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JONATHAN GRUBER: It might have been a little cognitive dissonance, for those of you who know the term, because today is the lecture I tell you why everything I taught you this semester is wrong. And maybe I was a little reluctant to come in and do that. But in all seriousness, today we're going to talk about behavioral economics. We're going to talk about basically how we can bring this insights from psychology into understanding how we make the models in this semester more realistic.

Now, once again, let's remember the role of models. The role of models-- remember the George Box saying all models are wrong, but some are useful. The goal of the models this semester were to figure out how to parsimoniously explain the world, how to give you models that you guys could solve in a problem set that have enormous explanatory power for how the world functions. And we've done that. That said, we can always make our models better.

And as you go on in economics, your goal should be to think about how we enrich these models and make them better, but without losing the goal of parsimony, without losing the goal of having models that are manageable and can explain the world, which means how do we minimally extend our models to think about bringing in much richer phenomenon? So let's talk about-- so behavioral economics does is essentially say, look, there's a set of realities from psychology that we ignore in economics. Behavioral economics is about how can we build models to bring in what we know is true from psychological research. And the best example of this is models of what we call time inconsistency.

This is the best example of how we bring in an important insight from psychology in a manageable way into our models. OK? So the idea of time inconsistency is that a widespread phenomenon that is not only always shown in psychological experiments, but in fact never rejected in psychological experiments, is the human problem of self-control. The human problem of self-control. We have a problem controlling ourselves.

And what does this mean in economic terms? It doesn't mean that individuals are irrational. It doesn't mean that the models we wrote down and the optimization assumptions we make are necessarily wrong. What it means is, while we can make optimal plans, we can't carry them out. So in other words, think about the optimization problem we've done so far is having two parts. You make an optimal plan, then you carry it out. We haven't separated those. We've just said, you decide how many cookies and pizza-- you eat that many cookies and pizza. But in fact, there's two steps. First, you got to decide how many cookies and pizza. Then you got to eat that many cookies and pizza.

And you might think, well, that's of irrelevant, the second step it's trivial, but it's not. It's not trivial whenever there are costs and benefits that differ in time. And when there are costs or benefits that differ in time, this can lead to self-control problems. In particular, when you have a decision that imposes a short-run cost for a long-run benefit, humans will undertake that activity. When you have an activity that imposes a short-run cost, long-term benefit, humans as a species, and maybe other species too, will undertake that activity.

So for example, smoking. If you're a smoker-- 90% of smokers when surveyed say they'd like to quit. Yet 90% do not quit. Why? Because when you wake up in the morning, you feel awful until you have that cigarette. You have the cigarette and you're like, OK, I'll have a smoke. I'll quit tomorrow. The idea of I can quit tomorrow, I'll solve that tomorrow, that's a standard feature of self-control problems. Let's think about savings for retirement. In our model of retirement savings, we had someone deciding across C1 and C2. And they just optimized with some indifference curve and budget constraint. We're not saying any of that math was wrong.

We're just saying, in practice, it's actually hard to put the money away and save it. Because in practice, once you have the money, there's a lot of attractive stuff. I talked about how, gee, when you get the job, you start saving right away. But right away when you get the job, you want a new car, and you want to party, and things like that. So it's hard to say, well, yeah, I'm going to save for 50 years from now. So rather than going to the party tonight.

OK. Maybe not. Once again, hard to teach in this crowd. We're all a very self-controlled crowd, relative to most Americans. But I think we all have experience with this. Think about dieting or exercise, things where there's-- with dieting, there's a short-run cost. You cannot eat that piece of cake, which is delicious, for a long-run benefit exercise. The short run cost, which is you've got to go work out. It takes time. It takes effort for a long run benefit.

Now, once again, you all look very fit. Maybe you don't feel that way about dieting and exercise, but we all have things we have self-control problems over. Mine is biting my nails. I cannot stop biting my nails. I'd like to stop biting my nails. I make plans to stop biting my nails. When I've got a deadline of paper on my favorite teams on TV, I bite my nails. OK, I've tried things like-- you can paint on your nails to make them taste terrible. It just tastes terrible when I bite my nails. OK?

I have a self-control problem. All humans-- not all humans. Most humans suffer from self-control problems of one or another. So the question is, how do we build that into the models we use? How do we take the kind of parsimonious model we've used and add an element of time inconsistency? Well, let's come back to the intertemporal choice model we had before. The internal choice model was someone trading off consuming today versus consuming tomorrow.

And let's make that rather than today versus tomorrow. Let's make it the whole future. Let's make someone's decision. Let's say that someone has a utility function that depends on the entire future path of their consumption. All that matters to my utility is consumption, but the entire future path. But here's the key thing. Let's also remember we learned about discounting, that I care less about the future than I care about today. OK?

Remember, with NPV, we talked about how money today is worth more than money in the future, which is why people would save. The reason people don't save is because I care more about today than I do about the future. And those humans have an inherent discounting of the future that offsets the return to saving. Putting money aside today is a benefit. You get more tomorrow, but it's a cost, which is we'd rather have today than tomorrow. That's the human nature. We call that discounting.

And we tip-- the way we typically model this is we say, look, we can model your utility as the sum from today till the end of time, till you die, of your consumption. In each period, you're-- let's say you're going to consume the same amount every time. Let's say your consumption smooth. So C is constant. Let's just say you're going to save the same amount forever. Times delta to the I minus T. Delta is what we call a discount factor.

Delta is less than 1, greater than 0. It's the discount factor. It's how much less I care about consumption in the future. OK? So for example, if delta is 0.9, then that says consuming something next year makes me 90% as happy as consuming it today. Consuming something in two years-- and we assume delta, by this functional formulation, is exponential. So we assume consume something in two years is 0.9 squared. So it's 0.81.

So basically, we assume that, exponentially, every period in the future is worth less. So next year is worth 0.9 of today. Two years is 0.81 of today, Et cetera. So we assume that basically the reason people don't see-- my retirement savings sample is pretty compelling, right? Say 15 years, you're better off than to save for the next 33 years. Why don't people do it? They don't do it because at a delta, even arbitrarily close to 1, 50 years from now is irrelevant.

If you take 0.9 to the 50, it's irrelevant. Or if you do-- even if it's 9.5. 50 years from now, you don't care about. As long as you're somewhat impatient, the distant future doesn't matter. And that's why people don't save for retirement. That's why, despite the incredibly strong incentives I laid out, people don't, because they discount the future. OK? Questions about why-- question about that model?

That's our Standard Economics Model. That's what I grew up with. That's what you learn in basic economics. That's what you learn in the next level when you go on and do more economics. This is the model you'll learn. It's a multi-version period of the-- multi-version version of the two period model I taught you. But it's wrong. Why is it wrong? It's wrong because every single psychological experiment ever run shows that discounting is not exponential, but rather hyperbolic, which means that people-- the discounting of the future is much, much deeper than we get when from a pure exponential function.

And here's the simple example of that. I'm going to do-- let me say this example slowly. It's important to get it right. Imagine I offer you the following OK? $100. I offer you a choice. $100 today or $125 in a year. $125 in a year. You can just-- don't vote. Just say how you feel about this choice. Then I offer you a different choice. I say $100 in two years versus $125 in three years. Now, with this exponential function, that's the same choice.

It's only a 0.9 factor between them. It's a one-year gap. So it shouldn't matter if I offer you today versus one year or two years versus three years. It turns out, it matters enormously. People always take this year, but they'll delay it in the future. If people are impatient today, but willing to be patient in the future. And that is an illustration of self-control problems. It's about having your hot little hands, you want it. But it's about, well, will you save in the future? Sure, I'll save in the future. That's great. Happy to do that.

And this example is exactly why this exponential model is wrong. And the hyperbolic model is right, that basically people feel differently about today than the future. And so, an economist named David Laibson at Harvard said, look, let's make a simple tweak to this model. Let's rewrite utility as the utility of today is today's consumption C plus a factor beta, times the sum from tomorrow, next year, till the end of time, times C, times delta, to the I minus T.

I minus T. How is this different than this? All I've done is I've pulled out today and add an extra factor B to the rest of the future, beta to the rest of the future. So look at this function versus this function. All I've done is pulled out one C from the sum. Kept the rest of the sum, and add an extra factor beta in front of this. What does that doing?

That's saying that starting next year, I'm an exponential discounter, but with beta less than 1, that entire future is worth less today than it would be under an exponential model. OK? So let me do this in a simple example. Let's say that you have-- let's say that you're offered 100 today versus 125 next year. And then, as I said, 100 and t versus 125 and t plus 1. And a hundred and t plus 2-- 100 and t plus 1, versus 125 and t plus 2.

Well, from for this decision, you use this part of the term, which is the same as exponential. So as long as delta isn't very small, you're going to wait. So let's say delta is 0.9. So that says that next year's is worth 125 times 0.9, which is still greater than 100. So you'd say I'll wait. But for this decision, you've got delta and beta. And the best tests in the laboratory of beta is 0.6. So now, it's 125 times 0.9 times 0.6, because you've got the regular delay of a year, but you also have this extra factor, which is you really like it today and care less about tomorrow.

So now you reject the offer. And that is a simple parameterization of how you could reject this offer, but accept this offer. You reject this offer, because this offer is an extra feature that discounts at beta. That is how-- that is how a very smart economist builds a psychological insight in a relatively simple way into one of our models. Take the model, tweak it a little bit, just pull the C out, add a beta, boom, you can explain it phenomenally you couldn't have explained before. That's good modeling.

Now, to be fair, while this looks simple, solving this model turns out to be a total nightmare. OK? I could not teach in this class. I'm not sure I can do it. OK, even though it's simple, because you've got all these iterative terms. It gets very complicated, OK? Which is why we don't teach it, even though it's probably a better model. But it's an example of how you can relatively, parsimoniously incorporate this idea.

Let me give you one final example. Any questions about this? One other example to motivate this, they did a really cool experiment in Amsterdam, which is they went to people and they said, here's a snack that you can have in one week. What would you like? And there was healthy and unhealthy snacks mixed in the list. They said, you can have a snack in one week. What would you like? About 50% of people chose the healthy snack.

They then came back a week later and said, here's what you chose, but guess what? Today we're going to let you change your decision. Would you like to change it? And almost everyone changes to have the unhealthy snack. That is when it was a week away, they were happy to wait for the healthy snack, but today they wanted the candy. OK, that is time and consistency. That's what this captures that our standard model doesn't.

That's the only math I'm going to do today. The only modeling I'll do today. But that is an example of how we can take a deep psychological insight and build it into our economics model, and enrich it to capture a whole new set of phenomena. And this is what we do in the Course 14.13, which is one of the most popular undergrad courses when 200 people take it a year. Incredibly great course, which is behavioral economics, which is teaching you how you take the next step from 14.01 to incorporate these psychological phenomena into models. OK? Yeah.

That is the most difficult-- there's a lot of hard problems here. What's the right time frame? It's a really hard problem. Here's the even harder problem. How do you do welfare? How do you do welfare when people make mistakes? We've said welfare is the sum-- the social welfare function is the sum of individual utility functions. What if the people in the individual utility functions are making mistakes? Does the government still just want to sum up their utility functions? The government want to correct those mistakes.

Hard question. So that's exactly that's why 14.13 is fun. You struggle with some deep philosophical issues like that. Now, what I want to do now, rather than writing down other models, because I want to-- you can take 14.13 to do that. I want to run through a set of fun insights that we get from behavioral economics and talk about what they imply. So let me just talk about some additional insights, some other examples. So these are other behavioral insights that we've worked on over the past few decades that we'd love to incorporate into our models to make a realistic model.

The first and one of the most famous is loss aversion. And I mentioned this briefly when we talked about uncertainty, which is, remember, I gave you guys the gamble. Win 100-- win 125, lose 100. And you mostly didn't take it. Then I said, well, what if it was win 12.50 lose 10. More of you should take it. And how many more of you did? But more of you should. And ultimately, if I said it was win $1.25, lose $1, all of you should take it. OK? Unless you're super risk averse, that's a great deal, no matter how wealthy you are.

But it turns out that that's not true. It turns out that basically people turned down gambles that can be above and beyond what's explained by risk aversion. And the best way to see is, this great calculation that was done by the economist Matt Rabin. So let's say someone would turn down-- someone of an average wealth. So they've got thousands of dollars. You offer them a 50/50 shot, win 11, lose 10. And they turn it down. You say, well, that's just risk aversion, right?

But if you apply that risk aversion to other bets, you see how ridiculous that is. That says that you would also turn down win 2,100, lose 800. It also means you would lose-- if I offered you the bet, lose 1,000, win infinity. You would turn it down. That if your risk averse enough that you turn down win 110, lose 100, and you extend that same risk aversion that same parameter implies, you would turn down lose 1,000, win infinity. None of you would turn that down. If you did, I'd be disappointed in you. OK?

So basically, the bottom line is risk aversion can't explain these decisions. What can is the model of loss aversion, which is that people have endowment effects. That is, I care more-- stuff I have already I care more about than stuff I might get. So here's the best example of how we think about endowment effects, which is that they did an experiment where they randomly selected individuals. Half of them, they said, here's a mug. It says MIT or whatever. How much would you pay for this mug?

And they got a demand curve and the average person would have paid $5. The other half of the people-- I'm sorry. So let me go back. It was a mug with a market price of $5 that half of people willing to pay-- the people pay them pay about $3. Then in the second experiment, randomly, they gave a set of other people-- they gave them the mug and said, how much would I have to pay you to buy this back from you? And the average person said, $7.

Same decision, right? In the one case, I just gave you the mug and the other case I didn't. But if the mug is worth $3 to you to buy, why would you only sell it for $7? Because once you have it, you feel differently. It's an endowment effect. Here's a great example from the Nobel Prize winning economist Richard Thaler. Imagine the following two questions. A, you have been exposed to a disease, which, if contracted, leads to a quick and painless death within a week. The probability you have this disease is 0.1%. What would you be willing to pay for a cure? That's question one.

Question two is we need to research this disease. If you're in the sample, you'll have to expose yourself and risk yourself to a 0.1% chance of dying. How much would I have to pay you to be in the experiment? Now, I hope you can see that it's the same question. In both cases, you're asking how much is it worth to you to take a 0.01 chance of-- 0.1% chance of dying. Yet, if you ask people the first question, they'd be willing to pay $200 for a cure.

That's the second question. You'd have to pay them $100,000 to be in the study. So there's a 5,000-fold difference between what people-- or 500-fold difference between these two framings. And the only difference is the framing is the endowment effect. So obviously, this is a clear thing we should ultimately want to build into our models. The problem is-- it's like the question has-- this nice astute question asked here, what's the right time period here? Here the question is, what's the right endowment? How do I think about the endowment effect?

And that's where a lot of the exciting modeling is going on is, how do I model the endowment people have? What's their reference point? Is it an important problem? That's one example. A second example, which is even more mind blowing, is based that people have unstable preferences. There was a professor at MIT who ran the following informal experiments. Never published. I can't guarantee the reports are reported accurately, but I love the stories I'm going to tell it anyway. He taught two classes in one day. He went to the first class and he said, to the first class, how much would you pay me to sing a song?

And he took a survey in the class. He got some demand curve, and there was some average value they'd pay him. Let's say it was $5. He then to a second class, same set of students and said, how much would you pay me not to sing a song? He got a demand curve. People would pay positive amounts, the average about $5. Basically, the way you ask the question affects how people feel about it. That is inconsistent with what we modeled so far. That is, your preferences are literally determined by the questions asked. Welcome to marketing. OK? Welcome to advertising.

And the advertisers tell you, duh, of course. That's why we advertise. If preferences were stable, we wouldn't advertise. We want to change preferences. OK? We want to affect preferences. That's why we say it's the number one best-selling. That's why we do all these things, OK? So preferences are unstable. That's really mind-blowing, because, basically, that says that a framing effect, how you frame things, can matter enormously. And that's a lot of what advertising, and what politicians, and others tried to do. OK?

Third example. Statistical biases. This is probably my favorite fact of anything I've ever done in research. So the statistical bias, the idea is, we like to think when we do uncertainty models that people understand the uncertainty they face, and they know how to process it. But it turns out they don't. So for example, 80% of drivers think they're better than average. That is impossible. But 80% of drivers think they're better than average.

Or my fact from my research I loved was, there was a survey that asked high school seniors, back in the 1980s, when smoking was a lot more prevalent-- they asked high school seniors who smoked a pack a day, what are the odds you'll be smoking in five years? Of those who said, I will be smoking in five years, 72% were smoking five years later. So on average they had reasonable prediction. Of those who said, I will not be smoking, 74% were smoking five years later. Zero predictivability because it's just hard to figure it out. It's hard to assess these statistics and probabilities. OK?

This has enormous implications. It says that teenagers may not be properly deciding whether to smoke. It turns out, if you ask smokers how bad is smoking for you? Actually, smokers know. Actually, if anything, smokers slightly overestimate how bad smoking is for you. It's not that smokers don't know how bad smoking is for you. If anything, they think worse for you than it is. But they think they're going to quit.

So if you ask smokers, what is the effect on the average person's length of life for smoking? It turns out by smoking you shorten your life by seven years. Smokers get that a bit right. They're probably a bit pessimistic. They may say eight or nine years. But if you ask them, how long do you expect to live? They give the population average, not a number eight years lower, because they think it won't affect them. Either they'll quit, or they're just superhuman, or whatever. So statistical biases are another example of that. OK?

A fourth example. Extrinsic versus intrinsic motivation. Extrinsic versus intrinsic motivation. OK? For many decisions we make, the right thing to do is obvious, and yet we don't do it. Let's take the classic example, which is inexpensive generic medication for life-threatening chronic disease. If you have diabetes, you can manage it. If you have type 2 diabetes, you can manage it with a product called metformin. It's $1-a-day pill you can take that will keep you alive. And if you don't take it, you'll die. It's not very complicated. OK?

You won't die right away. You'll eventually lose your leg and eventually die. Yet, a huge share of diabetics do not take their metformin. Compliance with metformin is incredibly poor. Now, you might think, OK, people are uninformed, whatever. Nothing's ever 100%. But if you run the following experiment, if you say to people with diabetes, I will lower your metformin costs from $1 a day to 0, a huge shares start to take it. Now think about that for a second.

It is whether you're going to die or not, and you're getting $1 a day affect whether you take it. And the answer is not that people are poor. It's that, in some sense, zero matters. In some sense, these signals intrinsic versus extrinsic. Motivation matters. These things matter. This is combining the two of framing matters. But basically individuals, essentially, they have to believe it. And the framing matters. OK?

Let me talk about another example. Defaults. This is probably the single most striking finding in all of empirical behavioral economics. A former student of mine named Brigitte Omadrian did a fascinating study. When you go to join your firm, when you go to get your job, you get a good job, you'll sign up. There'll be a benefits package. And they'll be like, do you want health insurance? Do you want a 401(k)? And as I told you, you should check yes. You should put your money away. Stop partying. Save your money for your future. OK?

You can still party too. You can afford to do both. OK? Now, if you look at most firms, most new workers, young workers do not choose the 401(k). About 20% of young workers sign up initially. Eventually, by the time they're older, it rises towards 80%, but initially it's about 20%. So Bridget studied a firm that made one simple change. They said, we're going to enroll you in the 401(k), unless you check here saying you don't want to be in it.

Literally, they just changed check if you want to be in to check if you want to be out. The participation rate among young people went from 20% to 80% with one wording change. That can simply not be explained by anything we've learned in 14.01 so far, at least before today. OK? There's simply no rational model of the world of any type which would justify that. The answer is that things, like presentation and defaults, matter. And once again, that needs to be built into our models. OK?

Now, why is this? That's where you got to take 14.13, where the place where behavioral economics is right now is, we've documented a huge set of these what we call anomalies, a huge set of strange examples that are inconsistent with our standard model. Where we're struggling and where we need more work and where 14.13 is can help you is, how do you write the correct models to explain those? OK? How do you write the correct model to explain those?

And so, for example, this defaults matter for one thing could be a procrastination story. It could be a lack-of-attention story. There's lots of stories you can tell. How do we write the right models to distinguish them? That's where the exciting cutting edge is in behavioral economics. OK? Question about any of these examples. I realize I went fast, but question about any of this. Yeah.

I know America-- if you want to be a heart donor, they like opt you out versus other countries opt you in. Do you know why that is?

That's a great point. A perfect example. Organ donations. You're defaulted in other countries. In America you have to sign up. They have organ donation rates that are dwarf ours. There's no good reason other than individual freedom. But this is what's-- this is a great segue. Other questions. That's a great segue to the last thing I wanted to talk about, which is, what does this all imply for policy? Where does this all lead us in terms of government policy?

And let me talk about a specific example then speaking about more generally. The specific example is taxation of cigarettes. We talked in the externalities lecture about how, when there's a negative consumption externality, you should tax the activity. Cigarettes are a classic negative consumption externality. It's been measured to be around $0.40 to $0.50 a pack. And that suggests that optimal policy would be to have a $0.40 to $0.50 a pack cigarette tax. But that's actually a pretty small number, it turns out.

And why is it so small? It's so small for an interesting reason. Cigarettes have huge externalities, uncovered medical costs. Smokers start fires, Et Cetera, secondhand smoke, Et cetera. But it turns out cigarettes have a huge positive externality. What's a positive externality? Well, smokers have a convenient habit of dying at 65. Why is that convenient? That means they spent their lifetime paying taxes and never get to elect their retirement benefits.

There is a positive-- that's a positive externality on us. We benefit from those stupid smokers, because basically they pay all the taxes. We get the benefits. That is a positive externality. That's not a controversial comment. It's a purely positive externality. Indeed, the tobacco companies in court have defended themselves by arguing that smoking has a death benefit. They quickly realized that wasn't a winning argument and went away from it. OK?

But that is a big reason why the external number isn't bigger. In fact, if you took out that death, the external number is more like $2 or $3 a pack. The reason it's so big is because there's this huge financial positive externality. Now, I worked in Washington, in the Clinton administration, and the thing I loved about that is, economists are just so much smarter than lawyers. Whenever I was in a room, unless I was in the room with Larry Summers, who was my mentor there, I was the smartest guy in the room because we know how to-- not the smartest by IQ, but the smartest by knowing how to think about how to frame a policy question.

Our whole field is around how to frame policy questions, and we're so good at it. Except one time, which led to stand up in front of a room of lawyers and say, you know what? We should tax cigarettes less because they kill people. And lawyers looked at me like, you're nuts. And I realized I probably actually was. Not that the externalities math is wrong. What was wrong was, the model of smoking was wrong. In particular, the model of smoking should incorporate self-control problems.

There is vast evidence that smokers suffer from self-control problems. Indeed, what's the best-- when it comes to what is the best piece of evidence for self-control problems, not what's in the lab? Because remember, we believe what people do, not what they say. The best piece of evidence for self-control problems is that, when people want to change their behavior, they search for commitment devices. For example, if you look at all the recommendation to quit smoking, it's all punish yourself If you smoke, leave your dirty cigarette butts in water, so you to smell it. Make a bet with your friends so that you have to pay them if you smoke.

It's all activities where you punish yourself if you smoke. That is not consistent with the rational model. In a rational model, you never punish yourself for some future act. You just wouldn't do the future act. The fact that people punish those for future act is exactly because those people knowing they have a self-control problem. Perhaps the best example is the syrup of ipecac. Syrup of ipecac is something you drink so that, if you consume alcohol, you vomit. Why would anyone do this? Because they know they're alcoholics and they can't stop consuming alcohol. It's like painting my nails with that shitty stuff. OK?

Syrup of ipecac is totally unjustified by any rational model. But it's justified by a self-control model, which is, I know I can't stop drinking, so I'm going to stop myself from drinking by setting up the self-control device, this commitment device. And that is evidence that basically people won't have self-control problems. Well, here's the thing. As I said, the alcohol tax and cigarettes, with this model, the exponential model is $0.50 a pack. With this model, it's $10 a pack. Why?

Because cigarettes are so bad for your health. Every pack of cigarettes, every cigarette you smoke lowers your life by 7 minutes. If you take that and multiply it by the value of life, that implies the damage done by a pack of cigarettes. If you take economists' estimates of the value of a life, it's about $40 a pack. That is, you lower your health by $40 a pack. So if none of that's a mistake, if you're perfectly rational, then that's irrelevant.

And it doesn't matter what you're doing to yourself. You've made a decision. You know that. But what if you don't get it right? Then it counts. Then we don't just care about externalities, but also externalities, what my co-author and I label externalities, which are the fact that the fact you're harming yourself does matter. In a standard economic model, the fact you're harming yourself doesn't matter. But once you make this minor tweak, which is, once again, consistent with every experiment ever run in the history of psychology, suddenly it does matter. And it matters a lot for government policies. The optimal tax goes from $0.50 a pack to $10 a pack.

Now it's $10 exactly right? No. But the point is that once internalities matter, that outputs a whole-- puts up a whole new space to think about policy, to think about the fact that policies which hurt people might actually, even if they don't hurt-- even externalities, might be things we want to address. So for example-- so basically, this comes back to thinking about the policy initiatives we talked about last time for health externalities. And we talked about why would you ever ban a drug.

Well, this is why. You'd never want to make a drug illegal if all we cared about was externalities. That is absolutely right. There is no externality argument, given the benefits and costs for making drugs illegal. Not no. But if you do the math, it's hard to justify. OK? Don't be too strong. It's hard to justify. But once you permit internalities, then it becomes easy to justify.

Once you say the people doing those drugs are making mistakes, it's easy to justify. So the fact that we, as a society, ban drugs means we believe in internalities. We believe that these kinds of inconsistent decisions are being made, all these kinds of various behavioral problems exist. And when all these exist, then suddenly we need to consider the fact that internalities might matter as well. And that's a new ballgame. Now, what's interesting is that the internalities-versus-externalities debate plays out very differently in different spaces.

So let's take smoking versus drinking. It turns out, the internalities of drinking are not very large. You have to be a really, really serious alcoholic to do major health damage to yourself. Whereas the externalities from drinking are enormous. As I said, 12,000 people a year die in drunk-driving accidents. 50% of all violent crimes are linked to consumption of alcohol. OK? 50% of domestic-- a huge share of domestic abuse is linked to alcohol. Alcohol is huge externalities, probably pretty modest externalities.

So any economist who didn't believe in this stuff, even just like 14.01, should believe we should tax alcohol more. Alcohol is vastly under-taxed. It is, quite frankly-- and my kid is upset that I try to say this. It is insane that you can get a beer for the same price as a Diet Coke. OK? That makes no sense at all. Basically, there are external damages done by-- now, you might say, but wait a second, John. I drink successfully in my dorm room. I might stumble from one form to another, but I'm not driving. I'm not committing crimes. I'm not domestic abuse. Lay off, buddy.

To which I say to you, remember, we're talking about is the cost to you of paying maybe $0.20 more a beer, versus the benefit to society of maybe a few thousand people less dying in drunk-driving accidents and less domestic abuse, less crime. And ultimately, we want to be a social welfare function to evaluate that. But for most social welfare functions, that's a trade-off worth making. Now, is it worth $5 a beer of tax? Probably not. Is it worth some? Absolutely. And so that's how we think about that.

But with cigarettes it's harder, because social economics doesn't work. You need more externality arguments to make that. Now let's talk about-- let's conclude by talking about what I said is the most significant health externality and also internality today, which is obesity. As I said, about 35% of our country's obese. In some states, it approaches 50%. Obesity has both internalities and externalities. The externalities arise because there's enormous medical costs associated with obesity, in particular through the fact that obesity causes diabetes type 2. And diabetes type 2 is incredibly expensive to treat.

The country of Mexico spends 1.1% of its entire GDP treating the complications from diabetes. Think about that. 1 in every $100 earned in Mexico, more than that, goes to just the complication of diabetes. This is an enormous health problem. It's a huge health expenditure for a country. And at the same time, there's also externalities. People don't have self-control around eating OK?

So anytime you don't have self-control-- once again, what's amazing about that model is just a little bit of lack of self-control-- so tobacco costs said, if there's big damage to your self yourself from eating too much-- a little bit of lack of self-control can cause a big effect internally. So obesity causes both externalities and medical internalities. Being obese lowers your life expectancy by something over 4 years. It's not as bad as smoking, but it's pretty bad. So basically, it's both external and internalities. So what do we do about it? Well, this is, as I said, where it gets hard.

The first thing we do that's obvious that anybody who believes in-- anybody would say it's more information. That's a clear one. We should explain to people things like nutritional, calorie labeling. Fun fact about calories. I talked to one of the guys who was an owner of Dunkin' Donuts. He says that's when they label calories. They label calories at Dunkin' Donuts. Donut consumption didn't change at all. Muffin consumption fell enormously. Why? Who knew muffins were like 500 calories each?

You know a donut is bad for you, but you don't realize a muffin-- that seems OK. It's twice as bad as a donut. Nobody knew that. So basically, information matters. So information is an obvious step, but it's not enough. We can do taxation. But the problem then is what do we tax? We can't tax food. Poor people won't be able to eat. We could try things like taxing sugar content. But then the problem is, what if they then just substitute towards fattier foods instead of sugary or foods?

Cigarette-- tobacco is easy. You tax tobacco. You're done. Food's harder because there's so many bad components of-- multiple components in food. OK? Now, really what we want to do is, we'd like to tax body weight. Now, we can't. But in theory, the externality is caused by being obese. So in theory, we could do that. In practice, politically, we can't. But actually, in practice, it's not obvious that would help. And the reason that obviously would help is because of self-control problems.

If you tax body weight-- so people in a year have to pay a higher tax, that might not affect whether they eat today. Whereas a tax on food is right in front of them. It puts the cost of benefits together. A tax on body weight puts the cost distant and the benefits future. And that runs the self-control problems. So that is another solution. The other solution is regulation. So for example, most European nations, and now in the US-- we've banned trans fats. Trans fats are a particularly awful kind of substance that is yummy, but is very bad for us. And we have good substitutes.

But once again, substitution makes that challenging. That was an easy case, because there were good substitutes that were all obviously better. So anytime you have something where there's all the substitutes are obviously better, that's easy to ban that. What about some of the substitutes that might be worse for you? Then that gets tricky. Another thing we do is regulate supply. A big problem we have in America is food deserts, they're called, where basically, there are large areas of America where you can't buy vegetables, literally. Within any walking distance, there's nowhere to buy vegetables, with any biking distance. You have to get in a bus and go a long way. OK?

So we could solve that by making them more available. It turns out-- so we could do that, making it more available. Now, it turns out we have tried all of these approaches I've said in individually. And all of them work a little bit and none of them make a huge difference on obesity. The one policy intervention that seems to matter a lot comes from behavioral economics, and it's what we call nudges, which is changing the framework in a way where we're not lowering welfare because your choice set hasn't changed. We're just changing the way it's presented to you, like the default example.

Now, let me just say, here a big caveat. Any of some of you who are-- I don't know if any of you-- there's a huge replication crisis in social sciences right now. And a lot of the studies I'll cite have not been successfully replicated. OK? But I believe him so much, I'm going to tell you about him anyway because I think they offer some interesting insights. But I just want to be clear on the evidence. There's a big replication crisis with these fun nudge studies. So more needs to be done.

But for example, one of the most famous studies was, they took people all eat a meal at the same time, put them in front of a movie, and gave them buckets of stale popcorn. And the buckets were full to different levels, a third full, a half full, and full. Everybody ate the entire bucket of what was in their bucket. OK? Despite the fact that it was different amounts, they were all equally hungry. It was just in front of them. They ate it. Or one study of professor Thomas-- has never been published, so I-- once again, just an informal story, but I love it.

Buffets create huge food waste, because we all know how buffet works. You say, the first thing-- you say, oh, that's good, you take a bunch of it. Next, say, oh, that's really good. You take a bunch of bite-- third thing, oh, yeah, I'll squeeze that in the corner of the plate because that looks good too. You don't eat it all. So they made a simple change in the buffet at her school. They put the place at the end of the row, rather than the beginning of the row. So you had to walk by the buffet to get your plate, so you knew what was there. And they lowered food waste by 20%. Because people then were like, oh, yeah, I know this is coming, so I won't load up so much on this.

These are, once again-- we need more study of this, but it suggests that the way we're really going to ultimately deal with problems like this is to lean to the behavioral biases that cause them. If you find this interesting, there's a book called *Nudge* by the Nobel Prize-winning economist Richard Thaler, who talks about this and talks about the behavioral economics behind it and all the policies behind it. But once again, the politics is hard. Perhaps the best nudge-based policy suggestion of all time was what Mayor Bloomberg suggested in New York, which was to ban large servings of soda.

He said, look, people buy a soda. You guys don't know. When I was a kid-- OK, now, when you go to buy a soda, you almost never can buy anything less than 18 ounces. And often capped by some less than 24 ounces. When I was a kid, the choice was typically 12 ounces. You can't even buy those anymore. Size have gone up. So Bloomberg said, look, let's just ban large-soda sizes, therefore make people work more to have to get those calories. Brilliant idea.

But the politics was ugly, even including-- obviously, conservatives opposed it because it's interfering with the free market, but liberals oppose it too. Jon Stewart made fun of him. I'll never forgive Jon Stewart for that. OK? Jon Stewart made fun of me, too. I'll never forgive him for that either. But basically, the bottom line is these behavioral nudges matter. And we should think seriously about incorporating them into policy. OK?

I'm going to stop there. We're going to come back on Wednesday. I'm not going to say, I'm not going to give you the answers to the finals on Wednesday. I'm just not going to say that I'm not going to give you the answers to the finals on Wednesday. So it's your decision whether you want to come or not.