trade normally claim that their preferred policies will create jobs; free-traders are forever warning that the Smoot-Hawley tariff caused the Great Depression. And the alternative view does not come at all naturally. During the NAFTA debates I shared a podium with an experienced, highly regarded U.S. trade negotiator, a strong NAFTA supporter. At one point a member of the audience asked me what I thought the effect of NAFTA would be on the number of jobs in the United States; when I replied "none", based on the standard arguments, the trade official exploded in anger: "It's remarks like that which explain why people hate economists!"

- *The balance of payments is not a problem:* The standard textbook presentation of the Ricardian model assumes balanced trade -- indeed, it is usually a one-period model in which trade must be balanced. Yet the news is full of stories about the balance of payments, of complaints about trade surpluses and deficits. Why are these absent from the story?

Again, economists have good reasons for thinking that it is a good approximation to separate balance of payments from real international trade issues. In Ricardo's case, the

essential ingredient was the argument by David Hume that trade imbalances are self-correcting: a surplus country will acquire specie, leading to rising prices that price its goods out of world markets, while a deficit country will correspondingly find its goods increasingly competitively priced. In the modern world, again, the channels involve less Invisible Hand and more government intervention: when monetary policies target the unemployment rate, exchange rates do the adjusting. Economists are also aware that even persistent trade imbalances are not necessarily a problem, and certainly that surpluses are not a sure sign of health or deficits one of weakness. Trade may be balanced in Chapter 2; but Chapter 13 explains that the trade balance is equal to the difference between savings and investment, and that a country may justifiably run persistent deficits if it is an attractive site for foreign investment.

Again, none of this is obvious to non-economists. The essential accounting identity, savings minus investment equals exports minus imports, is if anything a better-kept secret than the concept of comparative advantage. The debate over NAFTA was entirely phrased in terms of the apparent prospect that the United States would run a trade surplus with Mexico -- that was why the treaty was in our interests -- and the deficit that has actually materialized is universally regarded as a bad thing.

In sum, while the concept of comparative advantage may seem utterly simple to economists, in order to achieve that simplicity one must invoke a number of principles and useful simplifying assumptions that seem natural and reasonable only to someone familiar with economic analysis in general. ("What do you mean, objects fall at the same rate regardless of how heavy they are -- if I drop a cannonball and a feather ... you're assuming away air resistance? Why would you do that?") Those principles and simplifying assumptions are indeed reasonable, but they are not obvious.

4. The Two Cultures

I once had a very unpleasant, but ultimately useful, conversation with the editor of one of America's leading intellectual magazines. He was in the process of refusing to print a piece I had written at his request, and his dissatisfaction with what I had written was the main subject at hand. But along the way I somehow mentioned the need to represent economic ideas with carefully thought-out models, and he responded with a mixture of bafflement and asperity. Clearly the idea that economic ideas could benefit from being modeled was new to him, even though his journal frequently publishes articles on economic affairs; and he suggested to me that in future I would do well to explain why models are sometimes useful and why they usually are not.

At the time I was fairly flabbergasted: to question the usefulness of economic models at this late date seemed rather strange. But the economist's idea that economic theory for the most part consists of models has by no means been accepted by intellectuals outside our field. In fact, if one looks at the favorite economic writers of the non-economist intellectual -- Robert Reich, Lester Thurow, John Kenneth Galbraith -- one realizes that they have in common an aversion to or ignorance of modeling. There are model-oriented economists, like Alan Blinder, who also write for a broader audience, and they don't put their equations in their books and articles; but the skeleton of the models that structure their thought is visible under the surface to those who know how to look. By contrast, in the writings of Reich or Galbraith what you read is what you get -- there is

no hidden mathematical structure to the argument, no diagram one might draw on a blackboard or simulation one might run on a computer to clarify the point.

In this the situation in economics is virtually identical to that in evolutionary theory. Ask a working biologist who is the greatest living evolutionary thinker, and he or she will probably answer John Maynard Smith (with nods to George Williams and William Hamilton). Maynard Smith not only has a name that should have made him an economist; he writes and thinks like an economist, representing evolutionary issues with stylized mathematical models that are sometimes confronted with data, sometimes simulated on the computer, but always serve as the true structure informing the verbal argument. A textbook like his *Evolutionary Genetics* (1989) feels remarkably comfortable for an academic economist: the style is familiar, and even a good bit of the content looks like things economists do too. But ask intellectuals in general for a great evolutionary thinker and they will surely name Stephen Jay Gould -- who receives one brief, dismissive reference in Maynard Smith (1989). (One of my ill-advised moves in the conversation with the editor was to point out that the index to Tyson (1993) contains no references either to Reich or to Thurow).

What does Gould have that Maynard Smith does not? He is a more accessible writer -- but evolutionary theory is, to a far greater extent than economics, blessed with excellent popularizers: writers like Dawkins (1989) or Ridley (1993), who provide beautifully written expositions of what researchers have learned. (Writers like Gould or Reich are not, in the proper sense, popularizers: a popularizer reports on the work of a community of scholars, whereas these writers argue for their own, heterodox points of view). No, what makes Gould so popular with intellectuals is not merely the quality of his writing but the fact that, unlike Dawkins or Ridley, he is not trying to explain the essentially mathematical logic of modern evolutionary theory. It's not just that there are no equations or simulations in his books; he doesn't even think in terms of the mathematical models that inform the work of writers like Dawkins. That is what makes his work so appealing. The problem, of course, is that evolutionary theory -- the real thing -- is *based* on mathematical models; indeed, increasingly it is based on computer simulation. And so the very aversion to mathematics that makes Gould so appealing to his audience means that his books, while they may seem to his readers to contain deep ideas, seem to people who actually know the field to be mere literary confections with little serious intellectual content, and much of that simply wrong. In particular, readers whose ideas of evolution are formed by reading Gould's work get no sense of the power and reach of the theory of natural selection -- if anything, they come away with a sense that modern thought has shown that theory to be inadequate.

Economics is not as well served by its writers as evolution. Still, the distinctive feature of the writers whose ideas about world trade play well with an intellectual audience is the same: the successful books are those that not only do not explicitly discuss mathematical models, they are not even implicitly based on mathematical reasoning. A book like Robert Reich's *The Work of Nations* (Reich 1991) not only eschews equations and diagrams, it never even tries to present the idea of comparative advantage informally. In fact, it never uses the phrase "comparative advantage" at all, even to criticize it. As a result, books by authors such as Reich or Thurow do not make humanists uncomfortable. Unavoidably, however, they also give them no sense of the power and importance of economic models in general, or of Ricardo's difficult idea in

particular. If anything, the message one gets from these books is that in the new economy nineteenth-century concepts no longer apply.

It might be worth pointing out one exception to the general intellectual aversion to mathematical models. Intellectuals do reserve, both in evolution and economics, a small pedestal for mathematical modelers -- as long as their models are confusing and seem to refute orthodoxy. Call it the "Santa Fe syndrome". At one point in Dennett's book he reports a list of the top ten objections raised to Steven Pinker's theories about the evolution of language; one of them is "Natural selection is irrelevant, because now we have chaos theory". At about the same time I read this passage I had received a barrage of protests over an article that tried, without explicit mathematics, to walk through some simple models of international trade (Krugman 1994); several of the letters insisted that because of nonlinear dynamics it was impossible to reach any meaningful conclusions from simple models. ("Have you ever thought about the implications of increasing returns? You should read the work of Brian Arthur and Paul Romer.")

There are two odd things about the popularity of certain kinds of mathematical modeling among intellectuals who are generally hostile to such models. One is that the preferred models are typically far more difficult and obscure than the standard models in the field. The other is that the supposedly heterodox conclusions of these models are often not heterodox at all. To take a theme common to both evolution and economics: the idea that small random events can under certain conditions set in motion a cumulative process of change is the theme both of "peacock's tail" accounts of sexual selection and of external economy accounts of international specialization, both familiar stories that lie well inside the boundaries of academic orthodoxy, stories that can be and are illustrated with simple models in advanced undergraduate textbooks like Maynard Smith (1989) and Krugman and Obstfeld (1994). Yet many intellectuals believe that this idea was discovered at Santa Fe and challenges the foundations of both fields.

The secret to the popularity of certain mathematical modelers, I suspect, is that they are valued precisely because they seem to absolve intellectuals from the need to understand the models that underpin orthodox views. Hardly anyone tries to understand what the Santa Fe theorists are actually saying; it is the pose of opposition to received wisdom, together with the implication that in a complicated world you can't learn anything from simple models anyway, that is valued, because it seems to say that not knowing what's in the textbooks is OK.

A final note here: there is a new trend among people who don't like conventional economics, toward what is sometimes called "bionomics". The manifestos of groups like the Bionomics Institute claim that they are developing a new science of economics that abandons the mechanistic approach of the existing field in favor of a model based on ecology and evolution. (Speaker of the House Newt Gingrich is reported to be among those who find bionomics appealing). The irony is that neoclassical economics, with its emphasis on modeling the interactions of self-interested individuals, is no more mechanistic than neo-Darwinian evolutionary theory -- in fact, the theories are very similar to one another, down to the details of the models and the curves on the diagrams.

5. What can be done?

I cannot offer any grand strategy for dealing with the aversion of intellectuals to Ricardo's difficult idea. No matter what economists do, we can be sure that ten years from now the talk shows and the op-ed pages will still be full of men and women who regard themselves as experts on the global economy, but do not know or want to know about comparative advantage. Still, the diagnosis I have offered here provides some tactical hints:

(i) *Take ignorance seriously*: I am convinced that many economists, when they try to argue in favor of free trade, make the mistake of overestimating both their opponents and their audience. They cannot believe that famous intellectuals who write and speak often about world trade could be entirely ignorant of the most basic ideas. But they are - and so are their readers. This makes the task of explaining the benefits of trade harder - but it also means that it is remarkably easy to make fools of your opponents, catching them in elementary errors of logic and fact. This is playing dirty, and I advocate it strongly.

(ii) *Adopt the stance of rebel*: There is nothing that plays worse in our culture than seeming to be the stodgy defender of old ideas, no matter how true those ideas may be. Luckily, at this point the orthodoxy of the academic economists is very much a minority position among intellectuals in general; one can seem to be a courageous maverick, boldly challenging the powers that be, by reciting the contents of a standard textbook. It has worked for me!

(iii) *Don't take simple things for granted*: It is crucial, when trying to communicate Ricardo's idea to a broader audience, to stop and try to put yourself in the position of someone who does not know economics. Arguments must be built from the ground up - don't assume that people understand why it is reasonable to assume constant employment, or a self-correcting trade balance, or even that similar workers tend to be paid similar wages in different industries.

(iv) *Justify modeling*: Do not presume, as I did, that people accept and understand the idea that models facilitate understanding. Most intellectuals don't accept that idea, and must be persuaded or at least put on notice that it is an issue. It is particularly useful to have some clear examples of how "common sense" can be misleading, and a simple model can clarify matters immensely. (My recent favorite involves the "dollarization" of Russia. It is not easy to convince a non-economist that when gangsters hoard \$100 bills in Vladivostock, this is a capital outflow from Russia's point of view -- and that it has the same effects on the US economy as if that money was put in a New York bank. But if you can get the point across, you have also taught an object lesson in why economists who think in terms of models have an advantage over people who do economics by catch-phrase). None of this is going to be easy. Ricardo's idea is truly, madly, deeply difficult. But it is also utterly true, immensely sophisticated -- and extremely relevant to the modern world.

REFERENCES

Dawkins, R. (1986), *The Blind Watchmaker*, New York: Longman.

Dennett, D. (1995), *Darwin's Dangerous Idea: Evolution and the Meanings of Life*, New York: Simon and Schuster.

Fallows, J. (1994), *Looking at the Sun*, New York: Pantheon.

Goldsmith, J. (1994), *The Trap*, New York: Carroll and Graf.

Gould, S.J. (1989), *Wonderful Life*, New York: Norton.

Krugman, P. (1994), "Does Third World growth hurt First World prosperity?", *Harvard Business Review*, July.

Krugman, P. and M. Obstfeld (1994), *International Economics: Theory and Policy* (3rd edition), New York: HarperCollins.

Lind, M.

List, F. (1856), *The National System of Political Economy*

Maynard Smith, J. (1989), *Evolutionary Genetics*, Oxford: Oxford University Press.

Penrose, R. (1989), *The Emperor's New Mind*, New York: Oxford.

Reich, R. (1983)

Reich, R. (1991), *The Work of Nations*, New York: Basic Books

Ridley, M. (1993), *The Red Queen: Sex and the Evolution of Human Nature*, New York: Penguin.

Tyson, L. (1993), *Who's Bashing Whom?*, Washington: Institute for International Economics.