Agnieszka Tymula – 'The Science Behind Cheat Days'

Moderator: Welcome to the podcast series of *Raising the Bar Sydney.* Raising the Bar in 2016 saw 20 University of Sydney academics take their research out of the lecture theatre and into 20 bars across Sydney, all on one night.

In this podcast, you will hear Agnieszka Tymula's talk: *The Science of Cheat Days?* Enjoy the talk.

Agnieszka Tymula: So big thanks to Sammy for this introduction. There's one thing though that he forgot to tell you about me. I have huge problems sticking to my resolutions and I can give you a couple of examples. So a couple of years back I looked through my bank account and I realise it's time to start saving. So I promise myself, for the next month, I'm not buying anything that I don't really need. Two days into my savings plan, I bought myself $200 sandals because I simply couldn't resist them. And, and that's not all, right?

The other example comes from drinking. I don't know if you guys do that? Do you alcohol? Yes, I see you do that. The … but I was wondering if you do alcohol free days, like you wake up in the morning and you decide like, "Today I'm not drinking." Well I've, I've tried it a couple of times and I, and I have to say that on more than half of these days, I end up the day opening a bottle of wine and having a glass. So I'm not very good at doing that as well.

And then finally, I even quit going on a diet. I don't even start going on a diet because essentially, I don't know what it is about me going on a diet, but when I decide I will go on a diet, in the evening on the day you can 100% … so you can find me in the secrecy of my bedroom eating one litre of ice cream.

And I can give you one more example that's more recent. I've been travelling a lot since August, which means that I dropped my exercise regime. But I got back to Sydney last Wednesday, and I promised myself that I will go to the gym immediately after I get back, and I've been promising this to myself, that I will go the gym tomorrow, essentially since I came back and I haven't been back yet.

And I have maybe one more thing to share, which might be too much information, but today, as I was getting ready for this talk, the button from my jeans fell off, so I'm not sure whether I should take it as, as a coincidence or a signal from heavens, that on the day that I'm talking about obesity, a button from my jeans falls off. I will choose to ignore it.

But I think I'm not the only one having problems sticking to my resolutions. I suspect that since you are here to listen to a talk on cheat days, you have … you might have this problem yourself. And one of the consequences of having such problem is that as a society we are becoming heavier and heavier and today I will … my topic of my talk will be: How can we prevent obesity, thinking about it from the perspective of neuroeconomics.

So you might not know what neuroeconomics is because it's a relatively new discipline. It's only about 15 years old. But probably you've heard about behavioural economics. Have you heard about behavioural economics? You might have heard about the book *Thinking Fast, Thinking Slow* written by Daniel Kahneman, who got the Nobel Prize for his discoveries in behaviour economics.

So what behavioural economics is, is a discipline that uses the rigour of economics of the mathematical models of choice, but adds insights from psychology into it to make the models more realistic.

Neuroscience goes one stop further. In … sorry, neuroeconomics goes one step further. In neuroeconomics, we also add insights from neuroscience to our models, so the insights from how the brain works, because it's our brain that makes the decisions and therefore when we understand how our brain functions, we can understand better how people make decisions. And some choices that we make are obvious and very easy. Those are not that interesting. For example, if I ask you, "Do you prefer a BMW … new BMW, fresh from the factory, or do you prefer a 20 year old Mazda?" well I'm sure all of you are going to pick BMW.

But not all choices are as easy, and a particular decision that involves difficult trade-offs is very relevant for obesity. These are decisions where you trade-off immediate rewards, small rewards … so your one option is you receive something immediately, but it's a small reward, and the option is a bigger reward in the future. So if I have anybody here who works in the finance, you are probably immediately thinking about interest rates and saving decisions and that's right, this is what I'm talking about. But these decisions are not only about finance and all of you have made trade-offs like this before.

So this is a talk for adults, you are all above 18, all of you faced a decision after you finished high school, "Do I want to stop studying and go to work and immediate start getting a salary?" so that's an immediate reward of going to work. Or you other option could have been, "Do I forgo this immediate income and I go through the uni and I get higher income in the future?" So that's one type of trade-off.

Do I have any parents in the audience? I know I have some. So essentially parenthood is this, is this situation where you constantly ask yourself a question, "Do I give my child an iPad now," and if you do give the iPad now, that buys you immediate silence and peace. But you can do also another thing. You can spend time with your child and build a bond with them that will pay off in the future. You can also choose to spend this time with them on some education activities, which again, contributes to their future wellbeing in terms of their academic educational stock.

And then closer to the topic of, of today, we constantly make decisions about food and exercise. When you get back home in the evening, you can either stay at home and be a couch potato and watch TV and eat junk food, or you can go for a job, right? And it seems that more and more people are picking the first option. They don't exercise and they eat unhealthy foods. And I noted for myself some statistics here about obesity rates in Australia and I noted them because they are so horrifying them, that when you see them, the first thing you want to do is forget them.

So first I have a question for you. So before I spoon-feed them, spoon-feed you the statistics, I would like you to stop for a while and think what you guess they are. So my first question is: What do you think is the proportion of Australians who are overweight or obese. And it's hard to understand maybe what overweight and obese means, so let me tell you. If you take me and keep my height the same, you would have to add 17 kilo to me for me to pass the threshold from normal weight to overweight, so it's plus 17 kilo. To make me obese, you will have to add 32 kilo, so that's like adding more than half of my weight to me. So that's, that's quite a lot.

So, so just quietly in your own minds, think what the proportion of overweight and obese people is in Australian population. Who thinks it's less than a half of people who are overweight and obese. Who thinks it's more than a half. Okay. So you guys are right, it's more than a half. It's two in three Australians. So two in three, two-thirds of Australians are overweight or obese. That's twice the world average for, for … in the world, the average is one in three.

So that's, that's pretty big and I think in Australia we tend to think that the problem of obesity really concentrates on the US, this is where people have problems with it. But let me tell you, we are not far from the US. So in the US, 35% of people are obese. Remember, that's adding more than 50% of my weight to my height. So it's 35%. And Australia is on five percentage points behind, so 30% of Australians are obese.

What is really horrifying about this statistic is that it is growing really fast in Australia. So if you go just around 30 years back, to the 1980's, the percentage was only 18, so … actually 16, sorry; 16% of Australians were obese in 1980. So this increase was very rapid and it places Australia on the top, so really as the first country in the ranking of the countries of … of the ranking of the fastest growing obesity rates. So currently Australia, and actually New Zealand as well, they are both within the top 25 most obese countries; Australia is 24th. But it's likely that it's not going to stay there because the rates of obesity are growing in Australia at extreme pace.

And the costs are huge. So the costs of obesity are estimated to be $50B, Australian dollars, annually, and this includes hospitalisation costs, lost income and some social costs as well.

What is really frustrating about this condition is that we know the cure. And it's not like with other illnesses that maybe appeared recently and people are suffering and we don't know how to help them. No, for obesity, we know what the cure is. The source of obesity is the caloric imbalance: you consume too much and you spend too little. So we know exactly how to help people. They just need to change their behaviour about how much they eat and how much they exercise.

So you might be wondering, if we know what the cure of … for obesity is, why don't we look all like Taylor Swift and, sorry, Taylor Swift and Hugh Jackman, right, if we know what the solution is? So the researchers in the field of neuroeconomics have been trying to address this question for a couple of years now. The cure … so as the cause is behavioural, most likely, the most effective tool … cure will be also behavioural intervention that changes our attitudes to food and exercise, and unlikely it's going to be some medication.

So let me first unpack how an economist would think about the body mass index and what kind of decisions play here at all. So to change your BMI, you can do two things. You can eat to increase it or you can exercise to decrease it, pretty simple. Eating gives you immediate, immediate pleasure, so it's an immediate reward that you feel when you eat. Our brains are programed so that we feel reward when eating sugary and salty foods.

In the past, the food was not abundant and people had to be really motivated strongly by really strong rewarding signals in the brain to seek food. Nowadays when food is abundant, our brains have not adjusted to this abundance yet and we still get these signals that make us want to eat more and more and more and more than is healthy.

So when we eat, we might eventually eat too much, and that in long-term means that we might have health problems.

Now to reduce our BMI, I said we can exercise, and exercise is painful when you do it. So there is no immediate pleasure; it's just painful. And if you're exercising and it's not painful, then that means you're doing it wrong, and Eric who is a personal trainer, can confirm that. So exercising now is painful but it gives you long-term benefits, health benefits. So when we are making these decisions are about BMI, we face the trade-offs of the immediate rewards and delayed rewards.

To an economist, there might be three reasons, in such situation, why some people are healthy weight and others are unhealthy weight, and they relate to differences in evaluation that you have of exercise and food, differences in self-control, so differences in your ability to carry through with your plans, and differences in your attitudes towards future. Each of these three, suggest a different intervention that you could use to change your behaviour and we are going to go through all of them right now.

So the first one is evaluation and first of all, people might just not know that if they eat unhealthy and don't exercise, they will end up in high body mass index and health problems. I don't think that's a problem for the majority of people in Australia because we are really well informed about the consequences of eating and that we should exercise. But it is a point that's relevant in some countries, or was relevant at some point in their history.

So, so you might have made bets on where my accent comes from, and hopefully by now you got used to it. I'm Polish and I'm old enough to remember communism and the transition from communism to free markets. So what happened in Poland is that we suddenly got flooded, when the communism ended, with lots of unhealthy foods: chips, sodas, McDonald's, and these things are pleasant to consume. And people in Poland did not know by then … they were not educated about the bad consequences of such unhealthy diet and they consumed this junk food to the degree that, of course, they no longer do now that they know the consequences.

So there are countries in the world, or in places where the education is probably still needed. It's probably still needed even in Australia. We have to make sure that we educate the new generations about the benefits of exercise and benefits of healthy diet.

But let's suppose that the value of healthy eating and exercising is known to people, there's something that we can do about this valuation to make them lead healthier lifestyles. We can, we can add extra rewards with … to healthy eating or to exercising to increase the rewards associated with these activities. And there were two very successful interventions like this conducted in the US.

The first intervention aimed at making children eat more vegetables. So what they did is, at lunch time at schools, whenever a child ate his or her portion of vegetables, they got a coin. So it wasn't a real coin in the sense that it was vege-money. These were coins that cauliflower on them or celery. But the money was real in the sense that the kids could exchange the coins that they collected for some toys in the shop … in the school shop.

And the increase in the consumption of vegetables among these kids in the schools that used this intervention was just immense. So that really works. You can pay people for eating vegetables, at least children, and they, they will eat them.

Another intervention was aimed at increasing kids' physical activity, and it actually happened at my daughter's school when we still lived in New York. So what the intervention was is that kids were given points, miles, for running laps around the school building during recess. And there was a teacher, dedicated teacher, that would take notes how many laps each children ran. The more laps you ran, the more points you had. And the more points you had … and when you reached, actually, a certain threshold, you would get some reward. For a small number of miles it would be a sticker, then a pen, then a hat and if you ran a lot, you could get a backpack.

And these kids were running like crazy. Everybody was essentially running. So from the kids that would only sit during their recess and eat chips and talk, they changed into kids that are running like, you know, bunnies or hamsters in their little wheels. So, so, so you can pay people to exercise and to eat healthy.

Of course these interventions are quite expensive. They are expensive because they require these financial rewards and they are also expensive because they need to pay salaries of people who supervise implementation of these interventions. So what economists are now working on is, is to try to understand whether the effects of such interventions carry on after the intervention has stopped, how long the intervention should last so that it creates a habit in these children so that they keep running, keeping moving around, keep eating vegetables. And then we are also working on proper cost benefit analysis of whether these interventions pay off or not.

But why it is important for you is because each one of us can do such interventions to ourselves. So for example, the one thing that I've done before is promise myself a reward if I reach some weight target. And I know a lot of my friends have promised themselves, for example, new iPhones or new computers if they a marathon, if they reach some kind of exercise goal.

So the takeaway from this is that financial incentives matter and we can use them, even ourselves, to motivate, to motivate ourselves to eat healthier and exercise more. So that was the valuation.

The second example was self-control. So let's take me and friend Joanna here, for example, and let's say we have the same valuation for exercise and eating healthy but yet still, she has a six-pack and I don't. Why? Well … sorry. She says, "sorry". So you know, the reason is because I have problems with self-control and she doesn't. So we … when we both make a plan in the evening that we will go for a run before work, at 6.00am in the morning, we set up our alarm clocks for 6.00am and when the alarm clock goes off, Joanna goes for a run, she gets healthy. Me, on the other hand, I, I, I push the snooze button and I tell myself, "Oh, I won't go tomorrow, but I will run double … I won't go today but I will run double tomorrow." Then tomorrow comes and I do exactly the same thing. I push, push the snooze button and I make these false promises that I will run more and I will make up for it in the future. So one … so in the end I never run, right?

It turns out that people make such small promises on which they never deliver, also when it comes to food choices. And there was a really interesting and fun study in the UK where the researchers went to a company and they said to the employees that they are doing a study on different tastes and as a part of the study, a week from now, they would like to offer the employees a free lunch. And there were two choices. One was a salad, that's the healthy choice, the other one was a burger with fries, so that's the unhealthy choice.

And they told people that it would be really helpful for them if they could indicate what is it that they would like to each for lunch next week, because this is how they can manage the supplies. So you can imagine that most people picked, what?

Audience: Burger and fries.

Agnieszka Tymula: Burger and fries? No, they picked the salad. Most people picked the healthy choice. So when you … they were thinking about what they should eat a week from now on, they picked the healthy option.

Now when the researchers arrived a week later, they said, "Well actually we have a lot of leftovers so doesn't matter what you picked a week ago, you can pick either a salad or burger. Your choice from last week doesn't matter. And what did people do? Most of them reversed their choice and they picked a burger.

So you can be … and I mean we probably all do it, and you all have done this in the past. One way we can manage a problem like this, if we realise that we have it … if we are sophisticated about our preferences and we realise they will reverse in the future, what we can do is we can commit ourselves to a certain plan of action by limiting the choice, by limiting the alternatives from which we will be choosing in the future.

So the … this is, this is … there's this great idea in economics that this is what people should be doing, in theory of economics. But I think in practice it does not really exist because I do not see any real market where people would be paying money to reduce the number of options they have in the future. I just don't see it existing. It's, it's a wonderful idea but it somehow does not exist in the sense that people don't want to pay money for a service like this.

Moreover, some people are just not (24:00) about their preferences so they don't realise that they have this self-control problem. They do not realise that in the future they will not stick to their plans, so that's … I mean they cannot buy such device because they never think that they will need it.

So what, what I think is necessary is here … I think it's necessary that the government organisations step in and they structure our choice architecture in a way that makes the commitment a default. And let me give you an idea of what time of interventions that could happen and would potentially be very successful.

Think about how children, teenagers, order their lunch in school cafeterias. They all run down to the cafeteria around lunchtime when they are hungry. They all stand in line, you know, one behind another, and they pick what they are going to eat at that moment then. Now if you think about it, listening to everything that I told you, this is like the worst type of choice architecture that you could imagine. Instead, we could very easily fix this architecture and ask children, teenagers to pick what they are going to eat for lunch on a Saturday or Sunday the week before. And knowing … like the evidence from all the research that we've seen, would suggest that then they are going to make healthier choices.

And if you, if you … actually, if you … this is something … this is an idea, which we want to assess more vigorously in a little bit more detail, and on the tables and everywhere around you, you can see flyers that look like this. If you know any teenagers who'd like to participate in the study, make some money – we, we pay them well – and help science, they can follow the link that's here.

They can leave their contact details and when we do research studies, we will let them know that they can participate. Now the study is not sponsored by any food corporation. It's sponsored by the taxpayers' money. So I will not be sending any marketing materials, sending the emails, contacts to anybody. It's just purely for science.

And there are two questions that we are really interested in. We want to figure out how teenagers change their decision-making when they are around peers, versus when they make the decisions by themselves. And we want to separate that impact from understanding how their decisions for healthy and unhealthy foods change when they making decisions for now, versus when they are making decisions for later, in the future.

Okay, so we have two factors unpacked: valuation and problems with self-control, problems with sticking with your plans. The third one is patience. So let's take me and Joanna again. Remember, we value exercise and food in the same way. Now let's just hypothesise, because that's not true, that I don't have any self-control problems. So me and Joanna, we don't have any self-control problems. We are identical in terms of how we value food and exercise and being healthy.

Now there is still one more reason why she has six-pack and I don't. It is because she is more patient. In other words, she cares about the future more. So even though when we think about our future selves, when we think what is the value of being healthy, that is the same for us. I discount this a little bit more than she does because it is in the future. So I don't care about my future self as much as she does. So that's the idea.

Does this matter for decision-making? It does. There are plenty of studies that have shown links between how patient you are and the outcomes, in all areas of life. And I will give you just one study that's like the first study on the topic, and maybe you've heard about it, because even my seven year old, when I told him I'm going to talk about here, told me, "Oh, I know the marshmallow study. Is this what you're talking about?"

So in the marshmallow study, pre-schoolers came to the lab. They were given a marshmallow and they were told, "You can eat this one marshmallow or you can wait for a while and after I come back, I will give you a second marshmallow, if you didn't eat the first one. But if you ate your marshmallow, then I'm not going to give you the second one." And it turns out that children who managed not to eat the marshmallow, managed to wait for the … to have two - so that's exactly the situation I was talking about before: small, immediate reward versus bigger reward in the future – the kids who managed to wait, they were patient enough to wait for the bigger reward, have better outcomes in terms of their education and their health; they have lower BMI. So these kids were actually tracked until they were much older, and their outcomes in many areas were measured and they outperformed the ones who ate the one marshmallow.

Now I promised you some intervention strategies but for patience, economics doesn't offer anything, because we assume that people's preferences are given. To an economist, your level of patient is given to you and that's it. We don't know where it comes from. We don't investigate as a discipline where it comes from. And … but this is where neuroeconomics can help, because neuroeconomics goes to the biological roots of human behaviour. And to make this point, to explain this intervention, I actually have to build it a little bit and I have to give three different facts before I can give you the intervention.

So the first factor is that, at this point, we know enough, enough about the brain that we know where in the brain the value of the delayed rewards is being calculated. So what that means is that if I put you in the FMRI scanner and I looked at your brain activity, I could predict which of the options that I show you, you like more, because for the one you like more, your brain will be more active. So this can be a very useful resource, let's say, if you want to pick … change your haircut and you want your partner to like your haircut, I … you could bring your partner to me, I can put your partner in the scanner, put … and show your partner pictures of you with different haircuts and I will be able to predict which one he likes most, or she likes most. I … that's … that would be quite expensive but we could do that. Anyway, so, so we know in which regions of the brain the function of the bring correlates with how much you value different items.

Second of all, the structure of the brain matters as well. So forget the function. I can put you in the FMRI scanner, FMRI scanner, and I can scan your brain just for ten minutes and it gives me full information about your brain structure, how many neurones you have in different parts of the brain. And there are studies that show that the grey matter volume, the number of neurones that you have in certain areas, is predictive of your decision-making. So for example, in a study that we recently published, we've shown that we can predict how much risk individuals are going to take by the number of neurones that they have in the posterior parietal cortex.

Following that study, we actually had a journalist that came up to us and he didn't … was like very sceptical about our results and he said, "I want you to scan tell me and tell me what my risk attitudes will be." So we separately put him in the scanner. We separately measured his risk attitudes. And by his grey matter volume you could tell where he fits in a group of people in terms of how his risk attitude compares to the others.

So that's the other point. From the brain structure, we can predict how people will behave and here, the grey matter volume matters, and also the connections that you have between different brain regions.

The third point is that the brain is not static. Its structure is not static. It's something that changes over time and that we have impact over. So we can have an influence on how it changes. So use an analogy, you can think about the brain the way you think about your muscles. If you want to run faster, you will exercise, you will grow muscles on your legs. If you want to lift heavier things, you will exercise your biceps. And I think with, with the progress that neuroeconomics is currently making, I'm really hoping that within five to ten years we will be able to offer insights, what should be people do to make more patient decisions, to make healthier food and exercise decisions.

And now before I finish this talk – I'm about to end – I just wanted to compare the approaches to obesity and treating it to what neuroeconomics is suggesting. So remember I told you that when it comes to behaviour … and of course there, there are other reasons why some people are heavier than others; today we were just talking about behaviour. So there are three different reasons and each one of them suggests different intervention. Now it may be that one person has problems with all three factors, but it may be that they have problem with only one or two of them.

Now the current approaches to obesity are one size fits all. So they use the same type of intervention to induce weight loss or encourage people to eat more vegetables, independent of what the problem is or really without measuring where the behavioural problem is. This is something that we are attempting to change.

So you can see the second flyer on your tables and for … what we are doing in this study is, among other things, we want to understand whether before the study, we can predict who will be successful in losing weight in that study, just by classifying which of the three factors they have problem with. And then we have an intervention that works on one of these factors and we can see whether it is the people who problem with this factor that lose weight.

So for this study that I'm doing with a colleague of mine from the School of Economics, Stephie (35:33) and with an amazing team of people from the Boden Institute and Charles Perkins Centre at the University of Sydney, we are looking for people who are overweight or obese, but pre-diabetic. If you know of anybody who'd like to participate, pass it onto them. I know it's hard to tell people, "You should lose weight," so … but I have plenty of these flyers so you can take them and you can be very discrete about it and just put it at the reception at work or, you know, whatever you think might work best.

We offer some financial incentives that relate to the diagnosis of where your problem is, and this is the economic task that me and Stephie developed. But I mean the benefits of participating in this go beyond the financial incentives. Essentially for a period of one year you are under the amazing care of a truly amazing group of doctors and dieticians, if you sign up.

So this is all what I wanted to say and at this point, the floor is yours for questions, if you have any.

Moderator: Thank you for listening to the podcast series of *Raising the Bar Sydney*. If you want to hear more Raising the Bar talks, head to raisingthebarsydney.com.au.

End of Recording.