

# Academic Economics — Strengths and Weaknesses, after Considering Interdisciplinary Needs

I've outlined some remarks in a rough way, and after I'm finished talking from that outline, I'll take questions as long as anybody can endure listening, until they drag me away to wherever else I'm supposed to go.

As you might guess, I agreed to do this because the subject of getting the soft sciences so they talked better to each other has been one that has interested me for decades. And, of course, economics is in many respects the queen of the soft sciences. It's expected to be better than the rest. It's my view that economics is better at the multi-disciplinary stuff than the rest of the soft science. And it's also my view that it's still lousy, and I'd like to discuss this failure in this talk. As I talk about strengths and weaknesses in academic economics, one interesting fact you are entitled to know is that I never took a course in economics. And with this striking lack of credentials, you may wonder why I have the chutzpah to be up here giving this talk. The answer is I have a black belt in chutzpah. I was born with it. Some people, like some of the women I know, have a black belt in spending. They were born with that. But what they gave me was a black belt in chutzpah.

But I come from two peculiar strands of experience that may have given me some useful economic insights. One is Berkshire Hathaway and the other is my personal educational history.

Berkshire, of course, has finally gotten interesting. When Warren took over Berkshire, the market capitalization was about ten million dollars. And forty something years later, there are not many more shares outstanding now than there were then, and the market capitalization is about a hundred billion dollars, ten thousand for one. And since that has happened, year after year, in kind of a grind-ahead fashion, with very

few failures, it eventually drew some attention, indicating that maybe Warren and I knew something useful in microeconomics.

### **Non-use of Efficient Market Theory at Berkshire**

For a long time there was a Nobel Prize-winning economist who explained Berkshire Hathaway's success as follows:

First, he said Berkshire beat the market in common stock investing through one sigma of luck, because nobody could beat the market except by luck. This hard-form version of efficient market theory was taught in most schools of economics at the time. People were taught that nobody could beat the market. Next the professor went to two sigmas, and three sigmas, and four sigmas, and when he finally got to six sigmas of luck, people were laughing so hard he stopped doing it.

Then he reversed the explanation 180 degrees. He said, "No, it was still six sigmas, but it was six sigmas of skill." Well this very sad history demonstrates the truth of Benjamin Franklin's observation in Poor Richard's Almanac. If you would persuade, appeal to interest and not to reason. The man changed his view when his incentives made him change it, and not before.

I watched the same thing happen at the Jules Stein Eye Institute at UCLA. I asked at one point, why are you treating cataracts only with a totally obsolete cataract operation? And the man said to me, "Charlie, it's such a wonderful operation to teach." (Laughter). When he stopped using that operation, it was because almost all the patients had voted with their feet. Again, appeal to interest and not to reason if you want to change conclusions.

Well, Berkshire's whole record has been achieved without paying one ounce of attention to the efficient market theory in its hard form. And not one ounce of attention to the descendants of that idea, which came out of academic economics and

went into corporate finance and morphed into such obscenities as the capital asset pricing model, which we also paid no attention to. I think you'd have to believe in the tooth fairy to believe that you could easily outperform the market by seven-percentage points per annum just by investing in high volatility stocks.

Yet, believe it or not, like the Jules Stein doctor, people once believed this stuff. And the belief was rewarded. And it spread. And many people still believe it. But Berkshire never paid any attention to it. And now I think the world is coming our way and the idea of perfection in all market outcomes is going the way of the DoDo.

It was always clear to me that the stock market couldn't be perfectly efficient, because as a teenager, I'd been to the racetrack in Omaha where they had the parimutuel system. And it was quite obvious to me that if the house's take, the croupier's take, was 17%, some people consistently lost a lot less than 17% of all their bets, and other people consistently lost more than 17% of all their bets. So the parimutuel system in Omaha had no perfect efficiency. And so I didn't accept the argument that the stock market was always perfectly efficient in creating rational prices.

Indeed, there's been some documented cases since, of people getting so good at understanding horses and odds, that they actually are able to beat the house in off-track betting. There aren't many people who can do that, but there are a few people in America who can.

### **Personal Multidisciplinary Education**

Next, my personal education history is interesting because its deficiencies and my peculiarities eventually created advantages. For some odd reason, I had an early and extreme multidisciplinary cast of mind. I couldn't stand reaching for a small idea in my own discipline when there was a big idea right over the fence in somebody else's discipline. So I just grabbed in all directions for the big ideas that would really work.

Nobody taught me to do that; I was just born with that yen. I also was born with a huge craving for synthesis. And when it didn't come easily, which was often, I would rag the problem, and then when I failed I would put it aside and I'd come back to it and rag it again. It took me 20 years to figure out how and why the Reverend Moon's conversion methods worked. But the psychology departments haven't figured it out yet, so I'm ahead of them.

But anyway, I have this tendency to want to rag the problems. Because WW II caught me. I drifted into some physics, and the Air Corps sent me to Caltech where I did a little more physics as part of being made into a meteorologist. And there, at a very young age, I absorbed what I call the fundamental full attribution ethos of hard science. And that was enormously useful to me. Let me explain that ethos.

Under this ethos, you've got to know all the big ideas in all the disciplines less fundamental than your own. You can never make any explanation, which can be made in a more fundamental way, in any other way than the most fundamental way. And you always take with full attribution to the most fundamental ideas that you are required to use. When you're using physics, you say you're using physics. When you're using biology, you say you're using biology. And so on and so on. I could early on see that that ethos would act as a fine organizing system for my thoughts. And I strongly suspected that it would work really well in the soft sciences as well as the hard sciences, so I just grabbed it and used it all through my life in soft science as well as hard science. That was a very lucky idea for me.

Let me explain how extreme that ethos is in hard science. There is a constant, one of the fundamental constants in physics, known as Boltzmann's constant. You probably all know it very well. And the interesting thing about Boltzmann's constant is that Boltzmann didn't discover it. So why is Boltzmann's constant now named for Boltzmann? Well, the answer was that Boltzmann derived that constant from basic physics in a more fundamental way than the poor forgotten fellow who found the constant in the first place in some less fundamental way. The ethos of hard science is so strong in favor of reductionism to the more fundamental body of knowledge that

you can wash the discoverer right out of history when somebody else handles his discovery in a more fundamental way. I think that is correct. I think Boltzmann's constant should be named for Boltzmann.

At any rate, in my history and Berkshire's history Berkshire went on and on into considerable economic success, while ignoring the hard form efficient markets doctrine once very popular in academic economics and ignoring the descendants of that doctrine in corporate finance, where the results became even sillier than they were in the economics. This naturally encouraged me.

Finally, with my peculiar history, I'm also bold enough to be here today, because at least when I was young I wasn't a total klutz. For one year at the Harvard Law School, I was ranked second in my group of about a thousand, and I always figured that, while there were always a lot of people much smarter than I was, I didn't have to hang back totally in the thinking game.

### **The Obvious Strengths of Academic Economics**

Let me begin by discussing the obvious strengths of academic economics. The first obvious strength, and this is true of a lot of places that get repute, is that it was in the right place at the right time. Two hundred years ago, aided by the growth of technology and the growth of other developments in the civilization, the real output per capita of the civilized world started going up at about 2% per annum, compounded. And before that, for the previous thousands of years, it had gone up at a rate that hovered just a hair's breadth above zero. And, of course, economics grew up amid this huge success. Partly it helped the success, and partly it explained it. So, naturally, academic economics grew. And lately with the collapse of all the communist economies, as the free market economies or partially free market economies flourished, that added to the reputation of economics. Economics has been a very favorable place to be if you're in academia.

Economics was always more multidisciplinary than the rest of soft science. It just reached out and grabbed things as it needed to. And that tendency to just grab whatever you need from the rest of knowledge if you're an economist has reached a fairly high point in Mankiw's new textbook ([Principles of Economics](#)). I checked out that textbook. I must have been one of the few businessmen in America that bought it immediately when it came out because it had gotten such a big advance. I wanted to figure out what the guy was doing where he could get an advance that great. So this is how I happened to riffle through Mankiw's freshman textbook. And there I found laid out as principles of economics: opportunity cost is a superpower, to be used by all people who have any hope of getting the right answer. Also, incentives are superpowers.

And lastly, the tragedy of the commons model, popularized by UCSB's Garrett Hardin. Hardin caused the delightful introduction into economics – alongside Smith's beneficent invisible hand – of Hardin's wicked evildoing invisible foot. Well, I thought that the Hardin model made economics more complete, and I knew when Hardin introduced me to his model, the [Tragedy of the Commons](#), that it would be in the economics textbooks eventually. And, low and behold, it finally made it about 20 years later. And it's right for Mankiw to reach out into other disciplines and grab Hardin's model and anything else that works well.

Another thing that helped economics is that from the beginning it attracted the best brains in soft science. Its denizens also interacted more with the practical world than was at all common in soft science and the rest of academia, and that resulted in very creditable outcomes like the three cabinet appointments of economics PhD George Schultz and the cabinet appointment of Larry Summers. So this has been a very favored part of academia.

Also, economics early on attracted some of the best writers of language in the history of the earth. You start out with Adam Smith. Adam Smith was so good a thinker, and so good a writer, that in his own time, Emmanuel Kant, then the greatest intellectual in Germany, simply announced that there was nobody in Germany to equal Adam

Smith. Well Voltaire, being an even more pithy speaker than Kant, which wouldn't be that hard, immediately said, "Oh well, France doesn't have anybody who can even be compared to Adam Smith." So economics started with some very great men and great writers.

And then there have been later great writers like John Maynard Keynes, whom I quote all the time, and who has added a great amount of illumination to my life. And finally, even in the present era, if you take Paul Krugman and read his essays, you will be impressed by his fluency. I can't stand his politics; I'm on the other side. But I love this man's essays. I think Paul Krugman is one of the best essayists alive. And so economics has constantly attracted these fabulous writers. And they are so good that they have this enormous influence far outside their economic discipline, and that's very uncommon in other academic departments.

Okay, now it's time to extend criticism, instead of praise. We've recognized that economics is better than other soft-science academic departments in many ways. And one of the glories of civilization. Now it's only fair that we outline a few things that are wrong with academic economics.

## **What's Wrong with Economics**

### **1) Fatal Unconnectedness, Leading To "Man With A Hammer Syndrome," Often Causing Overweighing What Can Be Counted**

I think I've got eight, no nine objections, some being logical subdivisions of a big general objection. The big general objection to economics was the one early described by Alfred North Whitehead when he spoke of the fatal unconnectedness of academic disciplines, wherein each professor didn't even know the models of the other disciplines, much less try to synthesize those disciplines with his own.

I think there's a modern name for this approach that Whitehead didn't like, and that name is bonkers. This is a perfectly crazy way to behave. Yet economics, like much else in academia, is too insular.

The nature of this failure is that it creates what I always call, "man with a hammer syndrome." And that's taken from the folk saying: To the man with only a hammer, every problem looks pretty much like a nail. And that works marvellously to gum up all professions, and all departments of academia, and indeed most practical life. The only antidote for being an absolute klutz due to the presence of a man with a hammer syndrome is to have a full kit of tools. You don't have just a hammer. You've got all the tools. And you've got to have one more trick.

You've got to use those tools checklist-style, because you'll miss a lot if you just hope that the right tool is going to pop up unaided whenever you need it. But if you've got a full list of tools, and go through them in your mind, checklist-style, you will find a lot of answers that you won't find any other way. So limiting this big general objection that so disturbed Alfred North Whitehead is very important, and there are mental tricks that help do the job.

### *Overweighing what can be counted*

A special version of this "man with a hammer syndrome" is terrible, not only in economics but practically everywhere else, including business. It's really terrible in business. You've got a complex system and it spews out a lot of wonderful numbers that enable you to measure some factors. But there are other factors that are terribly important, [yet] there's no precise numbering you can put to these factors. You know they're important, but you don't have the numbers. Well practically everybody (1) overweighs the stuff that can be numbered, because it yields to the statistical techniques they're taught in academia, and (2) doesn't mix in the hard-to-measure stuff that may be more important. That is a mistake I've tried all my life to avoid, and I have no regrets for having done that.

The late, great, Thomas Hunt Morgan, who was one of the greatest biologists who ever lived, when he got to Caltech, had a very interesting, extreme way of avoiding some mistakes from overcounting what could be measured, and undercounting what couldn't. At that time there were no computers and the computer substitute then available to science and engineering was the Frieden calculator, and Caltech was full of Frieden calculators. And Thomas Hunt Morgan banned the Frieden calculator from the biology department. And when they said, "What the hell are you doing, Mr. Morgan?," He said, "Well, I am like a guy who is prospecting for gold along the banks of the Sacramento River in 1849. With a little intelligence, I can reach down and pick up big nuggets of gold. And as long as I can do that, I'm not going to let any people in my department waste scarce resources in placer mining." And that's the way Thomas Hunt Morgan got through life.

I've adopted the same technique, and here I am in my 80th year. I haven't had to do any placer mining yet. And it begins to look like I'm going to get all the way through, as I'd always hoped, without doing any of that damned placer mining. Of course if I were a physician, particularly an academic physician, I'd have to do the statistics, do the placer mining. But it's amazing what you can do in life without the placer mining if you've got a few good mental tricks and just keep ragging the problems the way Thomas Hunt Morgan did.

## **2) Failure To Follow The Fundamental Full Attribution Ethos of Hard Science**

What's wrong with the way Mankiw does economics is that he grabs from other disciplines without attribution. He doesn't label the grabbed items as physics or biology or psychology, or game theory, or whatever they really are, fully attributing the concept to the basic knowledge from which it came. If you don't do that, it's like running a business with a sloppy filing system. It reduces your power to be as good as you can be. Now Mankiw is so smart he does pretty well even when his technique is imperfect. He got the largest advance any textbook writer ever got.

But, nonetheless he'd be better if he had absorbed this hard science ethos that I say has been so helpful to me.

I have names for Mankiw's approach, grabbing whatever you need without attribution. Sometimes I call it "take what you wish," and sometimes I call it "Kiplingism." And when I call it Kiplingism, I'm reminding you of Kipling's stanza of poetry, which went something like this: "When Homer smote his blooming lyre, he'd heard men sing by land and sea, and what he thought he might require, he went and took, the same as me." Well that's the way Mankiw does it. He just grabs. This is much better than not grabbing. But it is much worse than grabbing with full attribution and full discipline, using all knowledge plus extreme reductionism where feasible.

### **3) Physics Envy**

The third weakness that I find in economics is what I call physics envy. And of course, that term has been borrowed from penis envy as described by one of the world's great idiots, Sigmund Freud. But he was very popular in his time, and the concept got a wide vogue.

#### *Washington Post case study*

One of the worst examples of what physics envy did to economics was cause adaptation and hard-form efficient market theory. And then when you logically derived consequences from this wrong theory, you would get conclusions such as: it can never be correct for any corporation to buy its own stock. Because the price by definition is totally efficient, there could never be any advantage. And they taught this theory to some partner at McKinsey when he was at some school of business that had adopted this crazy line of reasoning from economics, and the partner became a paid consultant for the Washington Post. And Washington Post stock was selling at a fifth of what an orangutan could figure was the plain value per share by just counting up

the values and dividing. But he so believed what he'd been taught in graduate school that he told the Washington Post they shouldn't buy their own stock. Well, fortunately, they put Warren Buffett on the Board, and he convinced them to buy back more than half of the outstanding stock, which enriched the remaining shareholders by much more than a billion dollars. So, there was at least one instance of a place that quickly killed a wrong academic theory.

**It's my view that economics could avoid a lot of this trouble that comes from physics envy. I want economics to pick up the basic ethos of hard science, the full attribution habit, but not the craving for an unattainable precision that comes from physics envy.** The sort of precise reliable formula that includes Boltzmann's constant is not going to happen, by and large, in economics. Economics involves too complex a system. And the craving for that physics-style precision does little but get you in terrible trouble, like the poor fool from McKinsey.

### *Einstein and Sharon Stone*

I think that economists would be way better off if they paid more attention to Einstein and Sharon Stone. Well, Einstein is easy because Einstein is famous for saying, "Everything should be made as simple as possible, but no more simple." Now, the saying is a tautology, but it's very useful, and some economist – it may have been Herb Stein – had a similar tautological saying that I dearly love: "If a thing can't go on forever, it will eventually stop."

Sharon Stone contributed to the subject because someone once asked her if she was bothered by penis envy. And she said, "absolutely not, I have more trouble than I can handle with what I've got." (Laughter).

When I talk about this false precision, this great hope for reliable, precise formulas, I am reminded of Arthur Laffer, who's in my political party, and who is one of the all-

time horses' asses when it comes to doing economics. His trouble is his craving for false precision, which is not an adult way of dealing with his subject matter.

The situation of people like Laffer reminds me of a rustic legislator – and this really happened in America. I don't invent these stories. Reality is always more ridiculous than what I'm going to tell you. At any rate, this rustic legislator proposed a new law in his state. He wanted to pass a law rounding Pi to an even 3.2 so it would be easier for the school children to make the computations. Well, you can say that this is too ridiculous, and it can't be fair to liken economics professors like Laffer to a rustic legislator like this. I say I'm under-criticizing the professors. At least when this rustic legislature rounded Pi to an even number, the error was relatively small. But once you try to put a lot of false precision into a complex system like economics, the errors can compound to the point where they're worse than those of the McKinsey partner when he was incompetently advising the Washington Post. So, economics should emulate physics' basic ethos, but its search for precision in physics-like formulas is almost always wrong in economics.

#### **4) Too Much Emphasis on Macroeconomics**

My fourth criticism is that there's too much emphasis on macroeconomics and not enough on microeconomics. I think this is wrong. It's like trying to master medicine without knowing anatomy and chemistry. Also, the discipline of microeconomics is a lot of fun. It helps you correctly understand macroeconomics. And it's a perfect circus to do. In contrast, I don't think macroeconomics people have all that much fun. For one thing they are often wrong because of extreme complexity in the system they wish to understand.

*Case study: Nebraska Furniture Mart's new store in Kansas City*

Let me demonstrate the power of microeconomics by solving two microeconomic problems. One simple and one a little harder. The first problem is this: Berkshire

Hathaway just opened a furniture and appliance store in [Kansas City](#). At the time Berkshire opened it, the largest selling furniture and appliance store in the world was another Berkshire Hathaway store, selling \$350 million worth of goods per year. The new store in a strange city opened up selling at the rate of more than \$500 million a year. From the day it opened, the 3,200 spaces in the parking lot were full. The women had to wait outside the ladies restroom because the architects didn't understand biology. (Laughter). It's hugely successful.

Well, I've given you the problem. Now, tell me what explains the runaway success of this new furniture and appliance store, which is outselling everything else in the world? (Pause). Well, let me do it for you. Is this a low-priced store or a high-priced store? (Laughter). It's not going to have a runaway success in a strange city as a high-priced store. That would take time. Number two, if it's moving \$500 million worth of furniture through it, it's one hell of a big store, furniture being as bulky as it is. And what does a big store do? It provides a big selection. So what could this possibly be except a low-priced store with a big selection?

But, you may wonder, why wasn't it done before, preventing its being done first now? Again, the answer just pops into your head: it costs a fortune to open a store this big. So, nobody's done it before. So, you quickly know the answer. With a few basic concepts, these microeconomic problems that seem hard can be solved much as you put a hot knife through butter. I like such easy ways of thought that are very remunerative. And I suggest that you people should also learn to do microeconomics better

### *Case study: Les Schwab Tires*

Now I'll give you a harder problem. There's a tire store chain in the Northwest, which has slowly succeeded over 50 years, the Les Schwab tire store chain. It just ground ahead. It started competing with the stores that were owned by the big tire companies that made all the tires, the Goodyears and so forth. And, of course, the manufacturers favored their own stores. Their "tied stores" had a big cost advantage.

Later, Les Schwab rose in competition with the huge price discounters like Costco and Sam's Club and before that Sears Roebuck and so forth. And yet here is Schwab now, with hundreds of millions of dollars in sales. And here's Les Schwab in his 80s, with no education, having done the whole thing. How did he do it? (Pause). I don't see a whole lot of people looking like a light bulb has come on. Well, let's think about it with some microeconomic fluency.

Is there some wave that Schwab could have caught? The minute you ask the question, the answer pops in. The Japanese had a zero position in tires and they got big. So this guy must have ridden that wave some in the early times. Then the slow following success has to have some other causes. And what probably happened here, obviously, is this guy did one hell of a lot of things right. And among the things that he must have done right is he must have harnessed what Mankiw calls the superpower of incentives. He must have a very clever incentive structure driving his people. And a clever personnel selection system, etc. And he must be pretty good at advertising. Which he is. He's an artist. So, he had to get a wave in Japanese tire invasion, the Japanese being as successful as they were. And then a talented fanatic had to get a hell of a lot of things right, and keep them right with clever systems. Again, not that hard of an answer. But what else would be a likely cause of the peculiar success?

We hire business school graduates and they're no better at these problems than you were. Maybe that's the reason we hire so few of them.

### *Causes of problem-solving success*

Well, how did I solve those problems? Obviously I was using a simple search engine in my mind to go through checklist-style, and I was using some rough algorithms that work pretty well in a great many complex systems, and those algorithms run something like this: Extreme success is likely to be caused by some combination of the following factors:

A) Extreme maximization or minimization of one or two variables. Example, Costco or our furniture and appliance store.

B) Adding success factors so that a bigger combination drives success, often in non-linear fashion, as one is reminded by the concept of breakpoint and the concept of critical mass in physics. Often results are not linear. You get a little bit more mass, and you get a lollapalooza result. And of course I've been searching for lollapalooza results all my life, so I'm very interested in models that explain their occurrence.

C) An extreme of good performance over many factors. Example, Toyota or Les Schwab.

D) Catching and riding some sort of big wave. Example, Oracle. By the way, I put down Oracle before I knew that the Oracle CFO was a big part of the proceedings here today.

Generally I recommend and use in problem solving cut-to-the quick algorithms, and I find you have to use them both forward and backward. Let me give you an example. I irritate my family by giving them little puzzles, and one of the puzzles that I gave my family not very long ago was when I said, "There's an activity in America, with one-on-one contests, and a national championship. The same person won the championship on two occasions about 65 years apart." "Now," I said, "name the activity," (Pause). Again, I don't see a lot of light bulbs going on. And in my family not a lot of light bulbs were flashing. But I have a physicist son who has been trained more in the type of thinking I like. And he immediately got the right answer, and here's the way he reasoned:

It can't be anything requiring a lot of hand-eye coordination. Nobody 85 years of age is going to win a national billiards tournament, much less a national tennis tournament. It just can't be. Then he figured it couldn't be chess, which this physicist plays very well, because it's too hard. The complexity of the system, the stamina

required are too great. But that led into checkers. And he thought, “Ah ha! There’s a game where vast experience might guide you to be the best even though you’re 85 years of age.”

And sure enough that was the right answer.

Anyway, I recommend that sort of mental trickery to all of you, flipping one’s thinking both backward and forward. And I recommend that academic economics get better at very small scale microeconomics as demonstrated here.

## 5) Too Little Synthesis in Economics

My fifth criticism is there is too little synthesis in economics. Not only with matters outside traditional economics, but also within economics. I have posed at two different business schools the following problem. I say, “You have studied supply and demand curves. You have learned that when you raise the price, ordinarily the volume you can sell goes down, and when you reduce the price, the volume you can sell goes up. Is that right? That’s what you’ve learned?” They all nod yes. And I say, “Now tell me several instances when, if you want the physical volume to go up, the correct answer is to increase the price?” And there’s this long and ghastly pause. And finally, in each of the two business schools in which I’ve tried this, maybe one person in fifty could name one instance. They come up with the idea that occasionally a higher price acts as a rough indicator of quality and thereby increases sales volumes.

This happened in the case of my friend Bill Ballhaus. When he was head of Beckman Instruments it produced some complicated product where if it failed it caused enormous damage to the purchaser. It wasn’t a pump at the bottom of an oil well, but that’s a good mental example. And he realized that the reason this thing was selling so poorly, even though it was better than anybody else’s product, was because it was priced lower. It made people think it was a low quality gizmo. So he raised the price by 20% or so and the volume went way up. But only one in fifty can come up with

this sole instance in a modern business school – one of the business schools being Stanford, which is hard to get into. And nobody has yet come up with the main answer that I like. Suppose you raise that price, and use the extra money to bribe the other guy's purchasing agent? (Laughter). Is that going to work? And are there functional equivalents in economics – microeconomics – of raising the price and using the extra sales proceeds to drive sales higher? And of course there are a zillion, once you've made that mental jump. It's so simple.

One of the most extreme examples is in the investment management field. Suppose you're the manager of a mutual fund, and you want to sell more. People commonly come to the following answer: You raise the commissions, which of course reduces the number of units of real investments delivered to the ultimate buyer, so you're increasing the price per unit of real investment that you're selling the ultimate customer. And you're using that extra commission to bribe the customer's purchasing agent. You're bribing the broker to betray his client and put the client's money into the high-commission product. This has worked to produce at least a trillion dollars of mutual fund sales.

This tactic is not an attractive part of human nature, and I want to tell you that I pretty completely avoided it in my life. I don't think it's necessary to spend your life selling what you would never buy. Even though it's legal, I don't think it's a good idea. But you shouldn't accept all my notions because you'll risk becoming unemployable. You shouldn't take my notions unless you're willing to risk being unemployable by all but a few.

I think my experience with my simple question is an example of how little synthesis people get, even in advanced academic settings, considering economic questions. Obvious questions, with such obvious answers. Yet people take four courses in economics, go to business school, have all these IQ points and write all these essays, but they can't synthesize worth a damn. This failure is not because the professors know all this stuff and they're deliberately withholding it from the students. This failure happens because the professors aren't all that good at this kind of synthesis.

They were trained in a different way. I can't remember if it was Keynes or Galbraith who said that economics professors are most economical with ideas. They make a few they learned in graduate school last a lifetime. (Laughter).

### *The second problem with synthesis*

The second interesting problem with synthesis involves two of the most famous examples in the economics. Number one is Ricardo's principle of comparative advantage in trade, and the other is Adam Smith's pin factory. And both of these, of course, work to vastly increase economic output per person, and they're similar in that each somehow directs functions into the hands of people who are very good at doing the functions. Yet they're radically different examples in that one of them is the ultimate example of central planning, the pin factory, where the whole system was planned by somebody, while the other example, Ricardo's, happens automatically as a natural consequence of trade.

And, of course, once you get into the joys of synthesis, you immediately think. "Do these things interact?" Of course they interact. Beautifully. And that's one of the causes of the power of a modern economic system. I saw an example of that kind of interaction years ago. Berkshire had this former savings and loan company, and it had made this loan on a hotel right opposite the Hollywood Park Racetrack. In due time the neighborhood changed and it was full of gangs, pimps, and dope dealers. They tore copper pipe out of the wall for dope fixes, and there were people hanging around the hotel with guns, and nobody would come. We foreclosed on it two or three times, and the loan value went down to nothing. We seemed to have an insolvable economic problem — a microeconomic problem.

Now we could have gone to McKinsey, or maybe a bunch of professors from Harvard, and we would have gotten a report about 10 inches thick about the ways we could approach this failing hotel in this terrible neighborhood. But instead, we put a sign on the property that said: "For sale or rent." And in came, in response to that sign, a man who said, "I'll spend \$200,000 fixing up your hotel, and buy it at a high

price on credit, if you can get zoning so I can turn the parking lot into a putting green.” “You’ve got to have a parking lot in a hotel,” we said. “What do you have in mind?” He said. “No, my business is flying seniors in from Florida, putting them near the airport, and then letting them go out to Disneyland and various places by bus and coming back. And I don’t care how bad the neighborhood is going to be because my people are self-contained behind walls. All they have to do is get on the bus in the morning and come home in the evening, and they don’t need a parking lot; they need a putting green.” So we made the deal with the guy. The whole thing worked beautifully, and the loan got paid off, and it all worked out.

Obviously that’s an interaction of Ricardo and the pin factory examples. The odd system that this guy had designed to amuse seniors was pure pin factory, and finding the guy with this system was pure Ricardo. So these things are interacting.

Well, I’ve taken you part way through the synthesis. It gets harder when you want to figure out how much activity should be within private firms, and how much should be within the government, and what are the factors that determine which functions are where, and why do the failures occur, and so on and so on.

It’s my opinion that anybody with a high IQ who graduated in economics ought to be able to sit down and write a ten-page synthesis of all these ideas that’s quite persuasive. And I would bet a lot of money that I could give this test in practically every economics department in the country, and get a perfectly lousy bunch of synthesis. They’d give me [Ronald Coase](#). They’d talk about transaction costs. They’d click off a little something that their professors gave them and spit it back. But in terms of really understanding how it all fits together, I would confidently predict that most people couldn’t do it very well.

By the way, if any of you want to try and do this, go ahead. I think you’ll find it hard. In this connection, one of the interesting things that I want to mention is that Max Planck, the great Nobel laureate who found Planck’s Constant, tried once to do economics. He gave it up. Now why did Max Planck, one of the smartest people who

ever lived, give up economics? The answer is, he said, “It’s too hard. The best solution you can get is messy and uncertain.” It didn’t satisfy Planck’s craving for order, and so he gave it up. And if Max Planck early on realized he was never going to get perfect order, I will confidently predict that all of the rest of you are going to have exactly the same result.

By the way there’s a famous story about Max Planck which is apocryphal: After he won his prize, he was invited to lecture everywhere, and he had this chauffeur that drove him around to give public lectures all through Germany. And the chauffeur memorized the lecture, and so one day he said, “Gee Professor Planck, why don’t you let me try it as we switch places?” And so he got up and gave the lecture. At the end of it some physicist stood up and posed a question of extreme difficulty. But the chauffeur was up to it. “Well,” he said, “I’m surprised that a citizen of an advanced city like Munich is asking so elementary a question, so I’m going to ask my chauffeur to respond.” (Laughter).

## **6) Extreme and Counterproductive Psychological Ignorance**

All right, I’m down to the sixth main defect, and this is a subdivision of the lack of adequate multidisciplinary: Extreme and counterproductive psychological ignorance in economics. Here I want to give you a very simple problem. I specialize in simple problems. You own a small casino in Las Vegas. It has fifty standard slot machines. Identical in appearance, they’re identical in function. They have exactly the same payout ratios. The things that cause the payouts are exactly the same. They occur in the same percentages. But there’s one machine in this group of slot machines that, no matter where you put it among the fifty, in fairly short order, when you go to the machines at the end of the day, there will be 25% more winnings from this one machine than from any other machine. Now surely I’m not going to have a failure here. What is different about that heavy winning machine? (Silence) Can anybody do it?

Male: More people play it.

Charles Munger: No, no, I want to know why more people play it. What's different about that machine is people have used modern electronics to give a higher ratio of near misses. That machine is going bar, bar, lemon. Bar, bar, grapefruit, way more often than normal machines, and that will cause heavier play. How do you get an answer like that? Easy. Obviously, there's a psychological cause: That machine is doing something to trigger some basic psychological response.

If you know the psychological factors, if you've got them on a checklist in your head, you just run down the factors, and, boom!, you get to one that must explain this occurrence. There isn't any other way to do it effectively. These answers are not going to come to people who don't learn these mental tricks. If you want to go through life like a one-legged man in an ass-kicking contest, why be my guest. But if you want to succeed, like a strong man with two legs, you have to pick up these tricks, including doing economics while knowing psychology.

In this vein, I next want to mention a strange Latin American case of a dysfunctional economy that got fixed. In this little subdivision of Latin America, a culture had arisen wherein everybody stole everything. They embezzled from the company, they stole everything that was loose in the community. And of course, the economy came practically to a halt. And this thing got fixed. Now where did I read about this case? I'll give you a hint. It wasn't in the annals of economics. I found this case in the annals of psychology. Clever people went down and used a bunch of psychological tricks. And they fixed it.

Well, I think there's no excuse if you're an economist, when there are wonderful cases like that of the dysfunctional economy becoming fixed, and these simple tricks that solve so many problems, and you don't know how to do the fixes and understand the problems. Why be so ignorant about psychology that you don't even know psychology's tricks that will fix your own dysfunctional economic systems?

Here I want to give you an extreme injunction. This is even tougher than the fundamental organizing ethos of hard science. This has been attributed to [Samuel](#)

Johnson. He said in substance that if an academic maintains in place an ignorance that can be easily removed with a little work, the conduct of the academic amounts to treachery. That was his word, “treachery.” You can see why I love this stuff. He says you have a duty if you’re an academic to be as little of a klutz as you can possibly be, and therefore you have got to keep grinding out of your system as much removable ignorance as you can remove.

## **7) Too Little Attention to Second and Higher Order Effects**

On to the next one the seventh defect: Too little attention in economics to second order and even higher order effects. This defect is quite understandable, because the consequences have consequences, and the consequences of the consequences have consequences, and so on. It gets very complicated. When I was a meteorologist I found this stuff very irritating. And economics makes meteorology look like a tea party.

### *Mispredicting Medicare costs*

Extreme economic ignorance was displayed when various experts, including Ph D. economists, forecast the cost of the original Medicare law. They did simple extrapolations of past costs. Well the cost forecast was off by a factor of more than 1000%. The cost they projected was less than 10% of the cost that happened. Once they put in place all these new incentives, the behavior changed in response to the incentives, and the numbers became quite different from their projection. And medicine invented new and expensive remedies, as it was sure to do. How could a great group of experts make such a silly forecast? Answer: They over simplified to get easy figures, like the rube rounding Pi to 3.2! They chose not to consider effects of effects on effects, and so on.

### *Investing in textile looms*

One good thing about this common form of misthinking from the viewpoint of academia, is that business people are even more foolish about microeconomics. The business version of the Medicare-type insanity is when you own a textile plant and a guy comes in and says, “Oh, isn’t this wonderful? They invented a new loom. It’ll pay for itself in three years at current prices because it adds so much efficiency to the production of textiles.” And you keep buying these looms for 20 years, and their equivalent, and you keep making 4% on capital, you never go anywhere. And the answer is, it wasn’t that technology didn’t work, it’s that the laws of economics caused the benefit from the new looms to go to the people that bought the textiles, not the guy that owned the textile plant. How could anybody not know that if he’d taken freshmen economics or been through business school? I think the schools are doing a lousy job. Otherwise such insanities wouldn’t happen so often.

Usually, I don’t use formal projections. I don’t let people do them for me because I don’t like throwing up on the desk (laughter), but I see them made in a very foolish way all the time, and many people believe in them, no matter how foolish they are. It’s an effective sales technique in America to put a foolish projection on a desk.

And if you’re an investment banker, it’s an art form. I don’t read their projections either. Once Warren and I bought a company and the seller had a big study done by an investment banker, it was about this thick. We just turned it over as if it were a diseased carcass. He said, “We paid \$2 million for that.” I said, “We don’t use them. Never look at them.”

### *Workman’s comp madness*

Anyway, as the Medicare example showed, all human systems are gamed, for reasons rooted deeply in psychology, and great skill is displayed in the gaming because game theory has so much potential. That’s what’s wrong with the workman’s comp system in California. Gaming has been raised to an art form. In the course of gaming the system, people learn to be crooked. Is this good for civilization? Is it good for

economic performance? Hell no. The people who design easily–gameable systems belong in the lowest circle of hell.

I've got a friend whose family controls about 8% of the truck trailer market. He just closed his last factory in California and he had one in Texas that was even worse. The workman's comp cost in his Texas plant got to be about 30% of payroll. Well, there's no such profit in making truck trailers. He closed his plant and moved it to Ogden, Utah, where a bunch of believing Mormons are raising big families and don't game the workman's comp system. The workman's comp expense is 2% of payroll.

Are the Latinos who were peopling his plant in Texas intrinsically dishonest or bad compared to the Mormons? No. It's just the incentive structure that so rewards all this fraud is put in place by these ignorant legislatures, many members of which have been to law school, and they just don't think about what terrible things they're doing to the civilization because they don't take into account the second order effects and the third order effects in lying and cheating. So, this happens everywhere, and when economics is full of it, it is just like the rest of life.

### *Niederhoffer's curriculum*

There was a wonderful example of gaming a human system in the career of Victor Niederhoffer in the Economics Department of Harvard. Victor Niederhoffer was the son of a police lieutenant, and he needed to get A's at Harvard. But he didn't want to do any serious work at Harvard, because what he really liked doing was, one, playing world-class checkers; two, gambling in high-stakes card games, at which he was very good, all hours of the day and night; three, being the squash champion of the United States, which he was for years; and, four, being about as good a tennis player as a part-time tennis player could be.

This did not leave much time for getting A's at Harvard so he went into the Economics Department. You'd think he would have chosen French poetry. But

remember, this was a guy who could play championship checkers. He thought he was up to outsmarting the Harvard Economics Department. And he was. He noticed that the graduate students did most of the boring work that would otherwise go to the professors, and he noticed that because it was so hard to get to be a graduate student at Harvard, they were all very brilliant and organized and hard working, as well as much needed by grateful professors.

And therefore, by custom, and as would be predicted from the psychological force called reciprocity tendency, in a really advanced graduate course, the professors always gave an A. So Victor Niederhoffer signed up for nothing but the most advanced graduate courses in the Harvard Economics Department, and of course, he got A, after A, after A, after A, and was hardly ever near a class. And for a while, some people at Harvard may have thought it had a new prodigy on its hands. That's a ridiculous story, but the scheme will work still. And Niederhoffer is famous: they call his style "Niederhofferizing the curriculum." (Laughter).

This shows how all-human systems are gamed. Another example of not thinking through the consequences of the consequences is the standard reaction in economics to Ricardo's law of comparative advantage giving benefit on both sides of trade. Ricardo came up with a wonderful, non-obvious explanation that was so powerful that people were charmed with it, and they still are, because it's a very useful idea. Everybody in economics understands that comparative advantage is a big deal, when one considers first order advantages in trade from the Ricardo effect. But suppose you've got a very talented ethnic group, like the Chinese, and they're very poor and backward, and you're an advanced nation, and you create free trade with China, and it goes on for a long time.

Now let's follow with second and third order consequences: You are more prosperous than you would have been if you hadn't traded with China in terms of average well-being in the United States, right? Ricardo proved it. But which nation is going to be growing faster in economic terms? It's obviously China. They're absorbing all the modern technology of the world through this great facilitator in free trade, and, like

the Asian Tigers have proved, they will get ahead fast. Look at Hong Kong. Look at Taiwan. Look at early Japan. So, you start in a place where you've got a weak nation of backward peasants, a billion and a quarter of them, and in the end they're going to be a much bigger, stronger nation than you are, maybe even having more and better atomic bombs. Well, Ricardo did not prove that that's a wonderful outcome for the former leading nation. He didn't try to determine second order and higher order effects.

If you try and talk like this to an economics professor, and I've done this three times, they shrink in horror and offense because they don't like this kind of talk. It really gums up this nice discipline of theirs, which is so much simpler when you ignore second and third order consequences.

The best answer I ever got on that subject – in three tries – was from George Schultz. He said, “Charlie, the way I figure it is if we stop trading with China, the other advanced nations will do it anyway, and we wouldn't stop the ascent of China compared to us, and we'd lose the Ricardo diagnosed advantages of trade.” Which is obviously correct. And I said, “Well George, you've just invented a new form of the tragedy of the commons. You're locked in this system and you can't fix it. You're going to go to a tragic hell in a handbasket, if going to hell involves being once the great leader of the world and finally going to the shallows in terms of leadership.” And he said, “Charlie, I do not want to think about this.” I think he's wise. He's even older than I am, and maybe I should learn from him.

## **8) Not Enough Attention to the Concept of Febezzlement**

Okay, I'm now down to my eighth objection: Too little attention within economics to the simplest and most fundamental principle of algebra. Now this sounds outrageous, that economics doesn't do algebra, right? Well, I want to try an example – I may be wrong on this. I'm old and I'm iconoclastic – but I throw it out anyway. I say that economics doesn't pay enough attention to the concept of febezzlement. And that I derive from Galbraith's idea. Galbraith's idea was that, if you have an undisclosed

embezzlement, it has a wonderful Keynesian stimulating effect on the economy because the guy who's been embezzled thinks he is as rich as he always was and spends accordingly, and the guy that had stolen the money gets all this new purchasing power. I think that's correct analysis on Galbraith's part. The trouble with his notion is that he's described a minor phenomenon. Because when the embezzlement is discovered, as it almost surely will be, the effect will quickly reverse. So the effect quickly cancels out.

But suppose you paid a lot of attention to algebra, which I guess Galbraith didn't, and you think, "Well, the fundamental principle of algebra is, 'If A is equal to B and B is equal to C, then A is equal to C.'" You've then got a fundamental principle that demands that you look for functional equivalents, all you can find. So suppose you ask the question, "Is there such a thing in economics as a febezzlement?" By the way, Galbraith invented the word "bezzle" to describe the amount of undisclosed embezzlement, so I invented the word "febezzlement": the functional equivalent of embezzlement.

This happened after I asked the question "Is there a functional equivalent of embezzlement?" I came up with a lot of wonderful affirmative answers. Some were in investment management. After all I'm near investment management. I considered the billions of dollars totally wasted in the course of investing common stock portfolios for American owners. As long as the market keeps going up, the guy who's wasting all this money doesn't feel it, because he's looking at these steadily rising values. And to the guy who is getting the money for investment advice, the money looks like well earned income, when he's really selling detriment for money, surely the functional equivalent of undisclosed embezzlement. You can see why I don't get invited to many lectures.

So I say, if you look in the economy for febezzlement, the functional equivalent of embezzlement, you'll find some enormously powerful factors. They create some "wealth effect" that is on steroids, compared to the old "wealth effect." But practically nobody thinks as I do, and I quitclaim my idea to any hungry graduate

student who has independent means, which he will need before his thesis topic is approved.

## **9) Not Enough Attention to Virtue and Vice Effects**

Okay, my ninth objection: Not enough attention to virtue and vice effects in economics. It has been plain to me since early life that there are enormous virtue effects in economics, and also enormous vice effects. But economists get very uncomfortable when you talk about virtue and vice. It doesn't lend itself to a lot of columns of numbers. But I would argue that there are big virtue effects in economics. I would say that the spreading of double-entry bookkeeping by the Monk, [Fra Luca de Pacioli](#), was a big virtue effect in economics. It made business more controllable, and it made it more honest. Then the cash register. The cash register did more for human morality than the congregational church. It was a really powerful phenomenon to make an economic system work better, just as, in reverse, a system that can be easily defrauded ruins a civilization. A system that's very hard to defraud, like a cash register, helps the economic performance of a civilization by reducing vice, but very few people within economics talk about it in those terms.

### *Religion*

I'll go further: I say economic systems work better when there's an extreme reliability ethos. And the traditional way to get a reliability ethos, at least in past generations in America, was through religion. The religions instilled guilt. We have a charming Irish Catholic priest in our neighborhood and he loves to say, "Those old Jews may have invented guilt, but we perfected it." (Laughter). And this guilt, derived from religion, has been a huge driver of a reliability ethos, which has been very helpful to economic outcomes for man.

### *Pay for directors and judges*

Many bad effects from vice are clear. You've got the crazy booms and crooked promotions – all you have to do is read the paper over the last six months. There's enough vice to make us all choke. And, by the way, everybody's angry about unfair compensation at the top of American corporations, and people should be. We now face various crazy nostrums invented by lawyers which won't give us a fix for unfair compensation, yet a good partial solution is obvious: If directors were significant shareholders who got a pay of zero, you'd be amazed what would happen to unfair compensation of corporate executives as we dampened effects from reciprocity tendency.

A roughly similar equivalent of this no-pay system has been tried in a strange place. In England the lower criminal courts which can send you to prison for a year or fine you substantially, are staffed by lay magistrates. You've got three judges sitting up there, and they all get a pay of zero. Their expenses are reimbursed, but not too liberally. And they work about 40 half-days a year, as volunteers. It's worked beautifully for about 700 years. Able and honest people compete to become magistrates, to perform the duty and get the significance, but no pay.

This is the system Benjamin Franklin, near the end of his life, wanted for U.S. government. He didn't want the high executives of government to be paid, but to be like himself or the entirely unpaid, well-off ministers and rulers of the Mormon Church. And when I see what's happened in California, I'm not sure he wasn't right. At any rate, no one now drifts in Franklin's direction. For one thing, professors – and most of them need money – get appointed directors.

Not a vice that some systems are deliberately made unfair. It is not always recognized that, to function best, morality should sometimes appear unfair, like most worldly outcomes. The craving for perfect fairness causes a lot of terrible problems in system function. Some systems should be made deliberately unfair to individuals because they'll be fairer on average for all of us. I frequently cite the example of having your career over, in the Navy, if your ship goes aground, even if it wasn't your fault. I say the lack of justice for the one guy that wasn't at fault is way more than made up by a

greater justice for everybody when every captain of a ship always sweats blood to make sure the ship doesn't go aground. Tolerating a little unfairness to some to get a greater fairness for all is a model I recommend to all of you. But again, I wouldn't put it in your assigned college work if you want to be graded well, particularly in a modern law school wherein there is usually an over-love of fairness-seeking process.

### *Contributions of vice to bubbles*

There are, of course, enormous vice effects in economics. You have these bubbles with so much fraud and folly. The aftermath is frequently very unpleasant, and we've had some of that lately. One of the first big bubbles, of course, was the huge and horrible South Sea bubble in England.

And the aftermath was interesting. Many of you probably don't remember what happened after the South Sea Bubble, which caused an enormous financial contraction, and a lot of pain. They banned publicly traded stock in England for decades. Parliament passed a law that said you can have a partnership with a few partners, but you can't have publicly traded stock. And, by the way, England continued to grow without publicly traded stock. The people who are in the business of prospering because there's a lot of stock being traded in casino-like frenzy wouldn't like this example if they studied it enough. It didn't ruin England to have a long period when they didn't have publicly traded shares.

Just as in real estate. We had all the shopping centers and auto dealerships, and so on, we needed for years when we didn't have publicly traded real estate shares. It's a myth that once you've got some capital market, economic considerations demand that it has to be as fast and efficient as a casino. It doesn't.

### *Paradoxical good contributions from vice; the irremovability of paradox*

Another interesting problem is raised by vice effects involving envy. Envy wisely got a very strong condemnation in the laws of Moses. You remember how they laid it on with a trowel: You couldn't covet thy neighbor's ass, you couldn't covet thy neighbor's servant girl, you couldn't covet...—Those old Jews knew how envious people are and how much trouble it caused. They really laid it on hard, and they were right. But Mandeville, remember his **fable of bees**? He demonstrated convincingly – to me, anyway – that envy was a great driver of proclivity to spend.

And so here's this terrible vice, which is forbidden in the Ten Commandments, and here it's driving all these favorable results in economics. There's some paradox in economics that nobody's going to get out.

When I was young, everybody was excited by Godel who came up with proof that you couldn't have a mathematical system without a lot of irritating incompleteness in it. Well, since then my betters tell me that they've come up with more irremovable defects in mathematics and have decided that you're never going to get mathematics without some paradox in it. No matter how hard you work, you're going to have to live with some paradox if you're a mathematician.

Well, if the mathematicians can't get the paradox out of their system when they're creating it themselves, the poor economists are never going to get rid of paradoxes, nor are any of the rest of us. It doesn't matter. Life is interesting with some paradox. When I run into a paradox I think either I'm a total horse's ass to have gotten to this point, or I'm fruitfully near the edge of my discipline. It adds excitement to life to wonder which it is.

## **Conclusion**

*Clinging to failed ideas – a horror story*

As I conclude, I want to tell one more story demonstrating how awful it is to get a wrong idea from a limited repertoire and just stick to it. And this is the story of Hyman Liebowitz who came to America from the old country. In the new country, as in the old, he tried to make his way in the family trade, which was manufacturing nails. And he struggled and he struggled, and finally his little nail business got to vast prosperity, and his wife said to him, “You are old, Hyman, it’s time to go to Florida and turn the business over to our son.”

So down he went to Florida, turning his business over to the son, but he got weekly financial reports. And he hadn’t been in Florida very long before they turned sharply negative. In fact, they were terrible. So he got on an airplane and he went back to New Jersey, where the factory was. As he left the airport on the way to the factory he saw this enormous outdoor advertising sign lighted up. And there was Jesus, spread out on the cross. And under it was a big legend, “They Used Liebowitz’s Nails.” So he stormed into the factory and said, “You dumb son! What do you think you’re doing? It took me 50 years to create this business!” “Papa,” he said, “trust me. I will fix it.”

So back he went to Florida, and while he was in Florida he got more reports, and the results kept getting worse. So he got on the airplane again. Left the airport, drove by the sign, looked up at this big lighted sign, and now there’s a vacant cross. And, low and behold, Jesus is crumpled on the ground under the cross, and the sign said, “They Didn’t Use Liebowitz’s Nails.” (Laughter). Well, you can laugh at that. It is ridiculous but it’s no more ridiculous than the way a lot of people cling to failed ideas. Keynes said “It’s not bringing in the new ideas that’s so hard. It’s getting rid of the old ones.” And Einstein said it better, attributing his mental success to “curiosity, concentration, perseverance and self-criticism.” By self-criticism he meant becoming good at destroying your own best-loved and hardest-won ideas. If you can get really good at destroying your own wrong ideas, that is a great gift.

*Repeating the big lesson*

Well, it's time to repeat the big lesson in this little talk. What I've urged is the use of a bigger multidisciplinary bag of tricks, mastered to fluency, to help economics and everything else. And I also urged that people not be discouraged by irremovable complexity and paradox. It just adds more fun to the problems. My inspiration again is Keynes: Better roughly right than precisely wrong.

And so I end by repeating what I said once before on a similar occasion. If you skillfully follow the multidisciplinary path, you will never wish to come back. It would be like cutting off your hands.

Well, that's the end. I'll take questions as long as people can endure me