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#369: The necessity of kindness: Altruism in animals and beyond

VOICEOVER

This is Up Close, the research talk show from the University of Melbourne, Australia.

ANDI HORVATH

Hi. I'm Dr Andi Horvath. Thanks for joining us. Today we get up close to the roots of altruism and the notions of goodness and empathy. Altruism is not just a human trait. Animals and insects also exhibit forms of it. Animals on the lookout for predators often raise the alarm call to their fellows but by doing so they draw attention to themselves, putting themselves at risk of becoming someone else's lunch. If you think about it the behaviour of altruism is diametrically opposed to the evolutionary imperatives of survival of the fittest and the notion of the selfish gene. So how do we explain altruism's adaptive role? What is the real utility of generosity of spirit?

To untangle this quandary and explore the evolutionary roots of goodness, empathy and justice is our guest evolutionary biologist, Professor Lee Dugatkin from the University of Louisville in the US. He is currently also a Miegunyah Fellow at the University of Melbourne. Lee welcome.

LEE DUGATKIN

Thank you very much. It's a pleasure to be here.

ANDI HORVATH

Now humans are capable of altruism. They can express the value of altruism to each other. But how does this express
itself in the animal world? In other words what do biologists and zoologists mean by altruism?

LEE DUGATKIN
It's a great question because altruism means a lot of different things to different people on the street and also within sciences. It means different things to psychologists and anthropologists. So for a zoologist and particularly for someone who studies the evolution of behaviour we have a really precise definition that allows us to go out and measure this. That is that a behaviour is altruistic if it costs something to the individual who does it and it benefits others. So the nice thing about that definition is that you can go out and you can measure whether it's costly to an individual. You can measure whether or not others get benefits.

So we're not making any assumptions about what goes on inside the brains of the animals. In fact we can talk about altruism in little microbes that don't have even a nervous system. So we define it very technically so we can measure it.

ANDI HORVATH

Okay, so where do we find altruism? Do we actually find it in microbes as well as insects as well as mammals and marsupials?

LEE DUGATKIN

We do. We find it across the entire span of different creatures. It'll be more common or less common in certain areas. But there's a famous example from the microbes that deal with these things called slime mold where - imagine a little scaffold being built up from the soil and on top of it is a capsule full of spores for the next generation. There are some cells that actually just become part of the ladder, become part of the scaffold. They never reproduce. They simply provide this ladder so that the cells in the capsule can get dispersed really long distances which is good for them. So they do something that's costly to themselves. They do something that's beneficial to others.

There are some cases where microbes need to float on the surface of the water. The do that by forming a mat that you could see out in the water anywhere. The way this mat is built is that the cells secrete this glue-like substance. It allows them to stick together and float on the surface. But there are some cells that don't do that. Basically they can cheat. They can get all the benefits of having altruists who produce the glue without producing the glue themselves. Because they're in the middle of the mat, they float.

So we have altruists; we have non-altruists in microbes, in honey bees, in ground squirrels, in chimps and in humans and in everything else.

ANDI HORVATH

Tell us a little bit more about the ground squirrels. How do they exhibit altruistic behaviour?

LEE DUGATKIN

Now this is one of my favourite examples. It really has become a textbook case. There was a fantastic animal behaviourist by the name of Paul Sherman. Paul did thousands of hours of field work out in California with these Belding's ground squirrels. Something dangerous comes into the vicinity. It could be a hawk. It could be some terrestrial predator. Some of the individuals, some of the ground squirrels, stand up on their hind legs and they give this piercing call. The other ground squirrels run for safety. They go down into their burrows and they get out of the way. The alarm caller will eventually do that but it pays the costs of making itself the most obvious thing out in the environment. We know that they get taken by the predator more but they help all the other ground squirrels.

ANDI HORVATH

Lee tell us about your exploration of Charles Darwin. He found the honey bee one of the most vexing species. It almost unravelled his theory of evolution. Tell us what happened there.

LEE DUGATKIN

Yes, so Darwin did this wonderful thing in his book The Origin of Species which was that he spent real chunks of space telling the readers problems that he had with his own theory. One of those problems were the honey bees and other bees, wasps and ants. We all know that if you get too close to a bee colony some of the workers will come out and on certain occasions they'll sting you. In a number of species when you get stung by a worker and they pull back, their stinger stays in your body and it keeps pumping venom and they're dead.

So Darwin was quite aware of this as anybody would be. He was also quite worried about it because as you said earlier the basic idea is that evolution by natural selection will favour things that allow you to do better than others in your population. Here we have these workers that are sacrificing their lives for the rest of the hive. So he was quite worried about it. He would write people that it was driving him half mad. His solution was that he realised that what the workers were doing was they were increasing the probability that the queen at their nest survived. The queen is this little baby making machine. She's pumping out hundreds and hundreds, perhaps thousands, of sisters and brothers of the worker.

What Darwin realised was even though we didn't have the terminology of genetics at that time yet, he realised that by saving all of these relatives at the hive, and

particularly the queen, what you were doing is you were getting more copies of your own what we would today call genes, into the next generation even though you gave up your life to do it.

ANDI HORVATH

Got it. So tell us about then the various evolutionary philosophers let's call them, that then followed Darwin. In particular WD Hamilton; he took Darwin's analysis of kinship and took it to the next level. Tell us about that.

LEE DUGATKIN

Right, so that was 100 years after Darwin. I won't go into some of the individuals in between, but there were some amazing scientists who were also incredible characters along the way including a fellow by the name of Prince Peter Kropotkin and various others who tinkered with these ideas. But it wasn't until Hamilton in the early 1960s that evolutionary biologists basically formalised. They came up with a mathematical theory for Darwin's ideas on this. So what Hamilton did was he used mathematics to build a very very simple equation that became known as Hamilton's Rule. The equation basically says that if you want to know how altruism could evolve via this family interaction, via helping your genetic relatives, you can formalise it with an equation that basically says that you take the genetic relatedness among individuals. You multiply it by how much somebody gets helped. If it's greater than the cost of the act then altruism evolves. So he's taking Darwin's basic idea but he's just putting it into mathematical equation form.

ANDI HORVATH

So this means we have a measure for altruism, essentially scientifically.

LEE DUGATKIN

That's right. So you can look at this equation. You can look at each of the things that are in it and make very specific predictions about when altruism should evolve. So for example the more genetically related individuals are, the more altruism we expect. The more relatives that you help - so if you think about the ground squirrels, you know you can help many many many of your siblings with one single call. The more individuals that are helped by an act of altruism the more altruism is likely to evolve. That is if they are genetic relatives, and so on. There's a whole series of these predictions that come out of the mathematics.

ANDI HORVATH

In some animals is there a gender divide between the types of animals that do the altruism? Is it more likely for males or is it more likely for females in certain species?

LEE DUGATKIN

It varies across species but oftentimes the answer is yes. If we're thinking right now specifically about this altruism that's driven by genetic relatedness what it boils down to is whether or not males or females are more likely to be surrounded by their genetic relatives. So in the ground squirrel case for example it turns out that because of the way that they disperse when they reach the age of sexual maturity females tend to be around genetic relatives much more often than males do. When you look at who gives those alarm calls what you find is that females give these calls way more than you might expect and males rarely do. It's very tied to who's got their genetic relatives around them and who doesn't.

ANDI HORVATH

So the theory of kinship is quite strong. It makes sense. It's almost the selfish gene or is it?

LEE DUGATKIN

No it is. It is. In fact when Hamilton came out with this work one of the strongest proponents of it - and basically one of the people who put it on the map because Hamilton when he did this was a PhD student and nobody knew him from Adam - the person who put this on the map was Richard Dawkins. Dawkins wrote The Selfish Gene. Basically all this does is it takes the selfish gene and pushes it to its extreme which is basically saying if you can get copies of these genes into the next generation - the typical way would be to produce babies, right? But it's not the only way. You can get more copies of genes into the next generation if you help your relatives because by definition they also are likely to have copies of these genes. So for Dawkins this was just extending the selfish gene theory out even further which is why he loved it so much.

ANDI HORVATH

I'm Andi Horvath and you're listening to Up Close. In this episode we're talking about the evolution of altruism, the motivation for goodness and empathy, with author and evolutionary biologist Professor Lee Dugatkin.
Now how early are humans able to exhibit empathy or altruism? How spontaneous and natural is it? Isn't it something we're encouraged to learn to do or is it natural?

LEE DUGATKIN

Well first you see it at very very young ages. Basically as early as we can figure out how to sort of experimentally look at what young children are doing and we give them a problem that involves altruism, we often see it, so at two years old, certainly. The question of whether it's got a genetic underpinning and the relative importance of learning, that's always a tough question with humans. Because I mean we're not going to be able to do the controlled experiments that we might do in other species. But at the same time we do have various ways to get at this.

One classic way is to compare various types of twins in humans. So for example we have identical twins and those individuals are essentially genetic clones. We have fraternal twins which are just normal siblings that happen to be in the womb at the same time. What you can do is you can compare the difference between how those identical twins and how those fraternal twins behave. If they're more likely to do the same thing or not do the same thing when they're identical twins that really suggests a genetic underpinning because they're more genetically related to each other than any pair of humans are.

There is evidence that for genetics being important in altruism in humans but of course learning plays an absolutely critical role as well. But we see it in kids from as early as they can walk. My guess is if we could figure out a way to test this in nine month old infants we might see rudimentary things as well.

ANDI HORVATH

So how do you test it in a two year old?

LEE DUGATKIN

Well the example that I love to give is; there's an experiment it's at the Max Planck Institute, where the researchers basically brought in a bunch of little kids. They were about two years old. Their mother was with them in the room. They're just standing there. They don't know what's about to happen. What they do is they set up something where there is a problem that an adult needs to solve. The little kids is standing in the corner. The question is whether or not they go out and try and help this stranger solve a problem that they can't seem to solve on their own.

In this case what it is is the researcher walks into the room. He's got a bunch of books in his hand. He can't figure out how to open this closet where he wants to put the books. The little kid is in the other corner of the room in the safety of his mother's shadow. The investigator walks in and he bangs the books up against the door that he's trying to open. He can't open it up. You look and see whether the kid leaves the safety of his mother and goes over the tries to open up the door for the researcher. They do. There are many ways you can do it. But basically you give them some task

that involves some risk from their perspective, from a little two year old's perspective, and you see whether or not they're willing to do that to help others. They typically are.

ANDI HORVATH

Okay let's turn to the world of animals. Give us some examples of neighbourly sentiments of empathy if you will or altruism in the animal world. Where does it happen amongst non-genetically related individuals?

LEE DUGATKIN

It happens again in everything from fish to bats to primates. I'll give you a couple of examples. One of the most famous is there are these nests of vampire bats where the individuals are living together. There is very little genetic relatedness so they're not related to one another. Vampire bats, they require blood meals. If you don't get a blood meal often like every day or two, you can starve to death. If you video tape and watch what goes on in these vampire nests you see something very odd, which is sometimes the bats that are starving, they'll approach another bat that's got a stomach full of blood. They're start licking them. If they're lucky the bat that has the stomach full of blood will regurgitate some of that blood to the starving bat.

Now it sounds rather disgusting but if you're a starving bat and you're about to die this is a good thing for you. So
people saw the bats doing this but they were confused about why a bat that had a stomach full of blood and was perfectly healthy would give any of that blood away to a starving group mate because this is a very costly thing to do. The fellow who did this work, Gerry Wilkinson, found that essentially the vampire bats were keeping track of who was a good buddy and who wasn't. So if somebody was to give you a blood meal when you were starving you were much more likely to turn around and help them when they were starving. So they were building up bat friendships essentially.

ANDI HORVATH

So these types of collaborations and co-operation are sort of like an act of I'll do a deed for you and you'll do a good deed for me, means that there's some projection into the future or there has been some projection into the past which is quite extraordinary.

LEE DUGATKIN

We certainly know about them using past experiences. So there's no question that they're keeping track of who does what. Now the future projections, that's a much

much more difficult thing to get at. They are, as evolutionary biologists, we work by assuming that natural selection has favoured this ability to keep track of others. If the costs and benefits work then we expect to see this kind of reciprocity, this exchange of goodness. But we don't assume that they're projecting anything into the future. Although there's a little bit of work on this, there's not a lot.

ANDI HORVATH

If there are extreme environmental changes in terms of availability of resources for particular species, does this tip the type of altruism that occurs? Does it actually change the type of collaboration and co-operation that occurs? Is there a limit to empathy?

LEE DUGATKIN

Well, in general the more that the environment is harsh and difficult the more we expect to see these kinds of altruistic and co-operative acts. The reason is really pretty basic. That is at the end of the day all of these kinds of altruism and empathy that we're talking about, somehow the individuals who do it are paid back. So they're either paid back because they're helping their relatives who are like them genetically or they're paid back because individuals are keeping track of who helps each other. They're always paid back in one way or another. So in essence these kinds of altruistic acts help the individual who does them at the end of some period of time.

When the environment gets really harsh and there aren't a lot of resources then if often pays for individuals to help one another in order to extract those resources. One good case of this is if you look at the way that lions for example hunt out in the Serengeti they often hunt in groups. They'll hunt in groups when they have to take down large prey. That's when they co-operate with each other. When they're hunting smaller prey you don't see that co-operative hunting. The logic here is pretty basic from an evolutionary perspective. That is if you're hunting small prey you don't need anybody else to accomplish that task. You can take that prey down and you can have it for yourself.

If you're hunting something large, let's say a water buffalo, you can't do it on your own or it's going to be extremely difficult. Then it's worth having somebody with you when you do it because the only way it can get done is if it's done in some sort of co-operative group. So when the environment is harsh, when you can't do it on your own, you tend to see co-operation. When the environment isn't as harsh and you can get what you need on your own you tend to see less co-operation.

ANDI HORVATH

Tell us more about social animals like rats. Now we're able to control their

environments in laboratories. What have we learned about altruism by studying a laboratory rat?

LEE DUGATKIN

Yes, so there is this wonderful study that was done about two or three years ago on empathy in laboratory rats. It was ingenious. Basically what they did was they had pairs of rats that had lived together for a while, a couple of weeks. They were not relatives. They were the same sex so there was no mating. They just lived with each other for a couple of weeks. Then the investigators gave them this problem. The problem was that one of the rats would be able to move around freely in an area but the other rat that it had been living with was put into a little plexiglass box with a locked door. They couldn't get out. They were trapped in there. They were giving off these distress calls that rats give off. The only way that the rat inside the little box behind the closed door could get out would be if its partner on the outside figured out how to open the door and then opened it and freed the trapped rat.

What they found was that after enough time when the rat that was free to move around finally did figure out how to open up the door - and it was a rather difficult thing to do - they did. They opened the door and they tended to do this day after day after day to free their trapped partner. The beautiful thing about this experiment was that they did all of these control experiments where they ruled out other possible explanations for what was going on here.

They were left with the strongest possibility being that the rat that was free to move around was empathetic. It sensed the other rat's distress because the other rat was giving off this distress call. Because it was empathetic, because it could put itself into the position of other rats and know what it was like to be in distress, when they heard another rat in distress they focused on trying to figure out how to stop that. That involved opening the door. Eventually they learned how to do it. Then they continually repeated it and freed their partner when they could.

ANDI HORVATH

But Lee can we really get into the mind of say, a rat and extrapolate that as empathy? I mean couldn't it have been, I'm annoyed at that rat or, I simply want to play with that rat?

LEE DUGATKIN

Right.

ANDI HORVATH

How do you tease out those nuances? Because we're almost limited by our own language and anthropomorphism.

LEE DUGATKIN

That's right, and these kinds of experiments are notorious for those sorts of problems. We don?t ever assume that we are getting inside the mind of the other animal that we're studying. Sometimes we can get inside its brain meaning that we can do things like scan various neural areas but we never assume that we're seeing the world the way that a rat does. So you're left with these problems you talked about.

In this experiment one of the clever things that they did was they ran a bunch of controls and basically they did things like this. They said what if we let this free rat who can move around into the arena and - it has this locked plexiglass box but there's no other rat inside of it. So one possibility is all that the rats really want to do is have something to do with their time. Maybe they just like a puzzle. The puzzle is how to open up the locked door and they couldn't care at all if there was another rat in there.

So what you do is you run the experiment with no other rat in there. You see if they do it. They don't. If there is a toy rat in there that looks like a rat but doesn't give the distress call then they won't do it either because there's no evidence that this other apparent rat is in distress. If there's no distress then there's no reason to be empathetic. They also were able to get with a couple of clever experiments the idea that maybe they didn't care that the other rat was in distress. Maybe they just wanted a play partner. They had a clever control experiment where they were able to rule out that possibility as well.

So all you can do as a scientist working on these problems is have ingenious people give you alternative explanations for what might be going on and then set up experiments to see whether or not that's possibly going on. If it is, it is. If it isn't then you rule that off the list of possible alternatives.

ANDI HORVATH

Can I ask you about the chocolate experiment with these rats? What did that tell us about altruism? If there's food available as opposed to play or letting the other rat go - what happens if food is introduced, and food that's really yummy?

LEE DUGATKIN

Right, so these rats they absolutely adore chocolate. They'll do anything for it. What the researchers wanted to do was get a handle on how much they value helping others who are in distress. So what they did was they had the same experiment.

There's a free rat and it's able to move around anywhere it wants. Its partner is trapped behind this closed door. There's another box just like one that's holding the trapped rat, but this box with a locked door has chocolate in it. What they found was that the rat that was able to move around on its own would first free its partner and then it would open up the locked door to the chocolate and share the chocolate with its partner.

So that suggests to us that they really value highly helping individuals in distress. Because the free rat could have easily gone over, opened up the door and eaten the chocolate before freeing its partner. But it didn't. Instead it first let its trapped partner out and then shared the food with it. So from our perspective we would say that they tend to value helping those in distress more than they value even the sweetness of chocolate.

ANDI HORVATH

Somehow I find that really reassuring.

LEE DUGATKIN

I do as well.

ANDI HORVATH

I'm Andi Horvath and our guest today on Up Close is the author of The Altruism Equation, Professor Lee Dugatkin. We're talking about the biological emergence of goodness, co-operation and fairness and perhaps what could be extrapolated to morality and justice. So Lee how do you test for fairness, justice and injustice? Because this is sort of the extension of empathy. There's sort of a notion of morality of what's right. I mean does a basic moral code have a biological basis? How can we explore this as evolutionary biologists?

LEE DUGATKIN

We have been obsessed with this question in evolutionary biology for a very very long time. It's extraordinarily difficult to get at. But it's also really important, right? Because if we want to understand our own morality what we want to be able to do is look to sort of the most basic primitive type of morality that might have existed before say, government and really structured laws were in place. To do that we can look at whether we find this in other species as well. So there's not a lot of work on it but the work that is out there I think quite naturally looks at some of our closest relatives. So it looks at other primates. If it's going to be anywhere it's going to be there. Then we can kind of work back and see if we find it even in simpler systems.

So there's a wonderful experiment done by one of the world's best primatologists by the name of Frans de Waal. Frans de
Waal and - at the time one of his students, Sarah Brosnan - set up an experiment to look at justice and injustice in capuchin monkeys. They were particularly interested in whether the monkeys would respond to an act of injustice. What they were trying to do was look at the non-human equivalent of the problem where you have a bunch of individuals who are doing a task. Some of them are getting more money for the same task than others. This is the sort of thing that we have laws to stop.

So in the US we have this problem where women make about 79 cents for every dollar that men make for the same exact task. This is injust. This is not fair. There is this sense that people have that if you do the same thing as somebody else you should be rewarded in the same way. So what Frans and Sarah wanted to do was see whether or not that sense was present in the capuchin monkeys.

They set up this really interesting experiment. So what they had were a pair of capuchin monkeys. They were in a very large cage. They were separated. One was on the left side, one was on the right side and there was a partition in the middle so that they could see each other. They could touch each other. But they were in separate halves. What they had done before the experiment was they had trained the capuchins to a pretty ingenious task which was the capuchins learned that if they handed Sarah a little stone in their cage that Sarah would turn around and she would give them a piece of food. So they learned that.

There were two types of food that were in the experiment. There was yummy food and there was food that was okay but not so yummy. There were cucumbers which the capuchins were perfectly happy with and they would eat. Then there were grapes which were yummier because they're sweeter and they have more sugar. So if you give a capuchin a choice they like the grapes over the cucumbers. But they'll eat either one.

So here's how the experiment goes. They take one of the capuchins and the capuchin hands them a stone. Sarah gives them a cucumber. You can watch the capuchin happily eat that cucumber. No problem. Then she goes over to the capuchin on the other side of the cage. That capuchin hands Sarah a stone. Sarah turns around and hands that capuchin a grape. That capuchin is thrilled. They eat the grape. But the other one who just got a cucumber sees this. It sees its buddy getting a grape for the same thing that it just did.

So now Sarah turns around and she goes back to that first capuchin who just a moment ago happily was eating cucumbers. That capuchin hands Sarah the stone again and Sarah gives the capuchin another cucumber. That capuchin all of a sudden is a very, very different animal. It looks at the cucumber and it literally takes it and it throws it in Sarah's face and starts banging on the cage, jumping up and down. This happens over and over again. The interpretation of what's going on is that all of a sudden it is not fair any more to get a cucumber for giving a stone. Because my friend over there on the other side just did the exact same thing and they got higher

pay. They got a grape. So all of a sudden that cucumber which I was happy with before, is no longer good enough because it's not fair that somebody else got more than I did. They do this over and over again.

This is the kind of thing you can do with capuchin monkeys. Eventually I think we'll figure out ways to set up experiments in other creatures to look at it. It's going to be trickier but I think eventually now that we've got some evidence of morality in its most basic form we can start looking at other species as well.

ANDI HORVATH

It's quite extraordinary. So what about past experiences? How do these capuchin monkeys or even human experiences, do they shape altruism? Are there ? issues of learning to trust?

LEE DUGATKIN

Oh absolutely. The extent to which learning and learning to trust plays a role is going to vary dramatically across the different species you look at. So in humans it probably plays the largest role. I would guess that much of the kinds of altruism and empathy and morality that we see is shaped by what we've learned. In non-humans it's going to play a role. It probably plays a big role in other primates. It may play less of a role in other creatures. But even in the little guppies that we work with in my laboratory in Louisville, we know that they keep track and they learn based on prior experiences.

So in our guppy case we have these little fish - you know guppies are about two centimetres long with a brain you know that you could fit it on the head of a pin. But we watch them when they're doing what amounts to guard duty. So they're kind of swimming around making sure there's nothing dangerous in the area. What we can demonstrate is they know based on prior experience who's going to stay by their side and take risks with them, like the equivalent of human army guard duty.
They preferentially hang around others who have indicated in the past that they'll stay by their side if there's danger. So we see learning even in the simplest of creatures but again we expect it to sort of play a bigger role in our own systems. In humans now there are all these wonderful experiments that are done where we're beginning to find the different areas of the human brain that are active when we trust others and when others basically violate that trust.
So if you think of the giant PET scanners that are in hospitals, that if you've got an injury and they want to see if there are any brain problems they'll do a brain scan on you. They'll put you in various large machines they have and they can scan your brains. Well you can use that same device to scan people's brains when they're perfectly healthy and you have given them some sort of altruism or trust problem to solve. They can literally sit in these scanners and have to solve the problem on a computer screen. You can look at what part of their brains are lighting up when

they're being altruistic. You can look at what parts of their brain are lighting up when they're being trusting. You can look at what parts of their brain are lighting up when someone else has violated a trust. We can try to begin to map what these things look like in the human brain.

ANDI HORVATH

So do studies of the opposite, say deception and injustice, give us any further insights? I'm particularly thinking of the cuckoo bird laying its eggs in other nests. It's sort of outsourcing altruism by deception.

LEE DUGATKIN

Right. So the work on deception and those sorts of behaviours are fundamental both in terms of understanding that sort of behaviour that we also see all the time in humans and understanding the evolution of those sorts of behaviours. So the cuckoo example is a good one. They basically will lay their eggs in the nests of other species and what they're doing is they're deceptively tapping into the altruistic tendencies of the other birds to help their young. It's a brilliant strategy and it works very well. But of course natural selection favours counter moves on the part of the birds that are being cheated. So there are all of these fairly sophisticated behaviours where if there's some evidence that a cuckoo or another species like that has laid eggs in your nest, what the individuals will do is they'll just push all of their eggs out.

Even if some of them are their own eggs they often will sacrifice that rather than raise a bunch of cuckoo eggs along the way. But I have to say there are also other examples that are even more - you might think of as sophisticated. So in primates evolutionary biologists study what they refer to as Machiavellian intelligence based on the book The Prince by Machiavelli. So there what happens is we look at deception in a more sort of active way. So for example, do chimpanzees attempt to trick others and make them go away if there's food around by making them think that there isn't food around so that they can scarf it all up for themselves?

We see it in chimpanzees. We see it in birds. We see it in other things as well. Sometimes it's really quite sophisticated. It requires you to put yourself in the position of others and make them believe that something that is going on is in fact not going on. If you think about that, that's actually quite sophisticated for non-humans to do. It requires a kind of perception that is quite sophisticated.

ANDI HORVATH

So to what extent does altruism as a biological concept inform or bleed into the economic, social and political thinking? Or even vice versa - has that influenced the

way we come to understand empathy and acts of kindness?

LEE DUGATKIN

Well there is a lot of back and forth between evolutionary biologists and let's say economists and political scientists these days. It goes both ways as you were suggesting. So when we kind of look at the information from evolutionary biologists to let's say, towards the political scientists and the economists, it's really important because virtually everything you do on an everyday basis involves some sort of act of altruism. So if I understand this is a non-profit podcast that we're doing.

ANDI HORVATH

Correct.

LEE DUGATKIN

Well somebody is paying - it's non-profit - you're not making a profit. But somebody is supporting this. Otherwise it wouldn't be here. So in the US we have national public radio which is free in the sense that you can turn it on and listen to these wonderful shows. But every once in a while there will be a pledge drive where you're asked to support. This is the classic altruism problem. I can sit in my car and I can think, I don't have to give any money and I can listen to NPR for free. On the other hand the problem is that if everybody does that, it goes away. So these are the kinds of problems we face all the time. Work coming from evolutionary biology helps us understand it because if we just study humans we have one species. If we study other animals we begin to have much much broader patterns of understanding. We can hope for example that if we study these kinds of problems in fish, bats and capuchins that maybe some common themes will emerge like they all seem to be more likely to be co-operative when X happens, whatever X might be. Then we can kind of focus on X when we study humans. Information flows the other way from political scientists and economists to evolutionary biologists - the economists and political scientists they've been interested in this ever since Adam Smith and before. They developed all these really nice mathematical models through understanding it. What we do is we steal their models and we make them into evolutionary models.

They're interested in what happens in real time. We're interested in what happens over many many many generations. So we take their math and we make it evolutionary. So there is this nice interchange between evolutionary folks and human scientists as well.

ANDI HORVATH

I'm really reassured that altruism is something that's wired into biology. It means that organ donations can happen. We can adopt children and a whole lot of good things in society can happen. So it's actually quite fundamental for society to function.

LEE DUGATKIN

Right. There are many philosophers over the years that will tell you that without this sense of altruism, without this sense of empathy, without this sense of justice, there cannot be society. Society is a compact between individuals based on the things that we've been talking about and the ability for us to study this now in all sorts of creatures really helps us understand this most fundamental of societal issues. Of course our hope from an evolutionary perspective is that the lessons that we learn can be used to make us better people. We'll see. I certainly have my fingers crossed.

ANDI HORVATH

Lee Dugatkin, thank you for being our guest on Up Close today.

LEE DUGATKIN

It was my pleasure. Thank you.

ANDI HORVATH

We've been speaking about the understanding of altruism with Professor Lee Dugatkin from the University of Louisville in the US. You will find details of Lee's publications on the Up Close website, together with a full transcript of this and all our other programs. Up Close is a production of the University of Melbourne, Australia. This episode was recorded on 2 May 2016. Producer was Eric van Bemmel; audio engineering by Gavin Nebauer. I'm Dr Andi Horvath. Cheers.

VOICEOVER

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